Appendix D2: Bats Baseline Study

Prepared for:

North Atlantic Refining Corp.
29 Pippy Pl, St. John's, NL
A1B 3X2

Prepared by:

Sikumiut Environmental Management Ltd.
79 Mews Pl, St. John's, NL
A1B 4N2

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List of Acronyms and Abbreviations

AC CDC	Atlantic Canada Conservation Data Centre
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
Fc	Frequency of peak bat call power
Fmax	Maximum frequency of bat call
Fmin	Minimum frequency of bat call
GPS	Global Positioning System
HGP	Hydrogen Generation Plant
High F	High frequency
HP	Hydrogenation Plant
IUCN	International Union for Conservation of Nature
kHz	kilohertz
km	kilometre
kV	kilovolts
LAA	Local Assessment Area
LOHC	Liquid Organic Hydrogen Carrier
m	meters
MET tower	Meteorological Tower
MW	megawatts
NL	Newfoundland and Labrador
NL ESA	Endangered Species Act (Newfoundland and Labrador)
NL WD	Newfoundland and Labrador Wildlife Division
North Atlantic	North Atlantic Refining Corp.
RAA	Regional Assessment Area
SAR	Species at Risk
SARA	Species at Risk Act (Federal)
Sc	Slope of the bat call
SCC	Species of Conservation Concern
SD card	Secure Digital card
spp.	species
SS	Sunnyside
the Project	North Atlantic Wind to Hydrogen Project
U.S.	United States of America
WNS	White-nose Syndrome

1.0 Introduction

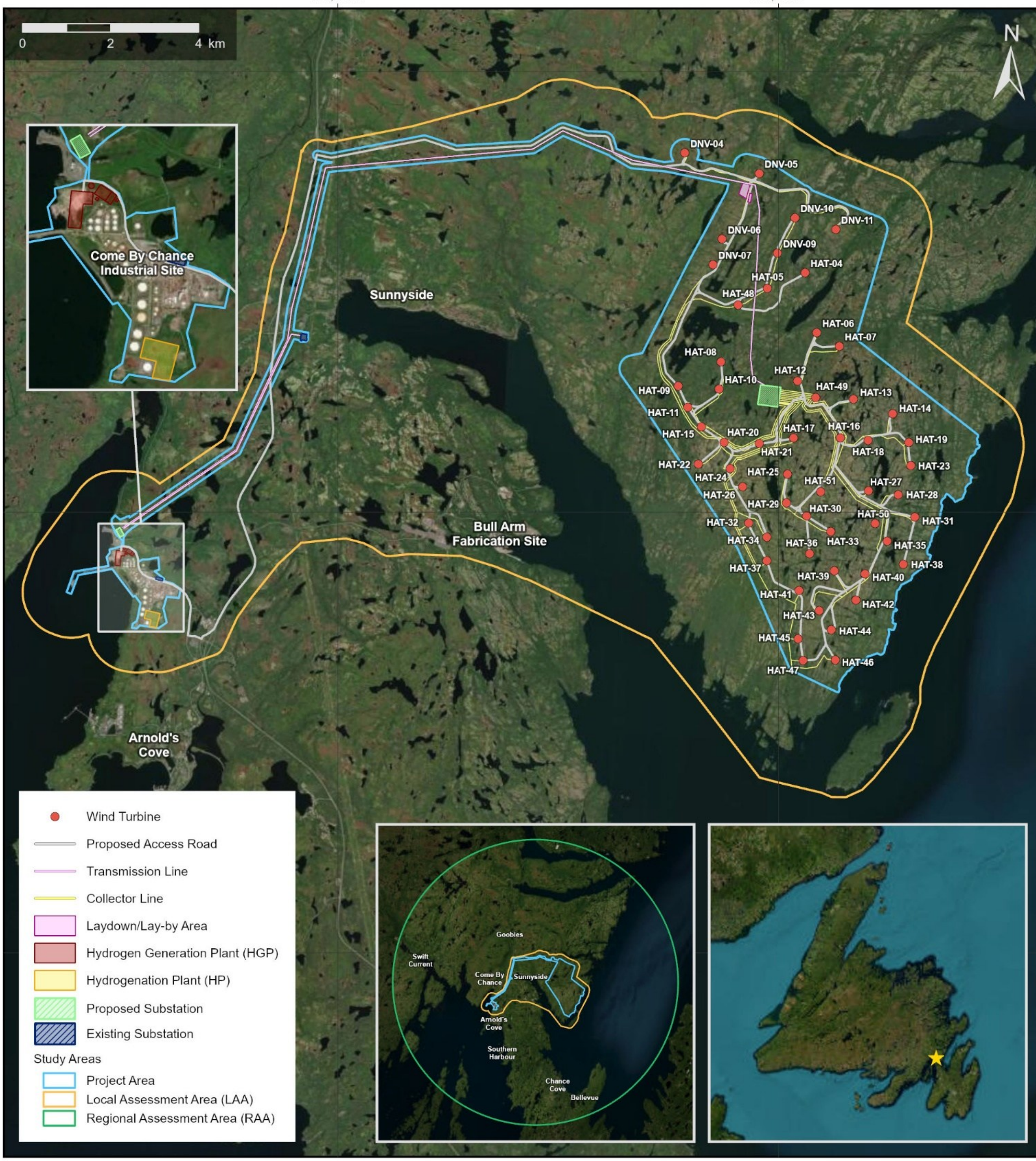
North Atlantic Refining Corp. (North Atlantic) is proposing to undertake the development of a Wind to Hydrogen project (the Project) on the Isthmus of Avalon Region in Newfoundland and Labrador (NL). This Project will entail the development, construction, operation and eventual decommissioning of a 324-megawatt (MW) Wind Farm consisting of 45 wind turbines on an undeveloped peninsula situated between Sunnyside and Deer Harbour. The Wind Farm will provide renewable electricity via a 138 kV transmission line to a newly developed Hydrogen Generation Plant (HGP), from where generated hydrogen will be transported to a Hydrogenation Plant (HP) for transformation into a Liquid Organic Hydrogen Carrier (LOHC), which will then be shipped from North Atlantic's port facilities to international markets for use in various decarbonization technologies.

In support of the Project, North Atlantic has undertaken environmental baseline studies throughout the PA. The 2024 field efforts were conducted between April and November 2024. This included field surveys specifically designed to assess the presence/absence of bat Species at Risk (SAR) in the PA. Additional surveys in the Regional Assessment Area (RAA), undertaken in 2023 and 2024, were also discussed to provide context on the presence of bats in the RAA. Five bat SAR, all protected under provincial legislation, were targeted in this baseline study. These include resident bat species, little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*), and migratory bat species - hoary bat (*Lasiurus cinereus*), Eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*).

The little brown myotis is the most common bat species in Canada (COSEWIC, 2013) but due to the highly transmissible fungal infection known as White-nose Syndrome (WNS), little brown myotis populations have faced rapid and severe declines (COSEWIC, 2013; ECCC, 2018). A recent study estimates that bat hibernacula infected with WNS may decrease in population by as much as 90% (Cheng et al., 2021). The Northern myotis is similar in appearance to the little brown myotis, distinguishable by their longer tragus and ears (COSEWIC, 2013) and appear to be less common in insular Newfoundland. Northern myotis populations have also been devastated by WNS, and they have been predicted to be functionally extirpated in the northeastern United States by the late 2020s (ECCC, 2018).

The silver-haired bat, hoary bat, and Eastern red bat are seasonal migrants that may visit the island of Newfoundland either purposefully or due to vagrant visits from weather events. Evidence of their presence on the island is rare, and little is known about these species in Newfoundland. Because these species can occupy the same airspace as the blade swept area of large turbines, they can be susceptible to collisions with turbines, especially during migration.

The second phase of the Bats Baseline Study is currently underway (in 2025), using data collected in 2024 to adjust and refine survey methodology. In addition, the number of detectors deployed has been expanded to a greater portion of the Wind Farm area and more will be deployed at lower elevations for comparison.



North Atlantic	FIGURE TITLE: **Project Location Overview**	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke	DATE: 10/07/2025
			REVIEWED BY: C. Bursey 10/07/2025	
			APPROVED BY: C. Collins 10/07/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-001-Rev0

Figure D2-1.0-1 Project location and preliminary infrastructure layout.

2.0 Methods

2.1 Desktop Study

A comprehensive desktop review was conducted to confirm the range and habitat use of the bats that may occur in the PA. This desktop study included a literature review of relevant material, like scientific articles, government reports and management plans, and open-source databases like iNaturalist. A review was also conducted of the SAR and Species of Conservation Concern (SCC) for the PA through an Atlantic Canada Conservation Data Centre (AC CDC) request. This request was made for the entire PA with a 5 km buffer which also included the Local Assessment Area (LAA) and part of the RAA.

2.2 Habitat Suitability Mapping

The Ecological Land Classification (ELC) study for the Project (Appendix D3), along with habitat suitability preferences of the potential bat species in the area, were used to assess habitat suitability in the PA. Open Water and Wetland ecotypes were considered of high suitability for species like little brown myotis and Northern myotis for bat foraging, while Coniferous Forest and Mixedwood Forest ecotypes may provide suitable roosting habitat, especially for Northern myotis. Many of the rocky outcroppings were examined for suitable cavities and their potential as resident bat hibernacula, and during field surveys these areas were investigated for the presence of suitable cavities. As per the advice of NL WD, to reduce the risk of transmitting WNS to potential bat populations, surveyors did not approach potential hibernacula but rather examined them at a distance using visual aids.

2.3 Acoustic Monitoring

Bat detectors enable the collection of the presence/absence of bats in a particular area, the identification of detected calls to species, and provide a surrogate for a true measure of abundance.

Each bat detection was manually verified to ensure the accuracy of the data (see Section 2.3.2). This ensures that if unexpected results arise, that Type I and Type II errors are minimized.

The results of the habitat suitability mapping informed the locations of the acoustic monitoring equipment. Three bat detectors were deployed in the PA in 2024. The location of SS Bat 1 was selected in an open wetland in the more forested portion of the PA, with increased habitat connectivity. SS Bat 3 was placed in a bog surrounded by rocky barrens. This habitat comprised approximately 36% of the PA (see Appendix D3: ELC). Most of the targeted bat species will forage in open areas, but to what extent in rocky barrens was unknown. SS Bat 2 was mounted on the only MET tower in the PA to allow for insight into bat activity at higher altitudes, especially during migration.

Detectors were deployed in 2023 and 2024 in the RAA. Detector placement in the RAA focused on habitat suitability, geographic coverage, and the inclusion of a MET tower for monitoring in higher airspace. Habitat selection for the detectors was purposefully stratified across habitat types, but all locations were in suitable bat habitats. These detectors were deployed to illustrate bat activity in the general area and enable a comparison of bat activity within certain habitat types between the PA and RAA.

Acoustic monitoring was carried out using Titley Scientific's Anabat Swift and Ranger models, equipped with a 10 to 140 kHz omnidirectional microphone. The units were set to a sensitivity of 16 to optimise bat detections and reduce noise recordings, and the recording format was set to full spectrum. Detectors are effective at indicating the presence of various bat species in an area; however, they are less effective at accurately determining abundance (e.g., a single bat could trigger the recorder multiple times in one night, or a large group of bats could pass through an area, with both scenarios resulting in similar data).

The detectors were mounted approximately 3 m high on trees facing suitable foraging habitat. A slight upwards angle directed the mic towards the most ideal airspace. An exception was made in the case of detectors mounted to MET towers, where the mic was installed directly onto the face of the detector. These detectors were around 50 m high on a pulley system to allow for monthly maintenance. Detectors were set to record from half an hour before sunset to half an hour after sunrise, encompassing the temporal window of activity for bats. GPS locations of the detectors were recorded by surveyors along with being stored as metadata on the SD cards.

In the PA, three detectors were deployed on May 6, 2024, and recovered on October 29, 2024. Deployment was timed to capture the active season for bats. The *Myotis* genus bats emerge from hibernaculum in early spring (COSEWIC, 2013; Koch et al., 2023). Females form maternity colonies and raise their young in the summer (COSEWIC, 2013), and swarming/breeding season occurs in the fall, and afterwards bats return to hibernacula (Sunga et al., 2022).

In addition to the three detectors deployed in the PA, eight were deployed in the RAA in 2023 and 2024. The locations of the RAA detectors were kept consistent for all but two detectors, which were moved to new locations in 2024 to prioritize an area closer to the PA and utilize a new MET tower. In 2023, detectors were deployed between May and June and recovered in November, and in 2024 they were deployed from April 17 until November 7. These detectors provided insight into bat activity and migration in the region. A map of acoustic detectors deployed throughout the PA and RAA is provided as Figure D2-2.3-1.

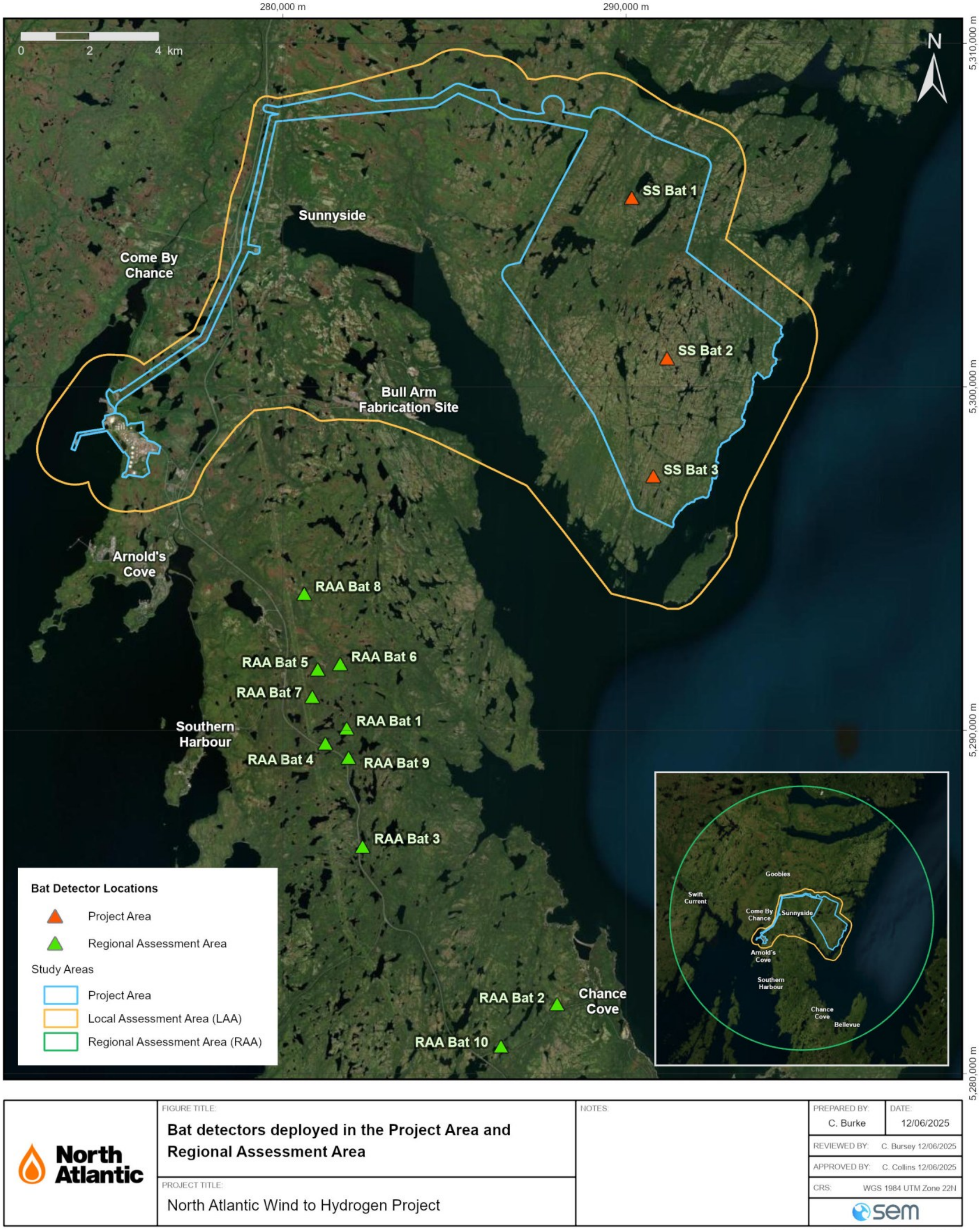


Figure D2-2.3-1 Bat detectors deployed in the Project Area and Regional Assessment Area.

2.3.1 Detector Locations in the Project Area

SS Bat 1 (47.86865, -53.80614): This detector was placed on the margin of a marsh complex. This marsh contains year-round standing water that is extremely shallow and heavily vegetated, and with an abundance of flying insects.

Figure D2-2.3-2 SS Bat 1 with marsh habitat in the background.

SS Bat 2 (47.82703 -53.79072): This detector was installed 50 m high on the Project's MET tower. The purpose of this detector to gain insight on bat activity in higher vertical space, closer to the blade swept area. This information could contribute to an improved understanding of the migratory species in Newfoundland.

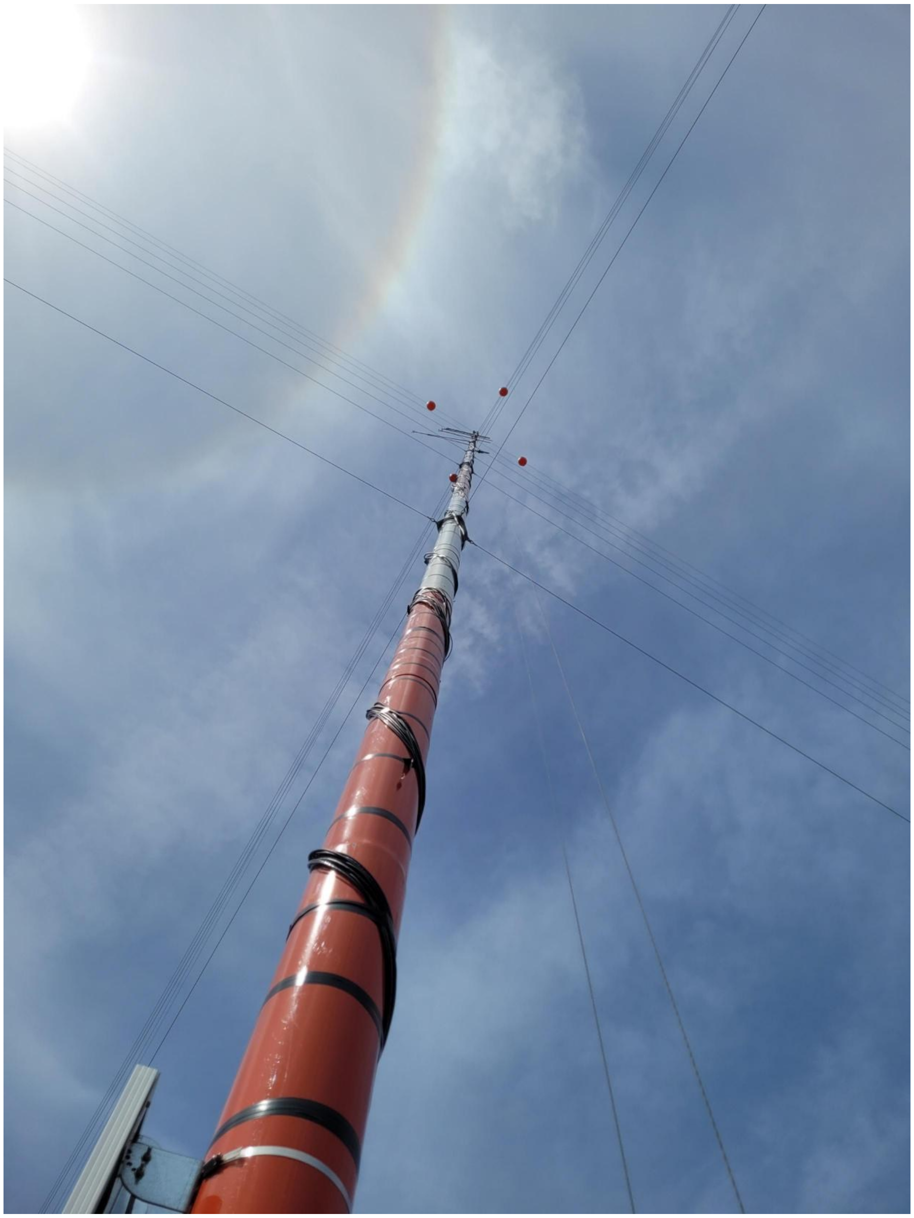


Figure D2-2.3-3 SS Bat 2 mounted on a MET tower.

SS Bat 3 (47.79609 -53.79360): SS Bat 3 was positioned in a small bog surrounded by barren rocky outcrops and other small wetland features. Rocky barrens make up approximately 36% of the PA (see Appendix D3: ELC). Given that such a large proportion of the Wind Farm area is comprised of this habitat type, it was important to establish how and to what extent bats were utilizing the rocky barren hilltop. Efforts in this area were expanded greatly in 2025 and additional bat data for the Wind Farm area, and the PA, will be available in fall 2025.

Figure D2-2.3-4 SS Bat 3 (barren habitat in background, wetland habitat behind the observer).

2.3.2 Detector Locations in the RAA

Eight bat detectors were deployed in the RAA in 2023 and in 2024. Six of the detectors were placed in the same locations each year, but two locations were moved in 2024. Detectors RAA Bat 1 through RAA Bat 6 were deployed in the same locations, whereas RAA Bat 7 and 8 represent the two detector locations used in 2024 only, and RAA Bat 9 and 10 represent the locations used in 2023 only.

RAA Bat 1 (47.72726, -53.90929): RAA Bat 1 was mounted 50 m high on a MET tower. This tower was located near the center of the Isthmus of Avalon. The detector was deployed on the met tower to monitor for high-flying migratory bats that may be passing through (e.g., hoary bat, silver-haired bat). The surrounding habitats consisted of barrens with multiple lakes and ponds within proximity.

Figure D2-2.3-5 RAA Bat 1 mounted on a MET tower.

RAA Bat 2 (47.65705, -53.82363): This detector was located near the community of Chance Cove. The detector was positioned in a small wetland with an attached pond. Surrounding this area are *Cladonia*-dominated barrens with numerous other wetlands and ponds. This habitat is relatively similar to the extensive barrens situated within the PA.

RAA Bat 3 (47.69644, -53.90131): RAA Bat 3 was positioned over a small pond which was connected to a series of water bodies via a watercourse. The area directly around this detector was barren with a fen wetland and pond just 10 m downhill from the detector.

RAA Bat 4 (47.72299, -53.91718): RAA Bat 4 was set up over a small marshy pond surrounded by a wetland and barren complex. This complex has connectivity to other water bodies and wetlands, which provide good foraging opportunities for various bat species.

Figure D2-2.3-6 RAA Bat 4 directed at a small marshy pond.

RAA Bat 5 (47.74226, -53.92126): This detector was positioned on a fen, surrounded by mature coniferous forest, and with multiple other wetlands and waterbodies nearby. This habitat type is also commonly found within the PA.

RAA Bat 6 (47.74386, -53.91273): RAA Bat 6 was positioned along a small river/stream riparian corridor. This open, beaver-influenced wetland provided good connectivity for foraging bats to move between the larger wetlands and waterbody areas.

Figure D2-2.3-7 View outwards from RAA Bat 6 after being flooded by beaver dam construction.

RAA Bat 7 (2024 only) (47.73503, -53.92297): RAA Bat 7 was deployed in a small, treed area in the center of a large fen complex. This fen contained numerous large unconnected pools. The area surrounding this wetland was dominated by mature coniferous trees, which could provide daytime roosts for bats.

RAA Bat 8 (2024 only) (47.76193, -53.92771): This detector was positioned on the shoreline of a pond, and directly behind the detector was an additional pond. The pond with the detector was nestled into a valley with mature trees surrounding and sheltering the pond. The other pond is mainly surrounded by wetlands. Near both ponds is a large wetland complex which provides additional foraging opportunities.

Figure D2-2.3-8 RAA Bat 8 directed towards a large pond.

RAA Bat 9 (2023 only) (47.71949 -53.90799): This detector was situated in a rich fen with a small stream. The area was relatively treed but maintained an open canopy and was suitable for bat foraging.

RAA Bat 10 (2023 only) (47.64547 -53.84472): This detector was positioned on a small pond near other small and medium-sized waterbodies. Multiple wetland and barren habitats also persisted in the area.

2.3.3 Call Identification

The acoustic monitoring study was based on the protocols outlined in *Bats and Wind Turbines: Pre-siting and Pre-construction Protocols* (Lausen et al., 2010). Bat call identification was conducted using 5.6.8 Kaleidoscope software (Wildlife Acoustics, Maynard, Massachusetts, U.S.). This software was used to remove non-bat recordings (noise) and group the bat data for individual identification. An experienced biologist then manually identified the species in each bat recording to ensure a high level of accuracy. A combination of two guidelines was used to increase the number of identified bats and ensure the accuracy of species identifications. Biologists mainly used the *Guide for Bat Monitoring in Atlantic Canada* (McBurney & Segers, 2021) and referred to the *Montana Bat Call Identification* (Maxell et al., 2011) as a secondary source. The Kaleidoscope software shows a spectrogram of each bat recording and provides some important variables such as the Fc (frequency of peak call power), Fmax (maximum frequency), and Sc (Slope of the call). Visual aspects of the spectrogram were taken into consideration during identification. The prominence of an elbow in the call, characteristic of the toe, and undulations within the call body were all used as identifying factors. Fmin (minimum frequency) was also analyzed for consistency between pulses. Little brown myotis have an Fc between 35 and 40 kHz, and Northern myotis have an Fc of 35 to 45 kHz (McBurney & Segers, 2021). Eastern red bat calls typically fall between 30 to 40 kHz; a frequency of 15 to 30 kHz for hoary bats; and 25 to 30 kHz for silver-haired bats (McBurney & Segers, 2021). Bat calls can be categorized into three separate types (McBurney & Segers, 2021):

- Search calls (looking for prey);
- Approach calls (homing in on detected prey); and
- Feeding buzz (fine-tuning before capture of prey).

Factors such as background noise, distance from recorder, and bat behaviour can influence the ability to identify the species. Species-specific identification requires clear calls from the search phase, as approach calls and feeding buzz pulses do not typically display the diagnostic characteristics of each bat species. In cases where a distinction could not be made between the little brown myotis and Northern myotis, calls were categorized as *Myotis* spp. Bats with higher frequency calls (>30 kHz) which could not be confidently identified to the *Myotis* genus were labelled as High F Bat.

3.0 Results

3.1 Desktop Study

The resident little brown myotis and Northern myotis are protected under provincial and federal endangered species legislation. The migratory bats, including the Eastern red bat, hoary bat, and silver-haired bat, are protected under provincial legislation and are under consideration for addition to the Federal **Species at Risk Act** (SARA). All three are listed as Endangered by COSEWIC.

Table D2-3.1-1 lists the conservation status of the potential resident and migratory bat species according to the Newfoundland and Labrador **Endangered Species Act** (NL ESA), the SARA, and the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (IUCN, 2024).

Table D2-3.1-1 Conservation status of bats in Newfoundland.

Common Name	Scientific Name	NL ESA	SARA	IUCN Red List
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	Endangered
Northern myotis	*Myotis septentrionalis*	Endangered	Endangered	Near Threatened
Eastern red bat	*Lasiurus borealis*	Endangered	Not Listed*	Least Concern
Hoary bat	*Lasiurus cinereus*	Endangered	Not Listed*	Least Concern
Silver-haired bat	*Lasionycteris noctivagans*	Endangered	Not Listed*	Least Concern

Notes
*Currently under consideration for addition to SARA Schedule 1 as an Endangered species.

The AC CDC data request for the PA (a 5 km radius from the center point of the PA) did not yield any results for bats. This was not unexpected, given that there hasn't historically been much bat research or monitoring around the island.

Little brown myotis

The species range for the little brown myotis includes the entire Province of Newfoundland, and NatureServe records include observations north of the PA (NatureServe, n.d. a). In addition, anecdotal observations place the little brown myotis in the surrounding region, with a recent observation in Adeytown (iNaturalist, 2023). The little brown myotis uses a wide variety of habitats, preferring to forage over open spaces (e.g., wetlands), and is preferential to aquatic insects (COSEWIC, 2013). These bats may roost in a variety of structures, including tree bark, cliff crevices, foliage, and anthropogenic buildings (ECCC, 2018). The little brown myotis is native to Newfoundland and uses the island year-round; they are short-distance migrators, moving from overwintering sites to summer roosting sites typically less than 550 km away (ECCC, 2018).

Northern myotis

Likely far less abundant than the little brown myotis, the Northern myotis' range includes the entire island of Newfoundland, and NatureServe distribution data denotes documented observations north of the PA (NatureServe, n.d. b). The Northern myotis prefers to forage and roost in more forested areas, feeding on moths and other insects (ECCC, 2018). As such, they are observed less frequently in anthropogenic areas compared to the little brown myotis (ECCC, 2018). The Northern myotis is native to Newfoundland and uses the island year-round and is thought to have similar seasonal movement patterns to the little brown myotis, often sharing hibernacula during the winter months (COSEWIC, 2012).

Hoary bat

The hoary bat overwinters in Mexico and the southern U.S., heading north to Canada in spring, where they have been observed in every province and territory (COSEWIC, 2023). This species was first observed on the island of Newfoundland in the 1980s and has recently been recorded in Gros Morne National Park via acoustic detections between 2013 and 2017 (Maunder, 1988; Washinger et al., 2020). In addition, there is anecdotal evidence of the hoary bat off the coast of southern Newfoundland (near Grand Bruit) in 2019 (iNaturalist, 2019). Finally, the hoary bat was recently detected near the Port of Argentia in Placentia Bay via acoustic detections in 2023 (Pattern Energy, 2024). The hoary bat forages in open areas, typically wetlands, grasslands, or open fields (COSEWIC, 2023). They roost in forested areas, often in tall trees, or occasionally in shrubs (COSEWIC, 2023). Hoary bats feed mostly on large moths and some large, hard insects (e.g., beetles) (Reimer et al., 2010).

Silver-haired bat

The silver-haired bat is known to occur throughout Canada, the U.S., and Mexico, although the extent of its range is unknown (COSEWIC, 2023). While they are thought to be rare for the Atlantic provinces, detections were recently confirmed for the island of Newfoundland (COSEWIC, 2023), and acoustic monitoring efforts in 2023 yielded an observation at the Port of Argentia in Placentia Bay (Pattern, 2024). The silver-haired bat prefers to forage in forested areas and is thought to be concentrated along forest edges (COSEWIC, 2023). Specific forest preferences are unknown, as observations have been made in both young and old forests (COSEWIC, 2023). Silver-haired bats use canopy gaps to forage for a wide range of small insects, including moths, flies, midges, and mosquitoes (COSEWIC, 2023; Barclay, 1985). Silver-haired bats roost in forests, tending to avoid areas of human occupancy (COSEWIC, 2023).

Eastern red bat

The Eastern red bat is typically found east of the North American Cordillera mountain range, having been documented in Mexico, Canada, and the U.S.; however, there is much uncertainty about their range extent (COSEWIC, 2023). They have recently been confirmed in NL, although they are thought to be uncommon in the Atlantic provinces (COSEWIC, 2023). The roosting behaviour of Eastern red bats is similar to that of hoary bats, although there is some evidence that Eastern red bats prefer deciduous over coniferous trees (COSEWIC, 2023). These bats forage in both forested and non-forested areas, in or above the trees, and in young or old forests (COSEWIC, 2023). Eastern red bats primarily feed on moths, but will eat a wide variety of insects (Clare et al., 2009).

3.2 Acoustic Monitoring, 2023

Eight detectors were deployed in the RAA in 2023, resulting in 3,337 total bat detections. These data provide the opportunity to compare the PA data to a more forested lowland region. The results from the 2023 program are summarized in Table D2-3.2-1.

Table D2-3.2-1 Bat detections by species and detector during the 2023 bat surveys in the RAA.

Detector	Deployment Dates	Little brown myotis	Northern myotis	*Myotis* spp.	High F bat	Silver-haired bat	Migratory spp.	Total Detections (per detector)
RAA Bat 1	Oct. 20 – Nov. 17	0	0	0	0	0	0	**0**
RAA Bat 2	June 20 – Oct. 23	166	29	57	0	0	0	**252**
RAA Bat 3	April 20 – May 18	53	1	14	0	0	0	**68**
RAA Bat 4	Aug. 1 – Nov. 12	277	5	182	0	0	0	**464**
RAA Bat 5	June 6 – Nov. 11	216	12	49	0	0	0	**277**
RAA Bat 6	June 20 – Nov. 11	485	81	182	7	4	1	**760**
RAA Bat 9	June 20 – Nov. 15	364	38	88	1	0	0	**491**
RAA Bat 10	May 18 – Nov. 15	778	75	172	0	0	0	**1025**
Total Detections (per species)		**2339**	**241**	**744**	**8**	**4**	**1**	

3.3 Acoustic Monitoring Results 2024

This section presents results from the 2024 acoustic monitoring efforts in the PA and RAA, and makes some preliminary comparisons between the two.

3.3.1 Project Area Results 2024

Three bat detectors were deployed in the PA in 2024. The data for these three detectors is merged in the graphs below to demonstrate general bat activity throughout the PA. Separate results for each detector are presented in Sections 3.3.1.1 through 3.3.1.3. From May 8 to October 11, a total of 593 bat calls were recorded across all detectors. Two large spikes in bat activity were observed on July 26 and August 26, representing 73 and 63 detections, respectively (Figure D2-3.3-1). Bat activity per hour peaked at 05:00 with 178 total detections, followed by 62 detections at 22:00 (Figure D2-3.3-2).

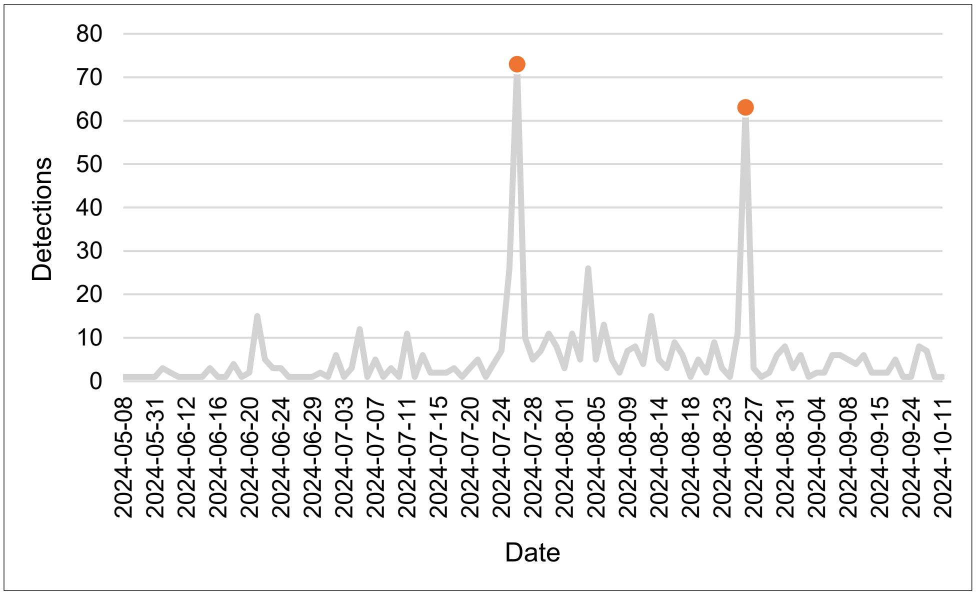


Figure D2-3.3-1 Number of bat detections per night in the Project Area.

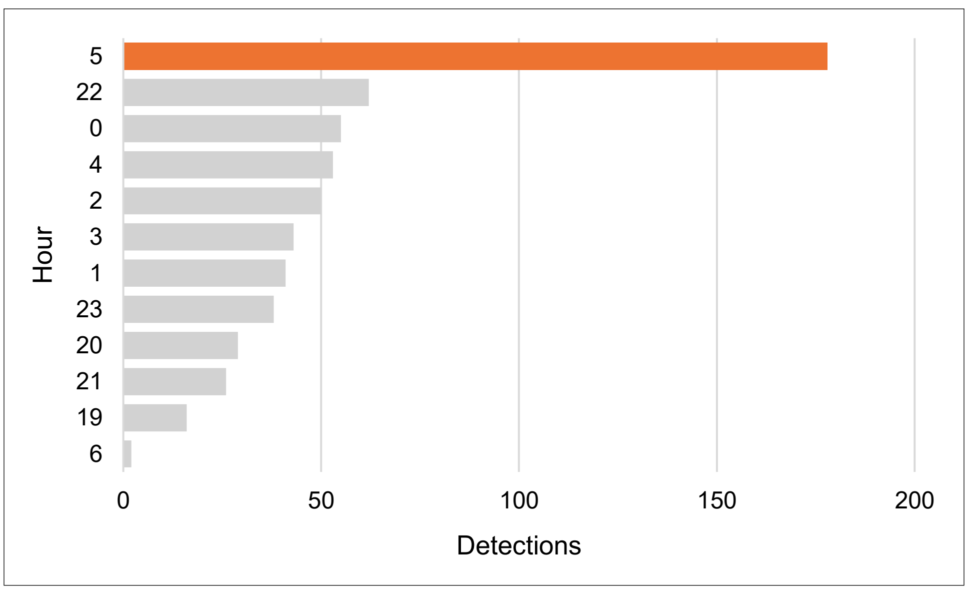


Figure D2-3.3-2 Number of bat detections per each night hour in the Project Area.

As expected, most calls identified to species were of the little brown myotis, with 214 total identifications. A large proportion of the unidentified *Myotis* detections are likely also little brown myotis. There were 66 confirmed detections of Northern myotis. One detection was labelled as a High F bat with potential to be a little brown myotis or Eastern red bat.

3.3.1.1 SS Bat 1

SS Bat 1 had 291 of the 593 total detections in the 2024 season. Through the whole deployment period from May to October, this recorder logged an average of 2.21 detections per night and 0.23 calls per hour. During the peak season from July 1 to August 31, an average of 3.26 detections per night and 0.338 detections per night hour were recorded.

Table D2-3.3-1 Number of bat detections per species from SS Bat 1.

Species	Detections
Little brown myotis	138
Myotis spp.	126
Northern myotis	26
High F bat	1

One High F bat call was recorded, originating from a multi-bat recording where an individual bat displayed characteristics of the Eastern red bat. The Fmin of this call was not consistent and had moderate undulations between pulses. The slope of the call was flatter, and the Fc was lower than that of other little brown myotis in the area. The small sample of this call featured in Figure D2-3.2-4 also shows an upturned toe which can be associated with Eastern red bats (McBurney & Segers, 2021). Even with these indicators to suggest that this is an Eastern red bat, it does not meet all the criteria to be confirmed as such and could have been produced by a little brown myotis producing a unique call.

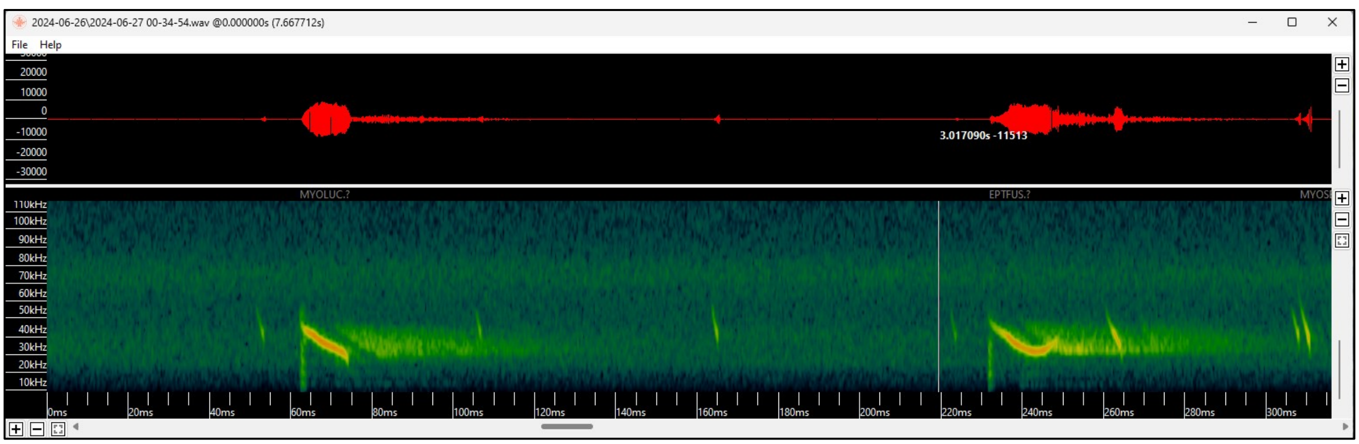


Figure D2-3.3-3 Sonogram of High F Bat detection on SS Bat 1.

3.3.1.2 SS Bat 2

As anticipated, much lower rates of detection were observed on the MET tower bat detector as compared to the other sites. Over the full deployment period, 8 calls were detected at a rate of 0.05 calls per night and 0.015 calls per night hour. Little brown myotis was the only species confirmed from this detector.

Table D2-3.3-2 Number of bat detections per species from SS Bat 2.

Species	Detections
Little brown myotis	6
Myotis spp.	2

3.3.1.3 SS Bat 3

SS Bat 3 had 293 detections total between May and October. SS Bat 3 experienced a technical malfunction between June 21 and July 24, so these dates have been removed from the calculations. More detections would likely have been collected from this site without this gap in coverage. This detector averaged 2.87 calls per night and 0.284 calls per night hour. During the recorder's operation in the peak active season (July 24 to August 31), an average of 6.53 calls per night and 0.633 calls per night hour were detected.

Table D2-3.3-3 Number of bat detections per species from SS Bat 3.

Species	Detections
Myotis spp.	183
Little brown myotis	70
Northern myotis	40

3.3.2 Regional Assessment Area Results 2024

The eight detectors located in the RAA in 2024 were more active than the detectors situated in the PA. The data for all eight detectors is merged in the graphs below to demonstrate general bat activity throughout the RAA. Separate results for each detector are presented in Sections 3.3.2.1 through 3.3.2.8. Across the eight detectors, a total of 8,918 bat detections were made between April 29 and October 16 (deployment was from April 17 to November 7). Bat activity was highest on June 17 and June 21, with 392 and 335 detections, respectively (Figure D2-3.3-4).

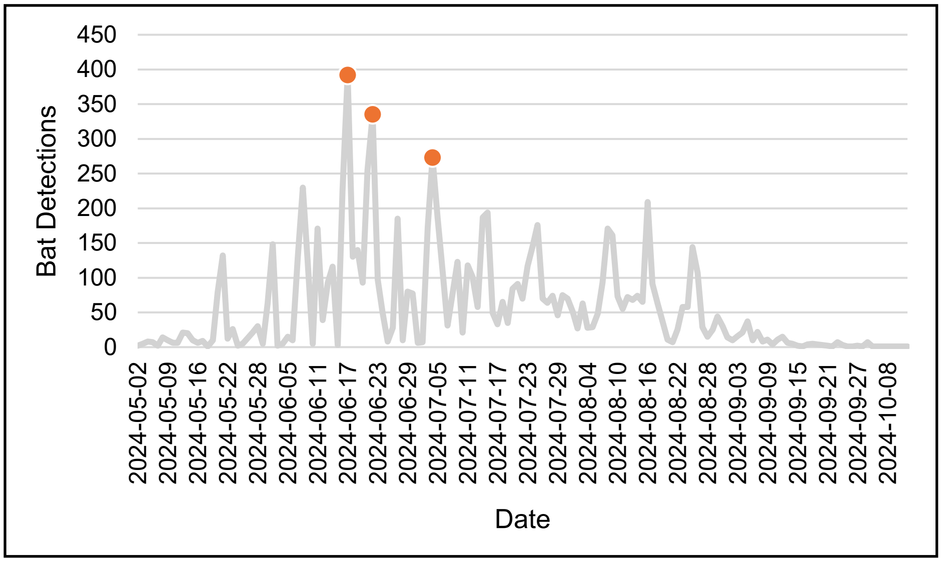


Figure D2-3.3-4 Number of bat detections per night across all detectors in the RAA.

Most of the bat activity was observed during the hour of 22:00 (Figure D2-3.3-5). This was an extremely active time compared to the other hours of the night. In the PA, 05:00 was the most common hour of bat activity, but the number of detections was so low that conclusions cannot be drawn from that result.

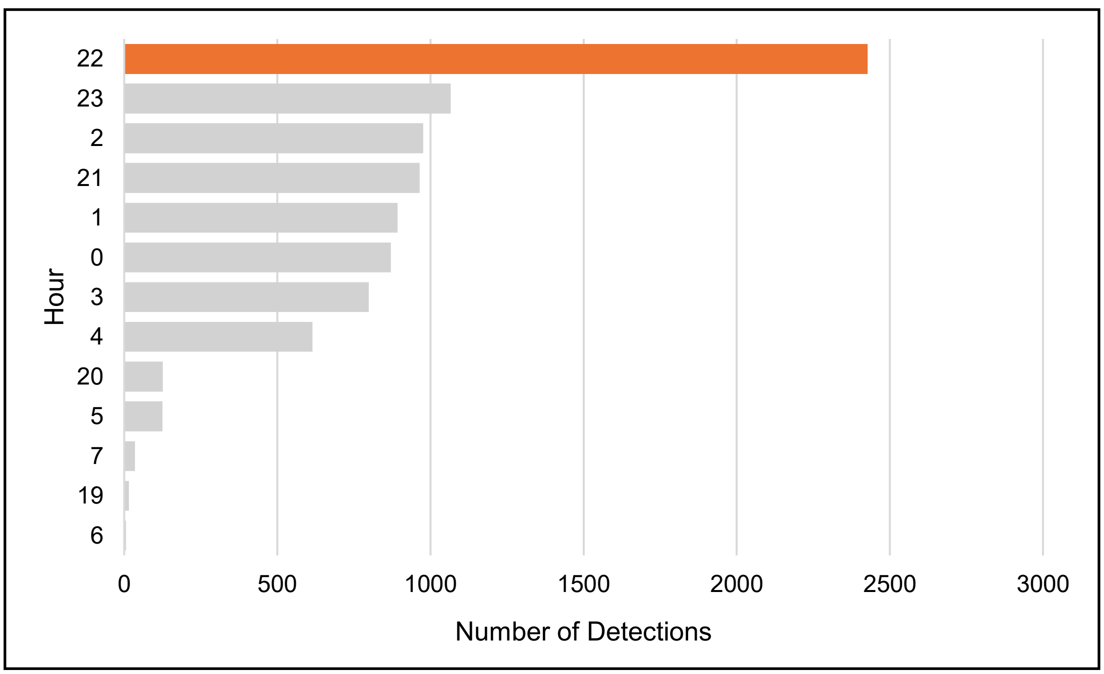


Figure D2-3.3-5 Number of bat detections per each night hour in the RAA.

Resident bats from the *Myotis* genus were the dominant group of bats detected in 2024 (Table D2-3.3-4). The only other genus possible from the analysis would be the *Lasiurus* genus of the Eastern red bat.

The Eastern red bat is possible in the 5 High F Bat recordings, where a confident distinction between Eastern red bat and little brown myotis could not be made.

Table D2-3.3-4 Number of bat detections per species in the RAA.

Species	Detections
Little brown myotis	4987
Myotis spp.	3719
Northern myotis	206
High F bat	5

3.3.2.1 RAA Bat 1

RAA Bat 1 was mounted 50 m above the ground on a MET tower. Through its deployment from May 6 to early November, only 6 bat detections were recorded. The PA MET tower detector (SS Bat 2) similarly recorded 8 total calls during its deployment, representing a very low rate of bat detections for the met tower detectors overall. Bat activity at RAA Bat 1 had an average of just 0.029 calls per night and 0.0024 calls per night hour. The distribution of species at this detector was most likely all little brown myotis, with four confirmed calls and two probable but unconfirmed.

Table D2-3.3-5 Number of bat detections per species from RAA Bat 1.

Species	Detections
Little brown myotis	4
Myotis spp.	2

3.3.2.2 RAA Bat 2

RAA Bat 2 demonstrated a relatively low level of activity, with 287 detections throughout its deployment. RAA Bat 2 detected an average of 1.410 calls per night and 0.117 calls per night hour. Of the calls confirmed to species, the species ratio was ~91% little brown myotis and ~9% Northern myotis.

Table D2-3.3-6 Number of bat detections per species from RAA Bat 2.

Species	Detections
Little brown myotis	137
Myotis spp.	137
Northern myotis	13

3.3.2.3 RAA Bat 3

RAA Bat 3 had a moderate level of activity compared to the other RAA detectors, with 859 detections throughout deployment, representing an average of 4.211 calls per night and 0.351 calls per night hour.

Of the calls confirmed to species, the species ratio was ~94% little brown myotis and ~4% Northern myotis.

Table D2-3.3-7 Number of bat detections per species from RAA Bat 3.

Species	Detections
Little brown myotis	451
Myotis spp.	388
Northern myotis	20

3.3.2.4 RAA Bat 4

RAA Bat 4 had a relatively high level of bat activity when compared to other RAA detectors, with 1,438 detections over the deployment period. An average of 7.05 calls per night and 0.587 calls per night hour were recorded. The species ratio from the calls identified to species at this detector was ~97% little brown myotis and ~3% Northern myotis.

Table D2-3.3-8 Number of bat detections per species from RAA Bat 4.

Species	Detections
Little brown myotis	582
Myotis spp.	797
Northern myotis	59

3.3.2.5 RAA Bat 5

RAA Bat 5 had a relatively low number of bat detections, with 195 over the deployment window. This equates to 0.956 detections per night and 0.079 detections per night hour. The species ratio of detections at this detector was ~90% little brown myotis and ~10% Northern myotis. Two detections were identified as High F bat. These were assigned due to a slight variance of Fmin between pulses and more of a hooked U-shape instead of an elbow. These features were only slight, so an identification of Eastern red bat could not be differentiated from a little brown myotis.

Table D2-3.3-9 Number of bat detections per species from RAA Bat 5.

Species	Detections
Little brown myotis	93
Myotis spp.	90
Northern myotis	10
High F bat	2

3.3.2.6 RAA Bat 6

RAA Bat 6 had a moderate level of bat detections, with 659 detections, averaging 3.230 detections per night and 0.269 detections per night hour. This detector had a relatively higher proportion of Northern myotis activity compared to other RAA detectors, where 15% of confirmed detections were from Northern myotis (and ~85% were from little brown myotis). This could be due to the long linear nature of the wetland with an abundance of forested area on each side, which the Northern myotis prefers over open spaces (COSEWIC, 2013).

Table D2-3.3-10 Number of bat detections per species from RAA Bat 6.

Species	Detections
Little brown myotis	248
Myotis spp.	350
Northern myotis	61

3.3.2.7 RAA Bat 7

RAA Bat 7 had a low to moderate level of bat activity during the deployment window, with 367 total calls recorded. This equates to 1.799 calls per night and 0.150 calls per night hour. The species distribution at this detector was ~93% little brown myotis and ~7% Northern myotis from calls identified to species.

Table D2-3.3-11 Number of bat detections per species from RAA Bat 7.

Species	Detections
Little brown myotis	181
Myotis spp.	173
Northern myotis	13

3.3.2.8 RAA Bat 8

RAA Bat 8 had the highest level of bat activity across all detectors by a large margin. This detector had 5,103 detections and an average activity level of 25.015 calls per night and 2.085 calls per hour. RAA Bat 8 was directed over a large waterbody and as expected, Northern myotis activity was low, with >99% of the calls identified to species belonging to little brown myotis and <1% belonging to the Northern myotis. This detector had many instances of unique *Myotis* social calls. An example of such a call is shown in Figure D2-3.3-6. The 3 High F Bat calls recorded at this detector could have been *Myotis* social calls. Unique *Myotis* social calls could have certain characteristics such as an upturned toe and lower slope, which would add these detections to the High F category. Alternatively, these calls could have been examples of the Eastern red bat.

Table D2-3.3-12 Number of bat detections per species from RAA Bat 8.

Species	Detections
Little brown myotis	3294
Myotis spp.	1776
Northern myotis	30
High F bat	3

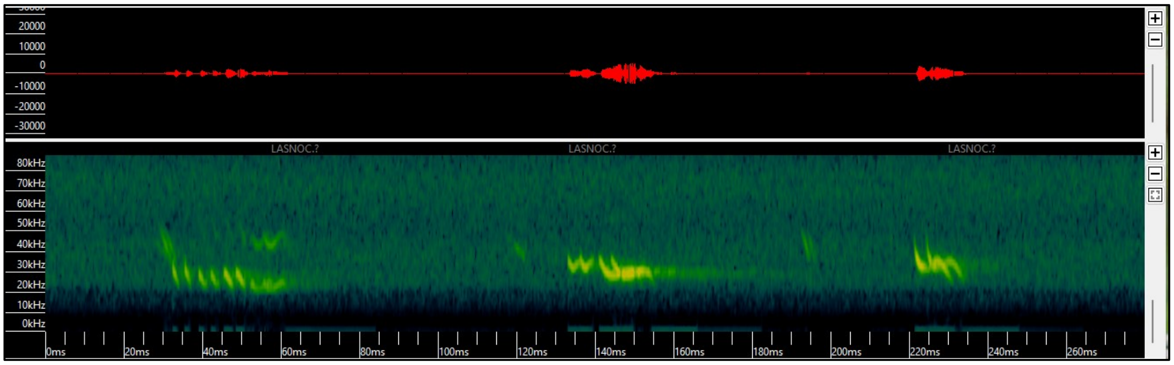


Figure D2-3.3-6 *Myotis* social call recorded on July 9, 2024, at RAA Bat 8.

4.0 Discussion

The 2024 Bats Baseline Study provided data for the PA and was compared to efforts in 2023 and 2024 in the RAA. Bat activity in the Wind Farm area of the PA was dominated by the two resident bat species, the little brown myotis and Northern myotis. No migratory bats were detected in the PA or RAA in either year. Based on the preliminary data, it may be unlikely that any significant bat migrations occur through the PA or RAA.

Overall, there were a relatively low number of bat detections from the PA, especially compared to the more forested lowland detectors of the RAA. SS Bat 1 and 3 had similar numbers of detections (291 and 293, respectively) and the met tower detector had just 8 myotis detections. Some of the detectors deployed in the RAA were generally much more active than the three deployed within the Wind Farm area of the PA.

These results from the PA are also relatively low when compared to recent results from the Argentia area, where many detectors had much higher activity (Pattern Energy, 2024). This very low number of detections from the Wind Farm area, over such a lengthy deployment, is a strong indicator that the Wind Farm area has very little potential habitat for bats, either for foraging or roosting. The Wind Farm area has very high coastal wind exposure, which could also reduce bat preference for the PA. This combination of high winds, low insect abundance, and poor foraging and roosting habitat makes the Wind Farm area relatively low risk with respect to bat abundance.

Monitoring efforts are ongoing through 2025, with an expanded array of detectors in the Wind Farm area that will be deployed until November. After completion of this monitoring effort there will be much more data on which to assess turbines of greatest risk to interactions with bats, and more information on which to base mitigations.

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