Species Management Report and Plan ADF&G/DWC/SMR&P–2026–3

Moose Management Report and Plan, Game Management Unit 17:

Report Period 1 July 2015–30 June 2020, and

Plan Period 1 July 2020–30 June 2025

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Alaska Department of Fish and Game Division of Wildlife Conservation

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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 Todd Rinaldi, Management Coordinator for Region IV for the Division of Wildlife Conservation.

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Cover Photo: Carrying a moose antler rack across tundra. ©2024 ADF&G. Photo by John Landsiedel.

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Purpose of this Report

This report provides a record of survey and inventory management activities for moose (*Alces alces*) in Game Management Unit 17 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 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. It is also made available to the public to inform them of wildlife management activities. The Alaska Department of Fish and Game's (ADF&G, the department) Division of Wildlife Conservation (DWC) publishes these reports on a 5-year cycle to document trends and describe potential changes in data collection activities for moose.

I. RY15–RY19 Management Report

Management Area

Unit 17 (18,800 mi^2) is located in Southwest Alaska and consists of drainages into Bristol Bay and the Bering Sea between Etolin Point and Cape Newenham, and all islands between these points, including Hagemeister Island and the Walrus Islands (Fig. 1). The unit encompasses diverse habitats including several mountain ranges (Ahklun Mountains, Wood River Mountains, and Neacola Mountains) and the Nushagak Hills, with large expanses of wet meadow and tundra habitat scattered throughout the unit. Unit 17 is further divided into 3 administrative units. Unit 17B is defined by 2 large river systems, the Nushagak and Mulchatna rivers that converge near the southern border of Unit 17B and continue on as the Nushagak River, defining a major portion of Unit 17C. These river corridors and their numerous tributaries contain excellent moose habitat with willows (*Salix* spp.), cottonwood (*Populus balsamifera*), alder (*Alnus* spp.), and spruce (*Picea* spp.). The habitat immediately adjacent to these stream corridors changes rapidly from riparian to wet meadows and tundra, which lack the woody vegetation that moose utilize during the winter months. The other significant habitat in both Units 17B and 17C are large areas of spruce and mixed birch (*Betula* spp.) forests. The western edge of both Units 17B and 17C is dominated by the Wood River Mountains and a series of large lakes that are sandwiched between mountain peaks. Unit 17A, though removed from the Nushagak and Mulchatna rivers, has a similar composition of riparian areas along stream corridors, wet meadows and tundra habitats away from the streams, and mountainous terrain. However, Unit 17A lacks the large expanses of spruce and mixed forest common to the other subunits; shrubs of alder and willow are the dominant woody species in many areas of Unit 17A.

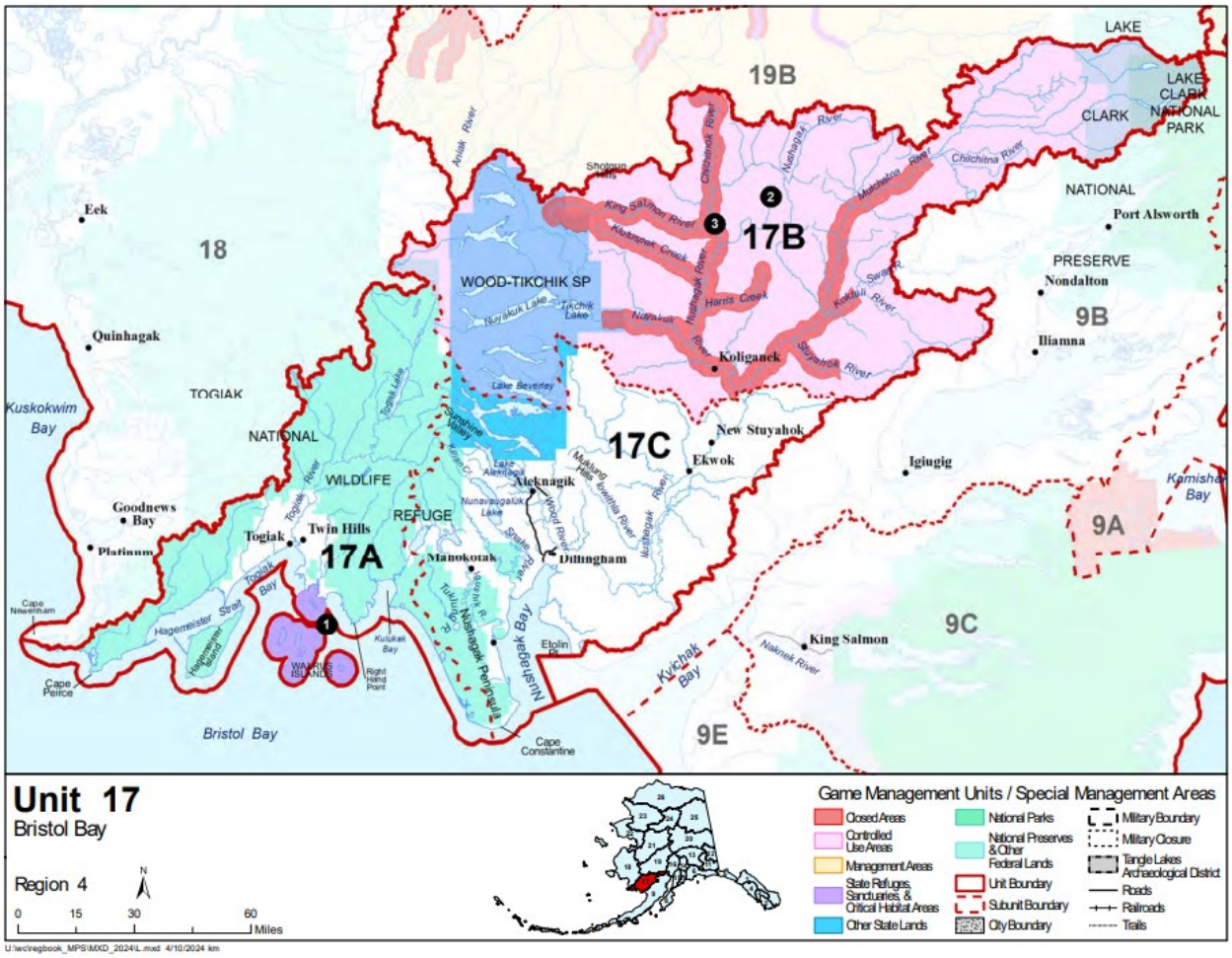

Figure 1. Unit 17 boundaries, Southwest Alaska, regulatory years 2015–2019.

Summary of Status, Trend, Management Activities, and History of Moose in Unit 17

Moose are relatively new inhabitants in the Bristol Bay area, possibly expanding their range from the middle Kuskokwim River drainages. Until the 1980s, population abundance was low, and moose primarily inhabited the Nushagak-Mulchatna river system. Residents harvested moose opportunistically; however, caribou, reindeer, bears, and beavers were historically the main sources of game meat. ADF&G began collecting data on the Unit 17 moose population in 1971. At that time, Faro (1973) reported moose were not abundant in the unit and animals close to the villages were subject to heavy hunting pressure.

Hunting seasons have varied over the years, but the legal bag limit had always been restricted to bulls until 2013, when a limited antlerless season was opened in Unit 17A. In the 1970s through mid-1980s, out of season harvest by unit residents was suspected to be the principal factor contributing to low densities of moose in the unit, when habitat conditions suggested the moose population could have increased (Taylor 1990).

Beginning in the 1990s, moose populations throughout Unit 17 increased substantially in number and range. Reasons for this increase likely include moderate snowfalls in several successive winters and decreased harvest of female moose. The reduction in the female harvest resulted in part from a positive response by unit residents to department education efforts, and from the abundance of an alternative big game resource. Moose are now common throughout the unit in areas with suitable habitat.

Management Direction

Existing Wildlife Management Plans

- The department's moose management plan for Unit 17 has been reviewed and modified over time based on public comments, staff recommendations, and Alaska Board of Game (BOG, the board) actions. These periodic changes in management planning have been reported in the division's previous species management reports. The plan portion of this report contains the current management plan for moose in Unit 17.

- *Moose Management Plan for Game Management Unit 17A* (Unit 17A Moose Management Group 2013). Interested stakeholders (Bristol Bay Federal Subsistence Regional Advisory Council, Nushagak and Togiak Fish and Game advisory committees, Togiak National Wildlife Refuge, and the Alaska Department of Fish and Game in Dillingham) worked together in 1996 to draft a Unit 17A moose management plan and have subsequently made revisions based on increasing moose abundance and associated changes in harvest pressure, desired hunter opportunity, and desired population levels.

Goals

- Develop methodology for assessing bull-to-cow ratios.
- Initiate study to assess moose productivity and recruitment.
- Improve moose harvest reporting and compliance with hunting regulations.
- Determine moose population size, trend, and composition
- Maintain healthy age and sex structures within Unit 17 moose populations.
- Provide maximum opportunity to participate in hunting moose.
- Provide for consumptive and nonconsumptive uses of moose populations.

Codified Objectives

Amounts Reasonably Necessary for Subsistence Uses

The Unit 17 moose population has a positive customary and traditional use determination finding. The unitwide amount reasonably necessary for subsistence value is 100–150 moose.

Intensive Management

In 2001 the BOG adopted a positive finding for intensive management (IM) of moose in Units 17B and 17C (no positive finding in Unit 17A). Current IM objectives are as follows:

- Population objectives
    - Unit 17B: 4,900–6,000
    - Unit 17C: 2,800–3,500
- Harvest objectives
    - Unit 17B: 200–400
    - Unit 17C: 165–350

MANAGEMENT OBJECTIVES

Unit 17A

- Manage for a minimum population of 300 moose and a target population of 1,100–1,750 moose.

Unit 17B

- Manage for a population of 4,900–6,000 moose with a human use objective of 200–400 moose.
- Achieve and maintain a density of 1 moose/mi^2 on habitat considered good moose range.

Unit 17C

- Manage for a population of 2,800–3,500 moose with a human use objective of 165–350 moose.
- Maintain a minimum density of 0.5 moose/mi^2.

All Subunits

- Design strategy for collecting demographic data on moose populations, in particular bull-to-cow ratios.

MANAGEMENT ACTIVITIES

Assessing population status and trends, monitoring harvest and mortality, and assessing habitat conditions are integral components of management programs in Unit 17. Survey and inventory management activities used to monitor moose populations in Unit 17 are described below and can be found in Woolington (2012; RY09–RY10) and Barten (2014, 2018; RY11–RY12, RY10–RY19).

1. Population Status and Trend

ACTIVITY 1.1. Conduct aerial surveys to estimate moose abundance.

Data Needs

Moose abundance is an integral component of moose management and essential to determine if our IM objectives are being met.

Methods

Surveys in Unit 17 use the Geospatial Population Estimator (GSPE; DeLong 2006) method. The GSPE estimates are used for monitoring trends in abundance and for assessing abundance in comparison to IM population objectives.

Surveys in Unit 17A were conducted in collaboration with Togiak National Wildlife Refuge (TNWR). Due to coastal weather affecting all of Unit 17, TNWR transitioned to fall surveys, rather than late winter surveys. Sex-age composition can be collected simultaneously during fall abundance surveys, but the GSPE method relies heavily on snow cover for increased moose detections. For this reason, GSPE surveys in Units 17B and 17C were conducted between February and March, and due to the timing of these surveys occurring after antler drop, the survey data does not include sex ratios.

Unit 17B is divided into east and west zones because it is a large geographic area and weather conditions limit survey opportunities to short periods of time. *17B West* consists of the area within Unit 17B that lies west of the Mulchatna River watershed to the Unit 18 border. *17B East* is area that covers the Mulchatna River drainage upstream of the confluence of the Nushagak and Mulchatna rivers. Attempts are made to survey each zone on a 3-year cycle, although the eastern portion of Unit 17B has not been surveyed since 2008.

Results and Discussion

In Unit 17A, the moose population has been increasing steadily since the early 1990s. The most recent population survey was completed in Fall 2019 (RY19) and the population estimate, with adjustment for sightability correction factor (SCF), was 2,138 moose. Further demographic metrics suggest that this population continues to be productive, although the decreasing percentage of calves within the population from the RY19 survey may indicate a declining population trend (Table 1).

Recent snow conditions have been favorable for moose surveys as evidenced by surveys in spring 2017 (RY16) in Unit 17B, and in Unit 17C in spring 2017 (RY16) and spring 2019 (RY18). Despite the good snow conditions of the past few years, we continue to lack enough information to understand if we are within the IM population objective in Unit 17B. The GSPE conducted in RY16 only covered the western zone and produced a population estimate of 1,669 moose, which included 240 calves (16% of the population). Given the previous estimates for 17B West that were also less than 2,000 animals, it is likely the Unit 17B moose population is below the IM population objective for the unit (4,900–6,000). However, it is possible the population objectives for Unit 17B were set during a period of reestablishment of this moose population,

when the population was over carrying capacity, and it is important to note that population objective could overrepresent what the habitat in the unit can support.

In Unit 17C, a GSPE survey was also conducted in RY16 (19–23 March 2017) with an estimated population of 2,581 moose, including 420 calves (16% of the population). An additional Unit 17C survey in RY18 (10–13 February 2019) produced an estimate of 2,126 moose, including 262 calves (12% of the population). The RY19 population estimate of 2,216 moose is below the management objective of 2,800–3,500 and reflects a continuing decline from RY13 to RY18. Over this period, calf percentages declined from 16% in spring 2017 to 12% in spring 2019, indicating reduced recruitment into the population.

Table 1. Unit 17 moose population estimation surveys, Southwest Alaska, regulatory years 1998–2019.

Area	Regulatory year	Population estimate (90% confidence interval)		Moose/ mi^2	Survey area (mi^2)	Minimum % calves
Unit 17A[a]	2016[b]	1,760[c]	(1,469–2,051)	0.52	3,399	20
	2017	2,369[c]	(2,021–2,717)	0.70	3,399	22
	2017[b]	1,714[c]	(1,419–2,009)	0.50	3,399	13
	2019[b]	2,138[c]	(1,838–2,438)	0.63	3,399	6
Unit 17B West[d]	2000	1,202	(1,061–1,343)	0.22	5,524	5
	2005	1,210	(1,090–1,330)	0.22	5,524	13
	2009	1,137	(978–1,296)	0.21	5,510	8
	2016	1,669	(1,376–1,962)	0.42	4,000[e]	14
Unit 17B East[f]	2001	1,953	(1,699–2,207)	0.46	4,269	4
	2008	1,466[g]	(1,042–1,890)	0.37	3,981	8
Unit 17C	1998	2,955	(2,467–3,443)	0.54	5,447	15
	2003	3,670	(3,128–4,212)	0.67	5,447	11
	2007	3,235	(2,881–3,589)	0.59	5,447	12
	2013	4,053	(3,289–4,817)	0.74	5,447	14
	2016	2,581	(1,971–3,191)	0.47	5,447	16
	2018	2,216	(2,008–2,424)	0.43	5,208[e]	12

[a] Surveys conducted by Togiak National Wildlife Refuge.
[b] GSPE surveys completed in the month of October, with little or no snow cover.
[c] Population estimate corrected for sightability trials.
[d] Unit 17B West refers to the area within Unit 17B that lies west of the Mulchatna River watershed to the Unit 18 border.
[e] Survey area was adjusted because some areas were classified with no moose habitat during stratification flights.
[f] Unit 17B East refers to the area within Unit 17B that includes the Mulchatna River drainage upstream of the confluence of the Nushagak and Mulchatna rivers.
[g] Estimate is for entire survey area; however, high winds and turbulence prevented counting in some sample units, especially some considered high density strata in riparian areas of the lower Mulchatna River.

Recommendations for Activity 1.1

Continue to schedule GSPE surveys for moose.

ACTIVITY 1.2. Spring recruitment and twinning surveys.

Data Needs

Estimates of moose nutritional condition and productivity are integral to management on a sustained yield basis over the long term and for the protection of moose health and habitat. Determining how many cows have twins relative to cows with singletons provides an indication of condition and productivity of the moose population. The information available from the current population survey protocol is insufficient to effectively guide management decisions about the moose populations in Units 17B and 17C, so gathering twinning data serves as an additional step toward a comprehensive understanding of these moose populations to allow for an adaptive management strategy guided by population level data.

Methods

As part of a research project assessing moose calf demography and sources of mortality, recruitment surveys and twinning surveys were scheduled for April and May, respectively. We assess recruitment by observing collared cows and recording if they still had their calf at heel. Twinning rate is assessed by observing if collared cows have newborn calves and the percentage that have singletons or twins.

Results and Discussion

Recruitment surveys were completed in mid- to late April during RY17–RY19 and yielded consistently low results. For RY17 through RY19, the average annual calf survival to 1 year was 13%, with a range of 6%–20%.

Twinning surveys were completed between mid-May and early June in RY16–RY19. Rates were consistently high among cows ≥ 36 months old, ranging from 55% to 70%. In spring 2017 (RY6), 20 cows were observed, with 11 twinning (55%). In spring 2018, 43 cows were observed, with 28 twinning (65%). In spring 2019, 47 cows were observed, with 33 twinning (70%), including 2 sets of triplets. In spring 2020, 45 cows were observed, with 31 twinning (68%).

Younger cows also contributed to reproduction. Of the eight 24-month-old cows observed in spring 2018, 7 were classified with calves-at-heel. In spring 2020, 45% of the 24-month-old cows were observed with calves.

Recommendations for Activity 1.2

Continue recruitment and twinning surveys.

ACTIVITY 1.3. Fall composition surveys.

Data Needs

This was a new activity for Unit 17 that was added due to the importance of composition data. Moose population surveys in Unit 17 have been conducted February–March due to lack of snow cover during the more traditional November period that is used in many other parts of the state. Because of the late timing of the surveys in Unit 17, antler drop has already occurred, preventing biologists from obtaining bull-to-cow ratio data. With the declining bull harvest in Units 17B and 17C over the past 10 years, and the liberal hunting seasons that include a winter hunt, we need to acquire this demographic information to assess the sustainability of our present moose hunting season and harvest rate.

Methods

Moose were located by searching traditional trend count areas by fixed-wing airplane after fresh snowfall. Group composition (by sex and age) and total group size were determined. Trend count areas were determined by previous area biologists based on known winter ranges for moose. Surveys were scheduled for mid- to late November.

Results and Discussion

Moose composition surveys were conducted 28 November–4 December 2016 across 9 trend areas in Units 17B and 17C. A total of 1,067 moose were classified by age and sex, with cows further classified by the number of calves-at-heel (0, 1, or 2). Results showed a bull-to-cow ratio of 54.5:100 in Unit 17B and 21.9:100 in Unit 17C. The lower ratio in Unit 17C is not unexpected, as most of the Unit 17 communities are within this subunit and local harvest is concentrated there. Unit 17 does not have codified objectives regarding bull-to-cow ratios; however, the observed bull-to-cow ratio in Unit 17C remains below what is typically considered a minimum management objective of 25 bulls per 100 cows. Calf-to-cow ratios were also low, with 28.4:100 in Unit 17B and 15.6:100 in Unit 17C, indicating relatively poor recruitment in both subunits, but especially in Unit 17C.

Recommendations for Activity 1.3

Continue to schedule moose composition surveys and complete as weather allows.

2. Mortality-Harvest Monitoring and Regulations

ACTIVITY 2.1. Monitor and analyze harvest and other mortality

Data Needs

Monitoring and analyzing harvest data are essential to determine whether the IM harvest objectives have been achieved and to provide insight into whether harvests are sustainable. These data are often the core of information presented and discussed during our regulatory processes and is always an important component in guiding our management decisions.

Methods

We collected harvest data by means of general season harvest ticket reports (GM000), registration permit reports (RM571, RM573, RM575, RM576, RM583, RM585, RM587), and a single draw permit (DM570). These data were compiled in the ADF&G Wildlife Information Network (WinfoNet) moose harvest database.

To encourage hunters to report their hunting effort, we used the local radio station and newspaper to prompt hunters to submit their report. We also met with many of the permittees during the permit issuance and stressed the importance of complying with reporting requirements. Hunters who did not report on their permits were sent reminder letters, and if they failed to comply with the permit reporting requirements, they were eventually put on the failure to report list. Additionally, department staff made phone calls to hunters who had failed to report in an attempt to collect harvest and effort information. We cooperated with enforcement efforts by the Alaska Wildlife Troopers during the hunting season.

Season and Bag Limit

Current Unit 17 moose season dates and bag limits are available on the ADF&G website:

http://www.adfg.alaska.gov/index.cfm?adfg=wildliferegulations.hunting

Most of the moose hunting effort in Unit 17 is conducted through registration permit hunts. During RY15–RY19, the fall seasons and bag limits varied across the unit; the Unit 17A resident season (RM573) was 25 August–20 September during RY15–RY17, and had a bag limit of 1 bull, while during RY18–RY19 the season dates were 25 August –25 September with a bag limit of 1 moose. The season in Units 17B and 17C occurred 20 August–15 September and allowed the harvest of any bull moose. None of the resident permit hunts were limited in the number of permits issued. In Unit 17B, nonresident hunters could hunt portions of the Mulchatna and Nushagak river corridors by registration permit, with a season of 5–15 September and the requirement to employ a selective harvest strategy for bull moose of 4 brow tines or ≥ 50-inch antlers. There was also a nonresident draw hunt in Unit 17A for 5–15 September with 20 permits available and a selective harvest of 4 brow tines or ≥ 50-inch antlers.

Units 17B and 17C also had a general season for resident hunters 1–15 September, which included a selective bull harvest criterion of spike-fork, 3 brow tines, or ≥ 50-inch antlers.

There were also winter hunts in all of Unit 17 for Alaska residents. In Unit 17A, the winter season was restricted to 31 days or less, occurring within the dates of 1 December and the last day of February, with the exact season dates announced annually via emergency order. The Unit 17A winter hunts had a bag limit of 1 antlered bull and 1 antlerless moose, with total harvest quotas of 10 cows and 15 bulls. In Units 17B and 17C, the winter hunts were 1–31 December with a bag limit of 1 antlered bull, and no quotas on total harvest.

Results and Discussion

Harvest by Hunters

Reported harvest of moose has been below the IM objective for Unit 17B (200–400) since RY00, with a significant downward trend over time. In Unit 17C the IM objective for harvest (165–350)

was met in RY15–RY17, but not during RY18–RY19 (Table 2). Harvest in Unit 17A has been increasing over time and we expect this population to provide more opportunity for harvest in future years (Table 2).

Unreported harvest in Unit 17 is unknown but could be significant in localized areas. In RY15–RY19 there were 131 individuals who failed to report (FTR) on their permits or harvest tickets, which represents an FTR rate of 2%. Based on information from Alaska Department of Public Safety annual investigations, out of season and unreported harvest increases during the winter; actual harvest during winter hunts across the unit could be higher than reported.

Table 2. Reported moose harvest data for all hunts in Unit 17, Southwest Alaska, regulatory years 2015–2019.

Regulatory year	Hunters afield	Success rate (%)	Reported harvest				
			Unit 17A	Unit 17B	Unit 17C	Unknown	Total
2015	1,179	25	60	61	177	0	298
2016	1,128	31	85	88	179	0	352
2017	1,065	30	73	78	169	0	320
2018	1,256	23	65	81	144	0	290
2019	1,190	26	108	98	108	0	314

Hunters continued to harvest moose with large antlers throughout this reporting period. During RY15–RY19, at least 39% of the moose antler dimensions that were recorded on hunt reports consisted of moose with antler spreads of 50 inches or greater, which is consistent to the last reporting period (RY10–RY14, 44%; Barten 2018). The largest antlers reported for each season of this reporting period were at least 70 inches, with 76 inches in RY19, which is also consistent with previous reporting (Table 3).

Table 3. Unit 17 average and largest reported moose antler spread, Southwest Alaska, regulatory years 2015–2019.

Regulatory year	Average antler spread (inches)[a]	Percentage > 50"[a]	Largest antlers (inches)[a]
2015	45	39	71
2016	45	41	70
2017	45	42	74
2018	47	49	72
2019	48	48	76

[a] Antler measurements were provided by hunters; data represents only a portion of the total harvest.

Permit Hunts

There are 6 registration permit hunts available for Alaska residents in Unit 17 (RM571, RM573, RM575, RM576, RM583, and RM585). Nonresidents have registration permit opportunity in Unit 17B (RM587, which allows harvest on the upper Nushagak River and some of its

tributaries) and nonresidents can only hunt moose in Unit 17A by applying for a draw hunt (DM570). Tables 4–5 display permit harvest information from across Unit 17. Unit 17A in particular has gained more hunters with additional hunting opportunities: the antlerless winter hunt (RM576) added in RY13, which increased the bag limit to 2 moose; the addition of the nonresident draw hunt (DM570) in RY14; and the antlerless fall hunt (RM571) that was added in RY18.

When looking at Tables 4–5, it is important to note that many hunters obtain permits for all the hunts in their area. For example, a hunter from Togiak could get permits for RM571, RM573, RM575, and RM576, and once 2 of the permits are successfully filled, the hunter does not attempt to hunt under the other 2 permits. As such, the hunter data as presented may be counting a single individual 1–4 times.

Winter hunts are becoming increasingly popular across the unit, and what used to be viewed as an additional opportunity for a small number of hunters who were unsuccessful during their fall moose hunt, has developed into a two-season approach for many hunters. Although Unit 17A appears to have a growing moose population that can handle the additional winter hunt pressure, the remainder of the unit may not be able to withstand this additional harvest without negatively affecting the demographic structure of the population.

General Hunt

General season moose hunts provide hunting opportunity during September in Unit 17B for both residents and nonresidents and in Unit 17C for residents only. The season structure has remained consistent, with a 15-day season for residents and an overlapping 10-day season for nonresidents. Although the general hunt represents a smaller portion of total harvest for Unit 17 (Table 6), it serves as an important means of maintaining hunting opportunity and providing access to both resident and nonresident hunters.

Hunter Residency and Success

Hunter residency and success varied across permit hunts and years in Unit 17. Resident-only hunts (RM571, RM573, RM575, RM576, RM583, RM585) showed considerable variation in success, ranging from 6–60% (Tables 4–5). Hunts RM573 and RM576 consistently produced the highest success rates, typically exceeding 30%, while RM571 remained low (< 10%).

Nonresident hunts (DM570, RM587) had moderate success, ranging 25–55% depending on year, with nearly all harvests being bulls.

General season data for Units 17B and 17C (Table 6) showed nonlocal and nonresident hunters accounted for most successful harvests. From RY15 to RY19, nonresidents comprised 14–23% of successful hunters, compared to 1–5% local residents. Overall, the percentage of general season hunters with successful hunts remained relatively stable (19–32%). Participation and success among local residents declined slightly over the period, which is likely due to the availability of alternative permit opportunities closer to their communities.

Table 4. Unit 17A reported moose hunter data by permit hunt, Southwest Alaska, regulatory years 2015–2019.

Hunt no./area	Regulatory year	Hunters				Harvest					
		Permits issued	Total hunters	Number successful	Percent successful	Bulls (%)		Cows (%)		Unknown	Total
RM571	2018	151	129	8	6.2	0	(0)	8	(100)	0	8
	2019	167	124	9	7.3	2	(22)	7	(78)	0	9
RM573	2015	152	125	38	30.4	38	(100)	0	(0)	0	38
	2016	168	143	46	32.2	46	(100)	0	(0)	0	46
	2017	149	128	42	32.8	42	(100)	0	(0)	0	42
	2018	167	146	29	19.9	29	(100)	0	(0)	0	29
	2019	177	138	47	34.1	47	(100)	0	(0)	0	47
RM575	2015	45	31	7	22.6	7	(100)	0	(0)	0	7
	2016	58	33	7	21.2	7	(100)	0	(0)	0	7
	2017	67	43	7	16.3	7	(100)	0	(0)	0	7
	2018	81	41	8	19.5	8	(100)	0	(0)	0	8
	2019	90	53	5	9.4	5	(100)	0	(0)	0	5
RM576	2015	46	32	11	34.4	1	(9)	10	(91)	0	11
	2016	75	48	22	45.8	2	(9)	20	(91)	0	22
	2017	76	47	21	44.7	3	(14)	18	(86)	0	21
	2018	87	41	15	36.6	0	(0)	15	(100)	0	15
	2019	101	70	43	61.0	8	(19)	35	(81)	0	43
DM570	2015	20	16	4	25.0	4	(100)	0	(0)	0	4
	2016	20	18	10	55.6	10	(100)	0	(0)	0	10
	2017	20	11	3	27.3	3	(100)	0	(0)	0	3
	2018	20	10	5	50.0	5	(100)	0	(0)	0	5
	2019	20	13	4	30.8	4	(100)	0	(0)	0	4

Table 5. Units 17B and 17C reported moose harvest data by permit hunt, Southwest, Alaska, regulatory years 2015–2019.

Hunt no./area	Regulatory year	Hunters				Harvest					
		Permits issued	Total hunters	Number successful	Percent successful	Bulls (%)		Cows (%)		Unknown	Total
RM583	2015	901	706	164	23.2	164	(100)	0	(0)	0	164
	2016	834	652	189	29.0	189	(100)	0	(0)	0	189
	2017	812	629	173	27.5	172	(99)	0	(0)	1	173
	2018	806	629	138	21.9	137	(99)	1	(1)	0	138
	2019	762	594	131	22.1	131	(100)	0	(0)	0	131
RM585	2015	337	215	41	19.1	41	(100)	0	(0)	0	41
	2016	281	169	26	15.4	26	(100)	0	(0)	0	26
	2017	276	142	21	14.8	21	(100)	0	(0)	0	21
	2018	306	176	28	15.9	28	(100)	0	(0)	0	28
	2019	228	123	17	13.8	17	(100)	0	(0)	0	17
RM587[a]	2015	30	27	7	25.9	7	(100)	0	(0)	0	7
	2016	34	27	14	51.9	14	(100)	0	(0)	0	14
	2017	29	26	14	53.8	14	(100)	0	(0)	0	14
	2018	38	35	10	28.6	10	(100)	0	(0)	0	10
	2019	34	31	14	45.2	14	(100)	0	(0)	0	14

[a] The RM587 permit is for Unit 17B only.

Table 6. Units 17B and 17C general season successful moose hunters by residency, Southwest Alaska, regulatory years 2015–2019.

	Unit 17B				Unit 17C				
Regulatory year	Local resident	Nonlocal resident	Nonresident	Total	Local resident	Nonlocal resident	Nonresident	Total	Total harvest
2015	3	6	8	17	4	3	2	9	26
2016	0	6	20	26	4	7	1	12	38
2017	2	3	21	26	2	8	3	13	39
2018	1	6	31	38	4	6	1	11	49
2019	1	4	30	35	0	8	1	9	44

Harvest Chronology

Most hunting opportunities occur in August and September, but winter hunts exist for additional harvest opportunities for residents. During RY15–RY19 the fall season comprised most of the harvest across Unit 17; moose harvest in August (20%) and September (62%) combined to account for 82% of all harvest across the reporting period. The RM585 winter hunt in Units 17B and 17C in December accounted for 9% of the total moose harvest, while the Unit 17A winter hunts split across January (5%) and February (4%) for a combined 9% of the total harvest during RY15–RY19.

Transport Methods

Transportation used by successful moose hunters varied across the subunits but was primarily by boat (56%), followed by 4-wheeler (17%), snowmachine (13%), and airplane (12%). All other methods of reported transportation accounted for < 2%. The large river and lake systems in the area offer widespread access via boat for local residents from each of the Unit 17 communities. Most nonresidents and nonlocal residents charter aircraft to access more remote hunt areas. Unit 17A has an aircraft restriction area along the Togiak River and some of its main tributaries, preventing those who access the unit by aircraft from hunting or transporting meat or gear through the corridor. This has proven to be an effective way to reduce hunter conflict, although the intent of the aircraft restriction is often misunderstood by both residents and nonresidents. Additionally, due to local residents' reliance on boat access to moose hunting areas along the Nushagak and Mulchatna rivers, the RM587 permit for this river corridor is limited to 75 nonresident permits to further reduce conflict amongst users in Unit 17B.

Other Mortality

Observations of predation of moose by wolves and bears occurred on occasion during this reporting period. Reports from local residents suggest wolf numbers are stable to decreasing. Unreported harvest of moose in Unit 17 may be a significant factor toward the overall mortality. During winter, hunters can disperse across the landscape and access moose in many of the otherwise inaccessible areas, and the extent of out-of-season harvest outside of the prescribed winter hunts is unknown. Additionally, there is evidence that female moose have been harvested in close proximity to some communities during the winter hunt.

Alaska Board of Game Actions and Emergency Orders

Emergency orders were issued each regulatory year to announce the opening and closing dates for the winter moose hunts (RM575 and RM576) in Unit 17A. Antlerless moose hunts must be reauthorized annually by the board; RM576 was reauthorized each year of this reporting period and RM571 began in RY18 and was reauthorized for RY19.

RY15

At the BOG meeting in March 2015, the board made the following regulatory changes for Unit 17A, which took effect at the beginning of RY15: 1**)** changed the bag limit for the resident winter registration hunt to 1 antlered bull and 1 antlerless moose, 2) added the month of February to the possible winter hunting season (a season of up to 31 days may be announced between 1

December and the last day of February), and 3) extended the nonresident drawing hunt **(**DM570**)** by 5 days to match the resident season (season dates changed to 1 September–20 September).

RY18

At the BOG meeting in February 2018, the board made the following regulatory changes for Unit 17A, which took effect at the beginning of RY18: 1**)** reauthorized the harvest of antlerless moose during the fall season (RM571); 2) extended the resident fall season by 5 days, with a bag limit of 1 moose (season dates changed to 25 August–25 September); and changed the nonresident season dates to 5–15 September.

Recommendations for Activity 2.1

Continue. This activity has been updated from the RY15–RY19 plan language that was focused on increasing participation in harvest reporting to language that focuses on management efforts to monitor and analyze harvest. Harvest and effort data can provide valuable insight into game abundance and whether the present seasons and bag limits are sustainable. With unreliable harvest and effort information we lose this important management tool. The ADF&G Dillingham office will continue to encourage all hunters to report their harvest in a timely manner; this is part of the department's ongoing outreach efforts and will no longer be listed as a separate management activity for Unit 17.

3. Habitat Assessment-Enhancement

No habitat assessment activities were planned or conducted for the RY15–RY19 reporting period and none are planned for the RY20–RY24.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

Data Recording and Archiving

- GSPE and harvest data are stored on ADF&G's internal WinfoNet database.
- All other electronic data and files such as survey forms, survey memos, and reports are stored on the area biologist's hard drive in the Dillingham ADF&G office. This network drive is backed up daily.
- Hard copies of surveys, memos, etc. are stored in file cabinets in the area biologist's office in Dillingham.

Agreements

Moose Management Plan for Game Management Unit 17A (Unit 17A Moose Management Group 2013).

Permitting

None.

Conclusions and Management Recommendations

Over the RY15–RY19 reporting period, moose populations in Units 17A, 17B, and 17C showed variable trends. Population estimates in Unit 17C declined, while the Unit 17A population increased. Insufficient data prevent a clear understanding of whether Unit 17B currently meets the population objective; however, the population objective for Unit 17B is unrealistic given the limited moose habitat and the reduced hunting pressure relative means the harvest objective is also unrealistic. Future management efforts should reevaluate these objectives and explore methods to conduct more comprehensive surveys in Unit 17B, ideally within a single GSPE effort to improve population assessment accuracy.

Harvest patterns generally reflected population trends, with reported harvest declining in Units 17B and 17C while increasing in Unit 17A. Although overall harvest remained below established objectives, these levels are consistent with observed population status and continued low recruitment in some areas. High twinning rates among mature cows indicate strong productivity potential; however, poor calf survival suggests recruitment challenges may be limiting population growth. The rise in participation and harvest success in Unit 17A highlights potential for expanding opportunity there, particularly during winter seasons, while caution remains warranted for Units 17B and 17C, where winter hunts should continue to be managed conservatively through emergency orders.

Unreported harvest, incomplete demographic surveys, and weather limitations have complicated efforts to monitor moose populations across Unit 17. Continued emphasis should be placed on maintaining consistent survey schedules, improving data collection under suboptimal snow conditions, and refining strategies to obtain reliable composition data during fall surveys. Future management should prioritize reassessing population and harvest objectives for Unit 17B, improving understanding of factors influencing population trends, and ensuring that hunting opportunities remain sustainable and aligned with local subsistence needs.

II. Project Review and RY20–RY24 Plan

Review of Management Direction

Management Direction

Moose management will focus on maintaining healthy age and sex ratios, ensuring sustainable populations, and providing for both consumptive and nonconsumptive uses. In Unit 17A, long-term collaboration with TNWR will continue, with an emphasis on refining harvest strategies and improving survey methods to ensure reliable annual monitoring.

In Units 17B and 17C, management will expand beyond periodic abundance estimates to include more frequent demographic surveys. These data will guide adjustments to hunting opportunities while maintaining population health. With the addition of fall composition surveys to the management activities, the management objective to design a strategy for collecting demographic data will no longer be listed.

Across all units, communication will continue to improve public understanding of regulations, increase compliance with harvest reporting, and maximize opportunity for hunters and other users who value moose populations.

GOALS

- Maintain healthy age and sex ratios within moose population structures.
- Provide for maximum opportunity to participate in hunting moose.
- Improve public understanding of hunting regulations and their purpose and increase compliance with moose harvest reporting.
- Provide for consumptive and nonconsumptive uses of moose populations.

CODIFIED OBJECTIVES

Amounts Reasonably Necessary for Subsistence Uses

The Unit 17 moose population has a positive customary and traditional use determination finding. The unitwide amount reasonably necessary for subsistence is 100–150 moose.

Intensive Management

In 2001 BOG adopted a positive finding for IM of moose in Units 17B and 17C (no positive finding in Unit 17A). Current IM objectives are as follows:

- Population objectives:
    - Unit 17B: 4,900–6,000
    - Unit 17C: 2,800–3,500
- Harvest objectives:
    - Unit 17B: 200–400
    - Unit 17C: 165–350

MANAGEMENT OBJECTIVES

Unit 17A

- Manage for a minimum population of 300 moose and a target population of 1,100–1,750 moose.

Unit 17B

- Manage for a population of 4,900–6,000 moose with a human use objective of 200–400 moose.
- Achieve and maintain a density of 1 moose/mi^2 on habitat considered good moose range.

Unit 17C

- Manage for a population of 2,800–3,500 moose with a human use objective of 165–350 moose.
- Maintain a minimum density of 0.5 moose/mi^2.

REVIEW OF MANAGEMENT ACTIVITIES

1. Population Status and Trend

ACTIVITY 1.1. Conduct aerial surveys to estimate moose abundance, and trends in these indices.

Data Needs

Moose abundance is an integral component of moose management and essential to determine if our IM objectives are being met.

Methods

Continue to use GSPE surveys to estimate moose abundance in each of the following areas: Units 17A, 17B West, 17B East, and 17C. We plan to conduct a survey in each of these areas on a triennial basis, weather permitting. Because snow conditions dictate success of these winter surveys, research on snow accumulation patterns is recommended; that information could be used to adjust survey boundaries to optimize the advantage of snow where it is available. Surveys may have to be conducted in smaller portions of the overall unit and then these estimates could be extrapolated, similar to how trend surveys were used in the past. Any habitat-use data we can collect from radiocollared moose could inform a desktop stratification, which would save time and therefore allow for more flexibility to conduct the actual surveys during the short weather windows in Bristol Bay (Barten 2014).

ACTIVITY 1.2. Spring recruitment and twinning surveys.

Data Needs

No change from RY15–RY19 reporting period.

Methods

Check collared and uncollared cows for twins or single calves-at-heel in mid- to late April for recruitment and mid- to late May for twinning.

ACTIVITY 1.3. Fall composition surveys.

Data Needs

No change from RY15–RY19 reporting period.

Methods

Due to the coastal weather that Unit 17 experiences, there is often a lack of snow on the ground during the late fall when it is most opportune to conduct a composition survey. It would be

prudent to ascertain the efficacy of conducting trend surveys in areas where moose traditionally congregate postrut and before antler drop, with or without snow. These areas would have to be defined through reconnaissance surveys in the first year. By employing GPS (Global Positioning System) collars on moose in each trend count area, future surveys would become more efficient. Major river corridors are the primary moose habitat in most of Unit 17 and thus land cover maps could help aid in determining what percentage of a composition search should be conducted along the various land types. The concern with conducting these surveys in forested habitat is the likelihood of missing animals peripheral to the focal animals, which could skew the results of the survey.

2. Mortality-Harvest Monitoring

ACTIVITY 2.1. Monitor and analyze harvest and other mortality.

Data Needs

No change from RY15–RY19.

Methods

No change from RY15–RY19.

3. Habitat Assessment-Enhancement

No habitat assessment activities are planned for the RY20–RY24 reporting period.

NONREGULATORY MANAGEMENT PROBLEMS OR NEEDS

The department will continue to work with local communities to improve harvest reporting. We will also continue to work with the stakeholders associated with the Unit 17A Moose Management Group.

Data Recording and Archiving

Survey results and harvest data will be stored ADF&G's internal WinfoNet database. Paper records such as aerial survey forms will be scanned and stored electronically on the network drive and hard copies will be stored in file cabinets in the area biologist's office.

Agreements

Moose Management Plan for Game Management Unit 17A (Unit 17A Moose Management Group 2013).

Permitting

None.

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