MATANUSKA-SUSITNA BOROUGH Fish & Wildlife Commission

350 E Dahlia Ave., Palmer, Alaska 99645

CHAIRPERSON
Peter Probasco

VICE CHAIR
Andy Couch

MSB STAFF
Maggie Brown

BOARD MEMBERS
Tim Hale
Michael Bowles
Marty Van Diest
Gabe Kitter
Bill Gamble
Kendra Zamzow
Ex officio: Jim Sykes

Special Meeting

May 15, 2025

Meeting Packet - Table of Contents

***Pg.** = **Item**:*

Physical Location of Meeting: (Updated) Assembly Chambers, DSJ Bldg, 350 E. Dahlia Ave., Palmer
Remote Participation: See attached agenda on p. 1

MATANUSKA-SUSITNA BOROUGH
MSB Fish and Wildlife Commission
AGENDA

Edna Devries, Mayor

Peter Probasco – Chair
Andy Couch – Vice Chair
Gabriel Kitter
Tim Hale
Bill Gamble
Kendra Zamzow
Michael Bowles
Marty Van Diest
Jim Sykes – Ex officio member

Maggie Brown – Staff

Michael Brown, Borough Manager

PLANNING & LAND USE DEPARTMENT
Alex Strawn, Planning & Land Use Director
Jason Ortiz, Planning & Land Use Deputy Director
Wade Long, Development Services Manager
Fred Wagner, Platting Officer

Assembly Chambers
Dorothy Swanda Jones Building 350 E.
Dahlia Avenue, Palmer

May 15, 2025
SPECIAL MEETING
4:00 p.m.

Ways to participate in MSB Fish and Wildlife Commission meetings:

IN-PERSON:

Assembly Chambers, DSJ Building

REMOTE PARTICIPATION VIA MICROSOFT TEAMS:

Join on your computer:
Join the meeting now
Meeting ID: 221 392 975 219 6
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Or call in (audio only):
1-907-290-7880
Phone Conference ID: 123 236 754#

I. CALL TO ORDER

II. ROLL CALL – DETERMINATION OF QUORUM

III. LAND ACKNOWLEDGEMENT

A. "We acknowledge that we are meeting on traditional lands of the Dena'ina and Ahtna Dene people, and we are grateful for their continued stewardship of the land, fish, and wildlife throughout time immemorial."

IV. PLEDGE OF ALLEGIANCE

V. APPROVAL OF AGENDA

VI. INTRODUCTIONS

A. FWC Opening Statement
B. ADF&G Opening Statement

VII. AUDIENCE PARTICIPATION (*three minutes per person*)

VIII. PRESENTATIONS

A. Chair's Report
B. ADF&G
    a. Game Season Summary Highlights
    b. Emerging Issues Summary Highlights

C. ITEMS OF BUSINESS

A. FWC/ADF&G Dialogue on Mat-Su Wildlife & FWC Questions

D. ADF&G/FWC FINAL COMMENTS

E. MEMBER COMMENTS

F. NEXT MEETING DATE: September 25, 2025, 4-6pm Back of the Assembly Chambers

G. ADJOURNMENT

Game Special Meeting Questions

1. **What is the current status of Units 13, 14, and 16 moose populations? Please provide yearly survey data.**

Unit 13 Moose Population Index

Year	13A	13B	13C	13D	13E	Total
2000	2323	4123	1948	1425	4332	14151
2001	2411	4001	1605	2084	5294	15395
2002	2582	3661	1518	1797		9558
2003	3581	4237	2286	1914		12017
2004	3136	4073	1268	1818		10295
2005	3412	4123	1913	1467		10916
2006	2904	4055	2286	1946	4447	15636
2007	3398	4599	2693	1882	4397	16968
2008	3065	4658	2966	1818	4533	17040
2009	4216	4720	3024	1978	4874	18812
2010	4081	5460	3001	2137	5041	19720
2011	4401	5447	3524	1829	5149	20350
2012	4159	5407	2943	1829	6237	20575
2013	4608	4955	3670	1414	5988	20634
2014	4206	4855	3850	1606	5975	20492
2015	4653	5115	3978	1063	6281	21090
2016	4156	4973	3833	1404	6036	20402
2017	3445	4237	2390	1350	6324	17746
2018	4121	3643	3106	1350	6413	18633
2019	3968	3845	3588	1201	6394	18997
2020	3726	4336	3298	1031	6196	18587
2021	4641	4115	2902	1340	6300	19298
2022	3621	3690	2943	1063	5309	16626
2023	3745	2809	2460	638	4822	14473
2024	3904	3074	1809	1074	4939	14800

GMU 14A	MOOSE SURVEY DATA												
	2023	2021	2020	2019	2019	2018	2017	2013	2012	2011	2009	2008	2003
Dates	17-19 Nov	20 - 22 Nov	29 Nov - 4 Dec	6-Dec	9-13 Feb.	30-Oct	1-4 Feb	15 - 18 Nov	26 - 27 Nov.	14 - 19 Nov.	18-Nov	13 - 17 Nov.	07-12 Dec
Census Type	GSPE	Sex & Age Comp	GSPE	Sex & Age Comp	GSPE	Sex & Age Comp	GSPE	GSPE	Sex & Age Comp	GSPE	Comp Survey	GSPE	GSPE
Total moose obs.	1323	571	1704	2013	1845	1809	1420	1750	1474	1863	761	2158	1869
Calves obs.	234	123	358	363	293	342	243	458	284	479	215	540	371
Pop Est.	6657	~~~	7112*	~~~	7896*	~~~	8756*	8500*	~~~	7993*	~~~	6613*	6428
80% CI	15.9		10.00%		15.40%		17.5%*	12.70%		14.6%*		13.40%	11.60%
Bull:100 cows	30	28	31	34		34		21	26 - 29	17.4	24.7	23	20.7
Ylg bull:100 cows	5	4	5	9.7		7.4		8.18		6.5		7.5	8.5
Calves:100 cows	28	35	35	29		31		43	27.8 - 30.8	43.5	48.9	42	28.5
% Calves	18	21.5	21.00%	18	18.9		17.15	26.2		27.2		25	19.1
	* includes sightability correction factor												
Pop Objective	6000 - 6500												
Harv Objective	360 - 750												

GMU 14B	MOOSE SURVEY DATA												
	2024	2021	2019	2018	2013	2009	2005	1999	1998	1994	1992	1990	1989
Dates	29 Nov-Dec 6	12-16 No	6-9 Feb	6-Dec	25 - 29 N	16-18 Nov.	21-25 Nov.	16-20 Nov.	20 Nov.	28Oct.-5Nov.	10-12 Nov.	7-14 Nov.	13-15 Nov.
Census Type	GSPE	GSPE	GSPE	Sex & Age Comp	Pop. Census	Pop. Census	Ver Hoef	Gasaway	Comp Survey	Becker	Becker	Becker	Becker
Total moose obs.	809	1253	1136	1499	1261	744	646	699	440	969	659	754	563
Calves obs.	123	151	162	217	218	91	64	83	33	107	79	85	89
Pop Est.	1648	2463	3198*	~	2700*	1662	1412	1687		2337	1583	1380	~2125*
80% CI	12.60%	11.80%	12.30%		6.80%	13.24%	15.22%	14.47%		22.56%	11.23%	13.77%	19.90%
Bull:100 cows	22.3	37		42.1	29.9	34	29.82	40.2	37.5	31.1	27.2	27.1	24.4
Ylg bull:100 cows	3.9	5.9			6.25	11.67	5.35	12.3	9.5	8.2	4.4	8.5	5.1
Calves:100 cows	22.4	15.8		24.1	27.5	18.4	15.5	21.3	11.1	17.3	21.7	20.1	26
% Calves	15.5	12	14.2		17.3	12.23	10.7	13.2	7.5	11.7	14.5	13.7	15.8
Observable moose										2027	1164		2125*
Pop Objective	2500 - 2800												
Harv Objective	100 - 200												

GMU 16A	MOOSE SURVEY DATA											
	2023	2020	2019	2017	2009	2005	2000	1997	1994	1993	1992	1990
Dates	1 Dec.-4	5 Dec.-1	26 Feb - 2 Mar	22 Nov-9 Dec	14-16 Nov.	22-28 Nov.	17-25 Nov.	19-24 Nov	8-14 Nov	4-10 Dec	18-20 Nov	20 Nov - 3 Dec
Census Type	GSPE	GSPE	GSPE	GSPE	Pop. Census	Ver Hoef	Mod. Becker	Mod. Becker	Trend	Becker	Becker	Gas.
Total moose obs.	1090	1037	1248	1975	853	590	787	1234	981	828	963	1366
Calves obs.	164	219	153	436	162	80	126	260	177	130	184	258
Pop Est.	3598	3666*	4190*	8654*	2574	1619	2420	3636	~3300	3284	2902	3123
80% CI	10.4	12.30%	14%	16.90%	11.43%	12.19%	21.81%	16.89%		27.50%	19.40%	9.25%
Bull:100 cows	19	19.2		33.37	25.76	22.17	27.8	32.9	41.7	24.1	36.3	26.7
Ylg bull:100 cows	4.8	2.5		9	5.7	3	5.7	12.1	10	10.3	10.8	7.2
Calves:100 cows	21	32.5		36.3	29.4	19	22.2	34.5	31.2	23.7	31.9	30.9
% Calves	15	17.6	12	20.3	18.84	13.68	14.8	20.6	18	16	18.9	19.5
Observable moose								3001		2526	2150	
Pop Objective	3500 - 4000											
Harv Objective	190 - 360											

Unit 16, cont'd

GMU 16B- North	MOOSE SURVEY DATA										
	2022	2019	2014	2008	2003	2001	2000	1996	1994	1993	1990
Dates	Nov 18 - 21	Feb 22 - 25	6-11 Dec.	29-31 Oct	24 Nov-6 Dec	5-7 Nov	20-22 Nov	1-2 Nov	13-18 Nov	15-21 Nov	Nov
Census Type	GSPE	GSPE	GSPE	GSPE	Gasaway	Mod. Becker	Mod. Becker	Mod. Becker-trend	Mod. Becker	Becker	Gas.
Total moose obs.	699	672	835	340	326	438	268	557	431	416	745
Calves obs.	58	56	151	21	34	45	15	62	25	42	95
Pop Est.	1686	1671*	1587*	834	982	1187	908	1912	~2000	2006	2650
80% CI	19%	12.00%	13.00%	22.59%	18.10%	15.33%	20.26%	17.00%		21.54%	15.55%
Bull:100 cows	33		60.4	59.7	35.3	39.7	39.5	38	~45	50	32
Ylg bull:100 cows	7.2		17	16	6.8	7.0	5.5	7	~10	~10	9
Calves:100 cows	9.8		34.4	11	17	14.4	7.3	23	~10	16	23
% Calves	6.8	8.6	18.1	6.4	9.1	9.0	5.0	14	~5	9	~13

Pop Objective	6500 - 7500
Harv Objective	310 - 600

GMU 16B-Middle	MOOSE SURVEY DATA												
	2022	2020	2019	2018	2011	2009	2008	2005	2004	2001	1999	1994	1993
Dates	Nov. 30-Dec. 4	16 - 19 Nov.	5-Dec	Mar 10-13	20 - 26 Nov	15 - 17 Nov.	11/19-11/22	11/26-12/1	NONE	8-11 Nov	23-27 Nov	11-25 Nov	28 Nov - 3 Dec
Census Type	GSPE	GSPE	Sex & Age Comp	GSPE	GSPE	Comp Survey	GSPE	GSPE	Ver Hoef *	Mod. Becker	Gas.	Mod. Becker	Becker
Total moose obs.	1066	1120	1009	1875	825	359	678	628	545	537	631	374	463
Calves obs.	105	99	138	231	127	44	79	46	99	43	31	59	72
Pop Est.	3153	3740*	``	5339*	3458*	~~~	2446*	1714		1836	3313	~3600	3654
80% CI	13.80%	12.6%*	``	18.2%*	15.6%*		13.18%	12.74%		14.54%	14.73%		53.80%
Bull:100 cows	13.5	28	38		42.4	38.8	54	29.29	34	32	28	~26	21
Ylg bull:100 cows	3	4	8		9		10.8	4		4	2	~4	9
Calves:100 cows	11.7	13.7	21.9		25.9	19.4	21	14	30	10	9	~24	25
% Calves	9.38%	8.90%	13.70%	13%	14.10%	12.3	12%	10	~18	7	7	~16	17

* includes sightablity correction factor

Ver Hoef * uncompleted surv composition only

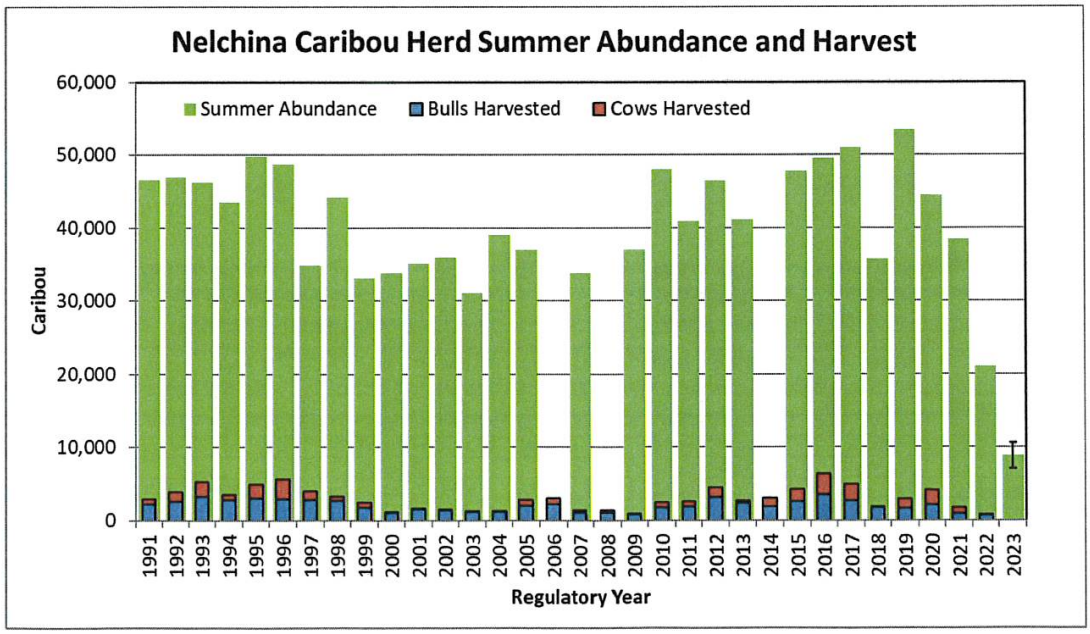
GMU 16B-South	MOOSE SURVEY DATA												
	2022	2019	2018	2010	2008	2004	2003	2001	2000	1999	1998	1997	1996
Dates	Nov 14 - 18	4-Dec	2/28/18-3/2/18	11/13-11/18	2-Dec	5-9 Dec	1-Dec	30 Oct, 4 Nov	16 Dec anlters?	15 Nov, 22 Nov	22-Nov	8 Nov, 3 Dec	8-9 Nov
Census Type	GSPE	Sex & Age Comp	GSPE	GSPE	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.	Sex+ age comp.
Total moose obs.	814	894	1106	703	247	604	154	594	98	458	357	595	363
Calves obs.	36	69	147	75	23	95	21	55	13	26	20	51	33
Pop Est.	1950	``	3074*	2372*		~960		~700-850					
80% CI	21.70%		17.6%*	32.80%				30.00%					
Bull:100 cows	35	32		51.5	77.8	23.2	46.1	30.5		37.6	35.3	37.0	31.5
Ylg bull:100 cows	2.7	10		15.1	12.7	9.7	16.5	3.0		4.1	7.2	8.3	7.3
Calves:100 cows	6.4	11		17.8	18.3	23	23.1	13.3		8.3	8.0	12.8	14.2
% Calves	4.5	7.7	13.3%	10.6	9.3	15.7	13.6	9.3	13.3	5.7	5.6	8.6	9.9
Observable moose													

2. **What are the current moose population objectives for Units 13, 14, and 16 compared to the population objectives for prior years, e.g. (1980 to 1990) and (1990 to 2000)?**

	1989–1990	1991–1992	1993–2000	2001–Present
13A			3,500–4,200	3,500–4,200
13B			5,300–6,300	5,300–6,300 (2025: 4,500–5,500)
13C			2,000–3,000	2,000–3,000 (2025: 2,500–3,250)
13D			1,200–1,900	1,200–1,900
13E			5,000–6,000	5,000–6,000
14A		5,000–5,500		6000–6500
14B		2,500–3,000	2,500–2,800	
16A	10,000	3,000–4,000	3,500–4,000	
16B		>7,000	>6,500	6,500–7,500

3. **Provide a population update, current trends, and population objective for Nelchina Caribou in Unit 13.**

Population Objective: 35,000–40,000



4. **What are the same-day airborne (SDA) harvests of wolves for 2024 and 2025 in Unit 13?**

In Regulatory Year 2023 (2022/23) 177 wolves were taken and in RY24 (2023/24) 76 wolves have been removed.

5. **What is the sheep population status in Unit 13 and Unit 14?**

Chugach survey data Unit 13

Year	TCUA	TazWest	TazEast	Combined	Lambs:Ewes
2012	-	416	408	-	25
2013	-	390	-	-	34
2014	120	267	318	705	20
2015	-	-	292	-	32
2016	86	364	307	757	31
2017	122	-	-	-	27
2018	-	296	291		21
2019	-	-	-	-	-
2020	70	165	-	-	24
2021	-	-	-	-	-
2022	82	206	195	483	29
2023	25	-	-	-	22
2024	58	174	107	339	32

Talkeetna survey data Unit 13

Date	Sublegal	Full Curl	Class I	Class II	Class III	UNKN	Total	Ewes2	Lambs	UNKN	Total sheep
7/1/2019	202	26	57	88	57	0	228	497	212	0	937
7/18/2020	158	19	71	44	43	0	177	366	61	0	604
7/1/2021	168	17	26	88	47	7	185	311	111	4	611
7/1/2022	129	8	48	52	29	1	138	270	81	0	489
7/1/2023	142	9	26	57	59	1	152	247	37	0	436
7/1/2024	113	8	25	54	34	0	121	269	96	0	486

Chugach survey data Unit 14A

Count Area		2014	2016	2017	2018	2019	2020	2021	2022	2023
A	Knik Gl./Marcus Baker Gl.	8	1	0	0	0	3			0
B	Grasshopper to Metal Ck	128	~	172	110	102	95	114	103	72
C	Metal Ck to Friday Ck	155	250	248		197	179	220	98	191
D	Friday Ck to N. of Wolverine	132	145	192		164	185	169	167	139
E	N. Wolverine to Carpenter Ck	53	63	57		33	65		30	29
F	Carpenter Ck to Coal Ck	127	157	195		167	115		73	51
	Total	603	616	864	110	663	642	503	471	482

Talkeetna index unit survey data Unit 14A

Count Area		2014	2015	2018	2019	2020	2022	2023
H1	Chickaloon to Kings River	123	106	98	101	98	100	61
G2	Kings River to Little Su	109	60	51	134	69	62	44
		232	166	149	235	167	162	105

We are more consistent with our Chugach surveys in Unit 14A due to the drawing hunt in that area which requires more data to manage. The 14A Chugach sheep populations were doing well and increasing during the last decade until several severe winters occurred in 2019–2021. We surveyed some portions of the 14B Talkeetna mountains this past year that had not been surveyed since 2015. Count areas at the further extent of the unit had declined significantly, while areas at the core of the unit appeared to be more stable. Overall, the Talkeetna sheep population appears to be stable at low density. The Unit 14 sheep populations as a whole appear to be tracking what we are seeing with sheep statewide and the decline is not due to hunting or human disturbance.

6. **Are there current plans or projects to improve moose habitat in Units 13, 14, and 16?**

   In Unit 14 the Little Granite Creek prescribed burn is set to take place sometime in 2025. In the remainder of Units 14A&B and 16 we have encouraged a "Let it Burn" strategy with DNR to allow forest fires to continue burning with the intent of improving moose habitat.

   We have been pressuring DNR-Forestry to delineate a significant portion of Unit 16 as limited fire protection to allow for natural burns when safe and appropriate.

   The Alphabet Hills prescribed burn in Unit 13 and associated research projects have been blocked by USFWS.

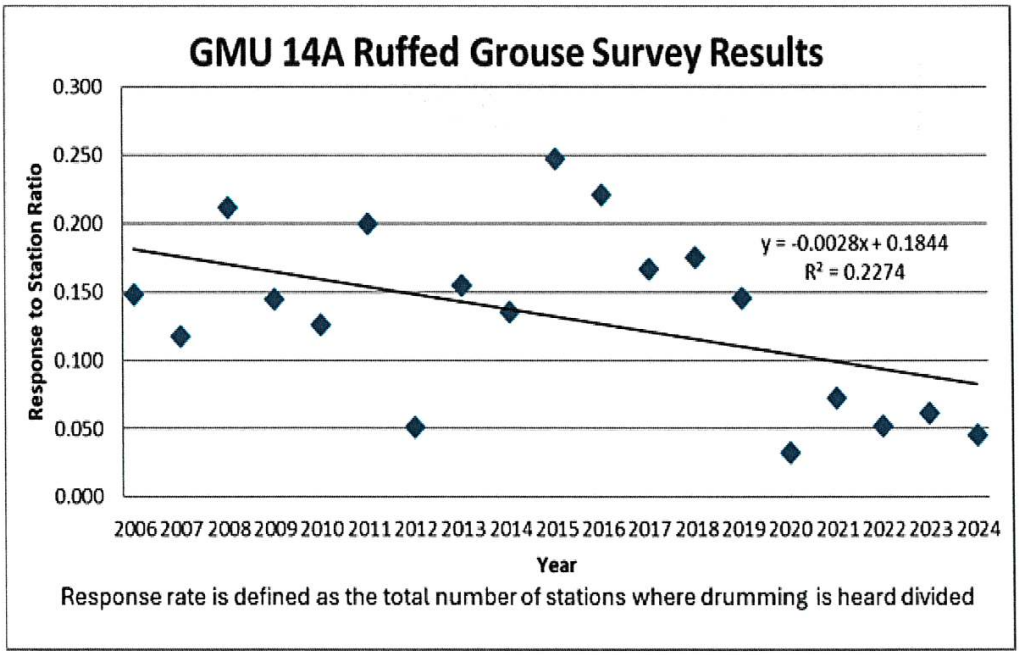
7. **If the only new infrastructure to be constructed in the West Susitna area is the 12-mile-long extension of the Korbel-mine (Portage Creek) road from the existing airstrip, how is this anticipated to affect sheep hunting in the area (Unit 16B)?**

   The disturbance from construction of the road and development of the mine has the potential to have a significant impact on sheep in the Portage Creek Valley. ADFG's most recent sheep survey from July 2022 observed 4 separate groups of sheep within 2 miles of the proposed road. The disturbance from construction and mining may displace sheep out of their traditional habitat and disrupt key time periods of lambing and breeding. Construction of the new road will create more access for hunting (if public), potentially resulting in additional harvest. Under full-curl management, additional harvest will not result in a population or management concern.

8. **The overwintering small bird population in the Mat-Su this winter appears to be low based on resident observations, sale of bird seed in Palmer, and the Mat-Su Birders club. According to the Mat-Su Christmas Bird count Common Redpolls and Pine Grosbeaks populations were down over 90% and chickadee species over 40% relative to average counts from 2018-2024. Ruffed Grouse were down 31%. In our 2024 meeting with ADFG, they noted that grouse populations for 2021–2023 were low. Please share the data from grouse and ptarmigan surveys. How does ADF&G track grouse and ptarmigan populations?**

We conduct annual spring grouse drumming counts to monitor the Ruffed Grouse population in Unit 14A. Ptarmigan populations are monitored with spring surveys along the Denali Hwy. which provide an index of abundance and not a population or density estimate.

We have just begun our spring surveys for Ruffed grouse this year and the counts appear to be higher than we have seen since 2020. We are still in the early stages of the spring Drumming surveys.



9. **Has avian flu been found in grouse or ptarmigan in Units 13, 14, or 16? Is this disease expected to impact population levels?**

We are not aware of any documented cases of avian Influenza in grouse in southcentral Alaska. However, it appears to be widespread in all avian species and has been detected in several mammals. I would assume that it could be spread to Grouse. Grouse are not a high-density flock species and rapid spread of disease through the population is less likely.

10. **How did this winter's MSB moose road and train kill compare to those in the past? In what years and in what areas were targeted hunts conducted to remove moose from road areas in the past 10 years?**

This winter (October-March) roadkill was reported as 65 and is below the average of 228.

This winter's (July-March) railkill was reported as 14 and the 10-year average is 61.

RY	Roadkill
2015	239
2016	250
2017	245
2018	245
2019	283
2020	–
2021	219
2022	277
2023	176
2024	65

RY	Railkill
2015	16
2016	47
2017	86
2018	55
2019	151
2020	33
2021	77
2022	64
2023	23
2024	14

*Targeted hunt (AM415) were used from 2011–2016.

11. **Does ADF&G have plans to implement any new processes or procedures in the near future with the passage of Proposal 75 (Add Department removal of wolves, brown bears, and black bears to Unit 16 Intensive Management Plan) at the latest Central and Southwest Regional BOG Meeting?**

The department now has the tools in place to get directly involved in the Unit 16 IM program. This year's harvest of wolves was very low due primarily to poor snow conditions. In the future we anticipate that permitted pilots will meet our wolf reduction goals without the involvement of the department because the last time the program was initiated in 2004 the public was successful. If the public is unable to meet wolf reduction goals when conditions are conducive, then the department may get involved. Those decisions are complicated and require the evaluation of many moving parts like weather, public participation, and priority among competing programs. There are no plans to start department removal in the near future.

12. **Is ADF&G researching new ways to execute moose surveys in Southcentral if issues related to lack of snow in the early fall persist? An article published in the ADN (see attached) regarding a study led by UAF examined alternative methods used in other states as well as in Canada. Is ADF&G considering the implementation of these alternative methods?**

    Yes, We currently do all incarnations of collecting moose population information from trend and minimum counts to snowless surveys and GSPEs in atypical survey months outside of November/December such as in February.

13. **To fully understand the decline of the moose population in GMU 16 since 2019, would the department benefit from additional research and information regarding moose populations, calf mortality, brow availability, and estimates of wolf and bear populations? What resources does the department lack in order to effectively execute the necessary research and data collection to provide a comprehensive data set on these topics?**

    The department has a good dataset for Unit 16 right now. We have funding and tools for regular moose surveys. However, the weather conditions are not always conducive. We are monitoring collared cows for calf production, twinning, and survival. We recently deployed additional collars and should have between 60 and 70 cows on the air this spring to meet sampling needs. We would like to have current bear estimates but given the high cost and high effort to conduct bear density estimates is not a priority. We know from monitoring harvest that hunting is not likely limiting the bear population and that bears are the leading cause of neonate moose mortality.

    We have a recent wolf minimum count of 120 wolves and estimate 150–180 as of 2024. and SDA is active Our goal is to reduce the population in Unit 16 to 35–55 wolves to allow for increased moose survival. There are studies that would be beneficial to related to predation from bears and wolves to help us understand the relationships of all three large predators and their impacts on the moose population but the ideal situation is to conduct these studies when we are not actively trying to reduce the predator populations.

14. **GMU 16 is the second-largest GMU, with two-thirds of the state's population residing in close proximity. Does this increase the priority level for managing moose as a food source compared to other GMUs?**
    No. Unit 16 moose management is currently the number one priority for the Palmer office. However, we also have Unit 14A that requires consistent monitoring due to our very high productivity and use of antlerless permits to regulate that population. Both populations have been identified by the BOG as being important for human consumption. Currently we are doing all we can to monitor the 16 moose population and assist it is recovery through harvesting predators. The BOG just approved adding department staff to the IM plan, and that becomes effective in July. That doesn't mean that we are going to run out next year and use department predator removal but it is now an option. The last time we started wolf control (2004) the public was very effective at quickly reducing

the wolf numbers. Our hope is that we get good conditions next season and that the public is effective at reducing the wolf numbers.

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Less-reliable fall snow makes Alaska moose population surveys more difficult

By Yereth Rosen, Alaska Beacon

Published: December 1, 2024

A few moose are seen from the air as they walk across snow at the edge of a forested area in Interior Alaska in this undated photo. Biologists who count moose from the air need adequate snow cover to spot the animals in the fall. Snow has become less reliable at that time of the year in some parts of the state, and fall moose surveys will be increasingly difficult if the trend continues. (Mike Taras / Alaska Department of Fish and Game)

When state biologists want to know how many moose are wandering around in different parts of Alaska, they usually get into small planes, take to the air and count the animals that stand out in the snow-covered landscape below.

Now climate change is threatening that practice.

A study led by University of Alaska Fairbanks scientists found that the time window for counting moose in the fall is being squeezed by later arrival of adequate snow. By

midcentury, it said, there may be too little snow to continue to do these traditional fall aerial surveys in more than half of Alaska's moose habitat.

The idea for the study was sparked by biologists' complaints about surveys becoming more difficult to complete, said lead author Todd Brinkman of UAF's Institute of Arctic Biology.

"Totally, that's the motivation," Brinkman said. "Being able to complete these in the fall is becoming more unpredictable."

For now, the fall surveys remain "pretty effective," but there is already some impact that is akin to "noise in the system," he said. "If these patterns continue, we've got to start thinking about what we're going to do."

Statewide, Alaska's snow season has shrunk, with snow arriving about a week later in the fall than in the 1990s and disappearing about a week earlier, on average, according to a 2019 report by the Alaska Center for Climate Assessment and Policy at UAF.

But the mere arrival of snow is not enough to support a successful moose survey.

Snow cover must be adequate, which is at least 15 centimeters, or about 6 inches, Brinkman said. Less snow than that may make the landscape look white, but not dependably so, and plants sticking up can make the ground look mottled, he said.

"It's not just snow onset. It's good enough snow to cover some of that ground vegetation so that those moose stick out. Because they're brown, of course," he said. "You need snow accumulation to cover up some of that vegetation, so that brown moose really jump out when these folks are in the plane at 500 feet or whatever it is."

A bull moose rests in the newly-fallen snow along Point Woronzof Drive in Anchorage on October 31, 2024. Brown moose stand out against the white snow, but they can be hidden in dark-colored trees. (Marc Lester / ADN)

Also needed for surveying is adequate daylight, which gets scarce at Alaska's high-north latitude and which makes midwinter moose-counting flights impossible.

If aerial surveying is delayed until daylight returns in the late winter or spring, biologists will not be able to spot from the air the difference between male and female moose, removing information needed to determine population sex ratios, Brinkman said. That is because the males, known as bulls, lose their antlers in the winter after growing them over late summer and fall.

Additionally, there are potential mismatch problems if surveys are delayed until spring, he said. Moose may have shifted locations since the start of winter, and it could be unclear what animals are being seen from the air, he said. "Are those the same moose, or does the distribution change?" he said.

Another problem with changing when surveys are done is that the state would lose consistency in its recordkeeping. Long-term data is from fall surveys, so the potential

seasonal differences in moose distributions could mean a data interruption if biologists have to switch to spring surveys.

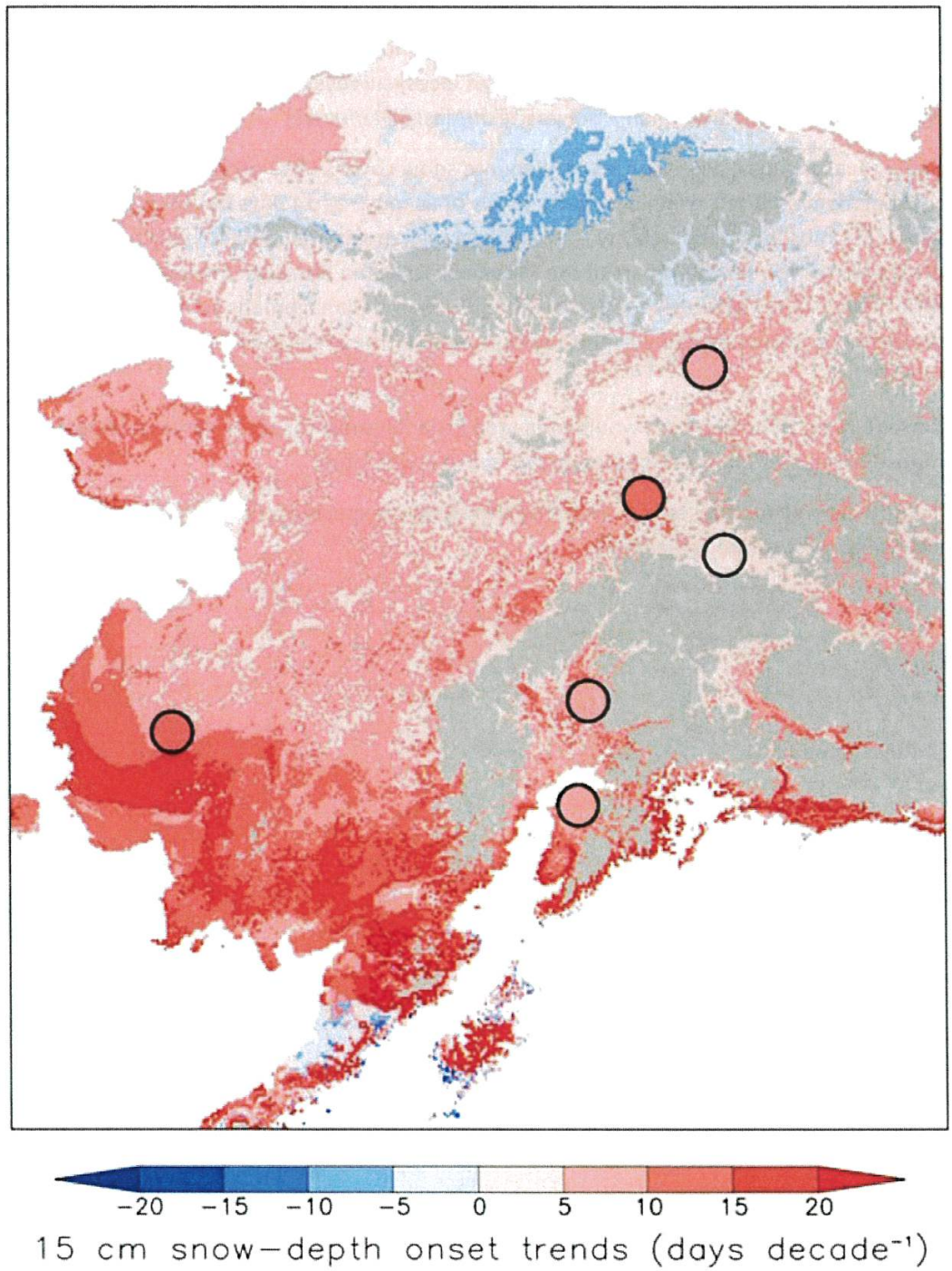
The concern goes beyond science and academia, Brinkman said. The changes could affect state managers' decisions and, ultimately, moose-hunting opportunities for the public, he said.

"If you don't have really good data, you've got to be cautious to avoid overharvest. And the goal usually is to try to give hunters as many opportunities as they can so they can build their freezers and, and their families can consume this really renewable healthy protein source," he said.

On the other hand, if hunting levels are set too low, there may be too many moose on the landscape for the habitat to support, he said.

Brinkman's study, which was co-authored by a UAF colleague and scientists at Colorado State University and Columbia University's Lamont Doherty Earth Observatory, combined past records with climate projections through the middle of the century.

It examined snow and survey records at seven areas within different Alaska game management units, the regions where specific wildlife regulations and hunting limits are applied. The records were from surveys done between 1987 and 2019 in seven subunits, which are portions of management units. In that time period, 170 surveys were completed and 41 canceled. The average start date was Nov. 12, but there was a lot of variation by region. Late arrival of adequate snow cover corresponded to survey cancellation, the study found.



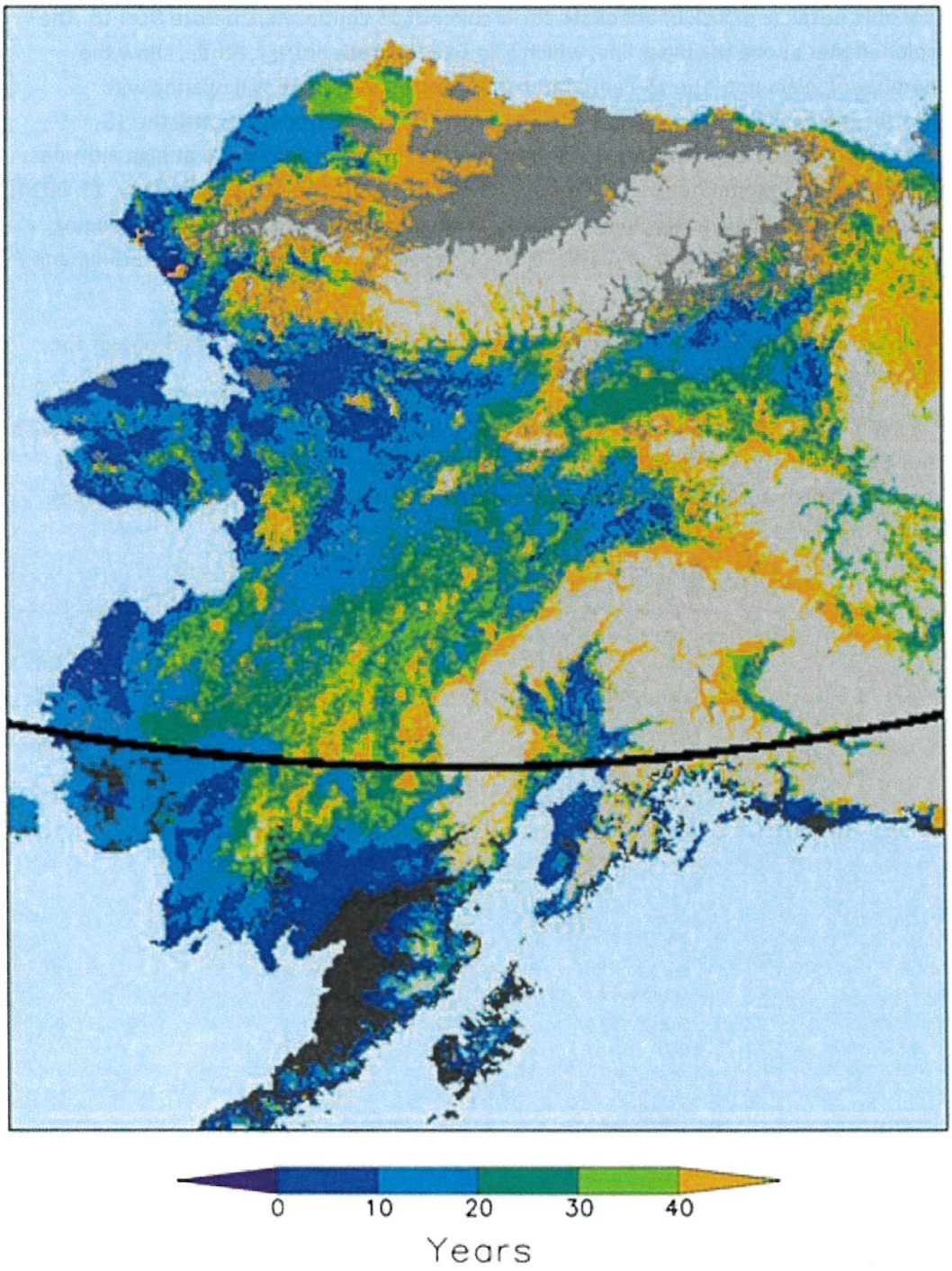
A map shows how the onset of snow changed in Alaska from 2005 to 2020. The map show

timing of snow accumulations of 15 centimeters, with red indicating later onset. The map is from the paper in the Nov. 11, 2024, issue of the Wildlife Society Bulletin titled: "Changing snow conditions are challenging moose (Alces alces) surveys in Alaska." (Graph provided by lead author Todd Brinkman / University of Alaska Fairbanks)

Snow records reveal a later onset of adequate snow cover in five of the seven game management subunits examined, with delays of as much as 14 days between 2005 and 2020. The most dramatic delay was in Game Management Subunit 14A, which encompasses the southern part of the Matanuska-Susitna Borough. In contrast, there was little change in fall snow cover over the period in Game Management Subunit 15A, which is on the Kenai Peninsula and was the southernmost of the areas in the study, the results found.

Continuation of those trends would mean too little fall snow for aerial surveys in most moose habitat within three or four decades, the study found.

In Southcentral and Western Alaska, that threshold is expected as soon as 10 years from now, according to the projections.



A map shows projections of periods when fall aerial moose surveys will no longer be

possible because of lack of adequate snow cover of 15 centimeters before Dec. 15. The color shades above the black line, which is at 61.3 degrees north latitude, show the number of years until the 15-centimeter snow depth onset date will overlap with insufficient daylight. Colors below the line show the number of years until the 15-centimeter depth is no longer expected by Dec. 15. Light gray areas are at high altitudes, assumed to be habitat not used by moose. The map is from the paper in the Nov. 11, 2024, issue of the Wildlife Society Bulletin titled: "Changing snow conditions are challenging moose (Alces alces) surveys in Alaska." (Graph provided by lead author Todd Brinkmann / University of Alaska Fairbanks)

A time crunch has already emerged to cause problems in some places, said one of the biologists who goes airborne each fall to assess moose numbers.

Lincoln Parrett, the Fairbanks-based regional supervisor for the Alaska Department of Fish and Game's Division of Wildlife Conservation — and a pilot himself — said fall snow is most reliable in Interior Alaska, where he works, and less reliable in areas closer to the coast.


Biologist Lincoln Parrett, who is both a pilot and the Fairbanks-based regional supervisor for the Alaska Division of Wildlife Conservation, is seen flying in this undated photo. (Photo provided by Lincoln Parrett)

But even in the Interior, where snow cover used to start reliably in October, there have been some challenges.

“As it turns out, what we found is that we’re just getting pinched, right?” Parrett said.

He was speaking on Nov. 21, the day after this group started one of the area surveys, which is relatively late in the year.

“And now we’re in a little bit of a race to get it done before a couple of things happen — before the bulls start to drop their antlers and before we run out of daylight. And so we just get pinched on that end,” he said.

The state’s fall surveys use a method called GeoSpatial Population Estimator, which samples boxes that are usually around 5 or 6 square miles, Parrett said. It generally takes

about 45 minutes to survey each of those boxes, depending on terrain. The system allows for a margin of error, as it is nearly impossible to count all moose, he said.

Parrett, like the numerous other pilots working on the fall moose surveys, flies with an observer as a partner sitting behind him. Both look out the plane windows on either side to count the moose below.

Parrett normally flies about 600 feet above the ground, making patterns that vary with the terrain below. Over flat landscapes, his flight patterns are in straight lines; over hilly terrain and curvy mountains, the flight paths are contoured accordingly. Over forested and heavily vegetated areas, where moose are harder to spot, he has to make more and tighter flight passes; over open tundra, where sight lines are clear, he makes fewer passes.

Other necessities for successful fall surveys, beyond adequate snow cover, include safe flying conditions and an adequate number of pilot-observer teams and planes.

Uncertain fall snow cover is not new in some places of Alaska, Parrett said.

In some parts of Western Alaska, for example, biologists have been relying on spring surveys rather than fall surveys for about 20 years, despite the drawbacks of those spring counts, he said.

Spring surveys have also been used in part of Interior Alaska as well, where the climate is very dry and snow can be scarce, he said.

In the future, as later-arriving snow makes the old-school fly-and-count method less feasible, technology could fill in the gaps, Parrett said.

Biologists at the Department of Fish and Game are looking at the option of tracking moose populations through genetics, using a method called close-kin mark-recapture, he said. That method uses extrapolations to estimate population sizes by tracking the genetics that link kin relationships between animals. The method has been used with other species like bearded seals in the Bering, Chukchi and Beaufort seas off Alaska and Arctic grayling fish in Canada's Yukon.

Moose surveying in the future could also incorporate the use of drones or infrared technology that can track the animals' presence through their body heat, Parrett said.

Two moose are seen from the air in a forested area of Interior Alaska in this undated photo. Moose are harder to spot when they are in vegetated areas. (Mark Nelson / Alaska Department of Fish and Game)

For now, though, he and his colleague are still using the traditional method, as long as daylight and weather holds out.

While he was grounded by fog on Nov. 21, he was expecting better moose-spotting conditions in the days to come.

"Right now, the air is very moist, and so the one thing that it's doing, I can see it happening before my eyes, is it's frosting. So all the trees and all the willows are going to be covered with frost, which will produce excellent conditions," he said.

Such conditions allow biologists to use the time-honored — and very low-tech — practice of seeking out moose by following the marks they leave in the stands of trees and bushes.

"That frost is amazing, because the moose knock the frost off as they walk around and they make these incredible trails," he said.

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