Detecting the presence of the Canada lynx (*Lynx canadensis)* in the Rossland Range

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Disclaimer

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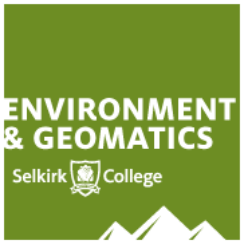

1. Abstract

The Canadian lynx (Lynx canadensis) is a threatened species protected under the Endangered Species Act. Their habitat exists throughout Canada and the United States of America. Lynx habitat has been impacted by anthropogenic causes, climate change, trapping, and forest fragmentation. Conservation Northwest (CN) is an American organization that works to protect and restore wildlands and wildlife between Washington Coast to British Columbia Rockies. CN created a citizen science wildlife monitoring program specific to the lynx population in Canada and the US. To gather detailed data CN includes volunteers and other countries in wildlife monitoring and citizen science projects. This study focuses on detecting the presence of lynx in the Rossland range to determine if there are transboundary relatedness between the population in Canada and the population in the United States of America. This study took place over 4 months by travelling to three site locations on the Old Cascade Highway. We used wildlife cameras, scent lures, cheek rubs, flashers, and tracking prints in the snow to record species occurrences. Throughout this study no lynx were observed from our cameras or by identifying tracks. Although we did detect the presence of other wildlife such as whitetail deer and snowshoe hare. Wildlife presence was more abundant at higher elevations the further the sites were away from human activity. Wildlife tracks could have been better detected with closer attention paid to snowfall. Tracks are best viewed between 48-72 hours after snowfall which could have ensured that tracks were seen before being filled in with snow. Further research is needed to better understand the lynx populations in Canada. Overall, this project offers data to CN and helps to collect data about the transboundary relationship between the Canada lynx and the population in the United States. Future research could include expanding sites along the Old Cascade Highway with the addition of more sites with more wildlife cameras. This would increase the chances of photographing lynx and other wildlife. This study could also be conducted for a longer period of time with weekly site visits and with more attention to snowfall for best wildlife tracking results.

2. Acknowledgements

Throughout this project my research partner Jolene Milan and myself worked together to gather information about the Canada Lynx. I would like to thank Lui Marinelli our faculty advisor who provided us with the equipment and knowledge we needed to complete this project. I would like to thank Brenda Beckwith for assisting us in the development of this paper. Also, I would like to acknowledge Conservation Northwest for allowing us to take part in their research. Finally, I would like to thank Selkirk College for the opportunity to study wildlife in the field and providing us with the tools, resources, and educators to assist our learning experiences.

3. Introduction

The Canada Lynx (*Lynx canadensis*) travel patterns have been affected due to climate change and anthropogenic fragmented habitat. Loss of suitable habitat suggests that fragmented landscapes can impede on recolonization of these areas by lynx (Gaines W). This causes lynx to compete with other species for habitat and food sources (Koehler M. G et al. 2007). They have also been affected by trapping, loss of habitat, increased urbanization, and development by forestry. These pressures have led to a reduction in their population (Koehler M. G et al. 2007). Lynx are now protected under the Endangered Species Act as a threatened species however their largest threat is loss of habitat.

Changing climate impacts lynx habitat connectivity by limiting the accessibility and suitability of habitat that lynx require (Krosby M 2016). Changes in environmental conditions will result in lower genetic diversity in lynx due to higher winter temperatures, low snow depth and low suitable habitat (Koen 2014). It is predicated that through climate change the suitability for lynx to survive at mid-to low elevations in the Columbia, Monashee, and Selkirk Mountains will decline (Krosby M 2016). This will make it difficult in the future for lynx to cross valleys, which will isolate populations that are higher in elevation due to fragmentation.

Conservation Northwest is a non-profit charity that works toward protecting, connecting and restoring wild lands and wildlife (Conservation Northwest 2017). Between Washington and British Columbia Conservation Northwest takes part in wildlife monitoring to detect trans-boundary activity between lynx populations (Conservation Northwest 2017). The main focus is

to collect genetic information and activity using wildlife cameras. In the past, Selkirk College has worked with Conservation Northwest on studying and documenting the present of lynx. To further this project, this research will be shared with Conservation Northwest to help determine if the species in Washington is related to the Canadian populations in British Columbia. The study objectives include conducting a literature review to gather field data through the use of wildlife cameras, flashers, scented lures, and snow tracks. To establish cheek rub stations in field sites to collect hair samples from lynx. Analyze data to determine presence of lynx, snowshoe hare, and other wildlife species using the sites. Lastly, to provide future recommendations for students or individuals taking part in citizen science based on our experience and conclusions gathered from our data collection.

4. Methods

4.1 Study Species

The Canada Lynx is a member of the cat family, Felidae that favours forested areas consisting of old growth trees with a dense undercover of shrubs and windfall (CWF 2019). Canada Lynx have silvery fur, black ear tufts, a short stubby tail and large feet which allows them to travel well in the snow at high (Figure 1). In Canada, they are widespread, ranging from Newfoundland to British Columbia (CWF 2019). The Canada Lynx prefers to hunt and preys mainly on snowshoe hare (*Lepus americanus*) (Rogers 2011). The relationship between the snowshoe hare and the lynx is an example of how a predator and its prey can influence its population dynamics. (Rogers 2011) When the snowshoe hare is abundant the lynx population expands (Rogers 2011).

4.2 Study Area

The study includes three sites located along the Old Cascade Highway. The highway is a gravel road connecting the communities of Rossland and Christina Lake, British Columbia (Figure 1). Site 1 is located at highway kilometre marker 5 (UTM11 04367220 5434057), site 2 is at

kilometre marker 8 (UTM 11 0436105 5432984), and site 3 is at marker 12 (UTM11 0434603 5430644). All sites are approximately 100m-200m from the road in areas with little human traffic. The trail to each site is marked with flagging tape to identify the entrance path from the highway.

4.3 Site Characteristics

The three sites are located in the Engelmann Spruce Subalpine Fir Dry Cold (ESSFdc1) and the Interior Cedar Hemlock Dry Warm (ICHdw1) Biogeoclimatic Ecosystem Classification (BEC) Units. The ESSF Unit is characterized by Engelmann spruce (Picea engelmanii) and sub-alpine fir (Abies lasiocarpa) in wetter areas and by its long cold winters and short cool summer (MacKillop and Ehman 2016). The ICH Unit is characterized by moist, warm springs, to very hot dry summers, and mild, dry winters (MacKillop 2016) and contains a diversity of species including western hemlock (Tsuga heterophylla), western red cedar (Thuja plicata) and spruce (Picea spp.). Shrub species include willow (Salix spp), devils club (Oploponax horridus) and Sitka alder (Alnus situate) (Ministry of Environment). All listed plant species were found in all three sites. Environments at high elevations with dense trees, good canopy cover and high snow levels in the winter are good lynx habitat which is why we chose these site locations for our study (CFW 2019)

4.4 Project Design and Data Collection

This project was initiated and developed by Conservation Northwest (CN). CN is a US environmental organization that works to protect, connect and restore wildlife lands and wildlife from the Washington Coast to the British Columbia Rockies (Conservation Northwest 2019). Lui Marinelli a professor from Selkirk College and graduate of the Recreation Fish and Wildlife Program began collecting data in the Rossland Range about the lynx population in collaboration with CN. To further data collection Jolene Milan and myself followed similar detection protocol which includes choosing sites, setting up baited cheek rubs, checking for lynx hair, and setting up wildlife cameras. Each site consists of two scent lures, a wildlife camera, a flasher to attract the lynx, and a cheek rub. Wildlife tracks and any other observations were recorded following a 100m transects in each cardinal direction (north, east, south, west). Each site was visited bi-

weekly from October, 26 2019 until February 2020. We visited the sites on Wednesday afternoons from 1:00-15:00. Each visit included replacing memory cards in the wildlife cameras, applying more castor oil to lures, checking cheek rubs for hair sample, looking for wildlife tracks, fixing flashers and observing any damage to site equipment.

4.5 Scent Lures

To attract the lynx to our sites we used a mixture of beaver castorium, catnip oil, glycerine oil, and propylene glycol. We applied this mixture to small square pieces of carpet like material and then to a tree and attached to the visual flashers hanging from a branch. The scent lure attached to the tree also has nails sticking out of it to collect hair samples from the lynx. While the lynx rubs on the scent lure their fur is left on the nails. The second scent lure is also carpet like material and is attached to the visual flasher.

4.6 Wildlife Cameras

We used Bushnell wildlife cameras supplied by CN to capture photos of any wildlife moving through our sites. The cameras capture photos when there is motion censored. These cameras are mounted on trees with straps above snow depth (approx 1m) with the visual flasher and scent lure in view. Photos are captured onto a memory card that is stored in the camera. When visiting the sites memory cards were checked and replaced if needed.

4.7 Visual Lure

The visual lures are made of aluminum pie plates hung from a long thin piece of wire and attached to a tree within the site about 2-3m from the ground. Their purpose is to reflect light to capture the attention of the lynx (Schlexer 2008). Attached to the pie plate is also a small piece of carpet with scent lure to hopefully attract lynx into the site and into view of the wildlife camera.

4.8 Tracking

To track wildlife in the snow we walked 100m in each cardinal direction (north, east, south, west) from the middle of our sites. Once we detected wildlife track(s) we would examine them, record them and try to identify the species. Tracks that were along the transect more then once would only be recorded as one set of tracks.

5. Results

Throughout our research we captured thousands of photos with our wildlife cameras. Many of the photos captured were taken due to wind moving branches or other near by vegetation. No Canada lynx were photographed during this study, however we did capture images of snowshoe hare (*Lepus americanus*) and white-tail deer (*Canis latrans)*. Overall, there were 50 snowshoe hare tracks and 2 deer tracks. The highest occurrence of wildlife tracks was at site 2 and the lowest at site 1. There were not occurrences of wildlife captured on wildlife camera at site 3. We did not collect any hair samples from any of our cheek rub stations.

At Site 1 there was no detection of lynx however we did capture footage of snowshoe hare on the wildlife camera (Figure 4). Site1 had the fewest amount of wildlife tracks (Table 1). There were two snowshoe hare tracks and no hair samples collected.

The wildlife camera at Site 2 captured photos of snowshoe hare and deer (Figure 2 and 3). No photos of lynx were captured at Site 2. Site 2 had the highest occurrence of snowshoe hare tracks (Table 2). There were no hair samples collected at this site.

There were no lynx photos captured at Site 3. Although there were snowshoe hare tracks (Table 3). There were also no hair samples at this site.

6. Discussion

We did not capture any lynx activity on our wildlife cameras at any of our 3 site locations on the cascade highway. Even though we did not detect the presence of lynx we can not rule out that there aren't any present in the area. Although, we did observe a high occurrence of snowshoe hare which implies the probability of Canada lynx (Scully E et al 2018). At all 3 site locations we captured images of snowshoe hare but no lynx. This could be due to technology errors with our cameras. We believe that our wildlife camera battery life was affected by cold temperatures, humidity, and moisture resulting in our cameras to shut off between site visits. Further at Site 8km our cheek rub station that we attached to a tree was torn and detached form the tree however there was no evidence of this activity on our wildlife camera. This led us to believe that there were some problems with our cameras function. Site 2 also had the highest occurrence of wildlife tracks, this could be because it was further up the road away from civilization then site 1. Perhaps if sites were further away from anthropogenic influences, we would have captured footage of lynx in our sites. Expanding the number of sites and the locations could increase the chances of getting a photograph of lynx in the future. If sites were further away from the road this may also increase the chances of gathering hair samples from our cheek rub stations.

To better understand what lynx habitat is ideal, information could be gathered on other elements such as: snowpack depth, canopy cover, temperature, and potentially more sites with more wildlife cameras. Lynx may choose to habituate to areas with moderate canopy cover because the understory growth provides security and a food source for snowshoe hares (Fuller et al 2007). We could also conduct snow-track surveys at least 48-72 hours after snowfall. To have more accurate tracking we could have tracked weather patterns and based our site visits on snowfall. We may have missed tracks due to the accumulation of snow overtop of tracks from days past. It is also possible that we did not detect Lynx activity due to anthropogenic activity such as snowmobiles or trails nearby

7. Conclusion

During this research project we did not detect any lynx at an of our sites during our four months of field work although we did have high occurrences of snowshoe hare which indicates the

Rossland Range could be habitable for lynx. In the future this project could be expanded by increasing the number of sites within the range and by choosing site locations at higher elevations further away from anthropogenic activity. To increase precision on tracking it may be useful in the future to watch the weather and visit sites weekly instead of bi-weekly. Further, better more reliable wildlife cameras may provide a better sense of the presence of lynx in the area. This study represents a small fraction of lynx population in Canada and could be expanded to answer further research questions presented by Conservation Northwest. If citizen science and this project continue to develop, we will be able to better understand the relationship between the United States lynx population and the Canadian lynx population. It was a pleasure working along side Conservation Northwest, Jolene Milan, and Lui Marinelli.

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9. Tables

Table 1. Site 5km species tracks within site location in the Rossland Range, 2019/2020.

Transect	Species	Occurrence
North	Snowshoe Hare	2
East	None	0
South	None	0
West	None	0
Center	None	0

Table 2. Site 8km species tracks within site location in the Rossland Range, 2019/2020.

Transect	Species	Occurrence
North	Snowshoe Hare	6
East	Snowshoe Hare	6
South	Snowshoe Hare	5
	Deer	1
West	Snowshoe Hare	7
Center	Snowshoe Hare	5

Table 3. Site 12km species tracks within site location in the Rossland Range, 2019/2020.

Transect	Species	Occurrence
North	Snowshoe Hare	2
East	Snowshoe Hare	5
South	Snowshoe Hare	6
	Deer	1
West	Snowshoe Hare	5
Center	Snowshoe Hare	1

10. Figures

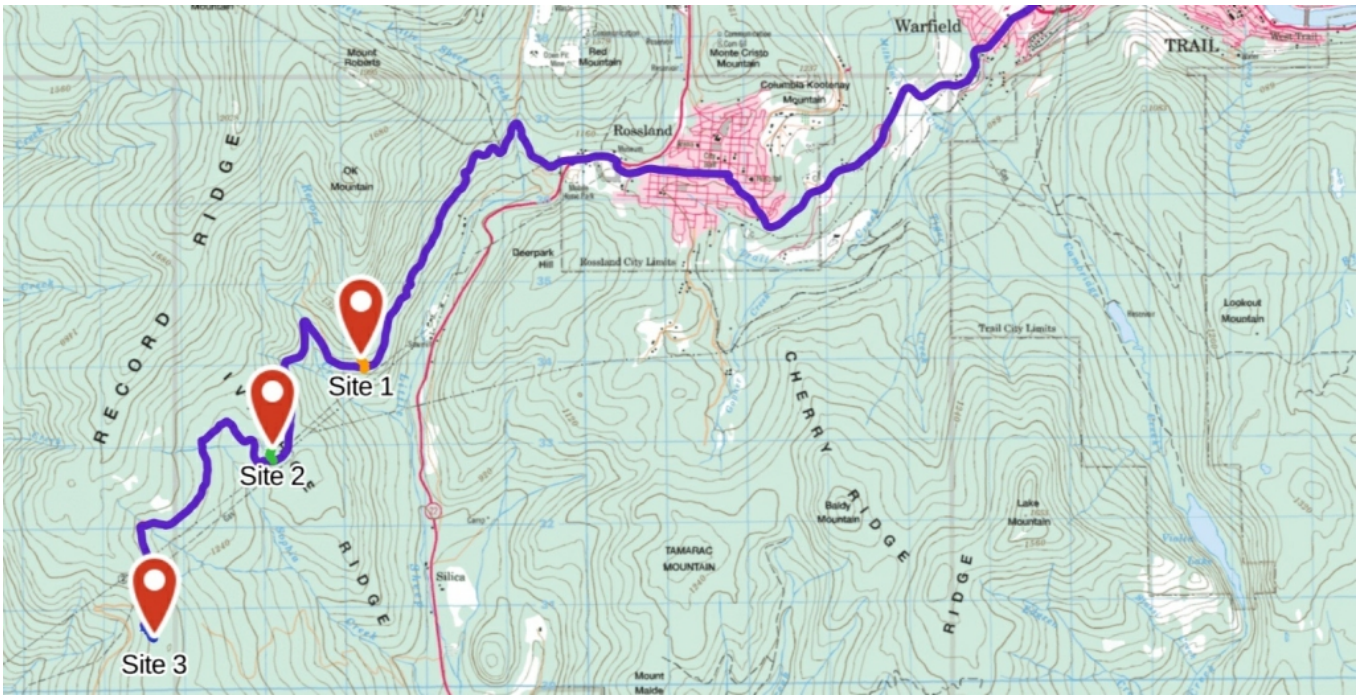

Figure 1. Research site locations along the Old Cascade Highway in the Rossland Range of southeastern British Columbia.

Figure 2. White tail deer captured by wildlife camera in the Rossland Range, 2019/2020.

Figure 3. White tail deer captured by wildlife camera in the Rossland Range, 2019/2020.

Figure 4. Snowshoe Hare captured by wildlife camera in the Rossland Range, 2019/2020.