

2019 Itcha-Ilgachuz caribou post-calving population survey

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The 2019 Itcha-Ilgachuz survey was flown June 19th – 21st to assess population status and June calf percentages. The herd has declined by 40% in one year (2018-19). Given the 3 year average rate of decline (-33.4 %, 2017-19), it is possible the herd will be functionally extirpated (< 20 animals) from the Chilcotin in 8 years.

June is typically the best month to conduct a population survey for the Itcha-Ilgachuz herd because the majority of the caribou are concentrated in alpine areas and are easier to locate than during the winter when they are spread out in smaller groups in low-elevation pine forests. Radio collars deployed on caribou in 2018 and 2019 provided a sample for mark-resight population estimation of 19 adult females and 6 adult males, for a total of 25 collared adult caribou with functioning collars. Functioning collars were defined as collars which had sent a GPS location on or after June 1, 2019, or whose VHF signal had been detected in the pre-census fixed wing flight flown on June 13-14th. The June 19th-21st survey was delayed by inclement weather conditions (snow, fog and high winds) on the 19th and 20th. 185 total caribou were seen in the survey (Table 1). This is the lowest number of Itcha-Ilgachuz caribou recorded since post-calving surveys on the Itcha-Ilgachuz herd began in the 1970s. An additional 24 caribou were sighted in follow up surveys on collared caribou within the Itcha-Ilgachuz herd boundary that were outside of the typical study area or that had been missed on earlier survey days. This resulted in a total minimum count of 209 caribou (66 cows, 58 bulls, 64 unclassified adults, 3 yearlings and 18 calves).

Table 1. Count of age and sex classes of caribou in the Itcha-Ilgachuz 2019 post-calving survey and in the follow-up survey.

Age and Sex Classification	2019 survey count	2019 follow up survey count
Adult cows	63	3
Adult bulls	40	18
Unclassified adults	61	3
Total adults	164	24
Yearlings	3	0
Calves	18	0
Total	185	24

Sightability was lower for both cows and bulls in 2019 in comparison to 2018 (Table 2). 2019 cow sightability was much lower than the average cow sightability from 1996-2003 of 75.9%. The high bull sightability in 2018-19 contrasts to the lower 41.7% average sightability of bulls from surveys in 2012 and 2014 (Dodd 2017).

Table 2. Collars available and sightability of adult Itcha-Ilgachuz caribou in 2018 and 2019.

Survey Year	2018	2019
Cow collars available	23	19
Cow collars sighted during survey	17	8
Cow Survey Sightability	73.9%	42.1%
Bull collars available	15	6
Bull collars sighted during survey	11	4
Bull Survey Sightability	73.3%	66.7%
All adult collars available	38	25
Adults sighted	28	12
Pooled adult sightability	73.7%	48.0%

The 2019 Itcha-Ilgachuz population estimate was calculated as the sum of the sightability-corrected estimates for cows, bulls, unclassified adults, yearlings and calves (Table 3). Mark-resight methodology was possible due to marked adult GPS-collared caribou (Table 2). The estimated number of cows (n=149, 95% Confidence Interval (CI) = 102-277) and bulls (n=60, 95% CI = 44-137) was calculated with the joint hypergeometric estimator for closed populations in NOREMARK (White and Garrot 1996). The estimated number of unclassified adults and yearlings was calculated with the 2019 pooled adult sightability (0.480). The estimated number of calves was calculated with the 2019 cow sightability (.421). Estimated percent calves were calculated as the estimated number of calves divided by the total population estimate (43/385). The 24 caribou seen on the follow-up survey were not added to the population estimate because the mark-resight methodology corrects for animals not seen during the survey.

Table 3. Sightability corrected population estimates and estimated percent calves from the 2019 Itcha-Ilgachuz caribou post-calving survey by age and sex classification of caribou. The population estimate from 2018 was 637.

Age and Sex classification	2019
Adult cows	149
Adult bulls	60
Unclassified adults	127
Total adults	336
Yearlings	6
Calves	43
Estimated percent calves	11.2%
Total Population Estimate	385

Population trends

The finite population growth rate (lambda, or λ , equation 1), which gives the proportional change in population size from one time period to the next for the Itcha-Ilgachuz herd from 2018-2019 is 0.604. If $\lambda < 1.0$, then $N_{t+1} < N_t$ and the population is declining. A lambda of 0.604 indicates a steep decline of 39.6% between 2018-19.

Equation 1. $\lambda = \frac{N_{t+1}}{N_t}$

Where N_t is the population size at time t

N_{t+1} is the number of individuals after one time period (e.g. after 1 year)

The herd has been declining since 2003 (Figure 1). Data from the 1970's was not used in Figure 1 because the caribou survey done in 1977 was less intensive, was conducted in April rather than in June, and was a minimum count with no sightability correction factor (Smith and Hebert, 1986).

The 2019 population estimate (N=385) is 39.6% lower than the 2018 population estimate (N=637). The average annual rate of decline over the past 10 years (2009-2019) is 23.2%, while the average rate of decline over the past 3 years (2017-2019) is 33.4%, which suggests the rate of decline may be accelerating. Given the 3 year average rate of decline, it is possible the herd will be functionally extirpated (<20 animals) from the Chilcotin in 8 years, although this may be sooner if the decline continues to accelerate, which is possible because the low calf percentages in June 2018 and 2019 (Figure 2) suggests two years of failed reproduction in the herd. The 2018-19 adult female survival rate was 80%. This is below the threshold of adult female survival of 88% associated with stable caribou populations (Bergerud and Elliot 1986).

Figure 1. Itcha-Ilgachuz caribou herd population trends from 1985-2019 from June post-calving population surveys.

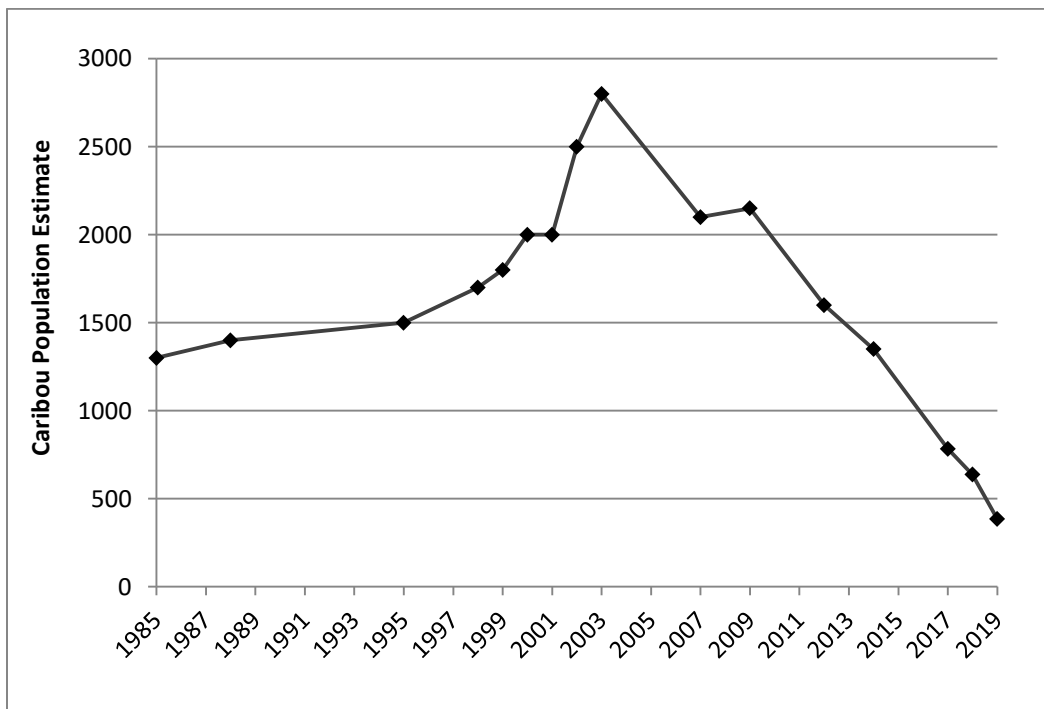
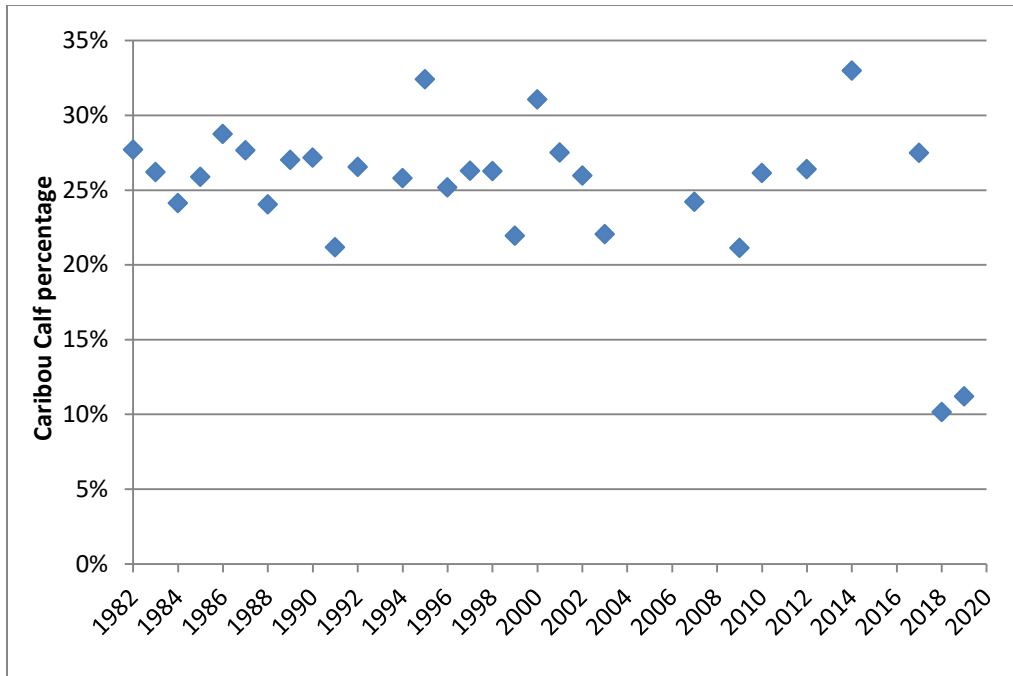


Figure 2. Itcha-Ilgachuz caribou June calf percentages (estimated calves/total population estimate) from 1982-2019.



As a comparison population estimate, the potential 2019 population size given the mortality rate of collared Itcha-Ilgachuz adult caribou was calculated. Out of 34 collars that were active from 2018-2019, there were 11 mortalities (Figure 3), for a mortality rate of collared adults of 32.4%. In comparison, the decline of adult caribou when comparing the sightability corrected population estimates for adults only from 2018 to 2019 is 40.3%. The population estimate calculated with the adult mortality rate yields an alternate population estimate of 374 adult caribou ($\lambda = .676$), which is slightly above the sightability-corrected estimate of 336 adult caribou ($\lambda = .604$). The similarity of the population estimates from the mortality data and the mark-resight survey lend further support to the findings of a steep decline in the herd. Collars that dropped off bulls during the rut (n=3) were censored from the analysis.

Mortality causes of Itcha-Ilgachuz caribou

Between Jan 1, 2018- September 26, 2019, 45% (5 of 11 mortalities) of collared adult caribou mortalities were likely caused by wolf (*Canis lupus*) predation. 18.2% of the mortalities (2/11 mortalities) were caused by cougar (*Puma concolor*) predation, and 18.2% were likely caused by bear predation (*Ursus spp*). A single mortality was health related, apparently caused by a fracture in a rear leg bone which became infected. These mortality trends are similar to causes of caribou mortality for this herd described from collaring efforts dating to 1985, although cougar predation has only become a contributing mortality factor in the last 7 years. Although the proximate cause of mortality for the Itcha-Ilgachuz herd is predation, the ultimate cause of the mortality is habitat alteration (habitat loss, degradation and fragmentation) from both human-caused and natural sources. Habitat alteration has increased the primary prey of predators and

thus led to higher predator populations and subsequent higher predation rates on caribou (Environment Canada, 2014).

Figure 3. Cause-specific mortality of collared adult Itcha-Ilgachuz caribou from 2018-2019 (N=11).

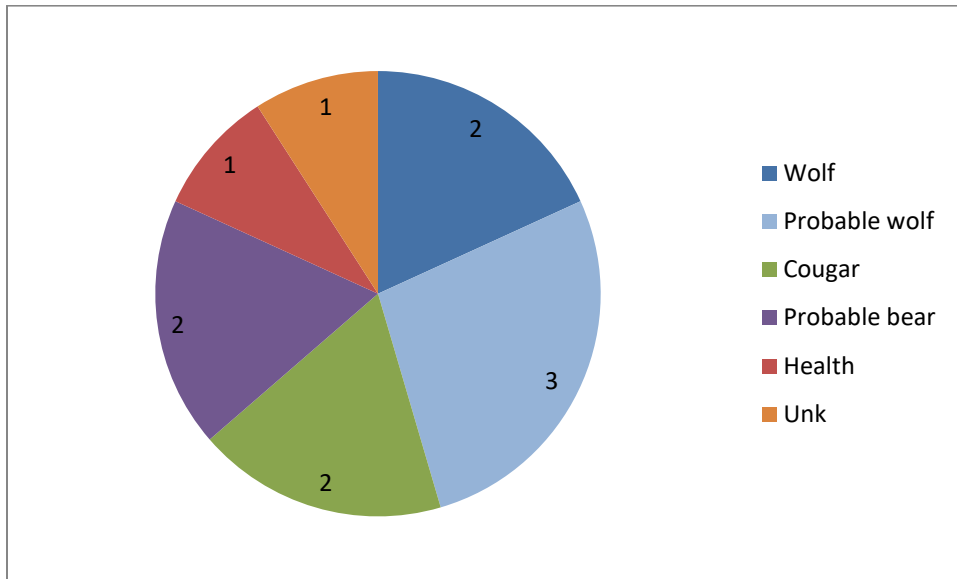


Figure 4. Map of survey tracks and caribou sightings during 2019 June Itcha-Ilgachuz post calving survey. June 20th was a follow-up day and was not considered to be part of the survey.

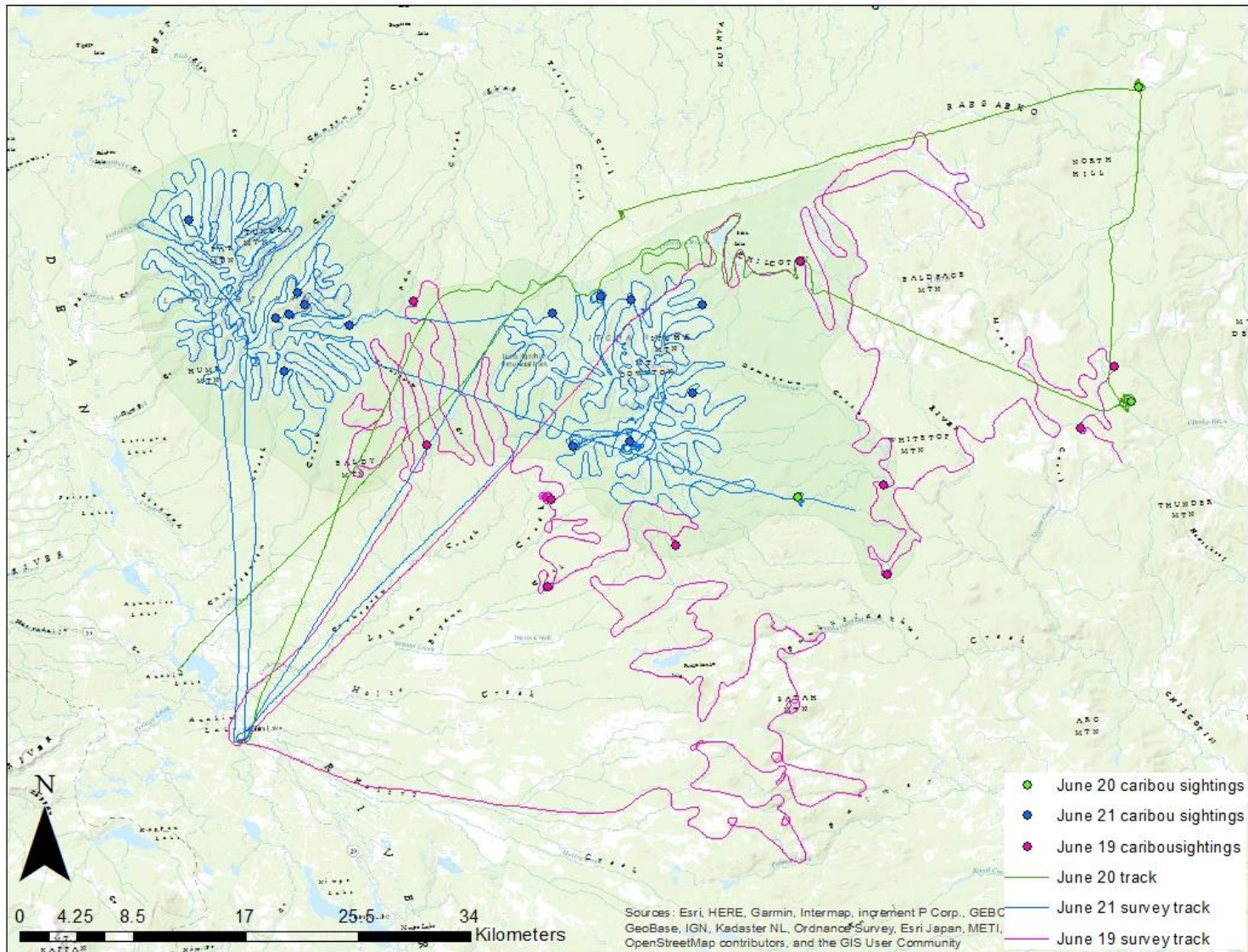


Figure 5. Group of 22 caribou (16 bulls, 3 cows and 3 unclassified adults) in a clearcut in low-elevation summer range sighted on June 20, 2019.



Figure 6. Group of 18 caribou (12 bulls, 1 cow, 5 unclassified adults) in low-elevation summer range sighted on June 19, 2019.



Figure 7. Photograph of part of the largest group of caribou seen on the survey (N=98, 26 cows, 1 calf, 18 bulls, 3 yearlings and 50 unclassified adults), in the Itcha Mountain Range on June 21, 2019. The one calf in the group is at the center of the photograph.



Citations

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