Summary of Findings

Bat Detections at Birge Nature preserve Birding Trail

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ABSTRACT: Echolocation signals were recently recorded in the Birge Nature Preserve to monitor local bat activity using a Wildlife Acoustics detection meter. Eight of nine bat species native to Michigan were identified using Kaleidoscope software to interpret recorded signals. The Silver-haired bat (*Lasionycteris noctivagans*) signals were recorded most frequently, followed by Little Brown Bat (*Myotis lucifugus*) and the Eastern Red Bat (*Lasiurus borealis*). The number of signals recorded for a given species does not accurately reflect a specific number of individuals, but signal numbers can be interpreted to indicate the relative population density among species. Data generated during this project will be incorporated in the Les Cheneaux Watershed Council (LCWC) database that is being developed in an attempt to obtain a more accurate assessment of Les Cheneaux bat population densities.

Introduction: Insect-eating bat populations across the country have plummeted in recent years due in large part to White-nose Syndrome, a lethal fungal disease caused by *Pseudogymnoascus destructans*. Little Brown Bats (*Myotis lucifugus*) have been reported to be the most common bat in the Les Cheneaux area prior to the population crash. The LCWC began monitoring local bat species two years ago to assess the relative numbers and species of surviving bats. Since the main purpose of the project is to monitor bat activity over a given time span, the presence of the various species is not verified beyond the automatic identification assigned by the Kaleidoscope software.

Methods

A Wildlife Acoustics SM4BAT-FS ultrasonic detection meter was set up on in the Birge Nature Preserve on August 9, 2019 at approximately 3:00 PM. The microphone was set up in a small clearing near the parking area of the birding trail. The co-ordinates were 46.004N, 84.472W.

The SM4BAT recorded bat ultrasonic echolocation signals from 30 minutes before civil sunset to 30 minutes after sunrise per the NABat (North American Bat Monitoring Program) protocol. Other recording parameters also met the NABat protocol as specified for the SM4BAT-FS. The microphone was elevated approximately 12 feet above the clearing floor. The instrument recorded detections from sunset August 9 through sunrise August 20, 2019. Figures 3 and 4 detail the equipment location and microphone placement.

Results

The BATSM4-FS registered a total of 1659 detections of bat echo location signals while recording from 30 minutes prior to sunset to 30 minutes after sunrise for 11 nights. A Wildlife Acoustics Kaleidoscope software analysis of the signals assigned an auto species identification (auto ID) to a total of 1,111 of the signals. Another 548 signals contained insufficient or conflicting information and were not assigned an auto ID. The software classified the remaining 142 signals as noise as they did not meet the requirements for bat echo location calls.

Table 1 breaks down the automatic species identification by date and number detected. The abbreviations used are as follows:

EPTFUS	Eptesicus Fuscus	Big Brown
LASBOR	Lasiurus Borealis	Eastern Red
LASCIN	Lasiurus Cinereus	Hoary
LASNOC	Lasionycteris Noctivagans	Silver Haired
MYOLUC	Myotis Lucifugus	Little Brown
MYOSEP	Myotis Septentrionalis	Northern Long Ear
MYOSOD	Myotis Sodalist	Indiana
PERSUB	Pipistrellus subflavus	Eastern Pipestrelle or Tri-Colored

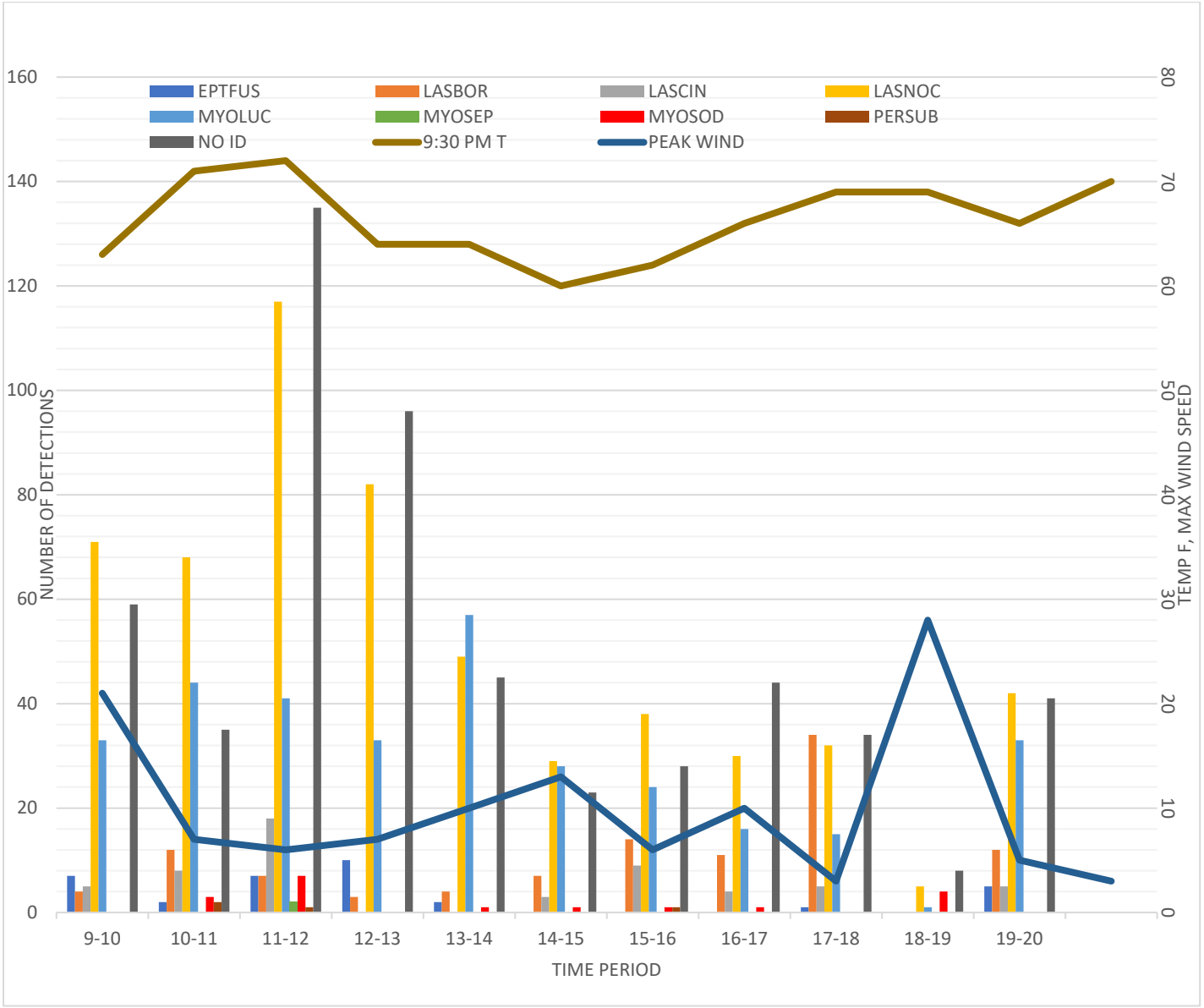
The period column in Table 1 refers to the recording night as identified with the dates, i.e. 9-10 is the night beginning at sunset August 9 and ending at sunrise August 10. Figure 1 depicts the breakdown by night. Included in the chart are plots for minimum temperature and maximum recorded wind speed during the recording period.

TABLE 1
AUTO ID SPECIES DETECTIONS PER TIME PERIOD

PERIOD	EPTFUS	LASBOR	LASCIN	LASNOC	MYOLUC	MYOSEP	MYOSOD	PERSUB	NO ID
9-10	7	4	5	71	33				59
10-11	2	12	8	68	44		3	2	35
11-12	7	7	18	117	41	2	7	1	135
12-13	10	3		82	33				96
13-14	2	4		49	57		1		45
14-15		7	3	29	28		1		23
15-16		14	9	38	24		1	1	28
16-17		11	4	30	16		1		44
17-18	1	34	5	32	15				34
18-19				5	1		4		8
19-20	5	12	5	42	33				41

FIGURE 1

AUTO ID SPECIES DETECTIONS PER TIME PERIOD



Discussion

The detections observed in the Birge Preserve are indicators of bat activity only. They do not corellate directly to the number of bats present. One bat, for instance, may make several passes near the microphone and thus be responsible for multiple detections in the same time period. Instances where the number of detections for one species number in the single digits, however, are indicative of a low number of animals or are false identifications assigned by the software. The large number of detections without assigned auto IDs suggests that the number of bats is probably higher than what is implied by the auto ID counts.

The auto ID function in the Kaleidoscope software identified eight of the nine species of bat found in Michigan. The silver Haired bat had the most detections followed by the Little Brown and the Eastern Red. While there were detections attributed to the endangered Indiana bat, it is not known if these were true detections. Little Brown bat calls are sometimes mis-identified as Indiana calls and the Birge preserve is outside of the known range of Indiana bats. On the night of August 18-19, however, the number of detections identified as MYOSOD (Indiana) was higher that of the MYOLUC (Little Brown). These detections also occurred later in the time period than any MYOLUC detections. It is not known if this is a result of MYOLUC dections hidden in the non-identified group or if Indiana bats were indeed present. Further analysis of the signals is required before any positive conclusions can be drawn.

On the night of August 18-19 the overall detected activity dropped approximately 90% compared to the previous night (Figure 2). The actual cause for this decrease is not known. A possible explanation is the peak wind speed recorded during the period. Gusts exceeding 25 mph were reported during the prime feeding time of sunset to midnight with sustained winds exceeding 15 mph.

Figure 2 also shows that the number of signals not automatically assigned an auto ID follows a similar trend as the detections auto ID'ed as Silver Haired bats (LASNOC). The detections that are not assigned an ID may contain chirps from several species within the minimum 1.5 ms chirp duration for recording what is considered a "true" detection. It follows then, that the species with the most detections will most likely dominate the number of chirps detected in the signals not assigned an ID.

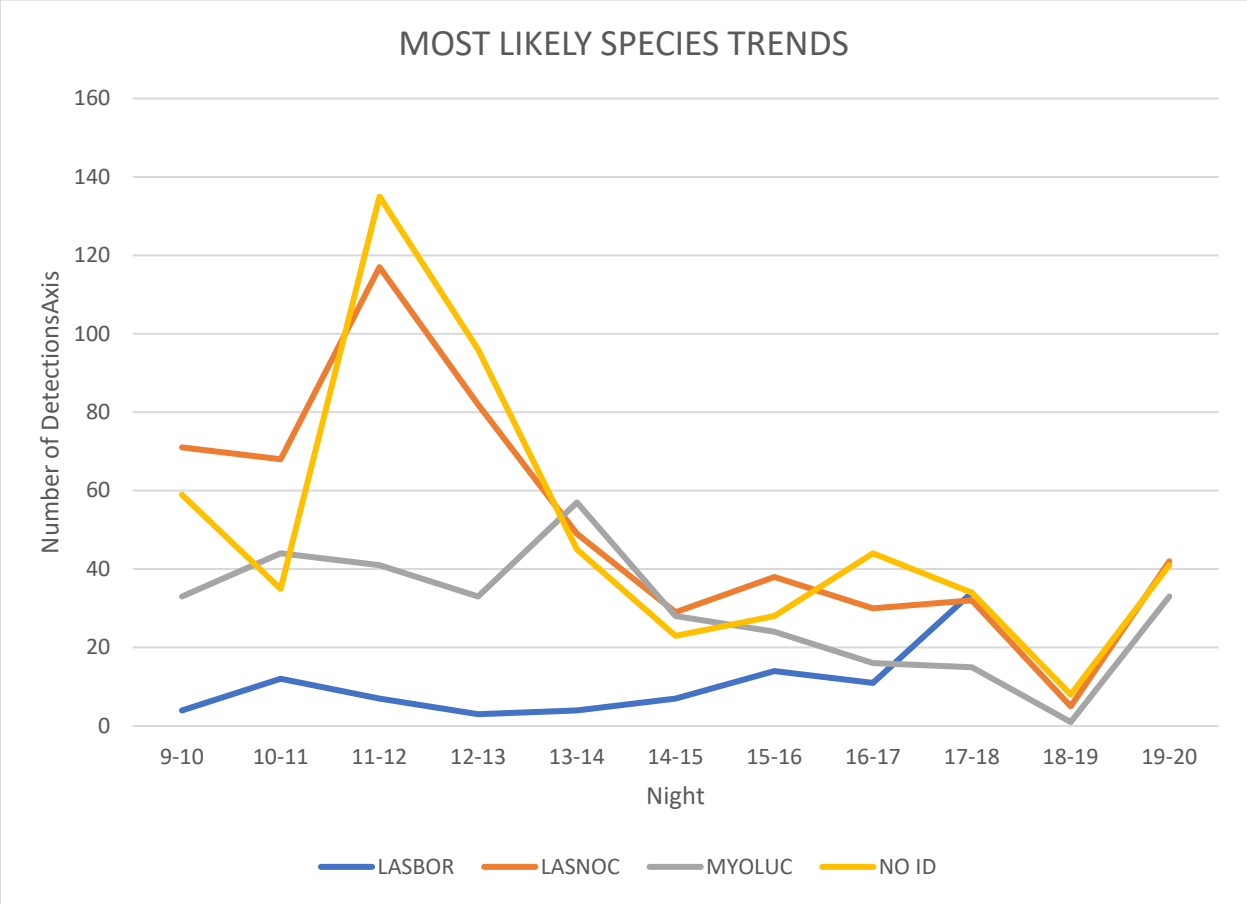
The Kaleidoscope software also provides a statistically derived number indicating the probability of the presence of each of the auto ID'ed species. The four species identified with the highest probability of presence were the LASBOR (Eastern Red or Red), LASCIN (Hoary), LASNOC (Silver Hair) and the MYOLUC (Little Brown). An analysis of the detection data from these species reveals a clear picture of a downward trend in detections over time.

Table 2

MOST LIKELY SPECIES PRESENT - DETECTIONS

PERIOD	LASBOR	LASCIN	LASNOC	MYOLUC	NO ID
9-10	4	5	71	33	59
10-11	12	8	68	44	35
11-12	7	18	117	41	135
12-13	3		82	33	96
13-14	4		49	57	45
14-15	7	3	29	28	23
15-16	14	9	38	24	28
16-17	11	4	30	16	44
17-18	34	5	32	15	34
18-19			5	1	8
19-20	12	5	42	33	41
TOTALS	108	57	563	325	548
SD	9	5	31	15	36
3SD	27	14	93	46	108

FIGURE 2



The downward trend in the number of detections may be related to the mating and migratory habits of the three species. It is known that Silver Haired bats are migratory. They may also move from one foraging area to another to avoid foraging competition from faster flying species. Little Browns tend to swarm and mate during late August and early september and then move on to the winter hibernacula. This may explain the drop in detections from period 1 to period 9. The Red Bat detections seem to remain relatively consistent over the monitoring time period except for the spike at segment 9 where the number triples. Red bats tend to migrate in flocks in the fall although usually later in September or October. The exact cause for the spike in detections remains unknown.

Additional Figures

3) Map/Image showing location of instrumentation
4) Photo showing microphone placement

FGURE 3 – INSTRUMENTATION LOCATION

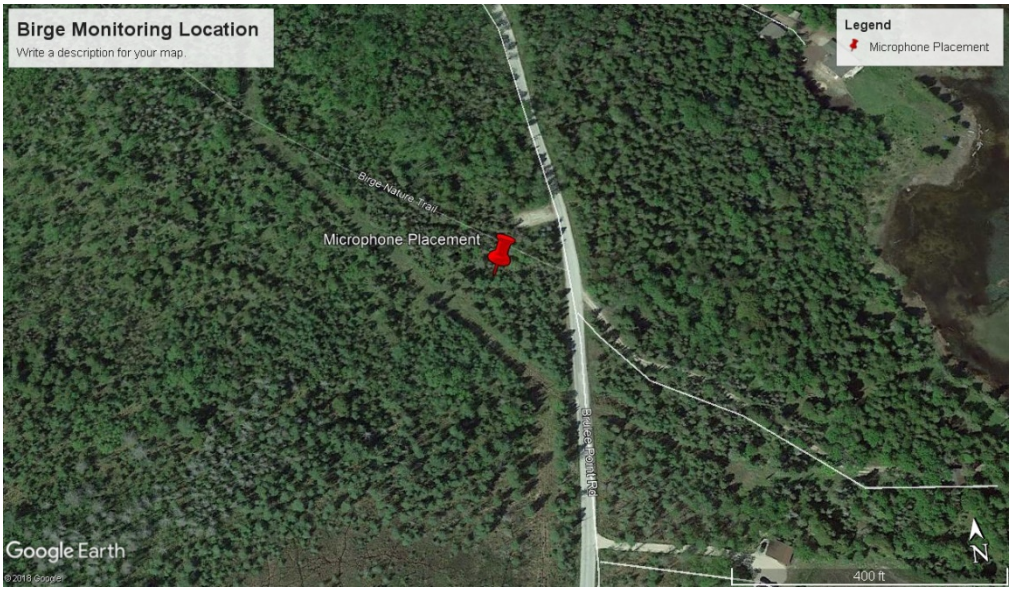


FIGURE 4 – MICROPHONE PLACEMENT