2015-16 Lake Revelstoke wolf census

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Executive Summary

Populations of wolves and cougars have played an important role in the decline of mountain caribou. As part of the caribou recovery plan, the British Columbia Government has been managing and monitoring populations of predators and their primary prey within caribou recovery areas since 2006-07. In continuation of this monitoring program, we conducted a wolf census in the 2015-16 Lake Revelstoke Survey area in November, 2015. Using both ground and aerial survey methods, between 10 and 13 wolves were counted in the Lake Revelstoke Survey Area. Additionally, 3 wolves were detected at Red Rock (Kinbasket Lake). 112 moose were observed during the aerial survey but no moose kills were observed from the air. These results suggest the wolf population in this area is stable since the decline that was recorded in 2008-2009. A complete summary of wolf census data since 2006-2007 is provided.

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1 Introduction

The decline of mountain caribou (*Rangifer tarandus caribou*) in British Columbia has been attributed to the numerical increase in populations of other large ungulates and their predators following landscape level habitat modifications, such as the clearing of old forests (Wittmer et al. 2005; Wittmer et al. 2005; Apps and McLellan 2006; Wittmer et al. 2007). A multi-facetted recovery program has been ongoing in the Lake Revelstoke region of the Columbia Mountains, in southeastern BC, where three remnant caribou ranges exist (Frisby-Boulder, Columbia South and Columbia North), each comprised of several small isolated breeding groups (van Oort et al. 2011). Long-term initiatives to recover caribou populations in this region have included forest harvest covenants to protect extensive areas of old-growth forest. Short-term actions have included management of moose (*Alces alces*) to try reduce wolf (*Canis lupus*) populations (Serrouya 2013). As part of this effort, caribou, moose, and wolf populations have been intensively monitored in the Lake Revelstoke area. In November 2015, we conducted a wolf census in the Lake Revelstoke area. The details of this census as well as a summary of the results are found below.

2 Lake Revelstoke Survey Area

The Lake Revelstoke Survey Area is centered on the Revelstoke Reservoir between the City of Revelstoke and Mica Dam and includes all major tributaries that drain into the Revelstoke Reservoir in this area (Fig 1). This is the main census area that has been consistently sampled annually since 2007. Buffer areas have also been sampled depending on snow conditions and budgets. Buffer areas included the Red Rock area, the Illecillewaet drainage, Tangier Valley, Encampment Creek, the Jordan River and the Wood Arm (van Oort and Bird 2011; Fig. 1). Encampment creek has since become a core area, and for the 2015-16 census, we sampled both Red Rock and Encampment creek areas (Fig. 1).

The west side of Lake Revelstoke (i.e. the Monashee Mountains) is incised by narrow, steep valleys, especially those in the southern portion of the census area. Side-valleys in the northern portion of the Monashees are larger and contain more open riparian habitats, wetlands, roads, as well as cutblocks, therefore providing more suitable moose and wolf habitat. On the east shore of Lake Revelstoke, in the Selkirk Mountains, the side valleys are fewer, but much larger, and contain substantially more wetlands and forestry activities, and are known to support larger moose and wolf populations; the three most important of these are the Big Mouth, Goldstream, and Downie drainages. As in previous years, we surveyed at least all appropriate habitats below 1200 m asl. However, with this early season survey, there was concern that moose may not yet be constrained to elevations below 1200 m. We tracked the elevation of 13 radio-collared moose and all except one or 2 were below 1200 m. Nonetheless, we attempted to census most the of the area to an elevation of 1400 m asl to provide a buffer area of coverage.

3 Methods

Methods followed those presented in detail previously (van Oort and Bird 2011). Prior to the survey, there was a relatively shallow snowpack covering the survey area (approximately 40 cm at valley bottom). A complete census was conducted over a short period of time (2 days), beginning ~3 days after a large snowfall event, which allowed fresh tracks to be detected and counted easily. The survey area was covered extensively by air, but ground surveys were also done simultaneously along Highway 23N, in the Goldstream drainage (both sides), the Downie/Sorcerer drainage and up most of the front-side forestry roads above Highway 23N, south of Downie Creek (e.g., Laforme, Keystone, Key FSR's). The Goldstream and the Downie drainages were surveyed by both ground and aerial crews.

The aerial survey was conducted with a Bell 206B helicopter carrying three experienced observers. The aerial survey flight-lines followed habitats where wolf tracks could be easily encountered, including river ice, wetlands,

resource roads, transmission lines and cut blocks. The helicopter conducted near-ground hovers, or put down to allow the observers to make close inspections of tracks, for example, to confirm the number of animals estimated from the air. Ground transects were done with trucks or snowmobiles along plowed or unplowed roads, respectively. Ground surveys followed transects established and surveyed in previous years (Fig. 1). Whether on the ground, or in the aircraft, wolf tracks that we encountered were trailed until the group size could be estimated. All crews carried hand-held radios to facilitate communication. Tracklogs of survey routes and waypoints of wolf sign were recorded using GPS units (Garmin Map76csx). Additionally, we counted and recorded coordinates for all visual observations of moose from the helicopter.

Wolf pack size was estimated with varying degrees of certainty. A minimum or total count of wolf group size was obtained objectively and derived from visual observations or from tracking evidence such as clear splitting of tracks, often from tracking animals on roads or ice where individual wolf tracks can be separated with certainty. We also recorded a "maximum" estimate when the total group size was not clear; these more subjective estimates were based on the observers' opinion using the overall amount of sign, circumstances, and tracking conditions.

4 Results

4.1 Overview of Census Results

The 2015-16 census was conducted on November 26th and 27th, 2015. The weather during this period generally consisted of a thin layer of cloud over the Lake Revelstoke Reservoir with clear skies above and in the larger side drainages. The previous storm deposited upwards of 20 cm of snow over a 2-day period (which culminated on November 24th). Overall, census conditions were good as judged by the clear differentiation of fresh and older tracks. Conditions were primarily deep powder with small, isolated areas of wind effect (i.e. at low elevation on the west side of Lake Revelstoke and higher elevation, exposed areas). In open areas wolf track foot penetration was 15-20 cm deep. There were several plowed roads including Highway 23 North, and the Goldstream and French Creek Forest Service Roads (both surveyed by ground crew).

The survey covered a total of 1714 km (1362 km from the air and 352 km on the ground). Flight time for the survey was 6.1 hours on November 26th and 7.1 hours on November 27th. Within the census area we counted 11 – 13 wolves (Table 1, Fig. 1). Outside the survey area, 3 wolves were found in the Sprague-Bay/Redrock area. There were 112 moose counted during the aerial survey which included: 18 cow-calf family groups (i.e. 18 cows, 19 calves), 25 bulls, 32 single cows, and 18 unsexed adult moose (Fig. 2).

Table 1: Wolf census results for the Lake Revelstoke wolf survey in November 2015.

Group	Location	Pack Size
1	Front Downie Crk	1
2	Upper Downie Crk	1
3	Seymour/Bourne Crk	1
4	French/Hiram	3-4
5	Birch Creek	5-6
	Lake Revelstoke Total	**11-13**
6	Redrock/Sprague Bay	3
	Grand Total	**14-16**

*not in the Lake Revelstoke survey area

4.2 Observation details

Group 1: **Lower Downie Crk (1)**

The lower portion of Downie Creek seemed to be the hub of predator activity in the Downie and Sorcerer Creek drainages where wolf, cougar and wolverine tracks were found (most of which seemed to be surrounding or in close proximity to active fur-trapping sites in this area). The lone wolf track found in this area was at ~6 km on Downie FSR. Here, the animal crossed Downie FSR moving west in the general direction of Lake Revelstoke and Highway 23S. Interestingly, this wolf was being followed by the cougar tracks.

Group 2: Upper Downie Creek (1)

Tracks for this lone wolf were detected by ground crew at ~26 km on the Downie Creek FSR. These tracks came from the back of the Downie Creek valley, crisscrossed the road, and were last seen moving northwest along Downie Creek. These were fresher tracks than those found in the lower Downie and we are certain these were made from a different wolf as we did not miss this animal further downstream.

Group 3: Seymour/Bourne Creek (1).

A single track, detected just north of Seymour Creek was found following a road paralleling the water. This track doubled back towards the north, and disappeared upslope, into the forest.

Group 4: French Creek/Hiram (3-4)

Here, a group of wolves was observed on French Creek FSR on November 26th by ground crews. During this time, the ground crew observed several instances where tracks from 3 wolves were found side-by-side travelling in the same direction. The following day, November 27th, aerial surveyors observed tracks from a group of similar size in the Nichol Creek area (north of the French Creek FSR) believed to be made from the same group (i.e. there were tracks found from the air linking these 2 observations. From the air, observers found evidence of 4 distinct bed sites and thus we have assigned a maximum pack size of 4 wolves for this group.

Group 5: Birch Creek (5-6)

The initial detection of these wolves was made during the highway transect, where a minimum of two animals were reported. On day 2 the helicopter was used to get a more accurate count of these wolves. Aerial observers found 2 separate groups of tracks, 1 below the highway, the other above (each travelling in the same direction). The track below the road was made by a single wolf whereas the tracks above were made by 4-5 wolves for a total estimate of 5 to 6 individuals for this pack.

Group 6: Redrock (3)

On the point of land forming the northeast side of Sprague Bay we detected a set of three wolf tracks in an area heavily used by moose. Given the nature of the interaction of the tracks from these two species there was likely a moose that had been killed, however none was detected from the helicopter.

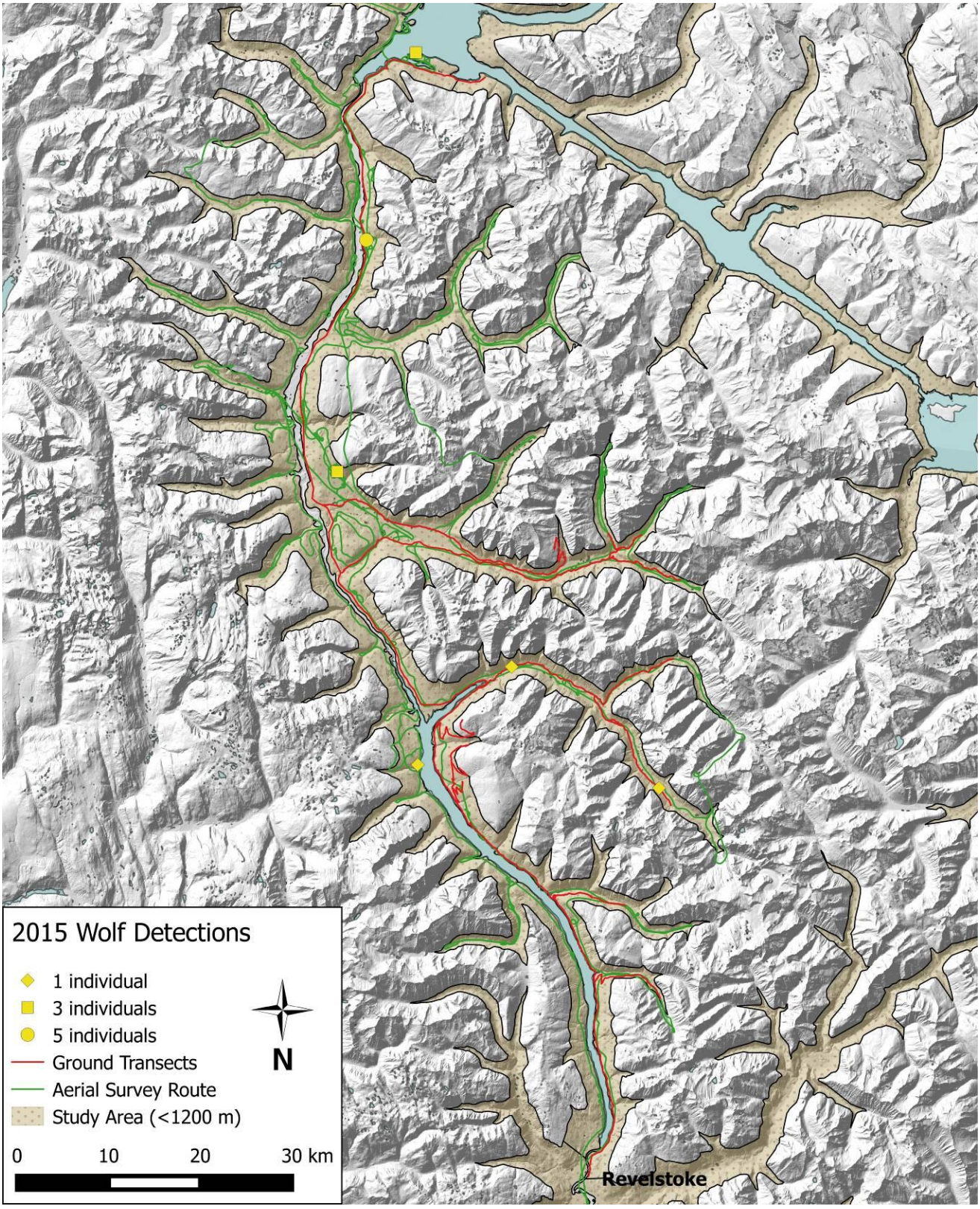

Figure 1. Survey transects and wolf detections from the November 2015 Lake Revelstoke wolf survey. All survey transects are plotted.

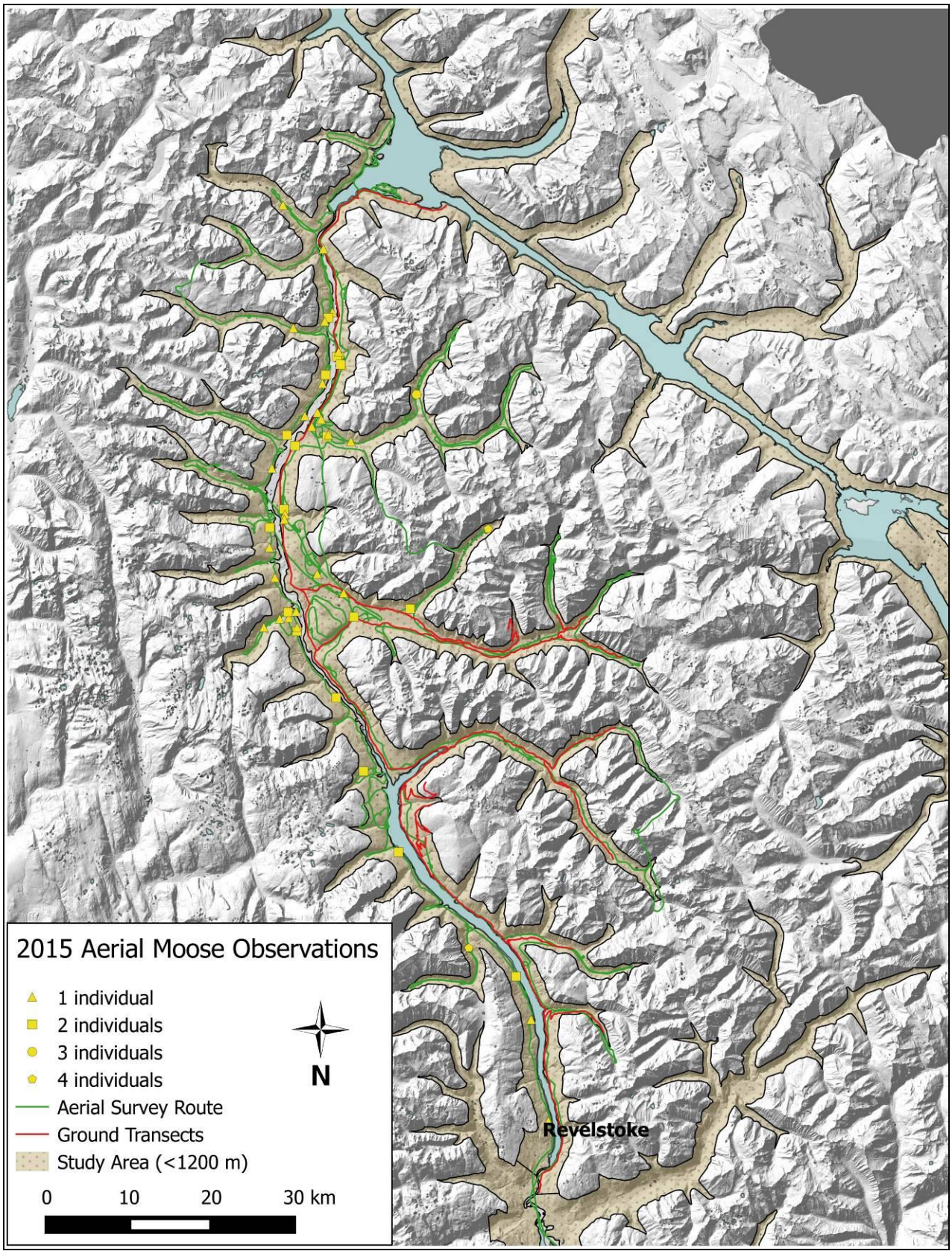

Figure 2. Locations of moose that were observed during the aerial survey from the helicopter.

4.3 Changes in abundance

Results from this census suggest that the Lake Revelstoke wolf population is still low relative to initial estimates (Figure 3).

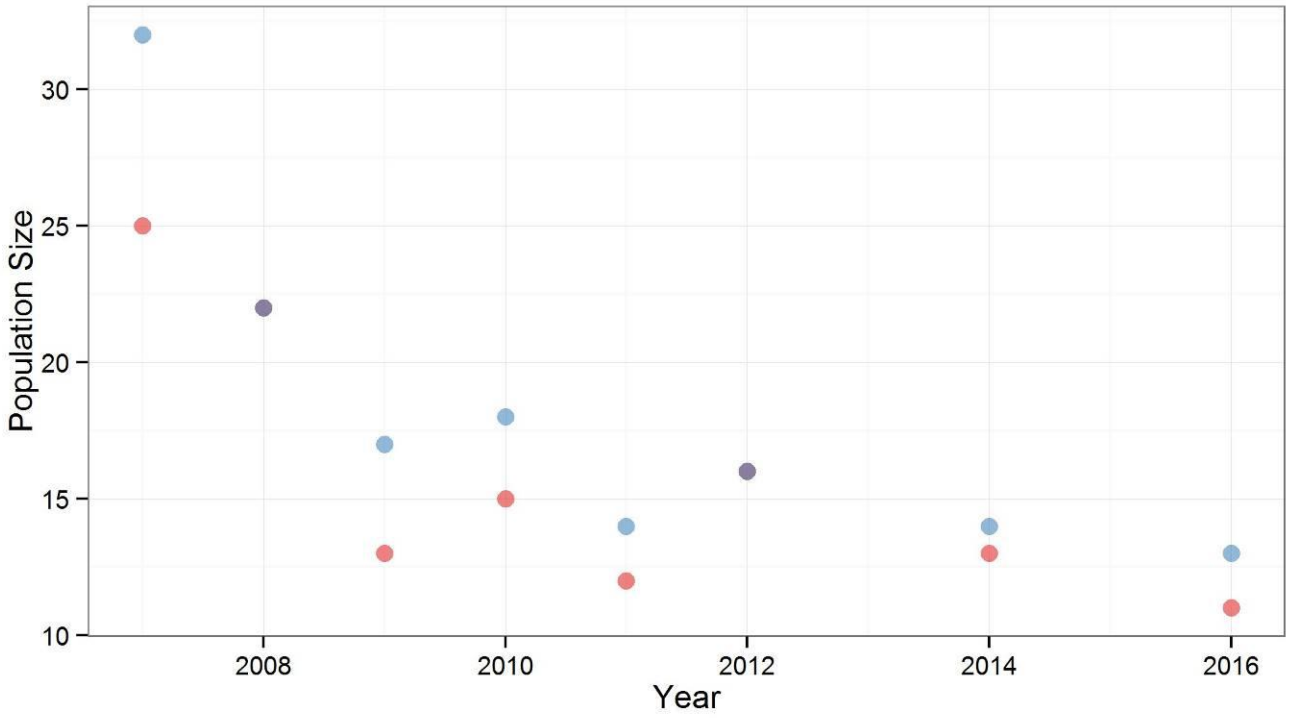

Figure 3: Lake Revelstoke population count estimates made from 2007 through 2016. Maximum estimates are plotted in blue, minimum estimates are plotted in red. Transparency of points allows over plotted data to be seen. **Note**: 2016 refers to the 2015-16 (i.e. the current) survey. Surveys were not completed in 2014-15 or 2012-13.

5 Discussion

The conditions for this census were excellent and we feel like we captured an accurate snap-shot of the abundance and distribution of wolves in the survey area. While still early in the season, the snow was relatively deep in most areas as we found typical snow depths were ~60 – 80 cm. The majority of fresh moose sign was found below 1200 m asl and none was observed above 1400 m asl.

In 2014-15, we were unable to conduct a census due to lack of confirmed funding early in the season and poor snow conditions after mid-January. However, the results from this census seem to still suggest that wolf abundance has not rebounded from the 2008-2009 decline. This year we recorded the lowest minimum estimate to date though these results are similar to estimates seen in 2009, 2011 and 2014.

Throughout the summer and fall of 2015, a pack of wolves was observed on the west side of Lake Revelstoke between Pat and Ruddock creek (in the area of the caribou maternity pen). At this time, camera trapping data suggested a group size of 4 animals (though 1 was removed by the Province at Horne Creek due to its close proximity with caribou recently released from the maternity pen). We did not however, detect wolves in this area during the census and believe that it is quite likely these wolves were on the east side of Lake Revelstoke

during the census (as wolves previously collared in this area were found to roam throughout both sides of Lake Revelstoke). The closest wolves observed during the census were those found at Birch Creek.

With regard to these Birch Creek wolves, there was some uncertainty as to the size of this group during the census. More specifically, there was some lack of consensus between the aerial observers as some felt that the tracks found above the highway were made by a group larger than 4 animals (potentially as large as 6 or 7). This lack of consensus stemmed from the quality of trenching found in deep snow. Those arguing for the smaller number felt the trench would be much larger with the higher estimate. Furthermore, in an area where the trench split into three separate trails, it gave the impression that the tracks were made by 4 to 5 individuals, not of multiple animals following each other. Thus, combining this observation with the single wolf track below the highway, we report a conservative minimum estimate of 5-6 wolves for this group.

We observed more than double the number of moose during this survey (112 including 19 calves) than we had during the last census (i.e. 50; van Oort and Serrouya, 2014). However, drawing conclusions about changes in moose abundance from these numbers is dubious. The 2015 census (i.e. the current census) occurred in late November, with a much shallower snowpack, and likely with the moose exhibiting different behavior than during surveys conducted later in the winter. Nonetheless, this dramatic change in moose detections deserves mention.

Our focus and methodology was to census wolves and thus, we did not attempt to quantify cougar, lynx, or wolverine in the study area. However, cougar tracks were observed in the front of Downie Creek as well as on the Key Road (likely the same animal). Wolverine were observed at low and higher elevations throughout the study area. A single observation of Lynx tracks was observed in the Sorcerer Creek drainage.

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