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ENVIRONMENTAL CONSULTING

FINAL REPORT:

SUMMER 2015 BAT SURVEY AND RADIOTELEMETRY STUDY CONDUCTED AT THE FORT DRUM MILITARY RESERVATION, JEFFERSON AND LEWIS COUNTIES, NEW YORK

Project No.

W911S2-15-P-3030

Prepared For:

**Fort Drum Environmental Division
Fish and Wildlife Management Program
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Abstract

In March 2015, Copperhead Environmental Consulting, Inc. (Copperhead Consulting) was contracted by the United States Army to conduct a mist net and radiotelemetry study (henceforth referred to as the Fort Drum Mist Net Survey) designed to determine the presence and roosting preferences of bats on the Fort Drum Military Reservation (Fort Drum). While information was collected on all bat species encountered on Fort Drum during the summer of 2015, the survey primarily focused on the federally-threatened northern long-eared bat (*Myotis septentrionalis*), the federally-endangered Indiana bat (*Myotis sodalis*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), eastern small-footed bat (*Myotis leibii*), and silver-haired bat (*Lasionycteris noctivagans*) roosting within and adjacent to the reservation boundaries.

The Fort Drum Mist Net Survey involved the capture of bats in mist nets and the fitting of target bat species (listed above) with radiotransmitters. Radio-tagged bats were subsequently tracked to day roosts and emergence counts were conducted on all trees in which radio-tagged bats were present. The netting effort followed guidelines outlined in the USFWS *Indiana bat (Myotis sodalis) Draft Recovery Plan: First Revision* (USFWS 2007). Net sites were chosen by Fort Drum Biologists in conjunction with Copperhead Consulting and were located in areas most likely to result in northern long-eared and/or Indiana bat captures, based upon past netting survey success, presence of suitable roosting habitat, travel corridors, and foraging and/or drinking areas.

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During the period of 15 June through 11 August 2015, a total of 694 bats representing five species were captured at 36 sites. Species complement included the big brown bat ($n = 516$), eastern red bat (*Lasiurus borealis*; $n = 96$), little brown bat ($n = 75$), silver-haired bat ($n = 6$), and hoary bat (*Lasiurus cinereus*; $n = 1$).

A total of 22 bats were fitted with radio transmitters including 13 big brown bats, 8 little brown bats, and 1 silver-haired bat. Focal bats were subsequently tracked to 51 day roosts comprised of 13 artificial structures and 38 trees of 12 species. Tree species used as roosts by focal bats included red maple (*Acer rubrum*; $n = 13$), sugar maple (*A. saccharum*; $n = 5$), black cherry (*Prunus serotina*; $n = 4$), eastern white pine (*Pinus strobus*; $n = 3$), bigtooth aspen (*Populus grandidentata*; $n = 2$), American elm (*Ulmus americana*; $n = 2$), green ash (*Fraxinus pennsylvanica*; $n = 2$), white ash (*F. americana*; $n = 2$), eastern cottonwood (*P. deltoids*; $n = 1$), red oak (*Quercus rubra*; $n = 1$), yellow birch (*Betula alleghaniensis*; $n = 1$) and American beech (*Fagus grandifolia*; $n = 1$). One roost (*Acer* sp.) was too decayed to identify to species. The mean diameter at breast height (dbh) and height of roost trees was 40.7 cm (16 in) and 15.5 m (50.9 ft), respectively.

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- Appendix B. Photographs of banded bats
- Appendix C. Photographs of roosts
- Appendix D. Completed mist net and roost tree datasheets

INTRODUCTION

Of the nine bat species known from New York, two species (Indiana bat and northern long-eared bat) are currently listed as threatened or endangered under the Endangered Species Act (ESA). The Indiana bat was first described by Miller and Allen in 1928 and formally attained endangered species status on 11 March 1967. The species is relatively well studied on the Fort Drum Military Reservation. After the first Indiana bat was captured near Fort Drum and subsequently tracked into the reservation's borders in 2006 (ESI 2006), mist net surveys have been conducted annually in an effort to gather species-specific information on density and habitat use of the reservation. In 2007, the first Indiana bat was captured within the reservation's borders and subsequently tracked to the first maternity roost identified on the installation (ESI 2008). The majority of Indiana bat maternity roosts found on the reservation since that time have been located in the cantonment area and southern most training areas of the installation (USAFD 2011). Subsequent mist net surveys conducted on the reservation have documented potential declines in the species and its congeners (C. Dobony, FtDrumNRB, pers.comm., 2015). The most recent range-wide winter census for the Indiana bat documented a 12.4 percent reduction in the number of bats overwintering in New York since 2013 and a 70.5 percent decline since 2007 (USFWS 2015).

To date, relatively little is known about the density, distribution, and habitat preferences of the northern long-eared bat on Fort Drum. However, of the nine species of bats documented in the above mentioned mist net surveys, the northern long-eared bat has seen the greatest decline in total capture (C. Dobony, FtDrumNRB, pers.comm., 2015). The species was once a commonly encountered bat in woodland settings, but biologists have documented population declines range-wide, presumably as a result of White Nose Syndrome (WNS). The effect of WNS on many bat populations in the United States (U.S.) and Canada has been swift and dramatic. The disease has been implicated in the death of more than 5.5 million bats across the U.S. and Canada, with populations in northeastern U.S. particularly hard hit with up to 100 percent mortality seen in some areas (USFWS 2011). Citing the recent impact of WNS and paucity of species-specific population data for the northern long-eared bat, the species was officially listed as federally threatened by the USFWS in April 2015.

In March 2015, Copperhead Consulting was contracted by Fort Drum, Public Works, Environmental Division (Fort Drum) to conduct a mist net survey and radiotelemetry study designed to document the distribution, density, and habitat use of the federally listed northern long-eared bat and Indiana bat and other species known to be present on Fort Drum including the little brown bat, big brown bat, eastern small-footed bat, and silver-haired bat. The results of the 2015 field effort detailed herein will help add to the installation's understanding of population trends and habitat use of the chiropterofauna present there. In light of the reductions and potential long-term effects

of WNS on local bat populations, continued monitoring of their populations and habitat preferences are essential for the continued management of these species.

All field activities associated with the Fort Drum Mist Net Survey were conducted under the authorization of Copperhead Consulting's Federal Fish and Wildlife Permit (#TE070584-12) and New York State Department of Environmental Conservation (NYSDEC) Scientific Collection and Endangered/Threatened Species Permits #1157 and #143, respectively.

Study Area

Fort Drum is located approximately 10 km (6 mi) northeast of Watertown, New York. The reservation covers approximately 43,301 ha (107,000 ac) in Jefferson and Lewis counties. Fort Drum includes or is adjacent to the towns of LeRay, Black River, Antwerp, Wilna, Philadelphia, and Champions in Jefferson County and the town of Diana in Lewis County, New York. Fort Drum lies within the Eastern Great Lakes and Hudson Lowlands ecoregion with local physiography that was highly affected by glacial activity (Omernick 1987). The area is made up of irregular plains bordered by hills and generally contains less surface irregularity and more agricultural activity and population density than the adjacent Northeastern Highlands and Northern Appalachian Plateau Uplands ecoregions (Omernick 1987). The agriculture of the area is predominately associated with dairy operations. Portions of this ecoregion that lie in close proximity to the Great Lakes experience an increased growing season, more winter cloudiness, and greater snowfall than surrounding areas (Omernick 1987).

METHODS

Mist Net Survey

Thirty six sites were surveyed on Fort Drum Military Reservation over two sampling periods during the summer 2015 field season (Table 1, Figure 1). Sampling within period one occurred between 15 June - 15 July. Sampling within period two occurred between 16 July - 15 August. Of the 36 sites, 30 sites were surveyed for two nights during each of the two sampling periods (four nights total). Five sites were surveyed for four consecutive nights and one site was surveyed for two nights during the second sample period. Per client request, mist net surveys were implemented in accordance with guidelines outlined in the USFWS *Indiana bat (Myotis sodalis) Draft Recovery Plan: First Revision* (USFWS 2007). Locations of mist net sites were provided by Fort Drum and were chosen based on previous capture results with emphasis placed on those sites producing northern long-eared bats. Photographs of mist net sites have been provided to Fort Drum via The U.S. Army Aviation and Missile Research Development and Engineering Center (AMRDEC) Safe Access File Exchange and are included in Appendix A.

Table 1. Site locations for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

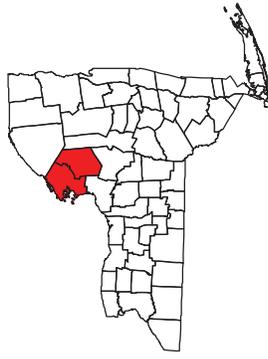
Site Name	Training Area	Northing	Easting
FD01	18A	4896449.553	463507.365
FD02	3B	4881606.490	439054.361
FD03	17C	4898998.510	456631.207
FD04	4A, 4B	4879552.684	440413.978
FD05	3A	4880216.606	440247.473
FD06	4D, 4E	4881371.445	442333.522
FD07	5B	4882336.225	444294.307
FD08	8B	4881089.560	448521.352
FD09	8C	4881073.279	450696.590
FD10	7C	4876780.152	449986.160
FD11	7F	4874920.292	450784.890
FD12	7F, 7E	4875226.721	452006.890
FD13	6A	4877684.391	444241.137
FD14	Cantonment	4875969.315	441940.043
FD15	9A, 14E	4877005.692	453891.978
FD16	9A	4876946.278	452917.046
FD17	9A	4878999.442	451880.238
FD18	9A	4879414.808	453124.360
FD19	14G	4879947.521	454634.187
FD20	14E	4878544.654	454875.959
FD21	14E	4878744.677	455538.323
FD22	14A,14C	4881150.894	458850.090
FD23	14C	4881616.810	457710.336
FD24	Cantonment	4875995.534	437275.457
FD25	Cantonment	4878530.545	434012.974
FD26	Cantonment	4879740.103	435518.309
FD27	3C	4880721.833	440797.528
FD28	5D	4880681.703	445676.719
FD29	13A	4887807.827	449841.295
FD30	16A	4887453.719	452974.326
FD31	15A,15C	4885290.816	452959.112
FD32	10B	4884366.035	451005.104
FD33	19D	4891167.383	465690.905
FD34	19D	4887977.755	463515.604
FD35	14B	4885140.135	461216.370
FD36	8C	4881509.525	450673.743



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Fort Drum Bat Surveys

Summer 2015



Jefferson and Lewis
Counties, New York

- Mist-net Site Location
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/29/2015

1:200,000
or
1 inch = 3 miles

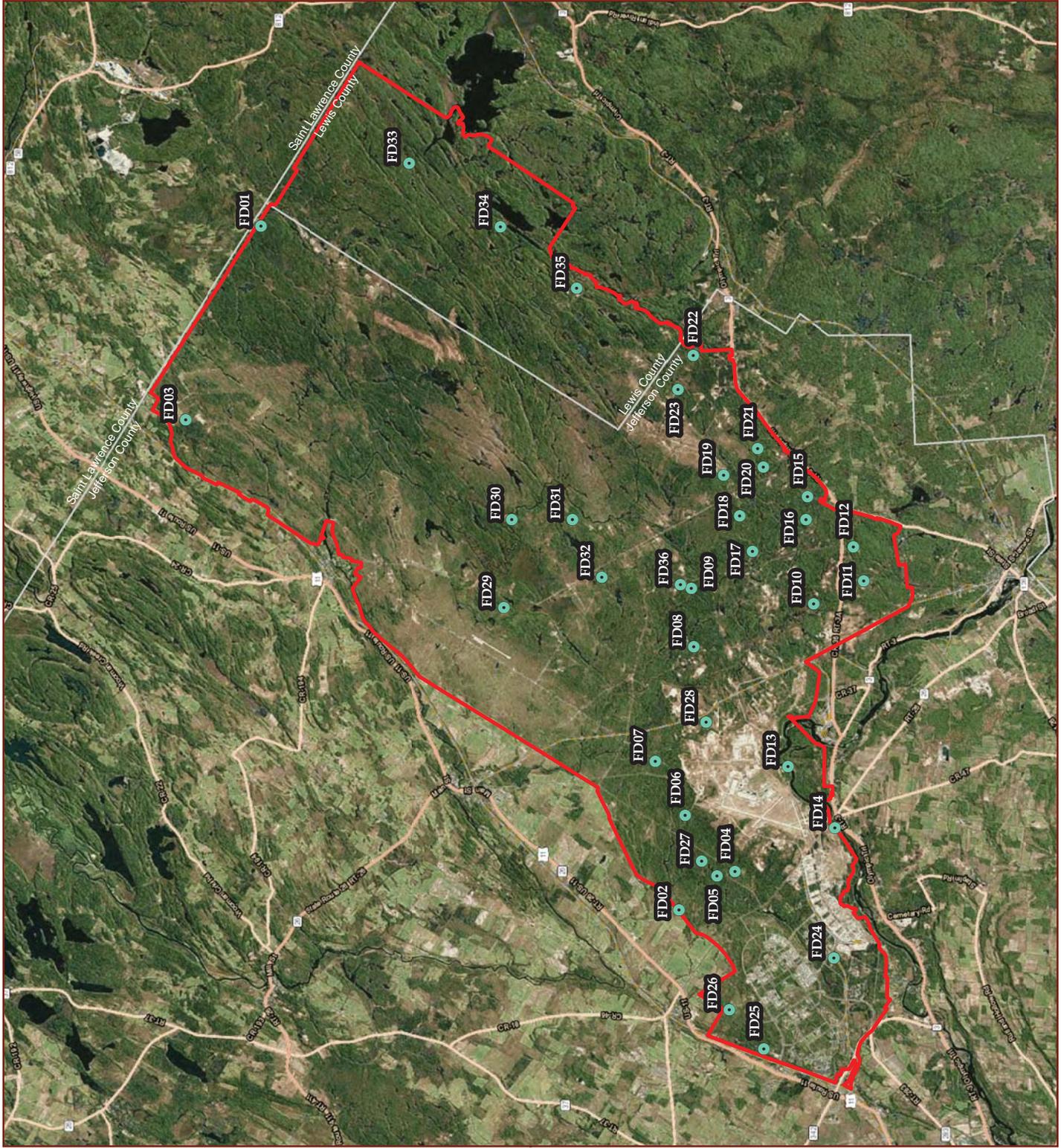
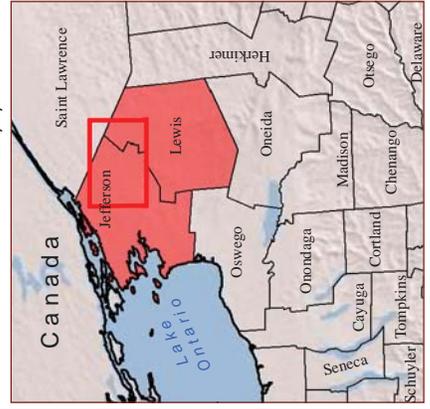


Figure 1. Site locations for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Mist nets were set to maximize coverage of flight paths used by bats along suitable travel corridors, foraging areas, and/or drinking areas. Placement of mist nets was based on the extent of canopy cover, presence of an open flyway, and forest conditions near the site. Actual location and orientation of each net was determined in the field by qualified biologists. Mist nets were deployed at sunset and left open for at least five hours each night. All nets were checked every 10 minutes and disturbance near the nets was kept to a minimum.

Weather data, including temperature (recorded from a portable, digital thermometer), relative wind speed, and cloud cover were recorded on an hourly basis. Netting was conducted within the minimum weather parameters as suggested in the mist-netting guidelines (USFWS 2007). Low visibility, high-quality, nylon nets, 2.6 m – 18 m long were used for each net set. A one, two or three tier set, 2.6 m – 8.0 m high, constituted a net set. Each site consisted of a minimum of two mist net sets over a minimum two night period. Data recorded for captured bats included capture time, capture net, capture height, species, sex, relative age (adult or juvenile), reproductive condition (pregnant, lactating, post-lactating, scrotal, non-reproductive), mass (g), right forearm length (mm), and Reichard's Wing-Damage Index classification system (Table 2, Reichard and Kunz 2009). An aluminum NYSDEC lipped arm band provided by Fort Drum was applied to captured bats (excluding eastern red bats). In order to document species and condition of each banded or radio-tagged bat, a digital photograph of the face, right wing, left wing, and uropotagium was taken for captured bats. For each little brown bat, photographs also included calcar, tragus, and toe hairs. Processing of bats was completed within 30 minutes from the time the bat was removed from the net.

Table 2. White-Nose Syndrome Wing-Damage Index scoring criteria used on the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Score ¹	Scoring Criteria
0	No damage. Fewer than five small scar spots are present on the membranes. The membranes are fully intact and pigmentation is normal.
1	Light damage. Less than 50 percent of flight membrane is depigmented (splotching), which is often visible only with translumination. The membranes are entirely intact. Some discoloration or flaking is visible on forearms. Such flaking on the forearm may exist even if the patagium appears unaffected
2	Moderate damage. Greater than 50 percent of wing membrane covered with scar tissue (splotching). Scarring is visible without translumination. Membrane exhibits some necrotic tissue and possibly few small holes (<0.5 cm diameter). Forearm skin may be flaking and discolored along the majority of the forearm, but this condition alone does not earn this score level.
3	Heavy damage. Deteriorated wing membrane and necrotic tissue. Isolated holes >0.5 cm are present in membranes. Necrotic or receding plagiopatagium and/or chiropatagium are evident. This score is characterized by notable loss of membrane area and abundant necrosis.

¹ - Bats with physical damage to wings, but no associated splotching or necrotic tissue (WNS) were scored as having "physical damage" (-P)

White-Nose Syndrome Protocol

In an effort to minimize the transmission of WNS from equipment to captured bats, all netting and field activities followed guidelines established by the multi-agency WNS Decontamination Team (USFWS 2012). All netting equipment was submerged in water heated to $\geq 122^{\circ}\text{F}$ for at least 20 minutes before arrival and following completion of each net site. Individual bats were kept in unused paper bags until processed. Disposable latex gloves were worn over sanitized handling gloves and changed or sanitized following the handling of each bat. All non-disposable equipment, e.g., scales, rulers, etc., coming into contact with bats were sanitized using Lysol® spray or Lysol® Disinfecting Wipes (Reckitt Benckiser LLC, Parsippany, NJ) immediately following the handling of each bat.

Radiotelemetry

Radiotelemetry was used to track focal bats to roost locations and monitor emergence. Tracking efforts were split into four, two week periods (i.e., 15 June - 30 June, 1 July - 15 July, 16 July - 31 July, and 1 August - 15 August). For each two week period, the goal was to fit five adult female bats (two northern long-eared bats, one Indiana bat, one little brown bat, and one big brown bat) with transmitters. Mist-netting periods one and two each resulted in two of the five allotted transmitters being deployed. During period three, two of the allotted five transmitters were deployed along with the

remaining transmitters from period one and two (six). During period three an additional transmitter was also deployed onto an adult, female little brown bat after approval from the Contracting Officer's Representative (COR). The remaining seven transmitters were deployed during period four. After all 20 transmitters were used, extra transmitters were provided by the COR. Copperhead Consulting deployed two of the extra transmitters and the COR tracked, and conducting exit counts on these extra radio-tagged bats. No more than two bats of each species were radio-tagged per mist net site.

Transmitters were attached by trimming a small patch of fur from the interscapular region of the back of a bat and applying a transmitter with non-toxic surgical cement (The Perma-Type Company, Inc., Plainville, CT, USA). Transmitters weighed 0.30 g and had an estimated lifespan of approximately 10 days (Lotek Wireless Inc., Ontario, Canada).

Daily ground and/or aerial searches for radio-tagged bats began the day following transmitter attachment (Figures 2 and 3). Depending on the availability of aircraft, aerial crews searched for signals within approved airspace when ground searches failed to locate focal bats. An example of a typical search for a missing bat can be found in Figure 4. Prior to aerial searches, coordination between the aircraft pilot, Fort Drum Range Control, and Wheeler-Sack Army Airfield took place in order to avoid conflicts with military training. Daily search patterns (ground or aerial) were documented using recreational GPS units.

In order to identify roost locations, focal bats were tracked each day for the entire life of their transmitters, or until transmitters were shed. Copperhead Consulting conferred with the COR before terminating tracking efforts.

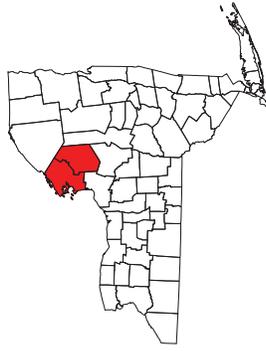
Ground tracking was conducted using Wildlife Materials, Inc. model TRX-1000S (Carbondale, IL) and/or Communications Specialists, Inc. model R1000 (Orange, CA) and three or five-element Yagi antennas. Aerial tracking was conducted using a 172 Cessna Skyhawk fitted with aircraft strut mount assemblies (Advanced Telemetry Systems Inc., [ATS] 1997, Isanti, MN) two 172-3FB four-element ATS Yagi directional antennas (ATS model #13886). An ATS scanning receiver/data logger (R4500S) was connected via coaxial cable to a switchbox inside the plane, allowing for selection of both or either antenna, as needed. From the air, a navigator plotted the presumed position of a bat (Seddon and Maloney 2004) using topographic software (Topo North America™ 9.0, DeLorme, Yarmouth, ME, USA) and laptop computer. Bat positions were estimated based on signal strength, location of the aircraft, and the surrounding topography. Using this information, ground crews were sent to obtain the final location of the focal bat.



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Fort Drum Bat Surveys

Summer 2015



Jefferson and Lewis
Counties, New York

- Fort Drum Boundary
- Ground Search Routes
- Ground Search Area Coverage

Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 11/24/2015

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or
1 inch = 6 miles

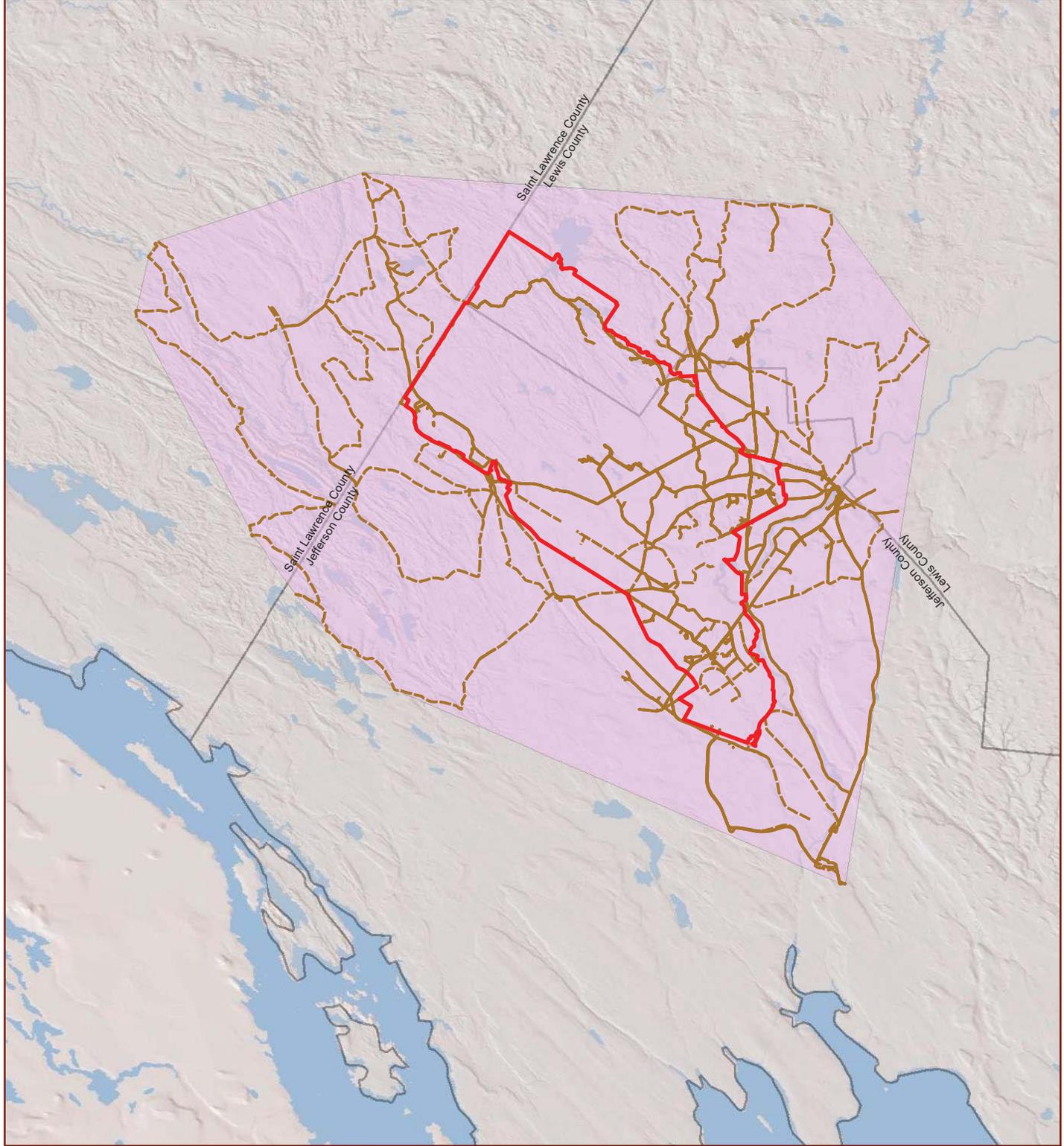
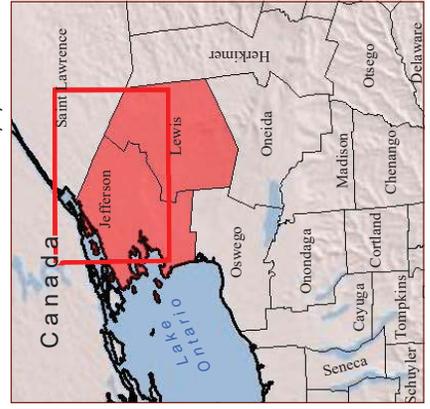


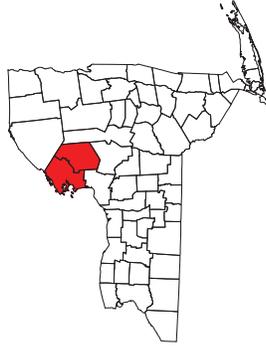
Figure 2. Ground radiotelemetry search routes and coverage area conducted during the summer 2015 Fort Drum Mist Net Survey, Fort Drum, New York.



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Fort Drum Bat Surveys

Summer 2015



Jefferson and Lewis
Counties, New York

-  Fort Drum Boundary
-  Plane Search Routes
-  Plane Search Coverage Area

Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
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Date: 11/24/2015

1:450,000
or
1 inch = 7 miles

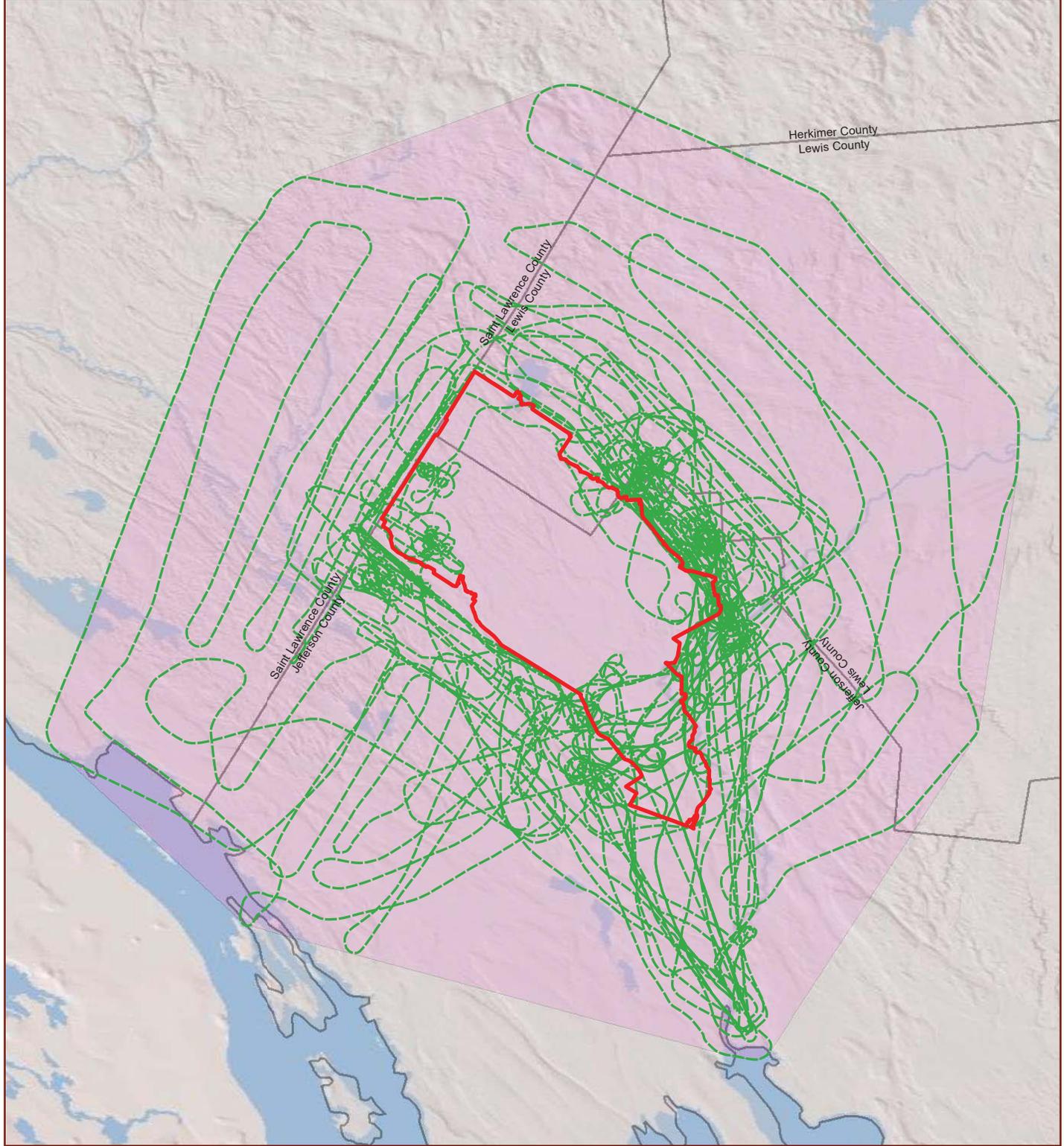
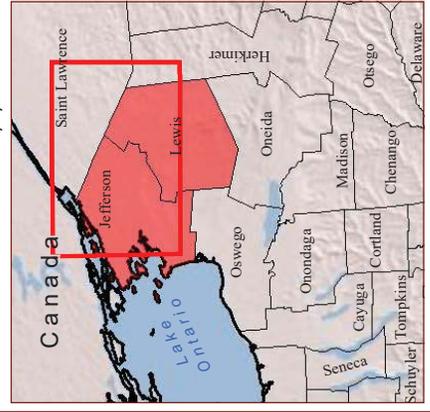


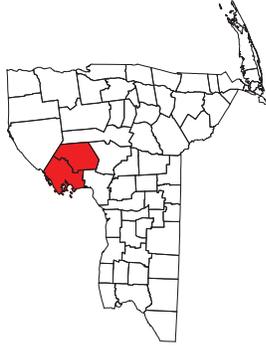
Figure 3. Aerial radiotelemetry search routes and coverage area conducted during the summer 2015 Fort Drum Mist Net Survey, Fort Drum, New York.



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Fort Drum Bat Surveys Summer 2015

Bat 34362 Search Area



Jefferson and Lewis
Counties, New York

- Roost Trees
- Capture Site (FD03)
- Ground Search
- Plane Search
- Search Coverage Area
- Fort Drum Boundary

Coordinates: System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 11/24/2015

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1 inch = 7 miles

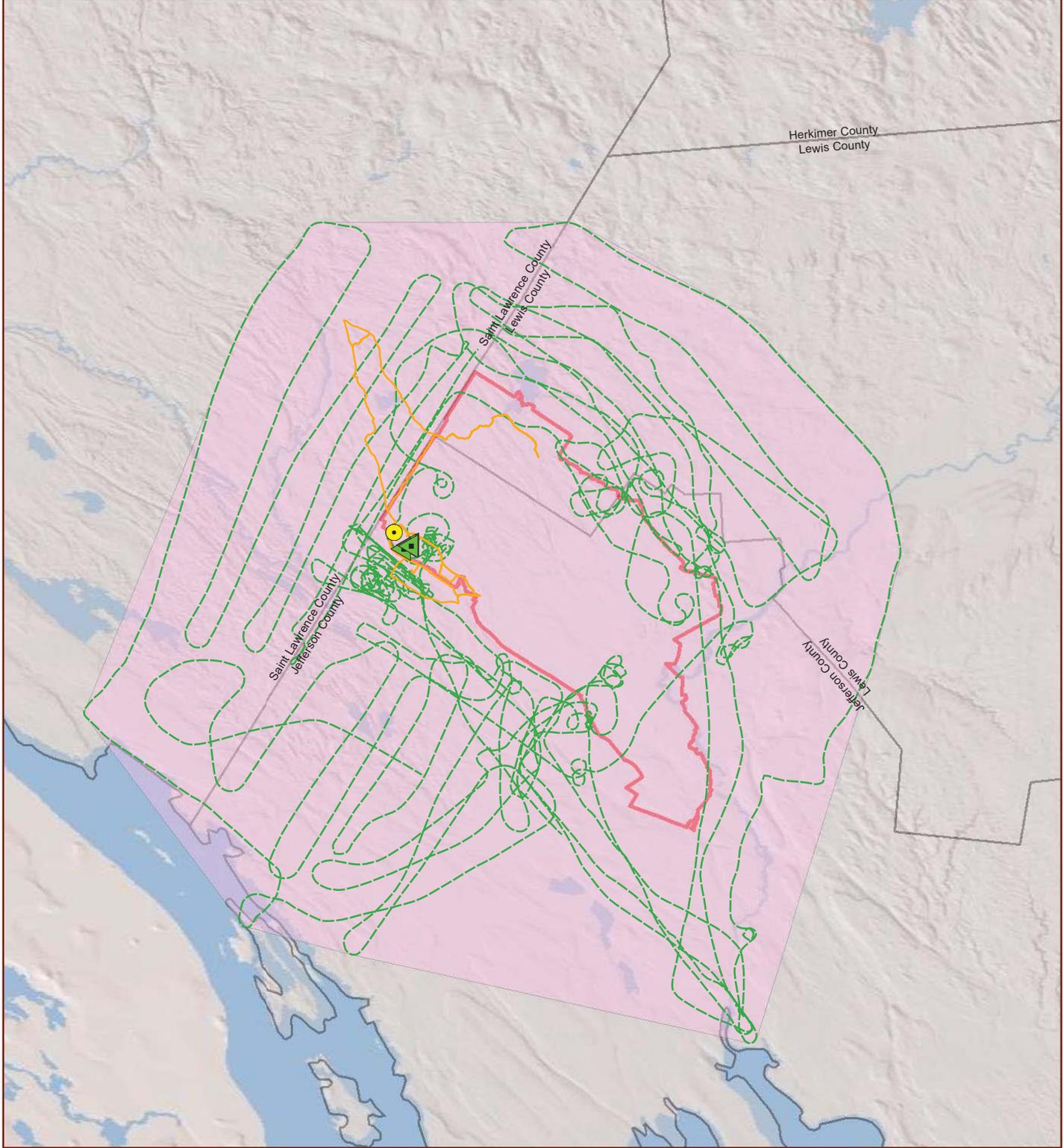
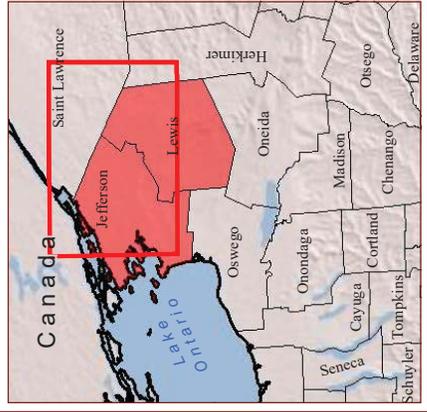


Figure 4. Aerial and ground radiotelemetry search routes and coverage area for Bat_34362 conducted during the summer 2015 Fort Drum Mist Net Survey, Fort Drum, New York.

Roost Tree Plots and Exit Counts

Roost trees were located, characterized, photographed, and the location recorded using a Trimble unit (model Geo XT 6000 and/or Geo XT 3000, Trimble Navigation Limited, Sunnyvale, California). A sketch of the roost was made and a small piece of rebar (roughly 12 inches) was pounded into the ground on the north facing side of each tree. High visibility flagging was also placed around each stake for future identification. Data recorded for each tree roost included species, diameter at breast height (dbh; in c), tree height (estimated in ft or m), roost height (also estimated in ft or m), tree condition (snag, live, live-damaged), percent usable bark cover for roosting (Gardner et al. 1991), percent total bark cover, tree ranking (whether the crown was considered dominant, co-dominant, intermediate, or suppressed), percent canopy cover at roost, decay class (following Maser et al. 1979) and any other noteworthy observations (e.g., bat vocalization or guano). These characteristics were also recorded for all trees within a roost tree plot as identified using a 10-basal area factor (BAF) English prism. Because this method is considered point sampling and not fixed area sampling, the plots are not uniform in size. Rather, the “probability of a given tree being sampled is proportional to its size” (Avery and Burkhart 2002:123). Additionally, the plot radius factor (PRF) is 2.75 ft meaning “for each inch of dbh, a tree can be 2.75 feet from the point to still be included in the point’s tally” (Avery and Burkhart 2002).

Exit counts were conducted on one to five roosts per evening based on the number of radio-tagged bats on the landscape and roosts used that day. Exit counts began one half hour before sunset and continued until one hour after sunset or until darkness impeded vision. Data recorded included ambient air temperature, time of sunset, time of first bat emerging, time of last bat emerging, and number of bats emerging. When possible, the time that a radio-tagged bat emerged was recorded. If a tagged bat did not emerge from a roost, a second exit count was conducted to confirm the transmitter was shed in the roost. Tracking was concluded after the transmitter remained in same roost for two consecutive days without moving or exiting the roost, and at the discretion of the COR.

Geospatial Documentation

Each mist net and roost tree location was recorded using a Trimble unit. Data was collected in the Universal Transverse Mercator (UTM), Zone 18N, Meters; Horizontal Datum - World Geodetic System 1984 (WGS 1984); Vertical Datum - Mean Sea Level (MSL) Earth Gravitational Model (EGM0 1996); Precision - 1000. GPS data was collected to maximum positional dilution of precision (PDOP) of Six. Target accuracy of mist net locations was less than five meters and target accuracy of roost tree data was less than one meter.

Raw Trimble data was imported into Trimble GPS Pathfinder Office and positions that did not meet positional accuracy standards were removed from the feature dataset. Features were reformed using the Grouping function of Pathfinder Office. Resulting

features were differentially post-processed in GPS Pathfinder Office using the permanent base stations located in Watertown, NY (NYWT), Hailesboro, NY (NYHL), or Lowville, NY, (NYLV) and positional accuracy standards were confirmed met in the differential correction report where at least 90 percent of positions in each feature met target accuracy requirements.

RESULTS

A total of 694 bats (excluding same season recaptures) representing five species were captured at 36 sites (Table 3). Species complement included the big brown bat ($n = 516$), eastern red bat ($n = 96$), little brown bat ($n = 75$), silver-haired bat ($n = 6$), and the hoary bat ($n = 1$). Bat captures per site ranged from 0 (Site FD16) to 104 bats (Site FD12). Thirty-nine bats escaped or were released before age and/or sex was determined. During the Fort Drum Mist Net Survey, 47 nights of netting resulted in no bats being captured and 19 nights of netting were ended prematurely due to inclement weather and/or military training.

A total of 20 recaptures were made of bats from previous years/studies (i.e., arm bands with numbers not corresponding to the 2015 survey effort), 33 bats were recaptured at the same site on different nights, 7 bats were recaptured at sites different from their original capture site, and 21 bats from Period 1 were recaptured in Period 2.

Photographs of each banded bat have been provided to Fort Drum via AMRDEC Safe Access File Exchange and are provided in Appendix B.

Table 3. Summary of bat captures during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Species	Adult Female			Adult Male		Juvenile		Unknown ¹	Total
	L	PL	NR	S	NR	M	F		
<i>Eptesicus fuscus</i>	92	120	25	45	103	55	54	22	516
<i>Myotis lucifugus</i>	2	13	11	6	20	14	7	2	75
<i>Lasiurus borealis</i>	6	12	20	8	7	10	18	15	96
<i>Lasionycteris noctivagans</i>	-	1	-	2	-	1	2	-	6
<i>Lasiurus cinereus</i>	-	-	-	-	-	-	1	-	1
Total	100	146	56	61	130	80	82	39	694

L= lactating; PL= Post-Lactating; NR= Non-Reproductive; S=Scrotal; M=Male; F=Female

Does not include same season recaptures

¹ Unknown= escaped and/or released before sex and/or age was determined

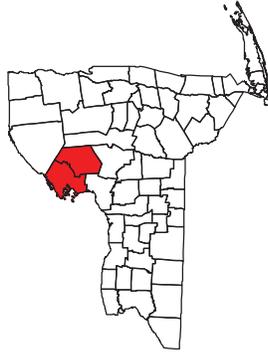
The big brown bat was the most widely distributed bat species, being captured at 34 sites (representing 94% of total capture, Figure 5), followed by the eastern red bat (22 sites or 61%, Figure 6) and the little brown bat (17 sites or 47%, Figure 7). Silver-haired bats were captured at three sites (8%, Figure 8) and a hoary bat was captured at one site (3%, Figure 9).



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Fort Drum Bat Surveys

Summer 2015



Jefferson and Lewis
Counties, New York

- Mis-net Site Location
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/29/2015

1:200,000
or
1 inch = 3 miles

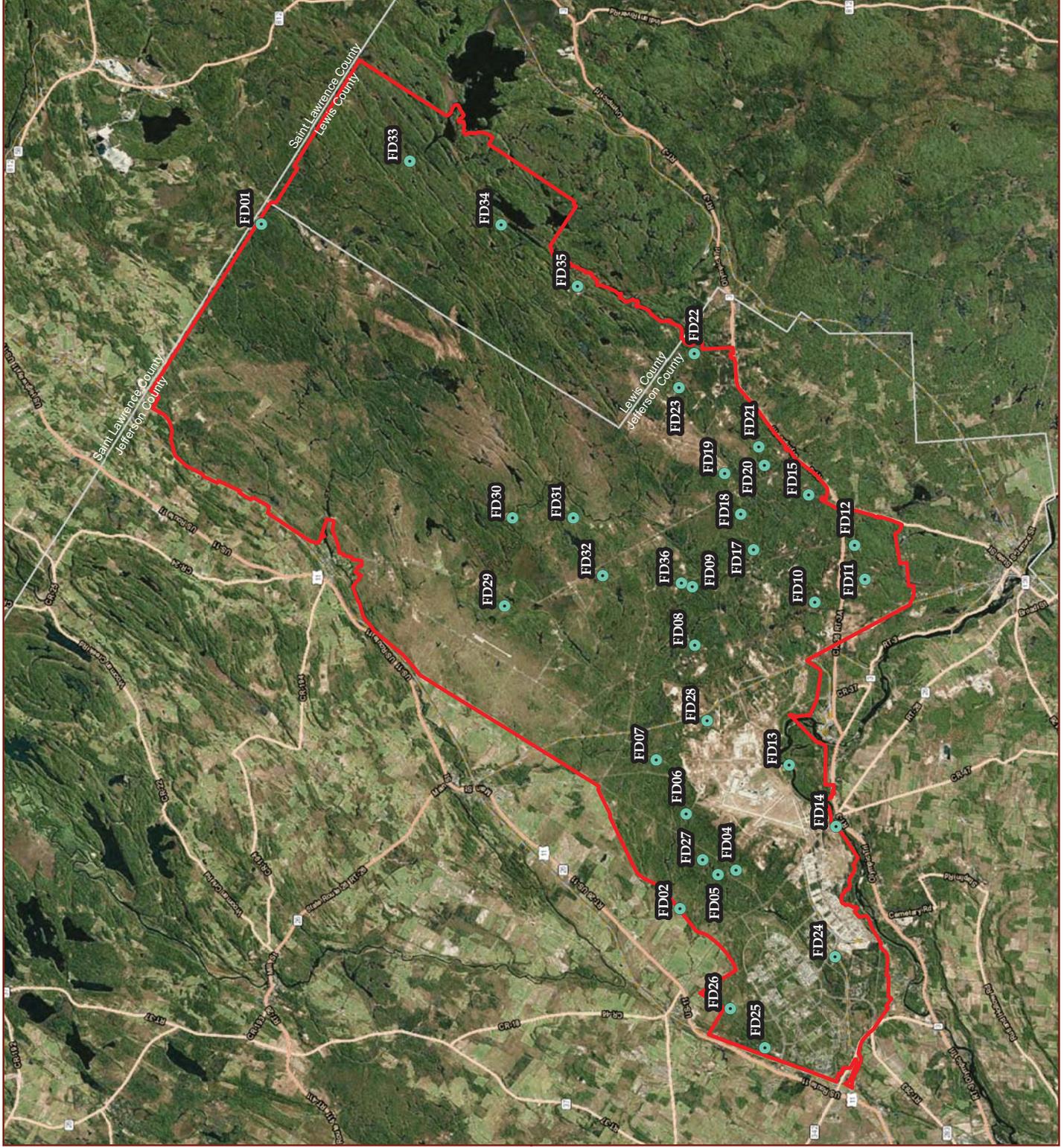
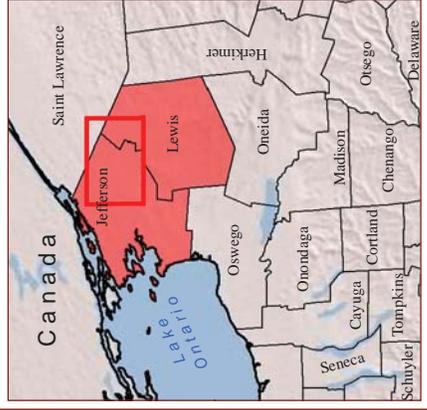


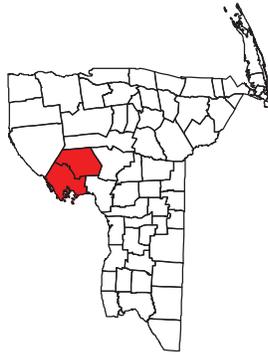
Figure 5. Big brown bat (*Eptesicus fuscus*) capture locations for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



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Fort Drum Bat Surveys

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Counties, New York

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UTM Zone 18N
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1:200,000
or
1 inch = 3 miles

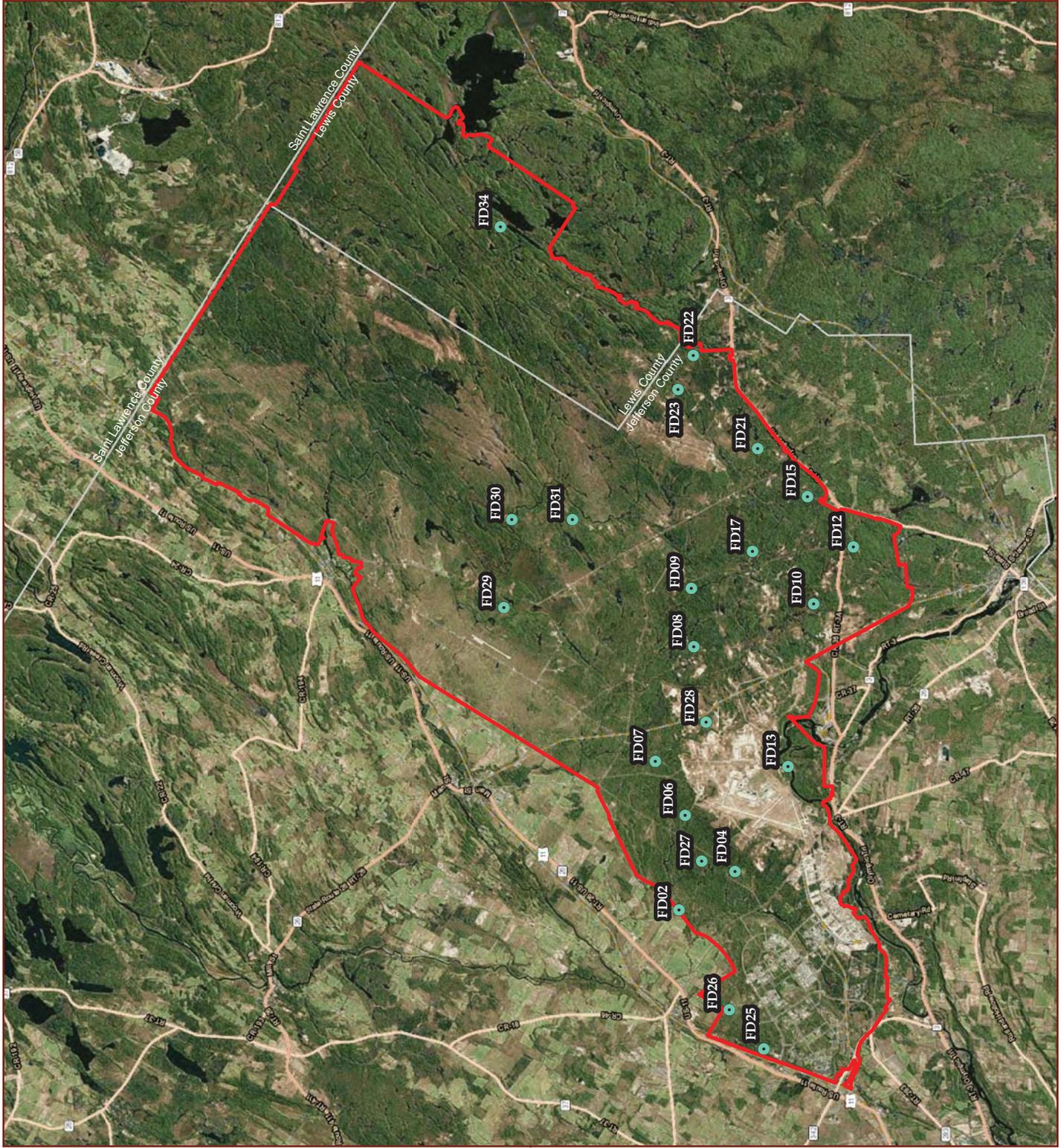
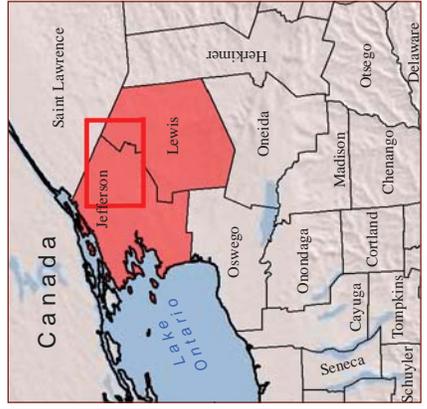


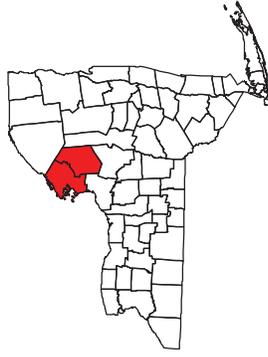
Figure 6. Eastern red bat (*Lasiurus borealis*) capture locations for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



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Fort Drum Bat Surveys

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Date: 10/29/2015

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or
1 inch = 3 miles

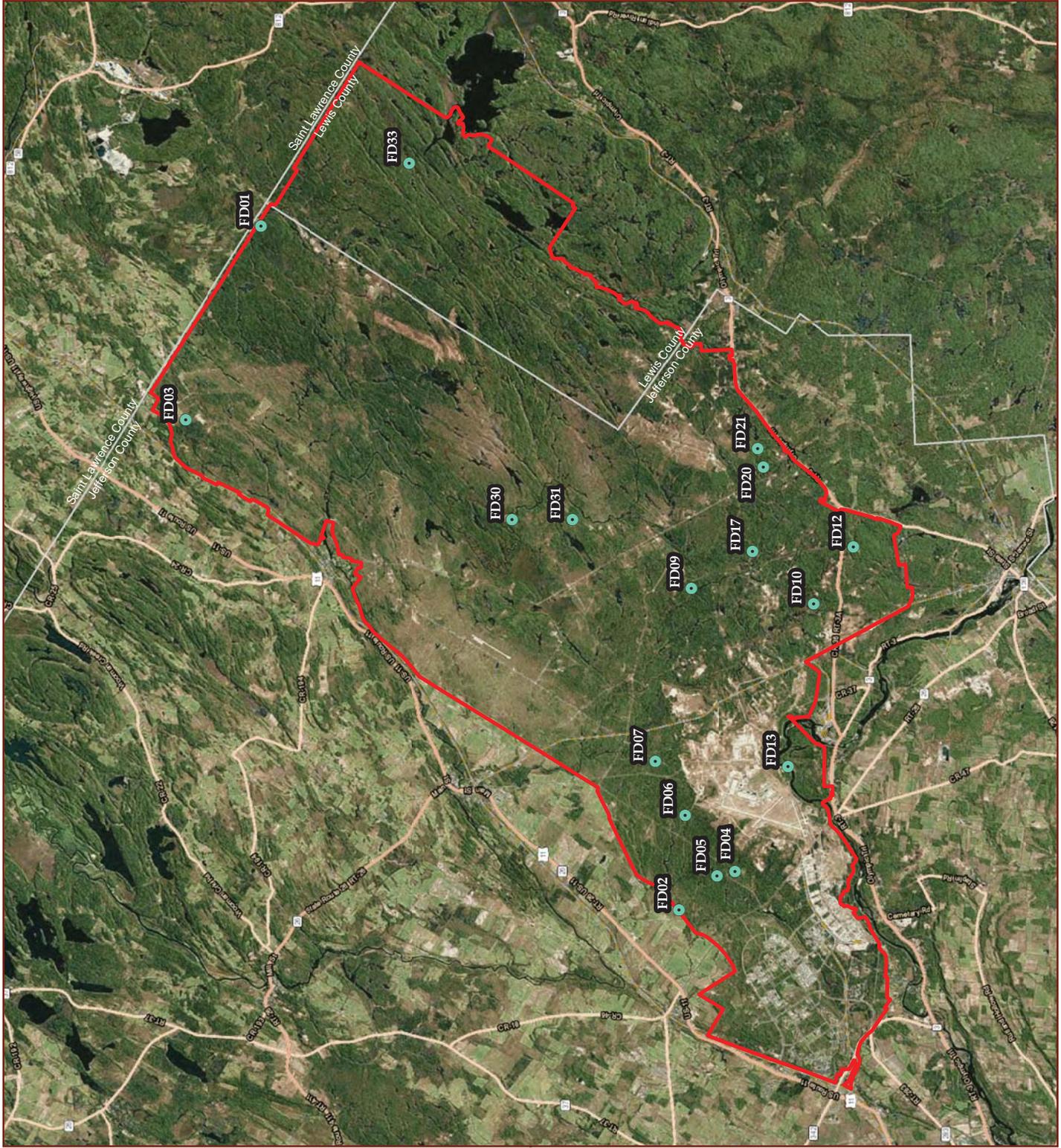
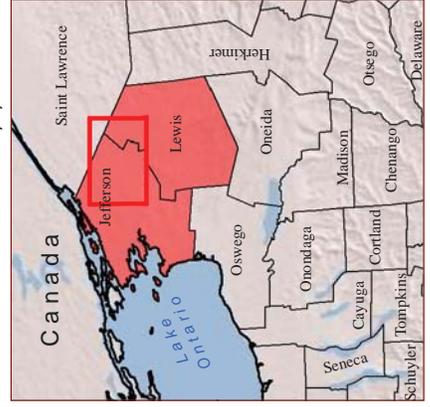


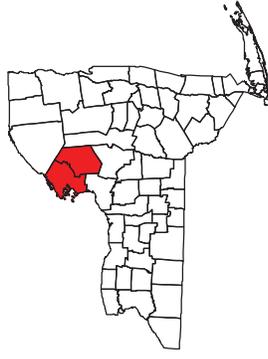
Figure 7. Little brown bat (*Myotis lucifugus*) capture locations for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



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Fort Drum Bat Surveys

Summer 2015



Jefferson and Lewis
Counties, New York

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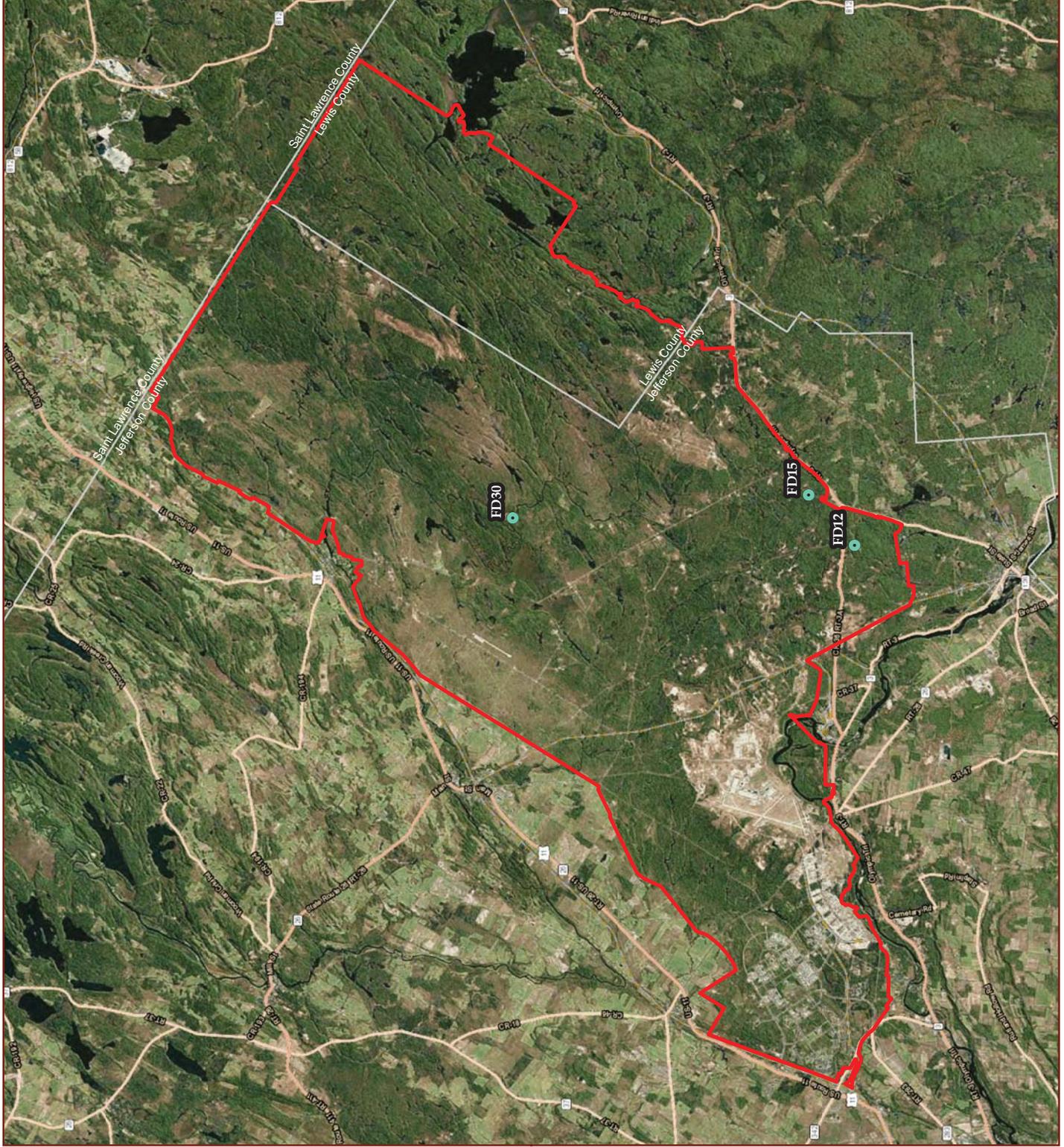
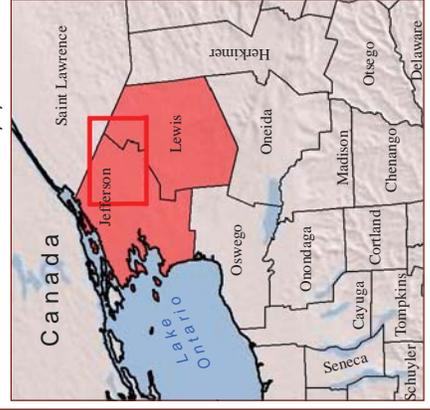
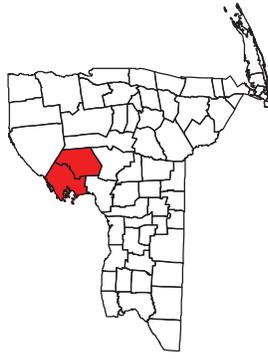


Figure 8. Silver-haired bat (*Lasionycteris noctivagans*) capture locations for the Fort Drum summer 2015 Mist Net Survey, Ft. Drum, New York.



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Fort Drum Bat Surveys Summer 2015



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- Fort Drum Boundary

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Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/29/2015

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1 inch = 3 miles

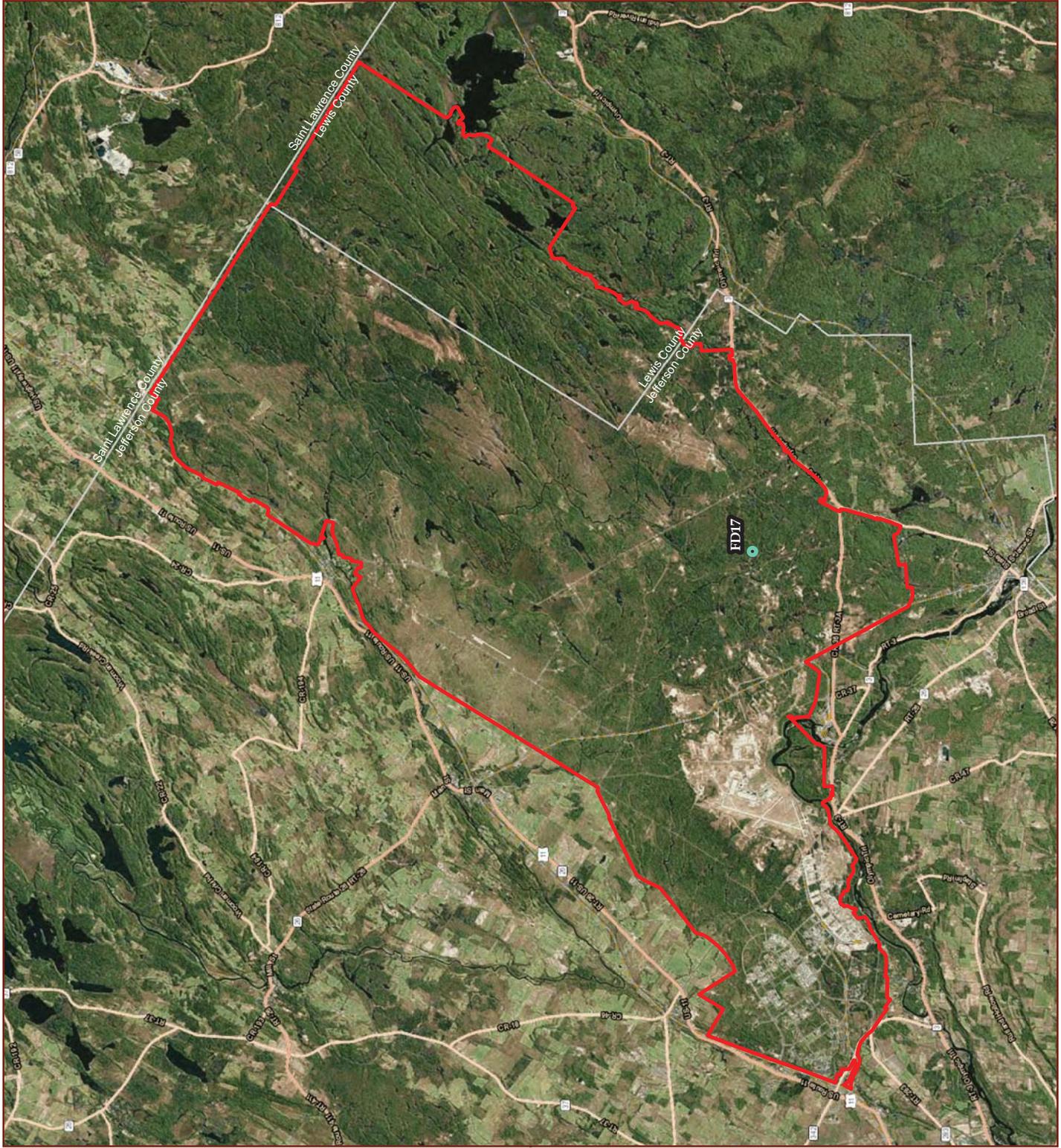
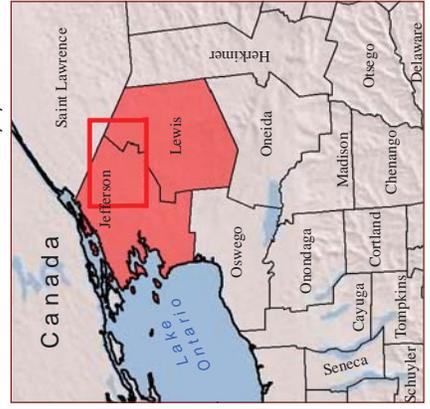


Figure 9. Hoary bat (*Lasiurus cinereus*) capture locations for the Fort Drum summer 2015 Mist Net Survey, Ft. Drum, New York.

Bat Capture by Sex and Age

Of the 694 bats processed for biological data, 302 were adult female (43.5% of total capture), 191 were adult male (27.5%), and 162 were juvenile (23.3%). Thirty-nine bats escaped or were released before species, sex, age, or reproductive condition could be recorded. Of the 302 adult females captured, 246 were classified as reproductive (81.5%)

Bat Capture by Site Location

The mean number of bats and species captured per site (36 site locations, Table 1) was 19.5 and 1.1, respectively. In general, the most productive sites were located over larger gravel roads in the southeastern area of the installation. Site FD12 produced the most bats ($n = 104$ or 15% of total bat captures), followed by sites FD15 ($n = 81$ or 12%), and FD22 ($n = 60$ or 9%) over four nights respectively (Table 4). Sites FD12, FD17, FD30 had the highest species richness, producing four species each over four nights of netting. No bats were captured at site FD16.

Table 4. Summary of bat captures by site and between study periods for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Site Name	<i>Eptesicus fuscus</i>		<i>Myotis lucifugus</i>		<i>Lasiurus cinereus</i>		<i>Lasiurus borealis</i>		<i>Lasiomycteris novitvagens</i>		Total Bats Captured		Species Richness	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
FD01	2	5	0	1	0	0	0	0	0	0	2	6	1	2
FD02	1	3	1	0	0	0	0	2	0	0	2	5	2	2
FD03	0	0	0	2	0	0	0	0	0	0	0	2	1	1
FD04	6	19	1	0	0	0	0	1	0	0	7	20	2	2
FD05	0	1	0	1	0	0	0	0	0	0	0	2	0	2
FD06	15	27	0	1	0	0	1	5	0	0	16	33	2	3
FD07	4	26	0	1	0	0	0	7	0	0	4	34	1	3
FD08	11	6	0	0	0	0	0	1	0	0	11	7	1	2
FD09*	-	23	-	2	-	0	-	3	-	0	-	28	-	3
FD10	3	28	1	1	0	0	1	4	0	0	5	33	3	3
FD11	12	10	0	0	0	0	0	0	0	0	12	10	1	1
FD12*	-	83	-	11	-	0	-	9	-	1	-	104	-	4
FD13	3	3	0	1	0	0	0	2	0	0	3	6	1	3
FD14	0	1	0	0	0	0	0	0	0	0	0	1	0	1
FD15	35	34	0	0	0	0	2	9	0	1	37	44	2	3
FD16*	-	0	-	0	-	0	-	0	-	0	-	0	-	0
FD17	4	23	0	1	0	1	0	1	0	0	4	26	1	4
FD18	0	3	0	0	0	0	0	0	0	0	0	3	0	1
FD19	2	0	0	0	0	0	0	0	0	0	2	0	2	0
FD20	8	6	1	0	0	0	0	0	0	0	9	6	2	1

Site Name	<i>Eptesicus fuscus</i>		<i>Myotis Lucifugus</i>		<i>Lasiurus cinereus</i>		<i>Lasiurus borealis</i>		<i>Lasiomycteris noctivagans</i>		Total Bats Captured		Species Richness	
	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2	Period 1	Period 2
FD21	1	5	0	3	0	0	0	1	0	0	1	9	1	3
FD22	12	42	0	0	0	0	0	6	0	0	12	48	1	2
FD23	0	1	0	0	0	0	1	0	0	0	1	1	1	1
FD24	0	1	0	0	0	0	0	0	0	0	0	1	0	1
FD25	4	0	0	0	0	0	0	1	0	0	4	1	1	1
FD26	0	1	0	0	0	0	1	1	0	0	1	2	1	2
FD27	0	1	0	0	0	0	1	1	0	0	1	2	1	2
FD28*	-	6	-	0	-	0	-	5	-	0	-	11	-	2
FD29	7	12	0	0	0	0	1	7	0	0	8	19	2	2
FD30	0	8	0	1	0	0	0	11	0	4	0	24	0	4
FD31	2	2	1	2	0	0	2	8	0	0	5	12	3	3
FD32	0	1	0	0	0	0	0	0	0	0	0	1	0	1
FD33*	-	5	-	42	-	0	-	0	-	0	-	47	-	2
FD34	1	0	0	0	0	0	0	1	0	0	1	1	1	1
FD35	1	0	0	0	0	0	0	0	0	0	1	0	1	0
FD36*	-	3	-	0	-	0	-	0	-	0	-	3	-	1
Total	134	389	5	70	0	1	10	86	0	6	149	552	-	-

Includes same season recaptures if bats were caught in separate sampling periods
* Surveyed during the second sampling period only

Bat Captures by Study Period

Sampling during period one resulted in 148 bats being captured (28%, Table 5). Big brown bats comprised the majority of the study period one captures (94%) followed by eastern red bats (7%) and little brown bats (3%). One juvenile big brown bat was captured (5 July) during the first sampling period.

Sampling during period two resulted in 374 bats being captured (72%). Big brown bats comprised the majority of study period two captures (72%), followed by eastern red bats (19%), little brown bats (4%), silver-haired bats (1%), and one hoary bat (0.2%).

For the purpose of this comparison, the six sites that were not netted during the two sampling periods were excluded (FD09, FD12, FD16, FD28, FD33 and FD36).

Table 5. Comparison of sampling periods for the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

	Period One	Period Two
<i>Eptesicus fuscus</i>	133	283
<i>Lasionycteris noctivagans</i>	0	5
<i>Lasiurus borealis</i>	10	70
<i>Lasiurus cinereus</i>	0	1
<i>Myotis lucifugus</i>	5	15
Adult	142	242
Juvenile	1	109
Total bats	148	374
Adult Female	90	153
Adult Male	52	89
Juvenile Female	0	56
Juvenile Male	1	53
Total Female	90	209
Total Male	53	144
Mean # of Bats/Site	4.97	9.97
Species Richness/Site	1.1	1.9

Does not include captures from sites FD09, FD12, FD16, FD28, FD33 and FD36.

Includes same season recaptures if bats were caught in separate sampling periods

Bats that escaped/were released before sexed and/or aged included.

White-nose Syndrome Wing Damage Index

Of the 142 bats examined for wing membrane damage during the first sampling period 70 (49.3%) received a score of 0 and 72 (50.7%) received a score of 1/1-P or higher (Table 6). Of the 512 bats examined for wing membrane damage during the second sampling period 338 (66%) received a score of 0 and 174 (34%) received a score of 1/1-P or higher (Table 7).

Over both sampling periods, 277 (56%) big brown bats received a score of 0 and 218 (44%) received a score of 1/1-P or higher (Table 8). Sixty-eight eastern red bats received a score of 0 (86%) and 11 (14%) received a score of 1/1-P or higher. Fifty-six little brown bats received a score of 0 (76%) and 17 received a score of 1 (23%). Silver-haired bat and hoary bat captures did not exhibit any sign of WNS. A tabular comparison of the relative wing index scores between bat species and study periods may be found in Tables 6 – 8.

Table 6. Wing Damage Index Scores (WDI) for bats captured during the first study period of the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Species	WDI 0	WDI 0-P	WDI 1	WDI 1-P	WDI 2	WDI 3
<i>Eptesicus fuscus</i>	63	0	45	21	1	0
<i>Lasionycteris noctivagans</i>	0	0	0	0	0	0
<i>Lasiurus borealis</i>	4	0	2	1	0	0
<i>Lasiurus cinereus</i>	0	0	0	0	0	0
<i>Myotis lucifugus</i>	3	0	2	0	0	0
Total	70	0	49	22	1	0
% of Total Capture	49.3	0.0	34.5	15.5	0.01	0.0

Table does not include bats in which WDI scores were not recorded

Table 7. Wing Damage Index Scores (WDI) for bats captured during the second study period of the summer 2015 Fort Drum Mist-Net Survey, Ft. Drum, New York.

Species	WDI 0	WDI 0-P	WDI 1	WDI 1-P	WDI 2	WDI 3
<i>Eptesicus fuscus</i>	214	23	103	18	7	0
<i>Lasionycteris noctivagans</i>	6	0	0	0	0	0
<i>Lasiurus borealis</i>	65	2	5	1	0	0
<i>Lasiurus cinereus</i>	1	0	0	0	0	0
<i>Myotis lucifugus</i>	53	0	15	0	0	0
Total	339	25	123	19	7	0
% of Total Capture	66.1	4.9	24.0	3.7	1.4	0.0

Table does not include bats in which WDI scores were not recorded

Table 8. Wing Damage Index Scores (WDI) for bats captured during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Species	WDI 0	WDI 0-P	WDI 1	WDI 1-P	WDI 2	WDI 3
<i>Eptesicus fuscus</i>	277	23	148	39	8	0
<i>Lasionycteris noctivagans</i>	6	0	0	0	0	0
<i>Lasiurus borealis</i>	68	2	7	2	0	0
<i>Lasiurus cinereus</i>	1	0	0	0	0	0
<i>Myotis lucifugus</i>	56	0	17	0	0	0
Total	408	25	172	41	8	0
% of Total Capture	62.4	3.8	26.3	6.3	1.2	0.0

Table does not include bats in which WDI scores were not recorded

Radiotelemetry

Overall, 22 bats of three species captured during the Fort Drum Mist Net Survey were fitted with radio transmitters and released at point of capture. Of the 22 bats, 13 were big brown bats, 8 were little brown bats, and 1 was a silver-haired bat (Table 9). Of the 22 radio-tagged bats, Copperhead tracked 20 (13 big browns, 6 little brown, and 1 silver-haired), while the COR tracked two of the little brown bats. Subsequent tracking by Copperhead resulted in the location of 51 day roosts (Table 10) on which 118 exit counts were conducted. A total of 130 bat days (a bat day is defined as one bat, in one roost, for one day) was documented for located roosts. Thirteen roosts were located in artificial structures and 38 were located in trees of 12 species including red maple, sugar maple, black cherry, eastern white pine, bigtooth aspen, American elm, green ash, white ash, eastern cottonwood, red oak, yellow birch, and American beech. One roost (*Acer* sp.) was too decayed to identify to species.

Radio-tagged bats switched roosts a total of 39 times and spent an average of 1.65 consecutive days in a particular roost before moving. Overall, bats that roosted in artificial structures switched roosts on average 0.55 times per bat and bats roosting in trees switched roosts on average 4.13 times per bat.

A detailed summary of roost type and character is provided in Table 10 and has been provided to Fort Drum via a Microsoft Excel spreadsheet. Narratives summarizing the daily movements and behavior of each focal bat are provided in the following sections. Photographs of each roost tree have been provided to Fort Drum via AMRDEC Safe Access File Exchange and are provided in Appendix C.

Table 9. Bats fitted with radio transmitters during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Band#	Species	Capture Date	Transmitter Frequency (MHz)	Capture Site	Sex	Age	Reproductive Condition
34449	<i>Eptesicus fuscus</i>	15-Jun	172.229	FD01	Female	Adult	Lactating
34111	<i>Myotis lucifugus</i>	17-Jun	172.989	FD04	Female	Adult	Non-Reproductive
34475	<i>Myotis lucifugus</i>	4-Jul	172.049	FD31	Female	Adult	Lactating
34520	<i>Eptesicus fuscus</i>	4-Jul	172.590	FD22	Female	Adult	Lactating
34347	<i>Eptesicus fuscus</i>	16-Jul	172.204	FD04	Female	Adult	Lactating
34348	<i>Eptesicus fuscus</i>	16-Jul	172.351	FD04	Female	Adult	Lactating
34476	<i>Eptesicus fuscus</i>	16-Jul	172.962	FD11	Female	Adult	Non-Reproductive
34482	<i>Eptesicus fuscus</i>	16-Jul	172.706	FD11	Female	Adult	Lactating
34401	<i>Eptesicus fuscus</i>	19-Jul	172.859	FD21	Female	Adult	Post Lactating
34403	<i>Eptesicus fuscus</i>	19-Jul	172.528	FD21	Female	Adult	Lactating
34332	<i>Eptesicus fuscus</i>	20-Jul	172.921	FD20	Female	Adult	Post Lactating
34407	<i>Myotis lucifugus</i>	20-Jul	172.284	FD21	Female	Adult	Post Lactating
34406	<i>Myotis lucifugus</i>	20-Jul	172.571	FD21	Female	Adult	Post Lactating
34362	<i>Myotis lucifugus</i>	2-Aug	172.438	FD03	Male	Juvenile	Non-Reproductive
34363	<i>Myotis lucifugus</i>	2-Aug	172.406	FD03	Male	Juvenile	Non-Reproductive
34632	<i>Lasionycteris noctivagans</i>	2-Aug	172.481	FD30	Female	Adult	Post Lactating
34365	<i>Eptesicus fuscus</i>	3-Aug	172.076	FD10	Female	Adult	Post Lactating
34430	<i>Eptesicus fuscus</i>	3-Aug	172.559	FD07	Female	Adult	Post Lactating
34434	<i>Eptesicus fuscus</i>	3-Aug	172.375	FD07	Female	Adult	Post Lactating
34729	<i>Eptesicus fuscus</i>	3-Aug	172.694	FD15	Female	Adult	Post Lactating
34805	<i>Myotis lucifugus</i>	8-Aug	151.985	FD33	Female	Adult	Post Lactating
34806	<i>Myotis lucifugus</i>	8-Aug	151.824	FD33	Female	Adult	Post Lactating

Table 10. All roost trees used by big brown, little brown and silver-haired bats during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Roost ID	Date First Located	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Highest Exit Count #
RT01_MYLU_34111	18-Jun**	-	Bat House	-	-	-	-	0	108
RT01_EPFU_34449	20-Jun	<i>Prunus serotina</i>	Cavity	4	45.9	11	5	0	26
RT01_EPFU_34520	5-Jul	-	House	-	-	8	-	-	79
RT01_MYLU_34475	6-Jul	-	Observati on Tower	-	-	4.5	-	-	1
RT02_EPFU_34520	7-Jul	-	House	-	-	8	-	-	96
RT02_MYLU_34475	7-Jul	-	Barracks Building	-	-	4	-	-	1
RT01_EPFU_34482	17-Jul	-	House	-	-	7.5	-	-	28
RT01_EPFU_34348***	17-Jul	-	House	-	-	-	-	-	-
RT01_EPFU_34347	17-Jul	<i>Acer rubrum</i>	*	1	29.5	6	0	*	1
RT01_EPFU_34476	18-Jul	<i>Acer saccharum</i>	Bark	4	54.6	9	20	5	23
RT02_EPFU_34347	18-Jul	<i>Pinus strobus</i>	Bark	1	54	4.5	0	*	1
RT02_EPFU_34476	19-Jul	<i>Acer saccharum</i>	Cavity	2	52.4	12	0	90	25
RT03_EPFU_34347	19-Jul	<i>Populus deltoides</i>	Cavity	2	150	15	0	*	1
RT04_EPFU_34347	20-Jul	<i>Quercus rubra</i>	Bark	1	30.4	10	0	100	1
RT01_EPFU_34332/34401	20-Jul	-	House	-	-	8	-	10	54
RT01_MYLU_34406/34407	21-Jul	-	Church	-	-	18	-	-	208
RT05_EPFU_34347	22-Jul	<i>Populus grandidentata</i>	Cavity	1	61.4	12	0	*	0

Roost ID	Date First Located	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Highest Exit Count #
RT01_EPFU_34403	24-Jul	<i>Acer saccharum</i>	Cavity	5	42.7	9	40	20	41
RT02_MYLU_34407	24-Jul	-	House	-	-	3.5	-	-	1
RT02_EPFU_34403	25-Jul	<i>Acer saccharum</i>	Cavity	2	32.7	10	0	*	1
RT03_MYLU_34407	25-Jul	-	House	-	-	6	-	-	1
RT03_EPFU_34403	26-Jul	<i>Fagus grandifolia</i>	Cavity	6	52.1	6	30	5	36
RT04_EPFU_34403	28-Jul	<i>Fraxinus americana</i>	Unknown	2	67.6	10	5	75	1
RT05_EPFU_34403	29-Jul	<i>Acer saccharum</i>	Cavity	2	46.9	11	5	25	5
RT06_EPFU_34403	30-Jul	<i>Fraxinus americana</i>	Crevice	1	45.5	6	0	30	31
RT01_LANO_34632	3-Aug	<i>Acer rubrum</i>	Bark	4/6	19.1	7	30	30	2
RT01_EPFU_34430	4-Aug	<i>Acer rubrum</i>	Cavity	4	29.3	7	15	0	1
RT01_EPFU_34729	4-Aug	-	House/ Cavity	-	-	5	-	-	11
RT02_LANO_34632	4-Aug	<i>Acer rubrum</i>	Bark	4	25.5	8	15	20	4
RT02_EPFU_34430	5-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1
RT01_EPFU_34434	5-Aug	-	House/ Cavity	-	-	10	-	0	4
RT01_EPFU_34365	5-Aug	<i>Pinus strobus</i>	Cavity	5	46.8	15	0	0	1
RT03_LANO_34632	5-Aug	<i>Acer rubrum</i>	Bark	3/4	21.9	7	20	10	1
RT02_EPFU_34365	6-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1
RT04_LANO_34632	6-Aug	<i>Acer rubrum</i>	Bark	4/6	33.1	7.5	15	30	1
RT01_MYLU_34362	8-Aug	<i>Acer rubrum</i>	Bark	4	15.8	4	30	0	2

Roost ID	Date First Located	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Highest Exit Count #
RT03_EPFU_34430	9-Aug	<i>Acer rubrum</i>	Cavity/ Crevice	7	36.5	5.5	2	95	1
RT05_LANO_34632	9-Aug	<i>Acer rubrum</i>	Bark	2	14.1	5	20	10	1
RT02_MYLU_34362	10-Aug	<i>Acer rubrum</i>	Bark	4	25.8	1.5	70	0	2
RT04_EPFU_34430	11-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4/6	42.6	6	30	25	1
RT03_EPFU_34365	11-Aug	<i>Prunus serotina</i>	Bark	4	41.5	*	20	*	1
RT03_MYLU_34362	11-Aug	<i>Ulmus americana</i>	Bark	4	24.5	*	35	*	0
RT06_LANO_34632	11-Aug	<i>Acer rubrum</i>	Cavity	2	59.4	5	25	95	1
RT05_EPFU_34430	12-Aug	<i>Betula alleghaniensis</i>	Cavity	4/6	18.7	6	0	30	2
RT04_EPFU_34365	12-Aug	<i>Acer sp.</i>	Cavity	5	40.2	19	0	15	1
RT04_MYLU_34362	12-Aug	<i>Ulmus americana</i>	Bark	3/4	33.3	9	5	15	1
RT05_MYLU_34362	14-Aug	<i>Acer rubrum</i>	Bark	4/6	14.5	1.5	50	0	1
RT05_EPFU_34365	15-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	2
RT06_EPFU_34430	16-Aug	<i>Acer rubrum</i>	*	2/6	37	*	10	50	1
RT07_EPFU_34430	19-Aug	<i>Populus grandidentata</i>	Cavity	4/6	31.6	4.5	5	95	1
RT06_EPFU_34365	21-Aug	<i>Prunus serotina</i>	Cavity	3/6	42.2	*	0	*	0

Cavity is defined as a hollow space inside of a roost; Crevice is defined as a narrow split or crack; Cavity/Crevice is defined as a narrow split that appears to open into a hollow cavity

* Exact roost location not observed

** Date first tracked to in 2015

*** No land owner permission to enter the property

Focal Bat Telemetry Summaries

Radio-tagged Big Brown Bats

Thirteen adult female big brown bats were fitted with radio transmitters during the Fort Drum Mist Net Survey. Radio-tagged big brown bats spent a total of 95 bat days in 34 roosts, switched roosts a total of 23 times, and spent an average of 1.93 consecutive days in a particular roost before moving. Seven roosts were located in artificial structures and 27 were found in trees consisting of 11 species (sugar maple, red maple, black cherry, eastern white pine, bigtooth aspen, green ash, white ash, eastern cottonwood, red oak, yellow birch, American beech and one *Acer* roost too decayed to identify to species). Six of the natural roosts documented for focal big brown bats were bark, 14 were cavity roosts, two were crevice roosts and one roost was both a cavity and crevice. Big brown bats roosting in artificial structures switched roosts on average 0.14 times per bat as opposed to bats roosting in trees which switched on average 3.67 times per bat. A total of 84 emergence counts were conducted.

Big brown bats found roosting in artificial structures traveled an average distance of 3705 meters from their capture site to their first located roost with an average distance of 49 meters between roosts. Big brown bats found roosting in trees traveled an average distance of 1673 meters from their capture site to their first located roost with an average distance of 244 meters between roosts. The maximum observed distance a big brown bat traveled was 6304 meters (bat EPFU_34403).

Bat EPFU_34449

Bat EPFU_34449 was an adult lactating female big brown bat captured at site FD01 (Figure 10) at 2120 h on the night of 15 June 2015. The mist net was placed across an opening from a gravel road to a field and the bat was caught 3.5 meters above the ground in a 9 m (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of red maple and white pine.

A 0.3-g transmitter (172.229) was attached to the bat, an aluminum wing band NYSDEC 34449 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground telemetry for a total of eight days (16 June - 23 June). Over the lifespan of the transmitter, the bat was successfully tracked for one bat day and one roost tree was located (black cherry, Table 11).

The bat was searched for by ground crews 16 June to 19 June but no signal was heard. The bat was first located 20 June in roost tree RT01_EPFU_34449, 1911 meters from the capture site. Bat EPFU_34449 continued to use this roost until 23 June when the transmitter was assumed to have been shed by the bat. Exit counts were conducted the night of 20 June with 26 bats exiting, 21 June with 21 bats exiting, and 22 June with no bats emerging. The transmitter did not leave the roost during the exit counts on the nights of 21 or 22 June. On 23 June, Copperhead Consulting confirmed the transmitter

to still be in the tree and assumed the bat had shed the transmitter in the roost. Tracking efforts were concluded with COR approval on 23 June.

Table 11. Big brown bat (bat EPFU_34449) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34449	RT01_EPFU_34449	20-Jun	<i>Prunus serotina</i>	Cavity	4	45.9	11	5	0	26	Yes
34449	RT01_EPFU_34449	21-Jun	<i>Prunus serotina</i>	Cavity	4	45.9	11	5	0	21	No
34449	RT01_EPFU_34449	22-Jun	<i>Prunus serotina</i>	Cavity	4	45.9	11	5	0	0	No
34449	RT01_EPFU_34449	23-Jun	<i>Prunus serotina</i>	Cavity	4	45.9	11	5	0	-	-

Cavity is defined as a hollow space inside of a roost
Exit count not conducted on 23-Jun-15.

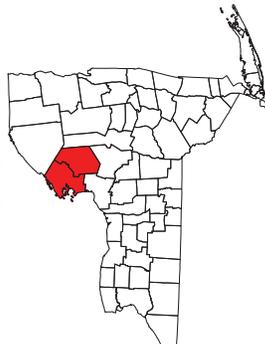


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Fort Drum Bat Surveys Summer 2015

Bat 34449

Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Non-convective Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/2/2015

1:12,000
 or
 1 inch = 1,000 feet

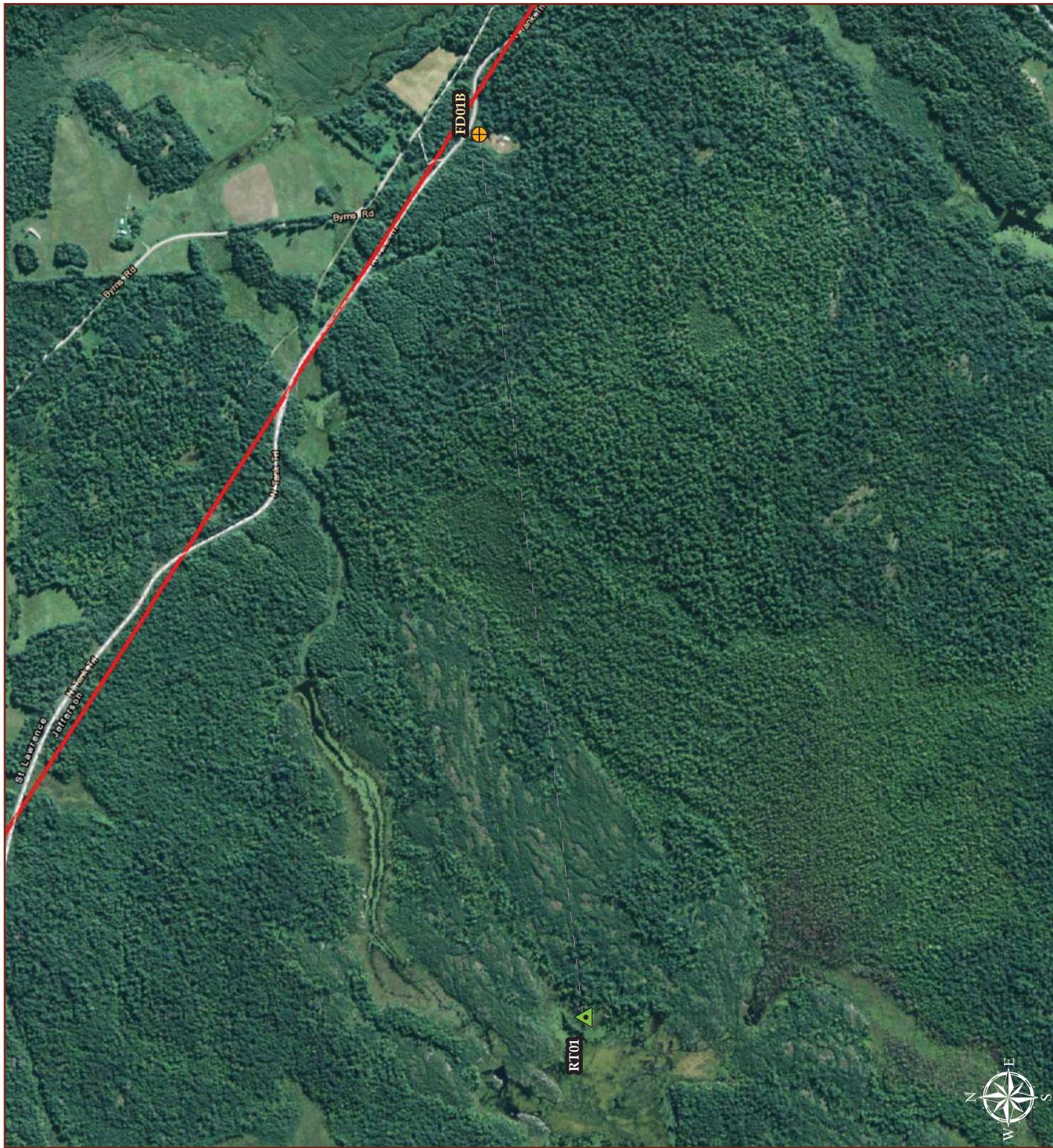


Figure 10. Capture site and roost location for bat EPFU_34449 tracked 16-Jun to 23-Jun during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34520

Bat EPFU_34520 was an adult lactating female big brown bat captured at site FD22 (Figure 11) at 2223 h on the night of 4 July 2015. The mist net was placed across a gravel road and the bat was caught two meters above the ground in an 18 m (59.1 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of sugar maple, bigtooth aspen, black cherry, and green ash.

A 0.3-g transmitter (172.590) was attached to the bat, an aluminum wing band NYSDEC 34520 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of seven days (5 July - 11 July). Over the lifespan of the transmitter, the bat was successfully tracked for four bat days and two roosts in artificial structures were located (Table 12).

The bat was first located 5 July in roost RT01_EPFU_34520 (a house in Natural Bridge, NY), 2400 m from the capture site. The bat used this roost on the nights of 5 July and 6 July and 79 and four bats were observed to exit the roosts, respectively. On 7 July, the bat was located 49 meters away in roost RT02_EPFU_34520 (another house in Natural Bridge) and remained there for five nights (7 July - 11 July). Exit counts conducted on 7 July observed 90 bats emerging. Ninety-four bats emerged on 8 July, 96 bats on 9 July, and 94 bats emerged on 10 July. The transmitter did not leave the roost 9 July or 10 July. On 11 July Copperhead Consulting confirmed the transmitter to still be in the house and assumed the bat had shed the transmitter in the roost. Tracking efforts were concluded with COR approval on 11 July.

Table 12. Big brown bat (bat EPFU_34520) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter	
											Exited	Roost
34520	RT01_EPFU_34520	5-Jul	-	House	-	-	8	-	-	79	*	
34520	RT01_EPFU_34520	6-Jul	-	House	-	-	8	-	-	4	*	
34520	RT02_EPFU_34520	7-Jul	-	House	-	-	8	-	-	90	Yes	
34520	RT02_EPFU_34520	8-Jul	-	House	-	-	8	-	-	94	*	
34520	RT02_EPFU_34520	9-Jul	-	House	-	-	8	-	-	96	No	
34520	RT02_EPFU_34520	10-Jul	-	House	-	-	8	-	-	94	No	

* No receiver during exit count.

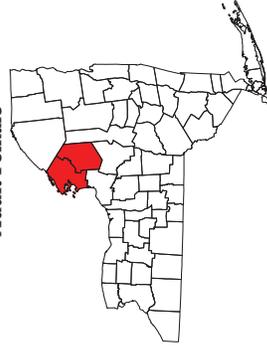


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Fort Drum Bat Surveys Summer 2015

Bat 34520

Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:12,000
 or
 1 inch = 1,000 feet

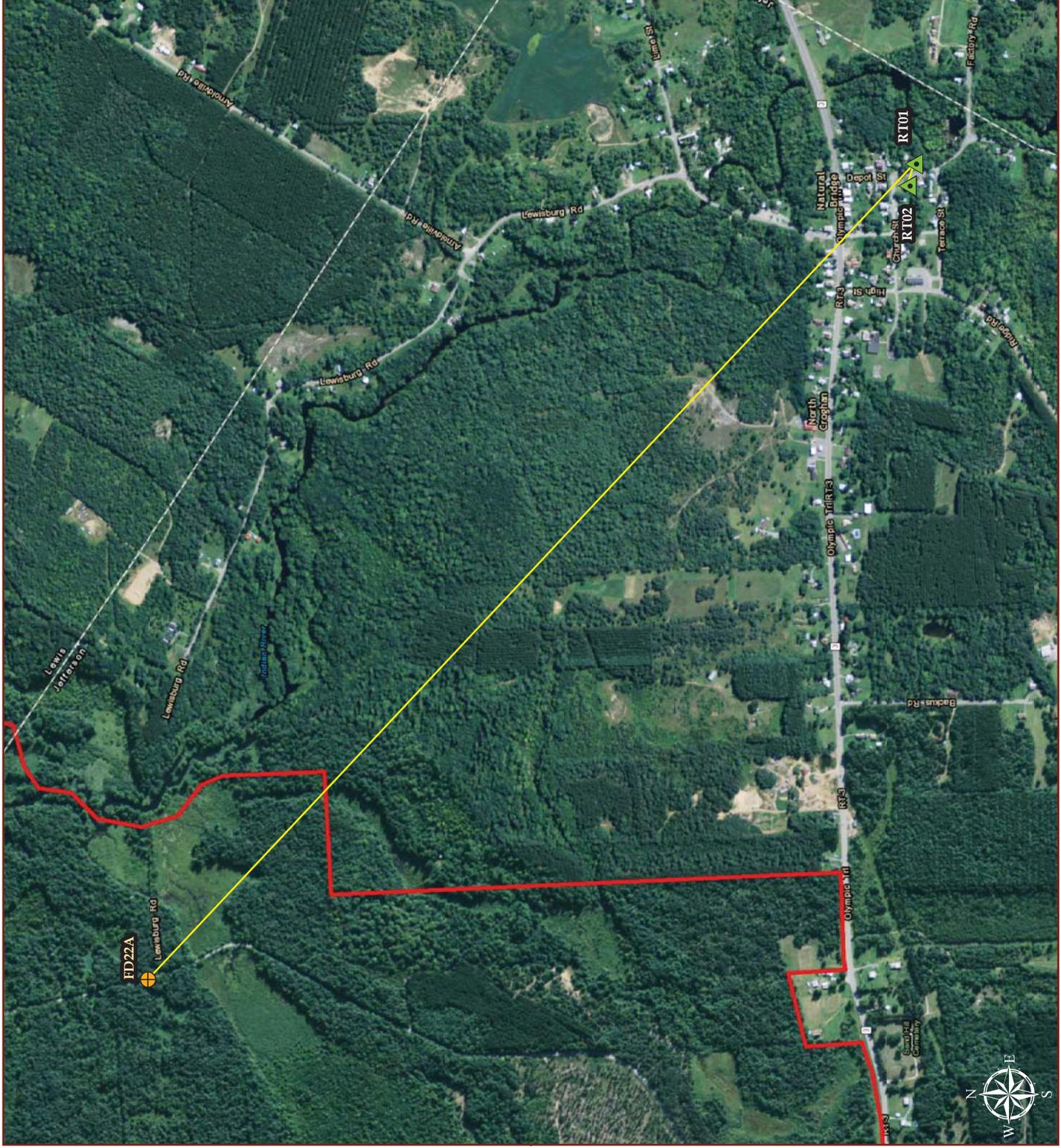


Figure 11. Capture site and roost locations for bat EPFU_34520 tracked 5 Jul - 11 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34482

Bat EPFU_34482 was an adult lactating female big brown bat originally captured at site FD11 on 6 July and aluminum wing band NYSDEC 34482 was placed on the left forearm. Bat EPFU_34482 was captured again at site FD11 (Figure 12) at 2222 h on the night of 16 July at which time a radio transmitter was attached to the bat. The mist net was placed across a gravel road adjacent to an open field and the bat was caught two meters above the ground in a 6 m (19.8 ft) x 6 m (19.8 ft) net set. The surrounding dominant vegetation consisted of white pine, red maple, and sugar maple.

A 0.3-g transmitter (172.706) was attached to the bat, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of nine days (17 July - 25 July). Over the lifespan of the transmitter, the bat was successfully tracked for nine bat days and one artificial structure roost was located (Table 13).

The bat was first located 17 July in roost RT01_EPFU_34482 (a house in Carthage, NY), 4344 meters from the capture site. The bat used this house over nine consecutive nights (17 July - 25 July). Copperhead Consulting was denied access for performing exit counts by the landowner from 17 July to 19 July. On 20 July, permission was granted and the exit count documented 28 bats emerging. Subsequent counts conducted on 21 and 22 July documented 17 and 23 bats emerging, respectively. On 23 July, the landowner again denied access for exit counts. The bat remained in the roost until 25 July, but was not heard in the roost on 26 July (the signal was monitored from a nearby public road). The bat was searched by ground crews on 26 and 27 July and again via the air on 7 and 8 August (upon the planes return to the study area), but no signal was heard. Tracking efforts were concluded with COR approval on 8 August.

Table 13. Big brown bat (bat EPFU_34482) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter	
											Exited	Roost
34482	RT01_EPFU_34482	17-Jul	-	House	-	-	7.5	-	-	*	-	-
34482	RT01_EPFU_34482	18-Jul	-	House	-	-	7.5	-	-	*	-	-
34482	RT01_EPFU_34482	19-Jul	-	House	-	-	7.5	-	-	*	-	-
34482	RT01_EPFU_34482	20-Jul	-	House	-	-	7.5	-	-	28	Yes	Yes
34482	RT01_EPFU_34482	21-Jul	-	House	-	-	7.5	-	-	17	Yes	Yes
34482	RT01_EPFU_34482	22-Jul	-	House	-	-	7.5	-	-	23	Yes	Yes
34482	RT01_EPFU_34482	23-Jul	-	House	-	-	7.5	-	-	*	-	-
34482	RT01_EPFU_34482	24-Jul	-	House	-	-	7.5	-	-	*	-	-
34482	RT01_EPFU_34482	25-Jul	-	House	-	-	7.5	-	-	*	Yes**	Yes**

* Landowner denied access for exit counts on 17, 18, 19, 23, 24, and 25 July

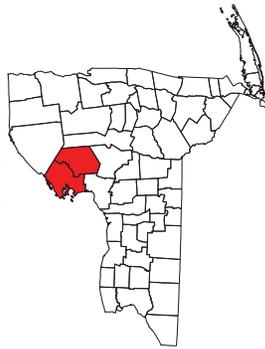
** Bat was not present in roost on 26 July so it was assumed the bat left the roost



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Fort Drum Bat Surveys Summer 2015

Bat 34482
Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/2/2015

1:18,000
 or
 1 inch = 1,500 feet

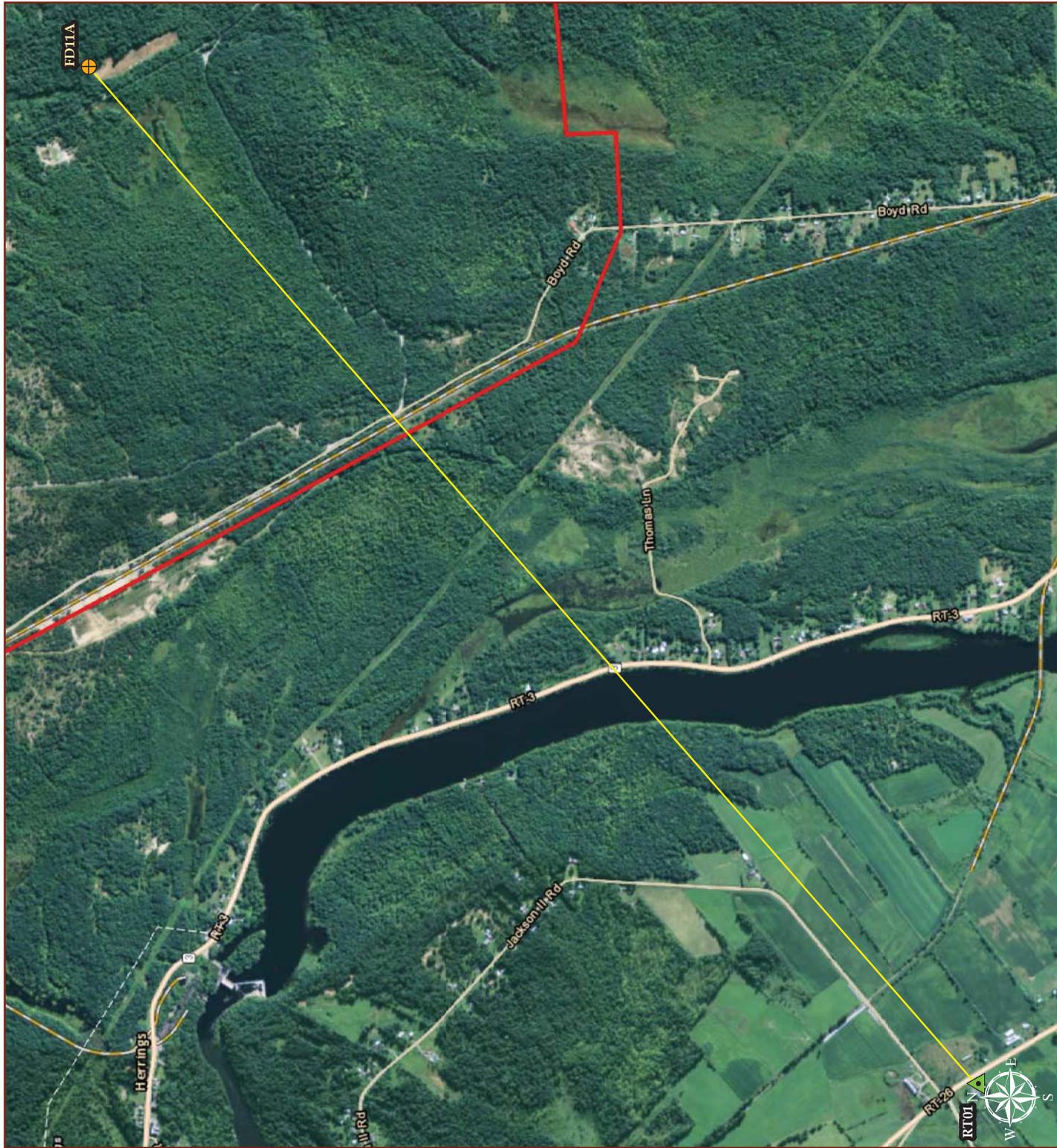


Figure 12. Capture site and roost location for bat EPFU_34482 tracked 17 July - 25 July during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34476

Bat EPFU_34476 was an adult non-reproductive female big brown bat originally captured at site FD11 on 5 July and aluminum wing band NYSDEC 34476 was placed on the left forearm. Bat EPFU_34476 was captured again at site FD11 (Figure 13) at 2111 h on the night of 16 July at which time a radio transmitter was attached to the bat. The mist net was placed across a gravel road adjacent to an open field and the bat was caught two meters above the ground in a 6 m (19.8 ft) x 6 m (19.8 ft) net set. Dominant vegetation surrounding the site consisted of sugar maple, bigtooth aspen, black cherry, and green ash.

A 0.3-g transmitter (172.962) was attached to the bat, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of 5 days (17 July - 21 July). Over the lifespan of the transmitter, the bat was successfully tracked for two bat days and two roost trees of one species were located (sugar maple, Table 14).

On 17 July, the signal was heard near Carthage, NY but a ground crew failed to locate the roost prior to dusk. The bat was first located on 18 July in roost tree RT01_EPFU_34776, 812 meters from the capture site, and an exit count conducted that evening documented 23 bats emerging. On 19 July, the bat was located 122 meters away in RT02_EPFU_34476. The exit count for 19 July was 25 bats. Both ground and aerial searches failed to find the bat on 20 July. On 21 July, the transmitter was found on the ground (18T 0450930 4874878) and tracking efforts were concluded.

Table 14. Big brown bat (bat EPFU_34476) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34476	RT01_EPFU_34476	18-Jul	<i>Acer saccharum</i>	Bark	4	54.6	9	20	5	23	Yes
34476	RT02_EPFU_34476	19-Jul	<i>Acer saccharum</i>	Cavity	2	52.4	12	0	90	25	Yes

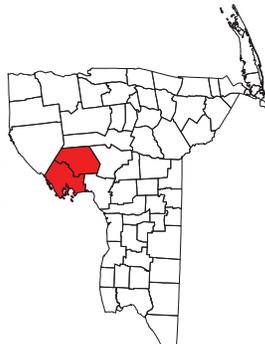
Cavity is defined as a hollow space inside of a roost



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Fort Drum Bat Surveys Summer 2015

Bat 34476
Eptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:6,000
 or
 1 inch = 500 feet



Figure 13. Capture site and roost locations for bat EPFU_34476 tracked 17 Jul - 21 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34348

Bat EPFU_34348 was an adult lactating female big brown bat captured at site FD04 (Figure 14) at 2155 h on the night of 16 July. The mist net was placed across a wooded trail and the bat was caught one meter above the ground in a 9 m (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of northern red oak, red maple, eastern hemlock (*Tsuga canadensis*), and yellow birch.

A 0.3-g transmitter (172.351) was attached to the bat, an aluminum wing band NYSDEC 34348 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of seven days (17 July - 23 July). Over the lifespan of the transmitter, the bat was successfully tracked for four bat days and a single roost in an artificial structure was located (Table 15).

On 17 July, the bat was first located in roost RT01_EPFU_34348 (an abandoned house in Evans Mills), 6011 meters from the capture site. The bat used this house from 17 July to 23 July when the transmitter was assumed to have fallen off (Table 14). The roost was a vacant house with no trespassing signs posted. Because all efforts by Copperhead Consulting and the Fort Drum COR failed to gain land owner permission to enter the property, the bats presence in the roost was checked from the nearby road at a distance making exit counts impossible. However, the signal was checked from the road each night after emergence to confirm transmitter remained on the bat and bat was exiting the roost. Observations conducted on 21 to 23 July indicated that the transmitter did not leave the roost and the transmitter was assumed to have been shed by the bat. Tracking efforts were concluded on 23 July with COR approval.

Table 15. Big brown bat (bat EPFU_34348) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost*
34348	RT01_EPFU_34348	17-Jul	-	House	-	-	-	-	-	-	Yes
34348	RT01_EPFU_34348	18-Jul	-	House	-	-	-	-	-	-	Yes
34348	RT01_EPFU_34348	19-Jul	-	House	-	-	-	-	-	-	Yes
34348	RT01_EPFU_34348	20-Jul	-	House	-	-	-	-	-	-	Yes
34348	RT01_EPFU_34348	21-Jul	-	House	-	-	-	-	-	-	No
34348	RT01_EPFU_34348	22-Jul	-	House	-	-	-	-	-	-	No
34348	RT01_EPFU_34348	23-Jul	-	House	-	-	-	-	-	-	No

Exit count not performed due to lack of land owner permission

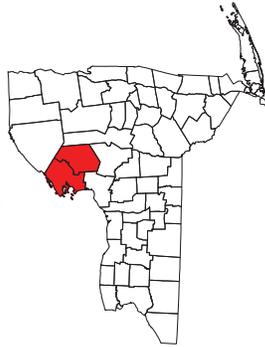
* Transmitter presence in roost was checked from the road after emergence.



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Fort Drum Bat Surveys Summer 2015

Bat 34348
Eptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:36,000
 or
 1 inch = 3,000 feet

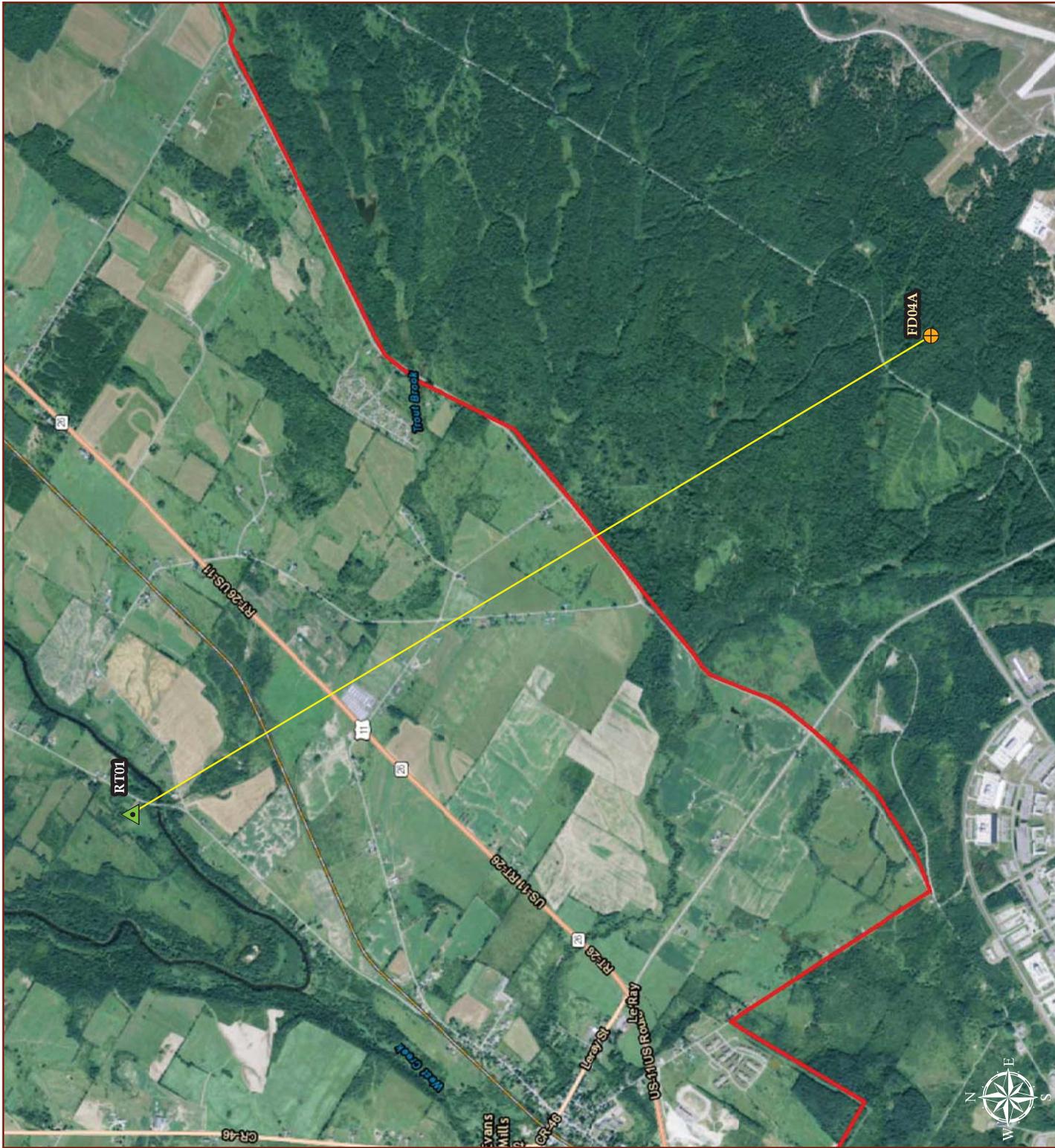


Figure 14. Capture site and roost location for bat EPFU_34348 tracked 17 Jul - 23 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34347

Bat EPFU_34347 was an adult lactating female big brown bat captured at site FD04 (Figure 15) at 2155h on the night of 16 July. The mist net was placed across a wooded trail and the bat was caught one meter above the ground in a 9 m (29.6) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of northern red oak, red maple, eastern hemlock, and yellow birch.

A 0.3-g transmitter (172.204) was attached to the bat, an aluminum wing band NYSDEC 34347 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of seven days (17 July - 23 July). Over the lifespan of the transmitter, the bat was successfully tracked for four bat days and five roost trees of five species were located (red maple, eastern white pine, eastern cottonwood, red oak, bigtooth aspen (Table 16). While performing exit counts, bat EPFU_34347 was never observed to be roosting with other bats.

The bat was first located 17 July in roost RT01_EPFU_34347, 121 meters from the capture site. During the exit count for 17 July the bat was not seen emerging, but the signal was observed to leave the roost. On 18 July, the bat was located 17 meters away in roost RT02_EPFU_34347. The exit count conducted on 18 July failed to see the focal bat emerging, but emergence was assumed based on signal strength. On 19 July, the bat was located 363 meters away in RT03_EPFU_34347. The exit count conducted on 19 July failed to observe the focal bat emerging but emergence was again assumed based on signal strength. On 20 July, the bat was located 427 meters away in RT04_EPFU_34347 where the bat was observed roosting on the exterior of the tree. An emergence count conducted later that evening observed only the focal bat exiting this tree. On 21 July, the bat was searched for by ground (the plane was not allowed to fly over the area due to air space restrictions) but failed to locate the signal. On 22 July, the transmitter was located 1322 meters away in RT05_EPFU_34347. During the exit count conducted that evening, no bats were observed exiting the tree and the transmitter never left the roost. The transmitter also remained in the roost after the exit count of 23 July. Copperhead Consulting assumed the bat had shed the transmitter in the roost and tracking efforts were concluded that day with COR approval.

Table 16. Big brown bat (bat EPFU_34347) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34347	RT01_EPFU_34347	17-Jul	<i>Acer rubrum</i>	*	1	29.5	6	0	*	1	Yes
34347	RT02_EPFU_34347	18-Jul	<i>Pinus strobus</i>	Bark	1	54	4.5	0	*	1	Yes
34347	RT03_EPFU_34347	19-Jul	<i>Populus deltoides</i>	Cavity	2	149.5	15	0	*	1	Yes
34347	RT04_EPFU_34347	20-Jul	<i>Quercus rubra</i>	Bark	1	30.4	10	0	100	1	Yes
34347	RT05_EPFU_34347	22-Jul	<i>Populus grandidentata</i>	Cavity	1	61.4	12	0	*	0	No
34347	RT05_EPFU_34347	23-Jul	<i>Populus grandidentata</i>	Cavity	1	61.4	12	0	*	0	No

Cavity is defined as a hollow space inside of a roost

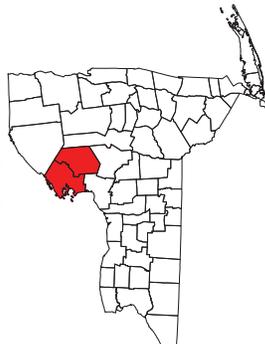
* Exact roost location not observed



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Fort Drum Bat Surveys Summer 2015

Bat 34347
Eptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/2/2015

1:8,000
 or
 1 inch = 667 feet



Figure 15. Capture site and roost locations for bat EPFU_34347 tracked 17 Jul - 23 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34430

Bat EPFU_34430 was an adult post lactating female big brown bat captured at site FD07 (Figure 16 and 17) at 2120h on the night of 3 August 2015. The mist net was placed across a wooded trail and the bat was caught three meters above the ground in a 9 m (29.6 ft) x 6 m (19.8 ft) net set. The surrounding dominant vegetation consisted of sugar maple, red maple, green ash, northern red oak, and paper birch (*Betula papyrifera*).

A 0.3-g transmitter (172.559) was attached to the bat, an aluminum wing band NYSDEC 34430 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of 17 days (4 August - 20 August). Over the lifespan of the transmitter, the bat was successfully tracked for 17 bat days and seven roost trees of four species were located (red maple, green ash, yellow birch, bigtooth aspen, Table 17).

On 4 August, the bat was first located in roost RT01_EPFU_34430, 612 meters from the capture site. An exit count took place on that evening with only the focal bat observed to exit the roost. On 5 August, the bat was located 93 meters away in RT02_EPFU_34430. The bat used this tree for five consecutive days (5 August - 8 August) and was the only bat observed to exit the roost during emergence counts conducted during this period. On 9 August, the bat was located 104 meters away in RT03_EPFU_34430 where only the focal bat was observed to exit the roost. On 10 August, the bat moved 104 meters back to RT02_EPFU_34430 where only the focal bat was observed to exit the roost. On 11 August, the bat was located 81.4 meters away in RT04_EPFU_34430 where only the focal bat was observed to exit the roost. On 12 August, the bat was located 76 meters away in RT05_EPFU_34430. The bat used this tree from 12 to 15 August. From 12 to 14 August, only the focal bat was observed to exit the roost, but the exit count conducted on 15 August documented two bats exiting the roost. On 16 August, the bat was located 32 meters away in RT06_EPFU_34430. The bat used this tree from 16 August to 18 August. Exit counts over this time observed only the focal bat exiting the roost. On 19 August, the bat was located 150 meters away in RT07_EPFU_34430. The bat used this tree on 19 and 20 August. The exit count for 19 August again observed only the focal bat exiting the roost. An emergence count was attempted at this roost on 20 August but the transmitter was not heard in the roost upon return for the exit count. Heavy rain occurred during emergence and no bats were seen exiting. The bat was searched for by a ground crew on 21 August but no signal was heard. Tracking efforts were concluded with COR approval on 21 August.

Table 17. Big brown bat (bat EPFU_34430) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34430	RT01_EPFU_34430	4-Aug	<i>Acer rubrum</i>	Cavity	4	29.3	7	15	0	1	Yes
34430	RT02_EPFU_34430	5-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1	Yes
34430	RT02_EPFU_34430	6-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1	Yes
34430	RT02_EPFU_34430	7-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1	Yes
34430	RT02_EPFU_34430	8-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1	Yes
34430	RT03_EPFU_34430	9-Aug	<i>Acer rubrum</i>	Cavity/ Crevice	7	36.5	5.5	2	95	1	Yes
34430	RT02_EPFU_34430	10-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4	48.7	11	10	60	1	Yes
34430	RT04_EPFU_34430	11-Aug	<i>Fraxinus pennsylvanica</i>	Bark	4/6	42.6	6	30	25	1	Yes
34430	RT05_EPFU_34430	12-Aug	<i>Betula alleghaniensis</i>	Cavity	4/6	18.7	6	0	30	1	Yes

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34430	RT05_EPFU_34430	13-Aug	<i>Betula alleghaniensis</i>	Cavity	4/6	18.7	6	0	30	1	Yes
34430	RT05_EPFU_34430	14-Aug	<i>Betula alleghaniensis</i>	Cavity	4/6	18.7	6	0	30	1	Yes
34430	RT05_EPFU_34430	15-Aug	<i>Betula alleghaniensis</i>	Cavity	4/6	18.7	6	0	30	2	Yes
34430	RT06_EPFU_34430	16-Aug	<i>Acer rubrum</i>	*	2/6	37	*	10	50	1	Yes
34430	RT06_EPFU_34430	17-Aug	<i>Acer rubrum</i>	*	2/6	37	*	10	50	1	Yes
34430	RT06_EPFU_34430	18-Aug	<i>Acer rubrum</i>	*	2/6	37	*	10	50	1	Yes
34430	RT07_EPFU_34430	19-Aug	<i>Populus grandidentata</i>	Cavity	4/6	31.6	4.5	5	95	1	Yes
34430	RT07_EPFU_34430	20-Aug	<i>Populus grandidentata</i>	Cavity	4/6	31.6	4.5	5	95	0	**

Cavity is defined as a hollow space inside of a roost; Crevice is defined as a narrow split or crack; Cavity/Crevice is defined as a narrow split that appears to open into a hollow cavity

* Exact roost location not observed

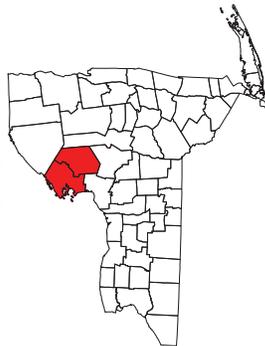
** Transmitter not heard in roost or surrounding area when Copperhead Consulting returned for the exit count.



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Fort Drum Bat Surveys Summer 2015

Bat 34430
Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:4,000
 or
 1 inch = 333 feet



Figure 16. Capture site and roost locations for bat EPFU_34430 tracked 4 Aug - 20 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



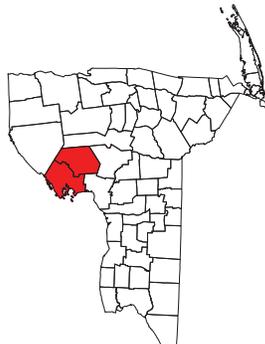
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Fort Drum Bat Surveys

Summer 2015

Bat 34430

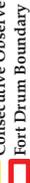
Eptesicus fuscus



Jefferson and Lewis
Counties, New York



Consecutive Observed Movement



Coordinates System:
WGS 1984 UTM Zone
18N
Projection: Transverse
Mercator
Datum: WGS 1984
Sources: Fort Drum,
USDA, ESRI, USGS
Date: 10/2/2015

1:1,200

or

1 inch = 100 feet

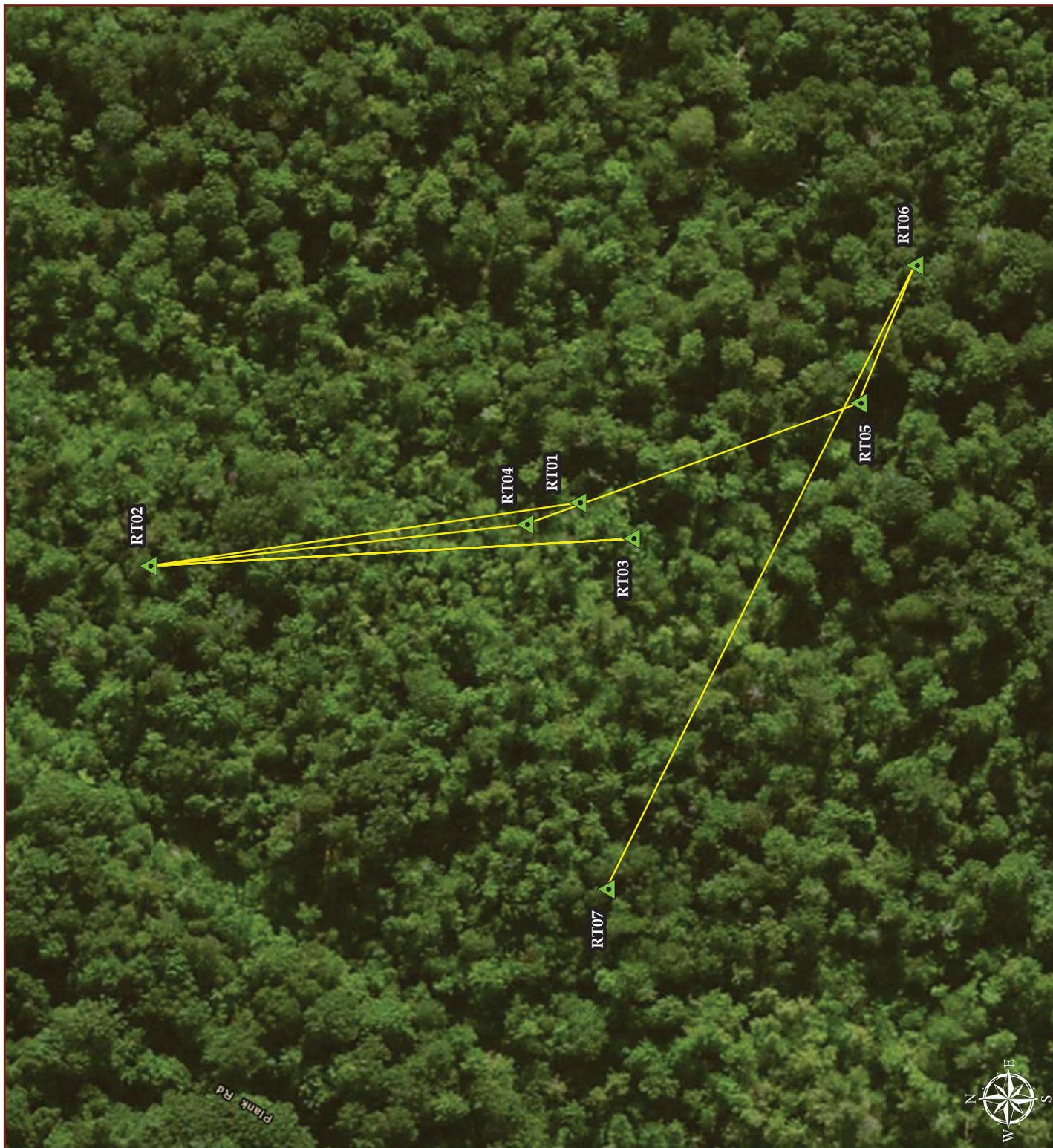


Figure 17. Roost trees (zoomed view) for bat EFFU_34430 tracked 4 Aug - 20 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34434

Bat EPFU_34434 was an adult post lactating female big brown captured at site FD07 (Figure 18) at 2207h on the night of 3 August. The mist net was placed across a wooded trail and the bat was caught three meters above the ground in a 6 m (19.8 ft) x 6 m (19.8 ft) net set. The surrounding dominant vegetation consisted of sugar maple, red maple, green ash, northern red oak, and paper birch.

A 0.3-g transmitter (172.375) was attached to the bat, an aluminum wing band NYSDEC 34434 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 15 days (4 August - 18 August). Over the lifespan of the transmitter, the bat was successfully tracked for 11 bat days and a single artificial roost structure was located (Table 18).

On 4 August, Copperhead Consulting triangulated the bat between Pleasant Road and Sycamore Road, near Gardnerville Road. Because the signal was not heard until late in the day on 4 August, Copperhead Consulting was unable to locate the roost. On 5 August, the bat was located in roost RT01_EPFU 34434 (a house in Evans Mills, NY), 3211 meters away from the capture site. The bat used this house for 12 consecutive days. An exit count was not conducted on 5 August due to a failure to gain land access. Access was granted on 6 August and an exit count conducted that evening documented four bats exiting. Exit counts conducted on 7 August observed four bats emerging, three bats exited on 8 August, four bats exited on 9 August, three bats exited on 10 August, three bats exited on 11 August, two bats emerged on 12 August, and two bats were observed to exit on 13 August. On 14 and 15 August, the bat was searched for via air and ground crews but was not located. On 16 August, the bat was located back in roost RT01_EPFU_34434. The exit count conducted on 16 August documented two bats exiting the roost. Due to the length of time the bat roosted in the house and lack of new meaningful biological data obtained via exit counts, and to maintain good relations between the property owners and Fort Drum, the COR recommended all subsequent exit counts be stopped. From that time, the bat's presence in the roost was checked from the road after emergence. On 17 August, the roost was checked after emergence and the bat had left the roost. On 18 August, the roost was checked after emergence and the transmitter remained in the roost. The assumption was made that the bat had shed the transmitter in the roost and tracking efforts were concluded with COR approval.

Table 18. Big brown bat (bat EPFU_34434) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34434	RT01_EPFU_34434	5-Aug	-	House/Cavity	-	-	10	-	0	*	*
34434	RT01_EPFU_34434	6-Aug	-	House/Cavity	-	-	10	-	0	4	Yes
34434	RT01_EPFU_34434	7-Aug	-	House/Cavity	-	-	10	-	0	4	Yes
34434	RT01_EPFU_34434	8-Aug	-	House/Cavity	-	-	10	-	0	3	Yes
34434	RT01_EPFU_34434	9-Aug	-	House/Cavity	-	-	10	-	0	4	Yes
34434	RT01_EPFU_34434	10-Aug	-	House/Cavity	-	-	10	-	0	3	Yes
34434	RT01_EPFU_34434	11-Aug	-	House/Cavity	-	-	10	-	0	3	Yes
34434	RT01_EPFU_34434	12-Aug	-	House/Cavity	-	-	10	-	0	2	Yes
34434	RT01_EPFU_34434	13-Aug	-	House/Cavity	-	-	10	-	0	2	Yes
34434	RT01_EPFU_34434	16-Aug	-	House/Cavity	-	-	10	-	0	2	Yes
34434	RT01_EPFU_34434	17-Aug	-	House/Cavity	-	-	10	-	0	-	Yes**
34434	RT01_EPFU_34434	18-Aug	-	House/Cavity	-	-	10	-	0	-	No**

Cavity is defined as a hollow space inside of a roost

* Exit count not performed due to lack of land owner permission

** Exit count not performed, transmitter presence in roost was checked from the road after emergence.



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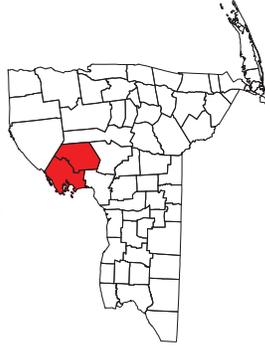
Fort Drum Bat Surveys

Summer 2015

Bat 34434

Eptesicus fuscus

Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Non-continuous Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:18,000
 or
 1 inch = 1,500 feet

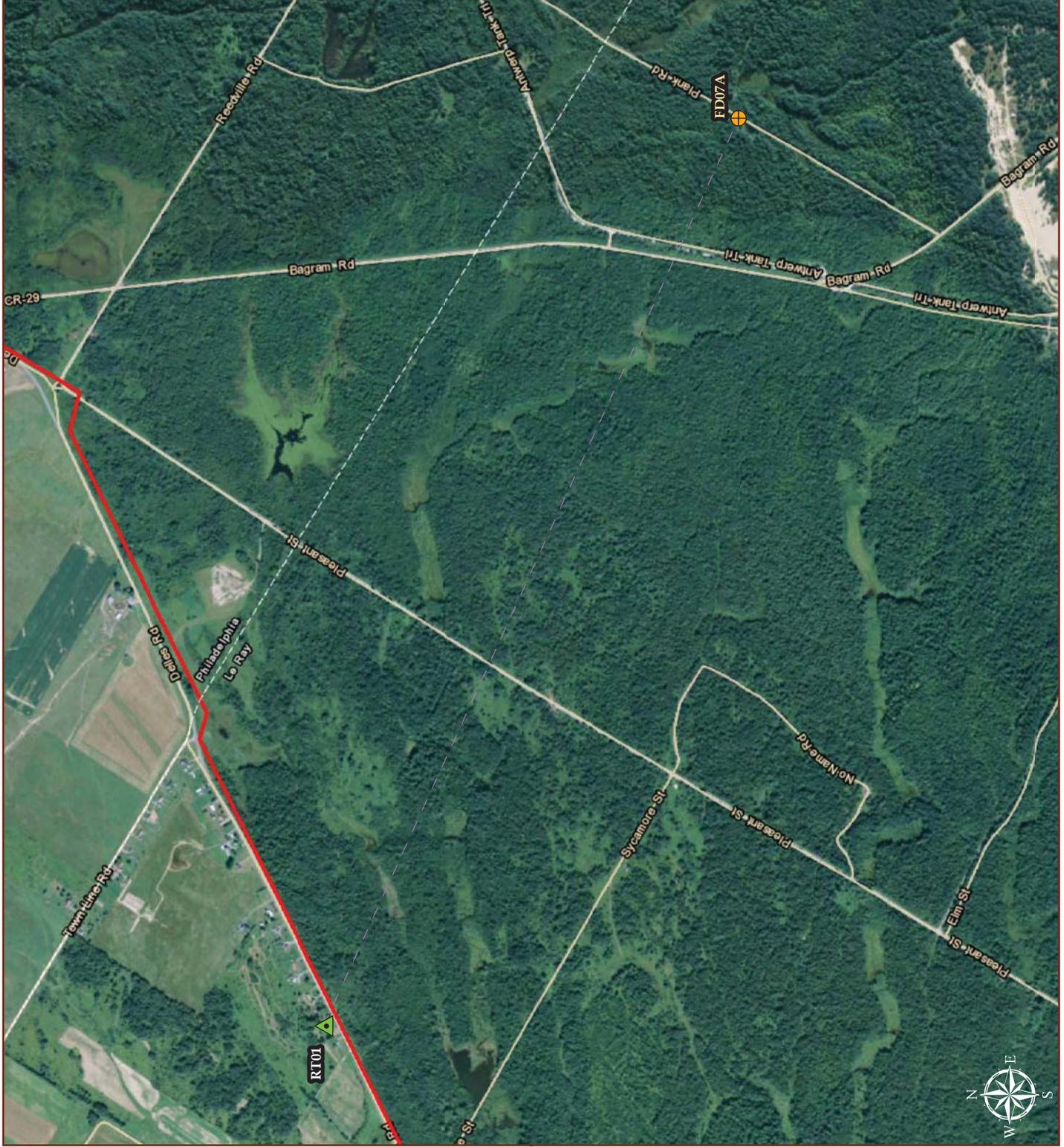


Figure 18. Capture site and roost location for bat EPFU_34434 tracked 4 Aug - 18 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34365

Bat EPFU_34365 was an adult post lactating female big brown bat captured at site FD10 (Figure 19) at 2120h on the night of 3 August. The mist net was placed across a wooded trail and the bat was caught two meters above the ground in a 9 m (29.6) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of sugar maple, red pine (*Pinus resinosa*), yellow birch, white oak (*Quercus alba*), and American beech.

A 0.3-g transmitter (172.076) was attached to the bat, an aluminum wing band NYSDEC 34365 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 18 days (4 August - 21 August). Over the lifespan of the transmitter, the bat was successfully tracked for 15 bat days and six roost trees of three species were located (eastern white pine, black cherry, unidentifiable maple, Table 19).

On 4 August, the bat was searched for by ground crew but no signal was heard. The bat was first located 5 August in roost RT01_EPFU_34365, 276 meters away from the capture site. An exit count conducted that evening observed only the focal bat emerging. On 6 August, the bat was located 85 meters away in RT02_EPFU_34365 and the bat roosted here for five consecutive days (6 August - 10 August). Exit counts conducted each evening over this period observed only the focal bat emerged from the roost. On 11 August, the bat was located 58 meters away in RT03_EPFU_34365. During the exit count the focal bat was not seen emerging, but it was assumed to have emerged based on signal strength. No other bats were seen exiting. On 12 August, the bat was located 555 meters away in RT04_EPFU_34365 where only the focal bat was observed to emerge. On 15 August, the bat was located 637 meters away in RT05_EPFU_34365. The bat used this tree for six days. During exit counts conducted on 15, 16, and 17 August, only the focal bat was observed to emerge. On 18 August, two bats emerged and on 19 August only the focal bat was observed to emerge. No exit count was performed on 20 August due to heavy rain at emergence. On 21 August, the bat was located 131.6 meters away in RT06_EPFU_34365. An exit count conducted on 21 August did not observe the bat leaving the roost and the transmitter remained in the tree after emergence. Tracking efforts were concluded on 21 August with COR approval.

Table 19. Big brown bat (bat EPFU_34365) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34365	RT01_EPFU_34365	5-Aug	<i>Pinus strobus</i>	Cavity	5	46.8	15	0	0	1	Yes
34365	RT02_EPFU_34365	6-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1	Yes
34365	RT02_EPFU_34365	7-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1	Yes
34365	RT02_EPFU_34365	8-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1	Yes
34365	RT02_EPFU_34365	9-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1	Yes
34365	RT02_EPFU_34365	10-Aug	<i>Pinus strobus</i>	Crevice	4	45.4	15	5	55	1	Yes
34365	RT03_EPFU_34365	11-Aug	<i>Prunus serotina</i>	Bark	4	41.5	*	20	*	1	Yes
34365	RT04_EPFU_34365	12-Aug	<i>Acer sp.</i>	Cavity	5	40.2	19	0	15	1	Yes
34365	RT05_EPFU_34365	15-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	1	Yes
34365	RT05_EPFU_34365	16-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	1	Yes
34365	RT05_EPFU_34365	17-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	1	Yes
34365	RT05_EPFU_34365	18-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	2	Yes
34365	RT05_EPFU_34365	19-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	1	Yes
34365	RT05_EPFU_34365	20-Aug	<i>Prunus serotina</i>	Cavity	5/6	44.5	6	0	10	-	**
34365	RT06_EPFU_34365	21-Aug	<i>Prunus serotina</i>	Cavity	3/6	42.2	*	0	*	0	No

Cavity is defined as a hollow space inside of a roost; Crevice is defined as a narrow split or crack

* Exact roost location not observed

** Exit count not done due to heavy rain at emergence



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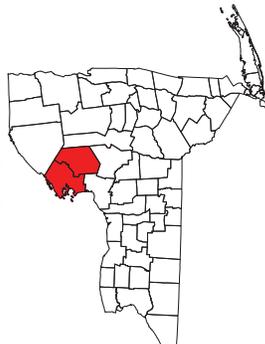
Fort Drum Bat Surveys

Summer 2015

Bat 34365

Epptesicus fuscus

Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System:
WGS 1984 UTM Zone
18N
Projection: Transverse
Mercator
Datum: WGS 1984
Sources: Fort Drum,
USDA, ESRI, USGS
Date: 10/2/2015

1:4,000
or
1 inch = 333 feet



Figure 19. Capture site and roost locations for bat EPPU_34365 tracked 4 Aug - 21 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34401

Bat EPFU_34401 was an adult post lactating female big brown bat captured at site FD21 (Figure 20) at 2146 h on the night of 19 July. The mist net was placed across Black Creek and the bat was caught at a height of 3.5 meters in a 9 m (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of red maple, eastern white pine, eastern hemlock, sugar maple, and black cherry.

A 0.3-g transmitter (172.859) was attached to the bat, an aluminum wing band NYSDEC 34401 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 13 days (20 July - 1 August). Over the lifespan of the transmitter, the bat was successfully tracked for 10 bat days and a single artificial roost structure was located (Table 20).

On 20 July, the bat was first located in roost RT01_EPFU_34332/34401 (a house in Carthage, NY), 4197 meters from the capture site. Bat EPFU_34332 also used this roost during this time. Bat EPFU_34401 used this roost from 20 July to 1 August when the transmitter was assumed to have been shed by the bat. On 20 July, Copperhead Consulting was denied access by the property owner to perform an exit count. Permission was granted 21 July until the end of the project. On 21 July, 31 bats emerged, 54 bats emerged on 22 July, 53 emerged on 23 July, 51 emerged on 24 July, 28 emerged on 25 July, 22 emerged on 26 July, 23 emerged on 27 July, 34 emerged on 28 July, 17 emerged on 29 July, 14 emerged on 30 July, and 22 emerged on 31 July. The transmitter did not leave the roost during exit counts conducted on 30 and 31 July. On 1 August, Copperhead Consulting confirmed the transmitter to still be in the house and assumed the bat had shed the transmitter in the roost. Tracking efforts were concluded With COR approval on 1 August.

Table 20. Big brown bat (bat EPFU_34401) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34401	RT01_EPFU_34332/34401	20-Jul	-	House	-	-	8	-	10	*	*
34401	RT01_EPFU_34332/34401	21-Jul	-	House	-	-	8	-	10	31	Yes
34401	RT01_EPFU_34332/34401	22-Jul	-	House	-	-	8	-	10	54	Yes
34401	RT01_EPFU_34332/34401	23-Jul	-	House	-	-	8	-	10	53	Yes
34401	RT01_EPFU_34332/34401	24-Jul	-	House	-	-	8	-	10	51	Yes
34401	RT01_EPFU_34332/34401	25-Jul	-	House	-	-	8	-	10	28	Yes
34401	RT01_EPFU_34332/34401	26-Jul	-	House	-	-	8	-	10	22	Yes
34401	RT01_EPFU_34332/34401	27-Jul	-	House	-	-	8	-	10	23	Yes
34401	RT01_EPFU_34332/34401	28-Jul	-	House	-	-	8	-	10	34	Yes
34401	RT01_EPFU_34332/34401	29-Jul	-	House	-	-	8	-	10	17	Yes
34401	RT01_EPFU_34332/34401	30-Jul	-	House	-	-	8	-	10	14	No
34401	RT01_EPFU_34332/34401	31-Jul	-	House	-	-	8	-	10	22	No
34401	RT01_EPFU_34332/34401	1-Aug	-	House	-	-	8	-	10	**	**

* Access was denied for exit count on 20 July 2015.

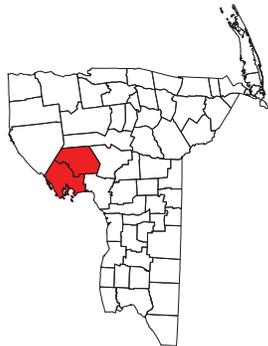
** No exit count was conducted on 1 August 2015.



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Fort Drum Bat Surveys Summer 2015

Bat 34401
Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:24,000
 or
 1 inch = 2,000 feet

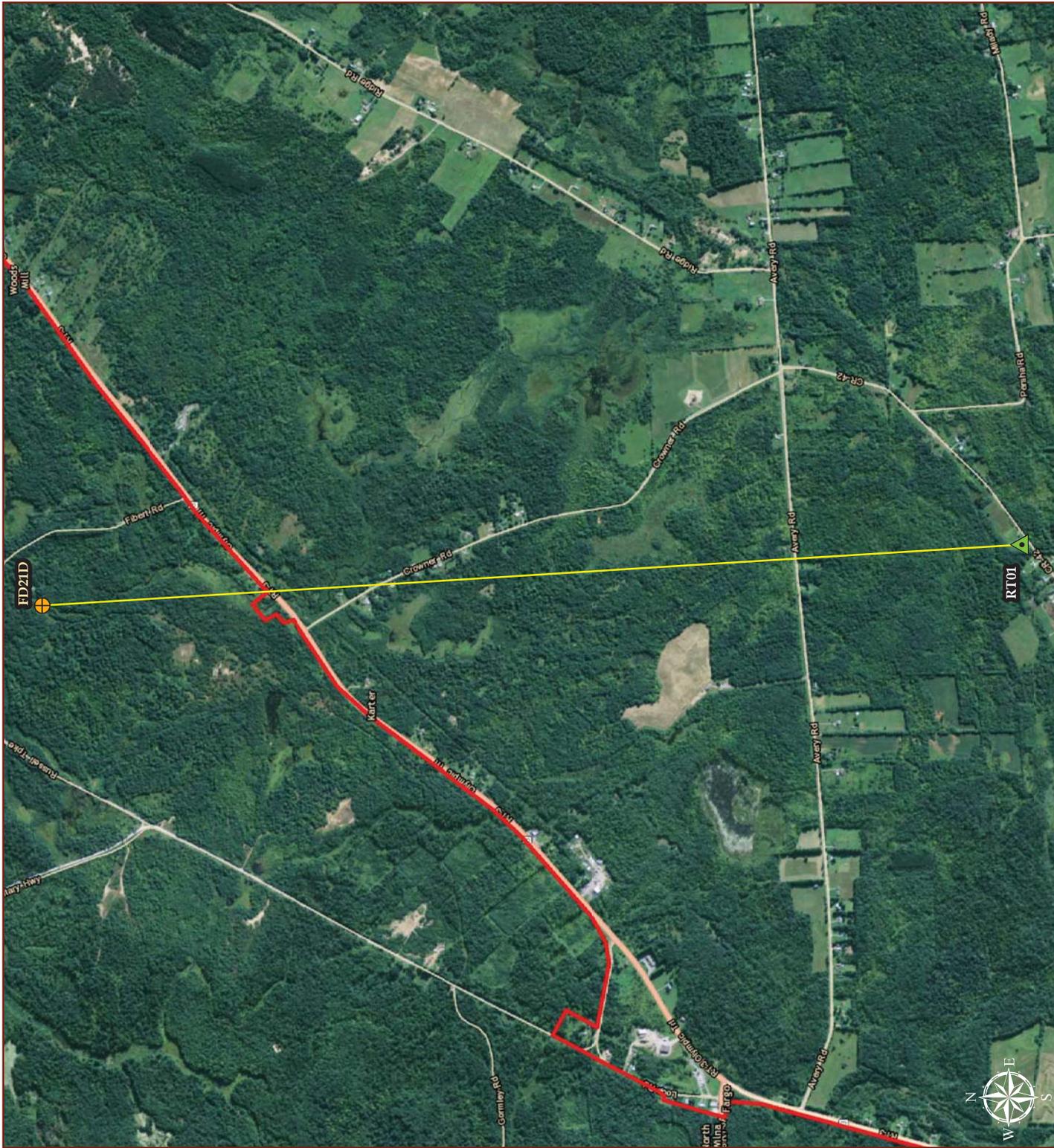


Figure 20. Capture site and roost location for bat EPFU_34401 tracked 20 Jul - 1 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34332

Bat EPFU_34332 was an adult post lactating female big brown bat captured at site FD20 (Figure 21) at 2130 h on the night of 20 July. The mist net was placed across a wooded trail and the bat was caught two meters above the ground in a 6 m (19.8 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of sugar maple, red maple, eastern hemlock, and American beech.

A 0.3-g transmitter (172.921) was attached to the bat, an aluminum wing band NYSDEC 34332 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 12 days (21 July - 1 August). Over the lifespan of the transmitter, the bat was successfully tracked for eight bat days and a single artificial roost structure was located (Table 21).

On 21 July, the bat was first located in roost RT01_EPFU_34332/34401, 4160 meters from the capture site. Bat EPFU_34401 also used this roost during this time. Bat EPFU_34332 used this house from 21 July to 28 July. On 21 July, 31 bats emerged, 54 bats emerged on 22 July, 53 emerged on 23 July, 51 emerged on 24 July, 28 emerged on 25 July, 22 emerged on 26 July, 23 emerged on 27 July, and 34 emerged on 28 July (Table 21). On 29 July, bat EPFU_34332 was not heard in the roost and was not searched for. The bat was searched for by ground crews on 30 - 31 July, and 1 August, and again via the air on 7 and 8 August (upon the planes return to the study area) but no signal was heard. Tracking efforts were concluded with COR approval on 8 August.

Table 21. Big brown bat (bat EPFU_34332) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

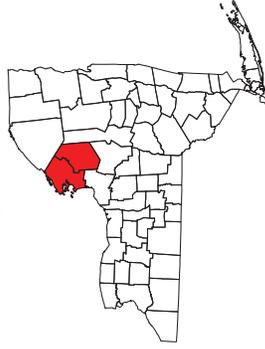
Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34332	RT01_EPFU_34332/34401	21-Jul	-	House	-	-	8	-	10	31	Yes
34332	RT01_EPFU_34332/34401	22-Jul	-	House	-	-	8	-	10	54	Yes
34332	RT01_EPFU_34332/34401	23-Jul	-	House	-	-	8	-	10	53	Yes
34332	RT01_EPFU_34332/34401	24-Jul	-	House	-	-	8	-	10	51	Yes
34332	RT01_EPFU_34332/34401	25-Jul	-	House	-	-	8	-	10	28	Yes
34332	RT01_EPFU_34332/34401	26-Jul	-	House	-	-	8	-	10	22	Yes
34332	RT01_EPFU_34332/34401	27-Jul	-	House	-	-	8	-	10	23	Yes
34332	RT01_EPFU_34332/34401	28-Jul	-	House	-	-	8	-	10	34	Yes



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Fort Drum Bat Surveys Summer 2015

Bat 34332
Eptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:24,000
 or
 1 inch = 2,000 feet

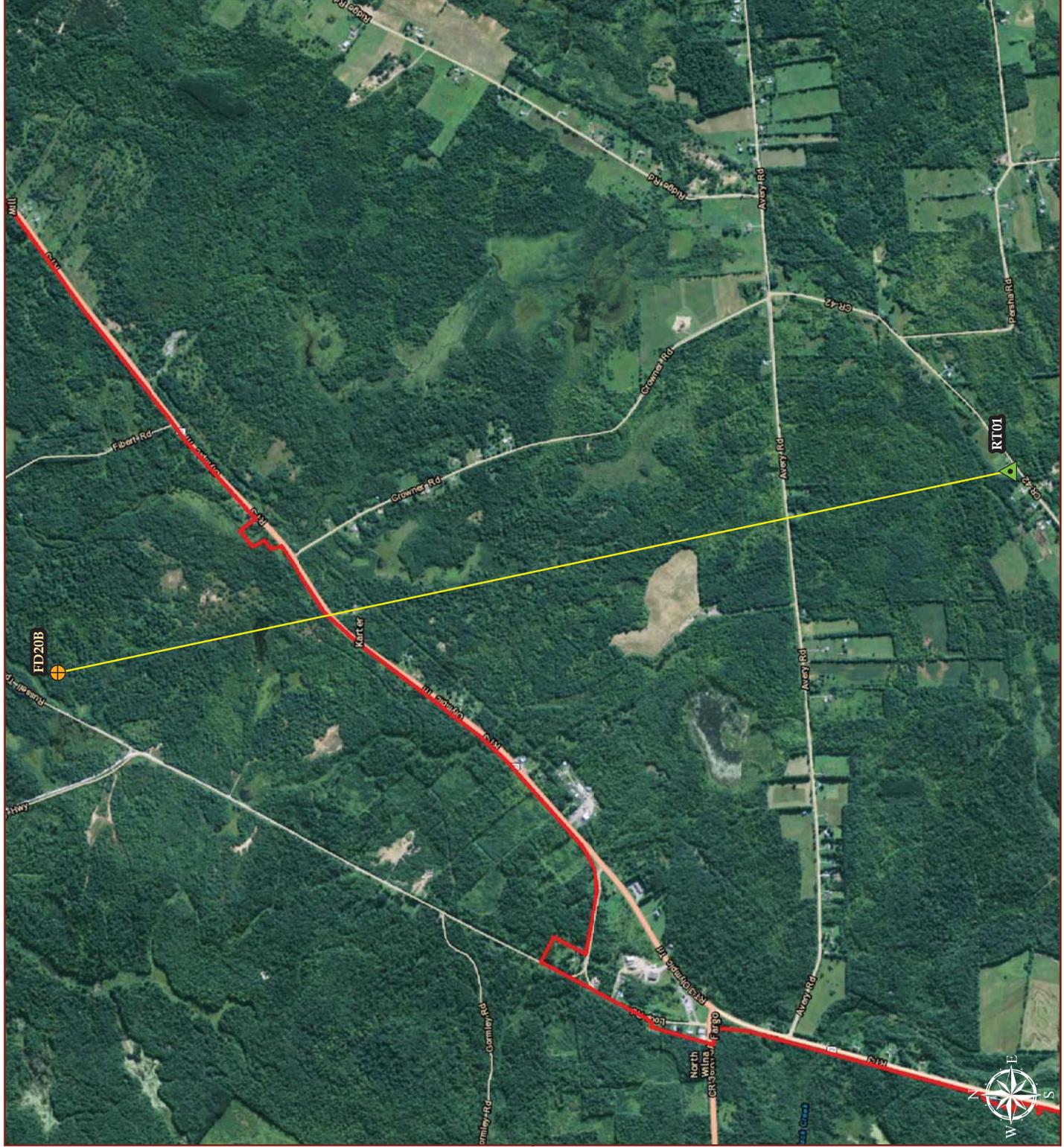


Figure 21. Capture site and roost location for bat EPFU_34332 tracked 21 Jul - 1 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34729

Bat EPFU_34729 was an adult post lactating female big brown bat originally captured at site FD15 on 4 July and aluminum wing band NYSDEC 34729 was placed on the left forearm. Bat EPFU_34729 was captured again at site FD15 (Figure 22) at 2105 h on the night of 3 August at which time a radio transmitter was attached to the bat. The mist net was placed across a wooded trail and the bat was caught three meters above the ground in a 9 m (29.6) x 7.8 m (25.7 ft) net set. The surrounding dominant vegetation consisted of sugar maple, and northern red oak.

A 0.3-g transmitter (172.694) was attached to the bat, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of five days (4 August - 8 August). Over the lifespan of the transmitter, the bat was successfully tracked for three bat days and a single artificial roost was located (Table 22).

The bat was first located on 4 August in roost RT01_EPFU_34729 (a house in Wilna, NY), 1611 meters away from the capture site and the bat used this house as a day roost for five consecutive days. An exit count was not completed 4 August due to lack of property owner permission (Table 22). On 5 August, the bat was observed to roost inside the northwest facing corner of the house. During the exit count, the transmitter seemed to be moving inside the roost but a heavy rain at 2045 h caused the bat to stop moving. Prior to the rain, four bats emerged and after the rain began, no bats were observed leaving the roost. The focal bat was not heard leaving the roost. On 6 August, the bat was roosting inside the southwest corner of the house. During the exit count, the transmitter seemed to be moving inside of the roost but the bat was never observed to emerge. Eleven bats emerged during this exit count. On 7 and 8 August, seven bats emerged and the transmitter did not appear to be moving in the roost. Copperhead Consulting assumed the bat had shed the transmitter in the roost and with COR approval, tracking efforts were concluded.

Table 22. Big brown bat (bat EPFU_34729) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34729	RT01_EPFU_34729	4-Aug	-	House/Cavity	-	-	5	-	-	-	*
34729	RT01_EPFU_34729	5-Aug	-	House/Cavity	-	-	5	-	-	4	No**
34729	RT01_EPFU_34729	6-Aug	-	House/Cavity	-	-	5	-	20	11	No**
34729	RT01_EPFU_34729	7-Aug	-	House/Cavity	-	-	5	-	20	7	No
34729	RT01_EPFU_34729	8-Aug	-	House/Cavity	-	-	5	-	20	7	No

Cavity is defined as a hollow space inside of a roost

* Access was denied for exit count on 4 August 2015.

** Bat sounded to be moving in the roost but never emerged

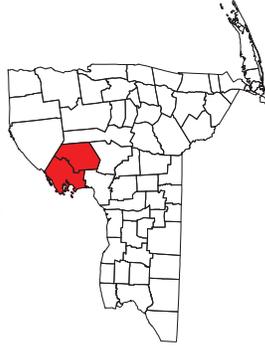


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Fort Drum Bat Surveys Summer 2015

Bat 34729

Epptesicus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System:
WGS 1984 UTM Zone
18N
Projection: Transverse
Mercator
Datum: WGS 1984
Sources: Fort Drum,
USDA, ESRI, USGS
Date: 10/2/2015

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or
1 inch = 1,000 feet

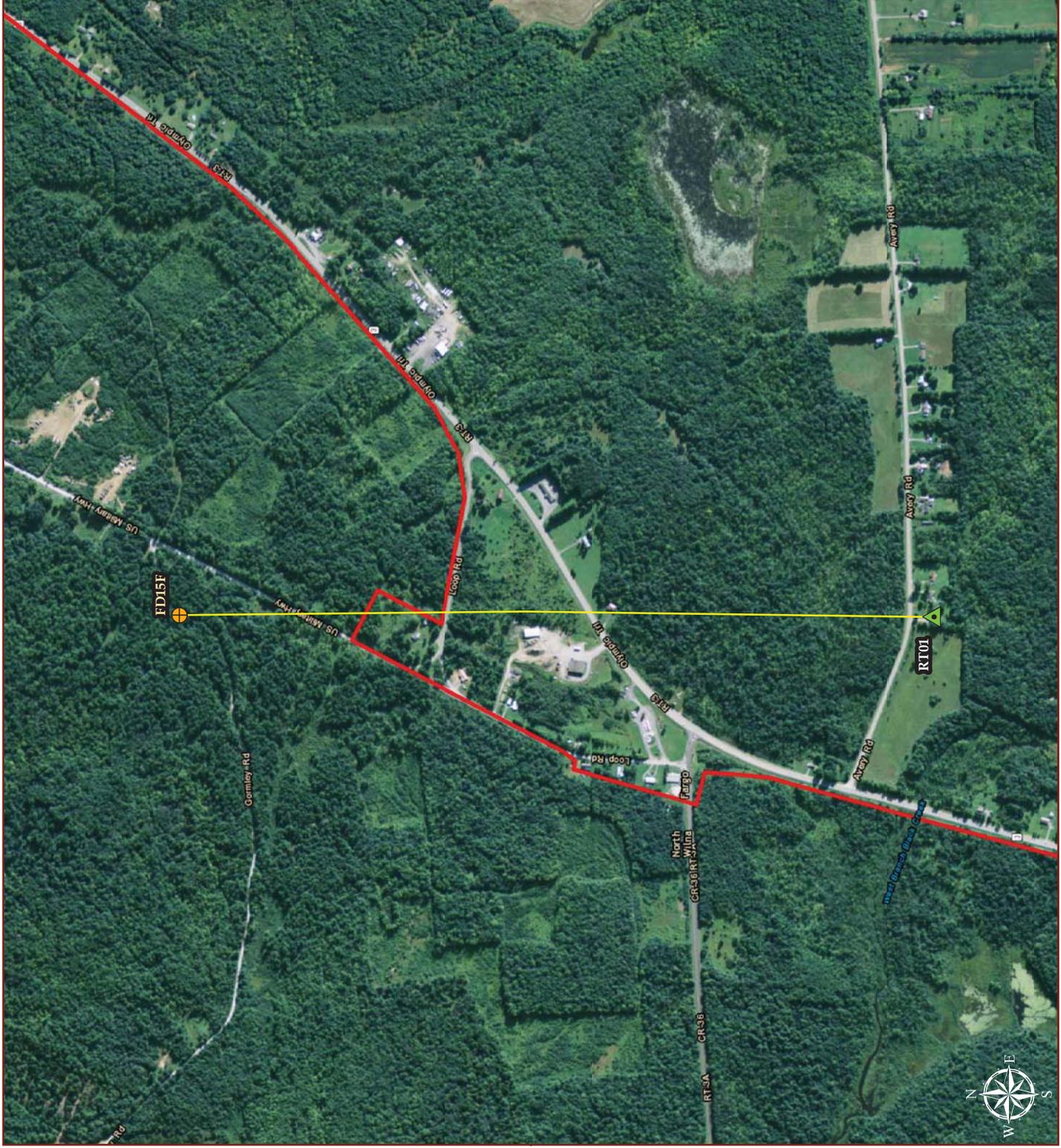


Figure 22. Capture site and roost location for bat EPFU_34729 tracked 4 Aug - 8 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat EPFU_34403

Bat EPFU_34403 was an adult lactating female big brown bat captured at site FD21 (Figure 23 and 24) at 2146 h on the night of 19 July. The mist net was placed across a wooded creek and the bat was caught at a height of 2 meters in a 9 m (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominant vegetation consisted of red maple, sugar maple, eastern white pine, eastern hemlock, and black cherry.

A 0.3-g transmitter (172.528) was attached to the bat, an aluminum wing band NYSDEC 34403 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 14 days (20 July - 2 August). Over the lifespan of the transmitter, the bat was successfully tracked for seven bat days and six roost trees of three species were located (sugar maple, American beech, white ash) (Table 23).

The bat was first located via aircraft on 20 July near Strong Road, southeast of Natural Bridge, NY (18T 0461661 4876861). Ground crews searched the area from nearby roads but no signal was heard. Aerial and ground searches for the bat on 21 July failed to hear the signal. On 22 and 23 July, the bat was heard by the plane near Strong Road but was not heard by the ground crew from the surrounding roads or by walking to the position estimated by the plane. The bat was located on 24 July in roost RT01_EPFU_34403 6304 meters away from the capture site. An exit count conducted on 24 July documented 41 bats emerging. On 25 July, the bat was located 122 meters away in roost RT02_EPFU_34403. An exit count conducted on 25 July did not observe the focal bat emerging, but its emergence was assumed based on signal strength. No other bats were seen emerging. On 26 July, the bat was located 211 meters away in roost RT03_EPFU_34403. Exit counts conducted on 26 July and 27 July documented 36 and 34 bats emerging, respectively. On 28 July, the bat was located 212 meters away in roost RT04_EPFU_34403. An exit count conducted on 28 July observed only the focal bat emerging. On 29 July, the bat was located 438 meters away in RT05_EPFU_34403 where five bats emerged. On 30 July, the bat was located 21 meters away in roost RT06_EPFU_34403. The bat used this tree four days (30 July - 2 August). Exit counts conducted during this time observed 16 bats emerging on 30 July, 31 bats on 31 July, and 12 bats on 1 August. The transmitter was not observed to leave the roost during exit counts conducted on 31 July and 1 August. On 2 August, Copperhead Consulting confirmed the transmitter to still be in the tree and assumed the bat had shed the transmitter in the roost. Tracking efforts were concluded with COR approval on 2 August.

Table 23. Big brown bat (bat EPFU_34403) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34403	RT01_EPFU_34403	24-Jul	<i>Acer saccharum</i>	Cavity	5	42.7	9	40	20	41	Yes
34403	RT02_EPFU_34403	25-Jul	<i>Acer saccharum</i>	Cavity	2	32.7	10	0	*	1	Yes
34403	RT03_EPFU_34403	26-Jul	<i>Fagus grandifolia</i>	Cavity	6	52.1	6	30	5	36	Yes
34403	RT03_EPFU_34403	27-Jul	<i>Fagus grandifolia</i>	Cavity	6	52.1	6	30	5	34	Yes
34403	RT04_EPFU_34403	28-Jul	<i>Fraxinus americana</i>	Unknown	2	67.6	10	5	75	1	Yes
34403	RT05_EPFU_34403	29-Jul	<i>Acer saccharum</i>	Cavity	2	46.9	11	5	25	5	Yes
34403	RT06_EPFU_34403	30-Jul	<i>Fraxinus americana</i>	Crevice	1	45.5	6	0	30	16	Yes
34403	RT06_EPFU_34403	31-Jul	<i>Fraxinus americana</i>	Crevice	1	45.5	6	0	30	31	No
34403	RT06_EPFU_34403	1-Aug	<i>Fraxinus americana</i>	Crevice	1	45.5	6	0	30	12	No
34403	RT06_EPFU_34403	2-Aug	<i>Fraxinus americana</i>	Crevice	1	45.5	6	0	30	**	**

Cavity is defined as a hollow space inside of a roost; Crevice is defined as a narrow split or crack

* Exact roost location not observed

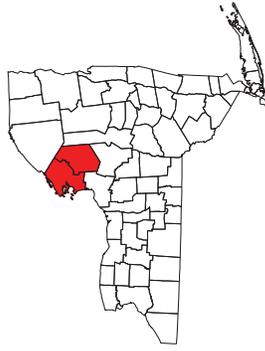
** No exit count was conducted on 2 August 2015.



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Fort Drum Bat Surveys Summer 2015

Bat 34403
Epistiscus fuscus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates: WGS 1984
System: UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/27/2015

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or
1 inch = 3,000 feet

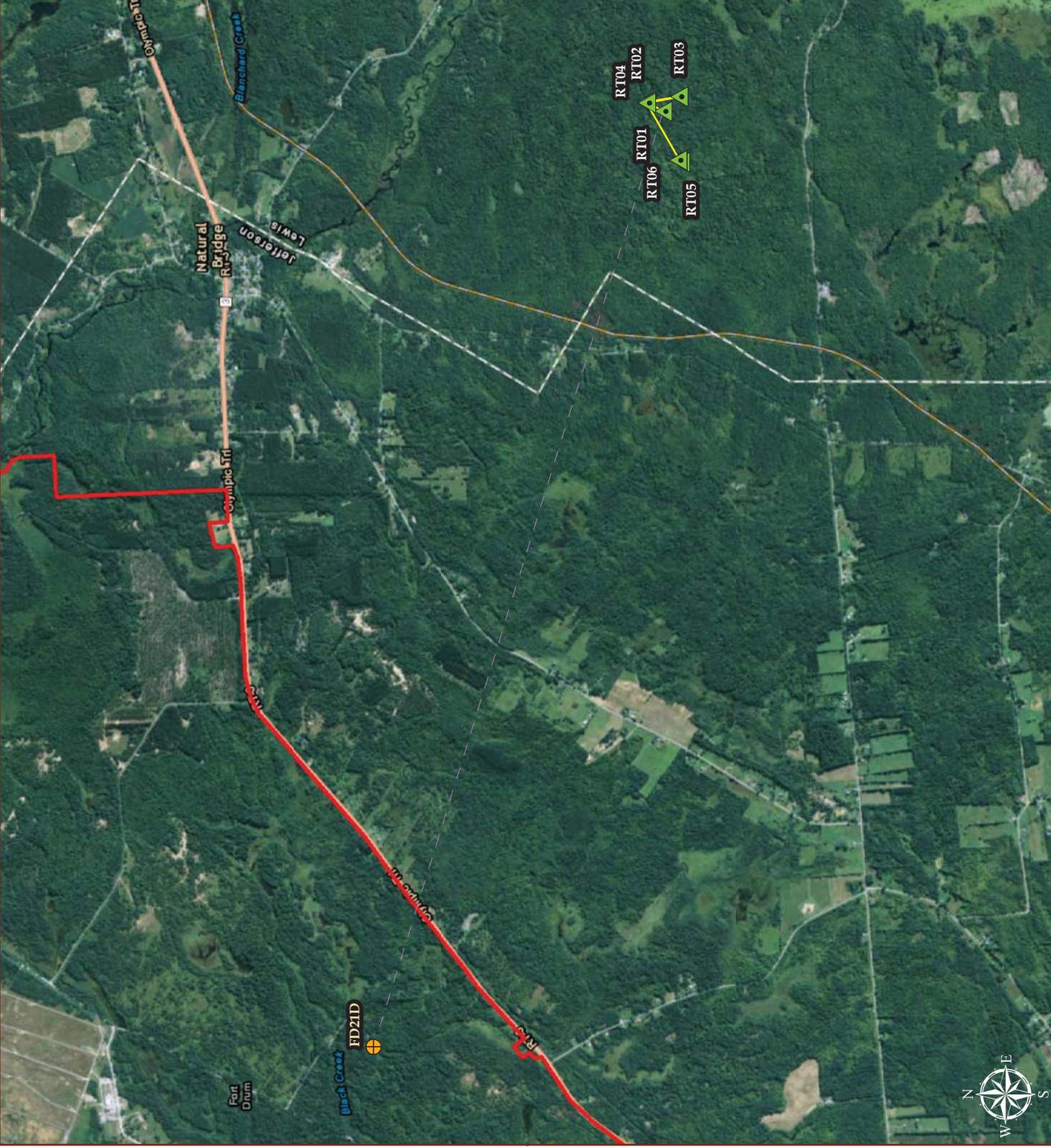


Figure 23. Capture site and roost locations for bat EPFU_34403 tracked 20 Jul - 2 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



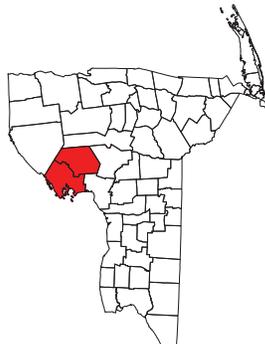
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Fort Drum Bat Surveys

Summer 2015

Bat 34403

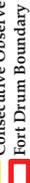
Eptesicus fuscus



Jefferson and Lewis
Counties, New York



Consecutive Observed Movement



Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/27/2015

1:2,400
or
1 inch = 200 feet

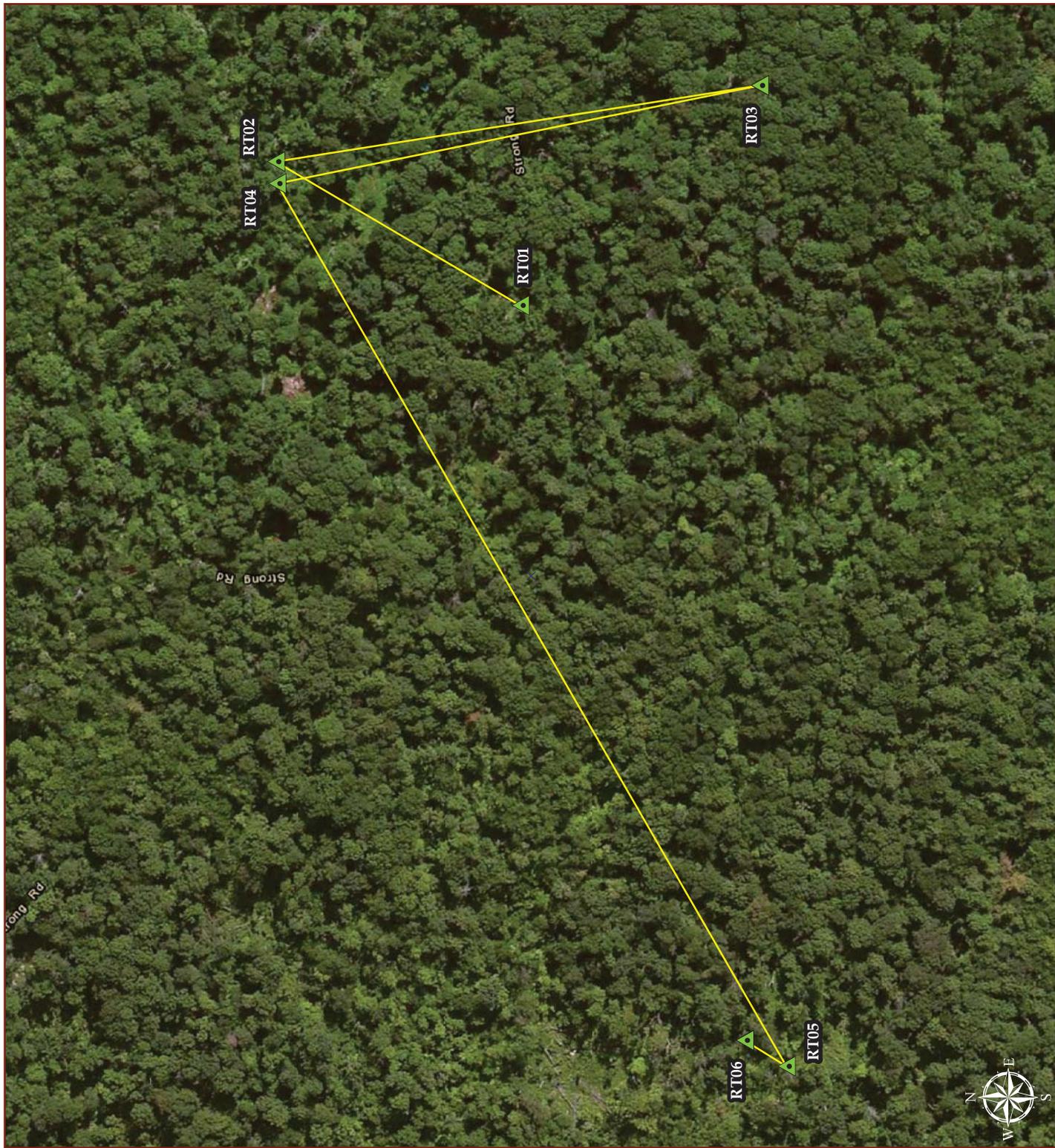


Figure 24. Roost locations (zoomed view) for bat EPFU_34403 tracked 20 Jul - 2 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Radio-tagged little brown bats

Six little brown bats were fitted with radio transmitters during the Fort Drum Mist Net Survey. Four of the bats were adult female and two of the bats were juvenile males. Radio-tagged little brown bats spent a total of 27 bat days in 11 roosts, switched roosts a total of nine times, and spent an average of 1.4 consecutive days in a particular roost before moving. Six roosts were located in artificial structures and five were found in trees consisting of two species (red maple and American elm). All five of the natural roosts documented for focal little brown bats were bark roosts. Little brown bats roosting in artificial structures switched roosts on average 1.25 times per bat and bats roosting in trees switched on average 4 times per bat. A total of 26 emergence counts were conducted.

Little brown bats found roosting in artificial structures traveled an average distance of 3480 meters from their capture site to their first located roost with an average distance of 2943 meters between roosts. Little brown bats found roosting in trees traveled an average distance of 1513 meters from their capture site to their first located roost with an average distance of 345 meters between roosts. The maximum observed distance a little brown bat traveled was 14590 meters (bat MYLU_34407).

Bat MYLU_34362

Bat MYLU_34362 was a juvenile non-reproductive male little brown bat captured at site FD03 (Figure 25 and 26) at 0015 h on the night of 2 August. The mist-net was placed across a wooded trail leading from an open field to an opening in the woodlot and the bat was caught 0.5 meters above the ground in a 12 m (39.4 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of red maple, bitternut hickory (*Carya cordiformis*), and Northern red oak.

A 0.3-g transmitter (172.438) was attached to the bat, an aluminum wing band NYSDEC 34362 was placed on the right forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 12 days (3 - 5 August and 7 - 15 August). Over the lifespan of the transmitter, the bat was successfully tracked for six bat days and five roost trees of two species were located (red maple and American elm, Table 24).

The bat was searched for by ground crews on 3 August to 5 August. The plane returned to the study area 6 August but was unable to fly due to unfavorable weather conditions. Aerial searches were resumed for the bat on 7 August. On 8 August, the bat was first located in roost tree RT01_MYLU_34362, 1513 meters from the capture site. The bat used this tree on 8 August and 9 August and two bats were observed to exit the roost each night. On 10 August, the bat was found in RT02_MYLU_34362, 15 meters away and two bats were observed to exit the roost that evening. On 11 August, the bat was found in RT03_MYLU_34362, 244 meters away. The bat was not observed leaving the roost and the bat was not heard leaving the roost due to telemetry equipment failure.

On 12 August, the bat was found in roost tree RT04_MYLU_34362, 492 meters away and an emergence count conducted that evening observed only the focal bat exiting the roost. On 13 August, the bat was located via the plane south of its previous roost in training area 17B. The bats estimated position obtained by the plane proved inaccurate due to the high elevation that was required for flight by Fort Drum Range Control and Wheeler-Sack Army Airfield and ground crews were ultimately unsuccessful in acquiring the signal. On 14 August, the bat was located in RT05_MYLU_34362, 630 meters away from roost tree RT04_MYLU_34362 and emergence counts conducted that evening observed only the focal bat emerging. On 15 August, the transmitter was found on the ground west of Spragueville Road (18T 0453484 4897994) and radio-tracking was concluded.

Table 24. Little brown bat (bat MYLU_34362) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy			Transmitter Exited Roost
									Closure (% at Roost)	Exit Count #		
34362	RT01_MYLU_34362	8-Aug	<i>Acer rubrum</i>	Bark	4	15.8	4	30	0	2		Yes
34362	RT01_MYLU_34362	9-Aug	<i>Acer rubrum</i>	Bark	4	15.8	4	30	0	2		Yes
34362	RT02_MYLU_34362	10-Aug	<i>Acer rubrum</i>	Bark	4	25.8	1.5	70	0	2		Yes
34362	RT03_MYLU_34362	11-Aug	<i>Ulmus americana</i>	Bark	4	24.5	*	35	*	0		**
34362	RT04_MYLU_34362	12-Aug	<i>Ulmus americana</i>	Bark	3/4	33.3	9	5	15	1		Yes
34362	RT05_MYLU_34362	14-Aug	<i>Acer rubrum</i>	Bark	4/6	14.5	1.5	50	0	1		Yes

* Exact roost location not observed

** Bat not heard leaving roost due to receiver equipment issues



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Fort Drum Bat Surveys Summer 2015

Bat 34362
Myotis lucifugus
Juvenile Male



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:8,000
 or
 1 inch = 667 feet



Figure 25. Capture site and roost locations for bat MYLU_34362 tracked 3 - 5 Aug and 7 - 15 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.



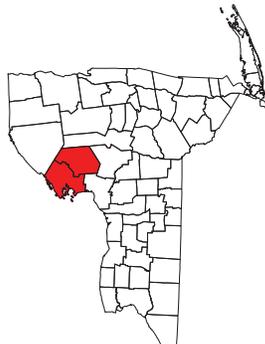
COPPERHEAD
ENVIRONMENTAL CONSULTING

Fort Drum Bat Surveys

Summer 2015

Bat 34362

Myotis lucifugus



Jefferson and Lewis
Counties, New York

- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System:
WGS 1984 UTM Zone
18N
Projection: Transverse
Mercator
Datum: WGS 1984
Sources: Fort Drum,
USDA, ESRI, USGS
Date: 10/2/2015

1:4,000
or
1 inch = 333 feet



Figure 26. Roost trees (zoomed view) for bat MYLU_34362 tracked 3 - 5 Aug and 7 - 15 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat MYLU_34363

Bat MYLU_34363 was a juvenile non-reproductive male little brown bat captured at site FD03 (Figure 27) at 0055 h on the night of 2 August. The mist net was placed across a wooded trail leading from an open field to an opening in the woodlot and the bat was caught 4.5 meters above the ground in a 12 m (39.4 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of red maple, bitternut hickory, and Northern red oak.

A 0.3-g transmitter (172.406) was attached to the bat, an aluminum wing band NYSDEC 34363 was placed on the right forearm, digital photographs were taken, and the bat was released near the capture site. Tracking efforts were conducted via ground and air for a total of nine days (3 - 5 August, 7 - 11 August, and 13 August). While the bat was located by the plane, no roost trees were located over the lifespan of the transmitter.

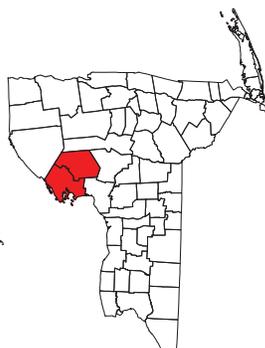
The bat was searched for by ground crews on 3 August to 5 August. The plane returned to the study area on 6 August but was unable to fly due to unfavorable weather conditions. The plane resumed the search for the bat over 7 August to 9 August, but was unable to locate the signal. On 10 August, the bat was heard by the plane near 18T 0461385 4896257. The estimated position for the signal determined by the plane proved inaccurate due to the high elevation that was required for flight by Fort Drum Range Control and Wheeler-Sack Army Airfield. Copperhead Consulting hiked to 18T 461643 4896351 but was unable to hear the bat from the ground and lightning in the area stopped the team from proceeding further to the suspected roost location. On 11 August, a ground crew hiked to the suspected roost location found by the plane on 10 August, but the signal was not heard. The plane was unable to fly due to inclement weather on 11 and 12 August. On 13 August, the plane located the bat in the same area first observed on 10 August but the flight altitude was again too high for an accurate position estimate. The COR was consulted and the decision was made that, until the plane could fly at a lower altitude, Copperhead Consulting would not need to hike to the plane point again. On 14 and 15 August, the plane was not allowed to fly over the suspected roost area due to restricted airspace. The plane departed the study area 16 August. Due to the difficulty in obtaining accurate position estimates via the plane and the inability to hear the signal via the ground, radio-tracking was concluded with COR approval on 15 August.



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Fort Drum Bat Surveys Summer 2015

Bat 34363
Myotis lucifragus
Juvenile Male



Jefferson and Lewis
Counties, New York

- ▲ Estimated Roost Location from Plane
- Ground telemetry Point (08/10)
- ⊕ Capture Site
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
Projection: Transverse Mercator
Datum: WGS 1984
Sources: Fort Drum, USDA, ESRI, USGS
Date: 10/28/2015

1:36,000
or
1 inch = 3,000 feet



Figure 27. Capture site and telemetry points for bat MYLU_34363 tracked 3 - 5 Aug, 7 - 11 Aug, and 13 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat MYLU_34111

Bat MYLU_34111 was originally captured as an adult post-lactating female in 2012 at the LeRay Mansion bat house where aluminum wing band NYSDEC 34111 was placed on the left forearm as a part of Fort Drum's annual WNS monitoring program. Bat MYLU_34111 was captured again during the Fort Drum Mist Net Survey as an adult non-reproductive female little brown bat at site FD04 (Figure 28) at 0130 h on the night of 17 June at which time a radio transmitter was attached to the bat. The mist net was placed across a roadway and the bat was caught 2.5 meters above the ground in a 4 m (13.1 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of northern red oak, red maple, eastern hemlock, and yellow birch.

A 0.3-g transmitter (172.989) was attached to the bat, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground searches for a total of five days (18 June - 22 June). Over the lifespan of the transmitter, the bat was successfully tracked for three bat days and tracking efforts observed the bat to roost exclusively in the LeRay Mansion bat house (Table 25).

The bat was first located on 18 June in roost RT01_MYLU_34111 (LeRay Mansion bat house), 2483 meters away from the capture site. The bat used this roost for three days. Exit counts conducted on 18 June observed 107 bats emerging. Exits counts conducted on 19 June (rain occurred during emergence and many bats returned to the bat box) and 20 June observed 108 emerging each night. On 21 June, ground searches failed to locate the signal and on 22 June, the transmitter was found on the ground west of Pleasant Road (18T 0440336 4880367), thereby concluding radio-tracking efforts.

Table 25. Little brown bat (bat MYLU_34111) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

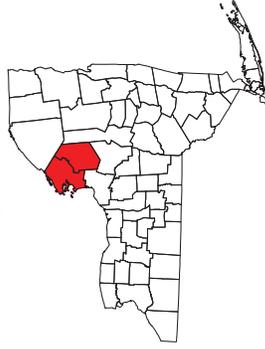
Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter	
											Exited	Roost
34111	RT01_MYLU_34111	18-Jun	-	Bat House	-	-	-	-	0	107	Yes	Yes
34111	RT01_MYLU_34111	19-Jun	-	Bat House	-	-	-	-	0	108	Yes	Yes
34111	RT01_MYLU_34111	20-Jun	-	Bat House	-	-	-	-	0	108	Yes	Yes



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Fort Drum Bat Surveys Summer 2015

Bat 34111
Myotis lucifugus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/2/2015

1:12,000
 or
 1 inch = 1,000 feet



Figure 28. Capture site and roost location for bat MYLU_34111 tracked 18 Jun - 22 Jun during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat MYLU_34407

Bat MYLU_34407 was an adult post lactating female little brown bat captured at site FD21 (Figure 29) at 2249 h on the night of 20 July. The mist net was placed across a wooded creek and the bat was caught 3.5 meters above the ground in a 9 (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of red maple, sugar maple, eastern white pine, eastern hemlock, and black cherry.

A 0.3-g transmitter (172.284) was attached to the bat, an aluminum wing band NYSDEC 34407 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and aerial telemetry for a total of 10 days (21 July - 30 July). Over the lifespan of the transmitter, the bat was successfully tracked for seven bat days and three artificial roosts were located (Table 26).

The bat was first found on 21 July in roost RT01_MYLU_34406/34407 (a church in Natural Bridge, NY), 5087 meters away from the capture site. An emergence count conducted that evening observed 118 bats exiting the roost. Bat MYLU_34406 also used this roost during this time. On 22 July, bat MYLU_34407 was heard from the plane near Carthage, New York. On 23 July, the bat again roosted in RT01_MYLU_34406/34407 for a second day and an emergence count documented 208 bats emerging. On 24 July, the bat was found 14590 meters away in roost RT02_MYLU_34407 (a garage in Carthage, NY). The landowner stated when he purchased the property, approximately 10 - 15 years prior, the garage contained a colony of roosting bats. He excluded the bats from the garage and hasn't observed bats roosting in the garage since. An exit count on 24 July observed only the focal bat leaving the roost. On 25 July, the bat was located 19 meters away in roost RT03_MYLU_34407 (another house in Carthage, NY). The bat used this roost for three consecutive days (25 July - 27 July) and exit counts conducted during this time observed only the focal bat emerging each night. On 28 July, the bat returned to roost RT02_MYLU_34407, 19 meters away and used this house for another three consecutive days (28 July - 30 July). An emergence count conducted on 28 July observed only the focal bat emerging. On 29 and 30 July, no bats emerged and the transmitter appeared to remained in the roost. The transmitter was assumed to have been shed by the bat in the roost and tracking efforts were concluded on 30 July with COR approval.

Table 26. Little brown bat (bat MYLU_34407) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34407	RT01_MYLU_34406/34407	21-Jul	-	Church	-	-	18	-	-	118	*
34407	RT01_MYLU_34406/34407	23-Jul	-	Church	-	-	18	-	-	208	Yes
34407	RT02_MYLU_34407	24-Jul	-	House	-	-	3.5	-	-	1	Yes
34407	RT03_MYLU_34407	25-Jul	-	House	-	-	6	-	-	1	Yes
34407	RT03_MYLU_34407	26-Jul	-	House	-	-	6	-	-	1	Yes
34407	RT03_MYLU_34407	27-Jul	-	House	-	-	6	-	-	1	Yes
34407	RT02_MYLU_34407	28-July	-	House	-	-	3.5	-	-	1	Yes
34407	RT02_MYLU_34407	29-Jul	-	House	-	-	3.5	-	-	0	No
34407	RT02_MYLU_34407	30-Jul	-	House	-	-	3.5	-	-	0	No

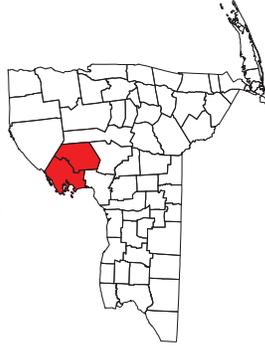
* No receiver during exit count.



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Fort Drum Bat Surveys Summer 2015

Bat 34407
Myotis lucifugus
Adult Female



**Jefferson and Lewis
Counties, New York**

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates: System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:72,000
 or
 1 inch = 6,000 feet

0 6,000 ft

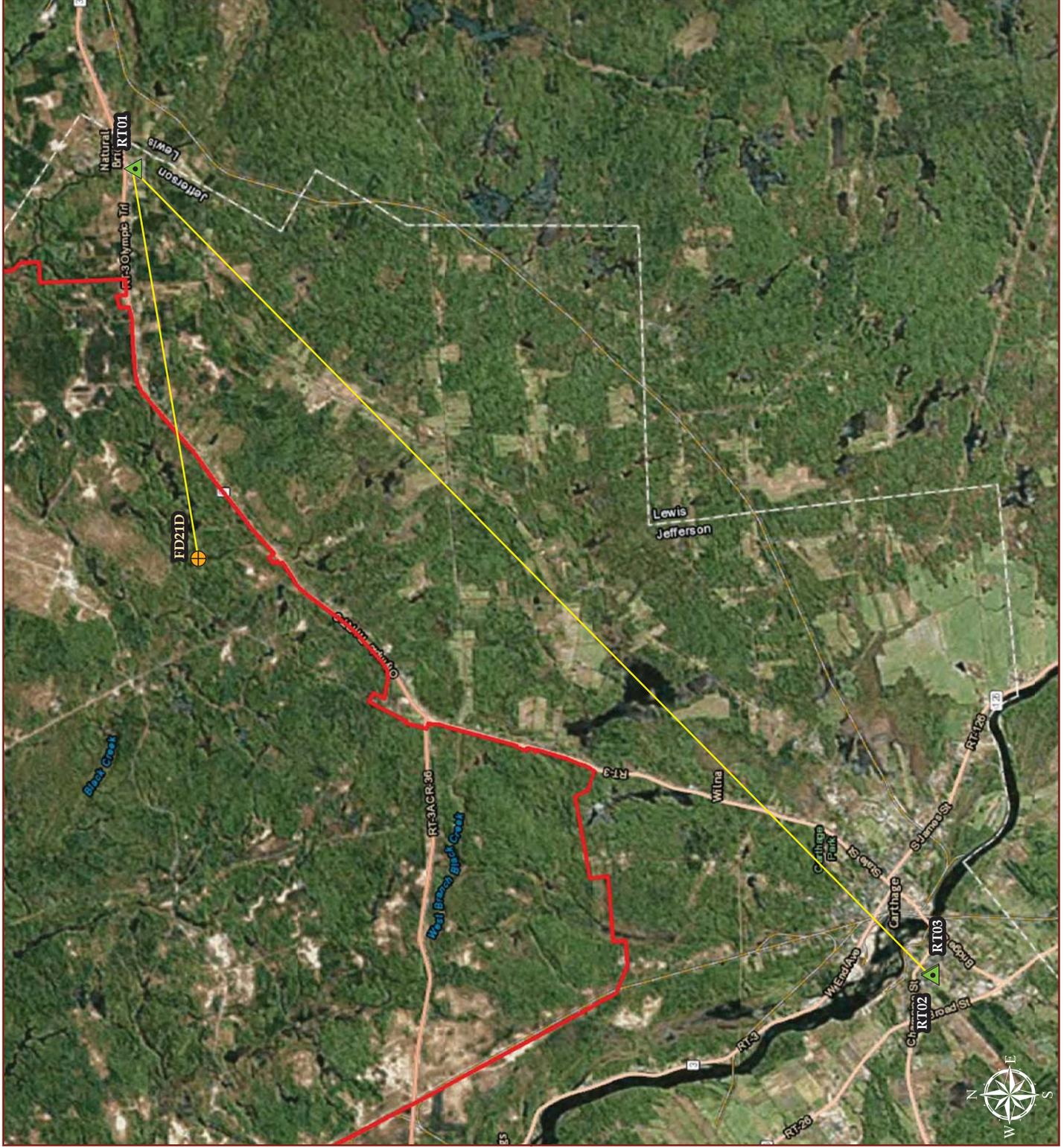


Figure 29. Capture site and roost locations for bat MYLU_34407 tracked 21 Jul - 30 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat MYLU_34406

Bat MYLU_34406 was an adult post lactating female little brown bat captured at site FD21 (Figure 30) at 0030 h on the night of 20 July. The mist net was placed across a wooded creek and the bat was caught at a height of 3.5 meters in a 9 (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of red maple, sugar maple, eastern white pine, eastern hemlock, and black cherry.

A 0.3-g transmitter (172.571) was attached to the bat, an aluminum wing band NYSDEC 34406 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of seven days (21 July - 27 July). Over the lifespan of the transmitter, the bat was successfully tracked for seven bat days and a single artificial structure roost was located (Table 27).

The bat was first located on 21 July in roost RT01_MYLU_34406/34407 (a church in Natural Bridge, NY), 5087 meters away from the capture site. The bat used this church for seven days (21 July - 27 July). An exit count conducted on 21 July documented 118 bats. Subsequent counts documented 135 bats on 22 July, 208 bats on 23 July, 181 bats on 24 July, 170 bats on 25 July, 203 bats on 26 July, and 138 bats on 27 July. During the exit count of 27 July, the transmitter pitch began fluctuating and completely stopped at 2010 h when it is believed the transmitter died. Searches for the missing bat were conducted via ground from 28 July to 31 July and again via air when the plane returned on 7 - 8 August with no success. Tracking efforts were concluded with COR approval on 8 August.

Table 27. Little brown bat (bat MYLU_34406) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34406	RT01_MYLU_34406/34407	21-Jul	-	Church	-	-	18	-	-	118	*
34406	RT01_MYLU_34406/34407	22-Jul	-	Church	-	-	18	-	-	135	*
34406	RT01_MYLU_34406/34407	23-Jul	-	Church	-	-	18	-	-	208	Yes
34406	RT01_MYLU_34406/34407	24-Jul	-	Church	-	-	18	-	-	181	*
34406	RT01_MYLU_34406/34407	25-Jul	-	Church	-	-	18	-	-	170	*
34406	RT01_MYLU_34406/34407	26-Jul	-	Church	-	-	18	-	-	203	Yes
34406	RT01_MYLU_34406/34407	27-Jul	-	Church	-	-	18	-	-	138	**

* No receiver during exit count.

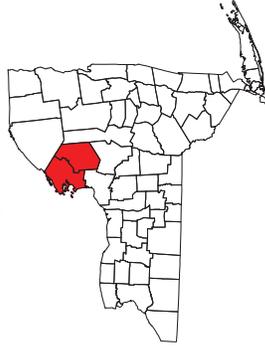
** Transmitter pitch fluctuated and completely stopped at 2010 h



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Fort Drum Bat Surveys Summer 2015

Bat 34406
Myotis lucifugus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:36,000
 or
 1 inch = 3,000 feet

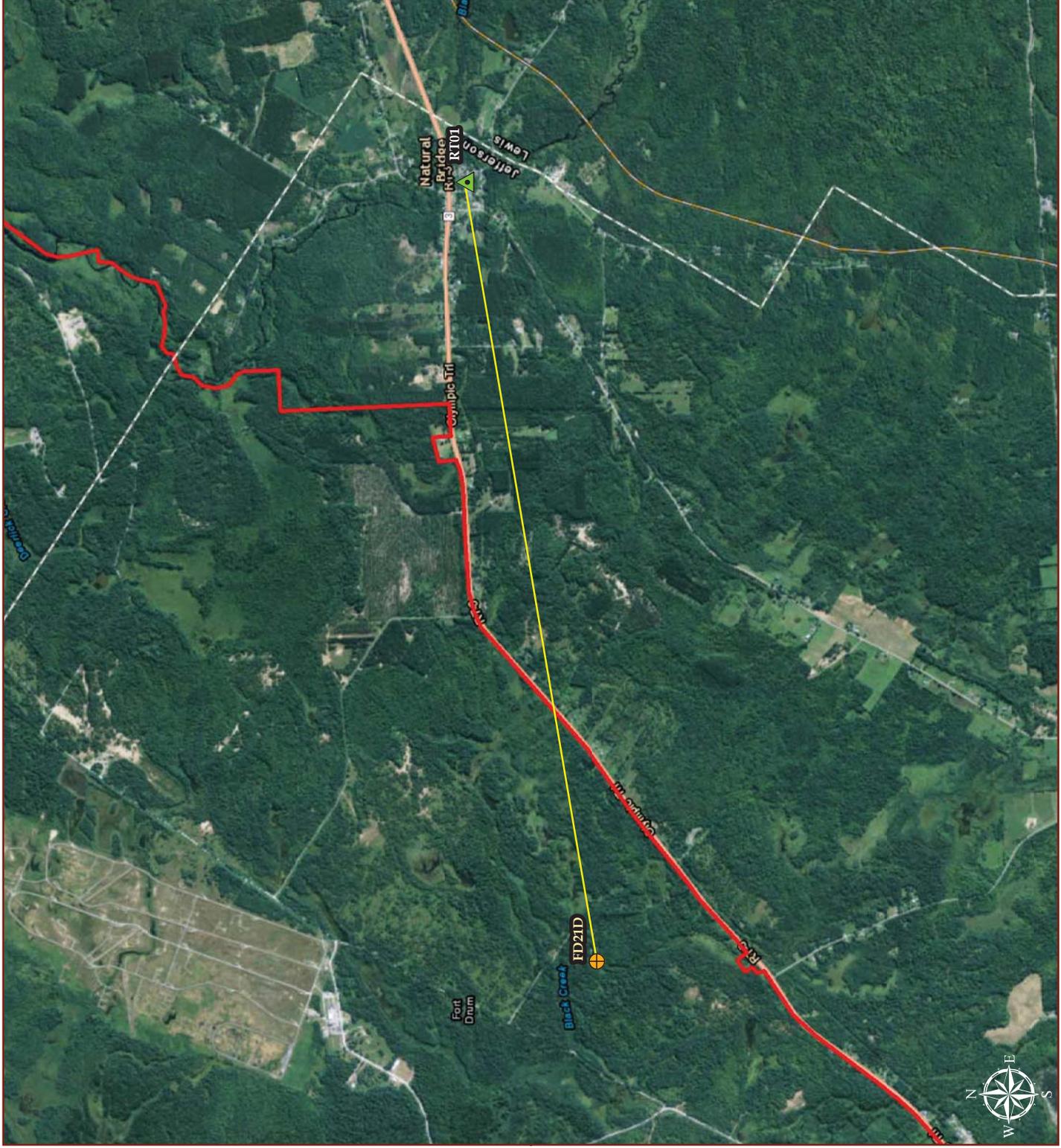


Figure 30. Capture site and roost location for bat MYLU_34406 tracked 21 Jul - 27 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat MYLU_34475

Bat MYLU_34475 was an adult lactating female little brown bat captured at site FD31 (Figure 31) at 0200 h on the night of 4 July. The mist net was placed across a gravel road and the bat was caught 5.5 meters above the ground in a 6 (19.8 ft) x 6 m (19.8 ft) net set. The surrounding dominate vegetation consisted of sugar maple, bitternut hickory, and American basswood (*Tilia Americana*).

A 0.3-g transmitter (172.049) was attached to the bat, an aluminum wing band NYSDEC 34475 was placed on the left forearm, digital photographs were taken, and the bat was released near the point of capture. Tracking efforts were conducted via ground and air for a total of 10 days (5 - 12 July and 14 - 15 July). Over the lifespan of the transmitter, the bat was successfully tracked for four bat days and two artificial roosts were located (Table 28). While performing exit counts, bat EPFU_34347 was never observed to be roosting with other bats.

The bat was first located via aircraft on 5 July and was believed to be roosting inside the impact area (18T 0455357 4886199). The plane was unable to pinpoint the roost location due to restricted airspace and the bat could not be heard from the ground. On 6 July, the bat was found roosting in RT01_MYLU_34475, 1265 meters away from the capture site. The bat was observed roosting inside an observation tower, under the peak of the roof. No other bats were visible and (with COR approval) an exit count was not conducted. On 7 July, the bat was located in RT02_MYLU_34475, 43 meters away. During the exit count for 7 July the focal bat was not seen emerging, but was assumed to have emerged based on signal strength. No other bats were seen emerging. On 8 July, the bat returned to RT01_MYLU_34475, 43 meters away. An exit count conducted that evening observed only the focal bat emerging. On 9 July, the bat was searched for by a ground crew but was not located. On 10 July, the bat was found in roost RT01_MYLU_34475. When Copperhead Consulting returned to the roost on the evening of 10 July to perform an exit count, no signal was heard at the roost or the surrounding area. The exit count was performed on RT01_MYLU_34475 with no bats emerging. Searches were conducted for the missing bat by ground crews on 11 and 12 July and by aircraft on 14 and 15 July but no signal was heard. Tracking efforts were concluded with COR approval on 15 July.

Table 28. Little brown bat (bat MYLU_34475) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34475	RT01_MYLU_34475	6-Jul	-	Observation Tower	-	-	4.5	-	-	-	Yes*
34475	RT02_MYLU_34475	7-Jul	-	Barracks Building	-	-	4	-	-	1	Yes
34475	RT01_MYLU_34475	8-Jul	-	Observation Tower	-	-	4.5	-	-	1	Yes
34475	RT01_MYLU_34475	10-Jul	-	Observation Tower	-	-	4.5	-	-	0	**

* No exit count conducted but bat switched roost

** Transmitter not heard in roost or surrounding area when Copperhead Consulting returned for the exit count.



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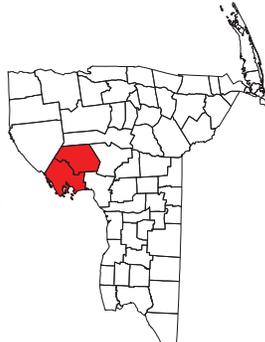
Fort Drum Bat Surveys

Summer 2015

Bat 34475

Myotis lucifugus

Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:7,200
 or
 1 inch = 600 feet



Figure 31. Capture site and roost locations for bat MYLU_34475 tracked 5 - 12 Jul and 14 - 15 Jul during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Radio-tagged silver-haired bat

A single adult female silver-haired bat was fitted with a radio transmitter during the Fort Drum Mist Net Survey. This bat spent a total of eight bat days in six roosts, switched roosts a total of seven times, and spent an average of one day in a particular roost before moving. The six roost trees consisted of one species (red maple) and a total of eight emergence counts were conducted. Five of the natural roosts documented for focal little brown bats were bark and one was a cavity roosts.

The silver-haired bat traveled 8268 meters from the capture site to the first located roost with an average distance of 156 meters between roosts. The maximum observed distance the silver-haired bat traveled was from the capture site to the first located roost (8268 m).

Bat LANO_34632

Bat LANO_34632 was an adult post-lactating female silver-haired bat captured at site FD30 (Figure 32 and 33) at 2220 h on the night of 2 August. The mist net was placed across a wooded trail and the bat was caught three meters above the ground in a 9 m (29.6 ft) x 5.2 m (17 ft) net set. The surrounding dominate vegetation consisted of sugar maple and eastern white pine.

A 0.3-g transmitter (172.481) was attached to the bat, an aluminum wing band NYSDEC 34632 was placed on the left forearm, digital photographs were taken, and the bat was released near point of capture. Tracking efforts were conducted via ground and air for a total of 13 days (3 August - 15 August). Over the lifespan of the transmitter, the bat was successfully tracked for eight bat days and six roost trees of one species were located (red maple, Table 29).

The bat was first located on 3 August in roost tree RT01_LANO_34632, 8268 meters away from the capture site. An exit count conducted that evening observed two bats emerging. On 4 August, the bat was located in roost tree RT02_LANO_34632, 93 meters away and the exit count observed two bats emerging. On 5 August, the bat was located in roost tree RT03_LANO_34632, 6 meters away and an exit count conducted that evening observed only the focal bat emerging. On 6 August, the bat was located in roost tree RT04_LANO_34632, 95 meters away and an exit count observed only the focal bat emerging. On 7 August the bat returned to RT01_LANO_34632, 14 meters away, where only the focal bat emerging. On 8 August, a search for the bat was conducted via ground and air but was not heard. On 9 August, the bat was located in roost tree RT05_LANO_34632, 201 meters away where only the focal bat was observed to exit the roost. On 10 August, the bat returned to RT02_LANO_34632, 124 meters away. The exit count documented four bats emerging. On 11 August, the bat was located in roost tree RT06_LANO_34632, 562 meters away where only the focal bat emerged.

The bat was searched for on the ground on 12 August, by both ground crews and aircraft on 13 and 14 August, and by aircraft 15 August, but no signal was heard. Tracking efforts were concluded with COR approval on 15 August.

Table 29. Silver-haired bat (bat LANO_34632) roosts located during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Bat Name	Roost ID	Date	Tree Species	Roost Type	Decay Status	DBH (cm)	Roost Height (m)	Exfoliating Bark (% of Tree)	Canopy Closure (% at Roost)	Exit Count #	Transmitter Exited Roost
34632	RT01_LANO_34632	3-Aug	<i>Acer rubrum</i>	Bark	4/6	19.1	7	30	30	2	Yes
34632	RT02_LANO_34632	4-Aug	<i>Acer rubrum</i>	Bark	4	25.5	8	15	20	2	Yes
34632	RT03_LANO_34632	5-Aug	<i>Acer rubrum</i>	Bark	3/4	21.9	7	20	10	1	Yes
34632	RT04_LANO_34632	6-Aug	<i>Acer rubrum</i>	Bark	4/6	33.1	7.5	15	30	1	Yes
34632	RT01_LANO_34632	7-Aug	<i>Acer rubrum</i>	Bark	4/6	19.1	7	30	30	1	Yes
34632	RT05_LANO_34632	9-Aug	<i>Acer rubrum</i>	Bark	2	14.1	5	20	10	1	Yes
34632	RT02_LANO_34632	10-Aug	<i>Acer rubrum</i>	Bark	4	25.5	8	15	20	4	Yes
34632	RT06_LANO_34632	11-Aug	<i>Acer rubrum</i>	Cavity	2	59.4	5	25	95	1	Yes

Cavity is defined as a hollow space inside of a roost



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Fort Drum Bat Surveys Summer 2015

Bat 34632
Lasiurus noctivagus
Adult Female



Jefferson and Lewis
Counties, New York

- Capture Site
- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System: WGS 1984 UTM Zone 18N
 Projection: Transverse Mercator
 Datum: WGS 1984
 Sources: Fort Drum, USDA, ESRI, USGS
 Date: 10/27/2015

1:48,000
 or
 1 inch = 4,000 feet

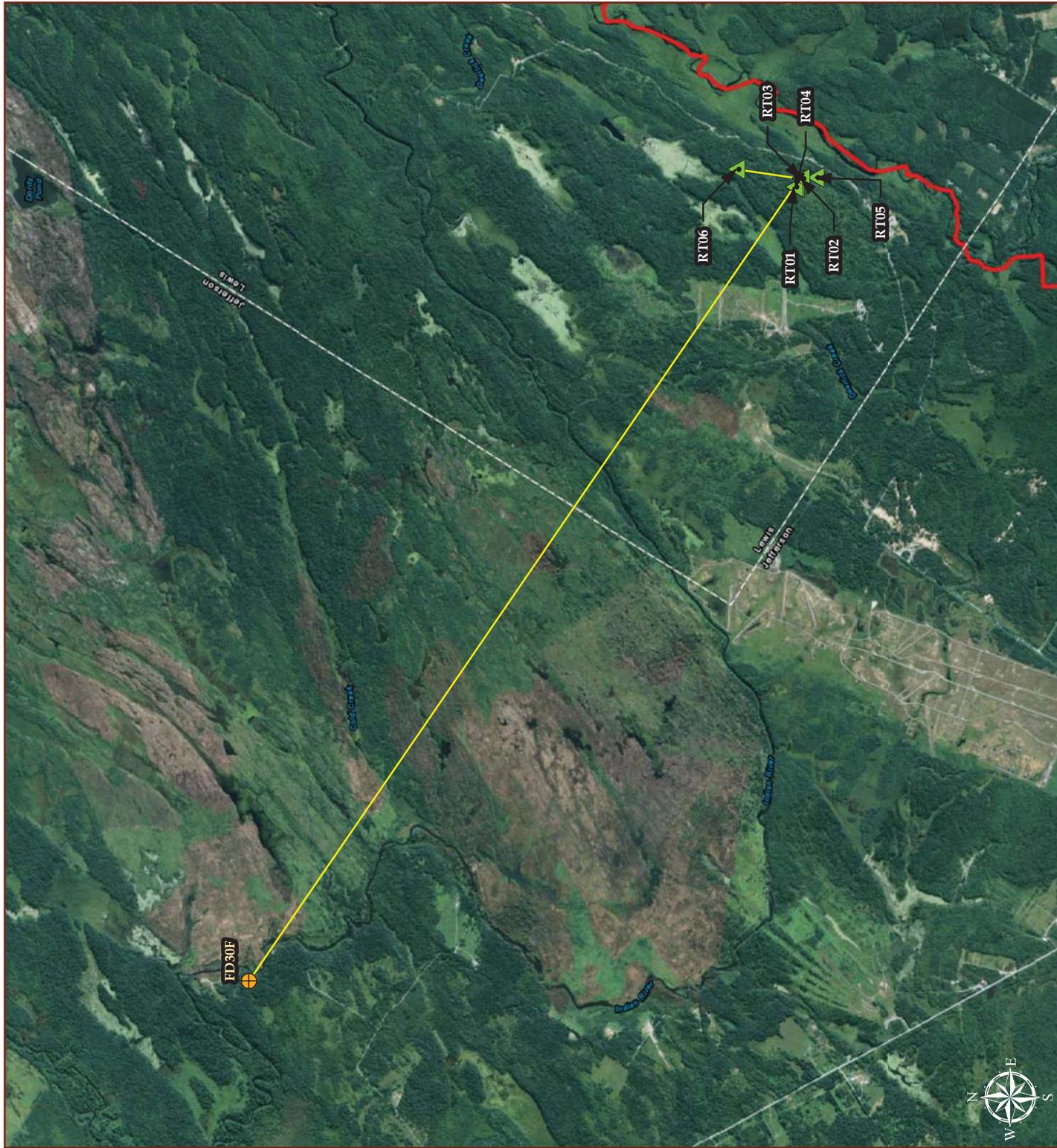


Figure 32. Capture site and roost locations for bat LANO_34632 tracked 3 Aug - 15 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

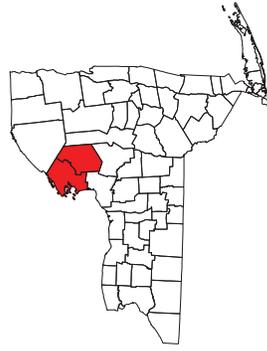


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Fort Drum Bat Surveys

Summer 2015

Bat 34632
Lasiurus noctivagus



Jefferson and Lewis
Counties, New York

- Roost Tree
- Consecutive Observed Movement
- Non-consecutive Observed Movement
- Fort Drum Boundary

Coordinates System:
WGS 1984 UTM Zone
18N
Projection: Transverse
Mercator
Datum: WGS 1984
Sources: Fort Drum,
USDA, ESRI, USGS
Date: 10/2/2015

1:4,000
or
1 inch = 333 feet

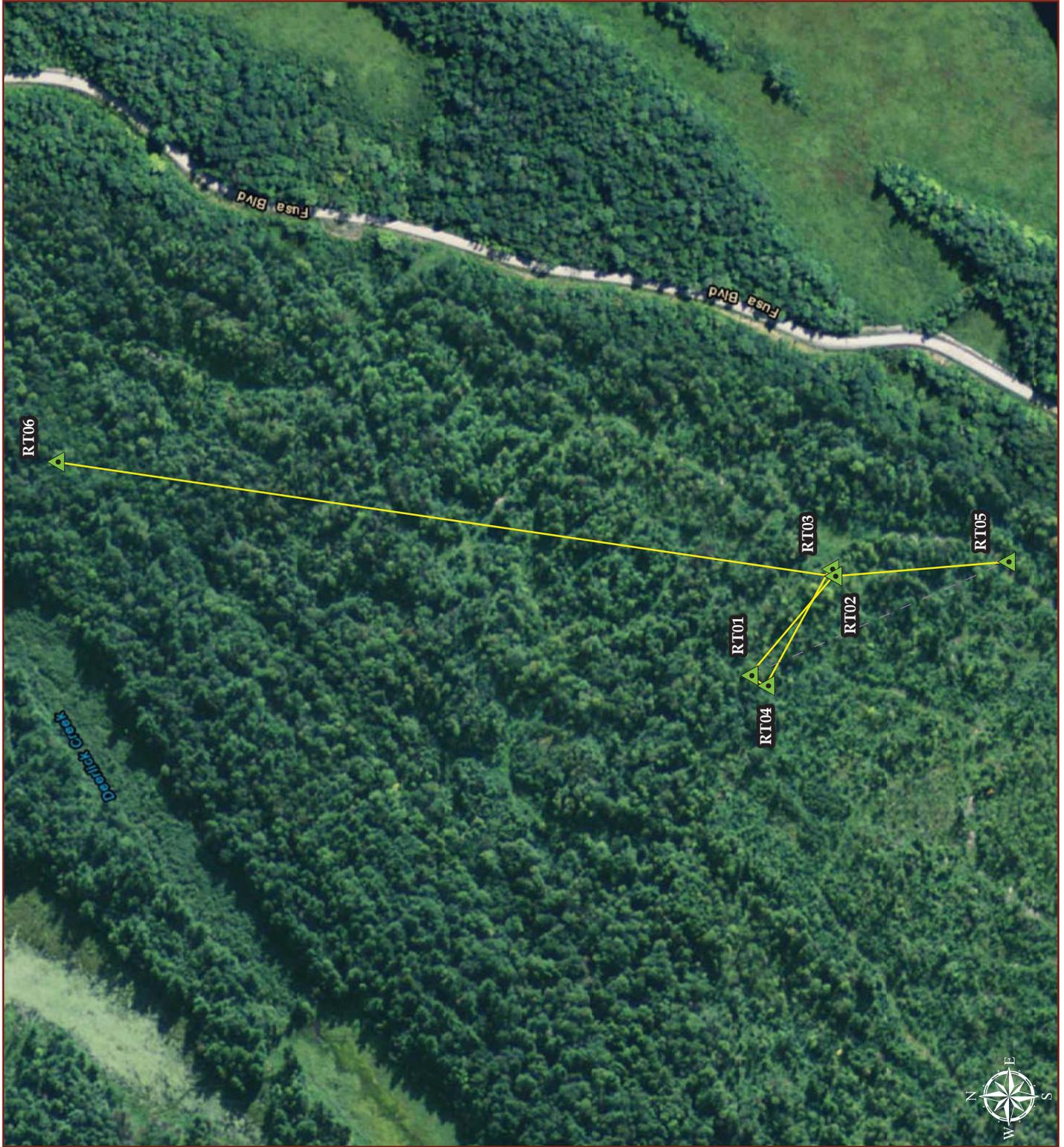


Figure 33. Roost trees (zoomed view) for bat LANO_34632 tracked 3 Aug - 15 Aug during the summer 2015 Fort Drum Mist Net Survey, Ft. Drum, New York.

Additional Radio Transmitter Attachment

During the course of the project, the COR provided extra radio transmitters (0.35-g, frequency 151.xxx) to be attached on bats. The COR was responsible for radio-tracking and performing exit counts. Copperhead Consulting attached two of these extra radio transmitters onto two adult female little brown bats.

Bat MYLU_34805 and Bat MYLU_34806

Bat MYLU_34805 and MYLU_34806 were both adult post-lactating female little brown bats captured at site FD33 on the night of 8 August 2015. Both bats were caught in mist nets placed across Bonaparte Creek. Bat MYLU_34805 was captured at 2200 h, four meters above the stream, in a 9 m (29.6 ft) x 7.8 (25.7 ft) net set. MYLU_34806 was captured at 2245 h, seven meters above the stream, in a 12 m (39.4 ft) x 7.8 (25.7 ft) net set. The surrounding dominate vegetation consisted of white pine, red maple, and paper birch.

Bat MYLU_34805 was fitted with a 0.35-g transmitter (151.985) and an aluminum wing band NYSDEC 34805 was placed on the left forearm. Bat MYLU_34806 was fitted with a 0.35-g transmitter (151.824), an aluminum wing band NYSDEC 34806 was placed on the left forearm. Digital photographs were taken of each bat and they were released near the point of capture.

DISCUSSION

Chiroptero fauna on Fort Drum

While total numbers of bats captured per site were similar to previous studies in the geographic area, species richness and abundance were not typical of the area on a pre-WNS landscape. In a comparison of the results from similar mist net surveys conducted on Fort Drum during the summers of 2007 – 2011 (Table 29), the total number of captures and mean number of bats captured per site in 2015 compares favorably. The species diversity encountered during the 2015 survey effort was lower than previous surveys; a total of five of the nine species of bat previously documented via mist net surveys conducted at Fort Drum were encountered during the Fort Drum Mist Net Survey.

No federally listed Indiana bats or northern long-eared bats were captured despite the fact that many of sites chosen for the 2015 survey effort were placed in habitats and at sites that have captured the species in past studies. There may be several factors to explain the difference in capture success between sampling years, but the most likely reason is the effect of WNS on local bat populations. In addition to the two listed species, tricolored bats and small-footed bats have also been captured in relatively small numbers during previous surveys (Table 30) but were not captured during 2015.

Table 30. Comparison of total bat captures and mean number of bats captured by site during the mist net surveys conducted at Fort Drum¹, Ft. Drum, New York.

	2007 (n = 81)	2008 (n = 41)	2009 (n = 85)	2010 (n = 85)	2011 (n = 60)	2015 (n = 71) ²
<i>Eptesicus fuscus</i>	574 (7.09)	215 (5.24)	311 (3.66)	486 (5.72)	364 (6.07)	516 (7.3)
<i>Myotis lucifugus</i>	440 (5.43)	104 (2.54)	35 (0.41)	51 (0.6)	14 (0.23)	75 (1.1)
<i>Myotis septentrionalis</i>	260 (3.21)	37 (0.90)	5 (0.06)	5 (0.06)	1 (0.02)	0
<i>Lasiurus borealis</i>	62 (0.77)	14 (0.34)	32 (0.38)	89 (1.05)	72 (1.2)	96 (1.4)
<i>Myotis sodalis</i>	18	2	0	2	1	0
<i>Lasiurus cinereus</i>	7	5	3	6	2	1
<i>Lasionycteris noctivagans</i>	4	3	4	5	2	6
<i>Perimyotis subflavus</i>	4	0	1	1	0	0
<i>Myotis leibii</i>	0	0	0	2	0	0
Total	1369	380	391	647	456	694
mean # bats/site	16.9	9.3	4.6	7.6	7.6	9.8

1 - Data provided by C. Dobony, Fish and Game Biologist, Fort Drum Natural Resources Branch

2 - Sites are divided into two night sampling efforts for comparison to past study years (two complete nights of sampling equals one site)

Does not include same season recaptures.

Most of the species listed above have proven susceptible to the effects of WNS, which is a likely candidate for the reductions seen in local bat populations. Mist net surveys conducted in New Hampshire during May - August documented a 68 - 98 percent reduction in the capture rates for little brown bats, northern long-eared bats, and small-footed bats between 2005 and 2011 (Mooseman et al. 2013). This study highlights what is a growing body of evidence documenting the impact that WNS has had on North American bat populations. For example, after a high of 260 northern long-eared bats was documented by survey in 2007 (a result that likely predated the largest reductions in bat populations caused by WNS), there has been a marked decline in the number of bats captured in subsequent survey efforts (Table 30).

However, while WNS have undoubtedly had an effect on bat populations in the northeast and Fort Drum, it should be noted that methodologies employed during even Federally approved mist net surveys have the potential to underestimate local bat populations (Murray et al. 2008). It is therefore possible that, given the relatively low densities of these species historically found in the project area, the 2015 survey effort could simply have failed to detect them.

Bat Capture by Species, Sex, Age, and Study Period

Of the 694 bats processed for biological data during the Fort Drum Mist Net Survey, 58.8 percent ($n = 408$) were classified as reproductive, i.e., evidence of reproduction in adult, female or juvenile bats. This data suggests that individuals encountered during the summer 2015 bat survey are currently using habitat in or around the Fort Drum Military Reservation for maternity roosting. The amount of recruitment documented by the relative increases in bat captures and the influx of volant juvenile bats during the second study period further highlights the fact that the reservation has suitable maternity habitat and is being used by reproductive bats.

Sampling during the second study period resulted in a two-fold increase of the mean number of bats (4.97 to 9.97) captured per site location and an increase in species richness from 1.1 to 1.9 species per site. This is likely due to the influx of volant juvenile bats on the landscape. While the increase in juveniles seen in the second study period is expected, the increase in both adult male and female bats documented in this period is also remarkable. One possible explanation of the increase of adult captures could be attributed to the influx of bats on the landscape and the subsequent change in foraging and commuting behaviors as they sought to avoid one another. Bats have been documented to use social calls to influence the movements of conspecifics and during the establishment of foraging territories. In one study, a playback of social calls resulted in a reduction of conspecific bat activity in the area (Kunz and Fenton 2003). Adams (1997) suggested that the influx of juvenile bats into their study population altered adult foraging behavior resulting in their use of more cluttered flyways (i.e., similar to the majority of the corridors surveyed during the Fort Drum Mist Net Survey). Whether the increase in adult bats captured in the second period is a reflection of a greater number of bats forcing foraging and commuting bats to disperse and utilize the more cluttered secondary roads and trails of Ft. Drum remains unknown. Regardless, future research should consider maximizing capture success by overlapping survey dates to correspond with the influx of bats on the wing.

Roost Tree Characteristics

One key element in the management of local bat populations involves understanding the specific needs of maternity colonies. Reproductive colonies of bats may be highly philopatric, often roosting in the same area over successive years. The availability of suitable roosts (both in terms of quality and quantity) in their home range is critical for bats, especially reproductive females. Maternity roosts offer suitable conditions for rearing young and to provide protection from predators and the elements. Because of this, roost trees can be a limiting factor for many woodland bats and the ephemeral nature of roosts coupled with their importance to bats in the reproductive season makes identifying and protecting this valuable resource an important component of any management plan.

Studies have shown that roost tree suitability probably depends on many factors including whether the tree is alive or dead, the extent of exfoliating bark, solar exposure, and season (USFWS 1983, Olson 2011, Willis et al. 2006). Bats are probably opportunistic in their choice of roosts and utilize tree species according to their availability on the landscape. Ultimately, roost choice is probably more a reflection of roost character (i.e., structure, amount of solar exposure, and size) than species (Callahan et al. 1997, Gardner et al. 1991b, Humphrey et al. 1977, USFWS 2007). The preferences of roosting bats for specific roost characteristics may also vary over time with the ecological value of (and subsequent choices made regarding) variables such as tree species, usable bark cover, roosting location, and canopy cover subject to changes seasonally and with the changing physiological requirements of adult bats and their young (Olson 2011).

Sugar maples were the most common tree species (18.5 percent; $n = 5$) used as roosts by big brown bats but other species included black cherry, red maple, eastern white pine, eastern cottonwood, red oak, bigtooth aspen, green ash, yellow birch, American beech, and white ash. Overall, roost tree plot analysis indicated that the most prominent trees immediately surrounding focal bat roosts were *P. strobus* ($n = 73$), *A. rubrum* ($n = 62$), and *Tsuga canadensis* ($n = 32$), suggesting that focal bats may have been preferentially choosing sugar maples over other, more prevalent species.

Most roost trees were classified as snags and the most prevalent roost decay class of focal bat roosts was Stage 4 (“loose bark”) snags of the 9-stage classification system. The thermodynamic characteristics of live and dead trees may differ and each may provide different levels of solar exposure due to canopy cover. Dead or dying trees presumably heat up faster and their senescent bark provides roost sites for adult bats and their young (Gardner et al. 1991). Live trees are thought to provide protection against inclement weather, e.g., high temperatures or precipitation (Callahan et al. 1997, Humphrey et al. 1977).

Natural vs Anthropogenic Roosts and Roost Switching

The roosting behavior of both big brown and little brown bats is perhaps the most conspicuous of all North American bats due to their habit of forming maternity roosts in artificial structures, often in high densities. However, as generalists, they may roost in either natural or artificial roosts. Big brown bats have been documented to roost in buildings, bridges, hollow trees, behind exfoliating bark, rock crevices, and tunnels (Barbour and Davis 1969). Adult males are usually solitary in summer but may sometimes roost with other males or infrequently with females in maternity roosts (Kurta and Baker 1990). Bats of both species that roost in anthropogenic structures may congregate in numbers in the hundreds, but tree roosts rarely exceed 30 – 40 individuals (Barbour and Davis 1969, Craig et al. 2004).

Overall, there was no significant difference between the dbh of roosts (34.2 cm) located during the summer 2015 bat survey and surrounding trees (34.4 cm). However, roost trees were taller than nearby trees (within data plots) at Fort Drum (14.3 vs. 8.3 m). Relative tree height may be important for maximizing the growth of young bats and sections of taller trees have the advantage of rising above the surrounding canopy to receive more solar exposure.

Of roosts used by big brown bats during the Fort Drum Mist Net Survey, 79 percent ($n = 27$) were “natural” roosts located in sloughing bark or cavities of dead or dying trees. By comparison, the majority of the roosts used by the six radio-tagged little brown bats during the Fort Drum Mist Net Survey were located in anthropogenic structures. Both big brown and little brown bats are apparently more flexible in their choice of roosts than Indiana and northern long-eared bats and have been documented to use both types of roosts with greater frequency than other species.

Several studies have documented the use of multiple roosts by bats during the summer maternity season (Gardner et al. 1991; Kurta et al. 1996; Kurta et al. 2002). A single colony may occupy multiple roosts on any given day and dozens of roosts over a reproductive season. For example, Indiana bats typically choose from a pool of 10 to 20 roosts often alternating between them over the course of a season (Callahan et al. 1997, USFWS 2007). During the Fort Drum Mist Net Survey, focal bats spent a total of 130 bat days in 51 roosts, switched roosts a total of 39 times, and spent an average of 1.65 consecutive days in a particular roost before moving. There was little difference in the mean number of roost switches per species; big brown bats spent an average of 1.9 consecutive days in a particular roost ($n = 34$) before moving and little brown bats spent an average of 1.4 consecutive days in a particular roost ($n = 11$). In a between-year comparison, focal Indiana bats during the summer 2008 Fort Drum radiotelemetry spent an average of 1.8 consecutive days in a particular roost before moving (Hawkins et al. 2009).

Overall, bats that roosted in anthropogenic structures were more sedentary during the maternity season with tree bats switching roosts 7.5 times more often than those roosting in anthropogenic roosts. The ephemeral nature of tree roosts was highlighted by the fact that at least 17 of all roost trees ($n = 38$) were confirmed to have been used for a single day. This number may underestimate the relative term of use between roost categories because this number only included those trees in which the full term of use was known, i.e., both the arrival and exit time of focal bats to a particular roost was observed. It is also interesting to note that, for all species, focal bats were never observed to alternate between anthropogenic and natural roosts, i.e., tree bats stayed tree bats and house bats remained house bats. While the causal relationship for the disparity seen in the relative occupancy times between roost types may simply be related to the abundance and ephemeral nature of the roost type itself, (i.e., in general, trees are more numerous and much less permanent than buildings), this fails to explain

why the choice of which roost type to use seems to be so concrete for the bats of Fort Drum.

These findings raise several interesting questions. First, what quality or qualities did anthropogenic roosts possess or were supplying to roosting bats that ameliorated or mitigated the need to switch roosts? Second, why would bats choose to roost in natural roosts if doing so meant that they needed to switch roosts (7 times more frequently) to find this quality elsewhere? This is assuming, of course, that switching roost incurs costs, energetic or otherwise. The reasons for the disparity between the two roost categories and, for roost switching in general, remain unclear but it has been suggested that this behavior may promote social interactions or serve to maintain knowledge of available high-quality roosts (Kunz 1982, Lewis 1995). Roost switching may also be done in response to changing ambient conditions, and the physiological requirements or developmental state of adults and young. Other advantages of this behavior may include predator avoidance and parasite control (USFWS 2007).

Several studies have attempted to investigate the potential advantages of the use of anthropogenic structures by roosting bats (Fenton 1970, Kunz 1982, William and Brittingham 1997). It has been suggested that buildings may have lower predation risks, offer superior microclimate conditions for the growth of young, and may allow larger aggregations of bats. Lausen and Barclay (2006) discussed the potential differences between roosting in natural and anthropogenic roosts for big brown bats. Lausen and Barclay found that building roosts were warmer and more thermally stable than natural roosts and, as a result, promote the growth and maturation rates of young. The positive thermoregulatory seen effects of anthropogenic roost may be even more important in northern latitudes like Fort Drum. Lausen and Barclay (1996) also documented frequent movements within the attics of buildings used by focal bats in their study which they suggested reflected microclimate choices made by bats. The variety of microclimates available to bats in artificial structures may be another advantage that these structures have over natural roosts.

Many communally roosting bats have been shown to roost in many different group configurations over the course of a maternity season and the composition of the group may depend on many variables. Craig et al. (2004) suggested that big brown bats, like the Indiana bat, display a social organization reminiscent of the fission-fusion societies of primates and cetaceans. This type of social organization is characterized by a highly dynamic social structure with members coalescing into larger groups (fusion) and frequently splintering into smaller groups or solitary individuals (fission). Exactly why fluctuations of this type occur remains unknown, but the evolution and maintenance of the fission-fusion model in bat communities may simply be a reflection of flexibility in roost choice.

White-Nose Syndrome

Because of their habit of roosting in caves during the winter months, cave roosting bats have always been particularly vulnerable to disturbance and habitat loss. While little data exists on epizootic disease outbreaks in bats, the potential for disease transmission during hibernation is also magnified by the communal roosting nature of cave bats, their frequent movements between hibernacula, and the physiological demands of hibernation itself. The relatively recent emergence of WNS in North American bats has drastically altered the survival outlook for many bat species. Recent studies suggest that WNS is the primary cause of seasonal mortality for several of the most common bats that overwinter in caves including the little brown bat, northern long-eared bat, and tricolored bat. Fatality is directly attributed to cutaneous infection with the fungus *Pseudogymnoascus destructans* (Pd) which is thought to disrupt torpor patterns leading to a premature depletion of body fat reserves (Frank et al. 2014). Since first being documented near Albany, New York in 2007, the disease has been estimated to kill more than 5.7 million bats in North America. In the northeast region, bat populations have been particularly devastated, declining to less than five percent of their former number in some areas (USFWS 2011).

Using the Wing Damage Index scoring system described by Reichard (2011), the majority of bats captured and evaluated for the effects of WNS during summer 2015 showed no signs of infection by Pd. Conversely, 37.6% of bats received a score indicating a least some level of wing damage; the majority (26.3%) of evaluated bats received a score of 1 indicating *light damage*, (i.e., < 50% of the flight membrane shows signs of depigmentation). The presence of skin lesions on bats is thought to lead to a greater amount of evaporative water loss leading to greater amount of arousals as bats try to replenish water supplies during hibernation (Frank et al 2014).

In a comparison of WDI scores between the two study periods, the relative proportion of bats receiving scores of 0 increased (49.3% vs. 66.1%, respectively) and the (combined) percentage of bats receiving a score indicating some degree of damage (WDI = 0P - 3) decreased (50.7% vs. 34.0%). WDI score are expected to decrease as summer progresses (Francl et al. 2011) as bats have time to heal damage to their flight membranes.

While it is clear that WNS has had a devastating effect on the populations of several cave roosting bat species, it remains unknown if all bats overwintering in caves are equally susceptible to the effects of WNS. There is considerable evidence that the big brown bat is at least partially resistant to cutaneous infection with Pd (Frank et al. 2014). Histological analyses of big brown bats from WNS affected sites in New York revealed no signs of fungal infection in hibernacula shared with infected little brown, northern long-eared and tricolored bats. In the Frank et al. study, big brown bats had torpor bouts of normal duration, emerged from hibernation with normal fat reserves, and showed few signs of cutaneous infection with Pd after hibernation. While WDI scores

recorded during the Fort Drum Mist Net Survey seem to indicate big brown bats are experiencing some level of WNS infection, it is unclear whether these scores represent an accurate reflection of bat health (Francl et al. 2011, Frank et al. 2014, Powers et al. 2013). Using data gleaned from previous studies conducted at Fort Drum, the total capture and mean number of big brown bats captured per site has remained relatively stable and may even have increased in recent years (Table 29). While WNS has undoubtedly had an impact on the populations of several North American bats species, gauging the exact impact of WNS on the bats of Fort Drum requires further study.

Radiotelemetry

Tracking flying bats is notoriously challenging. The nocturnal nature and mobility of bats coupled with the relatively small transmitter size required for most North American bats makes conducting radiotelemetry difficult. Although the daily movements of cavity roosting bats are likely to be limited to relatively short commuting and foraging flights during much of their summer maternity season, they are still highly mobile and can cover sizable distances during their daily movements.

Radio tracking efforts during the Fort Drum Mist Net Survey encountered multiple difficulties while tracking focal bats. Rugged terrain made ground tracking in certain areas difficult and weather limited flight time and in some instances grounded aircraft altogether. The amount of magnetic interference encountered within much of the study area also hindered tracking efforts. Finally, entire sections of the study area were off limits to ground and aerial crews due to military training operations being conducted in the area at the time. Despite these difficulties, all 20 of the bats that were (contractually) fitted with transmitters and tracked during the Fort Drum Mist Net Survey were subsequently relocated and all but one (Bat MYLU_34363) was tracked to at least one day roost. Efforts to track MYLU_34363 were hampered by inclement weather, rugged terrain, and aircraft access restrictions associated with the military training.

Early in the 2015 study, shorter than expected retention times for transmitters on focal bats caused concern and raised questions about application techniques and/or the adhesive qualities of our particular batch of surgical cement. New adhesive was procured and used on all transmitters (n = 15) fitted after 6 July. While the final mean retention time of transmitters fitted to all species of focal bats was very similar to the 2011 Fort Drum Mist Net Survey Perma-Type™ transmitter retention times (9.3 vs 10 days; C. Dobony, FtDrumNRB, pers.comm., 2015), the relative retention time of transmitters applied to focal bats before 6 July (using old glue) proved to be markedly lower than those applied after that date (5.5 vs. 10.1 days). Dividing the Fort Drum Mist Net Survey into four, two-week sampling periods shows an increase in mean retention times (5, 6, 8 and 13 days respectively). While most information is anecdotal, the common perception is that transmitter retention times can be effected by many variables including weather, the proper preparation of the bat, and both the condition and preparation of the adhesive being used. It is also a common perception that both

heat and age will degrade the adhesive properties of surgical cement. It remains unclear whether the increase in retention times witnessed after the use of the newer adhesive was simply a coincidence. Obviously, there is also the possibility that the adhesive was not the only variable involved in the retention of transmitters. Other potential reasons explaining the lower than expected retention times early in the study include increased grooming rates associated with WNS infection, potential differences in the pelage of species, and the type of roost being used.

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