

INTRODUCTION

Little brown bats (*Myotis lucifugus*) are one of the most common species of bats and are found throughout much of North America the only species of bat that has been reported in Interior Alaska. Traditionally, *M. lucifugus* is located by ultrasonic acoustic monitoring devices. These bats emit social calls that are characterized as high intensity frequency modulated (FM) sweeps ranging from 80 kHz down to 40 kHz.

Knowledge Gap: Much is unknown about *M. lucifugus* in the interior. Most notably, it is unknown whether they hibernate in the interior or migrate to the more temperate climates of Southeast and Southwest Alaska. It is yet to be confirmed whether research regarding behavior and habitat from studies from the lower 48 mirror the behaviors and habitats of *M. lucifugus* in interior Alaska. An accurate estimate of the number of *M. lucifugus* roosting in the interior has yet to be determined.

Objective: using ultrasonic acoustic monitoring devices, determine the presence of *M. lucifugus* in the fall prior to hibernation near UAF campus. Confirmation of species presence will give rise to future studies locating hibernacula, maternal colonies, feeding habits relative to insect emergence, etc.

SIGNIFICANCE OF CONSERVATION

- Throughout the lower 48 and Canada, *M. lucifugus* is considered an endangered or threatened species due to White Nose Syndrome, a fungus that grows in the nasal passages of bats during hibernation.
- Frick, et.al (2010) predicted an almost 99% extinction of *M. lucifugus* in the Northeastern US by 2026 due to the condition.
- Pseudogymnoascus destructans*, the fungus that causes WNS, grows poorly in cold and dry conditions, and has not yet been found in bat species in Alaska, though very easily could be transported from bats in the lower 48.
- Unaffected *M. lucifugus* within the interior may be paramount to conservation of the species nationwide.



M. lucifugus unaffected by WNS.
(AK Department of Fish and Game)



M. lucifugus affected by WNS.
(White Nose Syndrome Response Team)

PILOT STUDY METHODOLOGY

Materials

- Anabat Chorus ultrasonic auditory detectors
- 32-64 gigabyte memory cards
- Rechargeable AA batteries
- Anabat Insight

Methods

- Five Anabat Chorus detectors were deployed between September 6th and October 31st at two lakes near UAF campus.
- Detectors were affixed to trees approximately 5 feet from ground using wire and bike locks.
- Batteries on detectors and memory cards changed every 5-7 days.
- Auditory files were analyzed using Anabat Insight program - trigger search for sounds between 30 - 90 kHz

1. Ballaine Lake - off Karl Reishus trail [64.87129, -147.82938]
2. Ballaine Lake - adjacent to lake [64.86952, -147.82532]
3. Smith Lake - lake visible through trees [64.86728, -147.86351]
4. Smith Lake - lake visible through trees [64.86699, -147.86622]
5. Smith Lake - lake visible through trees [64.86718, -147.86818]



M. lucifugus range in Alaska
Alaska Public Media



Research design optimization for determining hibernation and spring emergence of Little Brown Bats (*Myotis lucifugus*)

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DESIGN OPTIMIZATION

MATERIALS

- Anabat Chorus equipped with ultrasonic microphones - ideally seven detectors will cover the perimeter of Smith Lake
- 8 rechargeable batteries per detector (4 active, 4 to swap out)
- 2-64 gig memory cards per detector
- Straps to affix detectors
- Locks
- GPS
- Anabat Insight program



Future study area (Smith Lake Park area)



Alaska Public Media

- Download SD card and ensure that detectors are functioning correctly using Anabat Insight - adjust if necessary
- Identify any bat activity in recordings - if bats are noted, take additional observations of detector site - insect activity, foliage, snow depth, etc. Attempt to locate hibernacula.
- Retrieve detectors mid-May
- Analyze data - record locations of bat activity for deploying detectors later for fall hibernation study

METHODS

- Prior to deployment, ensure that detector settings are correct
- Deploy detectors in mid-April for emergence study
- Set detectors according to optimal detector placement - affix to trees with bike locks and straps
- Record observations about foliage, coverage, insect activity, etc. of detector sites
- Check detectors every 5-7 days - swap batteries and SD cards

OPTIMAL DETECTOR PLACEMENT for the bats

- Proximity to water:** fall food availability is largely in the form of water bugs, caddis flies and spiders, so hibernacula are likely close to food source
- Enclosed, insulated spaces:** *M. lucifugus* occupy narrow, vertically deep spaces that will insulate with snow throughout winter. Ideal dimensions for bat houses are 24" x 16" x 3", with 3/4" - 2" partitions (Reimer & Barclay, 2024).



UAF News

Covered but open corridors through trees: long stretches of lateral flying is easily accomplished, but sufficient canopy and foliage coverage is available to avoid predation. *M. lucifugus* unlikely to be found on man-made trails.

OPTIMAL DETECTOR PLACEMENT for the detectors

- 100 feet apart:** microphones can accurately record up to 100 feet. For optimal coverage, detectors should be placed at 100 foot intervals
- Proximity to road systems:** in addition to *M. lucifugus* being averse to vehicles, the ambient buzz of cars yields a low frequency tone that can obscure ultrasonic signals
- Corridor selection:** microphones should point down corridors through the clearest possible path
- Potential noise obstruction:** avoid high foot traffic areas, such as open trails. Remove leaves and branches as needed as the rustling of foliage can disrupt microphone clarity



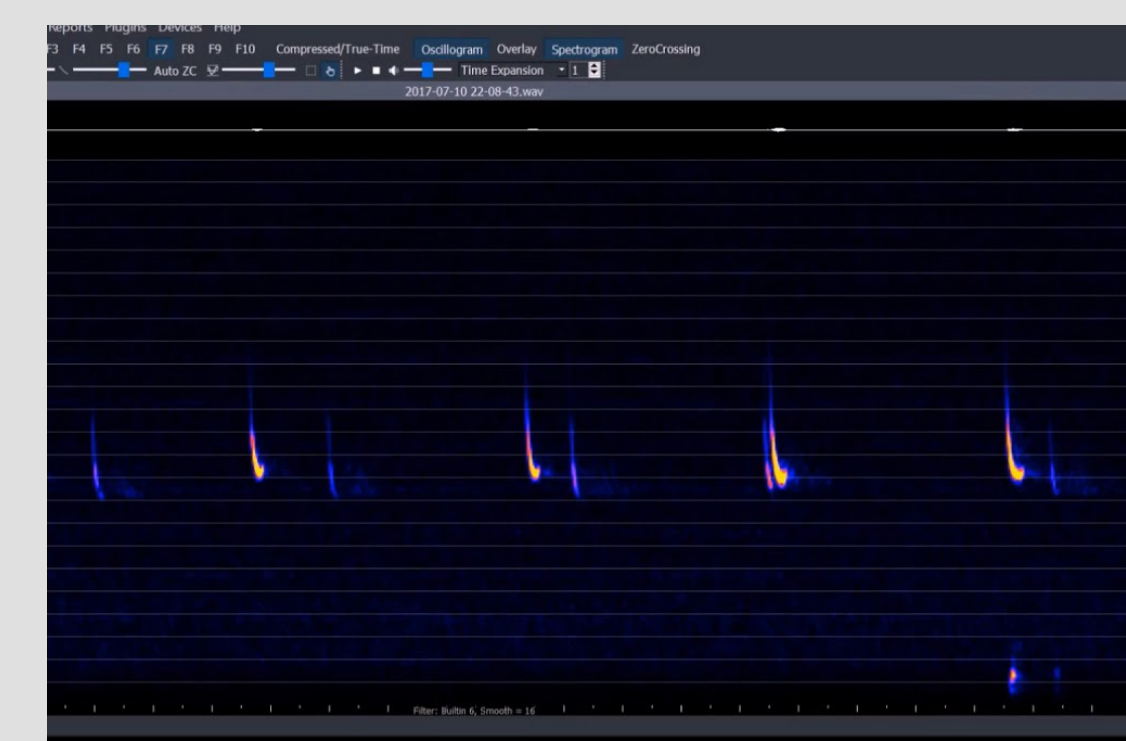
DETECTOR SETTINGS & DATA ANALYSIS

- Equip the ultrasonic microphone - ultrasonic microphone can be used on side B only
- Wait for GPS fix - this will record location, time, sunrise/sunset times, temperature, etc.
- Record mode should be "night" : will record 30 minutes before and 30 minutes after sunset
- Sampling rate should be 300 ksp/s
- Trigger activation mode should be selected - this will only record when it is active (night mode) and when the target frequency detected - minimum = 10kHz, maximum = 250 kHz
- Minimum event = 2 seconds
 - 10 K high pass filter on



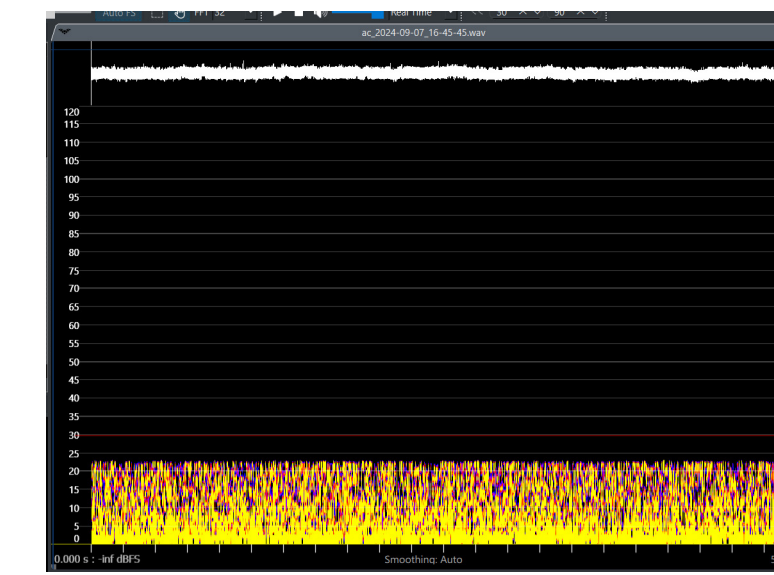
Anabat Chorus
(Titlley Scientific)

- Upload data to Anabat Insight
- Metadata is available in .csv files on SD cards
 - GPS locations
 - Temperature
 - Altitude
 - Time of trigger
- Set trigger search to 30-90 kHz (*M. lucifugus* typically calls at 40 80 kHz)
- Note where and when calls are positive for bats



Positive result for bat calls.
(Titlley Scientific)

LESSONS LEARNED FROM PILOT STUDY



- Check detectors frequently and analyze data as it is collected - make adjustments to detectors as needed
- Ensure microphone settings are correct for ultrasonic microphones - detectors must be set exactly as settings section states
- If detectors are set incorrectly for ultrasonic microphone, data in Anabat Insight will appear as above image - static 22 kHz across all files - recheck that recorder is set to
 - night mode
 - trigger activation mode
 - frequency 10 kHz - 250 kHz

NEXT STEPS & FUTURE STUDIES

- Spring 2025:** Wildlife Society UAF Chapter intends to deploy detectors again to establish presence or absence of *M. lucifugus* on campus. Locations will be centralized to Smith Lake for ease of travel for students.
- Once presence is established, research may pertain to many aspects of bat behaviors:
 - Emergence: Spring emergence has been reported around from late April to late September/early October (Reimer & Barclay, 2024).
 - Maternal colonies: Activity is reported between early May to mid October, peaks in July.
 - Hibernation: Hibernation is reported between late September and mid-April.
 - Conservation efforts: given the characteristics of hibernacula in the interior, how should a bat box be designed? How many bats should it accommodate and what should its dimensions be given our climate? Does it need to be insulated?



Bat Conservation International



AK Department of Fish and Game

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