APPENDIX K-5

2013 SPECIES AT RISK BASELINE: BATS

RAINY RIVER RESOURCES LTD.
RAINY RIVER PROJECT
2013 TERRESTRIAL BASELINE STUDY: BATS

Submitted by:

AMEC Environment & Infrastructure
a Division of AMEC Americas Limited
160 Traders Blvd., Suite 110
Mississauga, Ontario
L4Z 3K7

On behalf of:

Rainy River Resources
1111 Victoria Avenue East
Thunder Bay, Ontario
P7C 1B7

October 2013
TC111504

October 16, 2013
TC111504

Mr. Kyle Stanfield, P.Eng
Director, Environment & Sustainability
New Gold Inc.
1111 Victoria Avenue East
Thunder Bay, ON
P7C 1B7

Dear Mr. Stanfield,

AMEC Environment & Infrastructure is pleased to submit the attached 2013 Bat Report for the Rainy River Gold Project.

The 2013 Bat Report adds to the baseline studies on bats conducted previously by AMEC in 2012.

We greatly appreciate the opportunity to provide support for your Rainy River Gold Project. Should you have any questions regarding the study, please do not hesitate to contact us.

Yours Sincerely,

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited

Matt Evans, Ph.D..
Terrestrial Ecologist

Sheila Daniel, M.Sc. P.Geo.
Senior Associate Geoscientist
Head, Environmental Management

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited
160 Traders Blvd. East, Suite 110
Mississauga, Ontario, Canada L4Z 3K7
Tel (905) 568-2929
Fax (905) 568-1686
www.amec.com

RAINYRIVER

TABLE OF CONTENTS

PAGE

LIST OF APPENDICES

LIST OF TABLES

PAGE

LIST OF FIGURES

1.0 INTRODUCTION

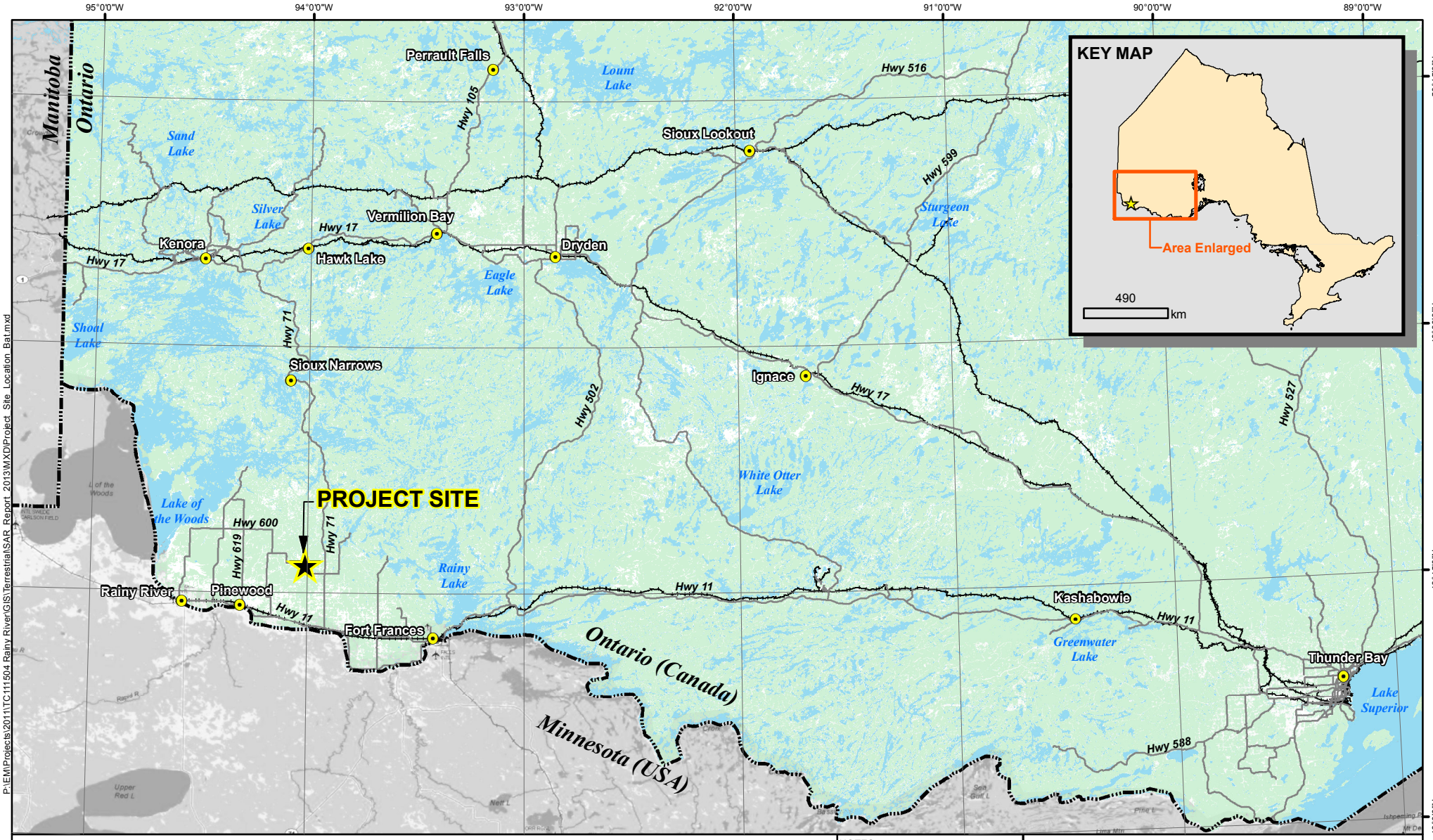
AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), was retained by Rainy River Resources (RRR) Ltd. to conduct 2013 terrestrial baseline environmental surveys with respect to bats and bat habitat at the Rainy River Project (RRP). The RRP is located in the Township of Chapple, District of Rainy River, in northwestern Ontario, approximately 65 kilometres (km) northwest of Fort Frances, and 420 km west of Thunder Bay (Figures 1-1 and 1-2).

In 2011, AMEC conducted terrestrial baseline surveys on birds and amphibians and to a lesser extent on mammals (not including bats), reptiles and insects (butterflies, dragonflies, damselflies) in the Natural Local Study Area (NLSA; AMEC 2011). Additional wildlife and vegetation baseline surveys were conducted in 2012 to further augment the database which included acoustic activity surveys for bats. This work revealed the presence of Little Brown Myotis and Northern Myotis within the proposed RRP footprint. These species have recently experienced dramatic population declines in Ontario and across northeastern North America due to White Nose Syndrome caused by the fungus *Pseudogymnoascus destructans* (formerly *Geomyces destructans*; Minnis and Lindner 2013). *Pseudogymnoascus destructans* grows optimally in the same conditions under which bats hibernate and has killed up to 99% of bats in infected hibernacula (Frick et al. 2010). Consequently, these species were designated as Endangered in February 2012 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and subsequently listed as Endangered in October 2012 by the Committee on the Status of Species at Risk in Ontario (COSSARO). Both species are protected as Species at Risk (SAR) under the *Endangered Species Act* (*ESA*) and protected under the *Fish and Wildlife Conservation Act* (*FWCA*).

Between June 18 and July 6, 2012, acoustic activity of bats was monitored at 5 survey locations within the RRP NLSA. Over an average ± standard deviation (SD) period of 5 ± 2 nights per location, the Little Brown Myotis was recorded 137 times and was recorded at all 5 survey locations and Northern Myotis was identified twice at a single location. Both species commonly produce echolocation calls that are difficult to distinguish from each other and so the Northern Myotis may have been recorded more often and at more locations than could be determined. As such, the level of use of the RRP NLSA by this species was unclear. Bat activity did not differ among the various 2012 survey sites throughout the NLSA (ANOVA: df = 4, 22, F = 0.93, p = 0.47).

Average nightly activity for the RRP estimated from all bat passes was 29.7 ± 32.2 passes / night and that for all passes classified as Myotis was 11.9 ± 8.4 passes / night. The apparent prevalence of Little Brown Myotis indicated that significant habitat types in the form of maternal roosting habitat and hibernacula for this species may occur within the RRP footprint. Therefore, follow-up baseline surveys were conducted in 2013 to confirm the presence and level of use of the RRP site by bats, particularly SAR species, and to assess the quality of habitat for bats. These included additional acoustic activity surveys as well as surveys to identify candidate significant wildlife habitat for bats within the RRP and within areas outside the RRP that could

serve as potential compensation lands in the event that compensation is required as mitigation. This report presents the results of the 2013 baseline studies for bats.



P:\EM\Projects\2011\TC111504 Rainy River\GIS\Terrestrial\SAR Report 2013\MXD\Project_Site_Location_Bat.mxd

LEGEND

- Project Site
- Regional Communities
- Provincial / National Border
- Regional Road / Highway
- Railway

0 25 50 100 150 200 250 Kilometres

NOTES:
- Ontario base data extracted from Land Information Ontario (MNR) data warehouse.
- Base data outside of Ontario extracted from ESRI DeLorme World Basemap

Datum: NAD83
Projection: UTM Zone 15N

N W E S

RAINY RIVER

amec

RAINY RIVER PROJECT

Project Location

PROJECT N°: TC111504	**FIGURE: 1-1**
SCALE: 1:1,800,000	DATE: October 2013

405000 412500 420000 427500 435000 442500

5422500

5415000

5407500

Sifton Township Conservation Reserve

Little Pine Lake

230kV Transmission Line

Boundary Lake

Burditt Lake

Off Lake

Rainy Lake I.R. No. 17B

Muskrat Lake

Hwy-619

Hwy-647

Hwy-615

Hwy-71

Hwy-600

Kishkakoesis River

Pinewood River

Pinewood Lake

Pipeline/Road

Spruce Island Provincial Park

Abbott Lake

P:\EM\Projects\2011\TC111504 Rainy River\GIS\Terrestrial\SAR_Report_2013\MXD\LSA_and_Proposed_ProjectBoundary_Bat.mxd

LEGEND

- Approximate Project Boundary
- Local Study Area (LSA)
- Regional Road / Highway
- Secondary Road
- Existing Transmission Line
- First Nation Reserve Lands
- Conservation Reserve (Regulated)
- Provincial Park

NOTES:
- Road data extracted from Land Information Ontario, Ontario Road Network, MNR
- Base map data from Geogratis NRCan Toporama DRG 1:50k sheets

Datum: NAD83
Projection: UTM Zone 15N

0 5 10 20 30 Kilometres

N W E S

RAINY RIVER amec

RAINY RIVER PROJECT

Local Study Area

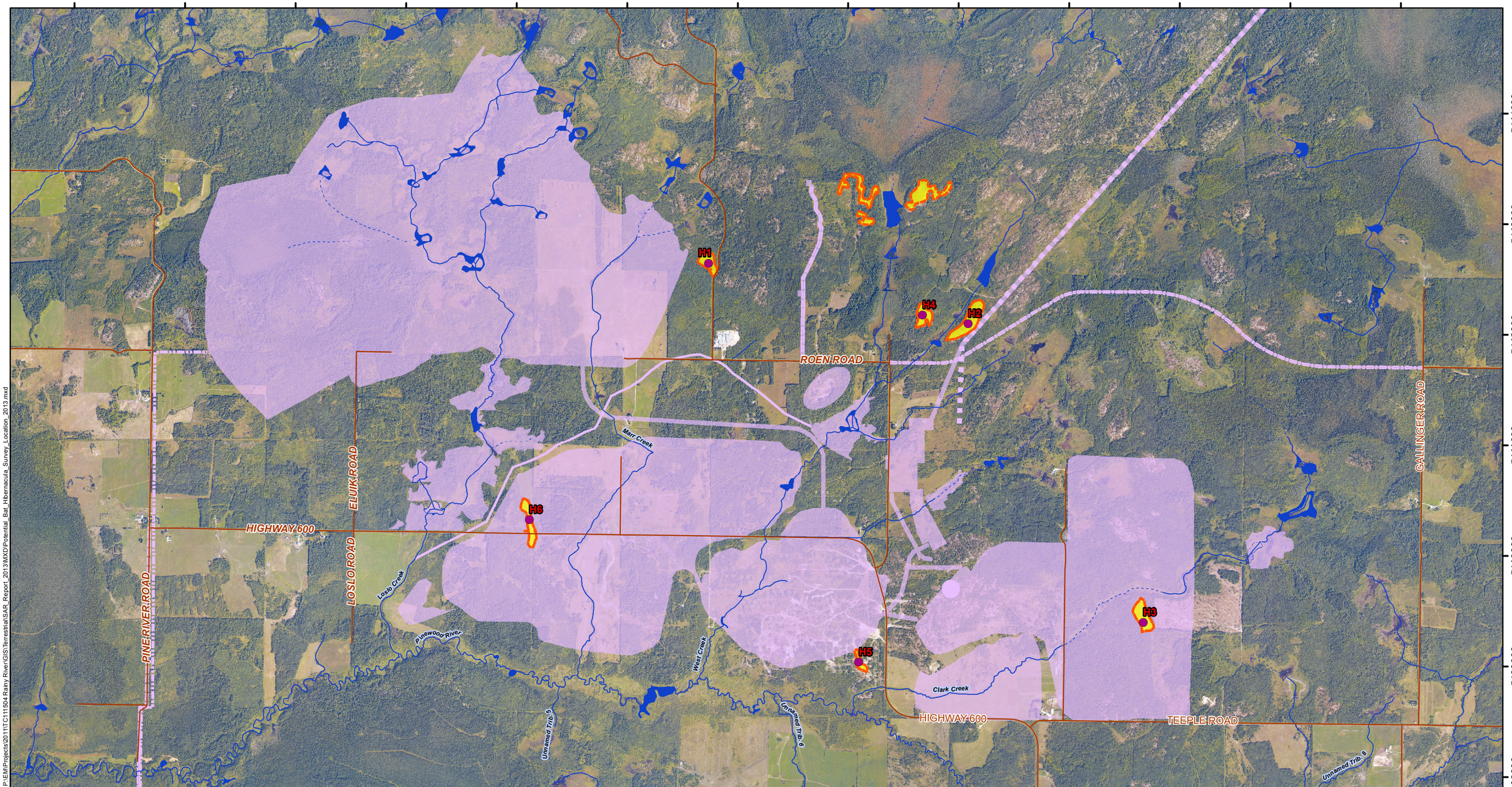
PROJECT N°: TC111504 | **FIGURE: 1-2**

SCALE: 1:112,000 | DATE: October 2013

2.0 STUDY OBJECTIVES

Bat impact assessment and habitat compensation studies undertaken in 2013 fulfilled the following objectives:

- Identify significant natural features used by bats and their total area within the RRP footprint;
- Confirm results from 2012 bat activity surveys at the RRP;
- Confirm the presence or absence of critical Little Brown Myotis and Northern Myotis habitat features within the RRP footprint; and
- Locate additional critical habitat features outside of the project footprint to be considered as compensatory habitat should critical bat habitat features need to be removed for RRP activities.



LEGEND

- Bat Hibernacula Survey Location
- Road
- Permanent Watercourse
- Intermittent Watercourse
- Waterbodies
- Canidate Bat Hibernacula
- Approximate Principal RRGP Facilities

0 0.5 1 2 3 4 5 Kilometres

NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

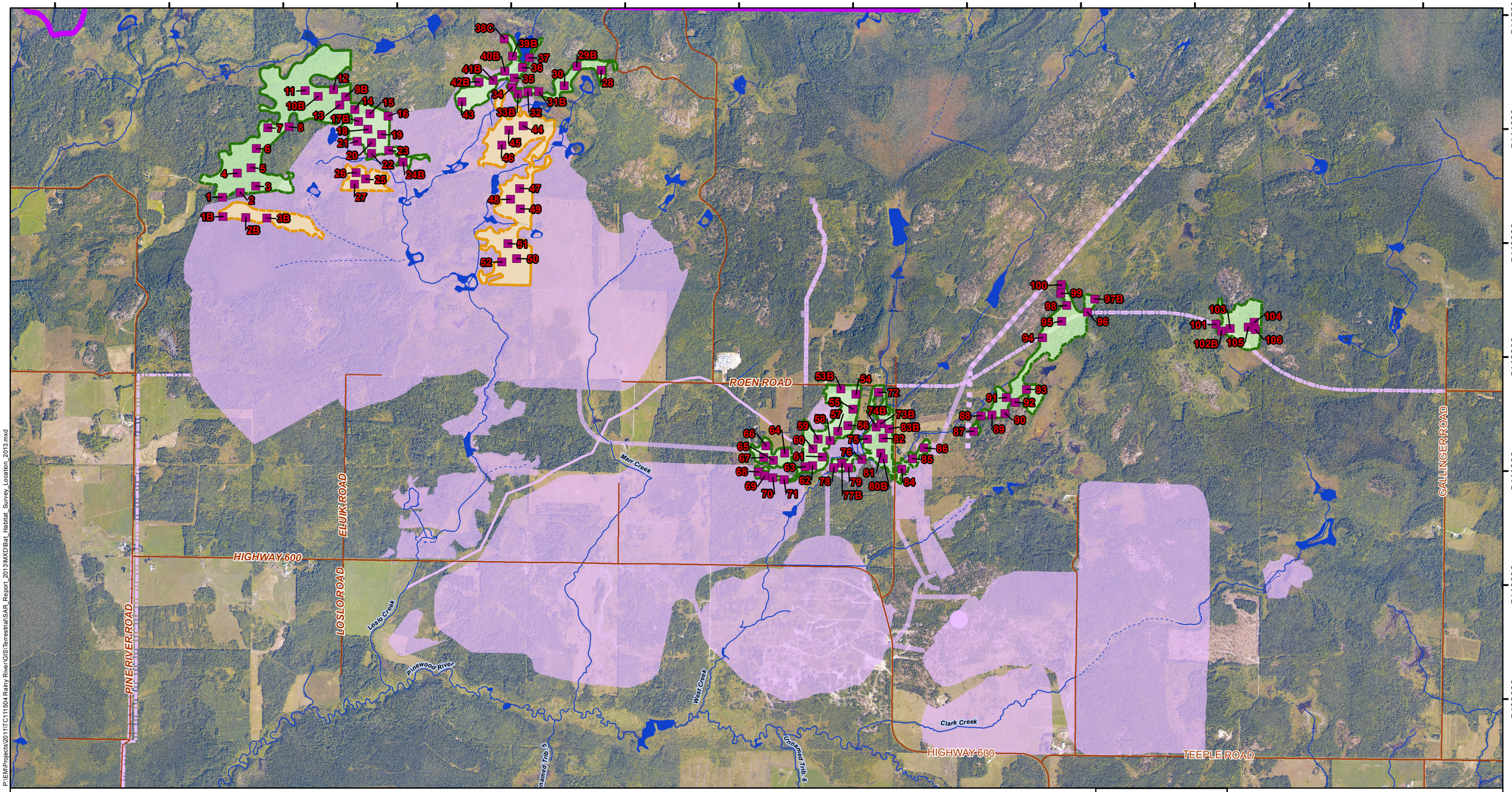
N W E S

RAINY RIVER amec

RAINY RIVER PROJECT

2013 Potential Bat Hibernacula Survey Locations

PROJECT Nº: TC111504	**FIGURE: 2-1**
SCALE: 1:33,000	DATE: October 2013



P:\EM\Projects\2011\TC\111504 Rainy River\GIS\Terrestrial\SAR_Report_2013\MXD\Bat_Habitat_Survey_Location_2013.mxd

LEGEND

- Bat Habitat Survey Location
- Potential Bat Maternity Roost Habitat
- Additional Surveyed Areas
- FRI Identified
- Road
- Waterbodies
- Permanent Watercourse
- Intermittent Watercourse
- Approximate Principal RRGP Facilities

0 0.5 1 2 3 4 5 Kilometres

NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

N W E S

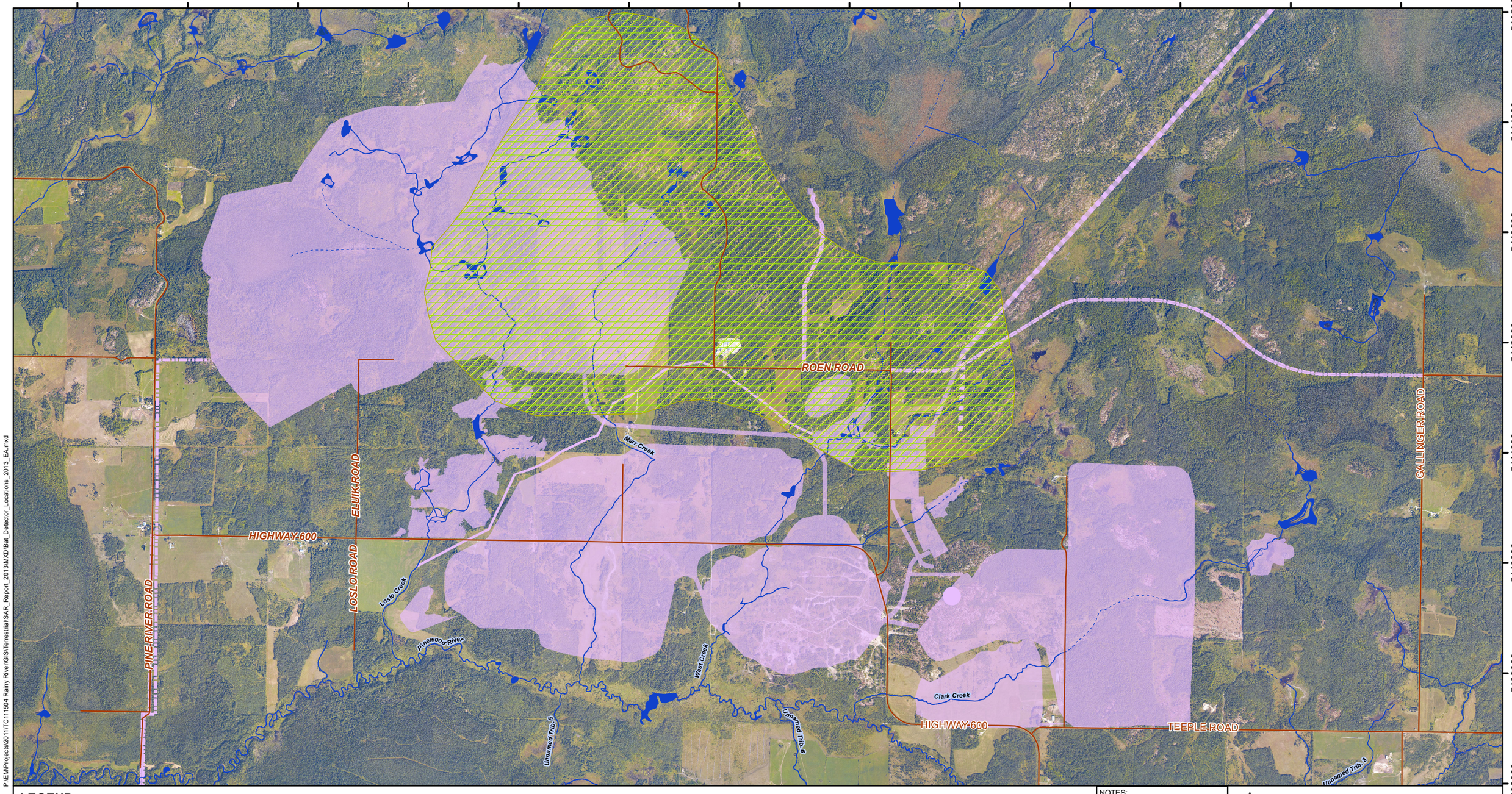
RAINY RIVER

amec

RAINY RIVER PROJECT

2013 Potential Bat Maternity Roost Habitat Survey Locations

PROJECT Nº: TC111504	**FIGURE: 2-2**
SCALE: 1:32,000	DATE: October 2013



P:\EMProjects\2011\TC111504 Rainy River\GIS\Terrestrial\SAR_Report_2013\MXD\Bat_Detector_Locations_2013_EA.mxd

LEGEND

- Bat Dectectors Generalized Location
- Road
- Permanent Watercourse
- Intermittent Watercourse
- Waterbodies
- Approximate Principal RRGP Facilities

0 0.5 1 2 3 4 5 Kilometres

NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

N W E S

RAINY RIVER

amec

RAINY RIVER PROJECT

2013 Bat Detector Locations

PROJECT Nº: TC111504	**FIGURE: 2-3**
SCALE: 1:33,000	DATE: October 2013

3.0 TARGETED SURVEY AREAS

Three significant bat habitat types are recognized by the MNR: 1) bat hibernacula, 2) bat maternity roost sites and 3) bat migration stopover sites (MNR 2011). Little is known regarding bat migratory stopover habitat in Ontario and there are currently no provincial criteria for identifying critical bat migratory stopover habitat (MNR 2011). As a result, this habitat type was not targeted during the 2013 field investigation. During the spring and early summer, most Ontario bat species rely on forest habitat that supports a healthy density of large-diameter cavity trees. Females form maternity colonies of tens to hundreds of individuals in cavities that provide a warm, humid microclimate that optimizes gestation and growth of offspring (Kunz and Anthony, 1982). In August and September, bats congregate at the entrance of caves or mine shafts which are used as hibernacula during the winter (Norquay et al. 2013). During winter, suitable hibernacula maintain temperatures slightly above freezing, a consistent air flow and high humidity levels (Raesly and Gates, 1987). Habitat surveys conducted in 2013 aimed to identify candidate maternity roosting habitat and candidate hibernacula.

A preliminary GIS analysis of Forest Resource Inventory (FRI) vegetation communities within the RRP NLSA was conducted to identify natural features that might serve as critical bat habitat. Four land features comprised of exposed bedrock were found to be present within the RRP footprint. An additional 2 areas of exposed bedrock fell within earlier versions of the RRP footprint and therefore were also included in 2013 surveys to ensure full coverage of the finalized RRP footprint (Figure 2-1). These 6 areas were surveyed for the presence of candidate bat hibernacula.

Maternity colonies are generally located in mature (dominant trees >80 years old) deciduous or mixed forest stands with a density of at least 10 cavity trees/hectare (ha) with a diameter at breast height (DBH) of 25 centimetres (cm) or greater. This cavity tree density threshold is also used to designate candidate maternity roosting habitat during bat habitat site investigations for renewable energy projects in Ontario (MNR 2011). Although MNR (2011) requests the use of Ecological Land Classification (ELC) data to identify mixedwood and deciduous forest types, FRI data is more readily available for lands in northern Ontario and includes community age data. The use of forest stand age data further scopes the vast area of hardwood forest present in the RRP NLSA (12,856 ha) and allows identification of forest tracts most likely to have a high density of cavity trees with a large DBH. Seven woodland features greater than 80 years old overlapped with the RRP footprint (Figure 2-2). Approximately 68 additional woodland features of similar characteristics were present throughout the NLSA. At least 23 of these occurred within prospective compensatory properties and thus could be protected as critical bat habitat as part of a compensation package (if needed) pursuant to a 17(2)(c) *ESA* permit. Surveys were conducted to determine if the 7 forest stands mentioned above were significant maternity roosting habitat. Surveys to identify candidate maternity roosting habitat were also conducted at 3 forest stands that fell within potential compensatory properties.

Before conducting surveys, the boundaries of the 10 forest polygons to be surveyed were further refined based on more recent aerial images of the study area. Areas that had clearly

been cleared since the collection of the FRI data were excluded from the original FRI polygons. Surveys were confined to the area within the refined polygons (Figure 2-2).

420000 420500 421000 421500 422000 422500 423000 423500 424000

5414500 5414000 5413500 5413000

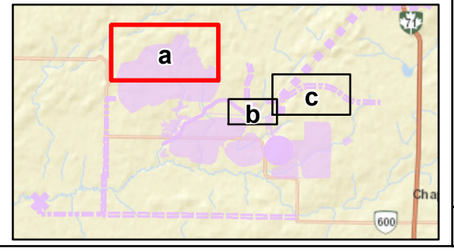
P:\EM\Projects\2011\TC\111504 Rainy River\GIS\Terrestrial\SAR_Report_2013\MXD\Bat_Habitat_Survey_Results_2013.mxd

LEGEND

- Bat Habitat Survey Location (Labeled with number of suitable cavity trees observed)

Potential Bat Maternity Roost Habitat

- Additional Surveyed Areas
- FRI Identified
- Road
- Waterbodies
- Permanent Watercourse
- Intermittent Watercourse
- Approximate Principal RRGP Facilities



NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

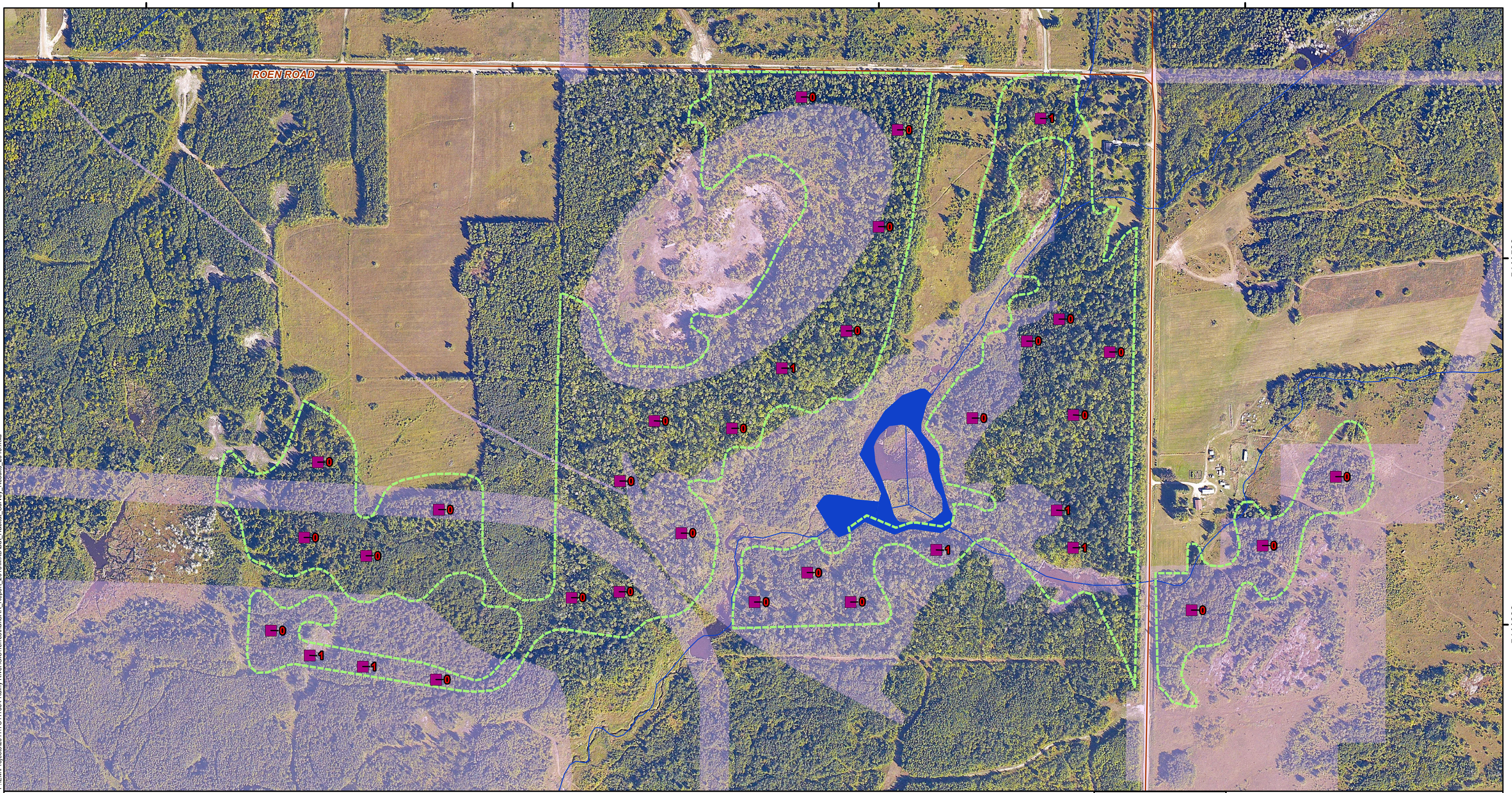
0 100 200 400 600 800 1,000 Metres

RAINY RIVER amec

RAINY RIVER PROJECT

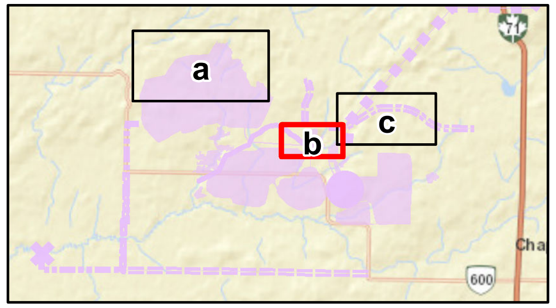
2013 Potential Bat Maternity Roost Habitat Survey Results

PROJECT Nº: TC111504	**FIGURE: 3-1a**
SCALE: 1:11,000	DATE: October 2013



LEGEND

- Bat Habitat Survey Location (Labeled with number of suitable cavity trees observed)
- Potential Bat Maternity Roost Habitat
  - Additional Surveyed Areas
  - FRI Identified
- Road
- Waterbodies
- Permanent Watercourse
- Intermittent Watercourse
- Approximate Principal RRGP Facilities



NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

0 100 200 400 600 800 1,000 Metres

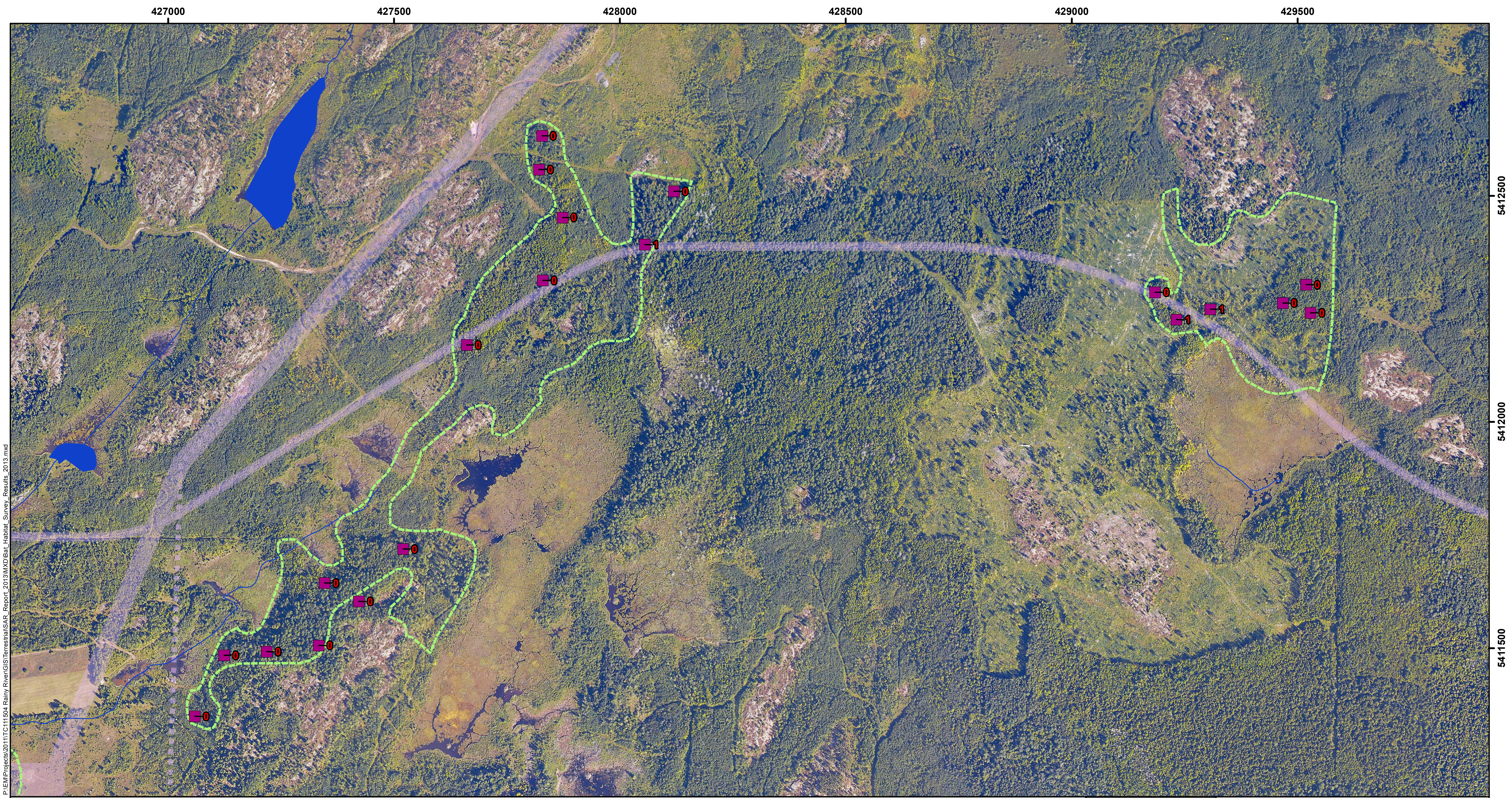
RAINY RIVER

amec

RAINY RIVER PROJECT

2013 Potential Bat Maternity Roost Habitat Survey Results

PROJECT Nº: TC111504	**FIGURE: 3-1b**
SCALE: 1:5,000	DATE: October 2013

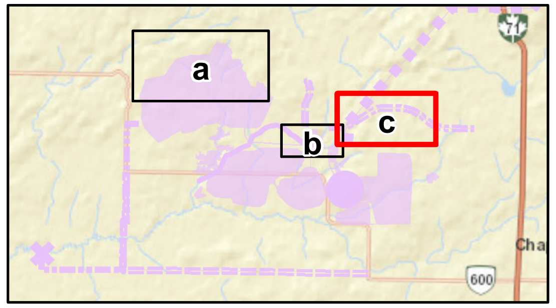


LEGEND

- Bat Habitat Survey Location (Labeled with number of suitable cavity trees observed)

Potential Bat Maternity Roost Habitat
- Additional Surveyed Areas
- FRI Identified

- Road
- Waterbodies
- Permanent Watercourse
- Intermittent Watercourse
- Approximate Principal RRGP Facilities



NOTES:
- Road and hydrology data extracted from LIO

Datum: NAD83
Projection: UTM Zone 15N

0 100 200 400 600 800 1,000 Metres

RAINY RIVER | amec

RAINY RIVER PROJECT

2013 Potential Bat Maternity Roost Habitat Survey Results

PROJECT Nº: TC111504	FIGURE: 3-1c
SCALE: 1:8,000	DATE: October 2013

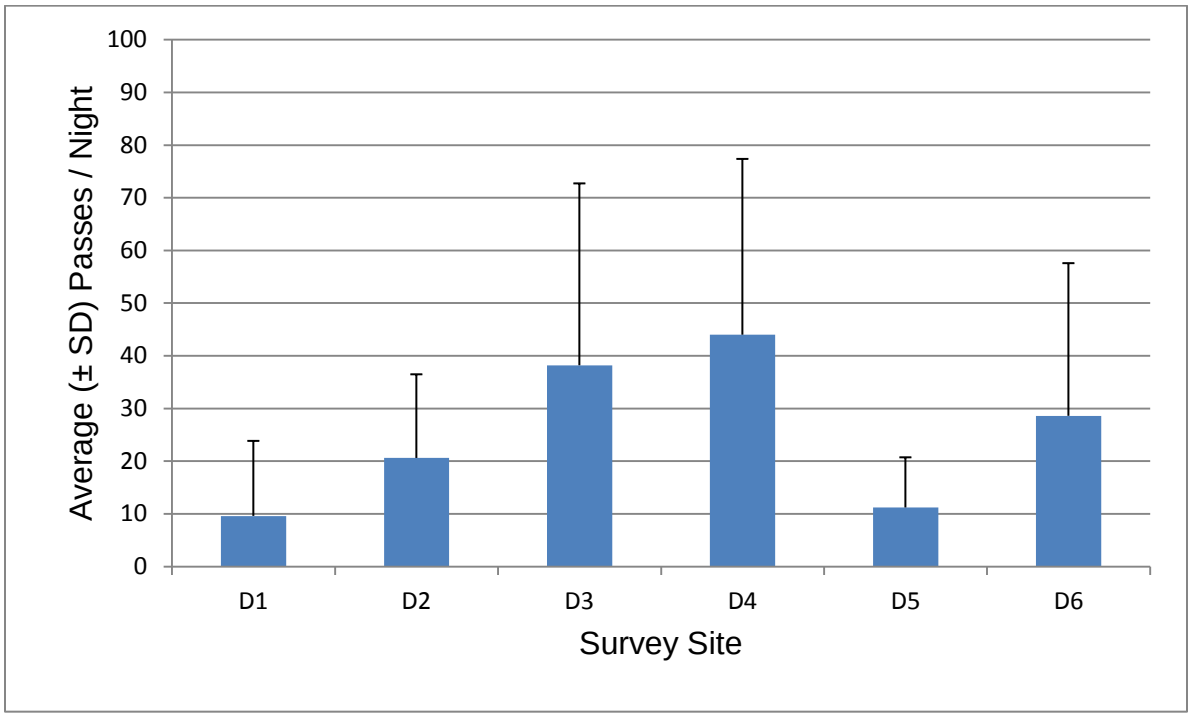


Figure 3-2: 2013 Acoustic Bat Activity Survey Results for 6 Locations within the RRP NLSA

4.0 METHODOLOGY

On May 21 to 26, 2013 AMEC conducted focused surveys for bats and bat habitats within and adjacent to the RRP NLSA using established MNR approved survey protocols described in detail below. Study objectives were addressed through the design, execution and completion of 1) bat hibernacula surveys, 2) bat maternity roosting habitat surveys and 3) bat acoustic activity surveys. Surveys were conducted in early summer during the leaf-off period which provided an unobstructed visual field for identifying potentially significant natural features.

4.1 Existing Information Review

A desktop review of information pertinent to identifying potential bat species and critical habitat features within the RRP Study Area was conducted prior to physical surveys. Table 4-1 provides a list of all reviewed documents, types of information obtained from each document and relevance of the information to this baseline study.

A list of bat species likely to occur within the RRP Study Area was generated from inventory maps in the Atlas of the Mammals of Ontario (Dobbyn 1994) and up-to-date range maps provided by Bat Conservation International (BCI 2013). Six bat species including two SAR were found to potentially occur within the RRP NLSA: Little Brown Myotis, Northern Myotis, Big Brown Bat, Silver-Haired Bat, Hoary Bat and Eastern Red Bat. SAR species (Little Brown Myotis and Northern Myotis) were targeted during habitat surveys described below and acoustic surveys provided a method to confirm the presence of these species and to inventory the level of activity of all bat species throughout the RRP NLSA.

4.2 Bat Hibernacula Surveys

Methods used to survey for candidate bat hibernacula followed those outlined in the document *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNR 2011). Desktop studies were used to identify target sites for surveys such as abandoned mines and geological formations that might be used by bats as hibernacula. No abandoned mines were found to occur within or near the RRP Study Area. Additionally, no karst was identified within the bedrock geology which, instead was comprised mostly of harder stone like Diorite and Mafic formations (MNDM 2013). Therefore, the probability of natural caves occurring within the RRP Study Area is likely low since its geology is far less conducive to the formation of caves via dissolution compared to softer stones like limestone, dolomite, gypsum and sandstone. These latter compositions form most of the known natural bat hibernacula in Canada (Ford 1961, Thomas et al. 1979, Hitchcock et al. 1984, Peck 1988, Bilecki 2003). Nevertheless, an effort was made to identify and examine areas of exposed bedrock within the RRP footprint. FRI mapping identified 4 such features within the RRP footprint and an additional 2 that no longer overlap the footprint but are still in close proximity to it (approximately 100 to 300 m; Figure 2-1). Each feature was visited and examined closely for the presence of deep fissures, rock piles and sink holes that might serve as potentially suitable hibernacula for bats. Photo documentation of each feature was also collected (Appendix A).

4.3 Bat Maternity Roosting Habitat Surveys

No standardized survey methods exist for evaluating the suitability of woodlands as bat maternity roosting habitat for the purpose of Environmental Impact Statements required *under CEAA 2012*. However, MNR (2011) provides methods for evaluating candidate bat maternity roost habitat for prospective wind energy projects. These methods were therefore employed to identify candidate maternity roosting habitat potentially impacted by the RRP. As described above, FRI data identified 7 old growth forest stands (>80 years old) that overlapped with the RRP footprint. The FRI boundaries of these forest stands were manipulated to reflect more recent boundaries observed from aerial images (Figure 2-2). Because the presence of a single active maternity roost within a forest ecotype polygon can render the entire polygon significant for bats (MNR 2011), surveys spanned entire forest stands and were not just confined to the RRP footprint. Surveys were conducted at the 7 impacted forest stands and at 3 additional forest stands outside the RRP footprint that could serve as compensatory property should habitat compensation be required.

Within identified forest stands, a total of 109 circular plots of 0.05 ha were selected at random locations (Figure 2-2). This totalled approximately 1 plot for every 1.5 ha (up to a maximum forest area of 30 ha) in forest stands within the RRP footprint and approximately 1 plot for every 4.5 ha in compensatory forest stands located adjacent to the footprint. Each plot was visited by two AMEC biologists and thoroughly examined for the presence of candidate bat maternity roost trees. In some instances, upon visiting a plot it was clear that the forest around the plot was too young and that no suitable trees (>80 years old) were present. In such cases, when possible, the plot was moved to an area of the forest with older and larger trees. Candidate trees were those that had a ≥25 cm DBH and that exhibited one or more of the following features (in order of importance):

- Contained habitable cavities originating from knots, woodpecker holes, cracks;
- Had a large amount of loose peeling bark;
- Were in an area where the canopy was relatively open; and
- Were in an early stage of decay (decay class 1 to 3; Watt and Caceres 1999).

Information recorded for each candidate roost tree included the DBH, height and species of the tree, number of cavities within the tree, height of the cavities from the ground and the amount of loose bark on the tree. Decay class of the tree was also recorded following the classification system described by Watt and Caceres (1999). A north-facing and a south-facing photo were also taken from the center of each plot as well as at least one photo of each identified candidate roost tree. The average number of candidate roost trees/ha was then calculated for each surveyed forest stand and, in line with the MNR (2011) guidelines, forest stands with a density of candidate roost trees equal to or greater than 10 trees/ha were identified as candidate maternity roosting habitat for bats.

4.4 Bat Acoustic Activity Surveys

Nocturnal bat activity was monitored from 30 minutes before sunset to 30 minutes after sunrise for 5 nights from May 21 to 26, 2013 with 6 Songmeter SM2Bat+ (Wildlife Acoustics Inc.) ultrasonic recording devices deployed throughout the RRP NLSA. Prior to deployment, an ultrasonic calibrator (Wildlife Acoustics Inc.) that emitted a 40 kHz pure tone was used to verify the sensitivity and proper functioning of the bat detector microphones. Only microphones with similar sensitivity values were used and the average ± SD sensitivity was -9.0 ± 1.9 dB. Detectors were positioned 2 to 4 m above ground at locations where higher levels of bat activity were likely to occur, such as woodland and/or wetland edges and at candidate hibernacula if any were identified (Furlonger et al. 1987). Midway through the survey period, the detector at D1 was moved to location D1B which was closer to a wetland and was therefore more favourable for the detection of foraging bats. Bat detectors were configured to begin recording when ultrasonic signals greater than 20 dB above the noise floor rolling average were detected. Upon trigger, a recording with a maximum duration of 8 sec was saved. A signal process then filtered recorded signals and retained those resembling bat echolocation. All recordings were made in .wav format with a 384 kHz sampling frequency and 16-bit resolution.

Recordings were identified to species using Sonobat 2.97 (Sonobat™). Qualitative and quantitative parameters were used to compare recorded calls of unknown species to those obtained from a library of recorded calls for which species was known. Parameters used for species identification included the frequency of maximum energy, minimum frequency, maximum frequency, call duration, slope of the call and other more qualitative parameters such as the time-frequency shape of the call, the position of the knee, presence of inflections and terminal curvatures (Appendix B). Less importance was placed on frequency with maximum energy and maximum frequency as these parameters were heavily influenced by the sensitivity of the recording equipment and maximum frequency is highly susceptible to atmospheric attenuation. Calls that could not be classified to a single species were placed in a group named after the two or more species most likely to have produced the call.

Table 4-1: Sources Consulted during the Review of Existing Information on Bats and Bat Habitat within the RRP Study Area

Organization	Data Type	Natural Features/Values
Ontario Ministry of Natural Resources - Natural Heritage Information Centre	Database Search	Provincial ranks for species
Ontario Ministry of Natural Resources – Forest Resource Inventory (FRI) Project	Forest stand age type	Forests likely to provide suitable bat maternity habitat
Ontario Ministry of Northern Development and Mines	Bedrock Geology, Abandoned Mines	Locations of potential bat hibernacula
Federation of Ontario Naturalists	Atlas of the Mammals of Ontario	Bat species list
Environment Canada - *Fish and Wildlife Conservation Act*	Wildlife that falls under this Act	Bat species list
Environment Canada	*Species at Risk Act* and wildlife that fall under this Act	Bat SAR list
Bat Conservation International	Species Occurrences / Range Maps	Species expected to occur in RRP NLSA

5.0 RESULTS

Weather conditions during the study were clear to overcast, with calm winds (0 to 1 on the Beaufort scale) with no precipitation. As surveys were conducted early in the active season, temperatures on some nights fell below what might be considered favourable for bats (less than 8 to 10°C). Weather conditions did not however hinder the fulfillment of the primary objective of the study which was to assess the suitability of habitat within the RRP NLSA. Furthermore, despite the weather, a sufficient number of calls (231; 13 ± 17 passes / night) for the determination of species present were still recorded in sub-favourable conditions and activity levels recorded during this study were still similar to those recorded later in the year in 2012.

5.1 Bat Hibernacula Surveys

Six areas of exposed bedrock (described in Section 4.2) were thoroughly investigated for the presence of candidate bat hibernacula. None of the examined rock contained cracks, crevices or other openings that might have been suitable for hibernation by bats. Any opening that was found was very shallow (less than 30 cm deep). A single crack was found at H5 (Figure 2-1) that might have been suitable as a temporary day roost but was still too shallow and confined to serve as a hibernaculum. Site H5 also contained 1 rock pile, a number of areas of overlaid rock and a moderately steep (60 degrees) rock face covered in a layer of loose small to large rock fragments. The rock face contained no suitable cracks or crevices and all rock pile features were unstable (rocks were loose and easily displaced). Piles were also shallow (less than 1 metre [m] tall) and therefore would not provide a suitable microclimate during winter. Rocks were relatively small and flat and therefore the piled or overlaid rock offered no passages or sheltered pockets. A photo of features observed at H5 is provided in Appendix A.

5.2 Bat Maternity Roosting Habitat Surveys

5.2.1 Areas Impacted by the RRP

A total of 16 candidate maternity roost trees were identified within the 7 forest stands that overlapped the RRP footprint (Figure 3-1). Most of those identifiable to species (14 / 15) were Trembling Aspen or at least a Poplar sp. The density of candidate roost trees calculated for each stand ranged from 0 trees/ha to 6.7 trees/ha with an average ± SD of 3.6 ± 2.6 trees/ha (Table 5-1). MNR (2011) specifies 10 trees/ha as the minimum density of candidate roost trees required for identifying candidate bat maternity roosting habitat. As the sampled areas within the project had densities below 10 cavity trees/ha, the project area is not considered significant or candidate maternity roosting habitat for bats, particularly for species of the genus *Myotis* and *Perimyotis*.

5.2.2 Prospective Compensatory Areas

A total of 7 candidate maternity roost trees were identified within the 3 forest stands surveyed outside the RRP footprint (Figure 3-1). Most of those identifiable to species (4 / 5) were a Poplar sp. The density of candidate roost trees calculated for each stand ranged from 0 trees/ha to 8.9 trees/ha with an average ± SD of 5.2 ± 4.6 trees/ha (Table 5-2). As the sampled areas within these tree stands had average densities below 10 cavity trees/ha, the prospective compensatory properties surveyed contained poor maternity roosting habitat for bats.

5.3 Bat Acoustic Activity Surveys

The acoustic activity of bats over the 5 recording nights averaged 9.6 ± 14.2 passes / night at D1, 20.6 ± 15.9 passes/night at D2, 38.2 ± 34.5 passes/night at D3, 44.0 ± 33.4 passes / night at D4, 11.2 ± 9.5 passes / night at D5 and 28.6 ± 29.0 passes / night at D6 (Figure 3-2). There was no statistical difference in activity among the 6 sites (ANOVA: df = 5, 24, F = 1.81, P = 0.15). Average bat activity across all sites was 25.4 ± 26.1 passes / night, very similar to the average value of 25.6 ± 32.2 estimated in 2012. Statistical analysis confirmed there was no difference in overall activity for the RRP between both years (ANOVA: df = 1, 52 F = 0.03, P = 0.87).

Five species were confirmed to occur within the Project Study Area: Little Brown Myotis, Northern Myotis, Silver-Haired Bat, Big Brown Bat and Hoary Bat (Table 5-3, 5-4). The most frequently recorded group was the Silver-Haired / Big Brown Bat group which comprised 45% (344 / 761) of all recorded bat passes followed by the Myotis group which made up 33% (249 / 761) of passes. Calls that were identifiable to the Little Brown Myotis made up 8% (58 / 761) of passes and those identifiable to the Silver-Haired Bat made up 6% (45 / 761) of passes. These 4 groups were recorded at all survey locations and the Hoary Bat was recorded at all sites except D1 and D6. The Big Brown Bat and Northern Myotis were only confirmed at D3 but calls of these species may have been recorded in other locations but could simply not be

distinguished from the calls of other species like those of the Silver-Haired Bat and the Little Brown Myotis (Table 5-4). Although no Eastern Red Bat was recorded during this study, this species is known to occur in the RRP NLSA as 29 Eastern Red Bat passes were recorded during studies in June and July in 2012. Barclay (1984) describes the arrival of the Eastern Red Bat during spring migration to a site 300 km northwest of the RRP as occurring in early to mid June. Therefore, this species had likely not yet arrived to the RRP during 2013 surveys.

5.4 Bat Species at Risk

In January 2013, the Little Brown Myotis and the Northern Myotis were afforded Endangered Species Status in Ontario and are now protected under the ESA and the FWCA. Since it first appeared in upstate New York in 2006, the fungal disease known as White Nose Syndrome has decimated millions of bats throughout eastern North America and is rapidly spreading westward (Frick et al. 2010). The natural histories of the two species most impacted by White Nose Syndrome are very similar in that both rely on old growth forest stands where they form maternity colonies in tree cavities. Both also rely on caves and abandoned mines as hibernacula and staging points for reproductive activities (Norquay et al. 2013). This section presents the results from surveys conducted to identify SAR critical habitat and species presence and relative activity levels throughout the RRP NLSA.

5.4.1 Little Brown Myotis

No natural candidate bat hibernacula or candidate bat maternity roosting habitat was identified within or in the vicinity of the NLSA. Six areas of exposed bedrock were thoroughly examined and none contained features such as cracks, crevices or other openings that might provide suitable habitat for hibernation. Rock piles at these sites were also unsuitable. No abandoned mines occurred near or within the RRP. The density of potential maternity roosting trees in forest stands impacted by the RRP footprint ranged from 0 to 6.67 trees/ha with an average ± SD of 3.6 ± 2.6 trees/ha (Table 5-1). This is below the 10 trees/ha minimum threshold specified by the MNR (MNR, 2011) for identifying candidate significant bat maternity roosting habitat. Therefore, areas impacted by project activities do not contain significant maternity roosting habitat for the Little Brown Myotis. Acoustic surveys did, however, confirm use of the NLSA by Little Brown Myotis.

Little Brown Myotis and Myotis sp. groups made up 41% (309 / 761) of all recorded passes of which 6% (18 / 309) were at D1, 12% (37 / 309) were at D2, 16% (48 / 309) were at D3, 39% (122 / 309) were at D4, 4% (11 / 309) were at D5 and 24% (73 / 309) were at D6 (Table 5-4). Since the Northern Myotis is generally less abundant than the Little Brown Myotis (Caceres and Barclay 2000), the majority of calls classified as Myotis were likely produced by the Little Brown Myotis. Average activity of the Little Brown Myotis and Myotis group throughout the NLSA was 10.4 ± 8.2 passes / night, very similar to the 11.9 ± 8.4 passes / night recorded in 2012. Taking into account the equipment and recording settings used and that efforts were made to place monitoring equipment in high-quality foraging habitat for bats, the levels of activity recorded for the Little Brown Myotis were relatively low. This is consistent with a poor availability of roost

trees within the RRP.

5.4.2 Northern Myotis

No suitable hibernacula or maternity roosting habitat for Northern Myotis was identified within and around the RRP Study Area. A single call of Northern Myotis at site D3 was confidently identifiable to species which was consistent with the low detection rate (2 passes) for this species in 2012 (Table 5-4). This species may have been recorded more often than this but could simply not be distinguished from the Little Brown Myotis. The Northern and Little Brown Myotis produce cryptic variants of echolocation that contain overlapping features. Additionally, the Northern Myotis produces calls with higher maximum frequencies that attenuate quickly. As a result, these distinguishing higher frequencies are often absent from recordings which can cause the Northern Myotis to be underrepresented in acoustic data. Nonetheless, the Northern Myotis is generally less abundant than the Little Brown Myotis (Caceres and Barclay 2000).

Table 5-1: Candidate Roost Trees Identified within Areas Impacted by the RRP

Forest Stand	Survey Plot	Tree ID	Species	DBH (cm)	Height (m)	Height of Cavities (m)	Peeling Bark	State of Decay[1]	Density of Candidate Maternity Roost Trees
1	2B	2B-1	Tamarack	25.5	25 to 30	15	None	3	2.5
	5	5-1	Poplar sp	33	>16	4 to 5	Some	5	
	15	15-1	Trembling Aspen	35	25	3	None	1	
2	29B	29B-1	Poplar sp.	50.5	8	5 to 8	Extensive	5	5
	30	30-1	Poplar sp.	41.5	10 to 15	1 to 7	Moderate	5	
	35	35-1	Poplar sp.	32	16	6 to 16	None	2, top dead	
	41B	41B-1	Poplar sp.	34	15	7 to 15	None	2, top dead	
3	57	57-1	Poplar sp.	40	20	5	Extensive	4	3.2
	69	69-1	Unknown	50	18	14	Some	4	
	70	70-1	Unknown	34.8	13	12	Some	5	
4	72	72-1	Poplar sp.	25	>12	3 to 12	Extensive	4	6.7
	76	76-1	Trembling Aspen	>25	>15	N / A	Extensive	4	
	80B	80B-1	Poplar sp.	40	>7	3 to 7	Little	Unknown	
	81	81-1	Poplar sp.	32.2	20	No cavities	Extensive	4	
5	-	-	-	-	-	-	-	-	0
6	96	96-1	Poplar sp.	36.5	?	?	None	1	1.4
7	102B	102B-1	Poplar sp.	31.6	>9	7 to 9	Little		6.7
	103	103-1	Poplar sp.	59.5	>12	7 to 12	Extensive	5	

[1]Classification codes follow those described in Watt and Caceres (1999).

Table 5-2: Candidate Roost Trees Identified Outside Areas Impacted by the RRP

Forest Stand	Survey Plot	Tree ID	Species	DBH (cm)	Height (m)	Height of Cavities (m)	Peeling Bark	State of Decay[1]	Density of Candidate Maternity Roost Trees
8	-	-	-	-	-	-	-	-	0
9	27	27-1	Poplar sp	>25	25 to 30	No Cavities	Extensive	5	6.7
10	45	45-1	Poplar sp	32	?	?	?	?	8.9
	46	46-1	Poplar sp	35	>12	5 to 12	None	2	
	46	46-2	Balsam Fir	31	?	N / A	Moderate	3	
	46	46-3	Poplar sp	48	?	7	None	1	

Table 5-3: Bat Species Detected During Acoustic Surveys at the RRP

Common Name	Scientific Name	Observed on Site	Provincial S-Rank[1]	Provincial Designation (ESA)[2]	Federal Designation (SARA)[3]	Other Protection (FWCA)[4]
Little Brown Myotis	*Myotis lucifugus*	x	S4	END	--	x
Northern Myotis	*Myotis septentrionalis*	x	S3	END	--	x
Big Brown Bat	*Eptesicus fuscus*	x	S5	--	--	x
Silver-Haired Bat	*Lasionycteris noctivagans*	x	S4	--	--	x
Hoary Bat	*Lasiurus cinereus*	x	S4	--	--	x
Eastern Red Bat	*Lasiurus borealis*	x [5]	S4	--	--	x

[1] S-Rank - *S3*: Uncommon or vulnerable species; S4 - Apparently Secure Species; S5 – Secure Species
[2] SARO - Species at Risk in Ontario (listed under *Endangered Species Act*)
[3] SARA - *Species at Risk Act, 2003* – Schedule 1: Full protection under SARA
[4] FWCA - *Fish and Wildlife Conservation Act*
[5] Only observed in 2012, not in 2013

Table 5-4: Echolocation Call Passes Recorded at 6 Survey Locations within the RRP NLSA

Species[1]	D1	D2	D3	D4	D5	D6
Little Brown Myotis	5	29	10	7	4	3
Northern Myotis	0	0	1	0	0	0
Silver-Haired Bat	0	11	17	11	1	5
Big Brown Bat	0	0	1	0	0	0
Hoary Bat	0	4	4	2	2	0
Eastern Red Bat	0	0	0	0	0	0
Myotis	13	8	38	115	7	70
LANO/EPFU	25	38	111	73	34	61
LANO/LACI	1	0	4	0	0	0
MYOTIS/LABO	1	7	0	2	3	3
MYLU/LABO	0	5	1	2	0	0
Unknown	3	1	4	8	5	1
Total Passes	48	103	191	220	56	143

[1] Codes are derived from scientific names: MYLU=Little Brown Myotis, MYSE=Northern Myotis, LANO=Silver-Haired Bat, EPFU=Big Brown Bat, LACI=Hoary Bat, LABO=Eastern Red Bat

6.0 CONCLUSION

Five species were identified within the RRP NLSA in 2013: Little Brown Myotis, Northern Myotis, Big Brown Bat, Silver-Haired Bat and Hoary Bat. A sixth species, the Eastern Red Bat, was not detected in 2013 but still occurs within the NLSA. The Little Brown Myotis and Northern Myotis are endangered species protected under the *ESA*. No candidate hibernacula or maternity roosting habitat for these species was identified during surveys. Acoustic surveys demonstrated in 2012 and 2013 that these species are, however, active to a relatively low to moderate degree within the NLSA which suggests that at least some roosts may be present within the RRP footprint. Consultation with the MNR should be undertaken to determine if a permit or further study is required for these species.

7.0 REFERENCES

AMEC. 2011. Rainy River Gold Project Terrestrial Wildlife Baseline Report for 2011.

BCI. 2013. Species Profiles. Bat Conservation International. Accessed July 2013 from www.batcon.org.

Barclay, R.M.R. 1984. Observations on the Migration, Ecology, and Behaviour of Bats at Delta Marsh, Manitoba. Canadian Field-Naturalist, 98:331-336.

Bilecki, L.C. 2003. Bat Hibernacula in the Karst Landscape of Central Manitoba: Protecting Critical Wildlife Habitat While Managing for Resource Development. Thesis submitted to the Natural Resources Institute. Accessed July 2013 from http://hdl.handle.net/1993/3794.

Caceres, M.C. and R.M.R. Barclay. 2000. Myotis septentrionalis. Mammalian Species, 634:1-4.

Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Federation of Ontario Naturalists, Toronto. 120 pages.

Ford, D.C. 1961. The Bonnechere Caves, Renfrew County, Ontario: A note. Canadian Geographer, 3:22-25.

Frick, W.F., J.F. Pollock, A.C. Hicks, K E. Langwig, D.S. Reynolds, G.G. Turner, C.M. Butchkoski, and T.H. Kunz. 2010. An Emerging Disease Causes Regional Population Collapse of a Common North American Bat Species. Science, 329:679–82.

Furlonger, C.L., H.J. Dewar and M.B. Fenton. 1987. Habitat use by Foraging Insectivorous Bats. Canadian Journal of Zoology, 65:284-288.

Hitchcock, H.B., R.Keen, and A.Kurta. 1984. Survival Rates of *Myotis leibii* and *Eptesicus fuscus* in Southeastern Ontario. Journal of Mammalogy, 65:126-130.

Kunz, T.H., and E.L.P. Anthony. 1982. Age Estimation and Post-Natal Growth in the Little Brown Bat, *Myotis lucifugus*. Journal of Mammalogy, 63:23-32.

Minnis, A.M., and D.L. Lindner. 2013. Phylogenetic Evaluation of Geomyces and Allies Reveals no Close Relatives of *Pseudogymnoascus destructans*, comb. nov., in Bat Hibernacula of Eastern North America. *Fungal Biology*, Accessed July 2013 from http://dx.doi.org/10.1016/j.funbio.2013.07.001.

Norquay, J.O., F. Martinez-Nuñez, J.E. Dubois, K.M. Monson, and C.K.R. Willis. 2013. Long-Distance Movements of Little Brown Bats (*Myotis lucifugus*). Journal of Mammalogy, 94:506-515.

Ontario Ministry of Natural Resources (MNR). 2011. Bats and Bat Habitats: Guidelines for Wind Power Projects. Queen's Printer for Ontario: July 2011. Accessed July 2013 from http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@renewable/documents/document/stdprod_088155.pdf

Ontario Ministry of Northern Development and Mines (MNDM). 2013. Abandoned Mines. Accessed July 2013 from http://www.mndm.gov.on.ca/en/mines-and- minerals/ applications/ogsearth.

Peck, S.B. 1988. A Review of the Cave Fauna of Canada, and the Composition and Ecology of the Invertebrate Fauna of Caves and Mines in Ontario. *C*anadian Journal of Zoology, 66:1197-1213.

Raesly, L.R. and J.E Gates. 1987. Winter Habitat Selection by North Temperate Cave Bats. American Midland Naturalist, 118:15-31.

Thomas, D.W., M.B. Fenton, and R.M.R. Barclay. 1979. Social Behaviour of the Little Brown Bat, Myotis lucifugus. Behavioral Ecology and Sociobiology, 6:129-136.

Watt, R.W., and M.C. Caceres. 1999. Managing for Snags in the Boreal Forests of Northeastern Ontario. Ontario Ministry of Natural Resources. Northeast Science and Technology. Technical Note- 016. 20p.

8.0 LIST OF ACRONYMS

DBH: Diameter at Breast Height
ELC: Ecological Land Classification
ESA: *Endangered Species Act*
FRI: Forest Resource Inventory
FWCA: *Fish and Wildlife Conservation Act*
NLSA: Natural Local Study Area
RRP: Rainy River Project
RRR: Rainy River Resources Ltd.
SAR: Species at Risk
SD: Standard Deviation

APPENDIX I

PHOTOS OF SOME POTENTIAL HABITAT FEATURES SURVEYED WITHIN THE NLSA

Figure 1: Area of exposed bedrock examined at H5 (Figure 2-1).

Figure 2: Shallow crack in rock identified at H5 (Figure 2-1; not a suitable hibernaculum).

Figure 3: Candidate bat roost tree 41-1 identified within Plot 41.

Figure 4: Candidate bat roost tree 57-1 identified within Plot 57.

Figure 5: Bat detector deployed at D5 (Figure 2-3).

APPENDIX II

EXAMPLES OF BAT ECHOLOCATION CALLS RECORDED AT THE RRP

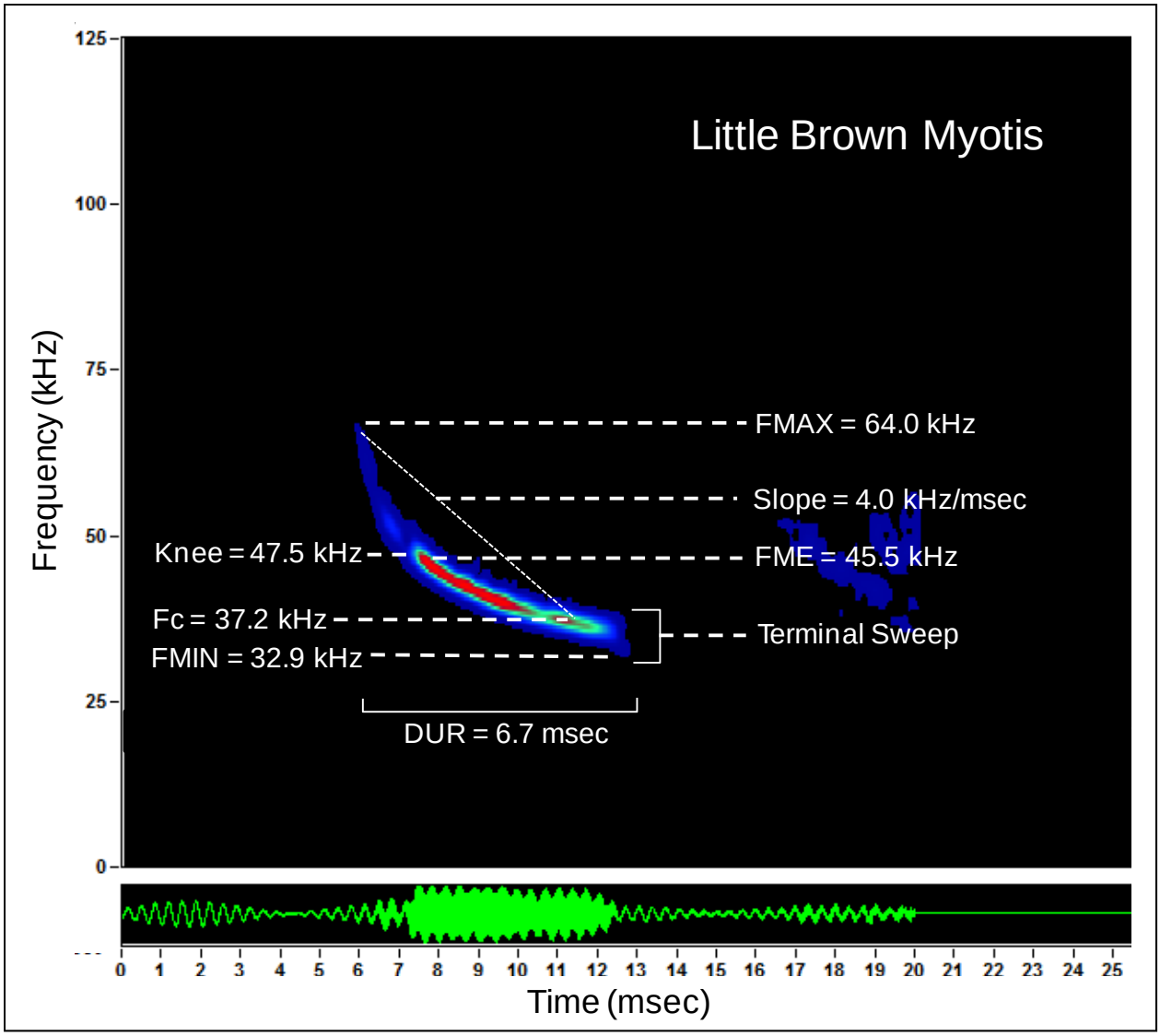


Figure 1: Spectrogram (above) and oscillogram (below) of a search-phase echolocation pulse from a Little Brown Myotis (*Myotis lucifugus*). Parameters displayed are those used to identify which species emitted the call: FMAX = Maximum frequency, FMIN = Minimum frequency, FME = Frequency with maximum energy, Knee = Frequency of most abrupt change in slope, Fc = Main frequency at the end of the call, DUR = Duration.

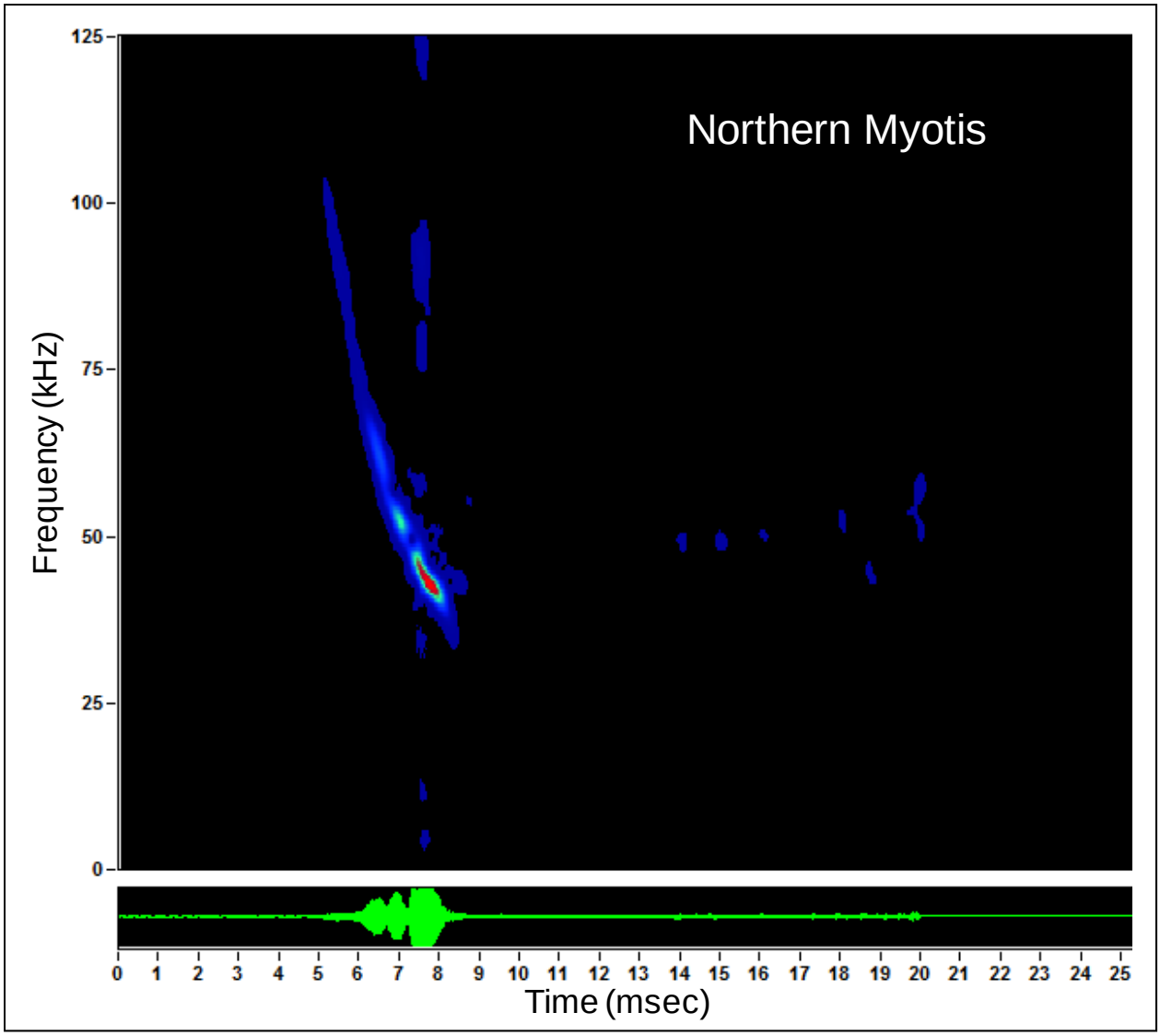


Figure 2: Spectrogram (above) and oscillogram (below) of a echolocation pulse from a Northern Myotis (*Myotis septentrionalis*).

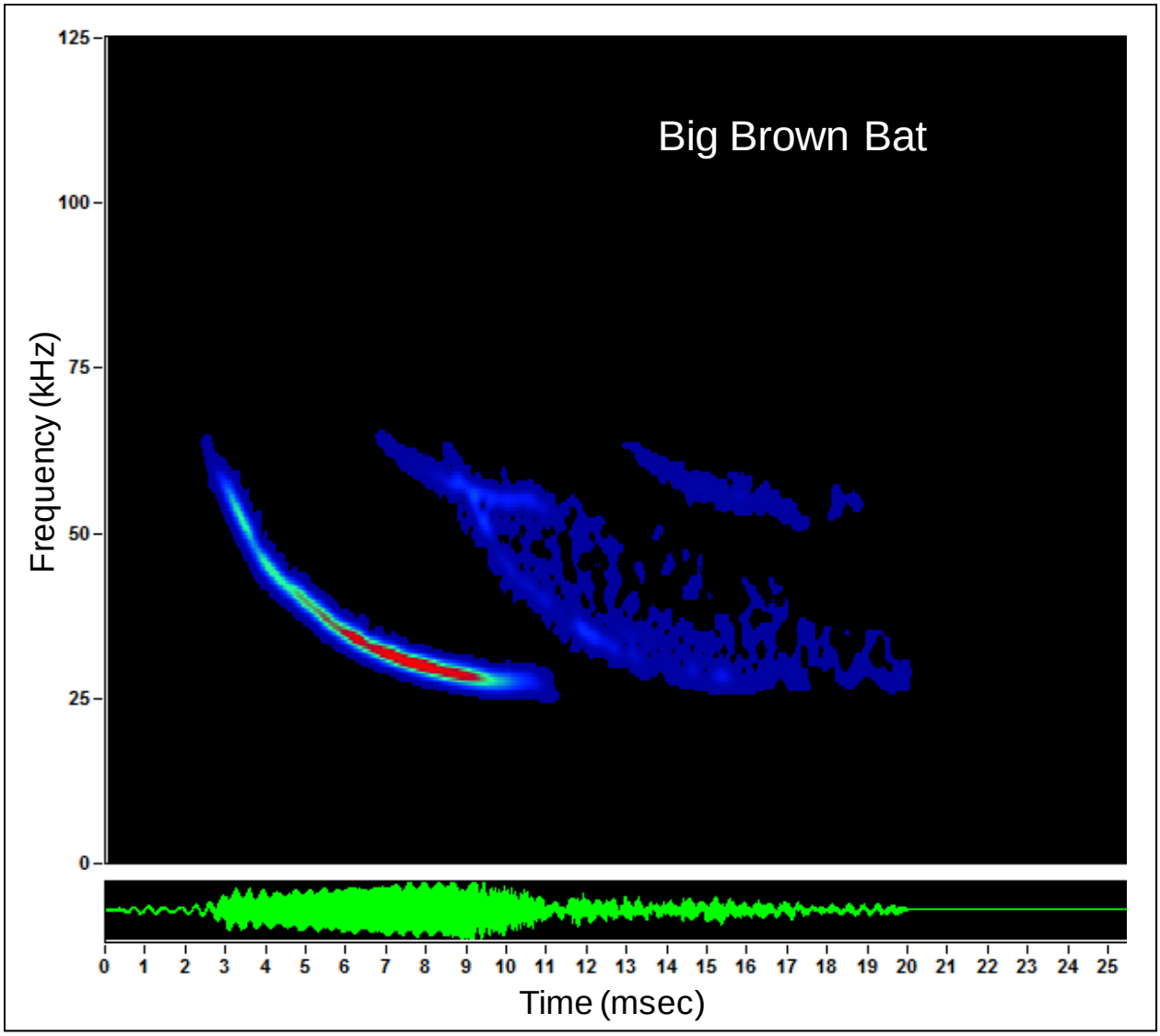


Figure 3: Spectrogram (above) and oscillogram (below) of a search-phase echolocation pulse from a Big Brown Bat (*Eptesicus fuscus*).

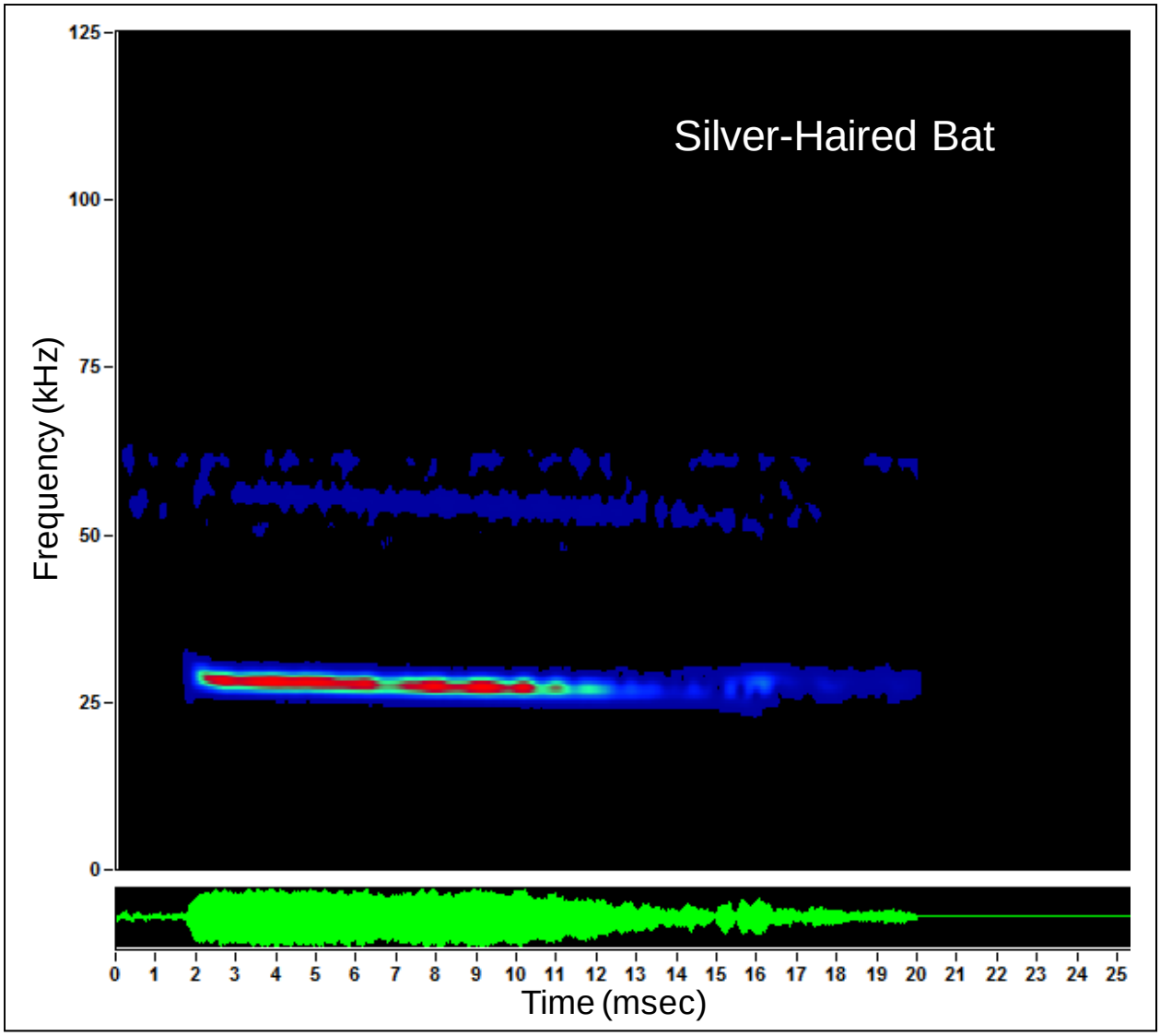


Figure 4: Spectrogram (above) and oscillogram (below) of a search-phase (constant frequency variant) echolocation pulse from a Silver-haired Bat (*Lasionycteris noctivagans*).

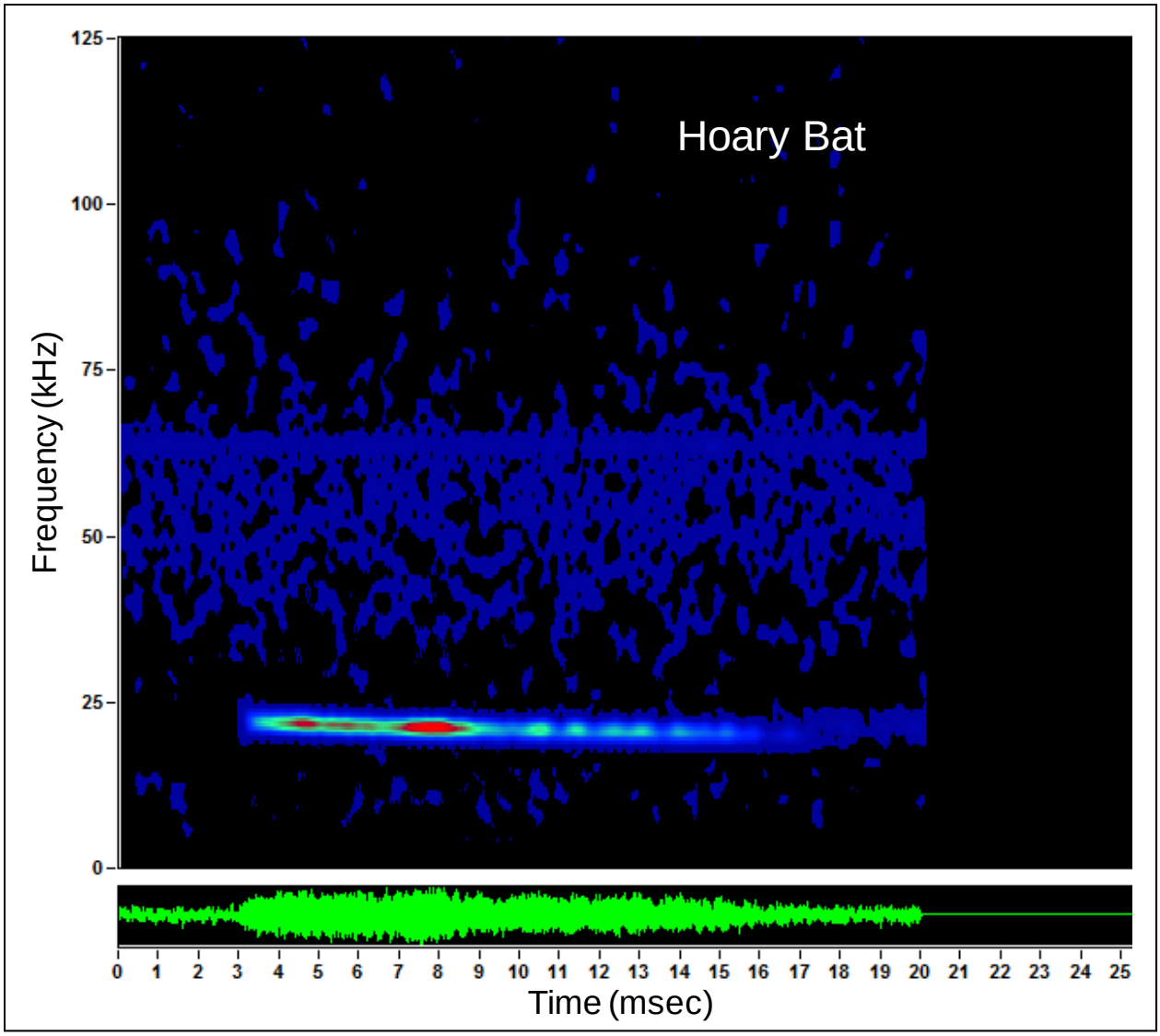


Figure 5: Spectrogram (above) and oscillogram (below) of a search-phase echolocation pulse from a Hoary Bat (*Lasiurus cinereus*).

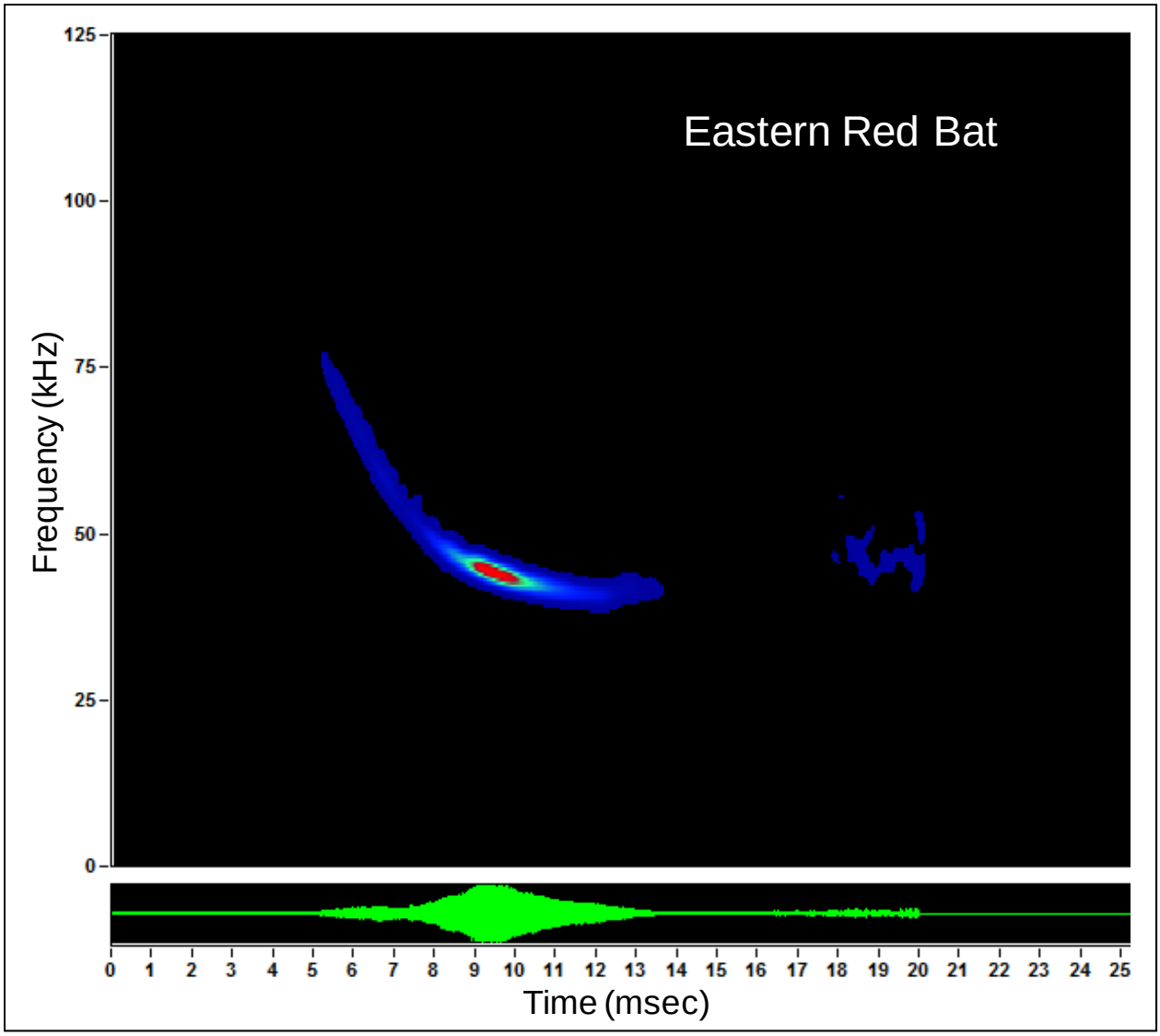


Figure 6: Spectrogram (above) and oscillogram (below) of a search-phase echolocation pulse from a Eastern Red Bat (*Lasiurus borealis*).