Little brown myotis maternity roost surveys: Copper River Basin, 2016

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Introduction

Little brown myotis are widespread across North America, and reach their northernmost extent in Alaska, Yukon and the Northwest Territories, Canada (Wilson et al. 2014). While bat research has been ongoing throughout Alaska since the early 1990's (Parker et al. 1996), relatively little is known about population size or trends in interior Alaska. In addition, while bats in southeast Alaska have been observed hibernating in caves, scree fields and root wads (K. Blejwas, pers. comm. 2016; Parker et al. 1996), winter locations for bats that summer in interior Alaska are still unknown.

Since 2007, little brown myotis have been dying by the millions in eastern North America due to white-nose syndrome (WNS), raising the alarm across their range. WNS is a disease that has a 90% mortality rate for infected little brown myotis colonies (USFWS 2016). It is currently present in 27 states and 5 Canadian provinces in eastern North America, and has killed over 6 million bats to date. As of 31 March 2016, white-nose syndrome was confirmed in Washington (USGS 2016), over 1300 miles from the nearest infection site. It has not yet arrived in Alaska, but if/when it does, having an understanding of species distribution, seasonal activity and abundance will assist in detecting the arrival and impact of WNS and enhance our ability to take appropriate action. Since hibernation behavior and over-wintering sites for little brown myotis are still unknown for bats in interior Alaska, testing for WNS at winter sites is not yet possible. However, given the site fidelity shown by females to summer maternity colonies, investigating and monitoring population fluctuations at these congregation sites may be the next best alternative (Dobony et al. 2011).

Our goal is to identify a network of little brown myotis (*Myotis lucifugus*) maternity colonies throughout Alaska to assist with studying and monitoring bat populations over time. In particular we plan to: a) begin establishing baseline population levels at maternity sites to effectively monitor fluctuations indicating the potential arrival of WNS to Alaska; b) investigate population dynamics inclusive of estimating colony size, survival, and reproductive rates, which will help inform management decisions; and c) build a network of citizen scientists to support monitoring efforts at maternity colonies throughout Alaska.

Methods

During the first year of our study (2016) we focused on six maternity colonies in local residences, including five along the Copper River Valley and one north of Anchorage in Wasilla. We spent two nights at each roost site counting emergence numbers and mist-netting to survey individuals in the colony. In addition, we recorded roost measurements including overall size, material type and general location.

Emergence counts and estimated colony size

Emergence counts were performed at each roost location on the first night of arrival at the site. Two to four observers were situated around the roost twenty minutes before sun set. Each observer was assigned to watch a portion of the roost building, and tallied bats emerging using a handheld tally clicker. Observers continued to count emerging bats for a minimum of one hour after emergence commenced, and ceased counting after a fifteen minute period of inactivity at the roost, or if more than ten bats were seen re-entering the roost. Emergence counts were not performed during nights of inclement weather such as frequent or heavy rain or wind. For colonies where juveniles had not yet fledged (no juveniles were captured during the survey night), colony size was estimated to be the total emergence count. For colonies where fledged juvenile were captured during the survey night, colony size was estimated by multiplying the total emergence count by the proportion of the survey population identified as adults (e.g. a roost with an emergence count of 100 and a capture survey consisting of 5% juveniles would result in an estimated colony size of 95 adults).

Capture surveys

During night two at each colony, standard capture techniques using mist nets were used to live-capture bats exiting the roost. Measurements were recorded for each capture including ear length, forearm length, mass, sex, tooth wear (indication of age), and reproductive status. Each bat was fitted with a metal lipped band engraved with a unique identifier for future identification during reproductive and population monitoring studies (see Appendix C). All capture and bat handling techniques strictly adhered to the National White-Nose Syndrome Decontamination Protocol (Version 04.12.2016). All animal handling was performed under IACUC Permit # 918743-1.

Results

We performed roost emergence counts and mist-netting surveys of little brown myotis at six known maternity roosts during July 2016 (Figure 1). Roosts were located in a variety of buildings including private residences, recreational cabins, abandoned cabins, and a large barn. All buildings were constructed of wood and majority of the buildings were fitted with a tin roof, with the exception of roost RM-16-02 which had a wood roof covered with tarpaper (see Appendix A). Majority of the roosts were within 200 meters of the nearest water body, and all roosts were within 20 m from the nearest forest edge (Table 1).

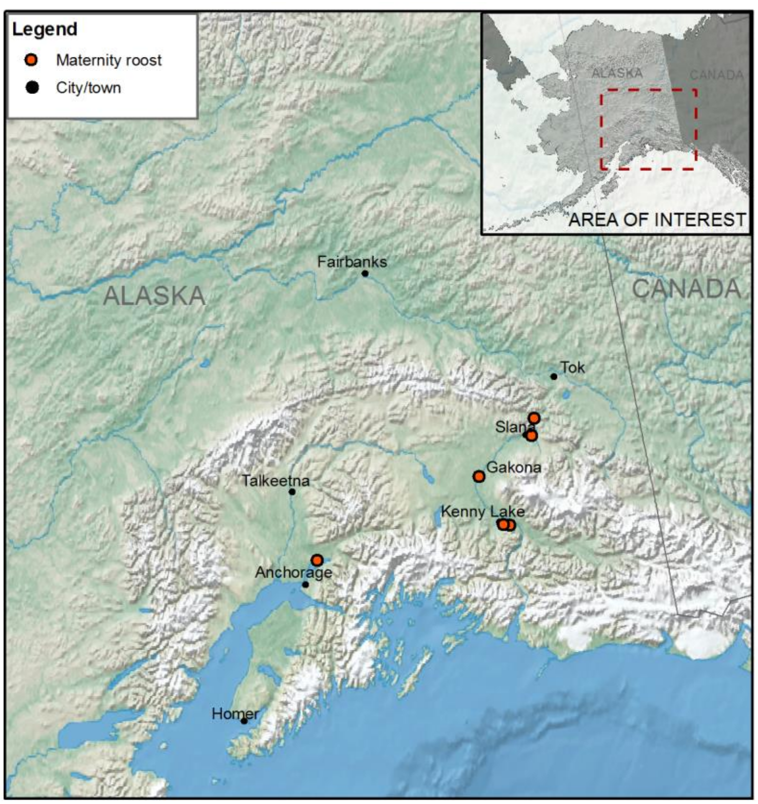

Figure 1: Locations of *Myotis lucifugus* maternity colonies surveyed during July, 2016

Table 1: Location and surrounding habitat of *Myotis lucifugus* maternity roosts along the Copper River, Alaska.

Roost	Latitude (N)	Longitude (W)	Distance from forest (m)	Distance from water (m)	Nearest waterbody (type)
RM-16-01	61.50	-149.59	3	20	River
RM-16-02	62.89	-143.68	20	100	Beaver pond
RM-16-03	62.69	-143.82	15	100	Small ponds, streams
RM-16-04	62.30	-145.31	20	200	River
RM-16-05	61.70	-144.86	20	> 500	unknown
RM-16-06	61.68	-144.69	10	500	River

Colony size ranged from approximately 50 to 470 adults and was not correlated with roost size (Table 2; Linear regression, $F_{1,4} = 0.53$, $p > 0.05$).

Table 2: Structure characteristics and estimated colony size of *Myotis lucifugus* maternity roosts along the Copper River, Alaska.

Roost	Length (m)	Width (m)	Height (m)	Total Area (m^2)	Total Volume (m^3)	Roof Type	Estimated Colony size
RM-16-01	47	13	13	611	7,943	Tin - open ceiling	48
RM-16-02	11	9	7	99	693	Shingle roll - closed attic	417†
RM-16-03	4	4	4	16	64	Tin - closed ceiling	57
RM-16-04	6	5	7	30	210	Tin - closed ceiling	468
RM-16-05	20	7	8	140	1,120	Tin - closed ceiling	66†
RM-16-06	10	6	9	60	540	Tin - closed ceiling	45†

† Emergence count adjusted to account for fledged juveniles

In total, we captured 140 individual bats and banded 136 individuals (see Appendix C). Average forearm length for adult females was 38.6 ± 0.96 mm (range: 36.2 to 40.9 mm; n = 121) and average mass was 8.0 ± 0.7 g for lactating and non-reproductive females (range: 6.0 to 10.5 g; n = 114), and 10.3 ± 1.0 g for pregnant females (range: 8.5 to 12.0 g; n = 8). The average female reproductive rate across colonies was 64.5% and ranged from 33% to 94% at each colony (Table 3).

Table 3: Reproduction rates of adult female *Myotis lucifugus* observed at maternity roosts during July 2016 along the Copper River basin, Alaska.

Roost	Netting Date	Reproductive Rate	Sample size	Estimated Colony size
RM-16-01	4-Jul-16	0.33	3	48
RM-16-02	9-Jul-16	0.89*	44	417†
RM-16-03	8-Jul-16	0.64	22	57
RM-16-04	11-Jul-16	0.57	28	468
RM-16-05	13-Jul-16	0.94*	16	66†
RM-16-06	20-Jul-16	0.50	8	45†

* Statistically higher than the overall mean reproductive rate

† Emergence count adjusted to account for fledged juveniles

Juveniles were captured at three of the six sites and the first volant juvenile was captured on 9 July, however, non-volant juveniles were also observed at the roost entrance that night. Juvenile captures ranged in size from 36.1 mm to 38.5 mm forearm length (mean: 37.5 ± 0.82, n=13) and 4.75 g to 7.5 g mass (mean: 6.5 ± 0.70, n = 13). The largest proportion of juveniles were captured at the latest surveyed roost on 20 July (Figure 2).

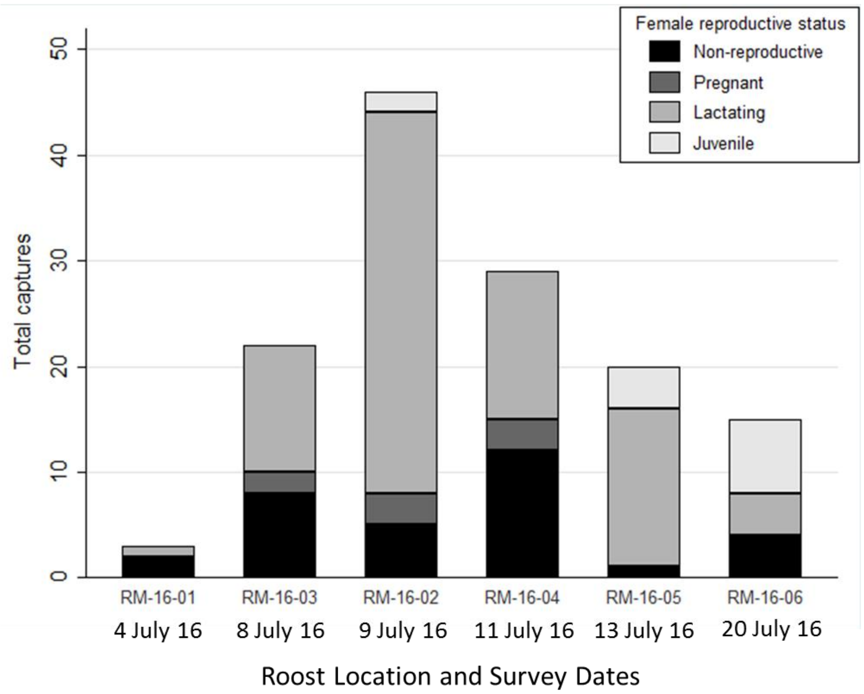

Figure 2: Age class and reproductive status capture profile of *Myotis lucifugus* captured during survey events in Alaska, July 2016.

During capture events, we noticed damaged ear tissue in 12% of the total number of captures (n = 140). Ear tissue damage was present in 0% to 24% of the captured individuals at each site (Table 4).

Table 4: Prevalence of ear tissue damage observed at *Myotis lucifugus* maternity colonies along the Copper River delta, AK, surveyed during July 2016.

Location	Captures with frostbite	Sample size	% captures with frostbite	Estimated colony size	% Population surveyed
RM-16-01	0	6	0.00	48	12.50
RM-16-02	1	48	2.08	417†	11.50
RM-16-03	5	23	21.74	57	40.35
RM-16-04	5	28	17.86	468	5.98
RM-16-05	5	20	25.00	66†	30.30
RM-16-06	1	15	6.67	45†	33.33
TOTAL	*17*	*140*	*12.14*	*1101*	*12.72*

† Emergence count adjusted to account for fledged juveniles

There was no significant difference between standardized mass (mass/forearm length; ANOVA, df = 120, $R^2 = 0.0005$, $F = 0.06$, $p > 0.05$) or reproductive rate (ANOVA, df = 120, $R^2 = 0.0152$, $F = 1.84$, $p > 0.05$) of adult females with and without ear tissue damage.

Discussion

During this first year of study, we identified and surveyed six little brown myotis maternity colonies in an effort to build a roost monitoring network across Alaska. All six colonies inhabited man-made roosts that varied in size, materials, human-occupancy, and nearby habitat (Appendix A). They were all within 20 meters from the nearest forest edge, and five of the six colonies had a water-body nearby (Table 1). This close proximity to the forest may be preferential for foraging and predation avoidance given the relatively bright nights at high latitudes (Rydell 1992). Colony population sizes ranged from 50 to nearly 500 adults and did not appear to be influenced by the size of the roost (Table 2). These man-made roost types and estimated colony sizes are consistent with little brown myotis roost selection and population numbers reported for colonies throughout their North American range (Anthony and Kunz 1977, Jung 2013, Randall et al. 2014, Smith 1940, Talerico 2008, Wilson *et al*. 2014).

Female reproductive rates varied across surveyed colonies with an average reproductive rate of 64.5% (Table 3). This is relatively low compared to maternity colonies farther south in places such as New Hampshire (87 to 99%; Frick *et al.* 2010) and the eastern US (> 96%; Cagle and Cockram 1943, Humphrey and Cope 1976). These lower reproductive rates are similar to those observed at other northern latitudes such as Yukon (33 to 74%; Talerico 2008) and the Northwest Territories (49 to 79%; Reimer 2013), Canada, and consistent with a documented trend of declining reproductive rates associated with increasing latitudes (Barclay et al. 2004). It should be noted however, that two maternity colonies surveyed this summer had reproductive rates significantly higher than the overall average (89% and 94%; Table 3) and were more consistent with rates observed farther south, illustrating the high variability observed across colonies within a given year. Future research investigating roost characteristics such as temperature profiles, and ambient seasonal temperatures may shed light on the causes of reduced reproductive rates within various roosts and colonies throughout Alaska. Reproductive rates of little brown myotis are known to be influenced by climate (Frick *et al.* 2010), and future research will investigate seasonal temperatures in conjunction with internal roost temperatures and reproductive rates across colonies.

While we did not do extensive temporal surveys at each colony to determine timing of parturition, lactation and fledging, our surveys at each site seem to suggest that overall, juveniles are fledging during the middle of July, which is consistent with what is seen at other northern sites (e.g. Northwest Territories; Reimer 2013). Interestingly, there appeared to be large variation in parturition dates both within and between colonies. At roost RM-16-02, pregnant females, lactating females, non-volant juveniles and fledged juveniles were all captured or observed (Figure 2). This overlap in reproductive stages has also been observed at northern sites in the Yukon (Talerico 2008) and may be linked to cool spring temperatures, variation in individual female fitness, and/or variation in torpor-use by individuals (Frick *et al.* 2010, Racey and Swift 1981).

During our capture surveys we noted a large number of bats exhibiting signs of ear tissue damage (Table 4). Currently in the literature there are only two papers that reference similar findings; LaVal and LaVal (1970) studied myotis species in Missouri and suggested that truncated ears were a sex-linked gene mutation that affected only males, while Kurta and Kweiscinski (2007) did histological studies of myotis ear tissue at hibernacula in Michigan and suggested that the truncated ears were the result of trauma most likely associated with frostbite. Since we observed damaged ear tissue in both males and females and the damage was not uniform across ears, we expect that the damage is similar to that reported by

Kurta and Kweiscinski (2007) and may be attributed to frostbite. Over the past few years, residents throughout Alaska have reported bats in human dwellings during the winter, and a recent radio tracking study during September suggested that bats may be spending the winter in buildings (Shively 2016). In addition, recent studies in southeast Alaska observed a small number of bats roosting in small cracks and crevices of scree fields and root wads (K. Blejwas, pers. comm. 2015). The high frequency of ear tissue damage observed in our study may support the idea that bats are spending the winter in roost sites throughout interior Alaska where temperatures fluctuate and drop to very low figures rather than migrating to more stable hibernacula farther south. While this winter-roosting behavior would be considered unusual compared to the rest of the species' range, winter roosting in buildings and scree fields has been observed for bat species in northern Norway (Michaelsen *et al.* 2013), and may be a strategy employed by bats at northern latitudes when relatively large, stable caves are lacking. Additional research to determine the definitive cause of the ear tissue damage, and the potential fitness effects is warranted.

In addition to monitoring existing maternity colonies, we worked with home owners to build artificial bat boxes in an effort to move bats out of human dwellings (Appendix B). We constructed three, single-chamber rockets boxes that were installed within close proximity to existing maternity colonies. Each bat box was outfitting with a hobo data logger and will be monitored for roost conditions and bat activity during 2017.

In conclusion, we consider this first summer of little brown myotis maternity colony surveys to have been a success in laying the groundwork for a long term monitoring program. We have identified wide variation in reproductive rates across colonies and reproductive phenology across individuals, and noted a high prevalence of damaged ear tissue amongst populations. Monitoring these six maternity colonies, with the help of local residents, will allow us to start following population trends at different sites to monitor for changes in population numbers at both a localized and region-wide level.

Ongoing Research

Data collection for the 2016 study period is still ongoing, and we currently have temperature loggers deployed in each of the six maternity roosts and each of the three artificial bat boxes. We will retrieve the temperature loggers during November 2016 and assess the temperature profiles of each roost in relation to ambient conditions. Future research plans include a second field season for 2017 during which we plan to add an additional six maternity roosts along the Tanana River to the roost monitoring network. We will also re-survey the six 2016 maternity roosts along the Copper River, to begin the second year of population data collection. Acoustic monitoring at these sites will commence in the spring (April) to identify when bats arrive at each maternity roost. If logistically feasible, acoustic monitoring will continue through the summer and autumn of 2017 to determine season length of female myotis across maternity colonies. Web-based outreach materials are currently being developed in collaboration with ADF&G to further engage citizen scientists in roost monitoring activities; and additional research into how environmental and roost conditions may impact reproductive rates and phenology is being considered.

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APPENDIX A – Maternity roost profiles

Roost ID: RM-16-01
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 3 July 2016
Colony emergence count 2016: 48 individuals

Bat exit/entrance point
Flight pathway

Figure 3: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-01

Roost size (length x width x height)**:** 140 m x 40 m x 40 m

General location: Wasilla, AK

Comments: The roost is an old barn situated on private land. The roof is ‘open’, with bats roosting in the peak of the SW side. The nearest water source is a river approximately 20 meters from the SE side. The barn is currently being used as storage.

Roost ID: RM-16-02
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 6 July 2016
Emergence count 2016: 435 individuals; estimated colony size: 417

Bat exit/entrance point
Flight pathway

Figure 4: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-02

Roost size (length x width x height)**:** 11 m x 9 m x 7 m

General location: Mentasta, AK

Comments: The roost is an abandoned house/cabin situated on private land. Roof materials are wood covered with shingle rolls.

Roost ID: RM-16-03
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 7 July 2016
Emergence count 2016: 57 individuals

Figure 5: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-03

Roost size (length x width x height)**:** 4 m x 4 m x 4 m

General location: Nabesna Road, AK

Comments: The roost is a guest cabin used frequently during the summer, situated on private land. Infrequently heated using wood stove. Roof material is tin. Bats roost along the spine of the roof during the day, between the closed ceiling and roofing material. An artificial bat box (style: rocket box) was built during July 2016 and installed approximately 10 meters away on the south side of the building (see appendix B for details).

Roost ID: RM-16-04
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 10 July 2016
Emergence count 2016: 468 individuals

Figure 6: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-04

Roost size (length x width x height)**:** 6 m x 5 m x 7 m

General location: Gakona, AK

Comments: The roost is a private residence with human occupants year round. The roof material is tin. Bats roost all throughout the roof which majority of the bats congregating along the spine. An artificial bat box (style: rocket box) was installed approximately 50 meters from the roost on the northwest side of the building during July 2016 (see appendix B for details).

Roost ID: RM-16-05
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 12 July 2016
Emergence count 2016: 83 individuals; estimated colony size: 66

Bat exit/entrance point
Flight pathway

Figure 7: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-05

Roost size (length x width x height)**:** 20 m x 7 m x 8 m

General location: Kenny Lake, AK

Comments: The roost is a private residence with human occupants year round. Numerous attempts have been made to block the roost entrance points. Six artificial bat houses were erected at the roost during autumn 2015: three were attached to the southwest side of the roost building, and three were attached to two outbuildings on the northwest side of the roost. An additional artificial roost (style: rocket box) was installed approximately twenty behinds from the roost, along the treeline and directly on the bat emergence flight path on the south side of the roost building, during July 2016 (see appendix B for details).

Roost ID: RM-16-06
Species: *Myotis luficugus,* Little brown myotis
Date surveyed: 19 July 2016
Emergence count 2016: 84 individuals; estimated colony size: 45

Bat exit/entrance point
Flight pathway

Figure 8: Little brown myotis (*Myotis luficugus*) maternity roost RM-16-06

Roost size* (length x width x height)**:** 10 m x 6 m x 9 m
*Bats are limited to the arctic entry: 3 m x 2 m x 3 m

General location: Kenny Lake, AK

Comments: Bats were primarily concentrated in the top portion of the ‘arctic entry’ on the south side of the building. Historically bats were present throughout the cabin roof/ceiling, however the home owners filled majority of the entrance points which resulted in the bats restricting use to the arctic entry.

APPENDIX B – Artificial Roost Pilot Project

Artificial Roost ID: RB-16-01
Target Species: *Myotis luficugus,* Little brown myotis
Date installed: 10 July 2016

Figure 9: Installation of artificial bat maternity roost RB-16-01 (style: rocket box) behind an active *Myotis lucifugus* maternity roost (RM-16-03).

General Location: Installed behind RM-16-03. Located on Nabesna Road, AK.

Comments: Installed along tree line behind RM-16-03. Not on major flight path of emerging bats.

Artificial Roost ID: RB-16-02
Target Species: *Myotis luficugus,* Little brown myotis
Date installed: 12 July 2016

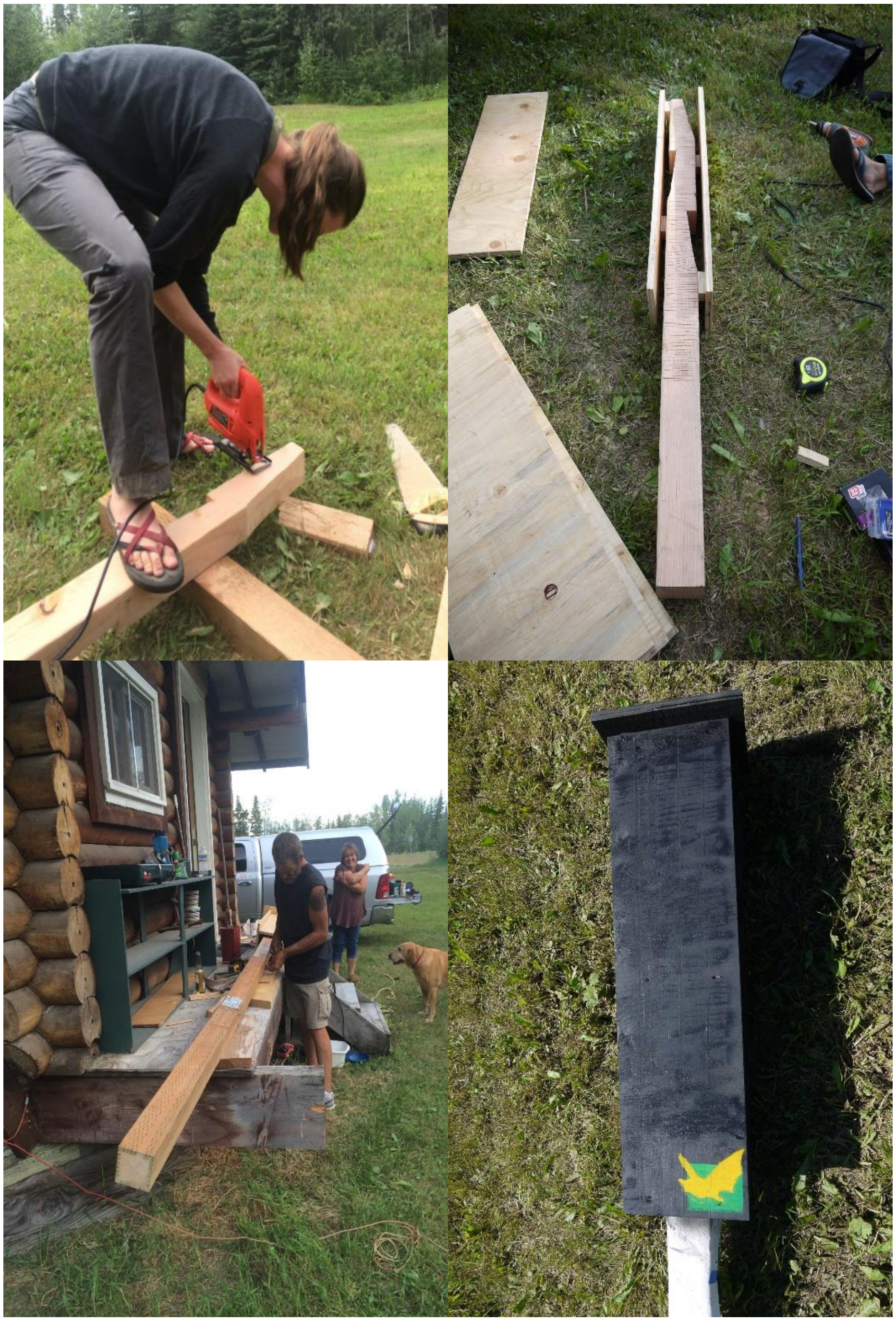

Figure 10: Construction of artificial bat roost RB-16-02 (style: rocket box).

General Location: Installed behind RM-16-04. Located in Gakona, AK.

Comments: Installed along tree line, directly on the flight path of bats emerging from RM-16-04.

Artificial Roost ID: RB-16-03
Target Species: *Myotis luficugus,* Little brown myotis
Date installed: 14 July 2016

Figure 11: Installation of artificial bat maternity roost RB-16-03 (style: rocket box) behind an active *Myotis lucifugus* maternity roost (RM-16-05; not in picture).

General Location: Installed behind RM-16-05, near Kenny Lake, AK.

Comments: Installed along tree line, directly on the flight path of bats emerging from RM-16-05.

APPENDIX C – Banding Records - 2016

Table 5: Little brown myotis (*Myotis lucifugus*) banding records for captures during July 2016 surveys

Band	Date	Location	Species	Sex	Age Class	Researcher
AP0319	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0320	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0321	8-Jul-16	RM-16-03	MYLU	M	Adult	J. Reimer, ACCS
AP0322	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0323	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0324	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0325	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0326	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0327	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0328	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0329	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0330	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0331	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0332	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0333	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0334	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0335	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0336	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0337	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0338	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0339	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0340	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0341	8-Jul-16	RM-16-03	MYLU	F	Adult	J. Reimer, ACCS
AP0342	9-Jul-16	RM-16-02	MYLU	F	Juvenile	J. Reimer, ACCS
AP0343	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0344	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0345	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0346	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0347	4-Jul-16	RM-16-01	MYLU	F	Adult	J. Reimer, ACCS
AP0348	4-Jul-16	RM-16-01	MYLU	F	Adult	J. Reimer, ACCS
AP0349	4-Jul-16	RM-16-01	MYLU	M	Adult	J. Reimer, ACCS
AP0350	4-Jul-16	RM-16-01	MYLU	F	Adult	J. Reimer, ACCS
AP0351	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0352	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0353	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0354	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0355	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS

Band	Date	Location	Species	Sex	Age Class	Researcher
AP0356	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0357	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0358	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0359	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0360	9-Jul-16	RM-16-02	MYLU	M	Adult	J. Reimer, ACCS
AP0361	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0362	9-Jul-16	RM-16-02	MYLU	M	Adult	J. Reimer, ACCS
AP0363	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0364	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0365	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0366	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0367	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0368	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0369	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0370	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0371	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0372	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0373	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0374	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0375	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0376	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0377	9-Jul-16	RM-16-02	MYLU	M	Juvenile	J. Reimer, ACCS
AP0378	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0379	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0380	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0381	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0382	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0383	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0384	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0385	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0386	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0387	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0388	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0389	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0390	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0391	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0392	9-Jul-16	RM-16-02	MYLU	F	Adult	J. Reimer, ACCS
AP0393	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0394	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0395	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0396	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0397	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS

Band	Date	Location	Species	Sex	Age Class	Researcher
AP0398	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0400	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0401	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0402	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0403	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0404	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0405	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0406	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0407	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0408	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0409	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0410	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0411	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0412	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0413	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0414	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0415	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0416	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0417	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0418	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0419	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0420	11-Jul-16	RM-16-04	MYLU	F	Adult	J. Reimer, ACCS
AP0421	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0422	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0423	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0424	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0425	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0426	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0427	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0428	13-Jul-16	RM-16-05	MYLU	F	Juvenile	J. Reimer, ACCS
AP0429	13-Jul-16	RM-16-05	MYLU	F	Juvenile	J. Reimer, ACCS
AP0430	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0431	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0432	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0433	13-Jul-16	RM-16-05	MYLU	F	Juvenile	J. Reimer, ACCS
AP0434	13-Jul-16	RM-16-05	MYLU	F	Juvenile	J. Reimer, ACCS
AP0435	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0436	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0437	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0438	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0439	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS
AP0440	13-Jul-16	RM-16-05	MYLU	F	Adult	J. Reimer, ACCS

Band	Date	Location	Species	Sex	Age Class	Researcher
AP0441	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AP0442	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AP0443	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AP0444	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AP0445	20-Jul-16	RM-16-06	MYLU	F	Unknown	J. Reimer, ACCS
AP0446	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AP0447	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AP0448	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AP0449	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AP0450	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AK1801	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AK1802	20-Jul-16	RM-16-06	MYLU	F	Juvenile	J. Reimer, ACCS
AK1803	20-Jul-16	RM-16-06	MYLU	M	Juvenile	J. Reimer, ACCS
AK1804	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS
AK1805	20-Jul-16	RM-16-06	MYLU	F	Adult	J. Reimer, ACCS