

# Population Status of Central Mountain Caribou Herds in British Columbia and Response to Recovery Management Actions, 2016



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## Background

The South Peace region of British Columbia contains several caribou herds (Figure 1) that have been declining rapidly over the past few decades, and one herd (Burnt Pine) has recently been extirpated (Seip and Jones 2016). First Nations traditional knowledge and reports by early explorers indicate that historically, caribou were very abundant in the South Peace (West Moberly First Nations 2009). As recently as 20 years ago there were still at least 672 caribou in these herds, and likely more; but by 2015 the estimated number of caribou in the South Peace had declined to 248 - 263 (Seip and Jones 2016).

The declining numbers of caribou in these herds resulted in them being nationally listed as Threatened in 2003. In April 2014, the Committee on the Status of Endangered Wildlife in Canada re-evaluated the status of these herds as part of the Central Mountain caribou population and recommended they be classified as Endangered due to ongoing population declines.

[http://www.cosewic.gc.ca/eng/sct1/searchdetail\\_e.cfm?id=1266&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=caribou&scienceName=&returnFlag=0&Page=1](http://www.cosewic.gc.ca/eng/sct1/searchdetail_e.cfm?id=1266&StartRow=1&boxStatus=All&boxTaxonomic=All&location=All&change=All&board=All&commonName=caribou&scienceName=&returnFlag=0&Page=1)

The immediate (proximate) cause of declining caribou numbers in these herds is excessive predation, primarily by wolves (Seip and Jones 2016). It is generally believed, however, that the underlying cause of increased predation is industrial landscape change which has created conditions that allow wolves to be more effective at killing caribou. Over the long term, protection and restoration of habitat will be necessary to restore self-sustaining caribou herds in the South Peace.

Unfortunately, recovery of disturbed caribou habitat is a lengthy process that takes decades. During that time, the habitat remains unsuitable for the survival of caribou and caribou herds will continue to decline. If caribou populations are to be maintained in the South Peace, immediate and more direct measures are required to reduce the excessive level of predation until habitat conditions improve.

Since 2014, the West Moberly and Sauteau First Nations have been conducting a maternal penning project to capture and hold pregnant adult female caribou in a pen throughout the calving period in order to protect the newborn calves from predators (McNay et al. 2016). Results from the first year indicated that calves could be successfully produced and protected within the pen, but when calves were released back to the wild they experienced very high mortality from wolf predation. It appears that maternal penning is of limited use if it is not accompanied with wolf control.

In an effort to halt the decline of caribou in the South Peace, the Government of British Columbia approved a wolf control program which began in 2015. The objective of the program was to reduce the number of wolves on and immediately adjacent to the ranges of five threatened caribou herds in the Central Mountain caribou population. The response of the caribou to reduced wolf numbers is being monitored by evaluating survival rate of radio-collared adult caribou, conducting calf recruitment counts, and conducting periodic population counts.

### **Wolf Reduction in Winter 2015**

The wolf control program in winter 2015 consisted of a combination of shooting wolves from helicopters and ground trapping by First Nations trappers. Poor snow conditions for wolf tracking and a delayed start (late January) limited the effectiveness of the program in the initial year. A total of 57 wolves were killed, 41 by aerial shooting and 16 by trapping (Figure 2). Those removals were lower than the 99 - 166 wolves estimated to be within the overall treatment area (Government of B.C., 2014).

The breakdown of wolf removal on each range was as follows:

<b>Treatment Area</b>	<b>Number of Wolves Removed</b>	<b>Population Estimate</b>	<b>Percent of Wolf Population Removed</b>
Moberly	29	29 - 49	59 - 100%
Kennedy/Scott	2	32 - 53	4 - 6%
Quintette	26	38 - 64	41 - 68%

Therefore, there was a relatively high level of wolf removal from the Moberly range, an intermediate level of removal from the Quintette range, and a minor level of removal from the Kennedy/Scott range.

## **Caribou Population Status**

### **Graham Herd (Comparison Area)**

The Graham caribou herd lives in the Rocky Mountains north of the Peace River and is not part of the Central Mountain caribou population. It is being monitored as the no wolf control comparison for the South Peace wolf control program (Culling and Culling 2016). Between April 2015 and March 2016, two of 29 collared caribou died in the Graham herd for an annual mortality rate of 6.8%. In March of 2016, an aerial census counted 181 caribou including 21 calves for a calf recruitment rate of 11.6%.

### **Moberly/Scott Herd**

The Moberly/Scott herd is the subject of an ongoing maternal penning project, so information on the 2015 and 2016 population parameters of the herd were collected and reported by Wildlife Infometrics in co-operation with the West Moberly and Sauleau First Nations (McNay et al. 2016). Although the Moberly and Scott herds were considered separate in the past, the movement of some Scott caribou to the maternity pen has resulted in the two herds becoming mixed into one.

The following information is a brief summary of the population parameters presented in the Wildlife Infometrics report (McNay et al. 2016). In March 2015, 11 adult females were captured and placed in the maternity pen. Although nine of those tested positive for pregnancy, only seven gave birth. Out of the seven calves, two died in the pen (one stillbirth, and one 3 days old). In July, the 11 adult females and five surviving calves were released and all of them survived to March 2016. No collared adults ( $n = 17$ ) in the Moberly/Scott herd died during the year. During a March 2016 survey flight, three of 14 adult females that had not been in the pen had surviving calves. Therefore, the penned females had better calf recruitment (45%) than the unpenned cows (21%). In total, 54 caribou were counted in the Moberly/Scott range including nine calves, for a calf recruitment rate of 16.7%. Included in that count was a group of four caribou with one radio-collared caribou that was originally collared in the Kennedy Siding range.

The 2016 calf recruitment rate was slightly higher than the average value of 14.3% calf recruitment from 2003 - 2015 (Seip and Jones 2016), but there were individual years with higher calf recruitment rates during those years. The more significant change was the apparent absence of any adult mortality compared to an average of 23.2% annual adult mortality since 2003. Although there were some years in the past when no mortalities of collared adults were

recorded, those years had a small sample size of collared caribou in the population (Seip and Jones 2016).

The combined high adult survival rate and relatively high calf recruitment rate resulted in a population increase from 42 caribou in 2015 to 54 in 2016. The improved population status corresponds to the combination of maternal penning and wolf control in 2015. These results provide a preliminary indication that maternal penning in combination with removal of wolves from the Moberly/Scott herd range may have improved caribou survival and contributed to a population increase.

### **Kennedy Siding Herd**

Adult mortality rates for this herd were determined by monitoring radio-collared caribou. Population estimates and calf recruitment rates were determined using aerial survey methods prior to 2015, but starting in 2015 a project led by Doug Heard used motion-sensitive cameras to count the caribou. The cameras are placed near feeding stations and salt blocks on the low-elevation winter range, and over several weeks all individuals in the herd can be identified by antler and pelage patterns (Heard and Zimmerman 2016).

Between March 2015 and March 2016, one of seven radio-collared caribou died. In addition, the collar of one caribou stopped transmitting data in June 2015 and could not be located. That collared caribou was not seen on the cameras during the early winter period, so we assumed that she died sometime in summer/fall. Therefore, we concluded that two of seven radio-collared caribou died for an annual mortality rate of 28.6%. This value was higher than the average rate of 15.6% observed from 2003 to 2015. One of the mortalities was an accidental road kill, and the missing caribou's cause of death was unknown.

The motion-sensitive cameras recorded 50 different caribou, including 26 cows, five calves, and 19 bulls. The calf recruitment rate of 10.0% in the herd was slightly lower than the average of 13.1% recorded since 2003.

The population of 50 caribou was identical to the number counted in 2015, and similar to population estimates since 2011 indicating that the Kennedy Siding herd has been stable over recent years. The number of caribou counted in 2015, however, was substantially lower than the 120 caribou counted in 2007 (Seip and Jones 2016). There was no evidence that wolf control or supplementary feeding had any positive impact on the caribou population growth rate in 2015. No detectable impact of wolf control would have been expected, however, given that only two wolves were killed within the Kennedy Siding range.

## Quintette Herd

For the Quintette herd, a population census was conducted in March 2016 to estimate the current population size, and data on calf recruitment and adult survival were collected to estimate the current population trend.

On March 8 and 9, an aerial survey of the high-elevation winter range of the Quintette herd was conducted from helicopter (Figure 3). Caribou tracks were easily observed as fresh snow was covering the majority of alpine areas during the survey. Visibility was generally unlimited allowing the entire alpine area to be searched. A snowstorm occurred in the Quintette/Roman mountain area during the March 8 survey, so this area was resurveyed on March 9 under clear conditions. At the time of the census there were 15 radio-collared caribou in the Quintette herd but radio-telemetry was not used to find collared caribou during the census. Six collared caribou were not seen during the census, and were located by radio-telemetry immediately following the survey to determine minimum population size and number of calves. Two additional collared cows that could not be found were located at a later date by aerial telemetry from a fixed-wing aircraft to confirm that they were still alive. Group size and number of calves could not be determined for these two caribou.

During the census, a total of 29 caribou were counted within the high-elevation census area. Seven of the 10 collared caribou that were in the high-elevation census area were seen during the survey for a sightability of 70%. Correcting for sightability, the population estimate on the high-elevation census area was 41 caribou. In addition, two collared caribou were outside the census area using low-elevation winter range, and three were using high-elevation winter range beyond the census area (Figure 3). Therefore we saw seven of the 15 collared caribou in the population for a sightability estimate of 47%, yielding an overall population estimate of 62 caribou. The minimum count of caribou was 33 in the high-elevation census area, and 39 in the overall population.

These population estimates represent a 50% decline in numbers since the last complete census in 2013. The 2013 population estimate for the high-elevation census area was 98, and the estimate for the total population was 129. Similarly, the minimum population count in 2013 was 100 caribou in the census area, and 114 in the overall population. During the 2008 census, the population estimate was 166 and the minimum count was 173, with most of the caribou located within the high-elevation census area.

Only five caribou were counted on the Quintette/Babcock/Roman area, down from 41 in 2008, and 34 in 2013. On Mt. Spieker/Bullmoose, 28 caribou were counted this year compared to 114 in 2008 and 28 in 2013. No caribou or tracks were seen in other portions of the high-elevation census area compared to 18 during the 2008 census, and 38 during the 2013 census.



During the census we counted seven calves out of a total of 35 caribou, representing 20.0% calves in the herd. This was higher than the annual average of 14.2% calves from 2003 - 2015 (Seip and Jones 2016). There were some individual years during that period, however, when calf recruitment was 20.0% or higher.

Between March 2015 and March 2016, six of 17 radio-collared adult females died for an average annual mortality rate of 35.3%. This value was higher than the 12.9% annual average rate calculated from 2003 - 2015. Causes of mortality in 2015/16 included one wolf kill, three grizzly kills, and two unknown.

In summary;

1. The Quintette caribou herd has declined by about 50% since the last complete census in 2013. The current population estimate is 62, with only 41 caribou within the core high-elevation winter range.
2. Calf recruitment of 20.0% was higher than the average recruitment in previous years, and may be related to the reduction of wolves in the herd area. This result is still inconclusive.
3. The adult mortality rate of 35.3% over the past year was too high to be balanced by the calf recruitment, indicating an ongoing decline despite the wolf reduction. Contrary to previous years, the primary cause of adult mortality was grizzly bear predation and only one collared caribou was known to have been killed by wolves.
4. Overall, the level of wolf reduction that occurred in 2015 did not halt the population decline, but there were some preliminary indications that it may have improved calf recruitment.

### **Bearhole-Redwillow subgroup of the Narraway Herd**

Ongoing monitoring of this small herd is limited to maintaining a few radio-collars in the herd to provide information on adult mortality, calf recruitment, and minimum population size.

Between March 2015 and March 2016, one of three collared caribou died for an annual adult mortality rate of 33.3%. The sample size was too small to provide reliable estimates in any single year, but when combined with data since 2008, the annual adult mortality rate has averaged 24.4%.

On March 8, two radio-collared Bearhole-Redwillow caribou, and one Quintette caribou that was using the Bearhole-Redwillow winter range were located and counted. A total of 19 caribou were counted with no calves. When combined with calf recruitment data since 2007, the calf recruitment rate was 17 calves/203 adults, representing an average of 7.7% calves in the herd. This low calf recruitment rate in combination with the high adult mortality rate is indicative of a rapidly declining population.

The minimum count of caribou was 18 (excluding the Quintette caribou), which is comparable to numbers counted in recent years, and consistent with an ongoing decline from a minimum count of 49 caribou, and a population estimate of 80 caribou in 2008 (Seip and Jones 2016).

The wolf control program did not extend into the Bearhole-Redwillow range so there was no expectation of any change in the ongoing population decline.

### **South Narraway subgroup of the Narraway Herd**

Surveys and monitoring of the South Narraway herd were conducted by the Alberta Department of Environment and Parks because this is a cross-border herd. A total of 35 caribou were counted including five calves for a calf recruitment of 14.3 %. This represents an ongoing decline in the minimum count from at least 102 caribou in 2008 (Seip and Jones 2016).

A population estimate for South Narraway caribou was also calculated using a model that predicts the probable number of groups in a population based on the distribution of collars in groups during calf recruitment surveys. The population estimate using that model was 34 - 82 caribou, with a mean estimate of 41 caribou in the population. This method has also signified an ongoing decline in the South Narraway caribou from an estimate of 179 (139 - 221) in 2008 (Seip and Jones 2016).

The wolf control program did not extend into the South Narraway range so there was no expectation of any change in the ongoing population decline.

## Central Mountain Caribou Population Estimate

Based on these latest results, the current estimate for the number of Central Mountain caribou in British Columbia is 219:

Herd	Population Estimate
Moberly/Scott	54
Kennedy Siding	50
Burnt Pine	0
Quintette	62
Bearhole-Redwillow Subgroup	18 (Minimum Count)
South Narraway Subgroup	35 (Minimum Count)

The 2016 population estimate of 219 caribou represents an ongoing decline in the total number of Central Mountain caribou, primarily due to the updated census for the Quintette caribou herd.

Year	Population Estimate
2016	219
2015	248 - 263
2014	235 - 260
2012	316 - 361

Minimum population counts within the past 20 years indicate that there were at least 672 caribou in the recent past, and probably at least 1000 (Seip and Jones 2016). The population recovery objective in the National Recovery Plan is for 2000 caribou in the Central Mountain population, distributed between British Columbia and Alberta.

## **Effect of Management Actions on Caribou Recovery**

The impact of the wolf removal program on caribou recovery is still equivocal because the level of removal in 2015 was below the objective. There was a relatively high level of wolf removal on the Moberly range, an intermediate level of removal on the Quintette range, and no significant removal on the Kennedy Siding and Scott range.

1. The Moberly/Scott herd had relatively high calf recruitment, and no documented adult mortality, resulting in a population increase. The combination of maternal penning to protect some of the newborn calves, and wolf control to protect calves and adults outside of the pen likely contributed to this improved survival and population increase.
2. The Quintette herd had high calf recruitment which may have been related to the intermediate level of wolf control, but the calf recruitment was not sufficient to balance the high level of adult mortality that occurred this year.
3. The Kennedy Siding herd had low calf recruitment, but it appeared to be adequate to balance the adult mortality leading to a stable population, despite the absence of any meaningful level of wolf control. Also, there was no evidence that the supplementary feeding resulted in improved calf recruitment (Heard and Zimmerman 2016).
4. The Graham caribou herd which is being used as the no wolf control comparison area had low calf recruitment, but high adult survival which may have been sufficient to keep the herd stable over the past year (Culling and Culling 2016).

## **Wolf Reduction in Winter 2016**

Wolf removals within the three treatment areas occurred from January to March 2016. Wolves were killed using a combination of aerial shooting and trapping. Eleven wolves were radio-collared to facilitate locating and removing entire wolf packs later in the season. A total of 155 wolves were killed by aerial shooting (Figure 4). Of those, 29 were killed adjacent to the treatment areas. This included some wolves that were located by following tracks that started within the treatment areas but moved outside the treatment boundary; and also some packs that were radio-collared within the treatment area, but were later located slightly outside the boundary. An additional 46 wolves were killed by ground trapping and/or shooting within the Moberly treatment area.

The breakdown of wolf removal on each range was as follows:

<b>Treatment Area</b>	<b>Number of Wolves Removed</b>	<b>Population Estimate</b>	<b>Percent of Estimated Wolf Population Removed</b>
Moberly	79	29 - 49	>100 %
Kennedy/Scott	58	32 - 53	>100 %
Quintette	64	38 - 64	100 %

Overall, 201 wolves were killed within and adjacent to the three treatment areas estimated to contain 99 - 166 wolves prior to the initiation of the wolf control program (Government of B.C., 2014). The underestimate of the wolf population was in part due to not including wolf packs that straddled the border of the removal areas. If the 29 wolves that were killed adjacent to the removal area are deducted, the 172 removals closely match the upper estimate of 166 wolves.

Therefore it appears that the wolf control program in winter 2016 removed a very large proportion of the wolf population. A significant level of wolf recolonization of the area is likely over the summer, so wolf control will need to be repeated next winter if wolves are to be maintained at low numbers.

Ongoing caribou monitoring will continue to evaluate if this wolf reduction is effectively increasing caribou survival rates and aiding population recovery.

## **Acknowledgments**

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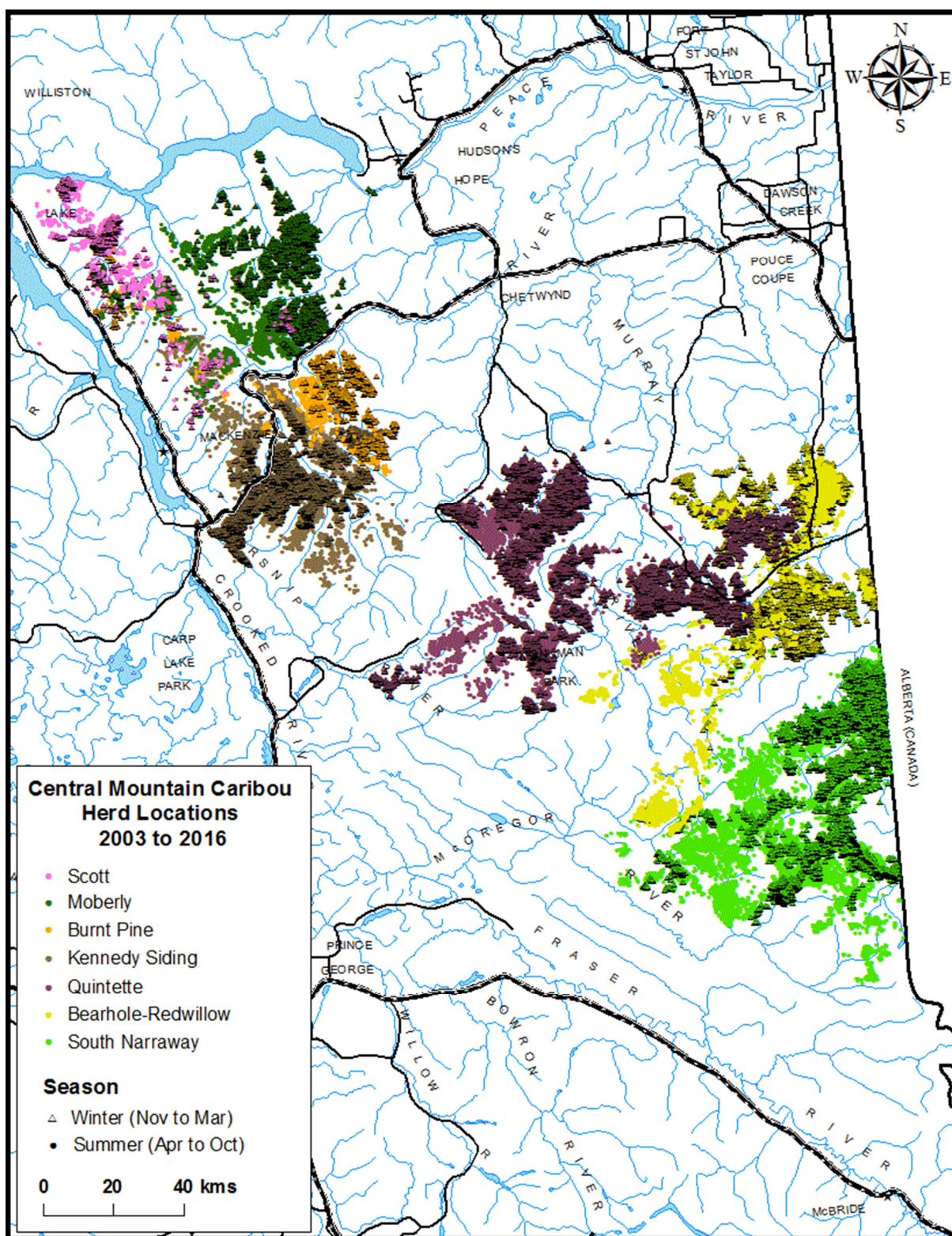


Figure 1. Radio-telemetry locations of caribou herds in the South Peace region of British Columbia, 2002 to 2016.

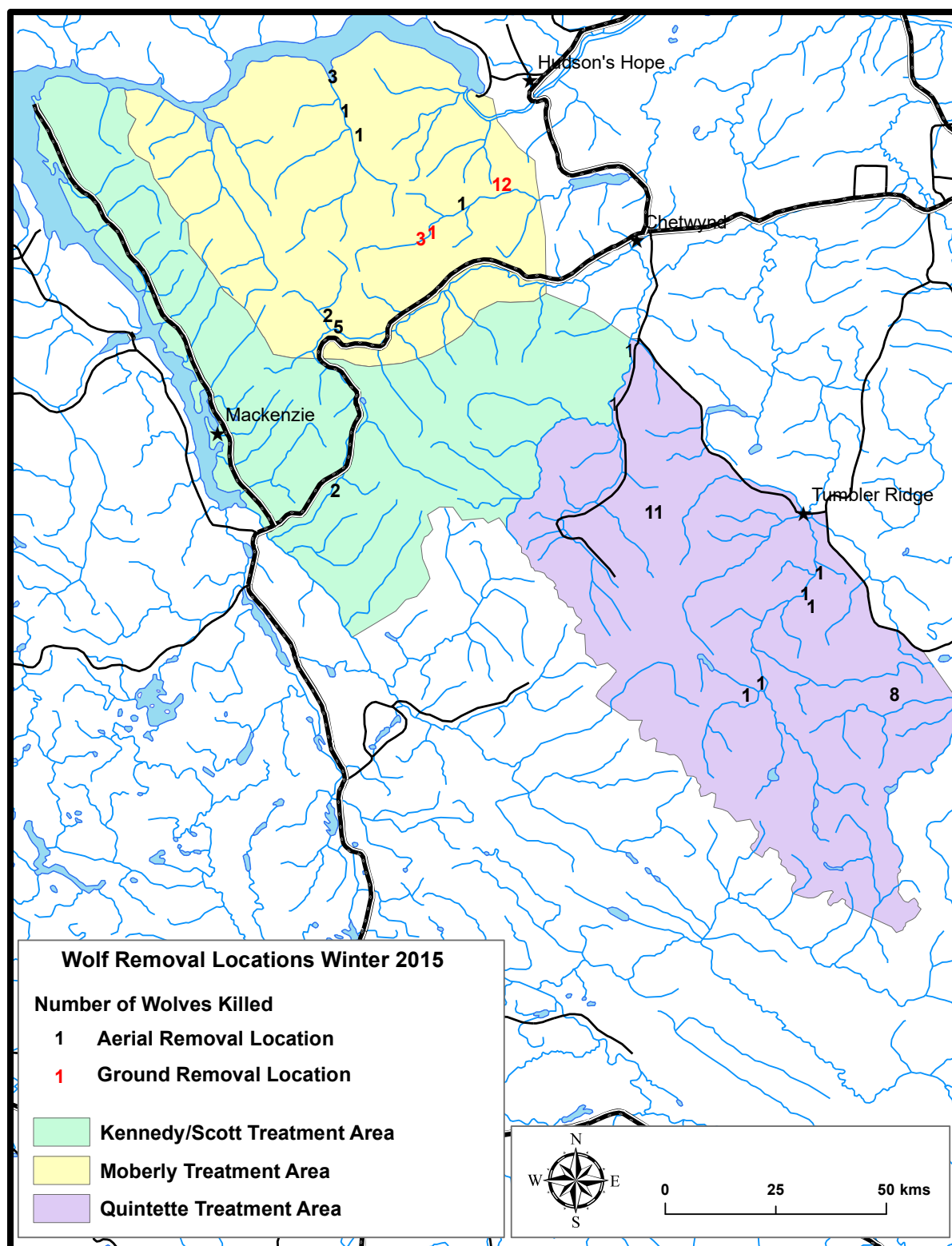


Figure 2. Wolf removal locations and treatment areas in the South Peace region of British Columbia, winter 2015.



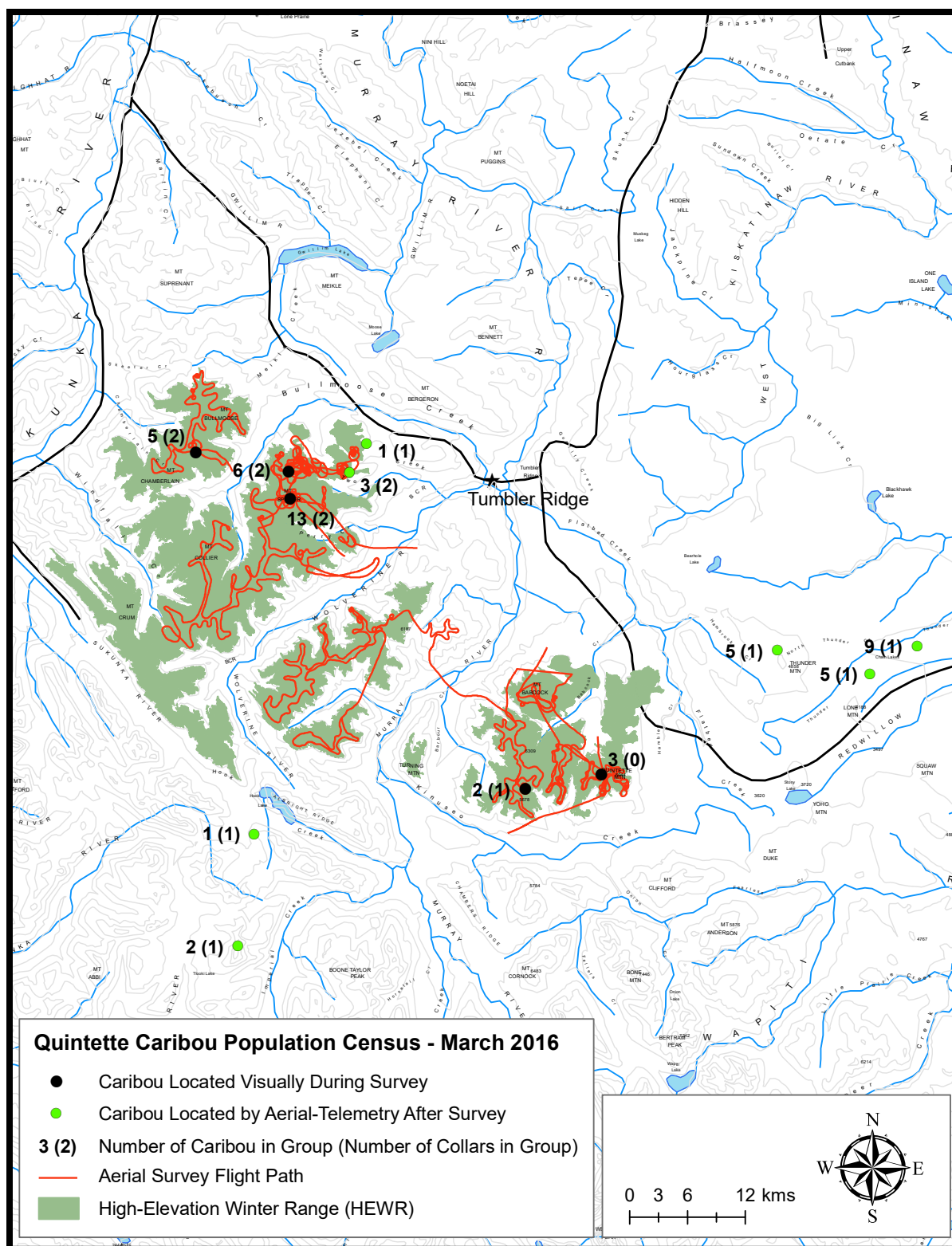


Figure 3. Aerial survey track and caribou locations for the Quintette caribou herd population census, March 2016.

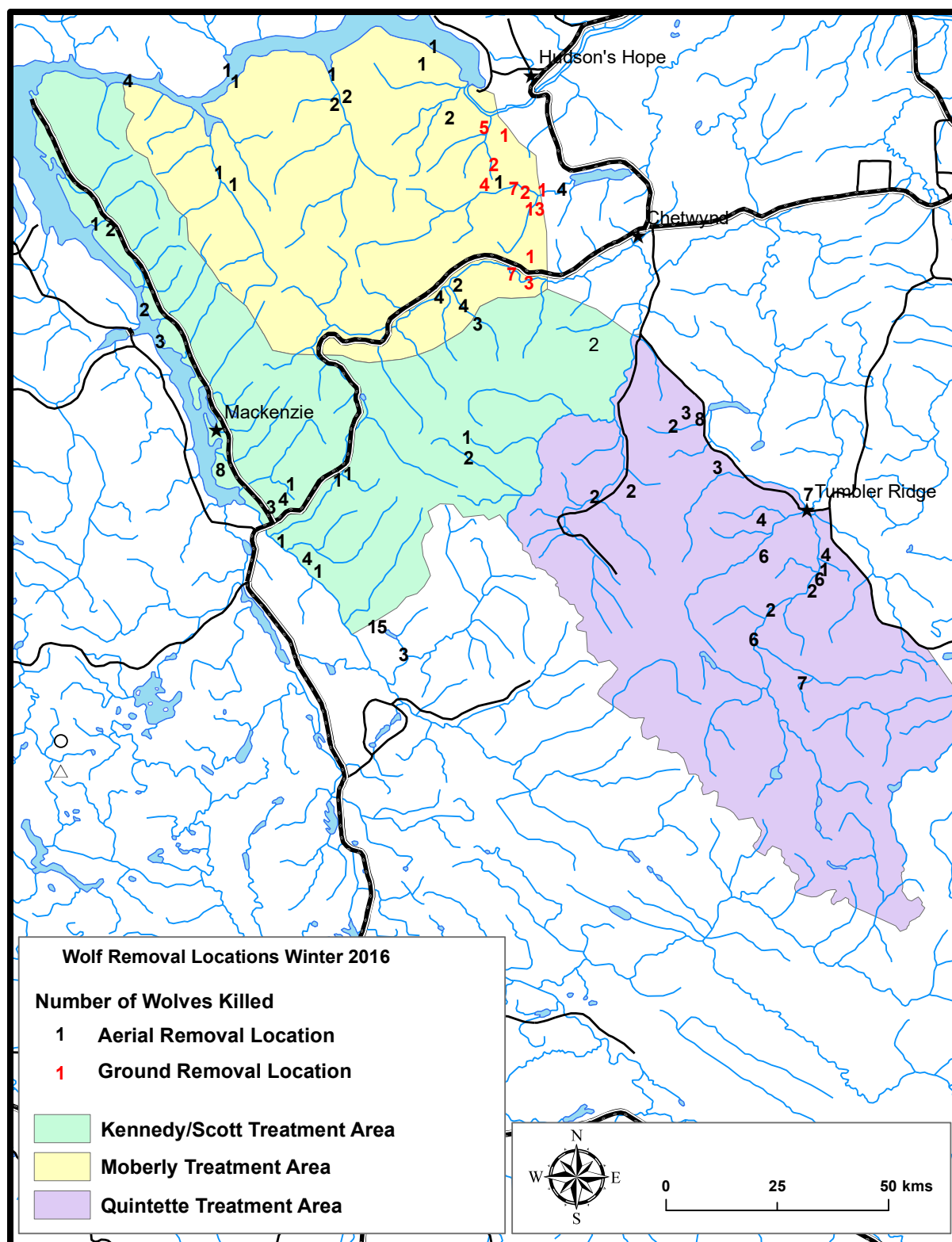


Figure 4. Wolf removal locations and treatment areas in the South Peace region of British Columbia, winter 2015.