

REMOTE CAMERA IMAGE CLASSIFICATION OF THE LITTLE HYLAND RIVER MINERAL LICK FOR 2011, 2012 AND 2013



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Abstract

The Fish and Wildlife Branch of Environment Yukon deployed one remote camera from June 20, 2011 to October 3, 2013 to document wildlife use of a mineral lick near the Little Hyland River in southeast Yukon. The remote camera recorded images for 836 consecutive days and captured 20,226 images. Mammal species detected included moose (*Alces alces*), caribou (*Rangifer tarandus*), black bear (*Ursus americanus*), porcupine (*Erethizon dorsatum*) and wolf (*Canis lupus*). The only bird species detected at the site was Canada goose (*Branta canadensis*). Unknown animals, unknown canids, unknown ungulates and unknown bear were detected. Hunters were also detected at the site. The species that most frequented the site were caribou (total count of 2,590) and moose (total count of 415).

High counts of moose were generally observed at the camera-trapping site during the months of June and July. In July, there was an average count of 60.3 moose for all 3 years of observation. In 2012 and 2013, there was an average count of 60 moose for the month of June. In 2011, only 3 moose were counted at the site in June likely because the camera was deployed on June 20, 2011, which resulted in a shorter observational window for that month.

Moose young of year (YoY) were present at the site in March, May, June, July, August, September and December. The highest counts of YoY moose were observed in July with a total of 12 counted.

High counts of caribou were generally observed during the months of June, July and August. Caribou counts were relatively low in June 2011 because the camera was deployed on June 20, 2011, which resulted in a shorter observational window for that month. The average caribou count in June for 2012 and 2013 data was 199. The average caribou count in July was 256 and in August was 201 based on data from 2011, 2012 and 2013.

Caribou young of year (YoY) were present at the site from July to November. The highest counts of YoY caribou were experienced in July (86 total for all 3 years) and August (102 total for all 3 years).

1 Introduction

The Fish and Wildlife Branch of Environment Yukon, Yukon Government deployed one remote camera from June 20, 2011 to October 3, 2013 to document wildlife use of a mineral lick near the Little Hyland River in southeast Yukon.

The specific objectives of the study were to:

- Summarize the mammal species captured by the remote camera
- Identify and summarize events of moose and caribou captured by the remote camera by year and by month
- Determine the frequency and times of year the remote camera captures image events of caribou cow and calves

Information gathered from this project may be useful to future environmental assessment processes for developing mitigation measures related to industrial development in this area. Possible applications of the study include identifying the wildlife species that may be most affected by development activities, modifying timing of activities, and altering aircraft flight paths.

2 Methods

2.1 Camera Trap

The remote camera used for the study was a Reconyx HC500 HyperFire Semi-Covert IR camera. The Reconyx camera was motion-triggered and provided colour photos during daylight hours and black and white photos when it was dark.

The camera was powered by lithium batteries, with a battery life up to 1 year, and the camera was housed in a sealed enclosure that was rain, snow and heat resistant.

The remote camera was programmed to take 3 successive photos when the infrared motion sensor was triggered. Images were date and time stamped.

2.2 Image classification

Camera data cards were collected at the site 4 times during the life of the project and the images from the remote camera were downloaded for classification. The images were classified using Timelapse, an open-source image analyzing software developed by Dr. Saul Greenberg at the University of Calgary. The protocol for image classification and database management for the data described in this report is detailed by Yukon Environment (2016).

Within the Timelapse program, caribou and moose were sub-classified into adult male, adult female, adult unknown, subadult, young-of-last-year, young-of-year and unknown. The following references were used to aid in classifying moose and caribou:

- Dubois, S, Gasaway, W. and Roby, D., 1981. Aerial classification of bull moose based on antler development.
- Alaska Department of Fish and Game, 2010. Caribou Sex Identification... Can you tell the difference?
- British Columbia Ministry of Sustainable Resource Management, 2002. Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou.
- Oswald, K. 1997. Moose aerial observation manual. Ontario Ministry of Natural Resources, Northeast Science & Technology.

2.3 Image Events, Duration and Animal counts

For every animal event captured by the camera, the species, number of animals and amount of time (duration) the animal(s) remained in front of the camera were determined and recorded. Duration in minutes was calculated using the time stamps on the images, rounding up to the nearest minute. In cases where a group of animals was occupying the area around the camera for a long period of time, the protocol outlined by Yukon Environmental (2016) was followed, whereby passages of animals separated by 10 minutes or more are classified as separate events.

It is often not possible to distinguish different individual animals from one event to another and as a result, the camera may capture a single individual animal multiple times in a day or within the span of the year. The information on the number of animals in this report does not reflect the number of individual animals in a population and, as a result, we use the term “count” to refer to the number of animals counted during events.

3 Results

3.1 Summary Statistics

The remote camera recorded images for 836 days and captured 20,226 images. The camera operated for 194 days in 2011, 366 days in 2012 and 276 days in 2013. As 2012 was the only year that the camera was operational for the full calendar year, it is not surprising that the species counts are also much higher for 2012 than for 2011 or 2013.

Figure 1 and Table 1 show the total count per wildlife species, and per human use over the course of the study by year. Mammal species detected included moose (*Alces alces*), caribou (*Rangifer tarandus*), black bear (*Ursus americanus*), porcupine (*Erethizon dorsatum*) and wolf (*Canus lupus*). The only bird species detected at the site was Canada goose (*Branta canadensis*). Unknown animals, unknown canids, unknown ungulates and unknown bear were detected; “unknowns” were generally a result of poor image quality from blurry or dark images or from cases where the animal was too far away to identify more precisely. The only human use at the site was the presence of hunters walking by to access adjacent areas.

Over the course of the camera-trapping program, the species that most frequented the site was caribou with a total count of 2,590, followed by moose with a total count of 415, Canada geese (“other” category in Figure 1 and Table 1) were counted 4 times, wolves and black bears were counted 2 times each and a porcupine was counted once. Unknown species were documented 66 times, unknown ungulates were counted 6 times, unknown canids were counted 5 times and unknown bear was documented once. Hunters were counted at the site 38 times over the course of the program.

Table 1. Species and human use counts at the Hyland River site for 2011, 2012, and 2013.

Species or Human Use	2011	2012	2013	Total by Species
Black Bear	0	1	1	2
Caribou	311	1,510	769	2,590
Hunter	1	18	19	38
Moose	63	208	144	415
Other	0	4	0	4
Porcupine	0	0	1	1
Unknown	8	44	14	66
Unknown Bear	0	1	0	1
Unknown Canid	2	3	0	5
Unknown Ungulate	1	5	0	6
Wolf	0	1	1	2
Total by Year	386	1,795	949	

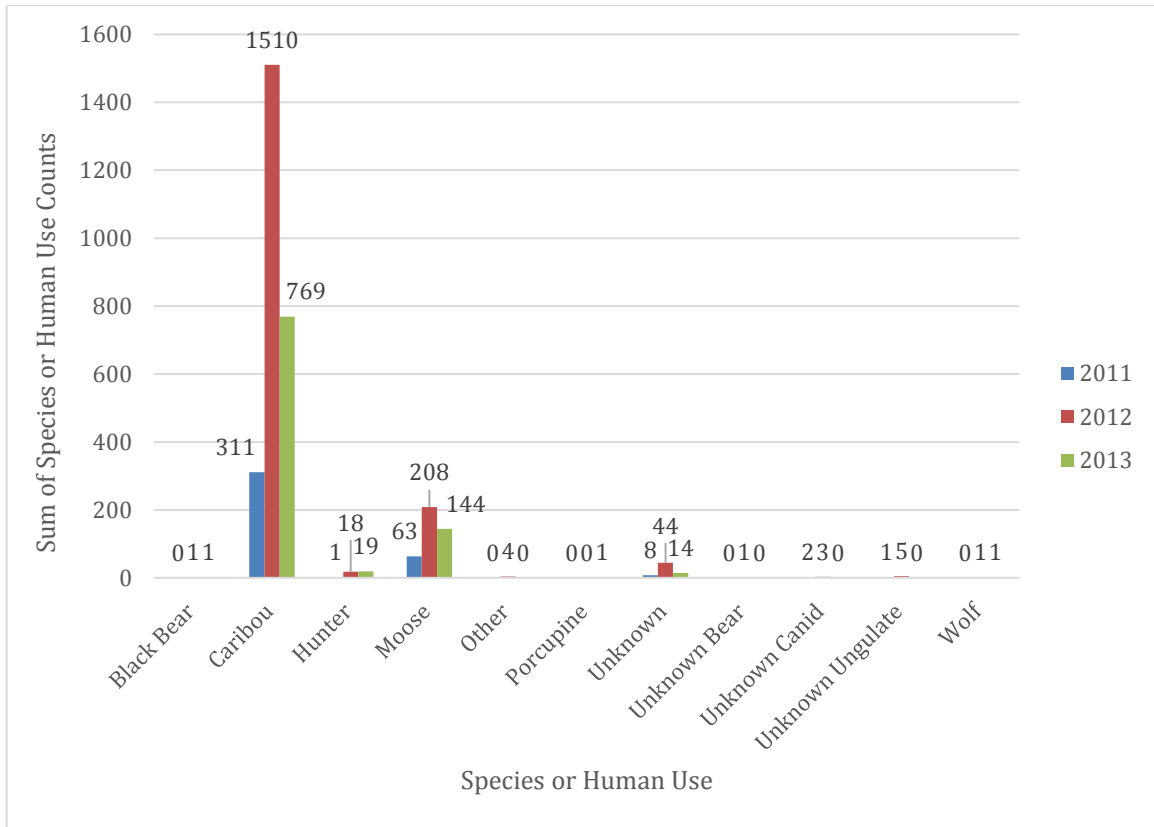


Figure 1. Species and human use counts at the Hyland River site for 2011, 2012 and 2013.

3.2 Summary of moose and caribou counts by month, week and duration

3.2.1 Moose

Figure 2 depicts moose counts by month at the Little Hyland River Site for 2011, 2012 and 2013. There were high counts of moose at the camera-trapping site in June and July. In June there was an average count of 60 moose for 2012 and 2013. In 2011 only 3 moose were counted at the site in June likely because the camera was deployed on June 20, 2011, which resulted in a shorter observational window for that month. In July there was an average count of 60.3 moose for all 3 years of observation. From August to May (2011 to 2013), counts of moose at the site were much lower and ranged from 17 to 0 moose counted per month.

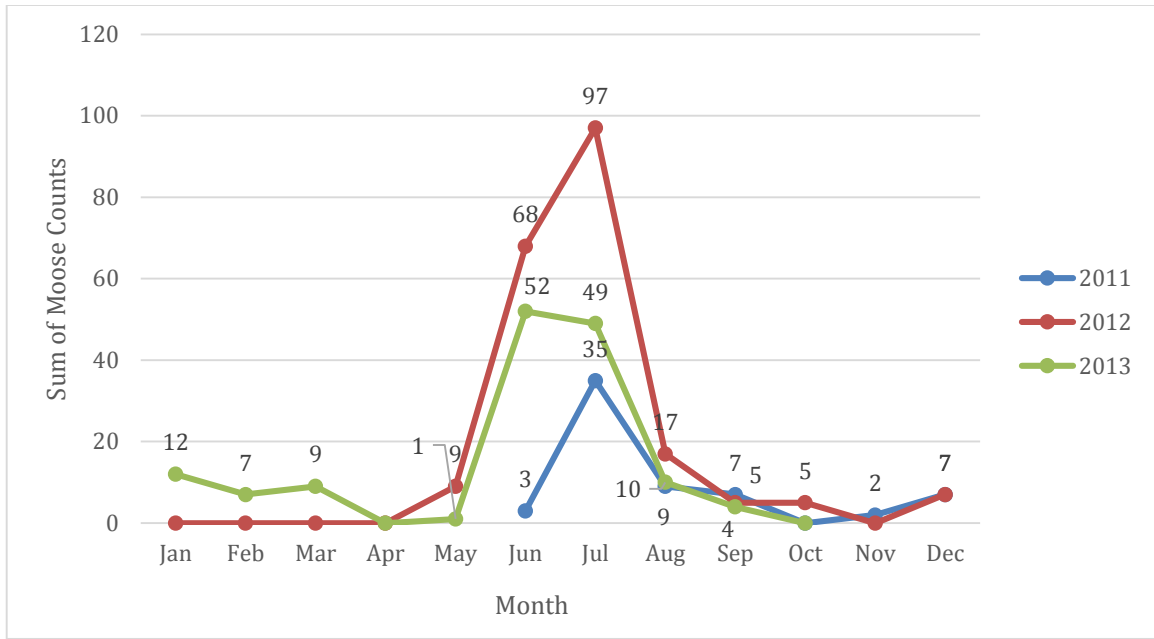


Figure 2. Sum of moose counts by month at the Little Hyland River site for 2011, 2012 and 2013.

Figure 3 depicts moose counts by week at the camera-trapping site for 2011, 2012 and 2013. Overall, the peak counts for moose occurred between June 3 and August 12. In 2011, the camera was deployed on June 20 and the peak counts were observed between June 20 and July 24. For 2012, peak weekly moose counts occurred during June 4 to July 22 and July 30 to August 12. In 2013, peak weekly moose counts occurred between June 3 and July 29.

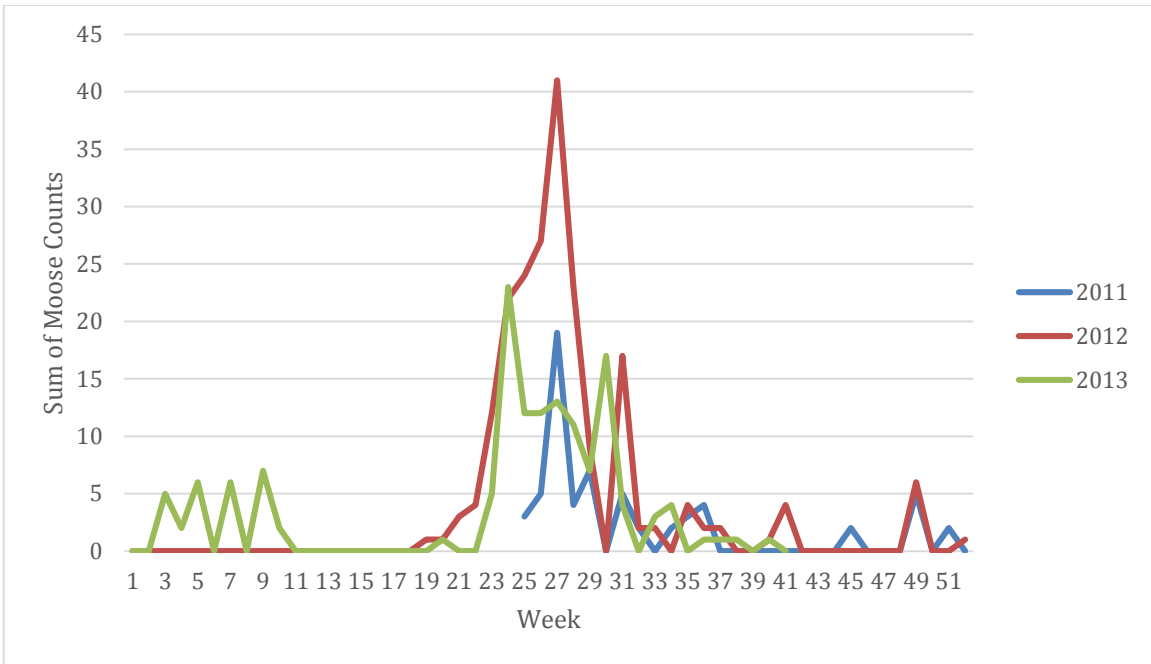


Figure 3. Sum of moose counts by week at the Little Hyland River site for 2011, 2012 and 2013.

Figure 4 depicts duration (in minutes) of moose activity by week at the Little Hyland River site for 2011, 2012 and 2013. Overall, the highest duration of moose at the site occurred between June 10 and July 15.

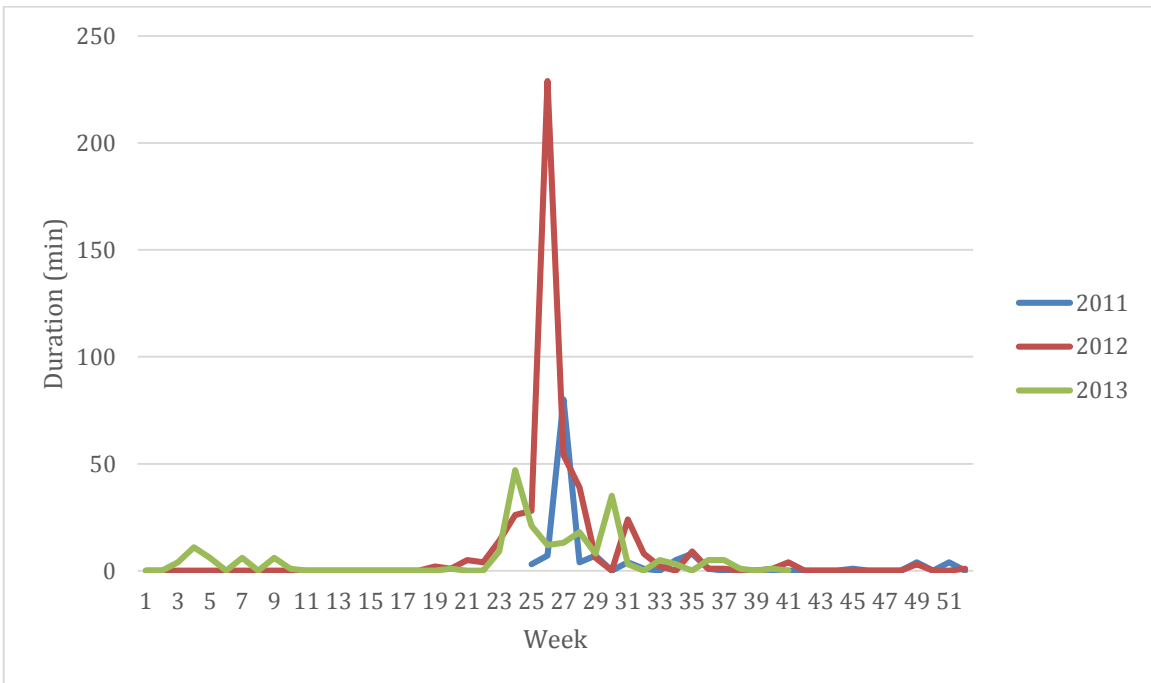


Figure 4. Moose count duration (in minutes) by week at the Little Hyland River site for 2011, 2012 and 2013.

3.2.2 Caribou

Figure 5 depicts caribou counts by month at the Little Hyland River site for 2011, 2012 and 2013. Caribou counts were generally high for the months of June, July and August. The caribou counts were relatively low in June for 2011 because the camera was deployed on June 20, 2011, which resulted in a shorter observational window for that month. The average caribou count in June for 2012 and 2013 data was 199. The average caribou count in July was 256 and in August was 201 based on data from 2011, 2012 and 2013.

May and September experienced moderate counts of caribou. The average caribou count for May was 31.5 based on data available for 2012 and 2013. The average caribou count for September was 50 based on data from 2011, 2012 and 2013.

In October and November, the caribou counts were highly variable between different years. Low counts of caribou were observed in 2011, high counts of caribou were observed in 2012, and there is no data for 2013.

From December to April low (12) to no counts of caribou were observed at the camera-trapping site.

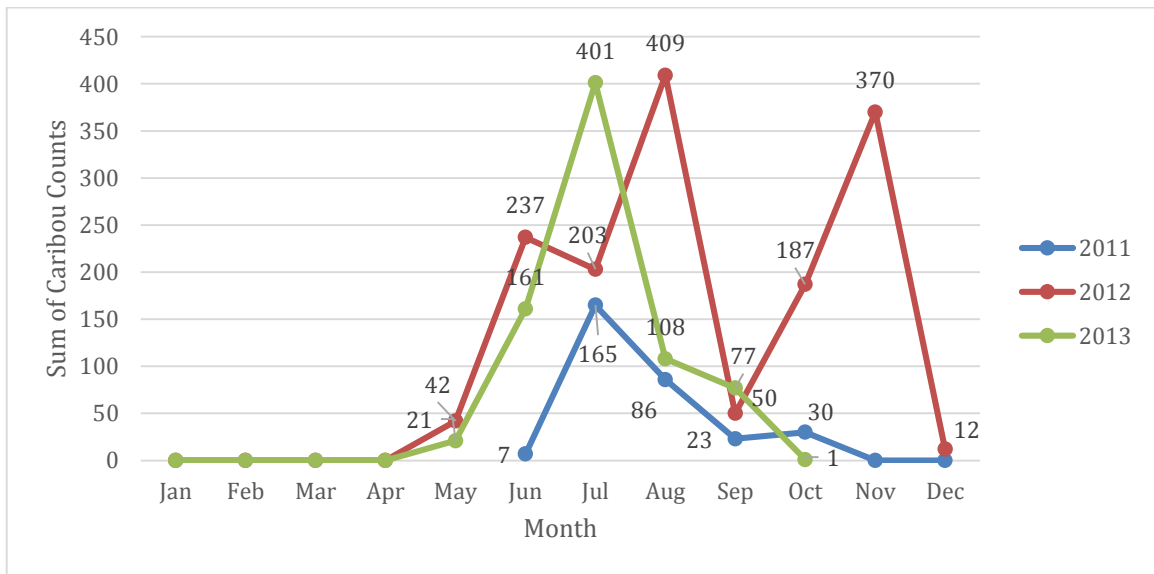


Figure 5. Sum of caribou counts by month for the Little Hyland River site for 2011, 2012 and 2013.

Figure 6 depicts caribou counts by week at the camera-trapping site for 2011, 2012 and 2013. Overall, the majority of the caribou counts were observed between May 21 and September 2.

In 2011, the camera was deployed on June 20; peak counts for caribou were observed between June 20 and August 14.

In 2012, peak counts for caribou were observed between May 28 and June 24 followed by a short decline in counts and an additional peak from July 9 to August 12. In 2012, high counts of caribou were also observed during the winter from October 15 to October 28 and November 5 to December 2.

In 2013, high counts of caribou were observed between May 27 and June 23 followed by a short decline in caribou counts and a second peak from July 8 to August 11. In 2013, the camera was removed on October 3 and no additional count data is available.

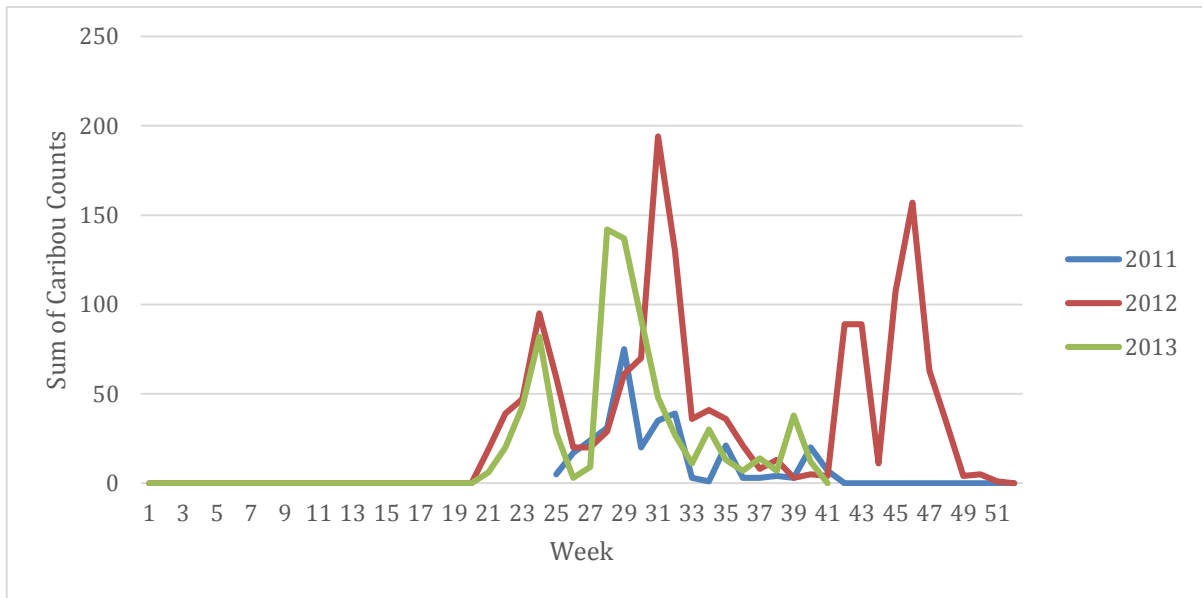


Figure 6. Sum of caribou counts by week for the Little Hyland River site for 2011, 2012 and 2013.

Figure 7 depicts duration (in minutes) of caribou activity by week at the Little Hyland River site for 2011, 2012 and 2013. Overall, the highest duration of caribou at the site occurred between May 27 and August 19.

In 2011, the camera was deployed on June 20; peak duration of caribou was observed at the site from June 20 to August 14.

In 2012, two peaks of caribou count duration were observed during the summer. The first peak was observed from May 28 to June 24 and the second peak was observed from July 9 to August

12. In 2012, a peak in caribou count duration was also observed during the winter from October 15 to October 28 and from November 5 to December 2.

In 2013, high duration of caribou at the site was observed from May 27 to June 23 and from July 8 to August 11.

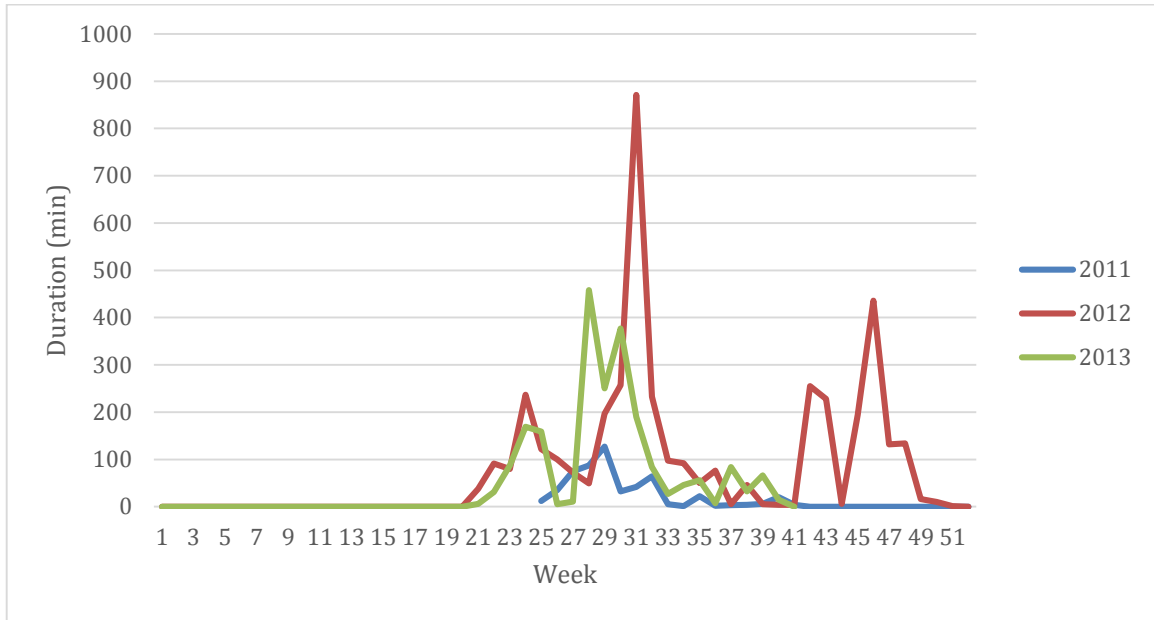


Figure 7. Caribou count duration (in minutes) by week at the Little Hyland River site for 2011, 2012 and 2013.

3.3 Summary of Caribou and Moose Young of Year counts

3.3.1 Moose Young of Year Counts

Figure 8 depicts the sum of moose young of year counts by month at the Little Hyland River Site for 2011, 2012 and 2013. Young of year were present at the site in March, May, June, July, August, September and December. The highest counts were observed in July with a total of 12 young of year counted.

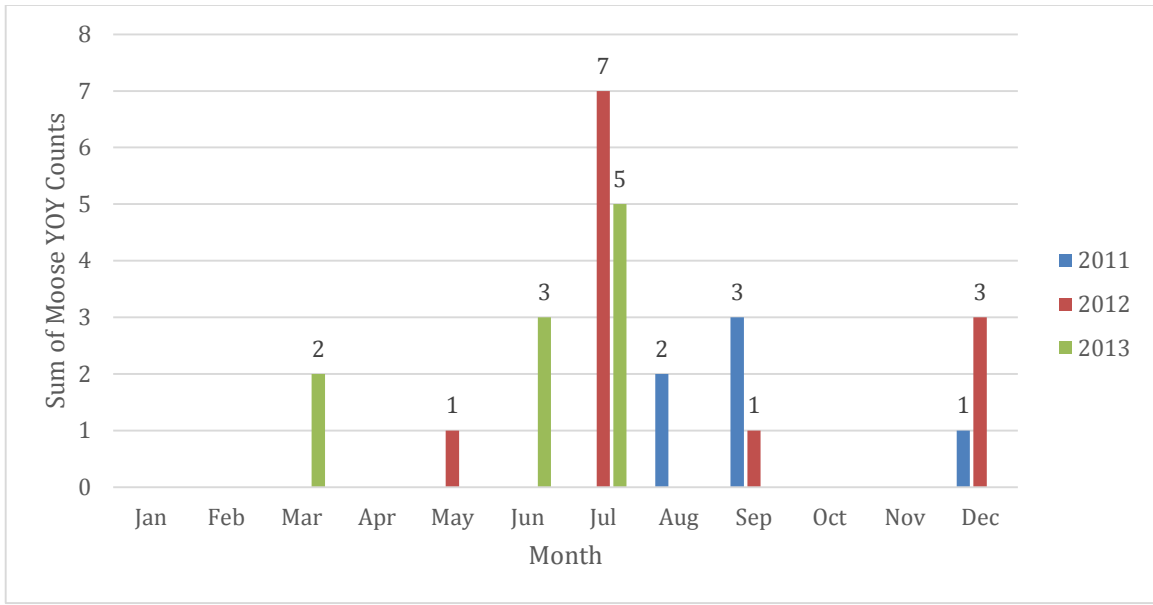


Figure 8. Sum of the moose young of year counts by month at the Little Hyland River site for 2011, 2012 and 2013.

3.3.2 Caribou Young of Year Counts

Figure 9 depicts the sum of caribou young of year counts by month at the Little Hyland River site for 2011, 2012 and 2013. Young of year were present at the site in July and August for all years. In total, there were counts of 86 young of year in July and 102 young of year in August.

Young of year were also present at the site in September, October and November. In total, there were counts of 26 young of year in September, 9 young of year in October and 16 young of year in November.

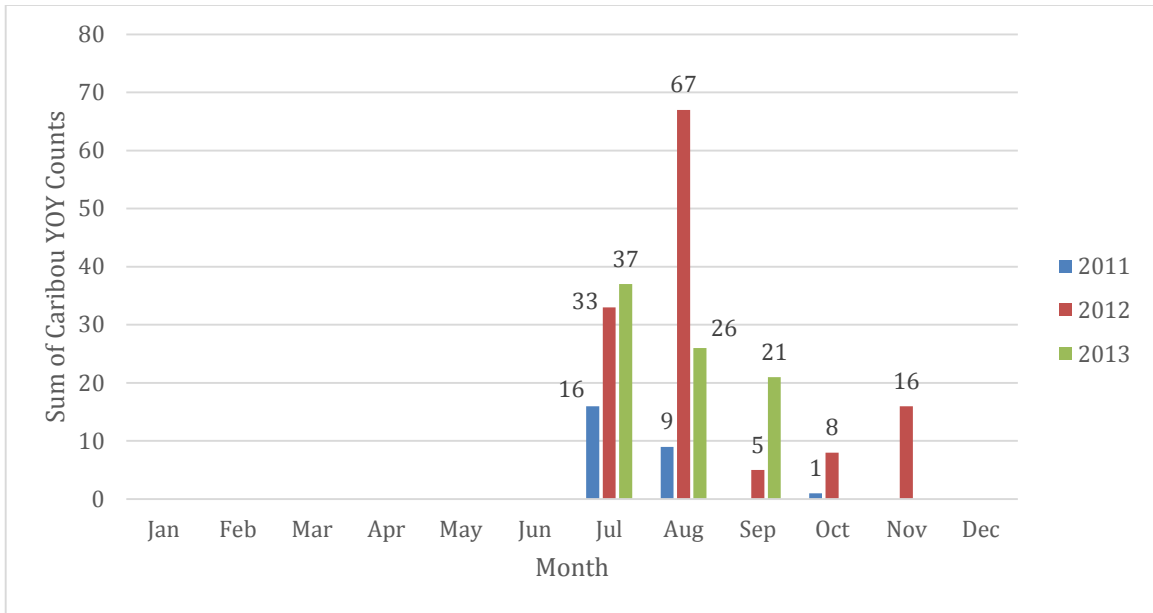


Figure 9. Sum of caribou young of year counts by month at the Little Hyland River site for 2011, 2012 and 2013.

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http://www.adfg.alaska.gov/static/hunting/caribouhunting/pdfs/caribou_gender_id.pdf
- British Columbia Ministry of Sustainable Resource Management, 2002. Aerial-based Inventory Methods for Selected Ungulates: Bison, Mountain Goat, Mountain Sheep, Moose, Elk, Deer and Caribou.
https://www.for.gov.bc.ca/hts/risc/pubs/tebiodiv/ungulatesv2/unga_ml20_final.pdf
- Dubois, S, Gasaway, W. and Roby, D., 1981. Aerial classification of bull moose based on antler development.
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- Yukon Environment, 2016. *Remote Camera Image Classification and Database Management*.