

Habitat Selection of Common Nighthawks (*Chordeiles minor*) During Breeding Season

For the Fish and Wildlife Enhancement Trust

Shannon Powell Consultants



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Executive Summary

Common Nighthawk (*Chordeiles minor*) was assessed as a Threatened species in Canada by COSEWIC in 2007. A Recovery Strategy for the nighthawk recommended that more studies are needed to determine how suitable habitat was being destroyed by anthropogenic activities. In 2017 the Fish and Wildlife Enhancement Trust funded a study on the Anthropogenic Effects of Common Nighthawks, which assessed mountain bike use on the trails within Chadburn Lake Park. The results of the study indicated a higher concentration of nighthawks within the old growth forest surrounding Long Lake. It also suggests that the significance of trail density might have less to do with breeding habits than the habitat itself. In 2018, the Habitat Selection of Common Nighthawks (*Chordeiles minor*) During Breeding Season was completed to determine what habitat the birds were utilizing. Breeding bird surveys were completed to determine the presence and absence of birds surrounding the Long Lake Recreation site. Once nighthawks were detected nest searches were conducted to determine the habitat that was being utilized. The findings suggest that the nighthawk are selecting the pine lichen forest as well upland old spruce forest. All sites were located on a steeper slope for the area, with sparser tree density and at least one large down woody debris. Most nesting sites were also located in a more remote area of the Long Lake recreation site with little or no trail activity. This brings the investigation of 2017 study regarding mountain bike avoidance back into question. Although the birds utilized the lake and surrounding area for feeding, they chose a more remote, undisturbed area for nesting.



1.0 Introduction

Common Nighthawk (*Chordeiles minor*) was designated as a threatened species by COSEWIC in 2007. In the 2016 Recovery Strategy from Environment Canada, under the Species and Risk Act, stated that studies are needed to determine the scale and intensity at which suitable habitat would likely be destroyed by anthropogenic activities. In 2017 the Fish and Wildlife Enhancement Trust along with Environment Yukon funded the study “Anthropogenic Effects on Common Nighthawks (*Chordeiles minor*) in Chadburn Lake Park”. The study compared the presence and absence of Common Nighthawks in a high-density recreation area (Grey Mountain) and low-density recreation area (Long Lake).

The study completed in 2017 did show a higher rate of detection in the less used part of the recreational area, but it wasn't conclusive enough to say that Common Nighthawks were avoiding the higher use recreational area. One of the findings of the study last summer was that there was a higher rate of nighthawk detection in the area surrounding Long Lake. The Grey Mountain survey transect ended in the Long Lake area and the Long Lake survey transect started on the other side of Long Lake. There was a higher detection of Common Nighthawk on both transects as they approached Long Lake.

The Long Lake area contains the largest concentration of upland old forest within the Chadburn Lake Park (CLBR 2016). This area is one of the few areas that escaped the last fire event in Chadburn Lake Park. The forest in this area is estimated at 100-year-old or older. The area surrounding the old growth forest is made up of upland pine forest. Long Lake has an undeveloped recreation site and trail system compared to other lakes within the parks. In the Chadburn Lake Management Plan 2017, the Long Lake area is slotted for improvements to the parking area, as well as the recreation area surrounding the lake.

The lack of information regarding critical breeding habitat for Common Nighthawk lead to the follow up study investigating habitat selection during the 2018 breeding season. This study used the same methodology to determine presence and absence as the 2017 study but included nest searches and extensive habitat plots to determine use.

1.1 Study Area

The Chadburn Lake Park is located within the municipal boundaries of the City of Whitehorse. The park is situated on the Traditional Territory of the Kwanlin Dun First Nations (KDFN) and Ta'an Kwach'an First Nation. The park covers 7,550 hectares and is

located on mostly the east side of the Yukon River within the city (CLMP 2016). The park is the largest regional park in the territory. A Park Management Plan was created ensure ecologically sustainable land use and development planning while guiding its responsible development. The park has very high biodiversity including many rare and vulnerable species and plant communities. This park is subject to widespread recreational use, settlement and development pressure, invasive plant species, and motorized recreational vehicles (CLMP 2016).

The study area is located within the Yukon Southern Lakes Eco region, in Canada's Boreal Cordillera Eco zone. This region's distinguishing characteristics includes broad valleys and large lakes. The area is generally snow covered from late October to mid-April in the valley and a month longer at higher elevations (Yukon Eco regions Working Group 2004). The study area is predominately open coniferous and mixed woodland. Lodge pole pine is the dominant tree species, with white spruce as well as feather moss common in the lower elevations. At higher elevations subalpine fir can be found with a feather moss understory when the canopy is dense (CLMR 2016).

The Chadburn Lake Management Plan has divided the park into four management areas: Conservation, Natural Environment, Intensive Recreation, and Cultural Heritage Protection. The survey transect was located in the conservation area as well as on adjacent, undeveloped KDFN land.

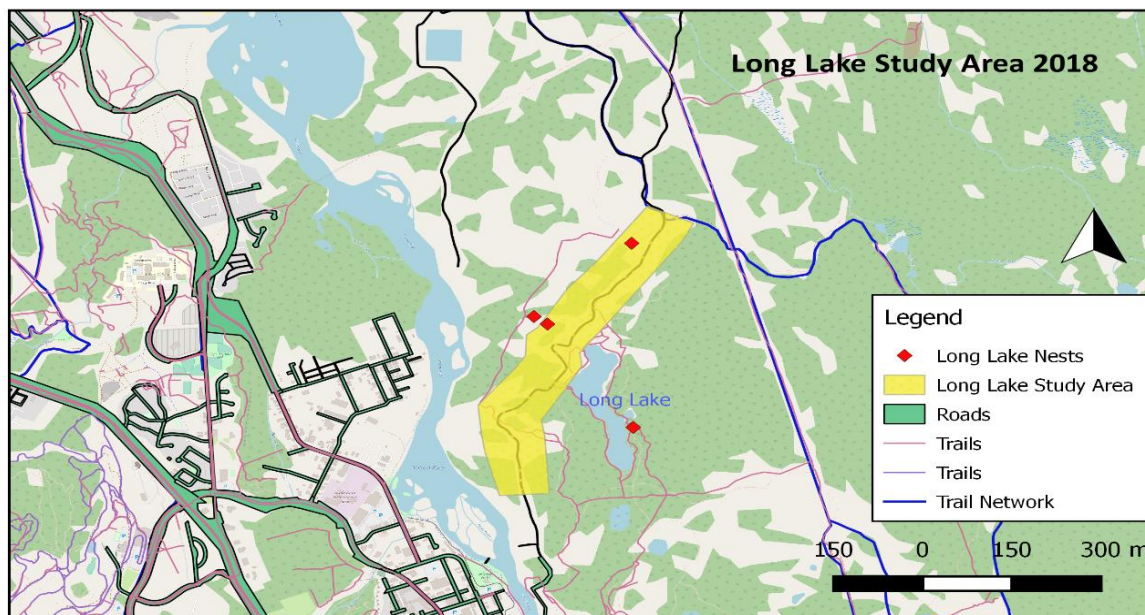


Figure 1: Common Nighthawk 2018 study area and nest locations.

2.0 Methods

2.1 Common Nighthawk Survey Methods

The survey followed the guidelines and protocols set out in the Saskatchewan Ministry of Environment, 2015, Common Nighthawk Survey Protocol. This protocol aligns with the Government of Alberta, 2013, Sensitive Species Guidelines for Common Nighthawk (*Chordeiles minor*). These were also the survey methods used in the 2017 Anthropogenic Effects on Common Nighthawks in a High Use Recreation Area.

2.1.1. Point Counts

The point count method is the most effective surveys for monitoring land birds (Ralph et al. 1993). They are one of the most common land bird monitoring methods because they are efficient, data rich, repeatable and require few resources (RIC1998). Assumptions must be made when completing point count surveys (Bibby et al. 1992): These include a) birds do not approach the observer or flee, b) birds are 100% detectable by the observer, c) birds do not move much during the count period and behave independently of one another, d) distance estimates are accurate, and e) birds are fully and correctly identified.

2.1.2. Call Playback

During breeding season males show territorial behavior and will respond to another male in its territory. The use of recorded calls provokes a response from the males therefore increasing the likelihood of detecting them (RIC 1998). This technique is useful to determine the total number of males in small areas. The survey started with three minutes of passive listening then was followed by three minutes of recorded calls. Which was 30 seconds of recorded nighthawk calls and 30 seconds of silence. In total 6 minutes was spent at each survey stop.

This type of censusing should be conducted in the early breeding season before males might suspend calling (McNichols 1981). Nighthawks in the Yukon are generally observed at the end of May until early July. The surveys were started on June 10th and finished on June 20th. Nighthawk surveys must be conducted starting one hour before sunset and ending 30 minutes after sunset (Hausleitner and Dulisse 2008). Nighthawks are generally crepuscular foragers, so surveys were not completed in cold conditions, (i.e. no survey was conducted if the temperature was colder than 7 Celsius). This is due to the fact that

nighthawks are known to reduce activity due to low insect activity rates (Hausleitner and Dulisse 2008).

2.2.2 Survey Transects

One survey transect was completed in the focus area of the Long Lake Recreation Site. The transect started before the recreation site and ended after to ensure the areas that had bird detections in the previous study were included. Observer stopped at predetermined locations evenly spaced across the study area to complete Point Counts with Call Playback surveys. During each survey observer records all Common Nighthawks seen and heard within survey location. Nighthawks detected beyond 400m of the station were recorded separately so that observers could ensure that Common Nighthawks detected at one location were not double counted at adjacent stations.

2.2.3 Sampling Effort

One census was completed per crew per night. Survey transect was completed when weather permitted. The unusually cold spring pushed surveys later in the season as the temperature was not meeting the criteria window. The available time for each survey was limited by the length of the crepuscular period. For the purpose of these censuses we used 1.5 hours as the timeframe complete the survey transects.

2.2.4 Nest Searches

If nighthawks were detected during surveys they were recorded, and the survey was completed. Upon completion the researcher returned to the detection location and searched forested area using the visual and vocal presence of the nighthawks to narrow down the nest location. Once the nest location was determined the site was recorded using GPS. In many cases secondary trips were made on other nights to locate the nests as the visibility was limited in the late evening.

2.2.5 Nest Observations

Once nests were located sites were visited multiply times from a safe distance to observe activity, seasonal changes, and determine nest survival. All observations and behavior were recorded.

2.4 Habitat Data Standards

Habitat descriptions were completed for each of the nesting locations in later summer once the nighthawks had vacated the area, as a way to reduce risk of disturbance. The habitat plots were completed using a smaller scale site description created by Yukon Energy Mines and Resources. The plots were a five-meter radius and tallied: tree species, saplings, understory vegetation, coarse woody debris, fine woody debris, forest floor, soil disturbance, slope and crown closure.

Data collected in habitat plots were classified into the Yukon Ecological and Landscape Classification guide. This was done to determine if a broader association can be found between nighthawks and available habitat in the Yukon to establish critical habitat. Micro site classifications were also completed in the area that was determined as the nesting site. These sites had data recorded to see what the nighthawks were using to establish a nest.

3.0 Results

3.1 Detection Data

Surveys were conducted from June 12th until July 13th, 2018 during the known Common Nighthawk breeding period. Due to a colder spring the survey crew had to delay and cancel some surveys due to the survey area being too cold. This delay and cancelation caused the survey dates to not perfectly overlap with the previous study year. There was one transect completed with eight sample stations starting before the Long Lake Recreation Area and ending after. These sites were visited on 5 different survey nights (Table 1). Total of 23 Common Night Hawk detections were recorded over the study period. The majority of detections occurred in the area surrounding Long Lake.

Transect Location	Sample Stations	Total Survey Hours	Total Detections
Long Lake	8	5.66	23

Table 1: Total hours and detections for the 2018 Nighthawk survey

3.1.1 Passive Listening vs Playback Detections

Seventy percent of nighthawk detections occurred during the three-minute passive listening period of the survey. When compared to the study completed in 2017 in a similar area, eighty three percent were detected in the passive portion of the survey. This shows

that completing the playback portion of the survey is important to ensure the probability of recording all individuals.

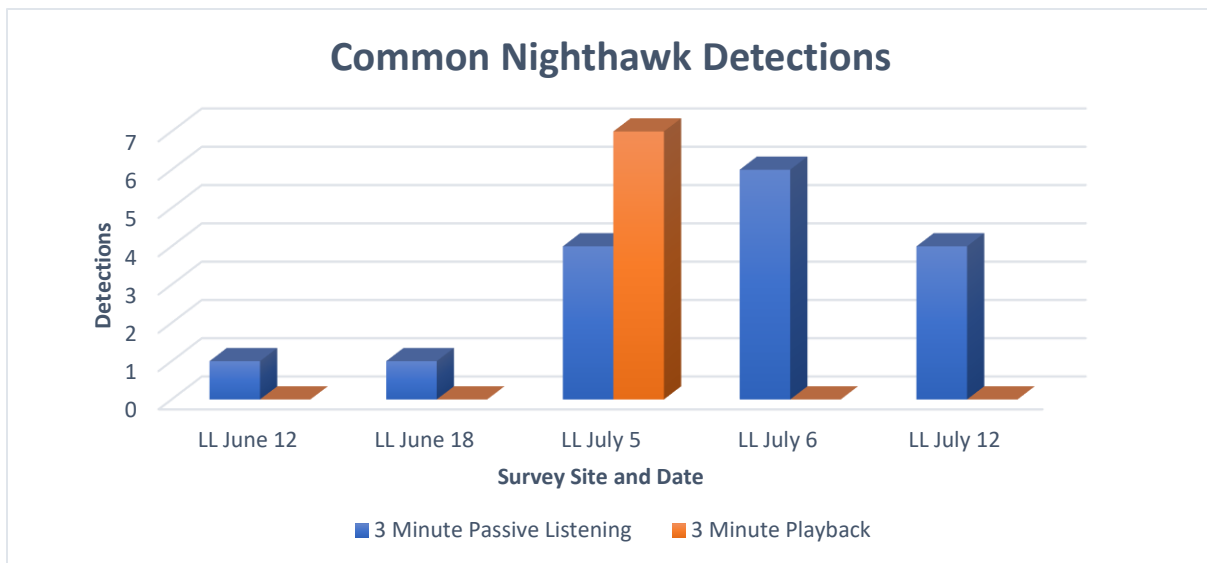


Figure 2: Common Nighthawk detections during the 6-minute survey window

3.1.2 Before and After Sunset Detections

All surveys were completed an hour before sunset and were completed no later than thirty minutes afterwards. Ninety one percent of the detections occurred in the hour before sunset. When compared to the previous nighthawk study completed in 2017, seventy five percent were detected before sunset. The cooler temperatures could have affected the available food in the later evening, decreasing the insect availability.

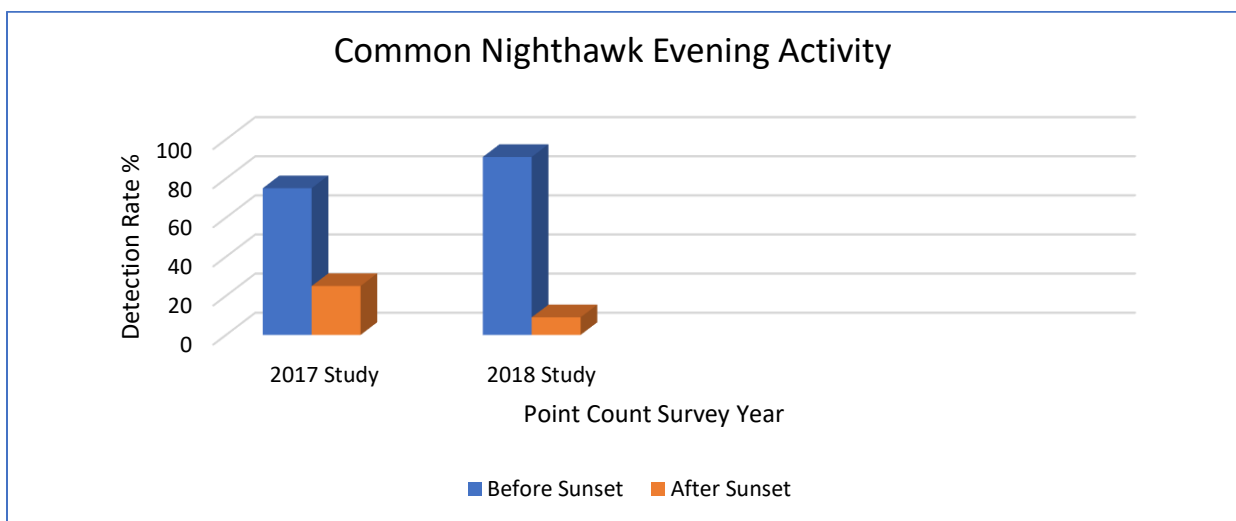


Figure 3: Detections before and after sunset compared between 2017 and 2018

3.3 Seasonal Temperature Variation

The temperatures in the southwest Yukon were unseasonably cool in 2018. When comparing the May and June temperatures between 2017 and 2018 there was a difference in the nighthawk activity in 2018. The overall detections didn't start until later and continued later into July than in 2017. It was concluded that nesting activity was likely delayed as well due to the colder temperatures.

3.4 Nest Search Activity

During point count surveys all detections were documented along with observational data was recorded. After completion of point count surveys, the detection areas were searched within the remaining timeline of the survey protocol to narrow the possible nest habitat. Additional nest search survey evenings were completed using the data from previous point counts to locate the nesting habitat being utilized.

3.4.1 Nesting Locations

Four nesting sites were located during the Long Lake Habitat Survey in 2018. One nest was located close to the Long Lake shore in the spruce old growth forest. This area contained a high amount of blowdown and on a 20' slope and was at 637 m elevation. This nest was the farthest from the survey route at 1,300 m as a crow flies and only 110m from the lake. The nest was 35 m from a popular recreation trail. Due to the location within the blowdown the nest was well hidden and protected under a downed spruce tree. This adult was flushed by survey crew on two occasions during initial find and one subsequent visit to monitor nest. Survey crew were able to monitor nest without disturbing the adult nighthawk once the nesting site area was known. These adults were reportedly flushed by trail users in the area on several occasions due to the close proximity to the trail. This was reported to survey crew by trail users. This nest was successful with two young.

The other three nest locations were on the west side of the Long Lake road in the Pine Lichen forest. Two of the nesting sites were in close proximity to each other, on either side of a large rolling hill approximately 200 m apart. Multiple visits were completed by survey crew to confirm the presence of two separate nests.

One of these nests was at 690 m elevation and 640 m from the road on a 30' slope. The site had a few large woody debris on the ground and the hill itself was sparsely vegetated with lots of exposed pine needle litter. The second nest in the area was at 670 m elevation and 430 m from the road. This nest was also located on a 30' slope with one large pine woody debris within plot. During these visits adult nighthawks showed agitated behavior

so survey crews kept their distance in order to not disturb them. Visits later in July confirmed that the nests were successful. The exact number of fledglings could not be confirmed due to the distance survey crew kept due to the aggressive behavior of the adults and caution to not disturb the young. Survey crew did confirm nest success through the vocalizing coming from nesting site to adult showing territorial behavior.

The last nesting location was approximately 220 m from the main road only 12 m from a side of the road. This nest was also located in the Pine Lichen Forest as well with large opening in the canopy on a slope of 10' and the elevation was 730 m. This nest site did not have any large woody debris like the other three sites. The nest site was located and had activity during early July with adults showing territorial behavior. The site was visited on two occasions to make observations. The nesting site was abandoned in mid-July. On investigation it appears the nest was preyed upon with disturbance to the vegetation in the area. On subsequent visits the adult nighthawk was no longer observed.

3.5 Habitat Descriptions for Nesting Areas in the Long Lake Study Site

The Long Lake study area is classified as the Boreal Low Zone in the Yukon Ecological and Landscape Classification guide. This reflects the regional climate with respect to soil and vegetation association as well as elevation (2016, Flynn et al.). One of the nesting sites that was located along the Long Lake shore was more specifically classified as White spruce-lichen-grass community which covers approximately 329 ha (CLBR 2016). As described the most dominant tree species was White spruce with a few Lodgepole Pine recorded. This site would be classified as BOLs/10-PSw26, in the. the Field Guide to Ecosite Identification The site consisted of Lodgepole Pine (*Pinus contorta*), White spruce (*Picea glauca*) Soapberry (*Shepherdia canadensis*) and Feathermoss (*Arctostaphylos uva-ursi*) This site had a large quantity of blow down and was located on a 20' slope. The nest micro site under a large White Spruce (*Picea glauca*) course woody debris. The site consisted of exposed soil, spruce needles, fine woody debris and leaf litter.

After assessing the data collected from the habitat plots of the other three nesting locations, they fell into the coniferous forest landscape that makes up the majority of the park, approximately 5,278 ha. More specifically the Pine-Lichen Forest Community which is the most abundant forest type in the park, totaling approximately 2,759 ha (CLBR 2016). This forest type is characteristic of dry and open pine forest with lichen carpet on the ground. These 3 sites were classified as in BOLs/10-P01, the Field Guide to Ecosite Identification. The sites consisted of Lodgepole Pine (*Pinus contorta*), Kinnikinnick (*Arctostaphylos uva-ursi*) and Lichen species (*Cladina spp*). Two of the sites were located on a 30' slope of the same hill, which was very sparsely treed with a few large pieces of

down woody debris at the nesting sites. One nesting site was near a large down woody debris of Lodgepole Pine. That nest micro site had exposed sand and fine rocks, pine needles and leaf litter. The other nesting site on the opposite side of the hill had lots of exposed sand, lichen, leaf litter and fine woody debris.

The last nesting site was in the Pine-Lichen Forest Community as well but had only 10' slope and did not have any large woody debris at the nesting site. Besides these few differences the two sites very similar, consisting of the same shrub and herb species. This nest area was never able to be pin pointed to the exact location before it was abandoned, and the area was disturbed.

Nest Site	Forest Type	Southern Lakes Boreal Low Subzone	Nest Success
Nest 1 (Lake Site)	White Spruce Lichen-Grass	BOLsl/10-PSw26 Pine-White spruce /Soapberry /Feather /Moss	Yes
Nest 2 (Side Road Site)	Pine Lichen	BOLsl/10-P01 Pine/Kinnikinnick/Lichen	No
Nest 3 (Side Slope)	Pine Lichen	BOLsl/10-P01 Pine/Kinnikinnick/Lichen	Yes
Nest 4 (Side Slope)	Pine Lichen	BOLsl/10-P01 Pine/Kinnikinnick/Lichen	Yes

Table 2: Summary of Habitat Data and Nest Success

4.0 Discussion

The purpose of this study was to understand the habitat selection for Common Nighthawks during breeding season. Breeding bird surveys estimates are one of the few studies that exist which assess the abundance of the Common Nighthawk in Canada, but long-term data suggests a significant decline in abundance (COSEWIC 2007). Although nighthawks breeding habitats vary, they strongly correlate to ground largely devoid of vegetation including sand dunes, forest clearings and rock outcrops (CLBR 2017). This research was conducted after the 2017 Anthropogenic Effects on Common Nighthawks study revealed that the birds were being detected in the Long Lake Recreation Area. The area has a small pocket of old growth spruce forest that didn't burn during the last fire cycle. The possible importance of this habitat and or the combination of the lake and surrounding habitat arouse, leading to the work in 2018.

The study area was determined using the nighthawk detections from the previous year's study. During the 2018-point count/playback survey the nighthawk detections increased as the crew approached Long Lake and drastically reduced as departed the area. The

survey stops surrounding the lake and recreation area had a significant amount of nighthawk activity. The calling, booming, and visual detections were continuous in the area surrounding the lake site. These detections dropped off completely north and south of the survey area.

The visual observations made during the survey periods showed adult activity moving from the lake area in the direction northwest towards the Yukon River. This was confirmed when 3 of the four nesting areas were discovered on the west side of the Long Lake road. Long Lake and the Yukon River are only approximately 1,800 m distance apart as a crow fly. The playback surveys, visual observations and nesting activity show a much higher use of Spruce and Pine lichen forest between the two water ways than the surrounding areas. This area appears to be a corridor that the nighthawks are utilizing with high frequency.

After comparing the subsequent year's study results it showed that the nighthawk activity before sunset was 16% higher in 2018. It was concluded that this was due to the fact that Whitehorse and surrounding areas had an unusually cooler spring most likely delaying breeding activity and available food. The nights that had the most detections and bird activity were when the evening temperatures were the highest.

During breeding season males show territorial behavior and will respond to another male in its territory. The use of recorded calls provokes a response from the males therefore increasing the likelihood of detecting them (RIC 1998). Seventy percent of the nighthawk detections in 2018 occurred during the passive listening portion of the surveys, this is 13% lower than the previous year study. This shows how 30% of the detections of the species could have been overlooked if only a passive listening survey was completed. When the objective of the survey is to determine presence/absence it is useful to use the playback to detect less active birds, especially if development might occur in the survey area in the future.

Four nest sites were found in the Long Lake Recreation site. Although the 2017 Anthropogenic Effects on Common Nighthawk in a High Use Recreation Area showed that the nighthawks were using the Long Lake site regardless of trail density. Out of the four nesting locations that were found in 2018, three sites were in an area with no hiking or biking trails. This does bring the question up again if the nighthawks are avoiding areas that are more developed when less disturbed areas are available.

5.0 Recommendations

Long Lake recreation area had a higher rate of Common Nighthawk activity than the surrounding areas. After completing two years of surveys in surrounding area, the birds seem to be selecting for the habitat around and adjacent to the lake. This indicates that the surrounding old growth forest in combination with the lake and Pine Lichen forest play a significant role in the breeding habitat. Four nesting sites were found in the area surrounding Long Lake which is more concentrated nesting sites than was expected from research on nighthawk nesting behavior. Nests found in close proximity to each other is similar to Sutherlands findings in 1963 that suggested multiple pairs may nest in small patches of suitable nesting habitat.

In the Chadburn Lake Management Plan 2017, the Long Lake area is designated for improvements to the parking area, as well as the recreation area surrounding the lake. Through presenting the findings of this research, the City of Whitehorse has taken precautionary steps by supporting a Species at Risk Mitigation and Management Report to help mitigate any negatives impacts to the nighthawk population. This will help keep the City informed on how to develop in the least impactful way.

In the anthropogenic study completed in 2017 the findings suggested that the significance of trail density might have less to do with breeding habits than the habitat itself. After completing the 2018 habitat study 3 of the 4 nests were located in undisturbed areas of the forest with little to no activity and trail network. This does bring the original question of the nighthawks avoiding trail dense areas back into question. I would recommend deploying trail counters in the Long Lake Recreation area to understand if the use has increased since 2017 now that we have confirmed this breeding area.

Repeating the 2018 Habitat Selection Study would offer greater evidence of the need to protect this habitat, such as through planning around trail building and other forest impacts. Repeating the point counts/playback survey will help to understand if nighthawks are avoiding the more developed portion of the Long Lake Recreation site which will emphasize the need to manage development in some areas surrounding the lake. The confirmation of the nighthawks returning to the site for a third breeding season will also help establish this area as critical habitat.

If the site can be established as a repeat breeding habitat for Common Nighthawk, this area can become a great outreach opportunity to educate residence on this species at risk that is declining across Canada. Once it is firmly established that nighthawks are utilizing the area, programs like Wildlife Viewing through the Department of Environment might be able to give public talks on the species and increase awareness of the perils

these birds face. Similar programs are offered with bats on the shores of Chadburn Lake and have greatly increased public awareness as well as stewardship. This site can also become an education opportunity in the way of sign boards at the parking lot overlooking Long Lake to increase awareness.

Another recommendation from this study are to continuously monitor the mountain bike activity and trail building to mitigate the possible effects. Some of these areas are already greatly fragmented and measures should be taken to protect the areas that are still intact for the Common Nighthawk.

It is further recommended that more information flow between researchers and City of Whitehorse. The information collected from these studies should be made available to planners and park managers. This can have an impact on the decisions that they make with regards new development and trail building. This will allow for more informed decisions as well as protect vulnerable species.



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