

Anthropogenic Effects on Common Nighthawk (*Chordeiles minor*) in a High Use Recreational Area

For Fish and Wildlife Enhancement Trust

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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. To address this within Yukon's context, a study area was chosen that was considered typical habitat for the nighthawk. The area chosen is also home to one of the most popular mountain biking areas in the City of Whitehorse. The increased interest in biking within the local community as well as visitors overlaps with those same nesting habitats. This study focused on assessing the presence and absence of common nighthawk in areas of high density (Grey Mountain) and low density (Long Lake) mountain bike trails. Trail counters were placed at trail heads to assess the amount of biking activity in the area during the nighthawk breeding season. Breeding bird surveys were completed to detect the presence and absence of the Common Nighthawk in the study area. The trail counters confirmed the assumption that the Grey Mountain trail system had almost 5 times more use than the Long Lake trails. Although the detection of the birds was much higher in the Long Lake area, there was still a 27% probability that the birds could be found in both study sites. The data also suggested that the nighthawk might be selecting the upland old seral forest that escaped the last fire that surrounds Long Lake. The study concluded that nighthawks are still selecting nesting habitat in comparatively high use areas, but that habitat values may be influencing this use due to the importance of the Long Lake old growth forest. This suggests that habitat might have more to do with presence of nighthawks than the density of recreation trails in this region.



1.0 Introduction

Common Nighthawk (*Chordeiles minor*) was listed as a Threatened species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2007. In the 2016 Recovery Strategy from Environment Canada states that studies are needed to determine the scale and intensity at which suitable habitat would likely be destroyed by anthropogenic activities. Common nighthawks are a migratory bird that commonly breeds in the southern part of Yukon (COSEWIC 2007b). The nighthawks are ground nesters, which makes them highly susceptible to disturbance and depredation (CLBR 2016).

The City of Whitehorse completed the designation of the Chadburn Lake Park in June 2017, the selected study area. This newly established park has seen a significant rise in mountain bike activity in recent years. Whitehorse and surrounding communities are becoming destinations for mountain bikers from around the world. The park is home to an estimated 260 km² of trails, which includes dirt roads and purpose-built mountain bike trails (CLBR 2016). Articles and films have been published about the trails located within Whitehorse and the Carcross area. Common Nighthawks use the habitat in which these trails are being established. This is due to the nature of the forest and the ease of trail development, and their scenic values. The nighthawk is a ground nester, which make them vulnerable during breeding season when the trails become snow free and mountain bikers flock to these areas.

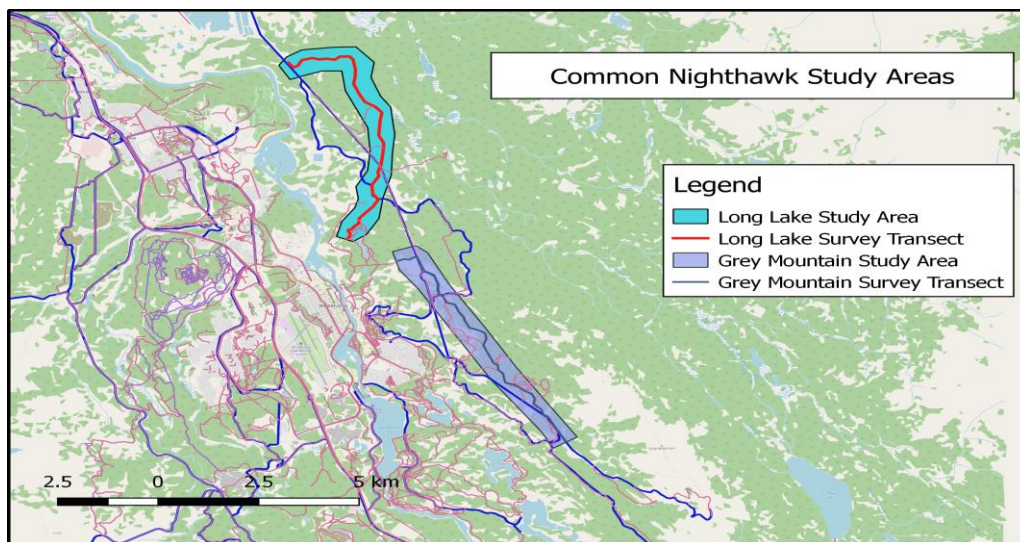
This project used a control/impact study design in two areas of Chadburn Lake Park. One area located on Grey Mountain is highly fragmented by trails and has high and consistent use of mountain bikers. The other area located around Long Lake has low density of trails and human use with the exception of the lake itself. These two areas were assessed for the relative abundance of Common Nighthawk during the breeding period. A third site was surveyed to assess the lower elevation and detection rates of roadside stops and noise and traffic influences. These surveys were completed using passive listening/playback survey protocols established for the Government of Saskatchewan, Alberta and British Columbia (Saskatchewan Ministry of Environment 2013, Government of Alberta 2013, RIC 1998). Trail counters were installed at the beginning of two trail heads in each main study area to understand the frequency of trail use to allow for comparability. Habitat plots were completed in each study area to compare the sites similarity, and to describe the relevant suitability of the habitat.

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 in the 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. For the purpose of this study one of the survey transects was in the Intensive Recreation Management Area. The second survey transect was in the conservation area and KDFN land which is undeveloped.



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. Which is aligned with the Government of Alberta. 2013, Sensitive Species Guidelines for Common Nighthawk (*Chordeiles minor*). Due to the nature of the survey and utilizing mountain bikes some adaptations were made using the Inventory Methods for Nighthawks and Poorwill: Standards for components of British Columbia's Biodiversity, Ministry of Environment created by Lands and Parks, Resources Inventory Branch for the Terrestrial Ecosystems Task Force Resources Inventory Committee.

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 method 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 birds do not approach the observer or flee, birds are 100% detectable at the observer. Birds do not move much during the count period and behave independently of one another. Distance estimates are accurate, and 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, any temperature colder than 7 Celsius the survey was canceled. 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

Each transects approximately 8 kilometers in length. Observer stopped every 800 meters to complete Point Counts with Call Playback surveys. During each survey observer records all Common Nighthawks seen and heard within 400m of 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 transects were done on consecutive nights when weather permitted to allow for comparability between study sites. 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. Weather depending two surveys should be conducted approximately 8-10 days apart.

2.3 Census Routes Selection

Survey Transect A – High Use Recreation Area on Grey Mountain

The survey transect started at the high lookout area parking lot of the Grey Mountain Road. The first two sites were accessed using a vehicle; the remaining sites were visited on mountain bike trails and used mountain bikes to access them. Total of 11 survey sites were established by pre-trail scouting. Each survey site followed the protocol and was approximately 800m from the previous site with a total transect of 7.97km.

Survey Transect B – Long Lake Conservation Area and Kwanlin Dun First Nation Protected Land

The survey transect was start at the high parking lot over looking Long Lake and followed the main road west for two sites using a vehicle. The route then followed a dirt road inaccessible to vehicles but accessed for the study by using mountain bikes. This road is obstructed by two washouts so no larger vehicles can access portions as well as ATV's might have difficulty. Ramps have been put in place by mountain bikers to allow access over the washouts. Total of 11 survey sites were established by pre-trail scouting. Each survey site was approximately 800m from the previous site for a total transect of 8.28km

2.4 Habitat Data Standards

Habitat descriptions were completed for each of the survey transects near counter location. 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 and crown closure.

2.5 Recreational Use of Trails

TRAFx mountain bike counters were installed on trails to understand the level of activity in each of the survey areas. The counters are buried in the middle of the trail. When a bike passed over the counter an aerospace-quality magnetometer coupled with advanced embedded software detected and recorded a count. Grey Mountain had two counters placed at trailheads accessing the mountain bike trails on the north side of Grey Mountain road. One was located on the survey transects trail and another located on a main access point a few kilometers south. Long Lake study area had two counters installed. One on the main mountain bike access trail and one on the survey transect a few kilometers west. All four counters were installed in late May and collected data until the end of September. The data collect from June 10th until June 20th during the breeding season and survey period was of most interest for this report



Figure 1: Grey Mountain and Long Lake Mountain Bike Counters on the Survey Transect, buried in these sites, as indicated by the temporary marker on the road (removed after photo).

3.0 Results

3.1 Detection Data

Surveys were conducted from June 10th until June 20th, 2017 during the known Common Nighthawk breeding period. Each study area was completed on consecutive nights to allow comparability when weather allowed. Due to colder weather in the forecast some surveys had to be completed sooner in order to not miss the survey window. Three transects and 33 sample stations were surveyed for a total sampling time of 12.34 hours. Two transects were studied using mountain bikes, for comparison of trail density and anthropogenic affects with one transect on the Chadburn Lake road done as a control and to assess detectability on the lower elevations, test protocol and inquire about roadside survey effectiveness. (Table 1). Total of 12 Common Night Hawk detections were recorded over the study period. The majority of detections happening in the Long Lake area (66.7%).

Table 1: Common Nighthawk survey effort including the number of transects and sample stations, listening hours and detections for Chadburn Lake Park June 10-20th.

Transect Location	Sample Stations	Total Survey Hours	Total Detections
Grey Mountain	11	3.88	2
Long Lake	11	4.13	8
Chadburn Road	11	4.33	2



3.1.1 Passive Listening vs Playback Detections

Eighty-three percent of nighthawk detections occurred during the three-minute passive listening period of the survey. Seventy-five percent of detections occurred before sunset and twenty-five percent occurred after.

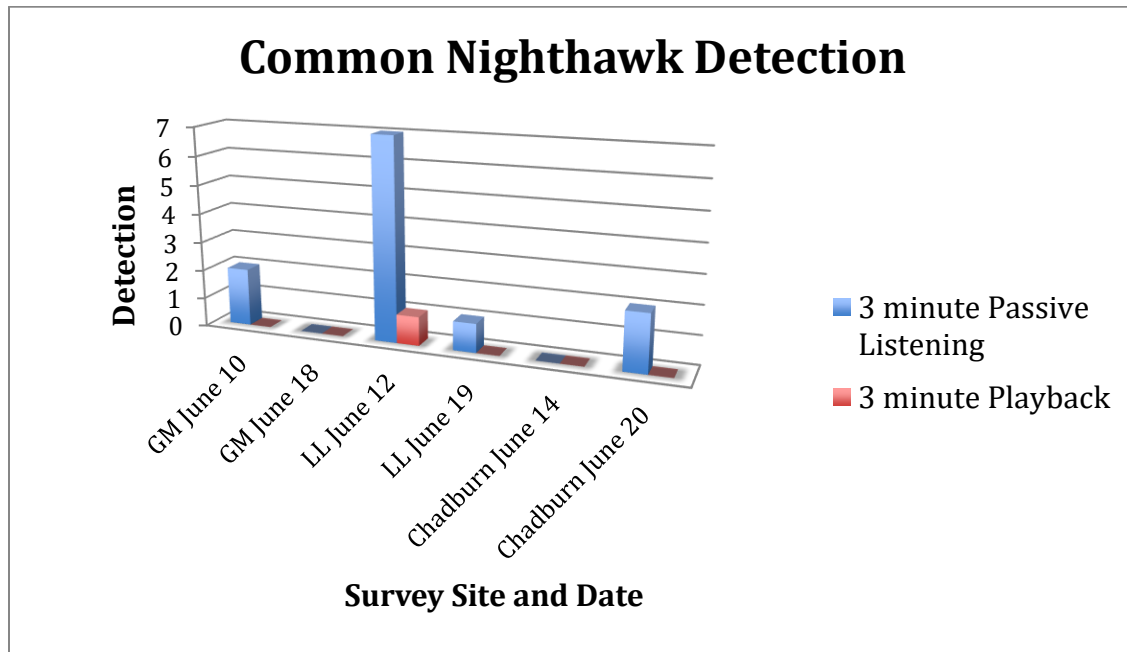


Figure 2: Common Nighthawk detection rates for the passive listening portion of the survey and the playback portion of the survey transect, per date.

3.1.2. Detectability between Grey Mountain Survey and Long Lake Survey

Common Nighthawks were detected during one or more of the surveys at both sites. There was not a significant difference in detectability between the first survey in early June and second survey, Grey Mountain: $p=0.360$; Long Lake, $p=0.167$.

When the Grey Mountain and Long Lake sites were compared to each other there was not a significant difference between detectability between sites ($p=0.273$). This means there is a 27% chance that you will find Common Nighthawks on both the high use trail network and the low-density trail network.

3.2.3 Chadburn Lake Transect Detection

The Chadburn Lake site was completed by car along a dirt road with slow, steady traffic. This site had only two detections that occurred during the passive listening portion of the survey. These two detections occurred at the same stop, on the same night. The survey transect was completed to assess the viability of surveying by the road and noise interference from traffic. Constant traffic noise and airplane noise made it difficult to hear birds as vehicles passed.

3.3 Mountain Bike Activity during Survey Period

As predicted the Grey Mountain trail system detected higher mountain bike activity then the Long Lake trails. During the survey period June 10th – June 20th the mountain bike counters recorded a significantly higher level of use as shown in Table 2 and Figure 2. From May 25th until September 21th the mountain bike activity was drastically different between the study sites.

Table 2: Mountain Bike activity levels detected using TRAFx counters for both the Grey Mountain study sites and Long Lake study sites.

Time Span	Grey Mountain Survey Transect	Grey Mountain Trailhead	Long Lake Survey Transect	Long Lake Trailhead
Survey Period June 10-20	236	434	46	104
Total Counter Period May 25 Sept 21	2756	4106	681	809

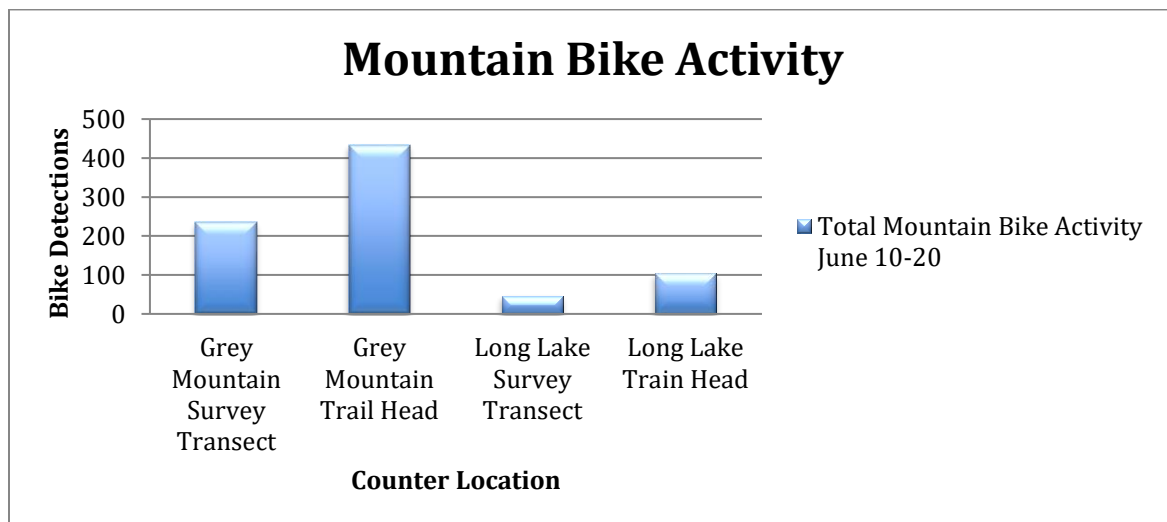


Figure 3: TRAFx mountain bike counter data collected between survey periods of June 10 until June 20.

3.3.1 Daily Mountain Bike Activity

A consistent pattern of activity was observed in the TRAFx data for weekend and weekday mountain bike use as seen in Figure 4 & 5. As expected overall weekend mountain bike use increased compared with weekday activity. Weekend use was spread out throughout the day (Figure 4). Weekday mountain bike activity had peak times that correspond to regular business hours (Figure 5). The data shown on the two days selected for the figures are consistent with the overall trend of weekend verse weekday activity.

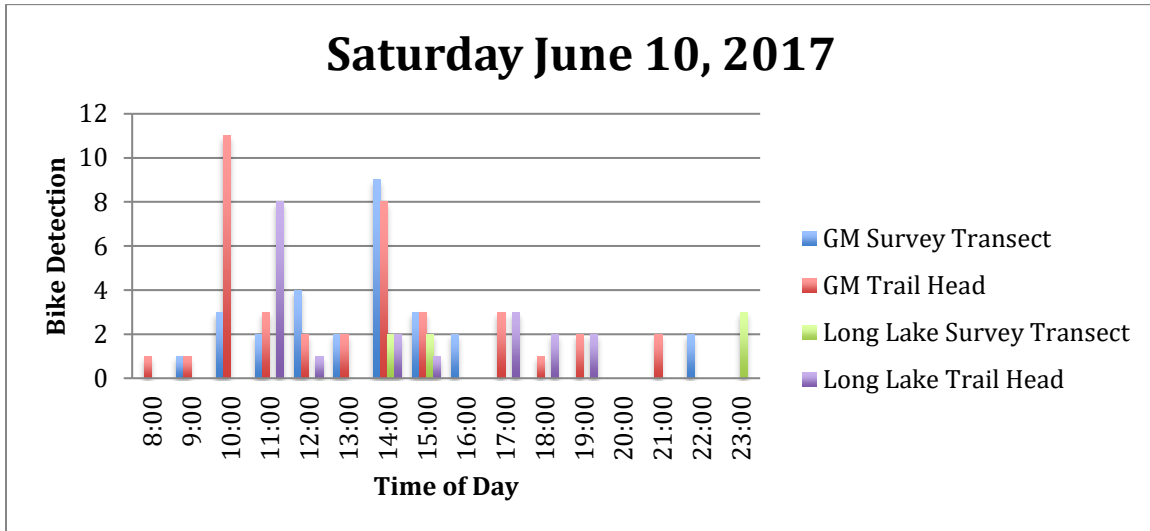


Figure 4: Weekend bike activity patterns for Saturday, June 10, 2018 for each of the TRANFx counter location.

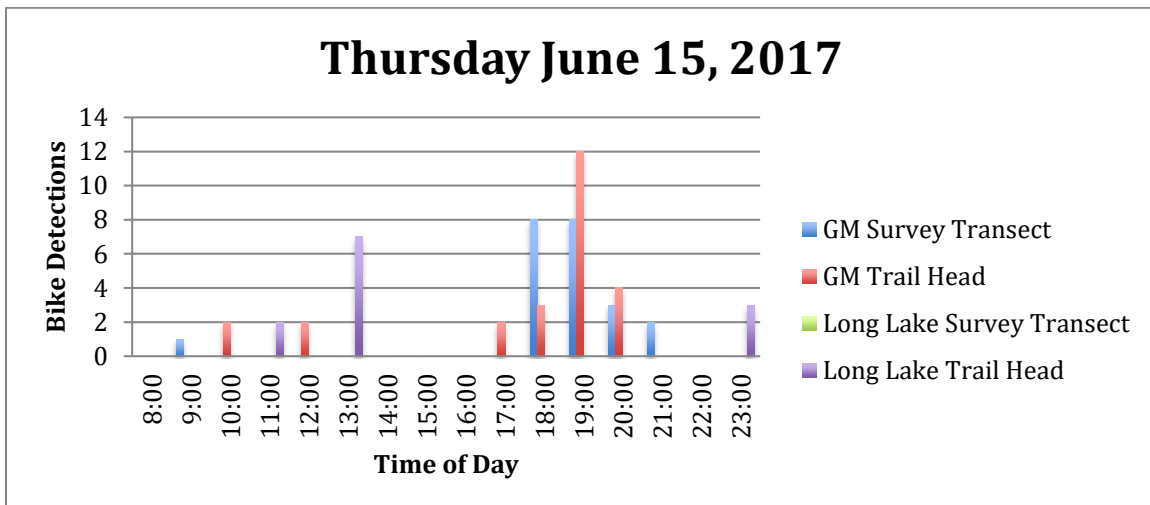


Figure 5: Weekday bike activity patterns for Thursday June 15, 2018 for each of the TRANFx counter location.

3.4 Habitat Descriptions for Grey Mountain and Long Lake Survey Areas

Each survey transect had a habitat description completed within proximity to the TRAFx mountain bike counter on the survey transect. There are nine distinct landscapes found in the Chadburn Lake Park (CLBR 2016). The most abundant forest type was found on two study transects with the third habitat plot describing a less common habitat landscape found in the park.

3.4.1 Grey Mountain Habitat Plot

After assessing the data collected from the habitat plot on the Grey Mountain transect it was categorized as a 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 totally approximately 2,759 ha (CLBR 2016). This forest type is characteristic of dry and open pine forest with lichen carpet on the ground. The dominant tree species found was lodge-pole pine.

3.4.2 Long Lake Habitat Plot

The data collect from the habitat plot on the Long Lake transect was also categorized as the coniferous forest landscape. It 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.

3.4.3 Chadburn Lake Habitat Plot

The data collected from the habitat plot on the Chadburn Lake Road transect was also categorized as the coniferous forest landscape. It had was very similar to the Grey Mountain plot and fit into the Pine-Lichen Forest Community which is the most common forest type present in the park.



4.0 Discussion

The purpose of this study was to understand the possible anthropogenic effects on Common Nighthawks by recreational bike activity. Apart from breeding bird surveys estimates, there are 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). The nighthawk are a ground nester and although their breeding habitats vary, they strongly correlate to ground largely devoid of vegetation including sand dunes, forest clearings and rock outcrops (CLBR 2017). This is also easy places to establish trails and allow for great views and experiences for mountain bike riders. The survey showed a total of 12 bird detections within the Chadburn Lake Park. This information will be beneficial for the Conservation Database in the Yukon to show a baseline presence of nighthawks in the park and will add to the overall much needed data collection within Canada.

The TRAFx trail counters allowed the study to quantify the mountain bike use between the two study sites. They confirmed our assumption that there is a significant amount of mountain bike activity on the Grey Mountain study transect with a total of 617 counted bikes during the study period. While the Long Lake study transect counted only 150 bikes. That means that Grey Mountain biking area had almost a 5 times higher rate of use then the Long Lake area. The counters were left in place throughout May until the end of September which showed a total of 6,862 mountain bikes using the Grey Mountain trails and a total of 1,490 in Long Lake for the same period.

Although there was higher level of Common Nighthawk activity in the Long Lake study area, there wasn't a significant enough difference between the two sites to prove the nighthawks are avoiding the higher used trails. There was a 27% probability that you would find nighthawks on either transect. The Grey Mountain transect only had a few detections and both occurred at the Long Lake end of the trail where trail density decreases. The Long Lake detections also occurred near the Lake which leaves questions about the significance of Long Lake and the food and habitat that it might provide. 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 within the park. The forest in this area is estimated at 100 years old or older

Common Nighthawk censusing should be conducted in the early breeding season before males might suspend calling (McNichols 1981). The surveys were started on June 10th and went until June 20th. The second set of surveys were completed slightly early due to colder weather on the forecast. Most of the detections occurred in the earlier site visits with only a few detections occurring later. It was concluded that the survey was timed correctly to assess the Nighthawk during its peak calling.

Analysis of the 33 survey stations from the three-different survey transects showed there was not a significant difference in the number of nighthawks counted before and after sunset. This was most likely due to the midnight sun that allows for good visibility even after the sunset. The two survey transects were completed in more remote locations also increased the detectability due to low noise pollution. The Chadburn Lake control transect had challenges around vehicle noise and detectability, which makes this transect hard to evaluate if all nighthawks were detected. We do not recommend completing nighthawk surveys along roads if other options are available due to noise pollution.

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). Most of the nighthawk detections occurred during the passive listening portion of the surveys, with only two detections after the playback portion. There is some debate over completing the playback as it might disturb breeding birds. This shows how the presence of the species can be overlooked when just completing the passive listening survey. 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.

5.0 Recommendations

The survey indicates that Long Lake and the surrounding old growth forest play a significant role in the breeding habitat of Common Nighthawk. Long Lake has well used, but relatively undeveloped recreation site and trail system compared to other lakes within the park. 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.

Although running the same study for another year might help add to the data to show a greater probability that nighthawks are avoiding the high use recreation areas, a study on the habitat selection of Common Nighthawks in the area surrounding Long Lake during breeding season should be the next step to helping protect the bird and its habitat. This will help clarify what habitats are important for nighthawks in the boreal forest of the southern lakes region. The anthropogenic study suggests that the significance of trail density might have less to do with breeding habits than the habitat itself.

Another recommendation from this study are to continuously monitor the mountain bike activity and trail building to mitigate the possible affects. 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 as well as other wildlife species.

This study also recommends more information flow between researchers and City of Whitehorse. The information collected from these studies must be shared with the people in charge of park and trail development. 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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