Summary of Acoustic Bat Surveys on the NorthMet Project Area

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The U.S. Fish and Wildlife Service proposed to list the northern long-eared bat (*Myotis septentrionalis*), as endangered on October 2, 2013. Acoustic surveys were conducted on PolyMet's NorthMet project area to determine presence of northern long-eared bat and little brown bat (*Myotis lucifugus*). The surveys included acoustic and emergence observations around both the NorthMet project area and the former LTV Erie Plant in St. Louis County. Passive acoustic detectors were installed on exploration roads near the potential mining site. Detectors were deployed for 34 nights of data collection. The passive detectors collected a total of 8,271 bat calls, with *Myotis spp*. accounting for 7,725 (90%) of the calls. Mobile surveys were also conducted during the study. This entailed driving a 16.5-mile transects, once a week, for a total of four nights. In addition to acoustic surveys, emergence surveys were conducted at the Erie Plant for a total of eight nights, resulting in three buildings being identified with bat activity.

Passive Surveys

Methods- Anabat™ SD-1 and SD-2 CF Bat Detectors were deployed on exploration trails within the NorthMet project area (Figure 1). Surveys were conducted from July 23, 2014 to August 12, 2014. The detectors were programmed to turn on at 2100 and turn off at 0600 to capture peak feeding times of two hours after sunset and two hours before sunrise. The Anabat™ detectors were placed in a weatherproof case and installed onto trees at about 8 ft. The weatherproof case has a reflective surface at a 45 degree angle, placed under the microphone in order to protect microphone from moisture, while allowing the signals to be reflected towards it.

Figure 1. Anabat passive monitoring set up

Two detectors were deployed at one time, at least 200m apart, for two nights. A total of 13 sites were monitored for 34 nights of data collection (Figure 1). Detectors that had an equipment malfunction where no data was recorded were redeployed in the same location for an additional two nights. Due to scheduling conflicts, two detectors were left at their sites for a lengthened period of six nights. The data was downloaded in the field using CFC Read and then erased from the CF cards to ready the detectors for redeployment. After the data were erased, Anabat™ detectors were redeployed in a new location within the NorthMet project area. Detectors were placed along flyways and areas that were likely to support bat forging activity, such as the edges of wetlands or small open areas caused by wind blow down.

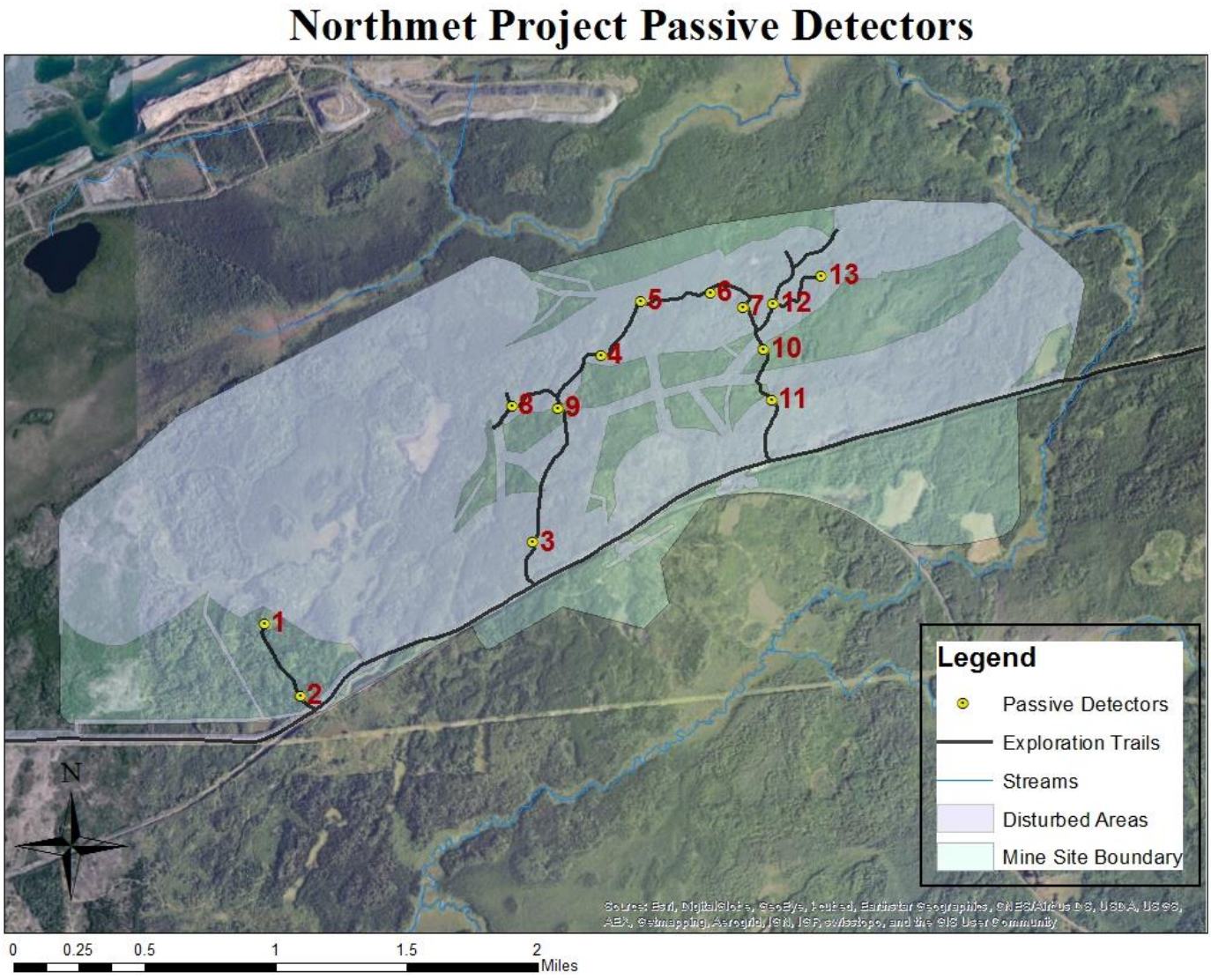

Figure 2. Layout of passive detectors within the NorthMet project area.

Results- A total of six species were detected: the little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*), silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), Eastern red bat (*Lasiurus borealis*), and hoary bat (*Lasiurus cinereus*) for a total of 8,271 calls. *Myotis* species comprised of 93.4 % of the calls detected with a total of 7,725 (Table 1). The silver-haired bat was the second most detected bat with 344 calls comprised of 4.2% of all calls. The big brown bat comprised of 1.6% of all calls detected with 136, and hoary bat *and* Eastern red bat

comprised of less than 1% of calls with 41 and 25 calls detected, respectively. During the nights of 08/08/14 and 08/09/14, interference caused an inability to distinguish between little brown bats and northern long-eared bats with confidence, so they were combined into one category called “40K *Myotis* spp.” With these data removed, the little brown bat accounts for 80% of all calls, and the northern long-eared bat accounts for 15% (Table 1). Detector 1 was the only detector that recorded more northern long-eared bats *(*28), than little brown bats *(*27). Detector 5 had the largest number of both little brown bats and northern long-eared bat recorded with 1,367 and 184 respectively (Table 3).

Passive Monitor Call Collection Summary			
Bat Species	**Species Code**	**# of Calls**	**% of all Calls**
Little Brown Bat	MYLU	4,595	77.8%
Northern Long-Eared Bat	MYSE	804	13.6%
Silver-Haired Bat	LANO	313	5.3%
Big Brown Bat	EPFU	136	2.3%
Hoary Bat	LACI	33	0.6%
Eastern Red Bat	LABO	25	0.4%
Tri-Colored Bat	PESU	0	0.0%
Total		**5,906**	**100.0%**
* These numbers do not include the calls of monitors placed on 08/08/2014 due to lack of distinction between MYLU and MYSE			

Table 1. Breakdown of data collected from 13 passive detectors deployed near the NorthMet project area.

Passive Monitor Call Collection Summary Including 08/08/2014 Data			
Bat Species	**Species Code**	**# of Calls**	**% of all Calls**
40K *Myotis* spp.	MY--	7,725	93.4%
Silver-Haired Bat	LANO	344	4.2%
Big Brown Bat	EPFU	136	1.6%
Hoary Bat	LACI	41	0.5%
Eastern Red Bat	LABO	25	0.3%
Tri-Colored Bat	PESU	0	0.0%
Total		**8,271**	**100.0%**

Table 2. Breakdown of data collected from 13 passive detectors deployed near the NorthMet project area, combining *Myotis* spp.

Passive Detector *Myotis* Species Call Collection Summary		
	# of Call Collected	
Detector #	Northern Long-Eared Bats	Little Brown Bats
1 (7/27/14-7/29/14)	28	27
2 (7/23/14-7/25/14)	72	161
3 (7/25/14-7/27/14)	93	877
4 (7/29/14-8/04/14)	149	662
5 (7/29/14-8/04/14)	184	1,367
6 (8/04/14-8/06/14)	72	88
7 (8/04/14-8/06/14)	131	689
8 (8/06/14-8/08/14)	25	206
9 (8/06/14-8/08/14)	26	61
10 (8/08/14-8/10/14)	1674 *Myotis* spp.*	
11 (8/08/14-8/10/14)	652 *Myotis* spp.*	
12 (8/10/14-8/12/14)	20	193
13 (8/10/14-8/12/14)	4	264
* Due to distortion, there was a lack of distinction between *Myotis* spp. at detectors 10 and 11.		

Table 3. Individual passive detectors and the number of northern long-eared and little brownbat calls detected at each.

Driving

Methods- Four driving surveys were conducted using an Anabat™ CF detector with a microphone mounted on the roof of the vehicle. A pre-determined 16.5-mile route was followed at 20 MPH which included the NorthMet project area along Dunka Road, the tailings basin, and the Erie Plant (Figure 3). It should be noted that the first transect driven on 07/24/14 did not include the tailings basin or Erie Plant and instead followed Dunka Road for its entirety. The surveys were conducted once per week, and had to be completed within 2 hours after sunset. A total of four surveys were conducted. The first survey was completed on 07/24/14, the second was completed on 7/28/14, the third was completed on 8/07/14 and the fourth was completed on 8/10/14. At the beginning and ending of each survey, the time, temperature, wind speed, moon visibility, and cloud cover were recorded. At the end of data collection, the calls were transferred to a computer and analyzed using AnalookW.

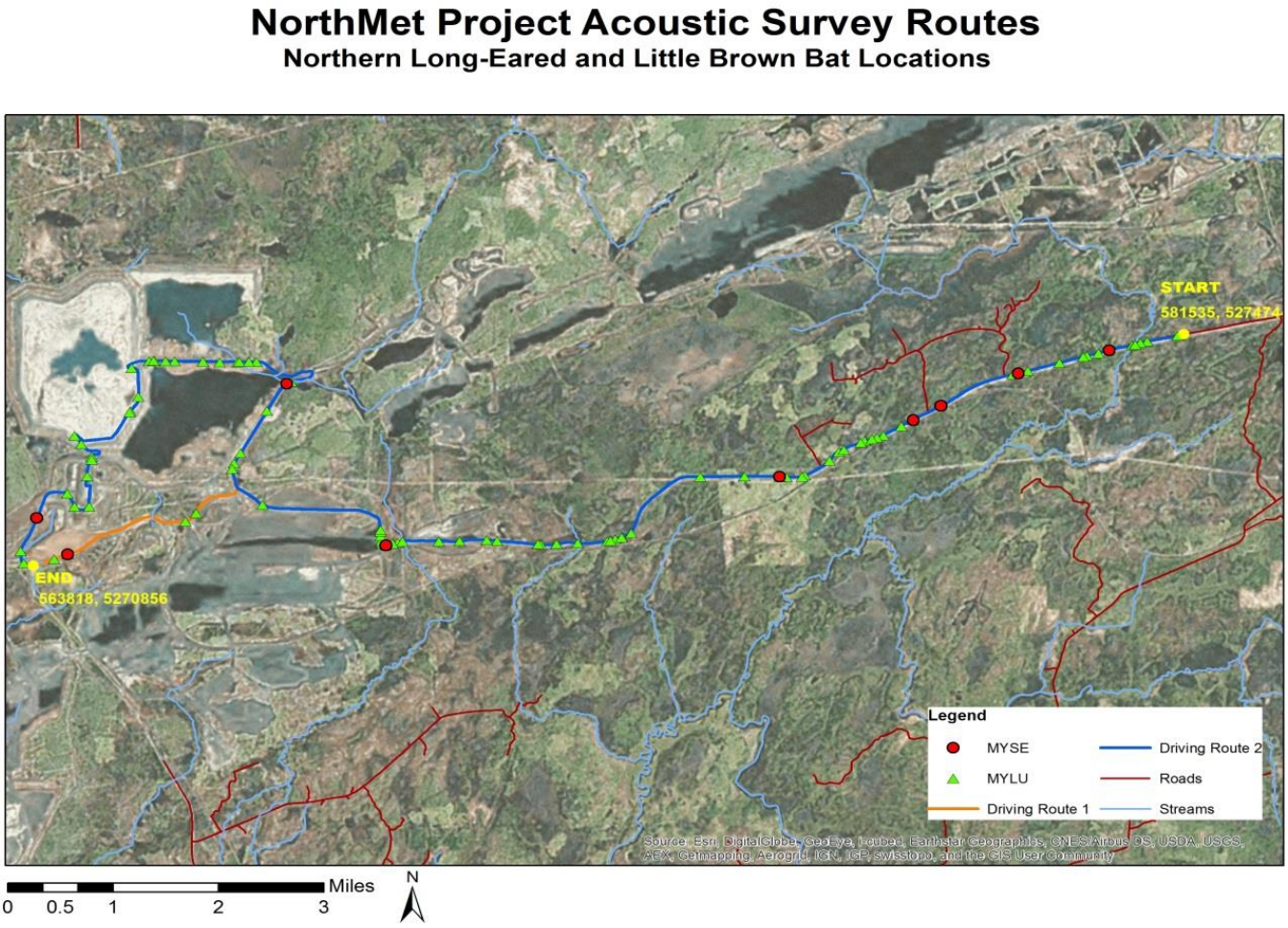

Figure 3: Specific locations of northern long-eared (MYSE) and little brown bat (MYLU) from the driving surveys

Results- A total of five species including the little brown bat, northern long-eared bat, silver-haired bat, big brown bat, and hoary bat were detected for a total of 195 calls. The Eastern red bat was the only species that was not detected during the driving surveys but was detected during the passive surveys. The silver-haired bat was the most common species detected with 99 calls accounting for 50.8% of all calls (Table 4). Little brown bat was the second most common with 61(31.3%) calls, big brown bat had 14 (7.2%) calls, hoary bat had *12 (6.2%)* calls*, and* northern long-eared bat had the least with 9 (4.6%) calls.

Driving Transect Call Collection Summary			
Bat Species	**Species Code**	**# of Calls**	**% of all Calls**
Little Brown Bat	MYLU	61	31.3%
Northern Long-Eared Bat	MYSE	9	4.6%
Silver-Haired Bat	LANO	99	50.8%
Big Brown Bat	EPFU	14	7.2%
Hoary Bat	LACI	12	6.2%
Eastern Red Bat	LABO	0	0.0%
Tri-Colored Bat	PESU	0	0.0%
Total		**195**	**100.0%**

Table 4. Breakdown of data collected from four nights of driving surveys.

Emergence

Method- PolyMet is planning to reuse a majority of the buildings that comprise the Erie Plant in order to process metals mined from the NorthMet project area. The Erie Plant consists of multiple buildings that have been decommissioned since 2000. Emergence surveys were conducted over eight nights between 7/23 and 8/12 to identify if any bats were emerging from the buildings and what specific structures they emerged from. Surveys started thirty minutes before sunset and consisted of walking around the outside of the buildings to determine structures where bat activity occurred. The surveys continued until it was either too dark to observe foraging bats or the bats dispersed elsewhere. Areas where bat activity was identified were watched for consecutive nights in an attempt to narrow down the specific structures bats were emerging from. Buildings that were identified with bat activity included the coarse crusher, drive house, and concentrator. Bats were typically located by visual observation; however, when weather permitted (i.e. no precipitation) Anabat detectors were used to capture call data to identify bats down to a specific species. On the night of 08/05/14, the concentrator and coarse crusher were entered to collect data. The lights were turned on inside the concentrator, allowing for easier observation of bats.

Results- Most bats emerged about 20 minutes after sunset and dispersed around 40 minutes after sunset. The largest amount of emerging bats (approximately 20) was observed at the coarse crusher. Multiple nights were spent narrowing down where the bats were emerging from around the coarse crusher; however, no clear roost structure could be identified. Bats were observed coming out of the east side of the coarse crusher, near the large ventilation systems (Figure 3 and 4). Bats were also observed emerging from the railroad tunnel that leads into the coarse crusher. No guano buildup was evident around suspected roost structures. In addition to the bats located outside the coarse crusher, about 6-10 bats were observed feeding inside the coarse crusher as well. Nearly all bats near this building were identified as little brown bat with 54 calls collected, making up 93.1% of all calls collected at the coarse crusher. Four calls were collected from northern long-eared bats, making up the remaining 6.9% of calls collected.

The second building that was surveyed was the concentrator. Bats were largely observed on the west side of the building; very few were seen on the east side. Most of the bats detected were little brown bats, though the northern long-eared bat was also present. 57 calls (72.2%) were identified as little brown bats while 22 calls (27.8%) were identified as northern long-eared bats. Two bats were observed flying inside the concentrator and were identified as silver-haired bat and big brown bat.

The last building observed was the drive house. The east end of the drive house had 8-10 bats foraging outside between the building and the rocky cliff. One bat was located foraging very close to the south side of the drive house, underneath the conveyor that connects the drive house to the fine crusher. All of these bats were identified as little brown bats.

Figure 4. Diagram of Erie Plant building layout. The concentrator, coarse crusher, and drive house were identified as having bat activity.

Figure 5. Possible roost structures near the coarse crusher. Areas outlined in yellow are suspected areas of bat emergence, though any crevices that may house bats are unable to be seen from the ground.

Figure 6. A possible crevice that houses bats near the coarse crusher. The yellow arrows point to the large crevice.

Acknowledgements

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