



MEMORANDUM

TO: Todd Rinaldi,
Regional Management Coordinator

DATE: November 2025

FROM: Evelyn Lichwa
Acting Dillingham Area Biologist

SUBJECT: 2025 Mulchatna Caribou herd
composition survey

Survey Objective

The Mulchatna Caribou Herd (MCH) is distributed across four geographic segments in southwest Alaska, though most animals occur in two primary areas. The eastern segment (EMCH) typically ruts in the upper Mulchatna River drainage within Game Management Unit (Unit) 17B (Figure 1), while the western segment (WMCH) primarily occupies areas near Three Step Mountain in Unit 18 (Figure 1). Fall composition surveys are scheduled each October to determine bull-to-cow ratios, calf-to-cow ratios, and to estimate calf survival over the summer. Fall composition results are utilized in conjunction with the summer population survey to estimate the number of cows, calves, and bulls for each segment and combined.

In July 2025, the EMCH and WMCH combined abundance was estimated at 16,276 animals with 8,684 in the EMCH and 7,592 in the WMCH. Tracking changes in the herd's composition provides valuable insight into demographic trends, reproductive success, and recruitment potential as well as monitoring achievement of intensive management objectives (IMO). Additionally, since 2023 the calf-to-cow ratio in the WMCH has been used, in part, to evaluate success of Department removal activities.

Survey Design

Due to EMCH and WMCH geographically distinct ranges, it is important to assess the segments separately to detect localized trends and combined for overall insight of the MCH. Herd composition surveys are conducted via a Robinson 44 (R44) helicopter with 1 or 2 Department staff to fly through groups of caribou and classify individuals as calf, cow, or bull. Bulls are further classified by antler size (i.e., small, medium, large) during the survey for general indication of bull age-class trends. Two fixed-wing planes are utilized to locate caribou and confirm that no groups of caribou are double-counted. Using GPS collar locations and last-known positions of VHF-collared caribou, fixed-wing aircraft guide the helicopter into caribou groups. To improve accuracy, large aggregations are systematically divided into smaller subgroups before classification.

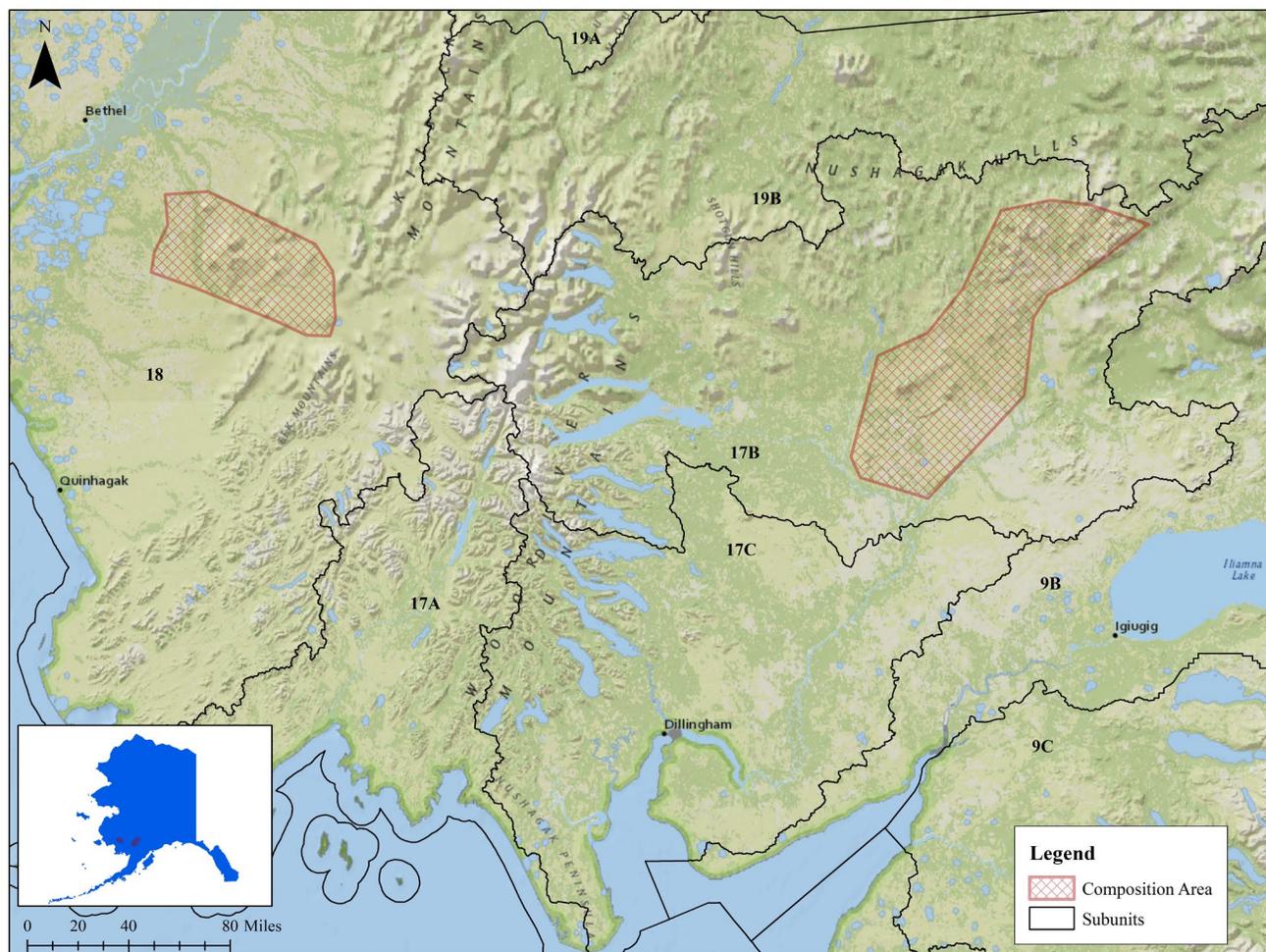


Figure 1. Mulchatna caribou herd composition survey areas in southwest Alaska, October 2025.

The observer conducting the composition survey records classifications with a digital voice recorder. An additional observer, if present, records sample size throughout the survey. Survey location is dependent upon the distribution of the herd at the time of the survey. An effort is made to sample caribou groups at different locations to represent the spatial distribution of the herd and minimize bias that can be caused by sexual segregation. A minimum of 30% of the estimated population is a desirable sample size for each composition survey.

Results

EMCH

The EMCH composition survey was conducted on 10 October under clear and calm conditions. Most caribou were scattered across several groups in the Nushagak Hills typical of this segment, concentrating in the Mosquito River drainage.

A total of 3,013 EMCH caribou were classified, representing approximately 35% of the population estimate. Of these, 1,639 (55%) were cows, 849 (28%) were calves, and 522 (17%) were bulls (Table 1).

The resulting ratios were 52 calves:100 cows and 32 bulls:100 cows, both increases from last year. The calf ratio exceeded the Intensive Management Objective (IMO) of 30:100 for the seventh consecutive year and was notably higher than the long-term average. The bull ratio, however, remained below the IMO of 35:100 for the second consecutive year.

Applying these ratios to the Rivest population estimate (8,864) yields an estimated 4,720 cows, 2,454 calves, and 1,510 bulls in the EMCH.

WMCH

The WMCH survey was conducted on 18 October under clear and calm conditions. Caribou were distributed atypically in several small groups, including lone cows, cow-calf only, and bull-only groups, primarily located in the flats north of Three Step Mountain.

A total of 2,656 WMCH caribou were classified, also representing approximately 35% of the population estimate. Of these, 1,407 (53%) were cows, 731 (28%) were calves, and 518 (19%) were bulls (Table 1). Two observers surveyed different areas and yielded significantly different ratios. One observed a calf ratio in the mid 50's and bull ratio in the low 30's while the other observed a calf ratio in the low 40's and a bull ratio in the high 40's.

The resulting ratios were 52 calves:100 cows and 37 bulls:100 cows. The calf ratio decreased slightly from last year's 54 calves:100 cows but remained above the IMO of 30:100 for the third consecutive year, consistent with Department predator removal efforts. The bull ratio improved from last year and exceeded the IMO of 35:100.

Applying these ratios to the Rivest population estimate (7,592) yields an estimated 4,018 cows, 2,089 calves, and 1,487 bulls in the WMCH.

Combined MCH

Overall, 5,665 caribou were classified across both segments, representing approximately 35% of the combined population estimate. Of those, 3,043 (55%) were cows, 1,579 (28%) were calves, and 1,040 (17%) were bulls.

The combined calf-to-cow ratio of 52 exceeded the IMO for the fifth consecutive year, while the bull-to-cow ratio of 34 was below the IMO this year. Applying these ratios to the combined Rivest population estimate (16,276) results in an estimated 8,750 cows, 4,550 calves, and 2,975 bulls in the MCH.

Table 1. Results from MCH composition survey, October 2025.

Group	No. Cows	No. Calves	No. Small Bulls	No. Med. Bulls	No. Large Bulls	No. Total Bulls	Bull-to-Cow Ratio	Calf-to-Cow Ratio	Sample Size	Herd Size	% Sampled
EMCH	1,639 (54%)	849 (28%)	121 (4%)	131 (4%)	270 (9%)	522 (17%)	32	52	3013	8,684	35%
WMCH	1,407 (53%)	731 (28%)	184 (7%)	124 (5%)	210 (8%)	518 (20%)	37	52	2656	7,592	35%

Survey Costs

Excluding staff time, the cost of the two surveys was approximately \$26,048 (Table 2).

Table 2. Expenses associated with MCH composition survey, October 2025.

Survey	Expense	Rate	Quantity	Total
EMCH	R44-Helicopter	\$1,005/hour	5.8 hours	\$5,892
	Cub	\$280/hour	6 hours	\$1,680
	Cessna 185	\$550/hour	7 hours	\$3,850
	Fuel	\$9.50/gallon	188 gallons	\$1,786
WMCH	R44-Helicopter	\$1,050/hour	6 hours	\$6,300
	Cub	\$265/hour	6.5 hours	\$1,722.5
	Maule	\$425/ hour	7.1 hours	\$3,017.5
	Fuel	\$9.00/gallon	200 gallons	\$1,800
Total				\$26,048*

*Does not include pilot per diem or ferry times, which will be accounted for in another memo.

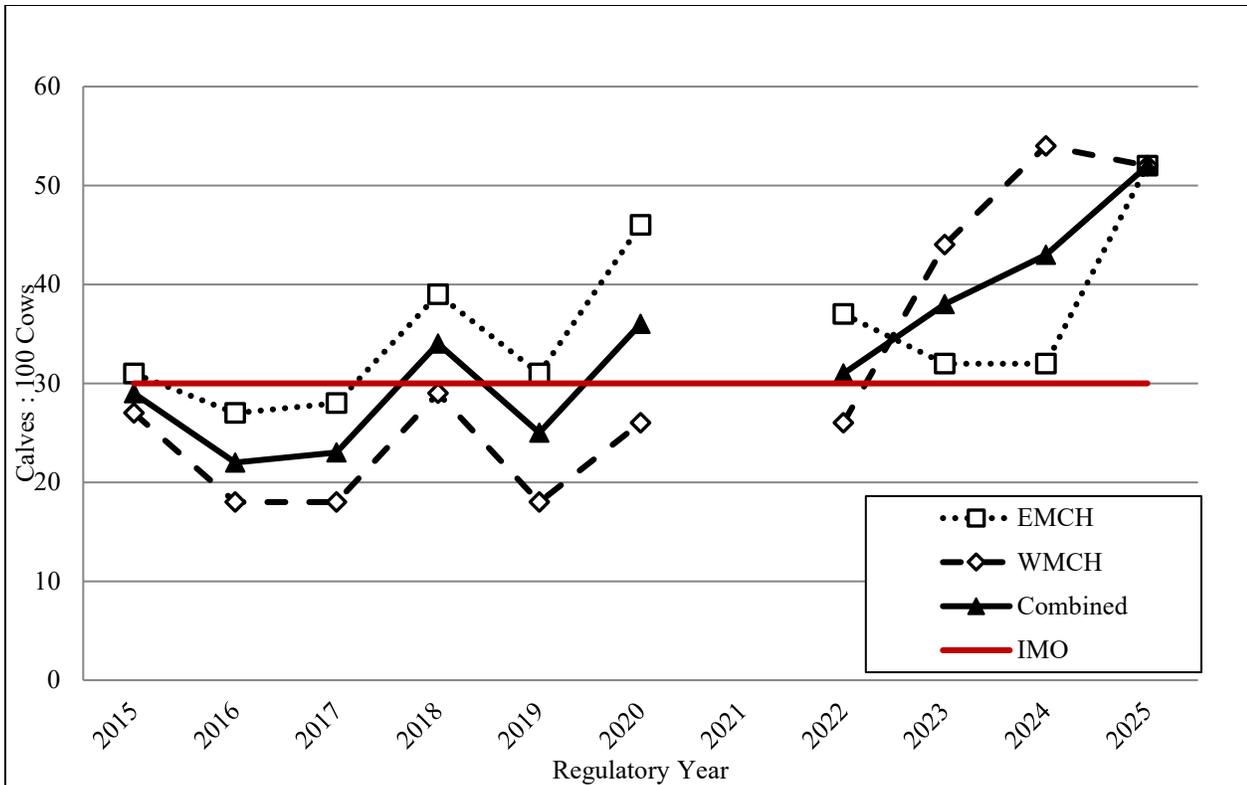


Figure 2. Mulchatna caribou herd calf-to-cow ratio 2015–2025.

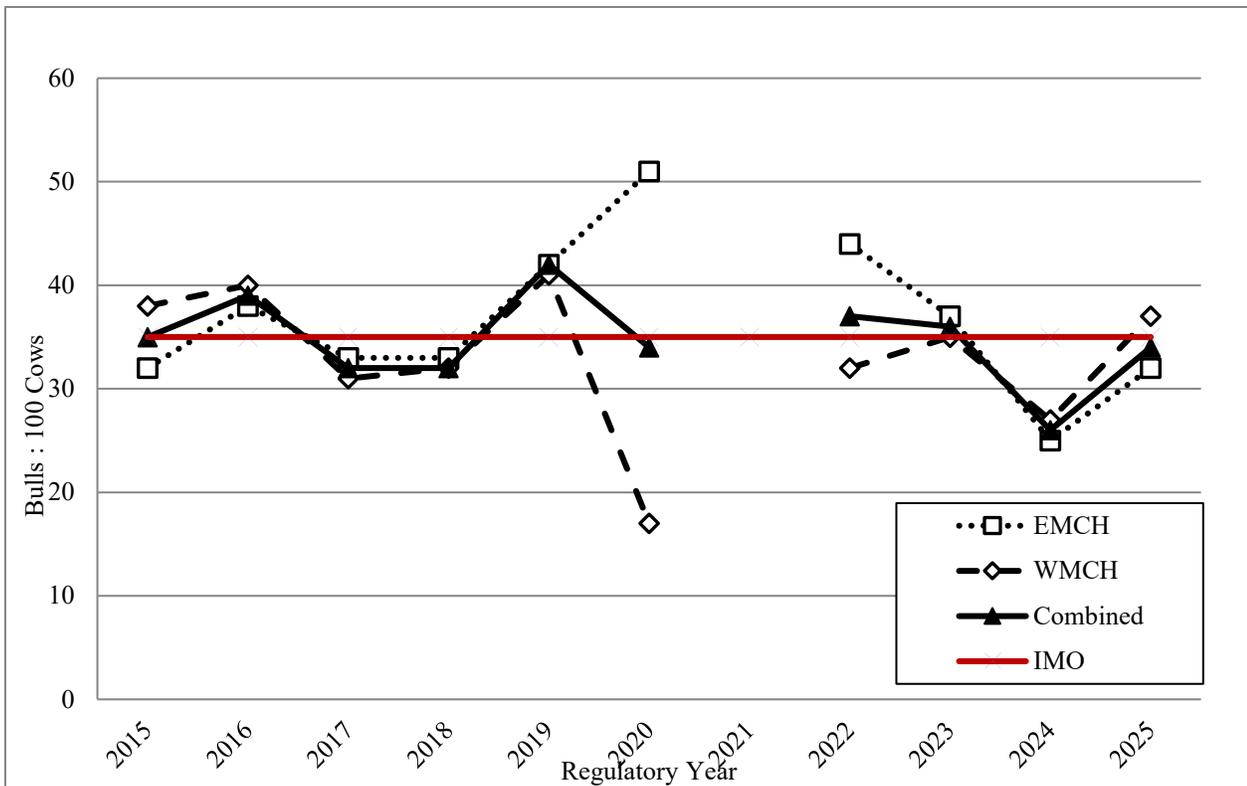


Figure 3. Mulchatna caribou herd bull-to-cow ratio 2015–2025.

Discussion and Management Implications

Composition surveys provide a sample-based snapshot of the age and sex structure of the Mulchatna Caribou Herd (MCH), offering insight into calf survival and progress toward established IMOs. Historically, MCH surveys were conducted in early October, but WMCH surveys are now delayed until after the Unit 18 moose hunt concludes on 15 October. Although this scheduling is necessary to avoid interfering with hunters later surveys can coincide with natural changes in caribou behavior and group composition that occur as rut progresses. EMCH surveys are conducted earlier because there is no hunt conflict, and mixing is typically stronger.

We can infer conception (rut) timing for the MCH from parturition data (Adam and Dale 1998; Laforge et al. 2023) using the birth dates of calves to cows with vaginal implant transmitters (VITs), and a 230-gestation period. VIT births in both 2024 and 2025 indicate similar calving phenology, allowing rut timing to be estimated this year. Given the main pulse of births, the WMCH peak rut around 20 September–2 October, and the EMCH around 17 September–2 October. If rut followed a similar pattern this year, the EMCH survey occurred closer to the tail end of peak rut, matching observations of ongoing rutting. In contrast the 18 Oct WMCH survey occurred >2 weeks after end inferred peak rut, late enough to introduce late survey bias and consistent with limited rut behavior and sexual segregation observed. Bulls and cows mix most strongly at peak rut (late September–early October) and re-segregate as breeding activity diminishes where bulls disperse while cows and calves consolidate (Cameron & Whitten 1979; Jakimchuk et al. 1987). As October progresses, mixing deteriorates and late-season bias may elevate calf ratios, under sample younger bull age classes, and have adjacent areas with significantly different sex ratios (Cameron & Whitten 1979; Ellington et al. 2020; ADF&G 2021; Adamczewski et al. 2022; ADF&G 2024a; ADF&G 2024b).

Previous WMCH composition surveys have documented strong aggregation with caribou in two to three major groups of a few hundred or more with one core group of 1,500–>3,000 caribou (ADF&G 2023; ADF&G 2024a). This year, we documented loose aggregation, minimal to no rutting activity, observations of lone cows, cow-calf only groups, bull only groups, and one core group of ~2,000 caribou spread out loosely over a few miles. The exclusion of the core group was evaluated to determine whether it skewed ratios in any direction. Removing the 1,115 caribou classified from the core group from the dataset did not significantly change either the calf or bull ratios (both increased by ~1–2%), indicating that it was adequately covered. In contrast, excluding all caribou not in the core group (1,541 caribou) decreases the calf ratio to 48 and the bull ratio to 32. The reduced stability of ratios once spatially segregated groups are removed from the sample, and significant differences in the two observers ratios from surveying different areas is consistent with spatial heterogeneity and sex-specific segregation that can emerge rapidly after peak rut (Cameron & Whitten 1979; Jakimchuk et al. 1987; Adamczewski et al. 2022).

The demographic ratios reflect the caribou sampled, and the EMCH and WMCH calf ratios were unexpected for different reasons. A lower WMCH calf ratio was anticipated given incomplete predator removal efforts and two prior years of high calf ratios that should have yielded more non-reproductive females, lowering the calf ratio. Composition counts can reflect true high early calf survival when corroborated by collared-calf survival or other independent indices (Ellington et al. 2020; Cameron et al. 2013); thus, a high WMCH calf:cow ratio in 2025 is biologically plausible given our sustained high early survival from collared calves (78% to two weeks, 71% to five months). In addition, a calf:cow ratio can remain high if yearling survival isn't as strong as indicated by our collared sample (82% in 2024, $n = 12$), late-survey sampling bias, and fewer adult cows counted during the survey which reduce the effective

adult female denominator. Whether the WMCH calf ratio is interpreted as 48 (core group) or 52 (full sample), it exceeds the IMO for the third consecutive year.

In the EMCH, the significant increase in calf ratio was unexpected because the segment does not receive predator removal treatment from the department and EMCH collared neonates experienced lower early survival (65% to two weeks, 59% to five months) than the WMCH. While at first it could seem counter-intuitive, modeling and empirical studies show that moderate-to-high neonatal survival can translate into relatively high composition ratios at fall survey timing when parturition rates are high and the cohort of yearlings is not large (Cameron et al. 2013; Ellington et al. 2020), which is likely the case for the EMCH given two prior years of moderate calf ratios. The significant increase in the EMCH calf:cow ratio likely reflects the observed shift in calving grounds which may have more favorable forage or reduced predator exposure—factors shown to improve early calf survival and apparent recruitment in other caribou systems (Cameron et al. 1992, Gustine et al. 2006). The EMCH ratio exceeded the IMO for the seventh consecutive year, and the combined calf:cow ratio for the fifth consecutive year, suggesting high or sustained calf survival to approximately 5 months of age.

While the overall bull ratios increased across the MCH, small bulls were least detected, and large bulls were the highest in the WMCH. This is unexpected for a herd with two prior years of high calf ratios but aligns with what would be seen from a late survey. Because mature bulls tend to remain with cow groups longer than younger age classes, late-season surveys may disproportionately detect them, while smaller bulls, having already dispersed, are underrepresented (Cameron & Whitten 1979; Jakimchuk et al. 1987; Adamczewski et al. 2022). Small bulls were also the least detected age class during the 2024 WMCH survey following a previous year of high calf ratio. Our late survey timing likely under sampled younger age-class bulls given the method of tracking into collared cows. Incorporating bull collars in future surveys could reduce bias by ensuring search efforts include bulls that may have dispersed or confirming they are still mixed with cows. This recommendation has come up in previous MCH memos and would also provide annual survival estimates which may help us interpret annual fluctuations in bull ratios.

Other potential sources of bias include that the WMCH survey occurred immediately after a few days of caribou research captures which likely changed the distribution and composition of caribou groups. Though the helicopter pilot was new to composition surveys, we used experienced fixed-wing spotters and staff to work caribou groups, and by design, should not have had an effect on composition accuracy. No caribou exhibited signs of brucellosis. Observers noted typical rut-associated injuries (broken legs, lameness) and one emaciated WMCH cow. Calves weighed in the same timeframe in both segments were robust (average ~137 lbs., $n = 27$), with the majority having forked antlers still in velvet. A brown bear was observed on a fresh collared-female mortality in the EMCH, and a sow with three cubs was documented during the WMCH survey; no other predators were observed.

The 2025 ratios accurately represent the caribou sampled, and observed ratios are biologically plausible, but late-season bias should be considered when interpreting both calf and bull ratios in the WMCH. Rut timing is not fixed and can vary in response to environmental conditions (Lent 1965; Laforge et al. 2023) meaning a survey that aligned better with breeding activity one year may miss it in others, as such, both surveys should be completed earlier if possible since later timing may bias ratios. Year-to-year fluctuations in bull and calf ratios are common in interior and southwestern Alaska herds, and interpretation requires balancing biological patterns with the inherent limitations and variability of aerial surveys.

Literature Cited

- Adamczewski, J., J. Williams, J. Boulanger & C. Modeste-Burgin. 2022. October 2021 fall composition survey of the Bathurst and Bluenose-East barren-ground caribou herds. Manuscript Report No. 301, Environment and Natural Resources, Government of Northwest Territories, Yellowknife, NT, Canada. 35 pp. [Adamczewski et al. 2022a.pdf](#).
- Adams, L. G., & Dale, B. W. 1998. Timing and synchrony of parturition in Alaskan caribou. *Journal of Mammalogy* 79(1):287–294.
- ADF&G. 2021. Species Management Report and Plan, Teshekpuk Caribou Herd, Game Management Unit 26A. Alaska Department of Fish and Game, Division of Wildlife Conservation, Juneau, Alaska. SMR&P-2021-43.
https://www.adfg.alaska.gov/static/research/wildlife/speciesmanagementreports/pdfs/caribou_2012_2022_gmu_26_a_teshekpuk.pdf
- ADF&G. 2023. 2023 fall MCH composition and calf survival. Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage, Alaska.
https://www.adfg.alaska.gov/static/applications/web/nocache/research/programs/intensivemanagement/pdfs/2023_fall_mch_composition_calf_survival.pdf
- ADF&G. 2024a. 2024 fall MCH composition and calf survival. Alaska Department of Fish and Game, Division of Wildlife Conservation, Anchorage, Alaska.
https://www.adfg.alaska.gov/static/applications/web/nocache/research/programs/intensivemanagement/pdfs/2024_fall_mch_composition_calf_survival.pdf
- ADF&G. 2024b. Species Management Report and Plan, Western Arctic Herd, GMUs 21D, 22, 23, 24, and 26A. Alaska Department of Fish and Game, Division of Wildlife Conservation, Juneau, Alaska. SMR&P-2024-11.
https://www.adfg.alaska.gov/static/research/wildlife/speciesmanagementreports/pdfs/caribou_2012_2022_western_arctic.pdf
- Cameron, R. D., Griffith, B., Parrett, L. S., & White, R. G. 2013. Efficacy of calf:cow ratios for estimating calf production of arctic caribou. *Rangifer*, 33(2), 27–34.
<https://doi.org/10.7557/2.33.2.2527>
- Cameron, R. D., Reed, D. J., Dau, J. R., & Smith, W. T. 1992. Redistribution of calving caribou in response to oil field development on the Arctic Slope of Alaska. *Arctic*, 338-342.
- Cameron, R. D., & Whitten, K. R. 1979. Seasonal Movements and Sexual Segregation of Caribou Determined by Aerial Survey. *Journal of Wildlife Management* 43:657–664.
<https://www.jstor.org/stable/3808740>
- Ellington, E. H., K. P. Lewis, E. L. Koen, and E. Vander Wal. 2020. Divergent estimates of herd-wide caribou calf survival: ecological factors and methodological biases. *Ecology and Evolution* 10:6580–6594. <https://onlinelibrary.wiley.com/doi/pdfdirect/10.1002/ece3.6553>

- Gustine, D. D., Parker, K. L., Lay, R. J., Gillingham, M. P., & Heard, D. C. 2006. Calf survival of woodland caribou in a multi-predator ecosystem. *Wildlife Monographs* 165:1–33. [https://doi.org/10.2193/0084-0173\(2006\)165\[1:CSOWCI\]2.0.CO;2](https://doi.org/10.2193/0084-0173(2006)165[1:CSOWCI]2.0.CO;2)
- Jakimchuk, R. D., Ferguson, S., & Sopuck, L. 1987. Differential habitat use and sexual segregation in the Central Arctic caribou herd. *Canadian Journal of Zoology* 65(3):534–541. <https://doi.org/10.1139/z87-083>
- Laforge, M. P., Webber, Q. M. R., & Vander Wal, E. 2023. Plasticity and repeatability in spring migration and parturition dates with implications for annual reproductive success. *Journal of Animal Ecology*, 92(5), 1042–1054. <https://doi.org/10.1111/1365-2656.13911>
- Lent, P. C. 1965. Rutting behavior in a barren-ground caribou population. *Animal Behaviour*, 13(2–3), 259–264. [https://doi.org/10.1016/0003-3472\(65\)90044-8](https://doi.org/10.1016/0003-3472(65)90044-8)