CHALEUR VENTUS WIND ENERGY PROJECT

APPENDIX H - BAT SURVEY REPORT, RESIDUAL ENVIRONMENTAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

CHALEUR VENTUS LIMITED PARTNERSHIP

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CHALEUR VENTUS LIMITED PARTNERSHIP

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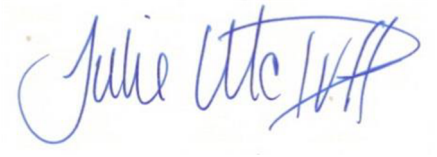

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1 INTRODUCTION

In Canada, wind energy development in a commercial context is one of the fastest growing sectors. New Brunswick alone is striving to meet an aggressive target of 40% of the province's electricity needs to be met by renewable energy by the year 2020 (Government of New Brunswick, 2019). Today, there is 294 megawatts (MW) of wind energy on the grid. New Brunswick currently has three operating wind farms and they represent some of the largest wind projects in Atlantic Canada (The Maritimes Energy Association, 2019).

Even though electrical generation from wind turbines has many environmental benefits, the rapid growth of wind power projects has raised concerns about impacts to migratory and resident wildlife populations. Wind power projects are subject to impact studies, the same as other major development projects. Because large numbers of bat fatalities at wind energy facilities is a relatively recent issue (Johnson, 2005), bats have become a primary environmental concern associated with wind energy development. Due to these fatalities, provincial governments are now requiring risk avoidance surveys prior to the construction of wind projects.

In New Brunswick, seven species of bat have been documented: the little brown myotis or little brown bat (*Myotis lucifugus*), the northern myotis or northern long-eared bat (*Myotis septentrionalis*), the big brown bat (*Eptesicus fuscus*), the hoary bat (*Lasiurus cinereus*), the eastern red bat (*Lasiurus borealis*), the silver-haired bat (*Lasionycteris noctivagans*), and the eastern pipistrelle or tri-colored bat (*Pipistrellus subflavus*) (Government of New Brunswick, n.d.). Little brown bat, northern long-eared bat, tri-colored bat, and big brown bat overwinter locally and hoary bat, silver-haired bat, and red bat are considered to be migratory species because they spend the winter in the south. It should be noted that in fall, even resident bat species migrate, although the distances are much smaller and less important than in the case of migratory species. Each of these species has been documented to have experienced fatalities at wind turbine sites (Broders, 2011). In North America, large number of bat fatalities mainly occur in late summer and early fall and the most affected are long distance migratory species, such as the hoary bat. Nevertheless, bat mortality has also been documented in smaller numbers for short-distance migratory (or resident) bat species (Broders, 2011). Even though some fatalities have been reported during spring migration, it is thought that spring migration behaviour is less structured and follows different routes compared to fall migration (Broders, 2011).

Of the seven species found in New Brunswick, little brown bat, northern long-eared bat, and tri-colored bat were emergency listed as Endangered on Schedule 1 of the federal *Species at Risk Act* (*SARA*) in 2014 because of sudden and dramatic declines across the eastern portions of the ranges of little brown bat and northern long-eared bat, and throughout the entire Canadian range of tri-colored bat. These declines are the direct result of white-nose syndrome (WNS), which is responsible for high mortality rates in hibernating bats through much of eastern North America (Blehert et al., 2009; Burns and Broders, 2013, CBC News, 2015; ECCC, 2015). In Canada, the total number of *Myotis* sp. bats recorded in New Brunswick, Nova Scotia, Ontario, and Quebec hibernacula declined by approximately 94% between 2010 and 2012 (ECCC, 2015). In Quebec, New Brunswick, and Nova Scotia, some hibernacula no longer have any individuals of these bat species present (Environment Canada, 2015). In March of 2011, WNS was first detected in a cave in Albert County, the province's most important bat hibernaculum (overwintering site) (Government of New Brunswick, n.d.). It is suspected that the tri-colored bat may now be extirpated in New Brunswick, as it has not been seen in caves since 2013, according to Donald F. McAlpine, head of the Department of Natural History of the New Brunswick Museum.

According to their known distribution areas, only two of the seven bat species found in New Brunswick could be potentially present within the Project area, namely the little brown bat and the northern long-eared bat (Prescott and Richard, 2004; ECCC, 2015). According to the Atlantic Canada Conservation Data Centre (ACCDC) ranking system, these two bat species are listed as S1 (Critically Imperiled - Critically imperiled in the province because of extreme rarity [often five or fewer occurrences] or because of factor[s] such as very steep declines making it especially vulnerable to extirpation from the state/province).

This report provides a summary of the Bat Studies completed in support of the Chaleur Ventus Wind Energy Project (Project) Registration Document that was submitted to with the Sustainable Development, Planning and Impact Evaluation Branch, Department of Environment and Local Government in September of 2019. The purpose of this report is to present the methods and results of the bat surveys, and present the assessment of residual effects and determination of the significance of residual effects on Bats.

1.1 PROJECT OVERVIEW

Chaleur Ventus Limited Partnership (CVLP) is proposing the development of the Project. The Project is located on privately owned land south of route 303 in Gloucester County, New Brunswick, and will have an aggregate electrical capacity of 20 MW. The Project will consist of five wind energy converters (WECs), access roads, collection system, substation, and associated temporary laydown areas required for construction. An approximate 9 kilometre (km) transmission line is proposed that runs south and southwest from the Project area to a proposed substation that will be located on Crown land approximately 2.8 km southeast of Saint-Leolin.

The Project is expected to consist of Enercon E-126 WECs with a nominal power of 4 MW. Each assembly will consist of the tower, hub, nacelle, rotor blades, and controller, with a total height of 179.5 to 194.5 metres (m) and is dependent on WEC availability from Enercon. The total WEC rotor diameter will be 127 m. It is anticipated that each WEC will be erected on a concrete foundation. The dimensions, depth, and type of foundation will depend on an evaluation of the local soil, surficial geology characteristics, wind forces at the location, and site-specific details of each location.

2 METHODS

2.1 EXISTING INFORMATON

A data report was obtained from ACCDC on March 14, 2018 (ACCDC, 2018). The report was reviewed to identify occurrences of rare and/or endangered bat species and special areas within 100 km of the Project . Additional bat survey data from other studies in New Brunswick were also considered to evaluate the potential of presence of the different bat species near the Project.

2.2 ACOUSTIC SURVEY

The bat inventory was conducted in 2018 and 2019 using a stationary acoustic inventory technique. This method uses automated stations, each composed of a waterproof box containing an *AnaBat® II* ultrasound detector, *AnaBat® CF Storage ZCAIM*, and a set of long-lasting batteries, which were installed within suitable habitat in the Project area.

The system's operating principle is relatively simple. Stations are equipped with an automated system and were set to record between 8:00 pm and 6:00 am. During this time, the *AnaBat® II Bat Detector* is active, ready to record ultrasonic audio signals. When a signal is received, sounds are transmitted to an interface (*AnaBat® CF Storage ZCAIM*) which processes and stores the information on a *Compact Flash* format memory card. The recordings on the memory cards are then transferred to a computer. Sound analysis software (*AnaBat®6, version 6.3 and Batview*) is used to produce sonograms which can be used to view and analyze the recorded calls. The bats are then identified to species by comparing the sonograms with the known characteristics of species specific echolocation calls (sound signatures). Bat call sonograms which could not be attributed to species (or genus) are labelled "Undetermined". This technique has certain limitations. Due to the similarity of their sound signatures, it is difficult to discriminate the two most common species in the genus *Myotis* (little brown bat and northern long-eared bat). In most cases, identification is limited to the genus level.

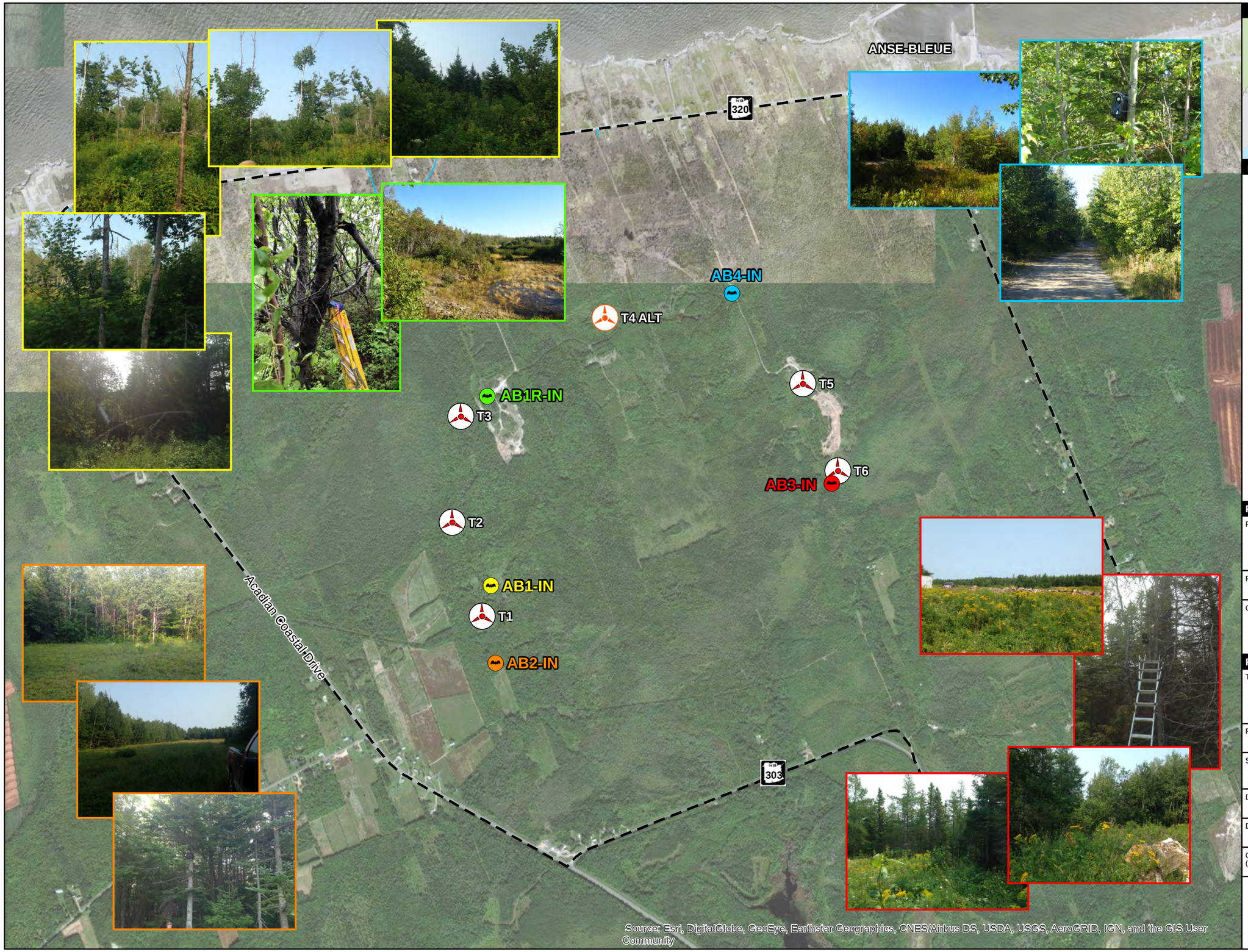
Detectors were installed by considering the topography of the Project area, habitat, presence of potential travel and/or migratory flyways, site availability for the installation of the *AnaBat® II Bat Detector*, and according to the recommendation of the New Brunswick Department of Energy and Resource Development (NBDERD, 2018).

In 2018, three detectors were deployed on August 13th and retrieved on September 15th (stations AB1-IN, AB2-IN and AB3-IN; Table 1; Figure 1). Due to a technical failure, systems only recorded until August 28th, and therefore only covered 15 nights of the bat fall migration period. In 2019, two detectors were deployed at the same stations (AB2-IN and AB3-IN), and the third detector was installed at a new station (AB1R-IN). Detectors were deployed on June 21st and retrieved on July 25th, covering 34 nights of the bat reproduction period. To acquire additional data in 2019, three detectors were deployed on September 13th and retrieved on September 30th, covering 17 nights of the fall migration period. Two detectors were installed at AB1R-IN and AB3-IN and one was installed at a new station (AB4-IN). All the detectors were placed in trees approximately 3 to 4 m above ground level.

Table 1 presents general habitat descriptions at each of the acoustic monitoring locations. Photographs of the habitat adjacent to each station are included on Figure 1.

Table 1 Acoustic Monitoring Station Locations and Habitat Descriptions

STATION	COORDINATES (ZONE 20T)	DEPLOYED	RETRIEVED (OR STOPPED)	RECORDING PERIOD	HABITAT DESCRIPTION
AB1-IN	E 342338 N 5297355	2018-08-13	2018-08-28	15 nights (migration)	3 m up in a maple tree, open wetland/cleared swamp along woods trail, facing east.
AB2-IN	E 342342 N 5297036	2018-08-13 2019-06-21	2018-08-28 2019-07-25	15 nights (migration) 34 nights (reproduction)	4 m up a spruce tree on the fringe of a blueberry field, facing the open area southeast.
AB3-IN	E 343759 N 5297713	2018-08-13 2019-06-21 2019-09-13	2018-08-28 2019-07-25 2019-09-30	15 nights (migration) 34 nights (reproduction) 17 nights (migration)	3.5 m up a tamarack tree on the forest edge facing the open recreation/construction debris area, facing northeast.
AB1R-IN	E 342354 N 5298132	2019-06-21 2019-09-13	2019-07-25 2019-09-30	34 nights (reproduction) 17 nights (migration)	3.5 m up a tree, within a lightly covered forest area (mostly hardwood). Facing east.
AB4-IN	E 343381 N 5298511	2019-09-13	2019-09-30	17 nights (migration)	3 m up in a tree, on the edge of a deciduous forest, near a gravel road.



KEY MAP:

- TURBINE LAYOUT
- ALTERNATE TURBINE LAYOUT
- ACOUSTIC BAT MONITORING STATIONS
- PROJECT AREA - WEC SITE

PROJECT:

PROJECT:
CHALEUR VENTUS
WIND ENERGY PROJECT

PROJECT NO.: 181-07802

CLIENT:
CHALEUR VENTUS
LIMITED PARTNERSHIP

FIGURE:

TITLE:
BAT ACOUSTIC MONITORING
STATION LOCATIONS

FIGURE NO.:	REVISION NO.:
1	0

SCALE: 0 100 200 400 600 800 Metres

DATUM:	PROJECTION:
NAD 83 CSRS	UTM ZONE 20 NORTH
DRAWN BY:	CHECKED BY:
T. MOREHOUSE	P. MARCOUX-VIEL
CREATED DATE: (YYYY-MM-DD) 2019-10-05	REVISION DATE: (YYYY-MM-DD) 2019-10-07

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3 RESULTS

3.1 EXISTING INFORMATION

According to the ACCDC report, no known bat hibernacula are present within 5 km of the Project area. Based on existing information, the closest known bat hibernaculum is located about 200 km south from the Project area (Vanderwolf et al., 2012). ACCDC does not report any bat species in the Project area or within 100 km

A bat survey conducted in 2017 for the Richibucto Wind Project (Natural Forces, 2017), located about 120 km south of the Project area, confirmed the presence of all seven bat species reported in New Brunswick; little brown bat, northern long-eared bat, big brown bat, hoary bat, eastern red bat, silver-haired bat, and tri-colored bat.

Bat surveys were also completed by WSP for the Wisokolamson Energy Project, located about 270 km south of the Project area (WSP, 2018). Three bat species and a genus were identified during this survey: the hoary bat, species in the genus *Myotis*, the big brown bat, and the tri-colored bat.

3.2 ACOUSTIC SURVEY

Table 2 shows the results for the reproduction period for each species/complex at each station, as numbers of bat passes, with the number of bat passes per night in parentheses. Table 3 shows the results for the 2018 and 2019 fall migration periods. A total of 362 bat passes were recorded during the survey. The species recorded were:

- Bats from the *Myotis* genus complex (161 recordings)
- Silver-haired bat (1 recording)
- Hoary bat (6 recordings)
- Eastern red bat (19 recordings)
- Tri-colored bat (3 recordings)

The *Myotis* complex could be either little brown bat or northern long-eared bat. Those calls were attributed to a complex because their characteristics did not show a decisive sonogram that could be used to accurately discriminate between the species. 172 recordings were also considered as “unidentified” calls. Those recordings were either unusual or too short to be correctly identified. A review of those calls showed that they are mostly high-frequency bats and are probably bats from the *Myotis* genus, however it is also possible that a portion of the unidentified calls are eastern red bats or tri-coloured bats.

Table 2 Bat Passes during the Reproduction Period for each Monitoring Station Deployed from June 21 to July 25, 2019

SPECIES/GENUS	AB1-IN	AB1R-IN	AB2-IN	AB3-IN	AB4-IN	TOTAL
Myotis genus complex	NA	0 (0.00)	7 (0.21)	2 (0.06)	NA	**9 (0.26)**
Silver-haired bat	NA	0 (0.00)	1 (0.03)	0 (0.00)	NA	**1 (0.03)**
Hoary bat	NA	0 (0.00)	4 (0.12)	1 (0.03)	NA	**5 (0.15)**
Eastern red bat	NA	0 (0.00)	1 (0.03)	0 (0.00)	NA	**1 (0.03)**
Tri-colored bat	NA	0 (0.00)	0 (0.00)	0 (0.00)	NA	**0 (0.00)**
Unidentified	NA	0 (0.00)	4 (0.12)	0 (0.00)	NA	**4 (0.12)**
Total	NA	**0 (0.00)**	**17 (0.50)**	**3 (0.09)**	NA	**20 (0.59)**

Note: The parenthesis shows the number of bat passes per night.

Table 3 Bat Passes per Night during the Fall Migration Period for each Monitoring Station Deployed from August 13 to September 15, 2018 and September 13 to September 30, 2019

SPECIES/GENUS	AB1-IN	AB1R-IN	AB2-IN	AB3-IN	AB4-IN	TOTAL
Migration period (2018)						
Myotis genus complex	0 (0.00)	NA	14 (0.93)	134 (8.93)	NA	**148 (9.87)**
Silver-haired bat	0 (0.00)	NA	0 (0.00)	0 (0.00)	NA	**0 (0.00)**
Hoary bat	0 (0.00)	NA	0 (0.00)	1 (0.07)	NA	**1 (0.07)**
Eastern red bat	0 (0.00)	NA	6 (0.40)	11 (0.73)	NA	**17 (1.13)**
Tri-colored bat	0 (0.00)	NA	0 (0.00)	3 (0.20)	NA	**3 (0.20)**
Unidentified	2 (0.13)	NA	38 (2.53)	120 (8.00)	NA	**160 (10.67)**
Total	**2 (0.13)**	NA	**58 (3.87)**	**160 (17.93)**	NA	**329 (21.93)**
Migration period (2019)						
Myotis genus complex	NA	1 (0.06)	NA	1 (0.06)	2 (0.12)	**4 (0.24)**
Silver-haired bat	NA	0 (0.00)	NA	0 (0.00)	0 (0.00)	**0 (0.00)**
Hoary bat	NA	0 (0.00)	NA	0 (0.00)	0 (0.00)	**0 (0.00)**
Eastern red bat	NA	1 (0.06)	NA	0 (0.00)	0 (0.00)	**1 (0.06)**
Tri-colored bat	NA	0 (0.00)	NA	0 (0.00)	0 (0.00)	**0 (0.00)**
Unidentified	NA	6 (0.35)	NA	1 (0.06)	1 (0.06)	**8 (0.47)**
Total	NA	**7 (0.47)**	NA	**2 (0.12)**	**3 (0.18)**	**13 (0.76)**

Note: The parenthesis shows the number of bat passes per night.

3.3 GENERAL DISCUSSION

For each recording period (reproduction [2019] and fall migration [2018 and 2019]) and for each monitoring station, bats from the *Myotis* genus were always the most common bats.

During the 2019 reproduction period, silver-haired bats, hoary bats, and eastern red bats were recorded. Recordings of hoary bats and eastern red bats were also captured during the migration period. Tri-colored bats were only recorded during the migration period. All of these species had a relatively low number of recorded calls. This can be explained by their potentially sparse geographical distribution because these species are north of their known ranges. However, the northern boundaries of their ranges are unclear due to the lack of bat surveys in this region.

An important number of *Myotis* sp. calls were recorded at station AB3-IN during the 2018 fall migration period, with 8.93 bat passes per night, which is relatively high for the region during 2018. As a comparison, the bat survey for the Richibucto Wind Project recorded 2.59 bat passes per night, which includes all the species recorded. In 2017, the bat survey done for the Wisokolamson Energy Project only recorded 0.15 bat passes per night.

Bats may use linear forest structures for foraging and to guide themselves when moving from one location to another (Grindal and Brigham 1998, Henderson and Broders 2008). Road and power lines are therefore potential corridors for their movements. A gravel road leads to monitoring station AB3-IN and could be used by the *Myotis* sp. as a flyway between the North Shore and the south, which could explain the high number of recorded calls in 2018. However, this high number of bat passes should be interpreted with caution. These results mean that there was a high level of activity of *Myotis* sp. near station AB3-IN in 2018, but does not necessarily mean that there was a high number of individual bats. The acoustic inventory method makes it possible to determine a relative activity rate but does not allow for the determination of a precise number of individuals. It should be kept in mind that 100 bat passes could be made by 100 different bats or only 1 bat (Collins, 2016).

To acquire a better understanding of the potential flyway identified near station AB3-IN during the 2018 fall migration period, additional data was collected during the 2019 fall migration period. As described in Section 2.2, monitoring stations were set-up at AB3-IN andAB1R-IN and a new station was established at AB4-IN. If there was a flyway present, a high number of recordings would be expected, at least at the AB3-IN monitoring station. However, the 2019 results showed a low number of bats recorded for each of these three monitoring stations, with only 13 recorded calls in 17 nights. Thus, the supplemental data did not support the presence of a potential flyway. The differences between the 2018 and 2019 fall migration periods could be linked to WNS. The local population of resident bats may have been affected by WNS and it cannot be ignored that the disease has recently reached more remote populations that potentially used to move through the Project area. The high number of bats detected during the 2018 fall migration period could also be linked to other factors such as annual fluctuations in local weather or an insect outbreak. More research would be required to understand use of the Project area by bats.

During the 2019 reproduction period, a relatively low number of bats was recorded. *Myotis* sp. was still the most common bat. With a maximum of 0.21 bat passes per night at monitoring station AB2-IN, no maternity colony is suspected near the monitoring station. Based on data collected in 2019, it indicates that the Project area may not be a high use area for maternal colonies of bats.

All the habitats selected for the monitoring locations were suitable for bats: forest patches alternating with clearings, and sometimes wetlands, providing both resting and foraging sites for bats.

4 IDENTIFICATION OF ENVIRONMENTAL EFFECTS

The identification of all potential interactions between the Project and VECs was completed in the Registration Document. It was determined that the following Project-Bat interactions have potential to result in residual effects because mitigation cannot remove the interaction. Therefore, further analysis is required to determine the significance of these Project effects (Section 5).

- Operation of the Project may result in bats colliding with WECs and other Project infrastructure
- Construction and operation of the Project may displace bats from previously used habitats in the Project area

5 CLASSIFICATION OF RESIDUAL ENVIRONMENTAL EFFECTS AND DETERMINATION OF SIGNIFICANCE

The residual effects classification is based on the magnitude, geographic extent, duration/frequency, reversibility and ecological context and is to describe residual effects predicted for the Project. The criteria are used to describe the nature and type of an effect on VECs. The residual effects classification is then used to determine the environmental significance of Project effects to VECs. The approach and criteria used to classify residual effects and determine their significance is presented in Section 7 of the Registration Document.

5.1 RESIDUAL EFFECTS ON BATS FROM COLLISIONS AND DISPLACEMENT

Wind projects have the potential to affect bats both directly and indirectly (Arnett et al., 2007). Although some effects are related to construction (e.g., habitat alteration), most potential effects on bats are related to mortality resulting from direct collision and sensory disturbance.

Activities that cause noise, vibration, and dust, such as deforestation, earth-moving, excavation, blasting, transportation, and construction activities, could disturb local populations of bats. Because bats use echolocation in their movements and to locate and capture prey, the presence of anthropogenic noise could conflict with these activities. The effect of sensory disturbance varies among species of bats because each uses a specific range of ultrasound frequencies (Bunkley et al., 2015). The noise generated by road traffic has frequencies varying between 0 kHz and 50 kHz; typical ranges are between 1 kHz and 20 kHz (Schaub et al., 2008). These frequencies are likely to cause a greater sensory disturbance in species using low frequencies for echolocation such as hoary bat and silver-haired bat than in other species. However, traffic noise is unlikely to affect peak activity times of bats in the Project area because construction is scheduled to occur during the daytime hours. Vibrations generated by the Project near bat maternity colonies can lead to a reduction in reproductive success or cause bats to leave the site to find an alternative location (McCracken, 2011; ECCC, 2015). Among the recorded bat species, *Myotis* sp. and tri-colored bat are resident species that overwinter in New Brunswick in habitats where conditions are suitable for hibernation. Frequent awakenings during the hibernation period can be a cause of mortality (Gauthier et al., 1995; Thomas, 1995). No potential hibernacula or other critical habitat (maternity sites) for bats were identified during the existing information review or during field surveys.

Bat activity is mostly nocturnal and bats can be affected by light pollution (Stone et al., 2015). The presence of artificial light appears to disrupt the movements of some species of bats and can cause them to use alternative routes which may require higher energy costs and increased risk of predation (Stone et al., 2009; Stone et al., 2015). Conversely, species such as big brown bat and *Myotis* species may use areas of artificial light for foraging because artificial light can concentrate many flying insects (Rydell, 1992; Stone et al., 2015). Lighting on WEC hubs and blades will be limited to minimum levels while still meeting requirements of Transport Canada.

Habitat alteration may affect bats in the Project area. However, the acoustic survey results did not reveal the presence of a maternity roost, as the number of bat passes recorded in 2019 during the reproduction period was low. The Project will be sited on existing roads and disturbed areas as much as possible, thereby minimizing the need to disturb new areas which may reduce potential displacement of some bat species.

The most apparent potential effect of the Project on bats is direct mortality resulting from collisions with WEC blades during Project operations. Mortality can either occur from direct contact with WEC blades or from barotrauma (Grodsky et al., 2011). Barotrauma is caused by rapid air-pressure reduction that causes tissue damage due to expansion of air in the lungs that is not accommodated by exhalations. It is probably the major cause of bat mortality from wind facilities (Rollins et al., 2012). *Myotis* sp. and tri-colored bats, both of which are species at risk, were detected near the proposed WEC locations, which implies that direct mortality is possible.

According to other post-construction monitoring programs for wind facilities, bat fatalities in Canada outnumber bird fatalities (ECCC et al., 2012). Because bats have a long lifespan and a low reproductive rate, fatalities from wind facilities may be important if they are in areas with high numbers of bats. Species in the genus *Myotis* and tri-colored bats are killed by WECs at lower rates relative to long-distance migratory species such as hoary bat (Arnett et al., 2008). This is likely because *Myotis* and tri-colored bats are non-migratory species that move shorter distances and generally fly at low altitudes during summer (Reynolds, 2006). However, although they are less affected by the presence of WECs, this impact should not be underestimated as bats are already affected by the WNS (Blehert et al., 2009; Burns and Broders, 2013, CBC News, 2015; ECCC, 2015).

Most bat fatalities are reported in the late summer months coinciding with the start of swarming and autumn migration (Johnson, 2005; Arnett et al., 2007; ECCC et al., 2012). Periods of high mortality may therefore be linked with the timing of large-scale insect migrations when bats feed at altitudes consistent with WEC heights (Rydell et al., 2010). The highest mortality occurs on suspected migratory flyways (Arnett et al., 2008). The 2018 migration

data showed a high number of *Myotis* sp. near WEC T6 , which could imply the presence of a flyway. However, the 2019 migration results did not support the hypothesis of the presence of a potential flyway in the Project area. More research would be required to understand use of the Project area by bats.

5.2 CUMULATIVE RESIDUAL EFFECTS

Cumulative residual environmental effects are defined as the sum of residual environmental effects from all past, current, and reasonably foreseeable projects and/or activities on the physical, biological, social and cultural components of the environment. In addition, natural disturbances such as fire, floods, insects, disease, and climate change can contribute to cumulative residual environmental effects.

The Project will implement mitigation practices to limit incremental environmental effects that will occur. Implementation of the mitigation for this Project is expected to result in minor changes to the biophysical and socio-economic environments from the Project relative to baseline conditions. Effects on bats from surrounding land use and peat harvesting operations are not expected to overlap with effects on bats in the local area. As such, no cumulative residual environmental effects are expected from surrounding land use in the local area. However, because the total number of *Myotis* sp. recorded in New Brunswick, Nova Scotia, Ontario, and Quebec hibernacula declined by approximately 94% between 2010 and 2012 it may imply that there would be fewer resident bats in the Project area. It could also imply that remaining bat populations in the Project area could be cumulatively affected by WNS plus the Project. As the Project progresses, CVLP will develop site-specific mitigation to reduce the potential for cumulative environmental effects to bats as required.

5.3 DETERMINATION OF SIGNIFICANCE

Prior to the Project, changes to resident bat populations from WNS are considered a moderate to high magnitude regional scale effect. It is unknown if the remaining populations of bats can recover from the impacts of WNS given the uncertainty of the resilience of the remaining populations of bats in New Brunswick. Regardless of the addition of the Project, the effects of WNS will likely continue during the Project.

Changes to bat populations in the Project area from previous environmental effects from natural disturbances (i.e., WNS) have had an adverse effect on bats. The incremental effects to bats from the addition of the Project are predicted to be small because only a portion of the local population might be directly affected by the Project. The Project consists of five WECs in an area that appears to have relatively low to moderate bat activity. A high number of *Myotis* sp. passes were recorded at one station during the 2018 fall migration period, but during the 2019 fall migration period, the same monitoring station showed a low number of *Myotis* sp. passes (Section 3). Therefore, the incremental residual effect from bats colliding with WECs and other Project infrastructure and displacement of bats from the Project area was determined to be moderate in magnitude (Table 4).

The Project will likely contribute to the previous environmental effects from WNS on bats, in particular for *Myotis* sp. and tri-colored bats. The incremental effects from the Project are predicted to be local in geographic extent and are expected to be reversible following decommissioning and reclamation (long-term). The incremental contribution of the Project to existing regional effects is not expected to decrease the resilience and increase risk to the remaining local or sub-regional bat populations in the area, given the proposed mitigations for the Project. Therefore, the incremental changes from the addition of the Project is predicted to not have significant adverse effects on bats. Confidence in this prediction is low to moderate because of uncertainty related to knowledge about the resilience of the remaining bat populations in the area, especially species affected by WNS. To test the prediction of significance presented in this EIA and to reduce uncertainty, a Post-Construction Monitoring program will be implemented (Section 9 of the Registration Document). If the Project is found to be causing significant mortality to local populations of bats during post-construction monitoring, additional mitigation will be evaluated.

Table 4 Summary of Residual Effects Classification and Predicted Significance

POTENTIAL INTERACTION AND RESIDUAL ENVIRONMENTAL EFFECT	MAGNITUDE	GEOGRAPHIC EXTENT	FREQUENCY	DURATION	REVERSIBILITY	SIGNIFICANCE
Operation of the Project may result in bats colliding with WECs	Moderate	Local	Continuous	Long-term	Reversible	Not Significant
Construction and operation of the Project may displace bats from previously used habitats in the Project area						

6 ADDITIONAL RECOMMENDED MITIGATIONS

Mitigations outlined in Section 5.4 and Section 8 of the Registration Document will be applied during the Project to reduce potential residual environmental effects to bats. A Post-Construction Monitoring program will be implemented to test the prediction of significance presented in this report and to reduce uncertainty of effects from the Project to existing populations of bats. Therefore, no additional mitigation has been identified.

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