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# MEMORANDUM

TO: Todd Rinaldi
Regional Management Coordinator

DATE: 22 July 2025

SUBJECT: 2025 Mulchatna Caribou Photo Survey

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**Introduction**

The Mulchatna Caribou Herd (MCH) is named for its traditional calving ground in the upper Mulchatna River in Game Management Unit (Unit) 17B. Historical records suggest that the herd reached a peak in the 1860s followed by a 60-year decline (Van Lanen et al. 2018). During the latter half of the 20th century the MCH herd grew sizably, expanding its range into Units 9C and 18 in the late 1980s to mid-1990s (Perry 2009, Woolington 2009, Van Lanen et al. 2018, Crowley 2019). The MCH population peaked and declined substantially again in the late 1990s after enveloping the Kilbuck herd in Units 18 and the western edge of 19B and 17B, along with portions of the Northern Alaska Peninsula herd (NAP) in Units 9B and 9C.

Throughout most of the year, caribou within the historic MCH range are spread out in several groups across portions of Units 9, 17, 18, and 19 (Figure 1). Between June and July, the MCH and outlying groups aggregate in post-calving groups allowing for observation of a large percentage of the caribou to obtain a population estimate. The degree to which the various groups aggregate is variable across the historic MCH range. The largest groups of the MCH are the east MCH (EMCH) and west MCH (WMCH) and they aggregate in two geographically separate areas. The EMCH range is comprised of rolling hills and tundra habitat with limited residual snow patches where caribou aggregate in the mid-Mulchatna River country (i.e., Mosquito & Koktuli rivers, Old Man Creek). Whereas the WMCH (i.e., west of the Wood-Tikchik Lakes) aggregate in steep mountainous terrain at greater elevation on persistent snowfields.

A smaller group, referred to as the central group (CMCH), calves at higher elevations in the Tikchik Mountains between Nuyakuk and Kulik lakes. Due to the limited number of collars and lack of strong aggregation within this group, Rivest estimates are not appropriate. Due to this and the proximity to WMCH calving grounds and the first year of removal efforts, the CMCH group was lumped in with WMCH estimates between 2022–2024. However, this violated Rivest assumptions that these groups are close enough to

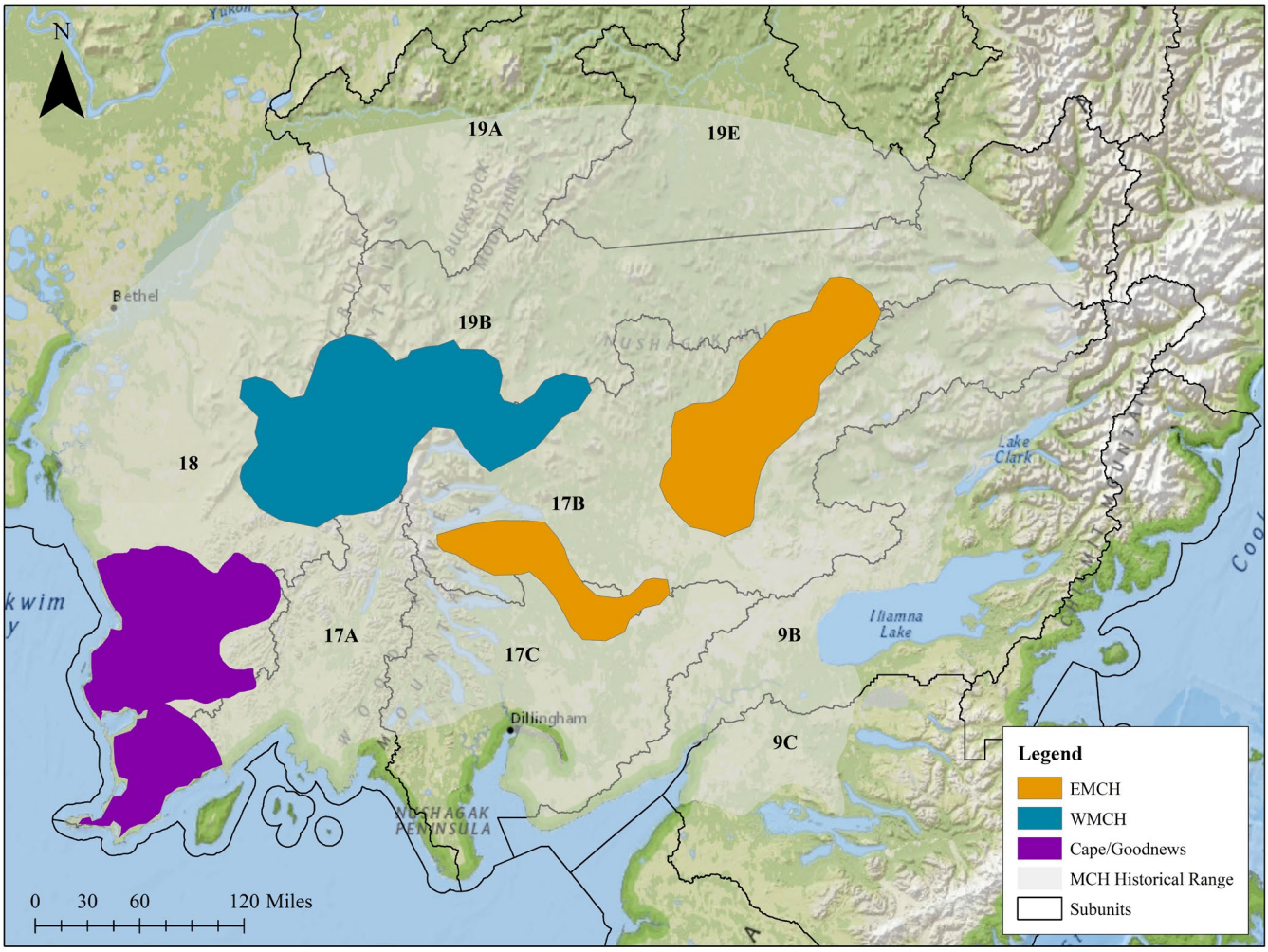


**Figure 1**. Summer range of the Mulchatna caribou herd in 2023 and outlying groups in portions of Game Management Units 17, 18, and 19.

mix during the survey, and because they have not received direct predator control treatment consistently it is not appropriate for their numbers to be included with WMCH. Thus, this year we excluded the CMCH group from Rivest estimates and only record their number with a minimum count. Further, we repeated analyses for the WMCH without the inclusion of CMCH caribou and provide corrected population numbers for 2022–2024. Within the MCH historic range, department staff monitor an additional outlying group on Cape Newenham and north into the Goodnews Drainage of Unit 18 referred to as the Cape Caribou Group (Figure 1). These caribou are monitored collaboratively with Togiak National Wildlife Refuge (TNWR).

Our approach to monitoring the MCH as it retracted and begins to rebound has been to continually monitor how portions of the herd behave relative to each other and former range occupation. The Kukaklek group in Units 9B and 9C was monitored as the MCH retracted and now occupies the historic Northern Alaska Peninsula Herd range. This group is no longer monitored as part of the MCH. Annual population estimates

of the MCH are important to monitor for growth towards population objectives. Since 2019, the combined EMCH and WMCH population estimate has been relatively stable at a low-level ranging between 12,500–13,450 caribou; below the population objective of 30,000–80,000 caribou. This year we continued following the Rivest photo survey method protocol (Rivest et al. 1998) to estimate the MCH population in Units 9, 17, 18, and 19.

**Methods**

*Pre-Survey Flights*

Pre-survey flights help determine the status and availability of radio-collared caribou prior to the population survey, with our objectives being to locate and determine status (i.e., alive, dead, or unheard for several months) of each radio-collared caribou and monitor caribou aggregation behavior.

*Population Survey*

We conducted a photo survey to obtain a population estimate for the MCH following the Rivest method protocol (Rivest et al. 1998), which requires strong post-calving aggregations. Once there is sufficient aggregation, caribou groups are located through radiotelemetry to be photographed. The precision of the Rivest estimate is influenced by the aggregation of caribou, randomness of collared animal distribution within groups, and number of radio collared caribou found.

*In-Flight Photo Survey Protocol*

1. Locate caribou groups from GPS collar locations or unique VHF signals of all active collars in the MCH.
2. Take multiple photos of each group with a DSLR camera with a telephoto lens. (If a group is too large for an oblique angle photograph from a handheld DSLR camera, or if terrain features prevent all caribou within the same group from being counted amongst one or two photos, the ADFG photo plane equipped with belly mounted cameras will be radioed into the group for a vertical photograph).
3. Scan through all available frequencies at least twice while circling over groups and record the frequencies found in those groups.
4. Record waypoints for all observed caribou groups (with or without radio collars) and assign each waypoint a group number.
5. Broadcast to other survey aircraft the frequencies that were located, so teams can focus their efforts on finding undetected caribou.
6. Complete steps 2–5 if a random group is found.

Caribou in photos taken during the survey are enumerated in ArcMap 10.8.1 and/or QGIS desktop 3.6.1. Photo series taken with the DeHavilland Beaver or Cessna 206-photo plane due to size or topography are stitched together by Department staff using ArcMap 10.8.1 (ESRI, Redlands, CA, USA). Once all photos are enumerated, groups with their respective counts and number of collars present are sent to the Region IV biometrician for analysis in R Statistical Software (R Core Team, 2025). Photo survey data for EMCH and WMCH have been analyzed separately and combined since 2019 because EMCH and WMCH have

independent calving and seasonal ranges. Based on the movements of radio-collared caribou and telemetry flights, mixing between EMCH, CMCH, and WMCH is low, but occurs every year.

Mulchatna caribou population surveys from 2022–2024 follow the same methodology outlined above, and the subsequent difference in the reported numbers is from removal of the CMCH group counts from the WMCH minimum count and population estimate and reported as a minimum count. We cannot add CMCH counts to EMCH or WMCH Rivest estimates because the CMCH has distinct calving grounds from the other two groups, and they do not mix together during the survey.

Further, the reason we use minimum counts for CMCH instead of standalone Rivest is that there's a precision issue. The CMCH group cannot be added to the combined estimate because when we use a minimum count, we cannot estimate standard error, though we know the lower bound of confidence interval, which is equal to the minimum count. When we are summing population estimates of three groups, and one group is missing standard error, we cannot estimate a standard error for the combined estimate.

**Results**

*Corrected estimates 2022–2024*

The corrected estimates for 2022–2024 are 5–8% lower than previously reported numbers (Table 1). Importantly, this reduction reflects the reassignment of caribou, not an actual decrease in caribou abundance. Central MCH caribou are still considered part of the MCH and are reported as a minimum count only as explained previously. Hereafter, any results or discussion around changes in population numbers and graphs will contain and/or be in reference to the corrected estimates. No surveys prior to 2022 required correction.

**Table 1.** Corrected minimum counts and Rivest population estimates for the Mulchatna Caribou herd 2022–2024. Minimum counts are in paratheses, except for the corrected CMCH column which only contain minimum counts.

| Year | Previously Reported East | Corrected East | Previously Reported West+Central | Corrected West | Corrected Central | Previously Reported Combined | Corrected Combined |
|---|---|---|---|---|---|---|---|
| 2022 | 6,242 ± 266 (5,637) | 6,242 ± 266 (5,637) | 5,870 ± 650 (4,073) | 5,050 ± 516 (3,904) | 169 | 12,112 ± 702 (9,710) | 11,292 ± 581 (9,541) |
| 2023 | 5,796 ± 295 (5,294) | 5,670 ± 231 (5,294) | 6,711 ± 615 (4,850) | 5,878 ± 509 (4,644) | 206 | 12,507 ± 682 (10,144) | 11,548 ± 559 (9,938) |
| 2024 | 7,393 ± 320 (6,811) | 7,393 ± 320 (6,811) | 7,453 ± 530 (6,005) | 6,681 ± 444 (5,581) | 424 | 14,846 ± 619 (12,816) | 14,724 ± 547 (12,392) |

*Pre-Survey Flights*

A pre-survey flight was conducted on 27 June for EMCH, CMCH, and WMCH which found caribou scattered over a large area and no new mortalities found. After pre-survey flights, we determined five

collars to be censored in EMCH and three in WMCH due having a dead battery, not heard for several months prior or otherwise inactive. No CMCH needed to be censored. This resulted in 69 collars being available for detection in EMCH, 5 in CMCH, and 82 in WMCH for the photo survey (Table 2). No pre-surveys were flown for the Cape group.

*Population Survey*

On 7 July, two crews surveyed the EMCH, CMCH, and WMCH. An additional crew in DHC-2 Beaver photographed two EMCH groups. We were able to detect 149 of 151 available collars (98%) during the EMCH and WMCH surveys. The CMCH group had 4 out of 5 collars detected (80%). During the Cape group survey, TNWR detected 7 out of 25 collars (28%). No new mortalities were detected during the survey for any group.

Caribou aggregations varied from 1 to >5,500 caribou. The EMCH were located from upper Old Man and McGreary creeks in Unit 17B and photographed in 16 groups. The WMCH inhabited mountainous terrain split between Unit 17A and Unit 18 with the bulk of the WMCH around Sawtooth Mountains. The WMCH were photographed in 21 groups, and the CMCH group was located near Kulik Lake. Due to the large geographic areas and loose aggregation of the Cape group the survey was flown over three days by TNWR staff on July 7, 9, and 10. They counted 1,464 caribou in 104 groups from the Kanektok river south to Cape Newenham and east towards the Togiak river in Units 17A and 18.

We counted 6,902 caribou in the East, and 6,573 caribou from the WMCH combined for a total minimum count of 13,475 caribou in the core groups of MCH. The combined 2025 EMCH and WMCH Rivest population estimate is 16,276 ± 668 (Table 2, Figure 2). The Rivest estimated number of caribou in the EMCH and WMCH is 8,684 ± 546 and 7,592 ±384, respectively (Table 2, Figure 2).

The survey for the CMCH and Cape groups yielded minimum counts of 168 and 1,464 caribou, respectively (Table 2). Neither the CMCH or Cape groups aggregate strongly enough or have enough collars for a Rivest estimate to be appropriate and are reported as minimum counts (Table 2).

The combined EMCH and WMCH estimates have been on an increasing trend since 2023 (Figure 2).

**Table 2**. Population survey data and estimates for the Mulchatna Caribou Herd, July 2025.

| Group | Survey Date | Active Collars | Detected Collars | Minimum Count | Population Estimate[a] | Method |
|---|---|---|---|---|---|---|
| East | July 7 | 69 | 68 | 6,902 | 8,684 ± 546 | Rivest |
| West | July 7 | 82 | 81 | 6,573 | 7,592 ± 384 | Rivest |
| Combined | July 7 | 151 | 149 | 13,475 | 16,276 ± 668 | Rivest |
| Central | July 7 | 5 | 4 | 168 | - | Minimum Count |
| Cape/Goodnews | July 7–10 | 25 | 7 | 1,464 | - | Minimum Count |

[a] - denotes no data available.

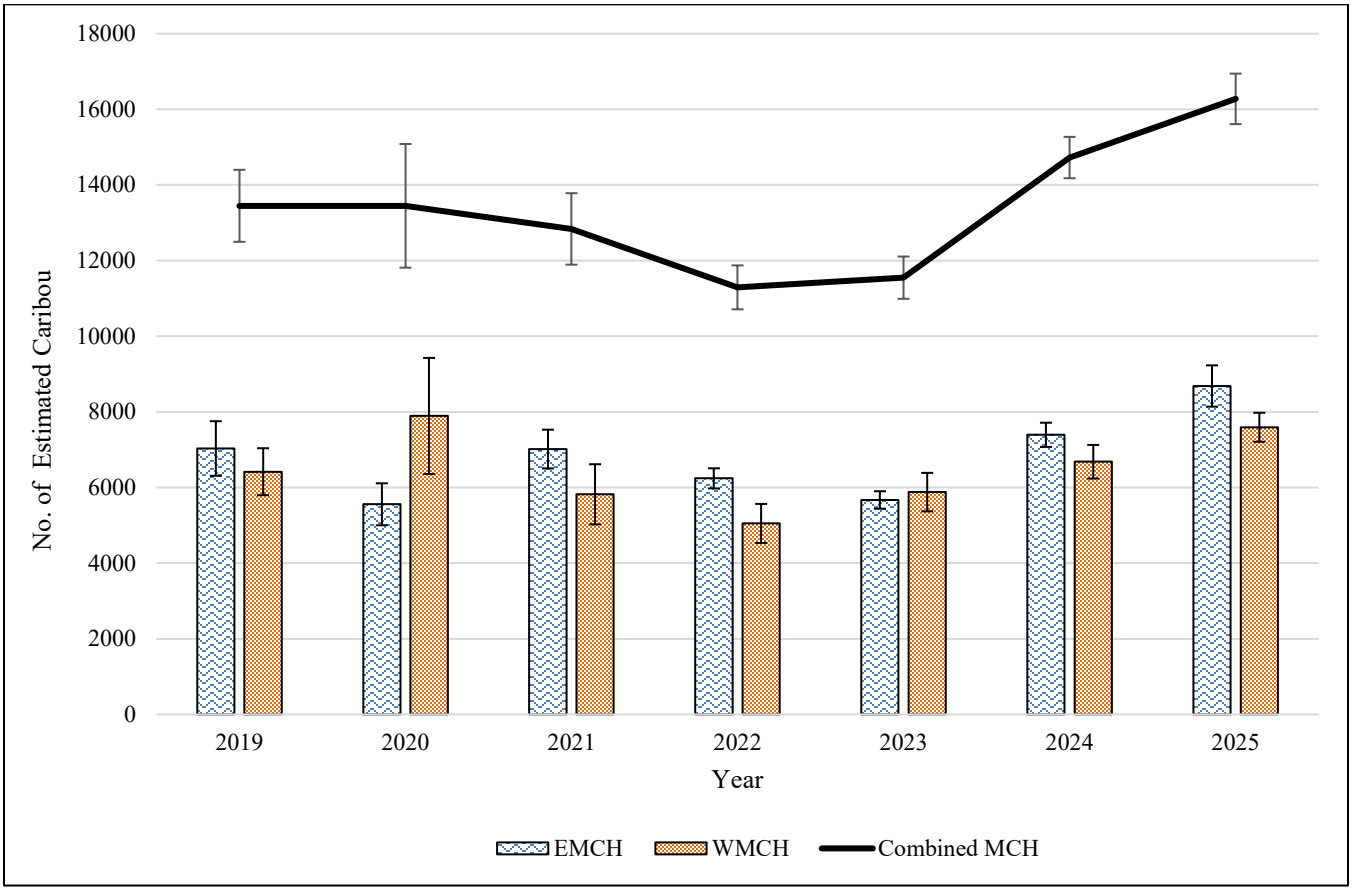


**Figure 2.** Rivest population estimates for portions of the Mulchatna Caribou herd in Units 9, 17, 18 and 19, 2019–2025 (Rivest et al. 1998). Black bars represent the standard error. The combined estimate includes EMCH and WMCH Rivest estimates.

**Discussion and Management Implications**

We surveyed four groups within the historic MCH range in Southwest Alaska for the 2025 population estimate. This included EMCH, CMCH, WMCH, and Cape/Goodnews groups in Units 17A, 17B, 18, and 19B.

The corrected MCH population estimates differ from previously reported numbers primarily due to the removal of CMCH caribou from the WMCH estimates from 2022–2024. These CMCH caribou had been grouped with WMCH population estimate beginning in 2022 due to proximity of calving grounds and that the CMCH designation was fairly new and there was uncertainty on how they would behave. Now, we know these caribou have separate calving grounds from WMCH and EMCH and cannot meet Rivest assumptions of being mixed in with either WMCH or EMCH during the survey and therefore should not be included in either group. Additionally, the CMCH caribou are not receiving direct predator control treatment on their calving grounds and the rest of the year, they rut and winter with EMCH. Their inclusion previously inflated WMCH estimates and increased error bounds in the WMCH and combined estimates. Excluding CMCH and reporting their numbers solely as minimum counts results in revised estimates for 2022–2024 that are 5–8% lower than previously reported. The corrected numbers show a more precise and biologically accurate representation of WMCH abundance, and a better understanding of WMCH population responses in the context of predator removal efforts.

From 2024 to 2025, Rivest population estimates increased across the range, rising 17.5% (1,291 caribou) in the East, 13.6% (911 caribou) in the West, and 15.7% (2,204 caribou) EMCH and WMCH combined. Minimum counts showed a similar response, increasing 1.3% (91 caribou) in the East, 17.8% (992 caribou) in the West, and 8.7% (1,083 caribou) EMCH and WMCH combined. This year's EMCH estimate carries a larger standard error than the past four years, and the estimate for EMCH may be slightly inflated because of weaker aggregation compared to recent years. Persistently cool, wet conditions prior to the survey may have contributed to EMCH being distributed across 16 groups compared to just six groups in each of the past two years. This dispersion reduced confidence in the EMCH Rivest estimate, which is nevertheless the primary driver of the overall Rivest increase. Interestingly, EMCH also drove last year's population increase, but primarily through its minimum count. Despite stronger increases in EMCH the past two years it is important to note three years of consecutive growth in WMCH estimates.

Predator removal efforts began in the WMCH in 2023, and subsequent surveys have documented growth. From 2023 to 2024, the WMCH Rivest estimate grew 13.7% (803 caribou). The minimum count rose in parallel, increasing 20.2% (937 caribou). When viewed over the removal years of 2023 to 2025, WMCH Rivest estimate increased 40.9% (4,728 caribou) and minimum counts rose 41.5% (1,929 caribou). The Rivest estimate for EMCH and WMCH combined has increased 30.1% between 2023 and 2025. This sustained growth following the initiation of Department predator removal suggests that management actions are aiding in WMCH population growth, as before department removal efforts, the MCH population was showing a slight decreasing trend after two years of estimates at approximately 13,500 caribou. Between 2022 (pre-department removal) and 2025 EMCH and WMCH combined Rivest

increased 44.1% (4,984 caribou) with the WMCH Rivest increasing 50.3% (2,542 caribou) in the same time period.

It is important to continually and critically assess what we call the MCH given their historic and current population trends and range use for future management decisions. A caribou population has been defined as a group of herds or subpopulations that do not exchange caribou with adjacent populations (Skoog 1968). If a herd experiences even minor dispersion of individuals (<10%) with other herds over the long term, the herds could be considered one population (Miller 1982). Although, recognition of caribou herds in Alaska since Skoog (1968) has been based on the identification of discrete calving grounds. The EMCH, CMCH, and WMCH groups have very distinct calving grounds but see yearly mixing, and while this occasional interchange could support considering them one herd, the stark differences in movement patterns and calving grounds could also support that they may benefit from separate management. The Cape group, on the other hand, has little to no documentation of dispersal into core groups and vice versa. As such it may be prudent to stop considering them Mulchatna caribou.

The first aerial surveys for MCH were conducted in 1949 in which the population was estimated to be 1,000 caribou. For approximately 10 years between 1965–1974 the population is thought to have remained between 6,000–13,000 caribou (Van Lanen et al. 2018). After the 1996 decline the MCH population held relatively stable between 20,000–30,000 between 2008–2016 and until recently had ranged from 11,500–13,500 with a slight decreasing trend until 2022. However, since the initiation of Department predator control, the MCH has increased yearly. It may still be appropriate to consider revising the current population objective of 30,000–80,000 given historic and recent population trends.

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