

## **Galena Area Caribou Management Report and Plan, Game Management Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D:**

Report Period 1 July 2017–30 June 2022, and  
Plan Period 1 July 2022–30 June 2027

**Sara Longson**



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Plan Period 1 July 2022–30 June 2027

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Species management reports and plans provide information about species that are hunted or trapped and management actions, goals, recommendations for those species, and plans for data collection. Detailed information is prepared for each species every 5 years by the area management biologist for game management units in their areas, who also develops a plan for data collection and species management for the next 5 years. This type of report is not produced for species that are not managed for hunting or trapping or for areas where there is no current or anticipated activity. Unit reports are reviewed and approved for publication by regional management coordinators and are available to the public via the Alaska Department of Fish and Game's public website.

This species management report and plan was reviewed and approved for publication by Jason Caikoski, Management Coordinator for Region III for the Division of Wildlife Conservation.

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**Cover Photo:** An aerial, top-down image of a group of Galena area caribou. ©2020 ADF&G. Photo by Sara Longson.

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# Contents

Purpose of this Report.....	1
I. RY17–RY21 Management Report .....	1
Management Area.....	1
Summary of Status, Trend, Management Activities, and History of Caribou in Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D.....	1
Management Direction.....	3
Existing Wildlife Management Plans .....	3
Goals .....	3
Codified Objectives .....	3
Amounts Reasonably Necessary for Subsistence Uses .....	3
Intensive Management.....	3
Management Objectives.....	3
Management Activities .....	4
1. Population Status and Trend .....	4
2. Mortality-Harvest Monitoring and Regulations.....	11
3. Habitat Assessment-Enhancement.....	14
Nonregulatory Management Problems or Needs.....	14
Data Recording and Archiving .....	15
Agreements .....	15
Permitting.....	15
Conclusions and Management Recommendations .....	15
II. Project Review and RY22–RY26 Plan .....	16
Review of Management Direction.....	16
Management Direction.....	16
Goals .....	16
Codified Objectives .....	16
Amounts Reasonably Necessary for Subsistence Uses .....	16
Intensive Management.....	16
Management Objectives.....	16
Review of Management Activities.....	17
1. Population Status and Trend .....	17
2. Mortality-Harvest Monitoring .....	18
3. Habitat Assessment-Enhancement.....	18
Nonregulatory Management Problems or Needs.....	19
Data Recording and Archiving .....	19
Agreements .....	19
Permitting.....	19
References Cited.....	19

## List of Tables

Table 1. Galena Mountain caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021. ....	5
Table 2. Wolf Mountain caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021. ....	6
Table 3. Ray Mountains caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021. ....	6
Table 4. Ray Mountains caribou composition counts, Interior Alaska, regulatory years 2019–2022. ....	7
Table 5. Hodzana Hills minimum caribou counts, Interior Alaska, regulatory years 2017–2021. ....	7
Table 6. Hodzana Hills caribou composition counts, Interior Alaska, regulatory years 2019–2022. ....	7
Table 7. Ray Mountains caribou herd parturition survey, Interior Alaska, 2022. ....	10
Table 8. Seasons and bag limits for the Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou herds, Interior Alaska, regulatory years 2020–2021. ....	13
Table 9. Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou reported harvest, Interior Alaska, regulatory years 2017–2021. ....	14
Table 10. Galena Mountain, Wolf Mountain, Ray Mountains, and Hodzana Hills caribou hunter residency and success, Interior Alaska, regulatory years 2017–2021. ....	14

## List of Appendices

Appendix A. Caribou radiotracking form for the Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou herds, Interior Alaska, regulatory years 2017–2021. ..	22
Appendix B. Caribou capture card for the Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou herds, Interior Alaska, regulatory years 2017–2021. ....	23

## Purpose of this Report

This report provides a record of survey and inventory management activities for caribou (*Rangifer tarandus granti*) in Game Management Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D during the 5 regulatory years 2017–2021, along with plans for the next 5 regulatory years 2022–2026. A regulatory year (RY) begins on 1 July and ends on 30 June (e.g., RY17 = 1 July 2017–30 June 2018). This report is primarily produced to provide agency staff with data and analysis to help guide and record agency efforts. It is also made available to the public to inform them about wildlife management activities. The Alaska Department of Fish and Game’s (ADF&G, the department) Division of Wildlife Conservation (DWC, the division) publishes these reports on a 5-year cycle to document trends and describe potential changes in data collection activities for caribou.

## I. RY17–RY21 Management Report

### Management Area

The management area includes Galena Mountain, Kokrines Hills, Ray Mountains, and Hodzana Hills, and encompasses portions of Game Management Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D (9,980 mi<sup>2</sup>). There are 4 caribou herds within this area, each named after its distinct calving area: 1) the Galena Mountain caribou herd (GMH) near Galena Mountain, 2) the Wolf Mountain caribou herd (WMH) near Wolf Mountain in the Kokrines Hills, 3) the Ray Mountains caribou herd (RMH) in the Ray Mountains, and the Hodzana Hills caribou herd (HHH) in the Hodzana Hills.

### Summary of Status, Trend, Management Activities, and History of Caribou in Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D

The GMH has fewer than 150 animals, typically calves east of Galena Mountain, and winters west of Galena Mountain. The WMH (300–500 animals) calves south of Wolf Mountain and winters north and east of Wolf Mountain in the Melozitna and Little Melozitna river drainages. The WMH and a portion of the GMH are occasionally sympatric during calving season in the portion of their ranges near Black Sand Creek in Unit 21C. The RMH (1,200–1,500 animals) calves in the Ray Mountains near Kilo Hot Springs, winters to the north in the Kanuti and Kilolitna river drainages, and, to a lesser degree, also winters in the Tozitna River drainage to the south.

Since 2003, ADF&G and the federal Bureau of Land Management (BLM) have worked to gather better information about the small groups of caribou in the Hodzana Hills, northeast of the Ray Mountains. Previously, these small groups were considered part of the RMH but are now considered a separate herd, referred to as the HHH (Hollis 2007). The HHH (700–1,000 animals) mainly resides and calves in the hills at the headwaters of the Dall, Kanuti, and Hodzana rivers.

The origins of the GMH, WMH, RMH, and HHH are unknown. Some residents speculated that the herds came from reindeer (*Rangifer tarandus*) from a commercial operation in the Kokrines Hills that ended around 1935. However, strong evidence indicates these animals are caribou (*R.*

*tarandus granti*) for 3 key reasons: 1) their physical characteristics are more similar to caribou than reindeer, 2) reindeer alleles were not found when tested (Cronin et al. 1995), and 3) the timing of calving for these herds is more consistent with caribou than reindeer (Saperstein 1997, Jandt 1998). Traditional ecological knowledge suggests that these herds are relict populations of the once vast caribou herds that migrated across western Alaska. Currently, there are no accepted criteria defining what degree of genetic difference constitutes a distinct population (COSEWIC 2002).<sup>1</sup> Mager (2012) found genetic evidence that the GMH and WMH herds appear to be genetically distinct, although the sample sizes were too small to draw firm conclusions.

Determining the sizes of the GMH, WMH, RMH, and HHH has been difficult due to the limited use of radio collars in these herds compared to other herds in Alaska. The GMH population likely declined from approximately 250–500 caribou before RY02 to fewer than 125 caribou by RY05 (Pamperin 2015). The highest number of GMH caribou observed since RY05 was 162 animals in April 2012. All hunting seasons were closed in the GMH area starting in RY04 because of population declines observed in that herd. The first comprehensive fall composition survey of the WMH was in October 1995, when 346 caribou were counted. The RMH was first surveyed by ADF&G and BLM during the fall of 1983, with 400 caribou counted. Surveys were conducted regularly during the 1990s and 2000s. Since 2003, ADF&G and BLM have made efforts to gain better information on the HHH, including radiocollaring caribou east of the Dalton Highway in the Hodzana Hills. In 2009, ADF&G conducted a comprehensive survey of the HHH, counting 775 caribou. From telemetry data collected between 2005 and 2009, Horne et al. (2014) estimated 1,000–1,500 animals in the HHH.

Aerial surveys of the GMH and WMH are difficult due to small group size, small number of active radio collars, and poor sightability in the dense black spruce (*Picea mariana*) forests where they frequently occur. Similarly, aerial surveys of the RMH and HHH are difficult due to frequent fog, clouds, and high winds in their ranges.

Few animals are harvested from the GMH, WMH, RMH, and HHH because they are relatively inaccessible during the hunting season, and few people outside the local area are aware of their existence. The combined average of reported and known unreported harvest from all 4 herds since 1991 has been less than 10 caribou per year. The GMH is subject to illegal harvest near the Galena-Huslia winter trail during winter months; however, that area is closed to prevent overharvest. The WMH is not easily accessible for hunting due to the scarcity of aircraft landing areas. Still, there have been reports of Argo use to access the area from the Melozitna River. Moose hunters on the Melozitna River rarely take WMH caribou incidentally in September. Hunter access to the RMH is limited to lengthy snowmachine trips during the winter or to a few ridgetop landing areas during snow-free months. The HHH is accessible primarily by aircraft, with occasional access from the Dalton Highway.

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<sup>1</sup> COSEWIC stands for the Committee on the Status of Endangered Wildlife in Canada.

# Management Direction

## EXISTING WILDLIFE MANAGEMENT PLANS

There are no active formal wildlife management plans developed through working groups or adopted by the Alaska Board of Game (BOG, the board) regarding the management of caribou in Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D.

## GOALS

- G1. Ensure harvest does not result in a long-term population decline.
- G2. Provide sustained opportunity for participation in caribou hunting.

## CODIFIED OBJECTIVES

### Amounts Reasonably Necessary for Subsistence Uses

- C1. There is a positive customary and traditional use finding for caribou in Units 20F, 21B, 21C, 21D, and 24 (the GMH, WMH, and RMH; 5 AAC 99.025)<sup>2</sup>, with the amount reasonably necessary for subsistence (ANS) set as 150–200 caribou.

### Intensive Management

The BOG made a negative determination for intensive management (5 AAC 92.108); therefore, there are no intensive management objectives for the GMH, WMH, RMH, and HHH.

## MANAGEMENT OBJECTIVES

Minimum counts of:

- M1. GMH: 150–250 caribou.
- M2. WMH: 300–400 caribou.
- M3. RMH: 800–900 caribou.
- M4. HHH: 700–800 caribou.

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<sup>2</sup> AAC stands for the Alaska Administrative Code.

## MANAGEMENT ACTIVITIES

### 1. Population Status and Trend

ACTIVITY 1.1. Conduct abundance counts and composition surveys (objectives M1–M4).

#### *Data Needs*

Minimum abundance counts, calf counts, and composition (age and sex) counts obtained through aerial surveys are used to evaluate population size, productivity, ratios, and trends. These counts are necessary for monitoring population status and informing the public, advisory committees, and the BOG.

#### *Methods*

Caribou from the GMH, WMH, RMH, and HHH were monitored using cooperative radiotelemetry flights conducted by ADF&G, BLM, and the U.S. Fish and Wildlife Service. Radio collars were placed on adult cows and used to locate the 4 herds for composition counts, locate calving areas, and delineate seasonal ranges.

Aerial surveys were conducted by helicopter (Robinson R44) and fixed-wing aircraft (Piper PA-18 or Bellanca Scout), following techniques outlined by Eagan (1993). Minimum abundance and composition of small groups were estimated visually and from high-quality digital photographs<sup>3</sup> of large, aggregated groups (generally >20 caribou) opportunistically located by radiotracking collared caribou. Herd size estimates were obtained using methods similar to the direct count aerial photocensus technique (Valkenburg et al. 1985), with digital photographs taken with handheld cameras from fixed-wing aircraft. A thorough approach to conducting a survey is to collect composition data in addition to numerical counts when caribou are well aggregated and all radiocollared animals are accounted for in the groups. However, due to budget constraints, data were often collected opportunistically in conjunction with another project.

#### *Results and Discussion*

##### GALENA MOUNTAIN HERD

During RY17–RY21, radiotracking surveys were conducted in cooperation with the FWS to obtain a minimum count by using collared animals to locate groups of caribou. Minimum counts from the GMH ranged from 8 to 124 caribou (Table 1), similar to the previous reporting period (RY13–RY17). The GMH counts remain low, and since 2014, a post-calving aggregation count has not been achieved. The herd's size is likely around 125 animals; the count on 13 February 2019 was 124 animals, of which 25 were bulls (Table 1).

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<sup>3</sup> Photographs were taken using a Canon EOS Rebel T5i (18.0 megapixels) with 18–35 mm and 55–250 mm zoom lenses.

**Table 1. Galena Mountain caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021.**

Survey date	Cows	Calves	Bulls	Unclassified	Total
Jul 2017 <sup>a</sup>	18	7	0	0	25
Feb 2018 <sup>b</sup>	76	23	1	0	100
May 2018 <sup>b</sup>	42	11	1	3	57
Jun 2018 <sup>a</sup>	23	26	8	33	90
Jul 2018 <sup>b</sup>	81	19	4	0	104
Feb 2019 <sup>b</sup>	83	16	25	0	124
Apr 2019 <sup>b</sup>	–	–	–	53	53
May 2019 <sup>a</sup>	87	26	0	0	113
Mar 2020 <sup>c</sup>	–	–	–	76	76
May 2020 <sup>b</sup>	37	6	5	0	48
Sep 2020 <sup>b</sup>	30	1	11	0	42
Jan 2021 <sup>b</sup>	75	13	3	0	91
Feb 2021 <sup>b</sup>	93	12	0	0	105
Apr 2021 <sup>b</sup>	0	0	12	95	107
May 2021 <sup>a</sup>	69	10	0	0	79
Jun 2021 <sup>b</sup>	35	8	2	0	45
Sep 2021 <sup>b</sup>	20	4	6	0	30
Feb 2022 <sup>b</sup>	78	6	22	0	106
Apr 2022 <sup>b</sup>	64	8 <sup>d</sup>	11	0	83
May 2022 <sup>a</sup>	5	1	2	0	8
Jun 2022 <sup>a</sup>	20	9	4	6	39

Note: En dashes indicate no data available.

<sup>a</sup> Photocensus from a fixed-wing aircraft.

<sup>b</sup> Fixed-wing survey; composition classification without photographs.

<sup>c</sup> Fixed-wing survey with no composition classification.

<sup>d</sup> Calves classified as short yearlings.

### WOLF MOUNTAIN HERD

Minimum counts from WMH radiotracking surveys ranged from 168 to 863 caribou during RY17–RY21 (Table 2). The surveys on 13 June 2019, 18 June 2020, and 1 July 2021 resulted in the 3 highest calf counts and total counts ever recorded within the WMH. The consecutive high total counts suggest that the cohorts were well recruited. A group of 101 animals was photographed within the survey area, and it is unclear whether these animals were from the WMH or RMH. There were no WMH collars in the group, and the RMH frequencies were not available to load into the receiver to see if any of the animals had RMH collars. The area will be searched during future radiotracking flights to identify if the group of animals returns. Since the WMH is widely dispersed throughout the year, surveys conducted during summer months or surveys of post-calving aggregations increase sightability and therefore increase the number of caribou observed.

**Table 2. Wolf Mountain caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021.**

Survey date	Cows	Calves	Bulls	Unclassified	Total
Jul 2017 <sup>a</sup>	–	–	–	375	375
May 2018 <sup>b</sup>	–	42	–	126	168
Jun 2018 <sup>a</sup>	243	86	0	0	329
May 2019 <sup>b</sup>	166	54	0	0	220
Jun 2019 <sup>a</sup>	532	148	1	3	684
Jun 2020 <sup>a</sup>	679	166	18	0	863
May 2021 <sup>c</sup>	121	21	–	52	194
Jul 2021 <sup>a</sup>	494	168	17	0	679
Apr 2022 <sup>c</sup>	230	18	15	0	263
Jun 2022 <sup>a</sup>	–	39	–	625	664

Note: En dashes indicate no data available.

<sup>a</sup> Photocensus from a fixed-wing aircraft.

<sup>b</sup> Fixed-wing survey; composition classifications with photographs.

<sup>c</sup> Fixed-wing survey; composition classifications without photographs.

#### RAY MOUNTAINS HERD

The 2020 photocensus for the RMH recorded the highest count among the 4 herds during 2017–2022, with a minimum count of 883 caribou (Table 3). During the July 2021 survey, conditions were excellent, but the RMH was not well aggregated, and the minimum count of 521 animals did not accurately reflect herd size. The calf count (39 calves) was low, but the herd was dispersed, so calves were likely missed.

**Table 3. Ray Mountains caribou herd minimum caribou counts, Interior Alaska, regulatory years 2017–2021.**

Survey date	Cows	Calves	Bulls	Unclassified	Total
Jul 2017	–	–	–	652	652
Jun 2018	668	144	0	0	812
May 2019	221	1	0	0	222
May 2019	472	67	1	20	560
Jun 2019	724	80	0	0	804
Jun 2019	643	76	–	15	734
Jun 2020	789	89	5	0	883
Jun 2021	246	49	–	58	353
Jul 2021	465	39	17	0	521
Jun 2022	553	81	63	2	699

Note: En dashes indicate no data available.

The BLM conducted composition surveys for the RMH during RY19–RY22 (Table 4). The composition survey results were relatively consistent during the reporting period, with low calf counts in 2020 and 2022 being the most notable observation. No composition surveys were conducted in the RMH or HHH herds in RY17 or RY18.

**Table 4. Ray Mountains caribou composition counts, Interior Alaska, regulatory years 2019–2022.**

Survey date	Bulls:100 cows	Calves:100 cows	Percent calves	Percent cows	Percent bulls	Total caribou observed
Sep 2019	31	22	14	65	20	679
Oct 2020	32	15	11	68	21	788
Sep 2022	38	8	10	67	23	686

*Source:* Data collected by the Bureau of Land Management.

HODZANA HILLS HERD

ADF&G biologists did not conduct a comprehensive survey to estimate abundance for the HHH during RY17–RY21; however, we did obtain minimum counts (Table 5). These counts aimed to assess the number of caribou within the herd and monitor any changes. Minimum counts ranged from 57 to 351 caribou. The highest minimum count occurred on 27 June 2019, but fog, clouds, gusty winds, and fair lighting limited the survey. During this flight, 3 very high frequency (VHF) collars were located and observed in a large, dispersed group; 1 VHF collar was located by itself; 5 VHF collars were located, but animals were not visible through the fog; and 3 VHF collars were not located at all. With 8 of 12 active radio collars either not located or not visible, along with poor aggregation and foggy conditions, the total number of caribou observed was likely not representative of the herd’s actual size.

**Table 5. Hodzana Hills minimum caribou counts, Interior Alaska, regulatory years 2017–2021.**

Survey date	Cows	Calves	Bulls	Unclassified	Total
Jun 2018	247	55	5	0	307
May 2019	36	3	2	16	57
Jun 2019	351	0	0	0	351
Jun 2020	171	15	11	4	201
Jun 2021	170	17	4	0	191
Jun 2022	126	18	8	0	152

Similar to the Ray Mountains composition survey results, the Hodzana Hills data were relatively consistent during RY17–RY21, but with low calf counts in 2019, 2020, and 2022 (Table 6). However, only 104 caribou were observed in 2022; therefore, we cannot make strong inferences from that year's data.

**Table 6. Hodzana Hills caribou composition counts, Interior Alaska, regulatory years 2019–2022.**

Survey date	Bulls:100 cows	Calves:100 cows	Percent calves	Percent cows	Percent bulls	Total caribou observed
Sep 2019	38	8	6	68	26	477
Oct 2020	27	17	12	70	19	321
Sep 2022	31	22	4	77	19	104

*Source:* Data collected by the Bureau of Land Management.

### *Recommendations for Activity 1.1*

Continue. When conducting minimum population counts, we can estimate population size, herd composition, distribution, and recruitment.

ACTIVITY 1.2. Collect caribou telemetry data (objectives M1–M4).

### *Data Needs*

Maintaining a minimum of 10 active radio collars per herd is essential for monitoring caribou distribution, calving locations, and movement patterns for the GMH, WMH, RMH, and HHH. Distribution information will help define the herds' ranges and their overlap with each other and with other sympatric herds. These data will also help delineate seasonal ranges and determine the extent of seasonal range overlap. Additionally, an adequate sample of radiocollared animals in each herd will improve our ability to locate caribou groups for abundance and composition surveys (Valkenburg et al. 2016).

Understanding movement during calving is important for determining calving strategies, whether a traditional calving ground exists, and whether there is calving site fidelity. Collecting Global Positioning System (GPS) collar data from collared cows before, during, and after calving may help infer calving timing.

Understanding movement during the rut is also important for determining whether there is an opportunity for genetic exchange with neighboring herds (Roffler et al. 2012). Movement data is needed for these small herds because they are a low-density, nonmigratory ecotype that differs from the larger migratory herds, as described by Bergerud (1996).

### *Methods*

Radiocollared caribou were located seasonally to determine range distribution, herd size, and movements. We attempted to maintain a minimum of 10 radio collars in each herd. When the number of radio collars within each herd fell below 10, additional caribou were captured and fitted with radio collars to increase sample sizes to  $\geq 10$ . Caribou captures follow the protocols and policies established in the *Manual of Wildlife Chemical Immobilization and Safety* (unpublished internal ADF&G document).

To increase location information, 43 additional VHF collars (11 in the WMH, 12 in the GMH, 9 in the RMH, and 11 in the HHH) were deployed during 22–28 March 2018 using a Super Cub and Robinson R44. Groups of caribou in suitable darting locations were located from a Super Cub aircraft, and locations were communicated to an R44 helicopter crew. The R44 approached the group of caribou and then selected and immobilized an adult female with a Pneu Dart rifle. The rifle was equipped with 2 cc darts with a three-quarter-inch barb that were loaded with 1.25 mL of carfentanil (3 mg/mL) and 0.75 cc of xylazine (100 mg/mL).<sup>4</sup> Once the animal was immobilized, intranasal oxygen was administered at 2 L/min, a Telonics VHF collar (150–151 MHz) was placed, and biological samples were collected as time permitted. The animal was

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<sup>4</sup> Cubic centimeter is abbreviated as cc.

reversed with 7.5 mL of naltrexone (50 mg/mL) and 0.3 mL of atipamezole (25 mg/mL). All data were recorded on a data card (Appendix B).

During 17–22 March 2020, 31 Telonics satellite and VHF iridium (TGW-4577-4) collars, along with 3 additional VHF collars (leftover from March 2018 captures designated for deployment in the RMH), were deployed. TGW-4577 collars transmit GPS location data via satellite and broadcast on specific VHF radio frequencies (150–151 MHz). These collars are expected to have a minimum battery life of 5 years. Battery life can be extended by reducing VHF transmission time from 1000 to 1600 Alaska Standard Time. Collars were programmed to obtain and transmit 1 location every 12 hours from 1 May to 30 August, then decrease to 1 location every 2 days from 30 August to 1 May. The VHF collars transmit a specific VHF radio frequency (150–151 MHz) 24 hours a day.

During 17–22 March 2020, groups of caribou in acceptable darting locations were located using a Super Cub aircraft, and their locations were communicated to a R44 helicopter crew. The R44 approached the group of caribou, then selected and immobilized an adult female using a Pneu Dart rifle. The 1.5 mL, 1-inch barbed darts were loaded with 0.5 mL of thiafentanil (10 mg/mL) and 0.65–0.7 mL of xylazine (100 mg/mL). Induction times ranged from 1 to 5 minutes. Once immobilized, a blindfold was placed on the animal, and intranasal oxygen was administered from a D tank at a rate of 2 L/min through a 14-gauge red rubber catheter. A Telonics iridium satellite collar (or VHF) was fixed around the neck (150–151 MHz). Additionally, biological samples were taken when time allowed. The animal was reversed with 1–2 mL of naltrexone (50 mg/mL) and 0.3 mL of atipamezole (25 mg/mL). All data were recorded on a data card (Appendix B).

During relocation flights, the radiocollared animals were located using a fixed-wing aircraft equipped with 2 antennas and a frequency scanner-receiver. Once a radiocollared animal was located, a GPS coordinate was recorded along with the number of individuals in the group (Appendix A). High-resolution digital photographs were taken of each group, and the caribou were classified from the photographs. Telemetry data was also used to determine distribution and movement patterns.

We used a Piper PA-18 aircraft to conduct 5 RMH parturition flights. These flights involved observing radiocollared (GPS) adult females from a fixed-wing aircraft during 17–28 May 2022. Caribou cows observed with either calves, hard antlers, or distended udders were classified as parturient (Whitten 1995). Each collared cow ( $n = 10$ ) was visited every day or every other day until the cow was observed with a calf at heel.

### *Results and Discussion*

In an effort to maintain desired sample sizes during RY17–RY21, 46 VHF and 31 GPS collars were deployed on adult females. In herds other than the GMH, WMH, RMH, and HHH, there has been an emphasis on replacing all VHF collars with GPS collars. The primary benefits of GPS collars over VHF collars include requiring fewer radiotracking flights to locate individuals, the ability to determine the date and location of mortalities, and access to frequent location data via satellites, which enables more robust analyses of distribution, movements, and vital rates.

The number of radiocollared caribou fluctuated due to mortalities or missing collars. During RY17–RY21, there were 7–16 active radio collars on GMH caribou, 10–16 on WMH caribou,

12–29 on RMH caribou, and 12–24 on HHH caribou. In RY21, a total of 50 radiocollars were considered active (not emitting a mortality signal) across the 4 herds; of these radiocollars, the GMH had 7 VHF collars, the WMH had 10 VHF collars, the RMH had 6 VHF collars and 11 GPS collars, and the HHH had 3 VHF collars and 13 GPS collars.

During 2022, 5 parturition flights were conducted for the RMH (Table 7). All GPS radiocollared cows were judged to be parturient. Of the 10 collared cows, 8 were observed with calves. The remaining 2 cows were classified as parturient due to the presence of hard antlers and an udder. On the first flight on 17 May 2022, 3 calves were observed. Peak calving was estimated as the date when  $\geq 50\%$  of parturient cows were observed with a calf at heel. By 19 May 2022, 5 of the 10 collared cows were observed with a calf at heel, indicating the peak of calving likely occurred on 18 May 2022. Throughout the survey, the collared cows were observed either alone or in very small groups. This calving strategy differs from that of the large, migratory herds, which calve in large groups.

**Table 7. Ray Mountains caribou herd parturition survey, Interior Alaska, 2022.**

Date	Cows	Calves
17 May 2022	10	3
19 May 2022	7	2
20 May 2022	5	1
23 May 2022	4	2
25 May 2022	2	0

At the time this report was authored, the only active collars were on adult cows. We need to include a sample of radiocollared bulls to monitor bull distribution and improve our abundance and composition counts. Bulls are frequently dispersed into small groups away from post-calving aggregations targeted for surveys; as a result, they may not be counted, leading to an underestimation of herd abundance.

Several times since the HHH herd was collared in 2014, the Central Arctic caribou herd and the Porcupine caribou herd (PCH) have intermixed with the HHH, likely contributing to the reduced number of HHH caribou. GPS collars assigned to the HHH were observed with the PCH, and after years of residing with the PCH, some animals returned to the HHH, while others remained with the PCH. The RMH also mixes with the HHH. GPS and VHF collars assigned to the RMH have been found in the HHH, and vice versa. The effects of this mixing will continue to be monitored.

#### *Recommendations for Activity 1.2*

Continue, with an emphasis on replacing all VHF collars with GPS collars.

#### ACTIVITY 1.3. Initiate nonintensive management (objectives M1–M4).

#### *Data Needs*

If a herd’s population falls below the management objective, nonintensive management would be initiated. A feasibility assessment would be conducted to evaluate biological, economic, and

social factors. The abundance of the GMH and WMH is very low and represents a conservation concern. Article VIII, Section 4 of the Alaska State Constitution requires ADF&G to manage populations (herds) on a sustainable basis. The GMH and WMH are identified as distinct populations in regulation (5 AAC 92.108 and 5 AAC 99.025); therefore, ADF&G is responsible for managing these distinct herds for sustainability. Although the GMH and WMH do not have a positive finding for intensive management, they are managed to provide hunting opportunities.

### *Methods*

Biological factors such as survival, recruitment, and habitat would have been evaluated at multiple phases of the project. Additionally, economic factors that estimate the costs and benefits of an intensive management program would have been defined. Social factors, including public expectations and acceptance, would have been investigated. Since most GMH and WMH caribou occur on and are harvested on state or BLM land, both intensive and nonintensive management options could be considered.

Calf survival factors, mortality factors, and habitat enhancement potential would have been investigated in the first phase of the project. The second phase would have assessed habitat response to prescribed fire and assessed caribou calf survival response to habitat enhancement. In the final phase, predator control would have been implemented. Predation rates and herd abundance would have been determined, and the response to predation control would have been assessed.

### *Results and Discussion*

A proposal was submitted to the BOG to direct ADF&G to establish a nonintensive predation control plan aimed at population recovery in the GMH and WMH. This plan would also consider habitat enhancement to improve transitional habitat and visual security for cows moving between their calving areas and summer range. Ridgeline travel corridors have become forested with high shrubs and trees. The encroachment of these shrubs and trees provides cover for bears that prey on caribou as they transition through this habitat with their calves to reach their summer range. The BOG did not pass this proposal.

Minimum counts of the GMH conducted since 2002 have largely remained below 150 animals, except in 2012 when 162 caribou were counted. The GMH is stable at a low population level. The WMH continues to have high calf counts and minimum counts, demonstrating that the cohorts are well recruited and do not represent a conservation concern.

### *Recommendations for Activity 1.3*

Discontinue.

## 2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor hunter effort and success (objectives M1–M4).

### *Data Needs*

Hunter effort and success data are needed to assess harvest trends and corroborate population trends. Analysis of harvest data also informs department recommendations to the BOG.

## *Methods*

Hunting mortality was monitored through hunter harvest reports. These reports submitted by hunters were entered into ADF&G's Wildlife Information Network database (WinfoNet). The data were summarized for each regulatory year and included total harvest, harvest location, hunter residency and success, harvest chronology, and the types of transportation used.

## *Season and Bag Limit*

Hunting regulations during RY17–RY21 are in the Alaska hunting regulations booklets, numbers 58–62; Table 8 depicts the season and bag limits for the RMH, GMH, WMH, and HHH during RY20–RY21. Current caribou season dates and bag limits are available on the department website.<sup>5</sup>

## *Results and Discussion*

### Harvest by Hunters

Reported harvest during RY17–RY21 was low (5-year average: GMH = 0 caribou, WMH = 4 caribou, RMH = 3 caribou, HHH = 1 caribou; Table 9) and did not exceed sustainable harvest rates of 3–4% of the minimum counts. The highest reported harvest recorded was in RY20, with 14 caribou harvested from the RMH, WMH, and HHH combined. Harvest in the WMH has increased from an average of fewer than 1 caribou per year to over 4 caribou per year since the previous reporting period. An increase in the number of successful nonresident hunters contributed to the high reported harvest (Table 10).

It is estimated that 1–2 caribou were taken (but not reported) each year along the Yukon River near Ruby, and an additional 3–5 unreported caribou were likely taken along the Yukon River between Rampart and Tanana each year (Osborne 1995). These caribou, usually bulls, can be found on remaining snowfields near the river in August or wandering to the river during September. An additional 5–7 caribou are probably taken during the winter by hunters from Tanana using snowmachines (Osborne 1995), and likely another 5–10 from Allakaket (G. W. Stout, Area Wildlife Biologist, ADF&G, Fairbanks, 2018, personal communication).

### Hunter Residency and Success

In RY20, a total of 14 caribou were harvested by 8 nonlocal residents and 6 nonresidents across all 4 herds (Table 10). During RY17–RY21, residents (both local and nonlocal) made up 60 (62%) of the 97 reported hunters; 21 (22%) residents were successful, and 25 (26%) nonresidents were successful. The average number of hunters slightly decreased during RY17–RY21; this reporting period averaged 19 hunters (range = 11–27), compared to the RY00–RY16 average of 22 hunters (range = 12–35).

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<sup>5</sup> <http://www.adfg.alaska.gov/index.cfm?adfg=wildliferegulations.hunting>.

**Table 8. Seasons and bag limits for the Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou herds, Interior Alaska, regulatory years 2020–2021.**

Area	Herd	Bag limits		Open seasons	
		Resident	Nonresident	Resident/subsistence	Nonresident
Unit 20F, north of the Yukon River.	Ray Mountains	1 caribou	1 caribou	10 Aug–31 Mar	10 Aug–30 Sep <sup>a</sup>
Unit 21B, that portion north of the Yukon River and downstream from Ukawutni Creek.	Galena Mountain	None	None	No open season	No open season
Remainder of Unit 21B.	Wolf Mountain	1 caribou	1 caribou	10 Aug–30 Sep	10 Aug–30 Sep
Unit 21C, that portion within the Dulbi River drainage and that portion within the Melozitna River drainage downstream from Big Creek.	Galena Mountain	None	None	No open season	No open season
Remainder of Unit 21C.	Wolf Mountain	1 caribou	1 caribou	10 Aug–30 Sep	10 Aug–30 Sep
Unit 21D, that portion north of the Yukon River and east of the Koyukuk River.	Galena Mountain	2 caribou	2 caribou	Winter season to be announced	No open season
Remainder of Unit 21D.	Western Arctic	5 caribou per day; calves may not be taken	5 caribou; calves may not be taken.	1 Jul–30 Jun	1 Jul–30 Jun
Unit 24A, that portion south of the south bank of the Kanuti River.	Ray Mountains and Hodzana Hills	1 caribou	1 caribou	10 Aug–Mar 31	10 Aug–30 Sep
Unit 24B, that portion south of the south bank of the Kanuti River, upstream from and including that portion of the Kanuti Kilolitna River drainage, bounded by the southeast bank of the Kodosin Nolitna Creek, then downstream along the east bank of the Kanuti Kilolitna River to its confluence with the Kanuti River.	Ray Mountains	1 caribou	1 caribou	10 Aug–31 Mar	10 Aug–30 Sep
Unit 25D, that portion drained by the west fork of the Dall River, west of the 150 W long.	Ray Mountains and Hodzana Hills	1 bull	1 bull	10 Aug–31 Mar	10 Aug–30 Sep

<sup>a</sup> General hunt only.

**Table 9. Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou reported harvest, Interior Alaska, regulatory years 2017–2021.**

Regulatory year	Ray Mountains		Galena Mountain		Wolf Mountain		Hodzana Hills		Total
	Bulls	Cows	Bulls	Cows	Bulls	Cows	Bulls	Cows	
2017	1	1	0	0	2	1	0	0	5
2018	3	1	0	0	7	0	0	0	11
2019	2	0	0	0	5	0	0	0	7
2020	4	1	0	0	4	0	4	1	14
2021	3	1	0	0	3	0	1	1	9

**Table 10. Galena Mountain, Wolf Mountain, Ray Mountains, and Hodzana Hills caribou hunter residency and success, Interior Alaska, regulatory years 2017–2021.**

Regulatory year	Successful				Unsuccessful				Total hunters
	Local resident <sup>a</sup>	Nonlocal resident	Nonresident	Total	Local resident <sup>a</sup>	Nonlocal resident	Nonresident	Total	
2017	0	2	3	5	0	9	4	13	18
2018	2	1	8	11	1	12	3	16	27
2019	0	2	5	7	0	2	2	4	11
2020	0	8	6	14	1	6	3	10	24
2021	0	6	3	9	1	7	0	8	17

<sup>a</sup> Residents of Units 20, 21B, 21C, 21D, and 24.

### *Other Mortality*

Predation is likely the main limiting factor in the GMH, WMH, RMH, and HHH, but there have been no studies to determine cause-specific mortality (Stout 2001). Black bears were likely the primary predators on the calving grounds of the GMH and WMH (Paragi and Simon 1993); they were observed following green-up along the hillsides as the snow melted, bringing them into proximity of cows prior to calving (Paragi and Simon 1993). Observations made during aerial surveys revealed that the boreal forest has been expanding into the hills toward the calving grounds of GMH and WMH. This growth limits visibility for caribou on the landscape, which hinders their ability to detect predators and escape. Grizzly bears are found throughout the calving ranges of all 4 herds, and calf mortality studies in other areas indicate that grizzlies are important predators of caribou calves (Boertje et al. 1995).

### *Recommendations for Activity 2.1*

Continue to monitor reported harvest.

### 3. Habitat Assessment-Enhancement

There were no habitat assessment-enhancement activities conducted for caribou in Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D during RY17–RY21.

## **NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS**

During the summer of 2014, GCI initiated construction of 2 telecommunications towers within the ranges of the GMH and WMH. ADF&G staff worked with GCI and its contractors to

minimize potential disturbances to nearby caribou (Pamperin 2015). Although we lack specific data on the extent and concentration of calving areas for these 2 herds, it is believed that most calving occurs in proximity to the 2 tower sites (G. W. Stout, Area Wildlife Biologist, ADF&G, Fairbanks, 2015, personal communication).

### Data Recording and Archiving

The caribou radiotracking form used in surveys during RY17–RY21 is included as Appendix A. Garmin MapSource data, capture cards, memoranda, and radiotracking forms are stored in the Galena Management Area Caribou database on WinfoNet, an internal ADF&G server. Caribou captures were entered into the department’s Capture and Handling Records in the WinfoNet database. All other electronic data are located on a hard drive in the Galena area biologist’s office at the department’s Region III headquarters office in Fairbanks and are backed up on the ADF&G Fairbanks network drive. Field data sheets, paper files, hard copies, and any other relevant data are located in a file cabinet in the Galena area biologist’s office.

### Agreements

None.

### Permitting

None.

## **Conclusions and Management Recommendations**

Although open hunting seasons for caribou existed for most of the herds in the Galena area, few animals were harvested due to limited access. The primary factor impeding herd growth is poor survival due to predation (Stout 2001).

The decline in GMH was not due to harvest, as no harvest has been reported in the GMH since 2000. Given that no caribou were reported harvested from the GMH in over 20 years, the department is confident that the decline was not related to harvest; therefore, we met our first management goal (G1) to ensure that harvest does not result in population decline. However, the second goal (G2), to provide opportunity for people to participate in caribou hunting, was not met because there was no open season for the GMH during RY17–RY21. Additionally, the management objective (M1) for the GMH was not achieved because the minimum counts were not within the range of 150–250 caribou. The management goals (G1 and G2) were met in the WMH, RMH, and HHH. The management objectives (M2–M3) for the WMH and RMH were met, as the minimum counts for both herds were within the ranges (300–400 caribou for the WMH and 800–900 caribou for the RMH). The management objective (M4) for the HHH was not achieved because the minimum counts were not within the range of 700–800 caribou.

The declining number of radio collars in each herd affected our ability to adequately survey the herds and estimate their population abundance and composition; therefore, we recommend maintaining 10 active collars in each herd (Pamperin 2015) and prioritizing the switch from VHF

to GPS collars. Because of low consumptive demand for these herds, other management activities directed towards these 4 herds will remain a low priority.

## II. Project Review and RY22–RY26 Plan

### Review of Management Direction

#### MANAGEMENT DIRECTION

There are several changes in the management direction for the 4 caribou herds (the GMH, WMH, RMH, and HHH) within Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D. (9,980 mi<sup>2</sup>). We will change the goals, simplify the 4 separate management objectives for each herd into a single objective, and discontinue activity 1.3. The new management objective is more consistent with the BOG and ADF&G priorities for these small caribou herds.

#### GOALS

G1. Maintain sustainable caribou populations for the GMH, WMH, RMH, and HHH.

#### CODIFIED OBJECTIVES

##### Amounts Reasonably Necessary for Subsistence Uses

C1. There is a positive customary and traditional use finding for caribou in Units 20F, 21B, 21C, 21D, and 24 (the GMH, WMH, and RMH; 5 AAC 99.025), with the ANS set as 150–200 caribou.

##### Intensive Management

The BOG made a negative determination for intensive management (5 AAC 92.108); therefore, there are no intensive management objectives for these caribou herds.

#### MANAGEMENT OBJECTIVES

The management objectives for RY22–RY26 will be updated to reflect the inability to implement a management response to declines in herd abundance. The GMH, WMH, RMH, and HHH are relatively low priority for active management; therefore, management objectives for specific herd sizes will be removed. Instead, population monitoring activities will primarily be used to document if harvest opportunities exist, evaluate ANS (C1), and detect changes in herd sizes, composition, and distribution.

M1. Monitor the GMH, WMH, RMH, and HHH to assess the availability of harvestable surplus and ANS (G1 and C1).

## REVIEW OF MANAGEMENT ACTIVITIES

### 1. Population Status and Trend

ACTIVITY 1.1. Conduct abundance counts and composition surveys (objective M1).

#### *Data Needs*

No change from RY17–RY21.

#### *Methods*

Caribou will be monitored through cooperative radiotelemetry studies by ADF&G, BLM, and the U.S. Fish and Wildlife Service. Aerial surveys will be conducted using helicopters (Robinson R44) and fixed-wing aircraft (Piper PA-18 or Bellanca Scout), following techniques outlined by Eagan (1993). Minimum abundance surveys will be conducted from fixed-wing aircraft by taking high-quality digital photographs of large, concentrated groups in late June or early July during post-calving aggregations, when the entire herd may be contained in a few groups. Visual searches of the range between groups will help locate uncollared caribou opportunistically.

Each caribou in the photographs will be classified and counted by importing the images into the Geographic Information System and using a counting tool within the software. The tool works by clicking on a caribou in the photo and assigning it as male, female, calf, or unknown by placing a color-coded dot on each animal. It then tracks the totals and ensures that animals are not double counted. A minimum count of the herd will be obtained from the photos.

We will follow the methods described by Valkenburg et al. (1985) for herd counts and aerial photography. Composition surveys will take place in the fall using fixed-wing aircraft and a helicopter. Caribou will be classified into the following groups: calves, cows, small bulls, medium bulls, and large bulls. Locations, waypoints, and track logs will be recorded with either handheld GPS devices or camera-mounted GPS devices. Data will be recorded on caribou radiotracking forms (Appendix A).

ACTIVITY 1.2. Collect caribou telemetry data (objective M1).

#### *Data Needs*

An adequate sample size of radiocollared caribou is needed to monitor their distribution, calving locations, and movement patterns. Distribution information will help define herd ranges and overlaps among the GMH, WMH, RMH, and HHH, as well as other sympatric herds.

Additionally, an adequate sample of radiocollared animals in each herd will improve our ability to locate caribou groups for abundance and composition surveys (Valkenburg et al. 2016).

Understanding movement during the rut is also important for determining whether there is an opportunity for genetic exchange with neighboring herds (Roffler 2012). Movement data are needed for these small herds because they are a low-density, nonmigratory ecotype that differs from the larger migratory herds described by Bergerud (1996). Compared to those large herd ecotypes, little research has been done on small herds in Alaska. Maintaining at least 10 active radio collars per herd is essential for locating groups of caribou during aerial surveys. Currently, the only active collars are on adult cows. We need to include a sample of radiocollared bulls to

monitor bull distribution and improve our abundance and composition counts. Bulls are frequently dispersed into small groups away from the post-calving aggregations targeted for surveys; as a result, they may not be counted, leading to an underestimation of herd abundance.

### *Methods*

Radiocollared caribou will be located seasonally to determine range distribution, herd size, and movements. We will attempt to maintain a minimum of 10 radio collars in each herd. When the number of radio collars within each herd falls below 10, additional caribou will be captured and fitted with radio collars to increase sample sizes to  $\geq 10$ . Caribou captures will follow the protocols and policies established in the *Manual of Wildlife Chemical Immobilization and Safety* (unpublished internal ADF&G document).

For each immobilized animal, a VHF radio collar will be fitted, body condition will be assessed, and biological samples will be collected. All radio collars (Telonics, Inc., Mesa, AZ) will operate at a frequency of 150–151 MHz and include movement-sensitive mortality switches. Radiotracking relocations will be conducted 24–48 hours and 2–4 weeks after capture to monitor potential capture-related mortalities. Subsequent flights will be conducted opportunistically.

During relocation flights, the radiocollared animals will be located using a fixed-wing aircraft equipped with 2 antennas and a frequency scanner-receiver. Once a radiocollared animal is located, a GPS coordinate will be recorded along with the number of individuals in the group (Appendix A). High-resolution digital photographs will be taken of each group, and caribou will be classified from these photographs. Abundance will be estimated using statistical models based on the size of each group and the number of individuals with radio collars. Telemetry data will be used to analyze distribution and movement patterns.

## 2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor harvest (objective M1).

### *Data Needs*

Harvest data are needed to evaluate trends in hunter demand and determine if harvest levels are sustainable for the GMH, WMH, RMH, and HHH and do not result in a population decline.

### *Methods*

Hunting mortality will be monitored using hunter harvest reports and adjusted to account for unreported harvest using methods outlined by Osborne (1995). Harvest reports submitted by hunters will be entered into WinfoNet, an internal ADF&G server. These data will be summarized for each regulatory year and will include total harvest, harvest location, hunter residency, success, number of days hunted, harvest chronology, and the types of transportation used.

## 3. Habitat Assessment-Enhancement

No habitat assessment-enhancement activities are planned for caribou in Units 20F, 21B, 21C, 21D, 24A, 24B, and 25D during RY22–RY26.

## NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Continue to work with other resource management agencies and identify cost-sharing opportunities with federal cooperators. Also, continue participating in Unicom/GCI reconnaissance flights to monitor for caribou during site visits through the remainder of their 30-year lease, which ends in 2044.

### Data Recording and Archiving

- Caribou radiotracking form (Appendix A).
- Caribou capture card (Appendix B).
- Harvest data will be stored on WinfoNet.

Garmin MapSource data, capture cards, memoranda, and radiotracking forms will be stored in the Galena Management Area Caribou database on WinfoNet. Caribou captures will be entered into the department's Capture and Handling Records in WinfoNet. All other electronic data will continue to be located on the computer in the Galena area biologist's office at ADF&G's Fairbanks office and backed up on the Fairbanks network drive. Field data sheets, paper files, hard copies, and any other relevant data will be stored in a file cabinet located in the Fairbanks ADF&G building.

### Agreements

There is a 30-year lease with Unicom/GCI that ends in 2044.

### Permitting

None.

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**Appendix B. Caribou capture card for the Ray Mountains, Galena Mountain, Wolf Mountain, and Hodzana Hills caribou herds, Interior Alaska, regulatory years 2017–2021.**

Acc # _____	Herd _____	Col # _____	Freq _____	Ser# _____	Date _____																		
Sex M/F _____	Age _____ yr	Dart Location _____																					
NET DART Drug _____	(ea dart)	# Darts _____	Antag _____																				
DOWN TIME _____	(from darting to down)		UP TIME _____	(from antag to up)																			
CONDITION	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">Ribs</td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 5%;">Rump</td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 10%;">Withers (hump)</td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> </tr> </table>					Ribs	1	2	3	4	5	Rump	1	2	3	4	5	Withers (hump)	1	2	3	4	5
Ribs	1	2	3	4	5	Rump	1	2	3	4	5	Withers (hump)	1	2	3	4	5						
NUMBER OF WARBLES _____	TOOTH ERUPTION _____																						
LOCATION _____	Lat _____		Long _____																				
GROUP Size _____	Comp _____		Other _____																				
REMARKS _____	_____																						
	_____																						



