Moose Management Report and Plan, Game Management Unit 1D:

Report Period 1 July 2015–30 June 2020, and

Plan Period 1 July 2020–30 June 2025

Carl H. Koch

2025

Alaska Department of Fish and Game Division of Wildlife Conservation

Species Management Report and Plan ADF&G/DWC/SMR&P-2025-25

Moose Management Report and Plan, Game Management Unit 1D:

Report Period 1 July 2015–30 June 2020, and

Plan Period 1 July 2020–30 June 2025

PREPARED BY:

Carl H. Koch
Area Wildlife Biologist

APPROVED BY:

Roy Churchwell
Management Coordinator

PUBLISHED BY:

June C. Younkins
Publications Coordinator

Alaska Department of Fish and Game
Division of Wildlife Conservation
PO Box 115526
Juneau, AK 99811-5526

Hunters are important founders of the modern wildlife conservation movement. They, along with trappers and sport shooters, provided funding for this publication through payment of federal taxes on firearms, ammunition, and archery equipment, and pay state hunting license and tag fees. These taxes and fees fund the federal Wildlife Restoration Program and the State of Alaska's Fish and Game Fund, which provided funding for the work reported on in this publication.

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 Roy Churchwell, Management Coordinator for Region I for the Division of Wildlife Conservation.

Species management reports and plans are available via the Alaska Department of Fish and Game's public website (www.adfg.alaska.gov) or by contacting Alaska Department of Fish and Game's Division of Wildlife Conservation, PO Box 115526, Juneau, AK 99811-5526; phone: (907) 465-4190; email: dfg.dwc.publications@alaska.gov. The report may also be accessed through most libraries, via interlibrary loan from the Alaska State Library or the Alaska Resources Library and Information Services (www.arlis.org). To subscribe to email announcements regarding new technical publications from the Alaska Department of Fish and Game, Division of Wildlife Conservation please use the following link: http://list.state.ak.us/mailman/listinfo/adfgwildlifereport.

This document, published in PDF format only, should be cited as:

Koch, C. H. 2025. Moose management report and plan, Game Management Unit 1D: Report period 1 July 2015–30 June 2020, and plan period 1 July 2020–30 June 2025. Alaska Department of Fish and Game, Species Management Report and Plan ADF&G/DWC/SMR&P-2025-25, Juneau.

Please contact the authors or the Division of Wildlife Conservation at (907) 465-4190 if you have questions about the content of this report.

Cover Photo: Bull moose during an aerial survey along the Takhin River area. ©2015 ADF&G. Photo by Carl H. Koch.

Contents

List of Figures

List of Tables

Purpose of this Report

This report provides a record of survey and inventory management activities for Moose (*Alces alces)* in Game Management Unit 1D for the 5 regulatory years 2015–2019 and plans for survey and inventory management activities in the next 5 regulatory years, 2020–2024. A regulatory year (RY) begins 1 July and ends 30 June (e.g., RY15 = 1 July 2015–30 June 2016). This report is produced primarily to provide agency staff with data and analysis to help guide and record agency efforts but is also provided to the public to inform it of wildlife management activities. In 2016 the Alaska Department of Fish and Game's (ADF&G, the department) Division of Wildlife Conservation (DWC) launched this 5-year report to report more efficiently on trends and to describe potential changes in data collection activities over the next 5 years. It replaces the moose management report of survey and inventory activities that was previously produced every 2 years.

I. RY15–RY19 Management Report

Management Area

Unit 1D (Fig. 1) is on the northern Southeast Alaska mainland, north of the latitude of Eldred Rock and excluding Sullivan Island and the Berners Bay drainages. Although the management area is 2,854 mi^2, moose primarily inhabit the Chilkat River valley and the valleys within the Chilkat Range. The lower Chilkat Valley has a maritime climate with cool, often wet summers. Precipitation declines with distance away from salt water. The winter weather varies by location. The Haines area in the lower Chilkat Valley averages about 200 inches of snow each winter, with temperatures near freezing. Further up the valley, winter temperatures are colder, and total snowfall and accumulated snowpack increase. The snowpack in the upper valley can exceed 10 ft deep. The topography comprises coastal mountains surrounding deep, u-shaped river valleys created by glacial action. The larger rivers are shallow and flow fast, with wide, braided channels. The mouths of the rivers often contain alluvial fans of gravel, boulders, and silt. Silt deposition and glacial rebound at the mouth of the Chilkat River have created a large, flat delta with varied seral vegetation types. Forest cover on upland slopes contains Sitka spruce-western hemlock (*Picea sichensis-Tsuga heterophyla*) forest with black cottonwood (*Populus trichocarpa*) and paper birch (*Betula papyrifer*) (Hundertmark 1983). Lowlands, including river bars, support varying vegetation types ranging from willow (*Salix* spp.) and alder (*Alnus* spp.) to spruce-hemlock forest and mature cottonwood. In 1990, the department estimated 200–250 mi^2 of moose summer range and 110–120 mi^2 of moose winter range, including 80 mi^2 of preferred winter range in Unit 1D (ADF&G 1990), but that amount may be declining due to isostatic rebound and forest succession. There are also small pockets of moose habitat in the Chilkoot, Katzehin, and Warm Pass valleys and along the western shore of Lynn Canal (ADF&G 1990).

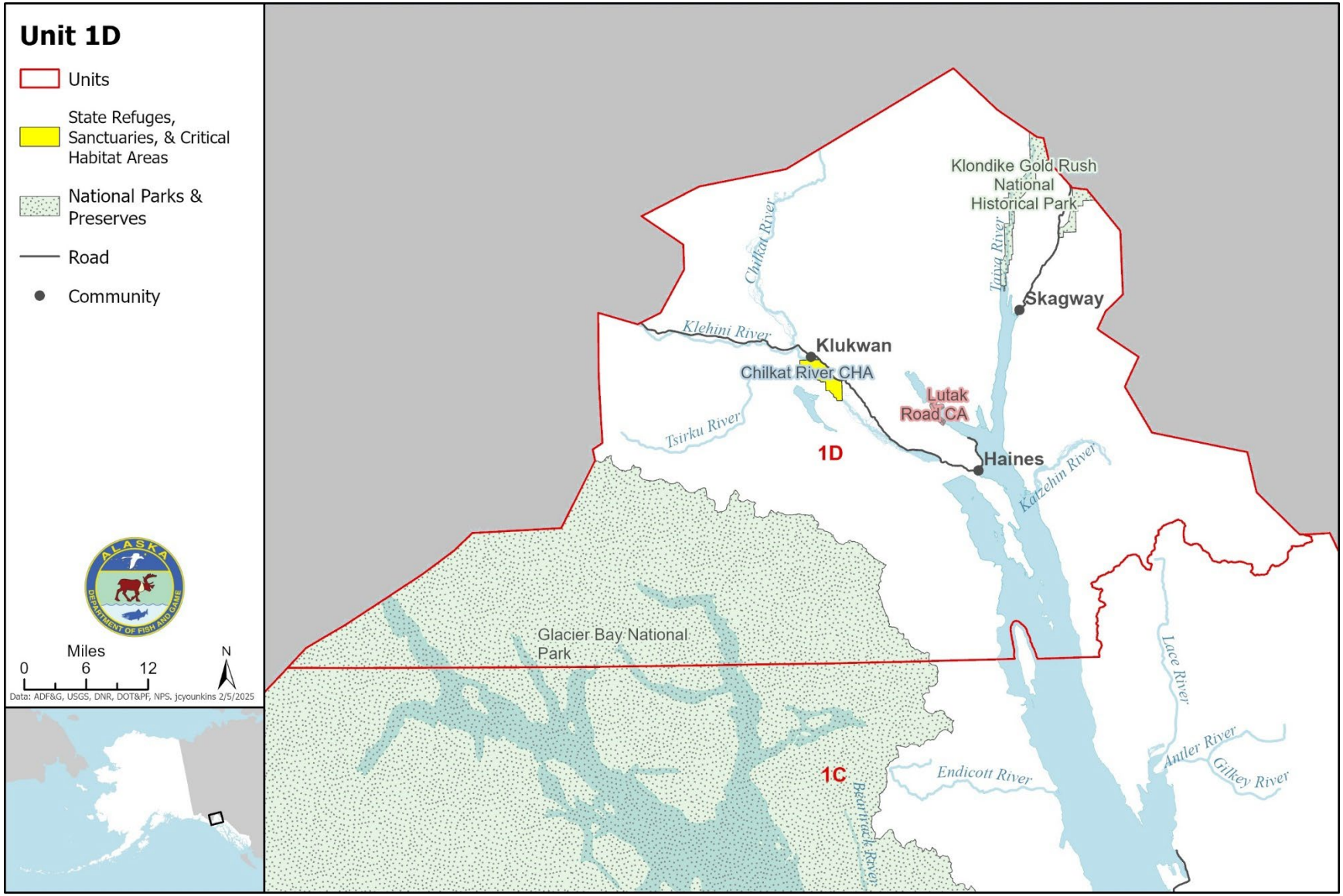

Figure 1. Map of Game Management Unit 1D, Southeast Alaska, regulatory years 2015–2019.

Summary of Status, Trend, Management Activities, and History of Moose in Unit 1D

Moose first arrived in the Chilkat Valley from Canada around 1930. Abundant browse resulting from postglacial successional vegetation allowed the moose population to increase rapidly, and in 1959, the first hunting season was opened. From 1959 to 1963, hunts were restricted to bulls and averaged 60 bulls per year. From 1964 to 1976, both bulls and cows were harvested out of concern over deteriorating range conditions caused by heavy browsing (ADF&G 1990). The maximum harvest occurred in 1966 when 92 bulls and 60 cows were harvested. In 1968, the population estimate peaked at 500–700 moose. Subsequent surveys suggested that the population had decreased to ~400 animals by the 1980s, and the most recent complete survey was conducted in 2016 and estimated the population at 250–350 animals. The long-term decline in this population is most likely related to forest succession and the declining abundance of preferred browse species. In recent years, the timing of aerial surveys has varied due to inconsistent snow cover. Caution is advised when interpreting survey findings because not all areas were surveyed each year.

The Alaska Board of Game (BOG) implemented a Tier II subsistence hunt for the 1990 season. However, widespread dissatisfaction with the allocation of only 20 Tier II permits and concerns about the status of the population contributed to local opposition to the hunt. In 1991, no permits were issued. In 1992, the season was closed early by emergency order. In 1993, BOG authorized a Tier II antler-restricted hunt for Unit 1D (Sell 2012). This slowed the pace of the hunt and allowed more hunter opportunity while affording protection to bulls that did not meet antler requirements. Current regulations authorize issuing up to 250 Tier II permits, and hunters must bring their moose antlers to the Haines ADF&G office for examination within 3 days of harvesting a moose. Based on aerial surveys and the population's likely size, the management objective for harvest has been 20–25 bulls. Beginning in RY08, BOG extended the season by 1 week, allowing for additional hunter opportunity.

Management Direction

Existing Wildlife Management Plans

In the late 1980s, ADF&G developed a management plan for moose throughout Region I (Southeast Alaska), including Unit 1D (ADF&G 1990), intended to guide management through RY94. Except for the Gustavus population, the 1990 plan included objectives and management strategies for each population.

Although the overall goals of the plan are important (e.g., maintain habitat, maintain a viable population, and manage moose on a sustained yield basis), the management objectives and harvest management strategies have changed since the plan was written based on public comments, BOG actions, and ADF&G staff recommendations. The periodic changes in management planning have been reported in the division's species management reports. The plan portion of this report contains the current management plan for moose in Unit 1D.

GOALS

Region I moose management goals were established when the Region I moose management plan was created in the late 1980s. The following goals are general and applicable to the entire region:

1. Maintain, protect, and enhance moose habitat and other components of the ecosystem.
2. Maintain viable populations of moose in their historic range throughout the region.
3. Manage moose on a sustained yield basis.
4. Manage moose in a manner consistent with the interests and desires of the public.
5. Manage moose primarily for meat rather than for trophy hunting.
6. Manage moose for the greatest hunter participation possible, consistent with maintaining viable populations, sustained yield, subsistence priority, and the interests and desires of the public.
7. Provide opportunities to view and photograph moose for the benefit of nonconsumptive users of moose.
8. Develop and maintain a database for making informed management decisions.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

The Haines moose hunt is a Tier II subsistence hunt. BOG determined that 100% of the allowable annual harvest is the amount necessary for subsistence.

Intensive Management

BOG has made a negative finding regarding intensive management for moose in Unit 1D (5 AAC 92.108). This is unlikely to change due to historic harvest levels and the limits of the Chilkat River Valley's habitat capability to support a large increase in the moose population.

MANAGEMENT OBJECTIVES

Population management objectives identified by department staff for Unit 1D are as follows:

1. Maintain a posthunt population of at least 200 moose.
2. Maintain a posthunt bull-to-cow ratio of 25:100.
3. Sustain a harvest of 20–25 moose annually.

When the 1990 moose management plan was written, biologists recognized that loss of habitat due to succession was likely to occur and that moose habitat capability is likely affected by other land uses in the area (e.g., logging). The ability to manipulate changes in habitat in ways that may benefit moose is limited, as other agencies must follow their own management plans (e.g., “Haines State Forest Management Plan”). Since the moose management plan (ADF&G 1990)

was developed, subsequent management reports document changes in management objectives developed by agency staff based on available data (e.g., aerial surveys and harvest records) and public comments. The posthunt population objective was reduced to 200 in 2004 based on variations in aerial survey methods, a lower estimated population, and other factors (Hessing 2004).

MANAGEMENT ACTIVITIES

ADF&G management biologists held annual fall moose meetings in Haines, during which we discussed harvest history and results from aerial surveys. We also showed the "Is This Moose Legal?" video to aid hunters in complying with antler restrictions. An updated version of that video was released during RY18.

All hunters are required to bring antlers and the lower jaw to the Haines ADF&G office within 3 days of harvesting a moose. Antler morphology data, photos, and a sample tooth were collected from harvested moose. Harvested moose that did not meet antler requirements were confiscated, and the meat was donated to charity. Antler restrictions were intended to protect enough breeding-age bulls to provide a sustainable population. We will continue to evaluate the age of harvested bulls and antler configuration as a management tool.

Aerial composition surveys were conducted annually, weather permitting, after the hunting season closed and when complete snow coverage was present.

In the past, population estimates were based on minimum counts without marked animals in the population. While useful for monitoring trends, they are not considered robust estimates and lack important population information such as recruitment and survival. In 2019, ADF&G captured and collared 24 moose in the spring and 16 moose in the fall so that mark-recapture models can be used to obtain more robust population estimates. In addition, collared cows will be monitored annually for survival and calf status. We plan to conduct captures of cow moose as needed annually to maintain a radiocollared sample size of at least 10% of the estimated population.

1. Population Status and Trend

ACTIVITY 1.1 Aerial surveys to obtain minimum counts and age-sex composition of the herd.

Data Needs

Moose abundance, age, and sex composition are important components for managing moose populations. These data are used to track population trends, assess whether objectives are met, and manage harvest. Additionally, these data allow staff to monitor the effects of management decisions and regulatory changes.

Methods

The 2015 and 2016 aerial surveys were conducted in a Piper Super Cub with 1 observer. No survey was conducted in 2017 due to poor weather conditions and a lack of pilot availability. The fall 2018 survey was conducted in February 2019 with 2 observers in a Maule aircraft. The

2019 fall survey was conducted in December with 1 observer using a Scout aircraft of a similar size to a Super Cub.

Surveys were conducted in the Chilkat River Valley after the close of the fall moose hunting season using fixed-wing aircraft at 300–500 ft above ground level when adequate snow cover was present. The primary survey route covered the Chilkat River Valley from Murphy Flats to Turtle Rock and the Takhin, Tsirku, and Kelsall river valleys. Using binoculars, moose were identified by sex and age class, and bulls were classified as small, medium, or large based on antler configuration. Locations of all moose were recorded with a handheld GPS, and age-sex data were recorded on survey forms. Minimum counts were tallied, and the ratios of bulls to 100 cows and calves to 100 cows were calculated.

Biologists conducted helicopter flights in the spring of 2019 and 2020, during the approximate peak of parturition, to estimate an index of the number of newborn calves and twins associated with collared cows. We also conducted fixed-wing flights to estimate the survival of calves associated with collared cows in April (for overwinter survival) and November (for oversummer survival). Finally, during the 2019 composition survey, the proportion of collared cows detected was recorded for sightability estimation, and any mortalities were documented for survival monitoring.

Results and Discussion

The timing and quality of surveys were weather-dependent and variable throughout the reporting period. ADF&G Biologists conducted composition surveys of the entire survey area in December 2015 and 2016. The 2016 survey was conducted under excellent conditions and resulted in the highest minimum count in over a decade (Table 1). During 2017, no survey could be conducted due to weather and logistical challenges (e.g., pilot availability). The weather was poor again during the fall of 2018, and the survey could not be completed until February 2019, long after bulls dropped their antlers. In December 2019, we could only survey ~50% of the area due to fog that developed during the survey. Areas surveyed in 2019 included the Klehini River, the Lower Chilkat Valley, and the area around Chilkat Lake. We could not survey the Takhin and Kicking Horse River valleys and the area above Wells Bridge. After a late snowstorm in March 2020, we surveyed the entire Chilkat Valley in an attempt to get a more complete moose count. The Katzehin area has very limited hunting activity and has not been surveyed since 2011.

Moose counted during surveys represent the minimum number of moose observed in the population (Table 1). More moose were counted during the early December 2016 survey than any Chilkat Valley survey in the previous decade. In 2018, the survey was delayed due to poor conditions for surveying until February 2019, after all bulls dropped their antlers. The 2018 count (55 moose in total) was exceptionally low. However, we utilized a faster aircraft and assumed that many moose had likely moved under the forest canopy to conserve energy due to the late-winter deep snow (Hundertmark et al. 1983). Lack of adequate snow cover and poor flying weather is not unique to Unit 1D and has been an ongoing challenge throughout Alaska in recent years (Kellie et al. 2019).

Table 1. Historic Unit 1D (Chilkat River Valley) aerial moose count data, Southeast Alaska, regulatory years 2005–2019.

Regulatory year	Total bulls	Total cows	Total calves	Unknown	Total moose	Count time (h)	Bulls:100 cows	Calves:100 cows	Calves % in population	Moose/h
2005	46	118	39	–	203	5.0	39	33	19	41
2006	49	106	31	2	188	4.4	46	29	16	43
2007	43	144	23	1	211	4.3	30	16	11	49
2008	25	22	23	140	210	5.7	–	–	11	37
2009	38	110	27	8	183	4.7	35	25	15	39
2010	47	120	27	3	197	6.0	39	23	14	33
2011	57	127	28	–	212	6.0	45	22	13	35
2012	42	109	24	2	177	4.4	39	22	14	40
2013	23	116	21	3	163	5.3	20	18	13	31
2014	–	13	12	122	147	6.0	–	–	8	25
2015	24	29	29	101	183	6.3	–	–	16	29
2016	41	32	32	116	221	5.4	–	–	14	41
2017[a]	–	–	–	–	–	–	–	–	–	–
2018[b,c]	–	3	4	48	55	4.8	–	–	7	11
2019[b,d]	10	6	5	45	66	3.8	–	–	8	17
2019[e]	–	18	6	52	76	8.0	–	–	8	10

[a] No survey was conducted in 2017.
[b] 2018 and 2019 surveys were conducted after antler drop.
[c] The 2018 survey was conducted in February 2019. Many moose were likely in forested areas (i.e., undetectable from aircraft).
[d] Only approximately 50% of the valley was surveyed due to fog developing in some areas.
[e] The entire Chilkat Valley was resurveyed in March 2020 (RY19). Many moose were likely in forested areas (i.e., undetectable from aircraft).

Recommendations for Activity 1.1

We recommend that annual fall population and composition surveys continue, as this information is important for ongoing moose hunt management to reduce the chances of overharvest.

ACTIVITY 1.2 Radiocollar cow moose to improve population estimates and learn about cow and calf survival.

Data Needs

Having a sample of radiocollared (i.e., marked) cow moose allows us to monitor survival and recruitment as well as estimate sightability by calculating the proportion of radiocollared animals missed during the survey.

Methods

ADF&G biologists began a more intensive moose monitoring project for Unit 1D in 2019. We captured 24 cows in March 2019 and 13 more in November 2019 using standard helicopter darting techniques approved by the State of Alaska Animal Care and Use Committee. Biologists fitted 27 cows with Telonics VHF collars and 10 cows with Vectronic satellite (GPS) collars. During aerial surveys, we monitored the survival status of collared cows using radiotelemetry and satellite tracking data.

Results and Discussion

In December 2019, we observed a total of 66 moose during a survey of ~50% of the survey area (Table 1). However, we only observed 6 marked moose in the portion of the valley we surveyed, indicating that sightability was 43% (6 of 14 marked animals were detected). This means that 57% of marked moose were undetected during the survey. We repeated the survey of the entire valley on 14 March 2020 to try and get a better population estimate. However, we only detected 76 moose in total, with 4 of the 37 marked moose detected (11% of the marked sample). On 17 March 2020, we radiotracked and located each of the 33 radiocollared moose that were not seen during the survey and found that most were under the forest canopy. Somewhat surprisingly, we noted several radiocollared cows using closed canopy forest from 300 ft to 1,600 ft elevation. Data obtained from radiocollared moose indicates that surveys conducted later in winter with deep snow run the risk of undercounting moose because many moose will have moved into forested areas where they are undetectable. Maintaining a sample of radiocollared moose (~10% of the population) will greatly aid biologists' understanding of trends in the population. In the future, during years when a larger proportion of the marked sample is observed, we will also be able to obtain more robust population estimates using Lincoln-Peterson (i.e., mark-recapture) models.

In addition to sightability estimation, we monitored the survival and recruitment associated with collared cows. During 2019, based on laboratory tests, the pregnancy rate of fall cows was 92%. Biologists observed that 61% of collared cows had calves and 46% had twins in 2019. The summer survival of calves observed in 2019 was 31%, similar to other areas in Southeast Alaska (e.g., Berners Bay and Gustavus). On 14 April 2020, staff observed only 3 of the 4 cows that had

calves at heel on 3 November 2022. Only 1 of the 3 cows had a calf present, indicating overwinter survival was 33%.

The objective of 25 bulls per 100 cows was met during RY15 and RY16, the only years during which complete valley surveys were conducted before antler drop. While the bull-to-cow ratio for 2019 (20 bulls per 100 cows) is below our management objective, we were unable to survey the entire valley, and we know from past surveys that it is likely more bulls were spending time in areas we were unable to survey (e.g., the Upper Chilkat Valley).

Recommendations for Activity 1.2

As long as funding and staff are available, a sample of radiocollared cows (at least 10% of the estimated population) should be maintained to support future monitoring of survival and recruitment.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2. Monitor harvest and other mortality, including age and antler configuration of harvested moose.

Data Needs

Monitoring harvest data is important to determine if the antler restriction strategy is appropriate and if harvest is sustainable.

Methods

ADF&G biologists documented the annual harvest using a mandatory checkstation staffed by agency personnel throughout the season. Hunters were required to report if they hunted, hunt duration, location, transport means, and date of harvest (for successful hunters) on hunt report cards. All hunters were required to produce a 5-inch section of lower jaw for aging by cementum analysis (Table 2). We documented the antler morphology of harvested bulls by measuring the width and beam circumference and recording the number of points and brow tines. Finally, we photographed each set of antlers for use in future hunter education.

Results and Discussion

During RY15–RY19, 24 bulls (range = 20–27 bulls) were harvested on average (Table 3). An average of 2 bulls (range = 0–3 bulls) per year that did not meet antler restriction requirements were confiscated and donated to charity. Some of the harvested animals fell into the sublegal antler category, and a small number of animals with broken antlers would likely have been sublegal had their antlers been intact. ADF&G management biologists considered the number of spike-forked animals harvested to be an index of the recruitment of bulls into the population. The number of yearlings in the harvest varied considerably, averaging 4 per year (range = 4–7 yearlings). The proportion of bulls aged 2–5 years ranged from 48% to 73% of the total harvest (Table 2). The harvested bulls in the 2- to 5-year-old age category were meant to be protected by antler restrictions. We must evaluate whether those restrictions are effective for the Haines population because the proportion of harvested animals in this age range increased from the

Table 2. Unit 1D age structure of harvested moose, Southeast Alaska, regulatory years 2005–2019.

Regulatory year	Age (year)															Total harvest	Percent aged	Mean age
	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5			
2005	0	8	1	5	1	2	0	0	0	0	0	0	0	0	0	17	94	2.8
2006	0	12	3	3	3	2	2	2	0	0	0	0	0	0	0	27	100	3.3
2007	0	6	8	4	1	0	2	0	0	0	1	0	0	0	0	22	100	3.2
2008	0	6	7	2	1	8	2	1	1	1	0	0	0	1	0	30	100	4.5
2009	0	6	3	2	2	1	2	1	1	0	0	0	0	0	0	18[a]	100	3.7
2010	0	7	4	1	4	2	1	1	0	0	1	0	0	0	0	21	100	3.7
2011	0	10	1	2	3	0	1	2	0	0	1	0	1	0	0	21	100	3.9
2012	0	7	4	4	2	2	0	0	2	1	0	0	0	0	0	22	100	3.7
2013	0	8	3	5	2	3	2	3	0	0	0	0	0	0	0	26[b]	92	3.8
2014	0	2	0	5	9	1	1	1	1	0	0	0	0	0	0	22[c]	91	4.5
2015	0	4	4	2	6	4	1	1	0	0	0	0	0	0	0	24[c]	92	3.9
2016	0	6	7	1	4	2	2	1	1	0	0	0	0	0	0	25[d]	96	3.7
2017	0	4	8	5	5	1	1	1	1	0	0	0	0	0	0	27[d]	96	3.6
2018	0	7	2	4	4	2	1	2	0	0	1	1	0	1	0	25	100	4.6
2019	0	4	3	2	4	2	3	1	0	0	0	0	0	0	0	20[d]	95	4.0

[a] Does not include 1 unsalvaged illegal harvest.
[b] Does not include the ages of 2 unrecovered illegal moose.
[c] No age available for 2 moose.
[d] No age available for 1 moose.

Table 3. Unit 1D moose hunter effort and success, Southeast Alaska, regulatory years 2005–2019.

Regulatory year	Permits issued	Successful hunters			Unsuccessful hunters			Total hunters		
		No. hunters	Total no. days	Avg. no. days	No. hunters	Total no. days	Avg. no. days	No. hunters	Total no. days	Avg. no. days
2005	220	18	87	4.8	148	934	6.3	166	1,021	6.2
2006	220	27	77	2.9	150	934	6.2	177	1,011	5.7
2007	220	22	104	4.7	156	1,430	9.2	178	1,534	8.6
2008	220	30	203	6.8	155	1,365	8.8	185	1,568	8.5
2009	251	18	90	5.0	197	1,863	9.5	215	1,953	9.1
2010	250	21	104	5.0	168	1,451	8.6	189	1,555	8.2
2011	250	21	84	4.0	172	1,471	8.6	193	1,501	7.8
2012	250	22	154	7.0	177	1,436	8.1	199	1,590	8.0
2013	257	26	131	5.0	185	1,654	8.9	211	1,785	8.5
2014	250	22	163	7.4	152	1,278	8.4	174	1,441	8.3
2015[a]	250	24	111	4.6	163	1,241	7.6	187	1,352	7.2
2016[a,b]	248	25	84	3.4	132	618	4.7	157	702	4.5
2017[a]	250	27	129	4.8	167	1,287	7.7	194	1,416	7.3
2018[a]	250	25	137	5.5	159	1,448	9.1	184	1,585	8.6
2019	250	20	116	5.8	169	1,544	9.1	189	1,660	8.8

[a] Hunt closed early due to emergency order when the harvest guideline level was met.
[b] Two permits were revoked because the hunters had failed to report on hunts in RY15.

previous report period. The antler strategy slows the pace of the hunt, which is a desire expressed by many of the long-time TM059 (Tier II subsistence) hunters.

Other mortality

Moose were occasionally killed in motor vehicle collisions, and 4 moose (3 cows and 1 calf) were accidentally caught in wolf snares during 2019. ADF&G captured and released 2 cows and 1 calf from the snares (the fourth moose ran off with the snare still attached). Two of the adult cows were fitted with VHF collars, which we later used to determine that they did not survive more than a couple of months, likely due to leg injuries and potential infection. The calf was never seen again with the cow.

Harvest by Hunters-Trappers

Season and bag limit	Resident hunters	Nonresident hunters
1 bull with spike-fork or 50-inch antlers or antlers with 3 or more brow tines on one side by Tier II subsistence hunting permit only; up to 250 permits may be issued.	15 September–7 October (Subsistence hunt only)	No open season

Permit Hunts

TM059 is the only moose hunt that occurs in Unit 1D. Harvest during RY15–RY19 ranged from 20 moose in RY19 to 27 moose in RY17 (Table 3). The mean annual harvest during RY15–RY19 was 24.2 moose. This was slightly higher than the mean annual harvest of 22.4 moose during RY10–RY14. Two hundred and fifty permits were issued each year, except during RY16, when 2 permits were revoked.

Hunter Residency and Success

During the reporting period, most of the hunters were Unit 1D residents (Table 4). Haines and Klukwan residents harvested 106 of the 121 moose taken during the report period. Hunter success ranged from 11% to 16% during the report period, with a mean success rate of 13.6% (Table 5). The average number of days among successful hunters ranged from 3.3 to 5.8 (Table 3). Total hunter days averaged 1,343 during the reporting period, with a high of 1,660 during RY19 and a low of 702 in RY16. Emergency orders to close seasons during RY15–RY17 affected this wide variation in the number of days hunted. For example, the season closed by emergency order after only 8 days in RY16.

Harvest Chronology

The season was closed early by emergency order during RY15–RY17 when the harvest guidelines were met but remained open for RY18–RY19. The highest harvest occurred during the first week of the season (Table 6). This is partially because the most easily identified legal bulls are harvested quickly. This was especially true during RY16, when 25 bulls were harvested

Table 4. Unit 1D annual moose harvest by community of residence, Southeast Alaska, regulatory years 2005–2019.

Regulatory year	Total harvest	Haines	Skagway	Juneau	Sitka	Other Alaska	Nonresident
2005	18	15	0	2	0	1	0
2006	27	25	0	1	1	0	0
2007	22	20	0	1	1	0	0
2008	30	30	0	0	0	0	0
2009	18[a]	17	0	1	0	0	0
2010	21	19	0	1	1	0	0
2011	21	20	0	1	0	0	0
2012	22	22	0	0	0	0	0
2013	26[b]	26	0	0	0	0	0
2014	22	20	0	1	1	0	0
2015	24	24	0	0	0	0	0
2016	25	24	0	0	1	0	0
2017	27	25	0	1	1	0	0
2018	25	24	0	0	1	0	0
2019	20	19	0	0	1	0	0

[a] Does not include 1 unsalvaged illegal harvest.
[b] Does not include 2 unsalvaged illegal harvests.

Table 5. Unit 1D moose harvests, number of hunters, and percent success, Southeast Alaska, regulatory years 2005–2019.

Regulatory year	No. males	No. females	No. unknown	Total harvest	No. hunters	Percent success
2005	18	0	0	18	166	11
2006	27	0	0	27	177	15
2007	22	0	0	22	178	12
2008	30	0	0	30	185	16
2009	18[a]	0	0	18[a]	215	8
2010	21	0	0	21	189	11
2011	21	0	0	21	193	11
2012	22	0	0	22	199	11
2013	26[b]	0	0	26[b]	211	12
2014	22	0	0	22	174	13
2015	24	0	0	24	187	13
2016	25	0	0	25	157	16
2017	27	0	0	27	194	14
2018	25	0	0	25	184	14
2019	20	0	0	20	189	11

[a] Does not include 1 unsalvaged illegal harvest.
[b] Does not include 2 unsalvaged illegal harvests.

Table 6. Unit 1D summary of harvest chronology, Southeast Alaska, regulatory years 2015–2019.

	15–21 Sep				22–28 Sep				29 Sep–7 Oct			
Regulatory year	Spike-fork	3 brow tines	>50″	Sublegal	Spike-fork	3 brow tines	>50″	Sublegal	Spike-fork	3 brow tines	>50″	Sublegal
2015[a]	3	9	4	1	1	3	2	1	0	0	0	0
2016[a]	5	15	2	2	1	0	0	0	0	0	0	0
2017[a]	1	13	1	2	1	3	1	1	1	2	2	0
2018	5	3	5	0	2	4	0	0	1	3	2	0
2019	3	8	2	0	0	3	2	0	1	0	1	0

[a] Season closed early by emergency order on 1 October 2015 (16-day season), 22 September 2016 (8-day season), and 3 October 2017 (19-day season).

in 8 days and only 2 sublegal bulls were taken. Overall, 68% of spike-forked bulls, 73% of bulls with 3 brow tines, and 58% of bulls with 50-inch or greater antler spread were harvested in the first week of the season (Table 6). A total of 7 sublegal bulls were taken during the report period (5 in the first week of the season and 2 during the second week), which was 41% lower than the previous report period when 12 sublegal bulls were taken.

Transport Methods

Most successful hunters used boats or highway vehicles during the reporting period (Table 7). Boat use ranged from 65% to 74% of all successful hunters. The use of highway vehicles ranged from 13% to 28%. Off-road recreational vehicle use by successful hunters ranged from 5% to 16%. Hunters did not use commercial services during this reporting period. Historically, commercial service use has always been very low (Table 8).

Table 7. Unit 1D transport methods used by successful moose hunters, Southeast Alaska, regulatory years 2005–2019.

	Airplane		Boat		ORV[a]		Highway vehicle		Other	
Regulatory year	Total	(%)	Total	(%)	Total	(%)	Total	(%)	Total	(%)
2005	0	(0)	12	(67)	3	(17)	3	(17)	0	(0)
2006	2	(7)	14	(52)	3	(11)	7	(26)	1	(4)
2007	0	(0)	14	(64)	5	(23)	3	(14)	0	(0)
2008	0	(0)	16	(53)	2	(7)	11	(37)	1	(3)
2009	0	(0)	10	(56)	3	(17)	2	(11)	3	(17)
2010	1	(5)	10	(48)	4	(19)	5	(24)	1	(5)
2011	0	(0)	12	(57)	3	(14)	6	(29)	0	(0)
2012	0	(0)	16	(73)	0	(0)	4	(18)	2	(9)
2013	0	(0)	18	(69)	4	(15)	4	(15)	0	(0)
2014	0	(0)	11	(50)	3	(14)	4	(18)	4	(18)
2015[b]	1	(4)	17	(71)	3	(13)	3	(13)	0	(0)
2016	0	(0)	16	(64)	4	(16)	5	(20)	0	(0)
2017	0	(0)	20	(74)	3	(11)	4	(15)	0	(0)
2018	0	(0)	18	(72)	0	(0)	7	(28)	0	(0)
2019	0	(0)	14	(70)	1	(5)	5	(25)	0	(0)

[a] ORV refers to off-road vehicles.
[b] Totals exceed 100% due to rounding.

Other Mortality

Other anthropogenic causes of mortality include collisions with highway vehicles and moose occasionally killed out of season in defense of life or property. In such cases, ADF&G biologists and Alaska Wildlife Troopers attempt to provide salvageable meat to charity.

Local residents have maintained an interest in harvesting moose for funeral ceremonies and request 1–2 cultural education permits annually. ADF&G works with local law enforcement to provide meat from sublegal bulls that have been confiscated and moose killed in motor vehicle collisions that are in good condition. If these requests increase significantly, we will continue working with interested groups to ensure harvest aligns with management objectives and harvest strategies.

Table 8. Unit 1D commercial services used by moose hunters, Southeast Alaska, regulatory years 2005–2019.

	Unit residents		Other Alaska residents		Total use	
Regulatory year	No	Yes	No	Yes	No	Yes
2005	145	2	9	1	154	3
2006	169	0	8	0	177	0
2007	174	0	4	0	178	0
2008	178	0	7	0	185	0
2009	201	1	12	0	213	1
2010	179	0	9	0	188	0
2011	183	0	11	0	194	0
2012	187	0	12	0	199	0
2013	197	0	12	0	209	0
2014	163	0	11	0	174	0
2015	177	0	10	0	187	0
2016	150	0	6	0	156	0
2017	186	0	7	0	193	0
2018	177	0	7	0	184	0
2019	183	0	6	0	189	0

Brown bears, black bears, and wolves inhabit Unit 1D, but we do not know the degree to which predation may limit the Haines moose population. Historically, wolf harvest in Unit 1D has been relatively low, averaging 7 wolves per year during this reporting period. Although we do not have data to quantify the effects of predation on moose calves directly, we do calculate the percentage of calves counted during aerial surveys. The average percentage of calves for RY15 and RY16 was 13.5%, nearly identical to the 10-year average of 13%, indicating there likely has not been a significant increase in predation on calves during those years. Future monitoring of the summer survival of calves associated with collared cows will provide an index of predation, which is assumed to be the primary cause of summer calf mortalities.

This reporting period included winters with deep snow and winters with little snow. Deep-snow winters may increase calf mortality. As forest succession advances throughout the Chilkat Valley, the availability of moose forage, particularly during winter, may decrease, and that could affect reproduction and calf survival (Hundertmark et al. 1983).

Alaska Board of Game Actions and Emergency Orders

The season was closed early by emergency order during RY15–RY17 after harvest guidelines were met or exceeded.

Recommendations for Activity 2

Biologists must continue collecting harvest information since it is an important measure of human-caused mortality. In addition, they should analyze current antler restrictions relative to the ages of harvested moose and the bull-to-cow ratios to determine if the restrictions protect an appropriate proportion of breeding-aged bulls.

3. Habitat Assessment-Enhancement

ACTIVITY 3. Conduct moose browse surveys.

Data Needs

The availability of forage, particularly winter forage, may limit moose in the Haines area. Estimates of the amount of browsing of important moose forage plants (e.g., willow, cottonwood, and red osier dogwood) will help biologists assess whether there is adequate browse available to sustain the moose population or the available habitat may be limiting the moose population.

Methods

After consultation with the moose research biologist, ADF&G biologists marked a sample of important winter browse species, willow and red osier dogwood (*Cornus stolonifera*), in plots throughout the Chilkat Valley in 2019. We estimated browse removal from marked plants to obtain baseline measurements.

Results and Discussion

In 2019, ADF&G biologists marked plants to monitor biomass removal proportions. Two sites in the Murphy Flats area in the Chilkat Valley had ~42–44% biomass removal, which was higher than plots in Gustavus (range = 28–37% biomass removal). This is consistent with our ultrasound measurements of captured cows, which showed that moose captured in the Chilkat Valley had lower body fat than moose captured in other areas of Southeast Alaska. This indicates that moose captured in 2019 may have been somewhat food-stressed before capture, and further browse monitoring and body condition measurements could provide useful information when feasible. However, we noted that some of the habitat sampling sites were challenging to get to and may be logistically difficult to repeat in some years if snow persists and staff are unavailable. We did not conduct browse surveys in the spring of 2020 due to travel restrictions during the COVID-19 pandemic.

Recommendations for Activity 3.

Based on staff time and funding availability, browse surveys should be continued.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

Harvest data are stored on the internal ADF&G database on a server (http://winfonet.alaska.gov/index.cfm).

Field data sheets from surveys and antler measurements are stored in file drawers in the area management section of the downstairs Douglas Area Office. Scanned copies of completed forms are stored on the Douglas ADF&G network drive (S:\Region1Shared-DWC\Offices\Douglas\Carl Koch\Moose).

GIS survey data are stored on the Assistant Area Biologist computer (C:\GIS_data\Haines\Survey_data) and the Region I server (S:\Region1Shared-DWC\Offices\Douglas\Carl Koch\Moose).

Agreements

No agreements affected these activities.

Permitting

Moose capture and handling activities were approved under ADF&G Animal Care and Use Committee protocol number 0076-2019-06.

Conclusions and Management Recommendations

Based on aerial survey data, we should continue using the management objective of a posthunt population of 200 moose. Without better population data, we believe the harvest objective of 20–25 bulls is appropriate.

Aerial surveys during the reporting period suggest that the moose population has remained relatively stable. However, during the last 3 years of the reporting period, the lack of adequate snow cover delayed surveys until after antler drop and confounded the collection of demographic data. Inconsistent survey conditions reinforce the need to continue maintaining a sample of collared adult cow moose to enable mark-resight population estimates, estimates of sightability during surveys, and estimates of adult and calf survival. We recommend maintaining a minimum radiocollared sample size of 10% of the population.

In the late 1960s, ADF&G biologists documented deteriorating range conditions due to heavy browsing and suggested that habitat management may be needed to sustain or grow the Chilkat Valley moose population (ADF&G 1990). McCarthy (1990) suggested examining the relationship between timber harvest and moose habitat in the Chilkat Valley. We recommend continuing to investigate the feasibility and utility of annual surveys to estimate the browse availability and use of winter browse.

II. Project Review and RY20–RY24 Plan

Review of Management Direction

MANAGEMENT DIRECTION

There are no broad changes in management direction.

GOALS

Region I moose management goals were established when the Region I moose management plan was created in the late 1980s. The following goals are general and applicable to the entire region:

1. Maintain, protect, and enhance moose habitat and other components of the ecosystem.
2. Maintain viable populations of moose in their historic range throughout the region.
3. Manage moose on a sustained yield basis.
4. Manage moose in a manner consistent with the interests and desires of the public.
5. Manage moose primarily for meat rather than for trophy hunting.
6. Manage moose for the greatest hunter participation possible, consistent with maintaining viable populations, sustained yield, subsistence priority, and the interests and desires of the public.
7. Provide opportunities to view and photograph moose for the benefit of nonconsumptive users of moose.
8. Develop and maintain a database for making informed management decisions.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

BOG determined that 100% of the allowable annual harvest is necessary for subsistence in Unit 1D.

Intensive Management

BOG determined a negative finding for intensive management in Unit 1D.

MANAGEMENT OBJECTIVES

Population management objectives identified by department staff for Unit 1D are as follows:

1. Maintain a posthunt population of at least 200 moose.
2. Maintain a posthunt bull-to-cow ratio of 25:100.
3. Sustain a harvest of 20–25 moose annually.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct aerial surveys to obtain minimum counts and age-sex composition of the herd.

Data Needs

No change from RY15–RY19.

Methods

No change from RY15–RY19. We currently conduct annual minimum count surveys when snow cover allows.

ACTIVITY 1.2. Radiocollar cow moose to improve population estimates and learn about cow and calf survival.

Data Needs

Better ways of estimating the true size and makeup of the moose population may allow for additional hunting opportunities. ADF&G biologists recommend maintaining a sample of radiocollared cow moose to facilitate mark-resight and modeled population estimates incorporating sightability data and estimates of cow and calf survival.

Methods

ADF&G biologists recommend radiocollaring enough cow moose with long-lasting VHF radio collars using standard ADF&G capture methods to maintain a sample size of ~10% of the population. We also recommend using telemetry to estimate survival and recruitment and investigate causes of mortality when possible.

2. Mortality-Harvest Monitoring

ACTIVITY 2. Monitor harvest and other mortality, including age and antler configuration of harvested moose.

Data Needs

No change from RY15–RY19; however, an assessment of the current harvest strategy could be accomplished through an in-depth analysis of harvest data collected by ADF&G biologists.

Methods

In addition to the methods used for the previous reporting period, an analysis of age versus antler morphology and bull-to-cow ratios will allow an evaluation of the current antler restrictions.

3. Habitat Assessment-Enhancement

ACTIVITY 3. Conduct moose browse surveys.

Data Needs

Except for the work that was initiated in the spring of 2019, information about browse availability is limited to work done in the 1980s (Hundertmark et al. 1983) and one survey conducted in 2007 (Neil Barten, Area Biologist, ADF&G, Douglas, May 2007 unpublished preliminary data summary). The 2007 data indicates that many willows were either too tall to browse or had evidence of over-browsing. Further investigation is needed to determine if browse availability is limiting the size of the moose population.

Methods

The exact methods will depend on input from the ADF&G biometrician and moose specialist. Depending on staff availability, plots may be visited annually during the spring, and measurements of browse activity will be obtained to determine the availability and amount of use of browse species.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

Harvest data will be stored in an internal ADF&G database on a server (http://winfonet.alaska.gov/index.cfm).

Field data sheets from surveys and antler measurements will be stored in file drawers in the area management section of the downstairs Douglas Area Office. Scanned copies of completed forms will be stored on the Douglas ADF&G network drive (S:\Region1Shared-DWC\Offices\Douglas\Carl Koch\Moose).

GIS survey data will be stored on the Assistant Area Biologist computer (C:\GIS_data\Haines\Survey_data) and the Region 1 server (S:\Region1Shared-DWC\Offices\Douglas\Carl Koch\Moose).

Agreements

There are no agreements currently affecting these activities.

Permitting

Institutional Animal Care and Use Committee approval and appropriate training have been obtained and will be updated before any moose captures.

Acknowledgments

Fixed-wing pilots Chuck Schroth and Lynn Bennett assisted with aerial surveys. Helicopter pilots Eric Eichner and Cristian Kolden assisted with moose captures. Cheryl McRoberts and the staff at the American Bald Eagle Foundation in Haines, Alaska, provided a venue and

audiovisual aids for annual public moose meetings. Program technician Faith Lorentz assisted with staffing the hunter checkstation and collecting data from hunters. Alaska Wildlife Troopers from Haines and Juneau assisted with enforcement issues and transferring illegally harvested moose to charities to ensure no salvageable meat went to waste. June Younkins reviewed this document for division and department standards and completed the publication process.

References Cited

Alaska Department of Fish and Game. 1990. Strategic plan for management of moose in Region I, Southeast Alaska: 1990–94. Final. Division of Wildlife Conservation, Douglas.

Hessing, P. 2004. Unit 1D moose management report. Pages 45–57 [*In*] C. Brown, editor. Moose management report of survey-inventory activities 1 July 2001–30 June 2003. Alaska Department of Fish and Game, Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Project 1.0, Juneau.

Hundertmark, K. J., W. L. Eberhardt, and R. E. Ball. 1983. Winter habitat utilization by moose and mountain goats in the Chilkat Valley: Final report. Contribution to the Haines-Klukwan Cooperative Resource Study; funded by legislative appropriation. Alaska Department of Fish and Game, Division of Game, Juneau.

Kellie, K. A., K. E. Colson, and J. H. Reynolds. 2019. Challenges to monitoring moose in Alaska. Alaska Department of Fish and Game, Wildlife Management Report ADF&G/DWC/WMR-2019-1, Juneau.

McCarthy, T. 1990. Unit 1D moose. Pages 23–32 [*In*] Sid O. Morgan, editor. Moose annual report of survey-inventory activities 1 July 1988–30 June 1989. Division of Wildlife Conservation, Federal Aid in Wildlife Restoration Study 1.0, Juneau.

Sell, S. K. 2012. Unit 1D moose. Pages 50–60 [*In*] P. Harper, editor. Moose management report of survey-inventory activities 1 July 2009–30 June 2011. Alaska Department of Fish and Game, Species Management Report ADF&G/DWC/SMR-2012-5, Juneau.


ALASKA
DEPARTMENT OF FISH AND GAME