




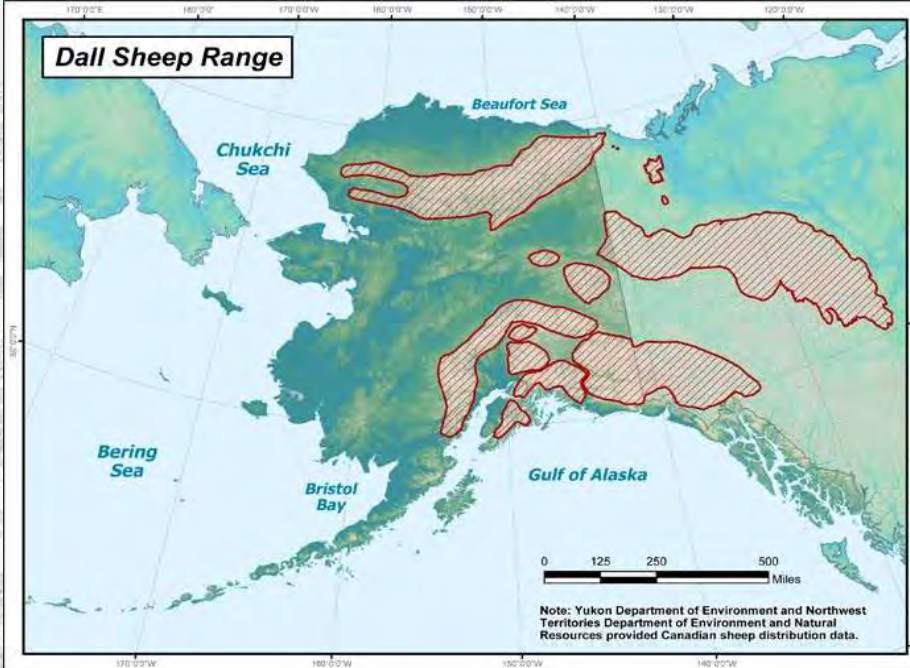
2022 BOG Dall's Sheep Informational Meeting



1



Dall's Sheep Distribution



2



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General Review of Dall's Sheep Populations in Alaska

1880 - 2009

Joe Want – ADF&G
joseph.want@alaska.gov

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*“Hunters entering sheep country in 1945
were astonished to find but a small fraction
of the previously known populations”*

Robert F. Scott 1949 USF&WS

5

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*“Hunters entering sheep country in 1992
were astonished to find but a small fraction
of the previously known populations”*

Anonymous -1992

6

6

*“Hunters entering sheep country in 2022
were astonished to find but a small fraction
of the previously known populations”*

Anonymous - 2022

7

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Ethnographic References

- Ca. 1885 : Long winter of deep snows northern Alaska

8

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Ethnographic References

- Ca. 1885 : Long winter of deep snows northern Alaska
- 1885 - 1910 : Historically, sheep populations low in several mountain ranges



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Ethnographic References

- Ca. 1885 : Long winter of deep snows
- 1885 - 1910 : Historically, sheep populations low in several mountain ranges
- 1906 - 07: 6-10 % of the residents of the central Brooks Range were reported to have succumbed to hunger

10

10

Alaska Game Commission (AGC)

- 1928: Moore reported sheep hunting in “...headwaters of the Noatak...” and “plenty of sheepskin parkas and sleeping bags in the village...”.



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11

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- 1939: Agent Collins reported “...numerous bands of sheep...” north and south of the Noatak.

12

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- 1928: Moore reported sheep hunting in “...headwaters of the Noatak...” and “plenty of sheepskin parkas and sleeping bags in the village...”.
- 1939: Agent Collins reported “...numerous bands of sheep...” north and south of the Noatak.
- 1949: Scott’s surveys - central DeLong mountains - n=117

13

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Department of Wildlife Conservation (DWC)

- 1962-63: Personal observations central Brooks R.

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- 1968: L. Nichols Brooks Range, reported:

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16

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 - numerous bands of sheep Hulahula
 - R. Losche “1000 sheep Okokmilaga”

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17

Department of Wildlife Conservation (DWC)

- 1962-63: Personal observations central Brooks R.
- 1968: L. Nichols Brooks Range, reported:
 - numerous bands of sheep Hulahula
 - R. Losche “1000 sheep Okokmilaga”
 - R. Marshall – practically all mountains with suitable habitat have sheep.

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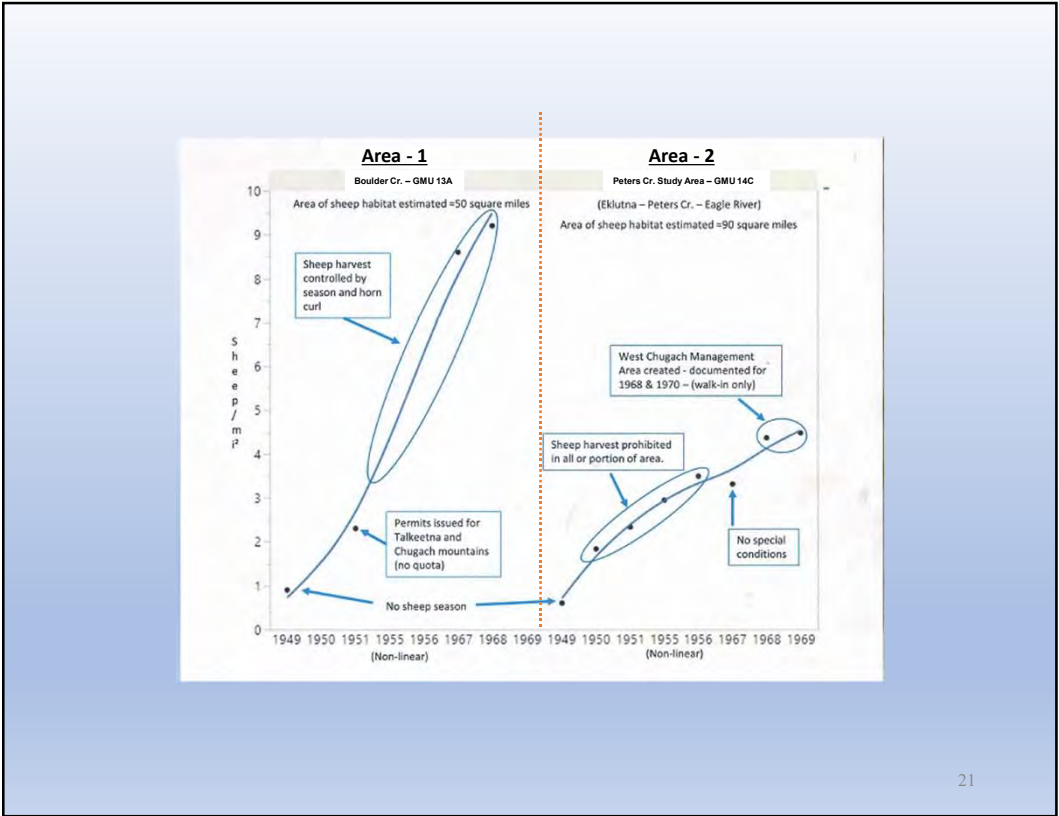
Table 1. Total sheep observed during aerial surveys of the Hulahula River, Brooks Range, Alaska, 1976-86.

Year	No. Sheep	Survey time (hrs)	Aircraft type
1976	1,746	19.0	Helio Courier
1979	1,982	14.0	Super Cub
1982	2,186	20.8	Super Cub
1986	3,196	36.3	Super Cub

Pg.131 - http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/federal_aid/89_sheep_si_6.0_morgan.pdf

AREA	YEAR	ESTIMATED HERD SIZE
	1949	350
Kenai Peninsula	1968	2,220
	1949	45
Boulder Creek, Talkeetna Mountains	1968	460
	1949	54
Peters Creek area, Chugach Mountains	1969	403
	1949	795
McKinley Park	1968	3,500

http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/research_pdfs/dall_sheep_managment_nichols_1971.pdf



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Public comments regarding Dall’s sheep – AGC – 1930 report

Letter Number	Name	Location	Comment
42	F. Alba	Fairbanks	“...good lamb crop on the entire north slope of the Alaska Range
43	L. Corbly	Fairbanks	“...lamb crop in his section very light...”
44	Resident	Nabesna country	“...lots of lambs – out of 60 ewes in one bunch, 40 had lambs
59	Olmstead	Anchorage	Kenai crop of lambs greatest seen on their travels
59?	G. Waddell	Anchorage	Largest number of young sheep seen in Killey River
64	Rickey	Nabesna district	Lot of lambs – about 2 of 3 ewes had lambs
65	A. Lien	Mount Hayes district	Very poor increase in lambs – believes bad weather the cause
66	T. Martin	Seldovia	Good increase in lambs – counted 18 ewes with 22 lambs – another group 40 ewes with 43. saw a band of 36 or 37 rams.

Source: AGC report 1930 – pg. 50

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General Overview

- Population cycles occurred in:

23

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General Overview

- Population cycles occurred in:
 - areas open or closed to hunting

24

24

General Overview

- Population cycles occurred in:
 - areas open or closed to hunting
 - the territory during the general seasons 1902 -1951

25

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General Overview

- Population cycles occurred in:
 - areas open or closed to hunting
 - the territory during the general seasons 1902 -1951
 - areas controlled by permits or general seasons


26

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General Overview


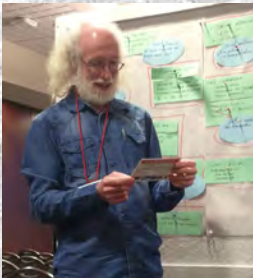
- Population cycles occurred in:
 - areas open or closed to hunting
 - the territory during the general seasons 1902 -1951
 - areas controlled by permits or general seasons
 - areas with harvest regulated by curl and age restrictions

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Historical Overview Con't

- 2014 Sheep Hunter Survey (Dr. Brinkman)
https://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/mgt_rpts/14_sheep_hunter_survey_report.pdf
- 2015 Sheep Working Group (Dr. Bath)



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Recent Changes

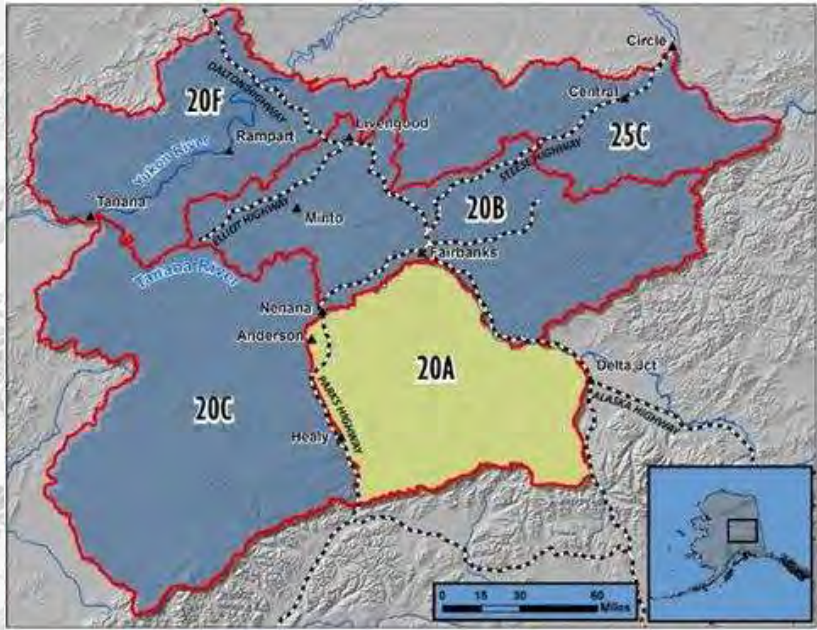
- Increased Tag Fees (2017)
- Non-Residents: 1 sheep every 4 years (2016)
- Aircraft Restrictions (2015)
- GMU 23 Closure (2015)
- Chugach Mountains: General Season to Draw (2008)

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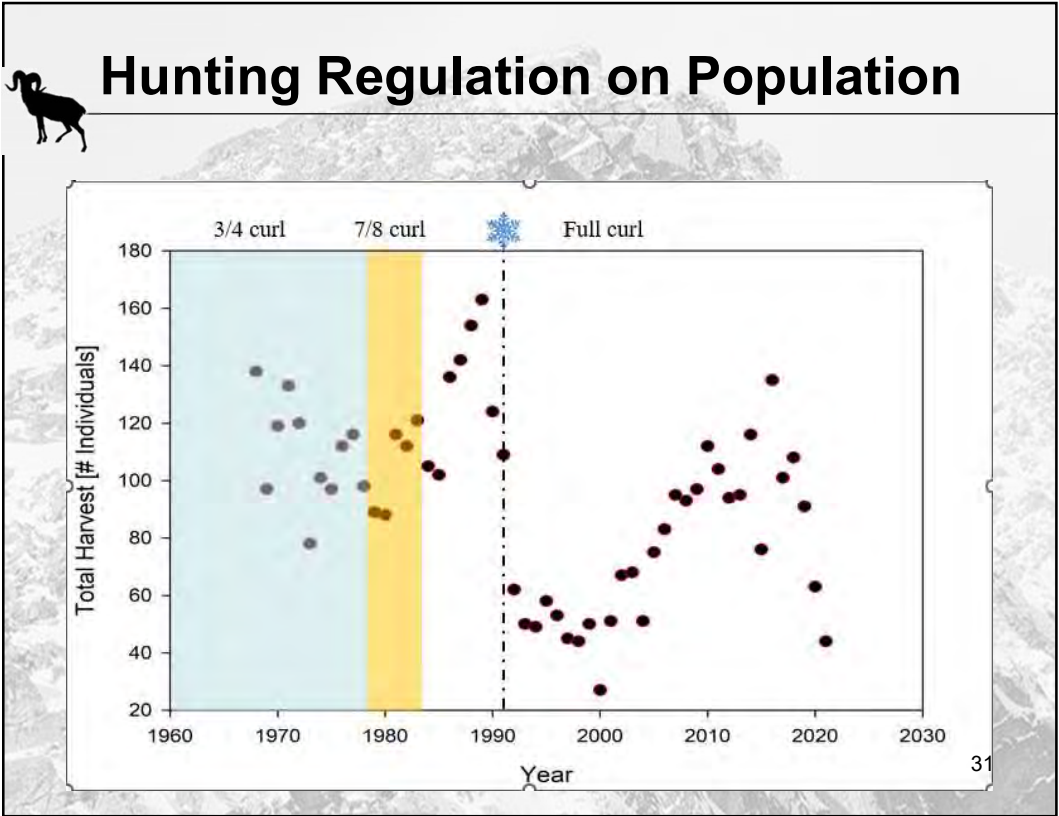


GMU 20A Example

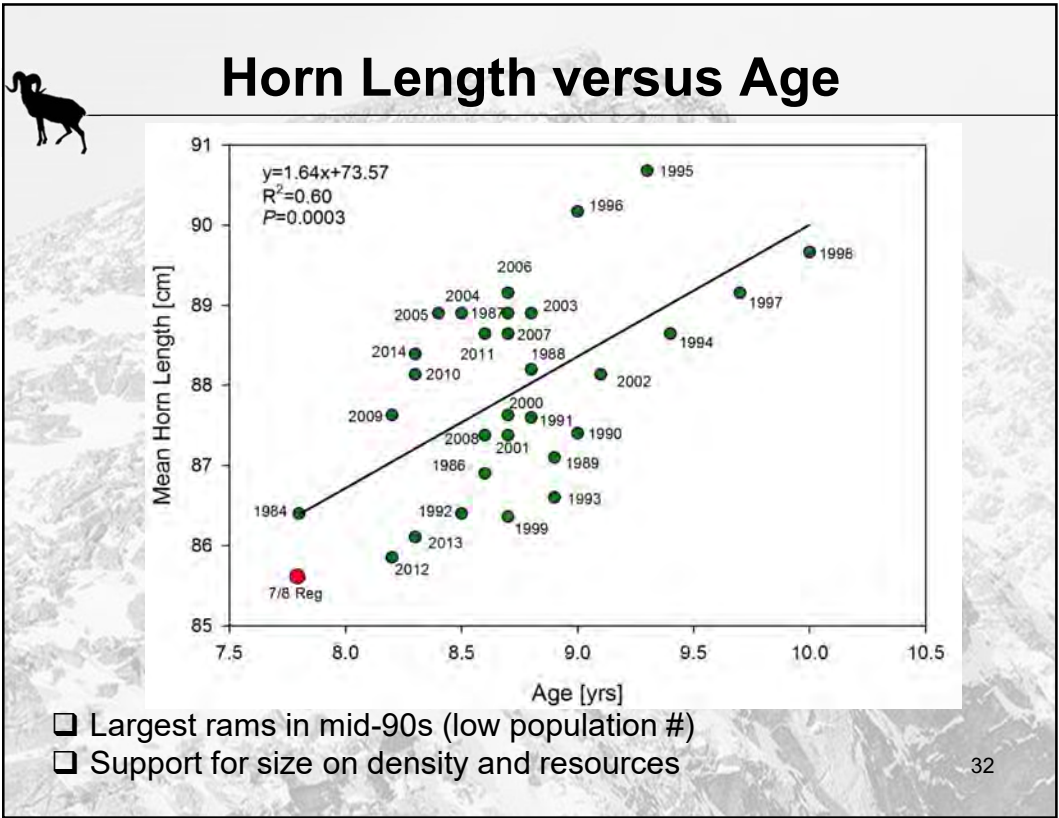


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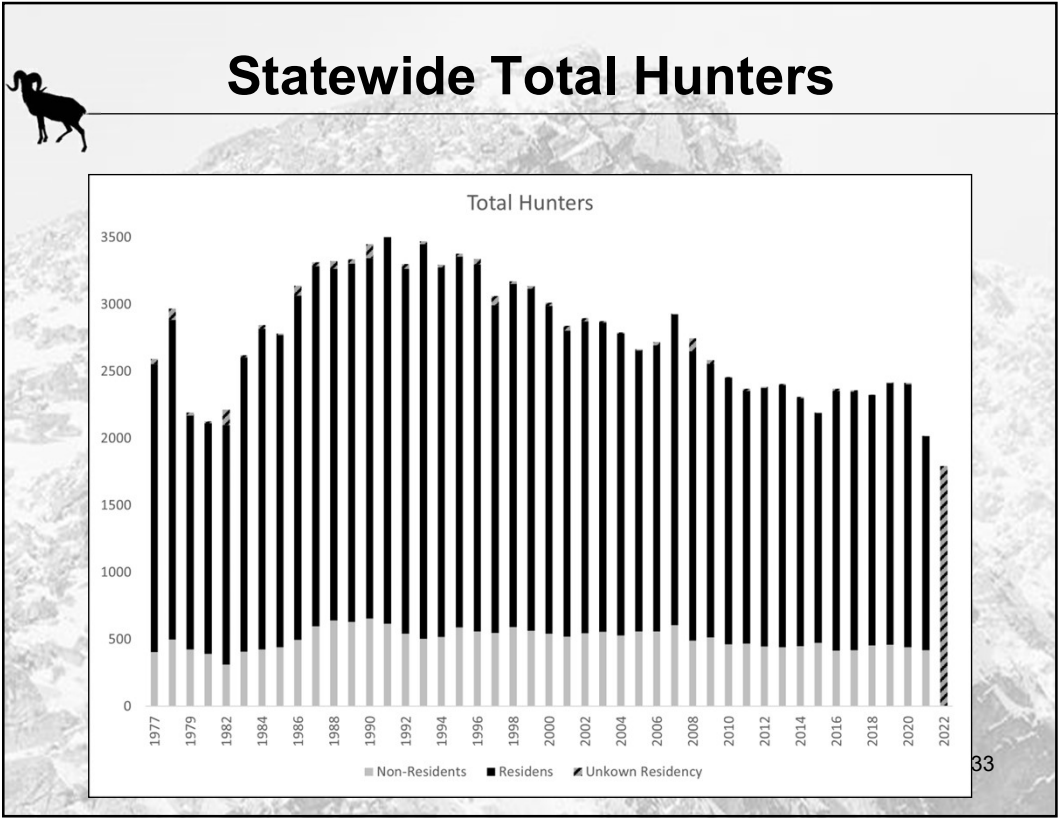


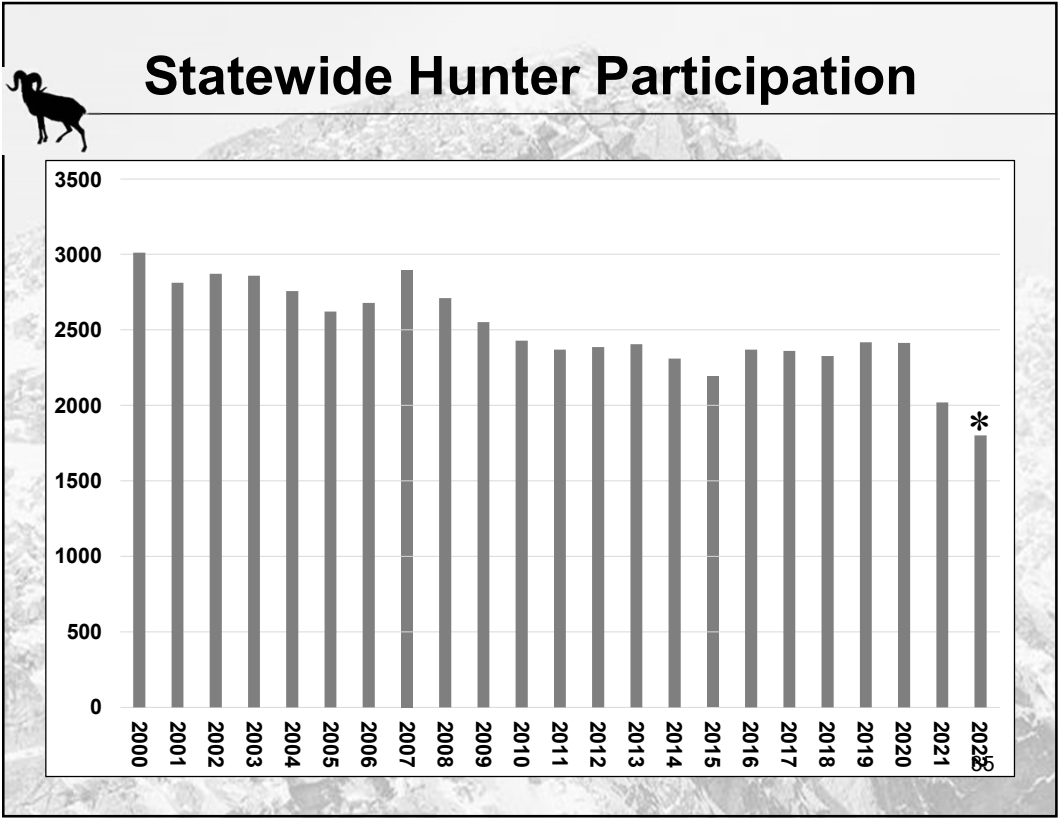
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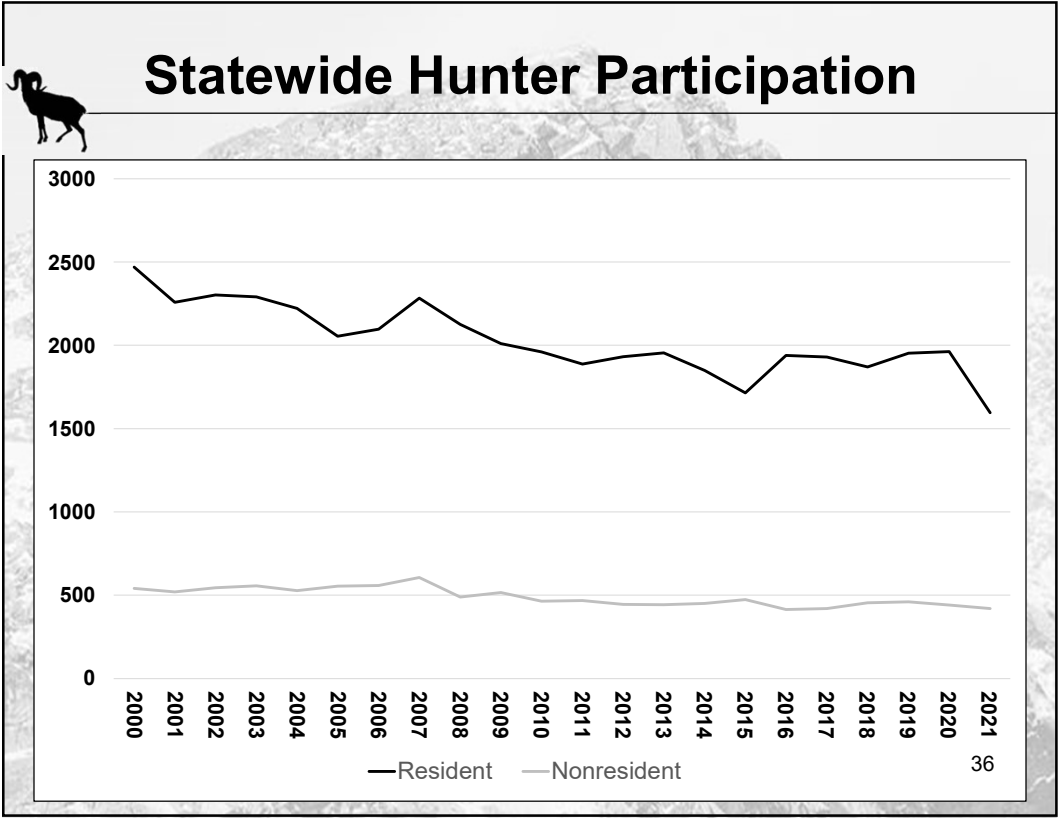
- ❑ Largest rams in mid-90s (low population #)
- ❑ Support for size on density and resources

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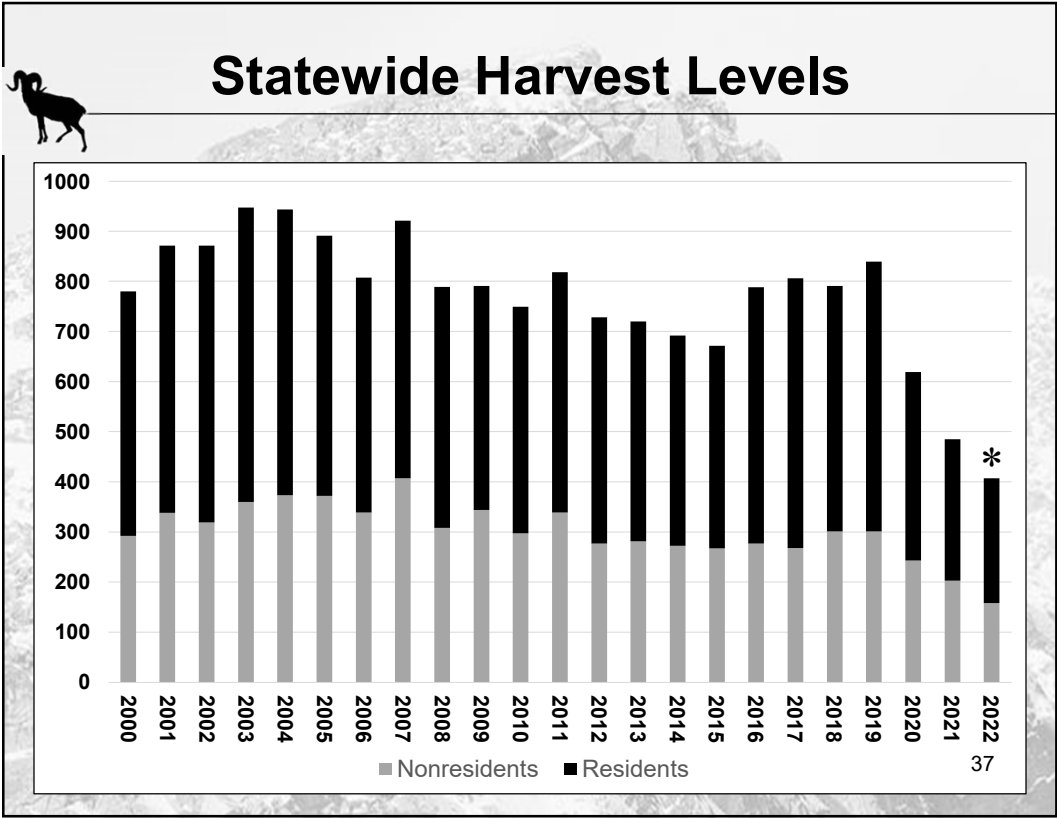




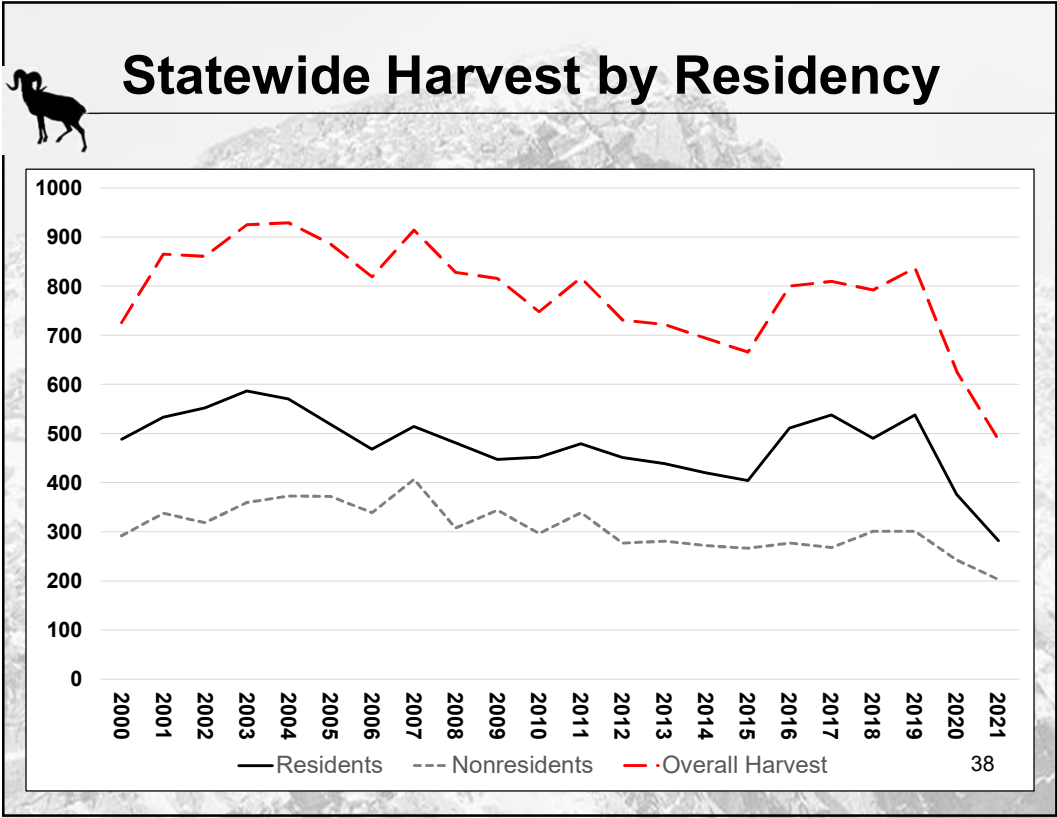
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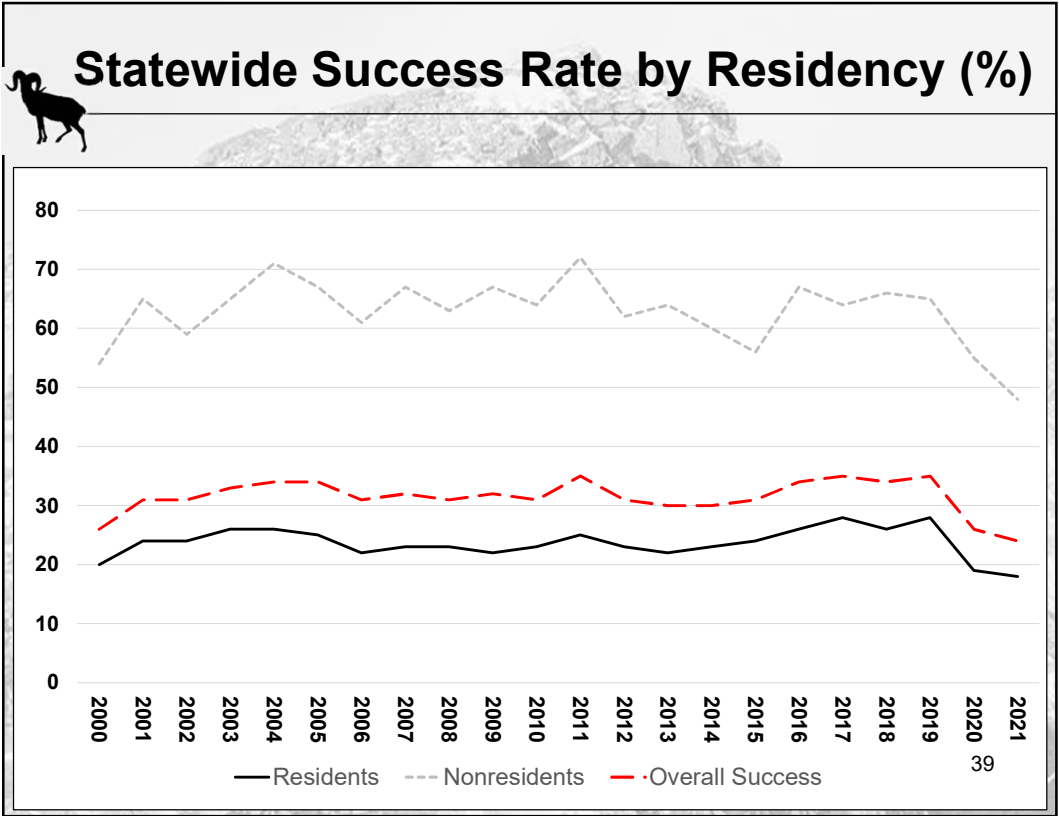
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Sublegal Harvest 2022

Fairbanks
6 out of 106
2 resident, 4 guided


Anchorage
7 out of 110
3 resident, 3 guided, 1 2DK

Palmer
13 out of 99
7 resident, 4 guided



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Current Populations and Trajectories

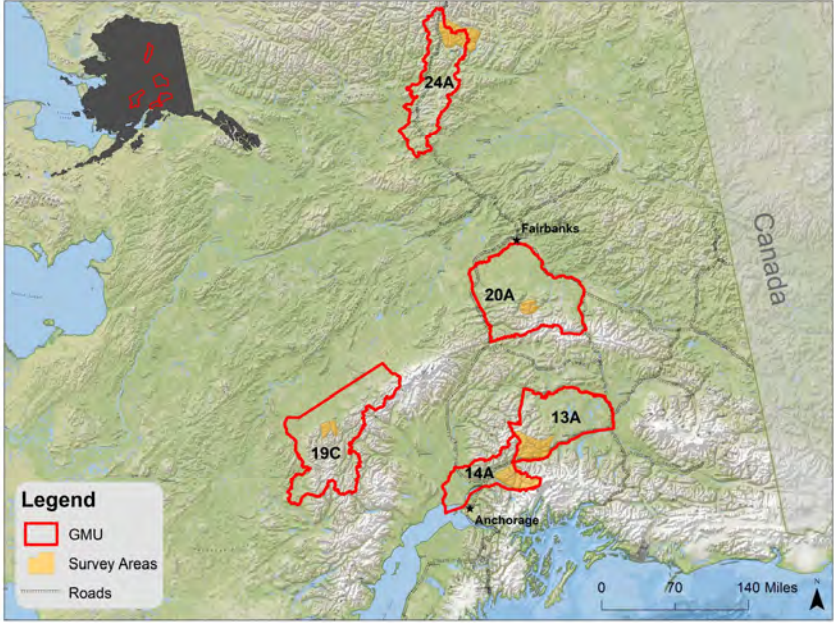
- Data from a range of survey areas across latitudes
 - Sheep population issues aren't limited to one mountain range.
- Background
 - Imperfect/incomplete data. (Funding, weather, pilot availability)
- Survey techniques – caveats and assumptions
 - Minimum count – not corrected for sightability
- Small area relative to entire GMU
- What we see represents a slice of the population

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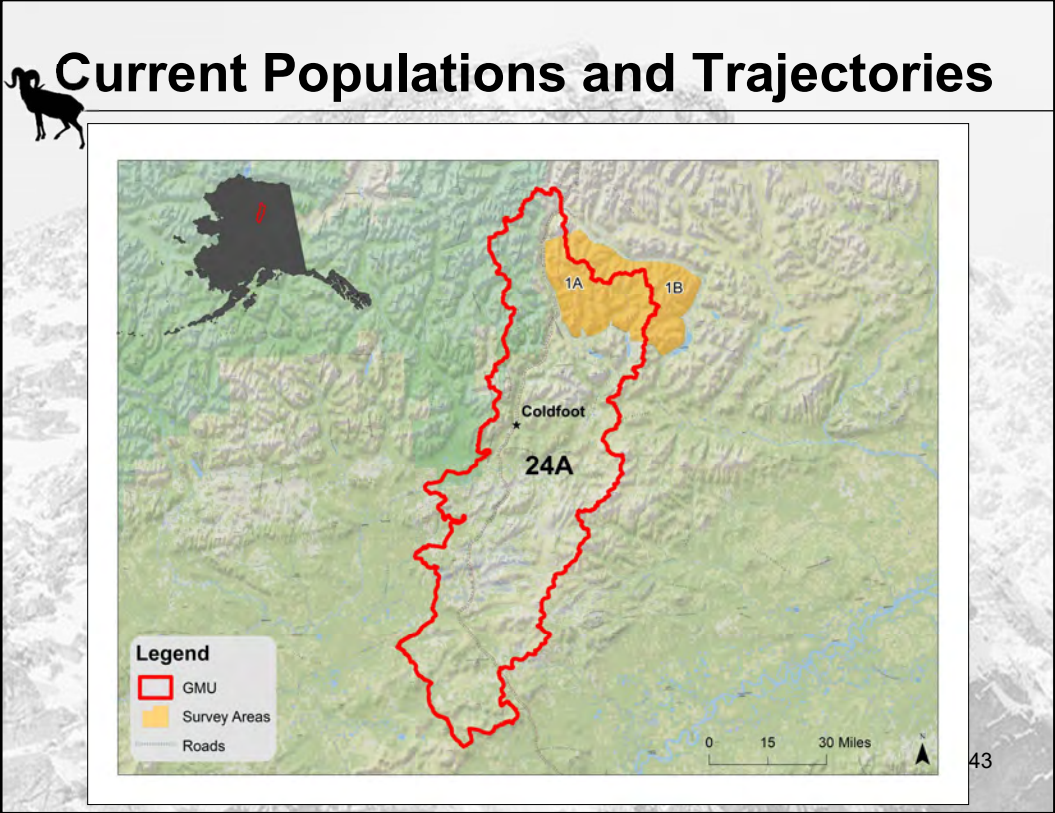


Current Populations and Trajectories

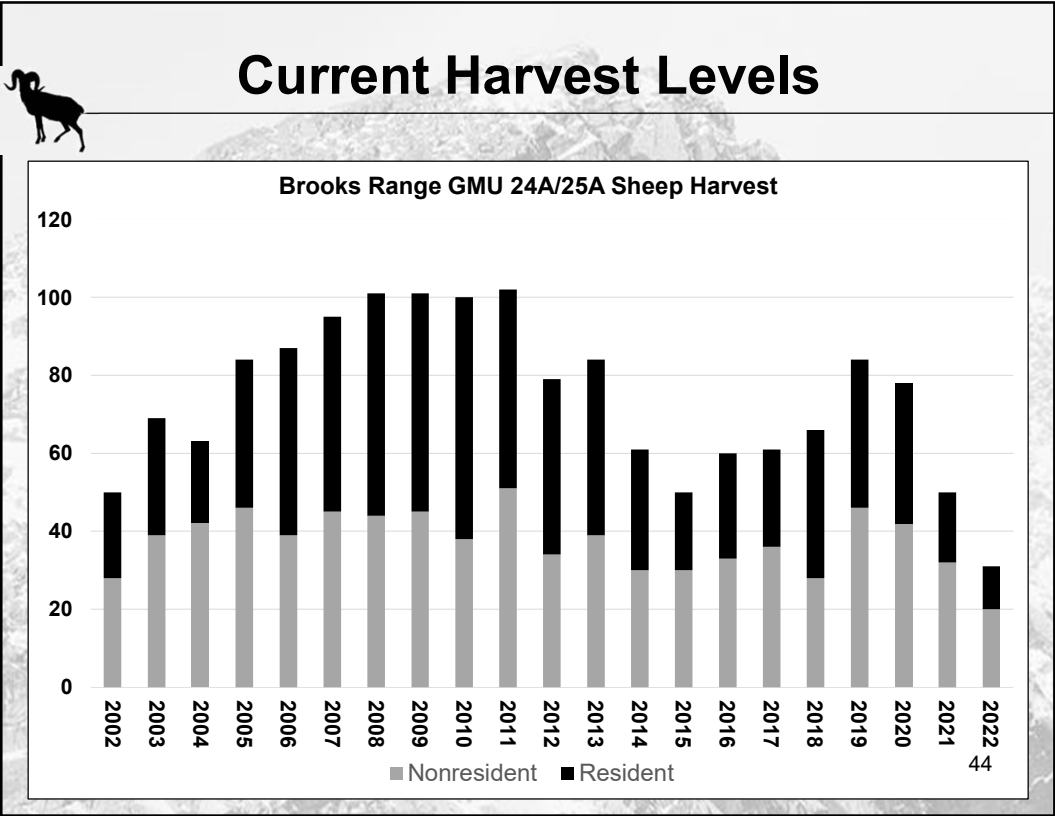


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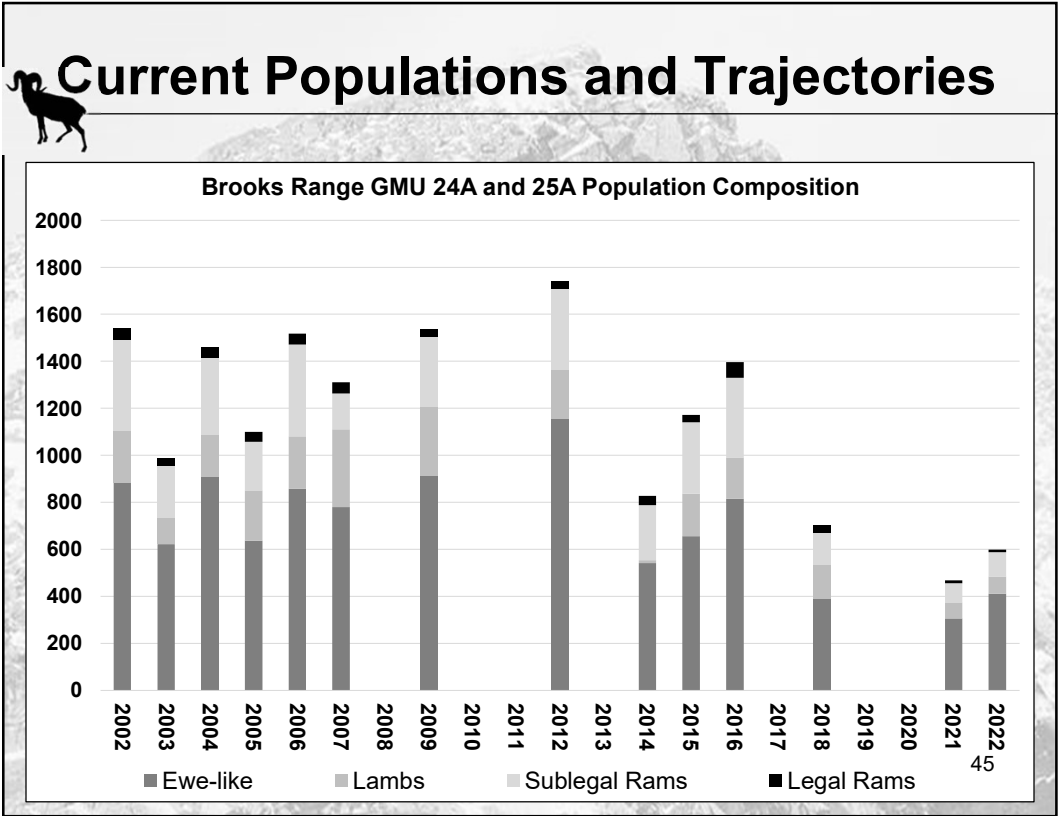
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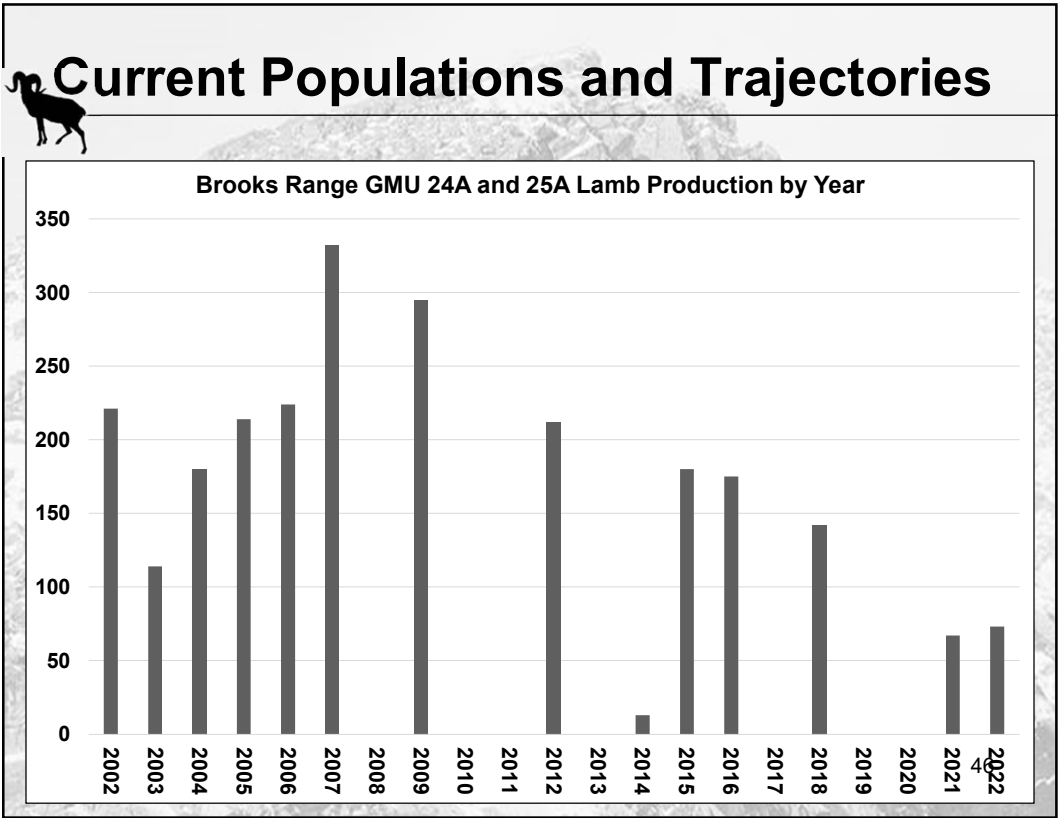
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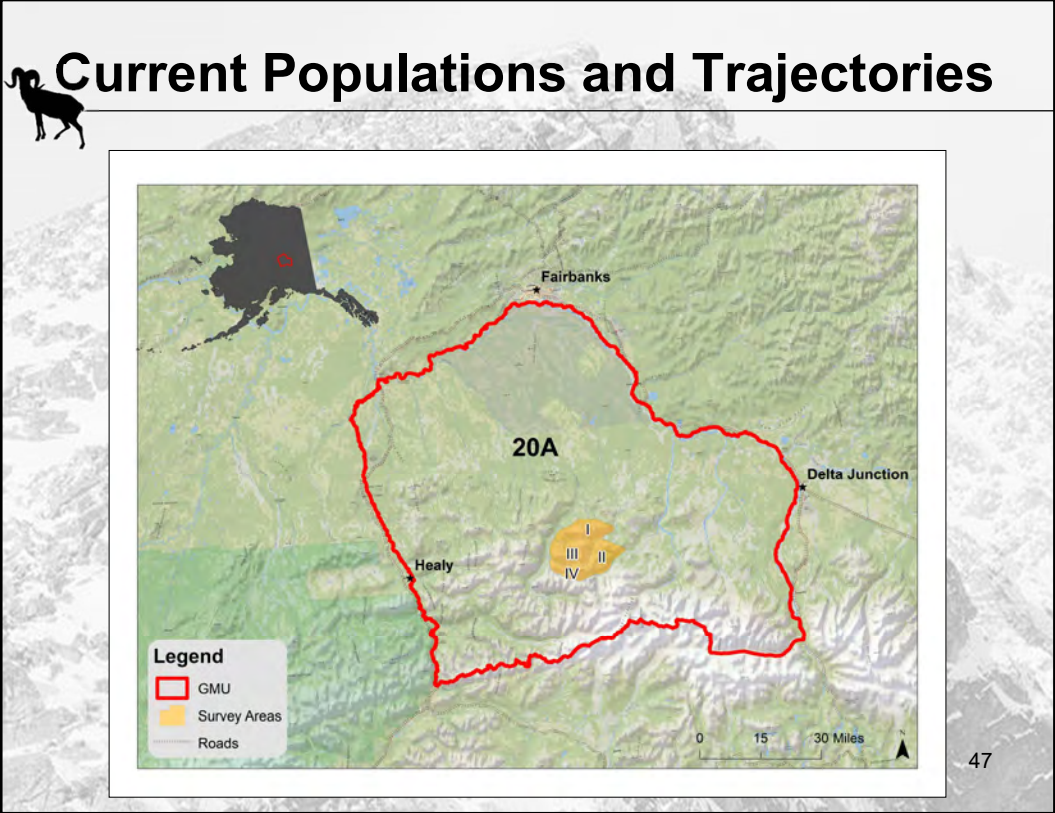
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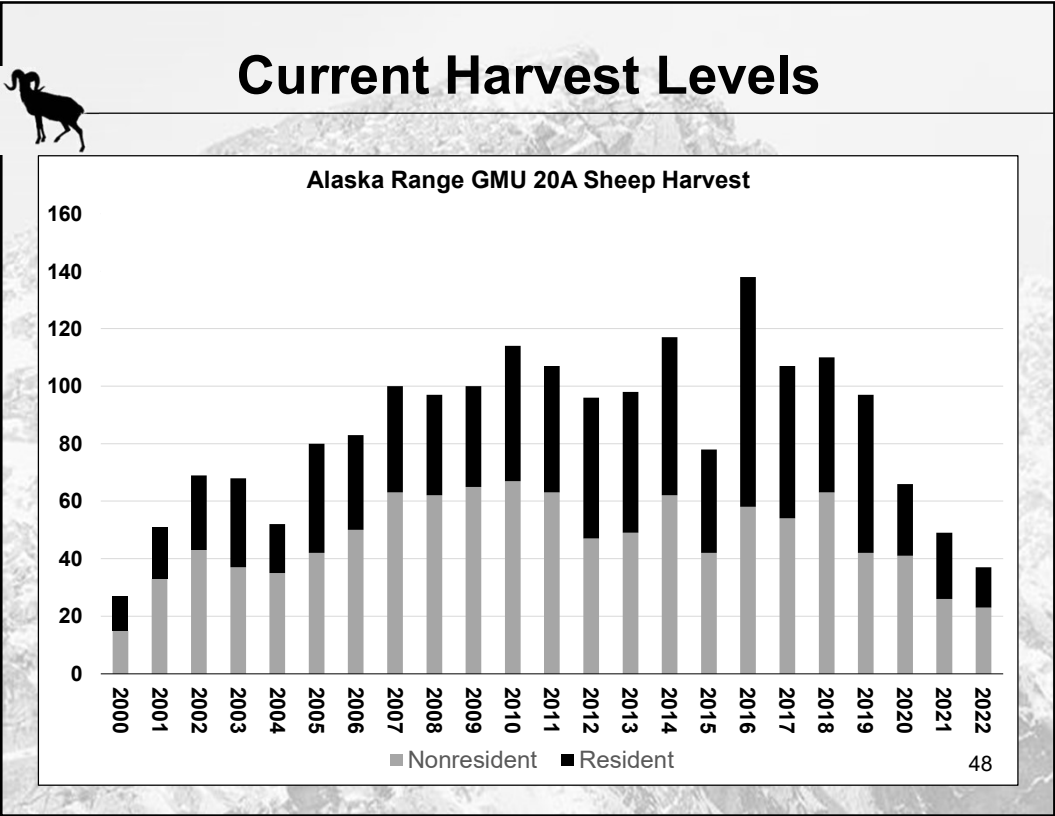
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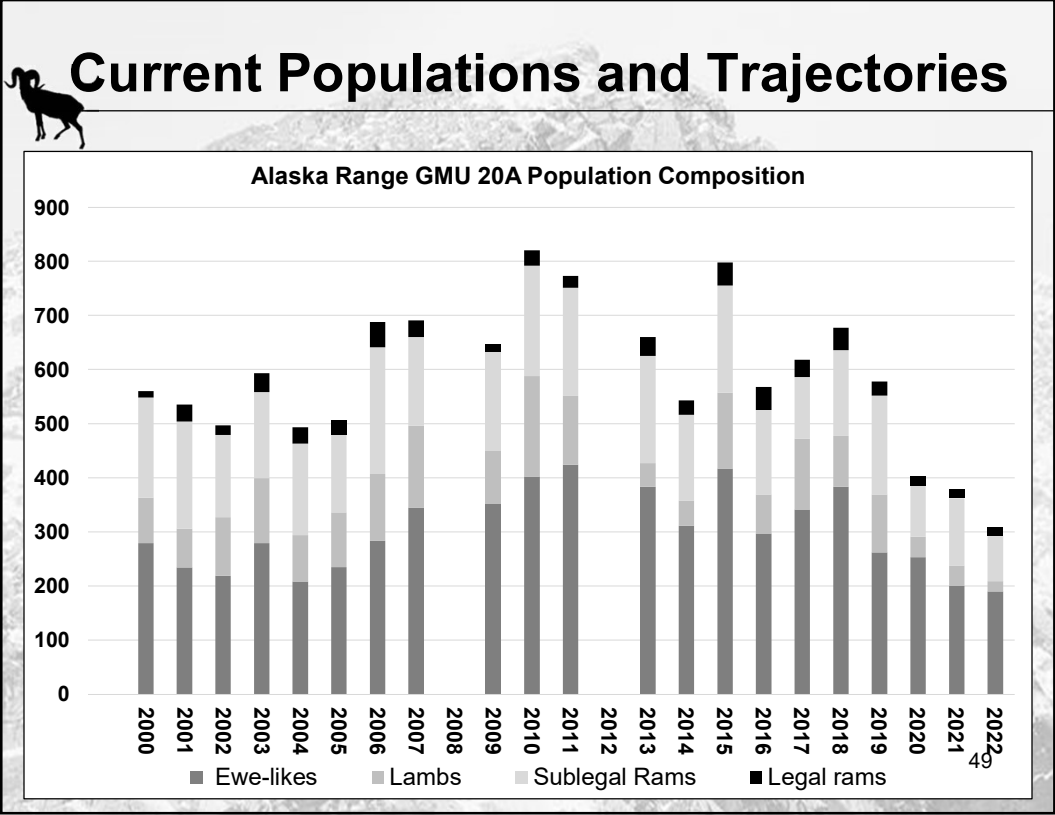
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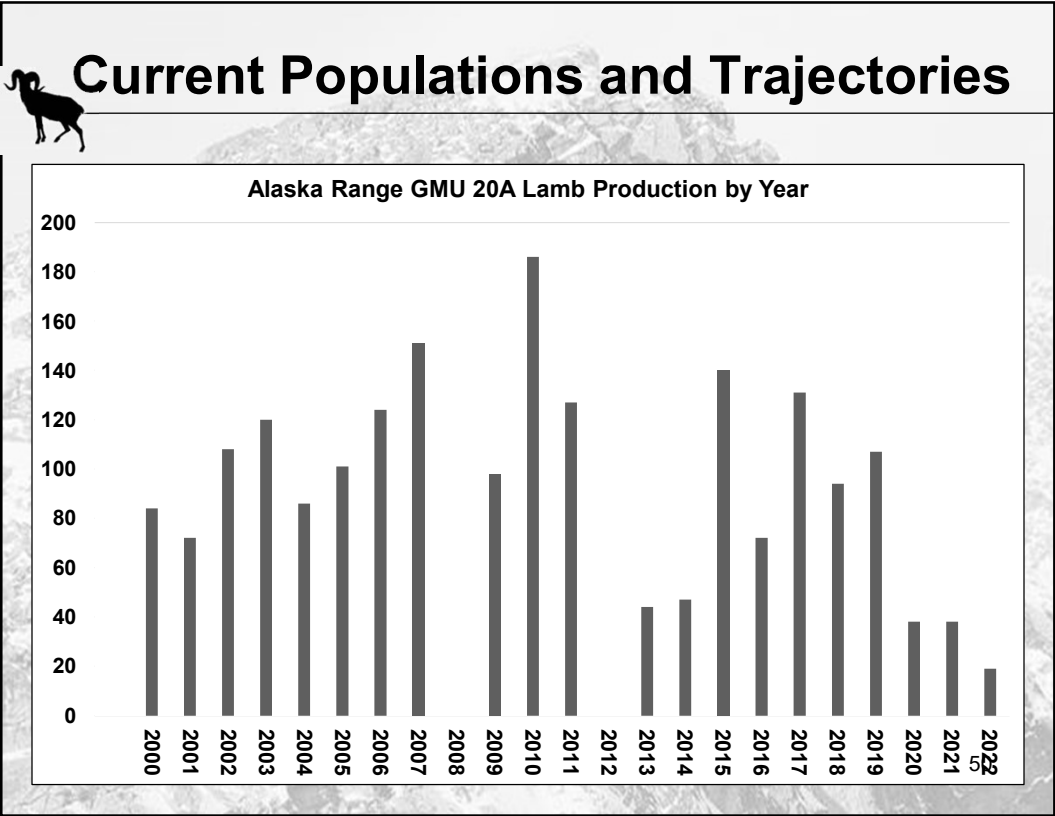
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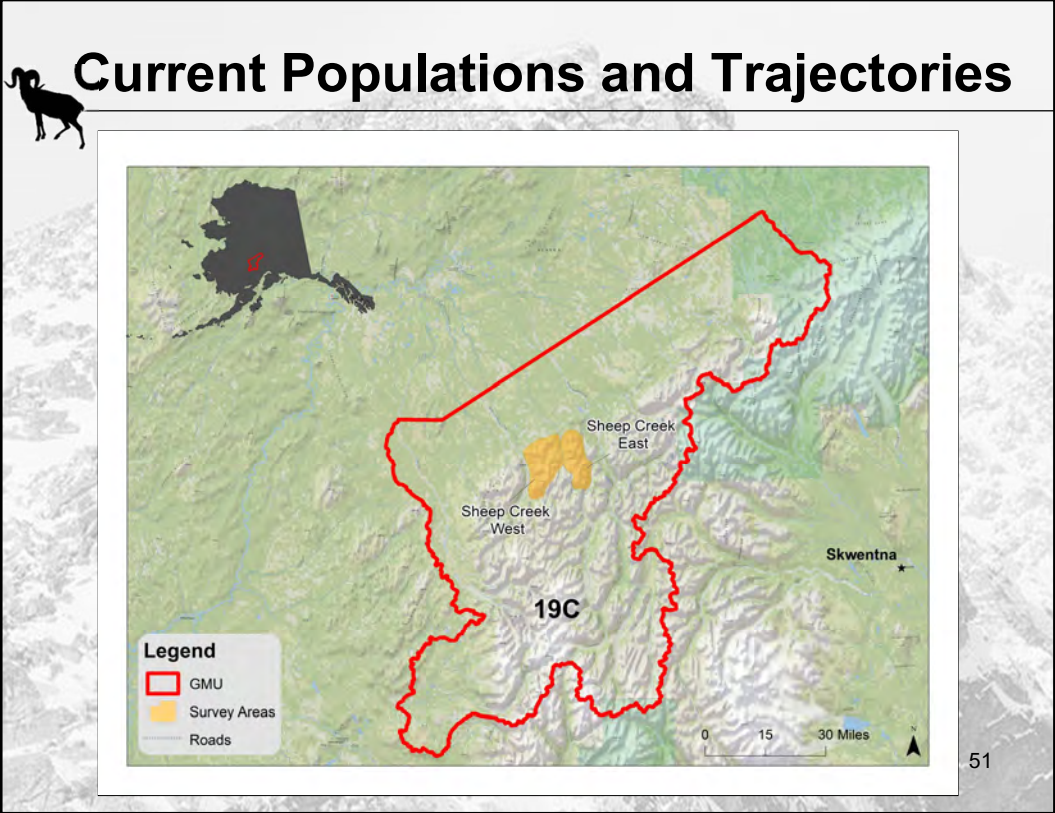
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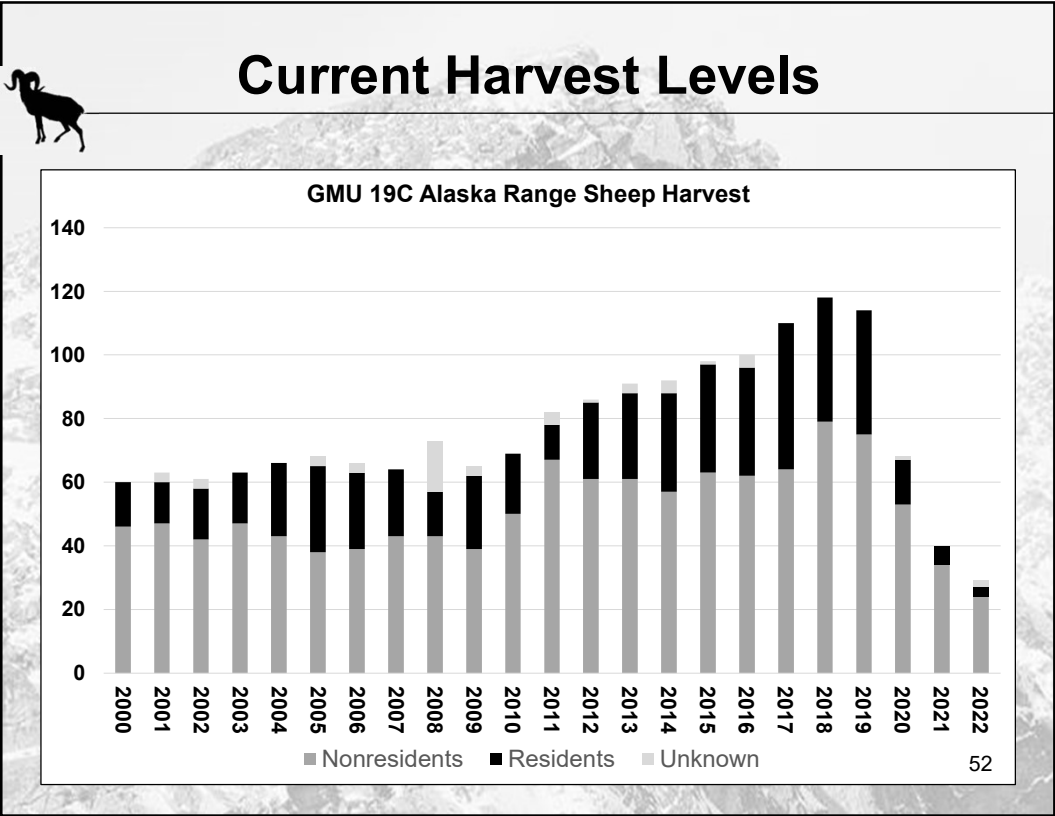
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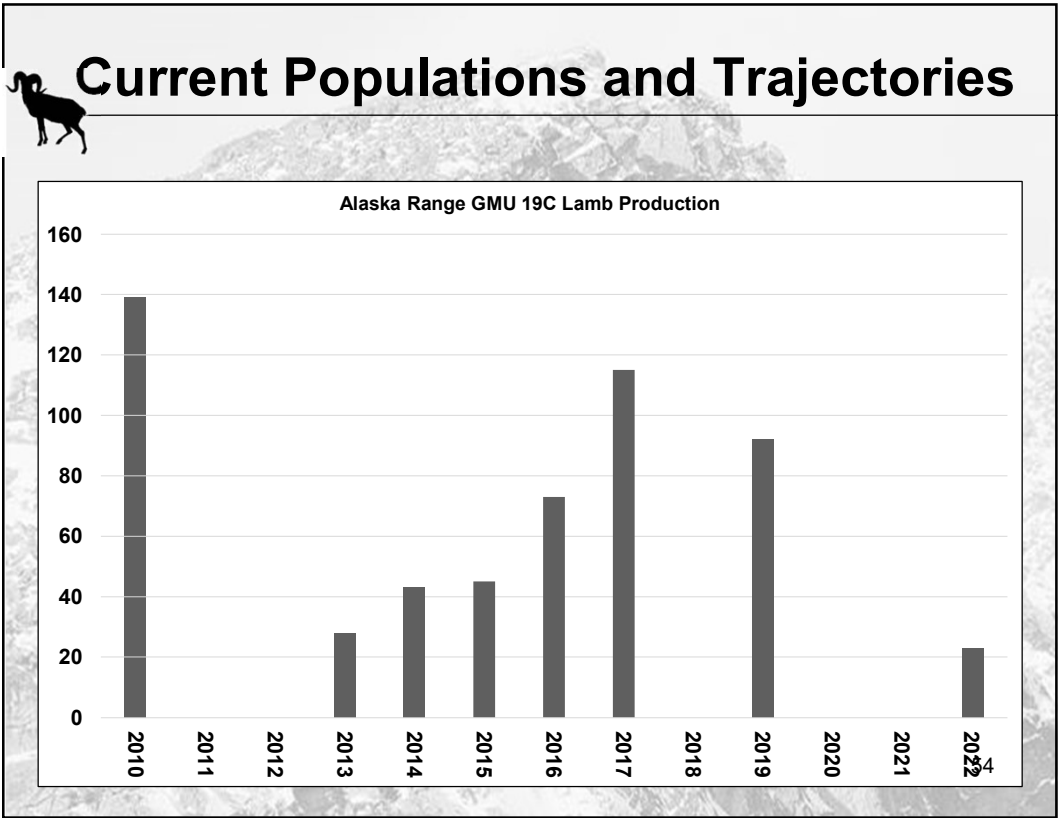
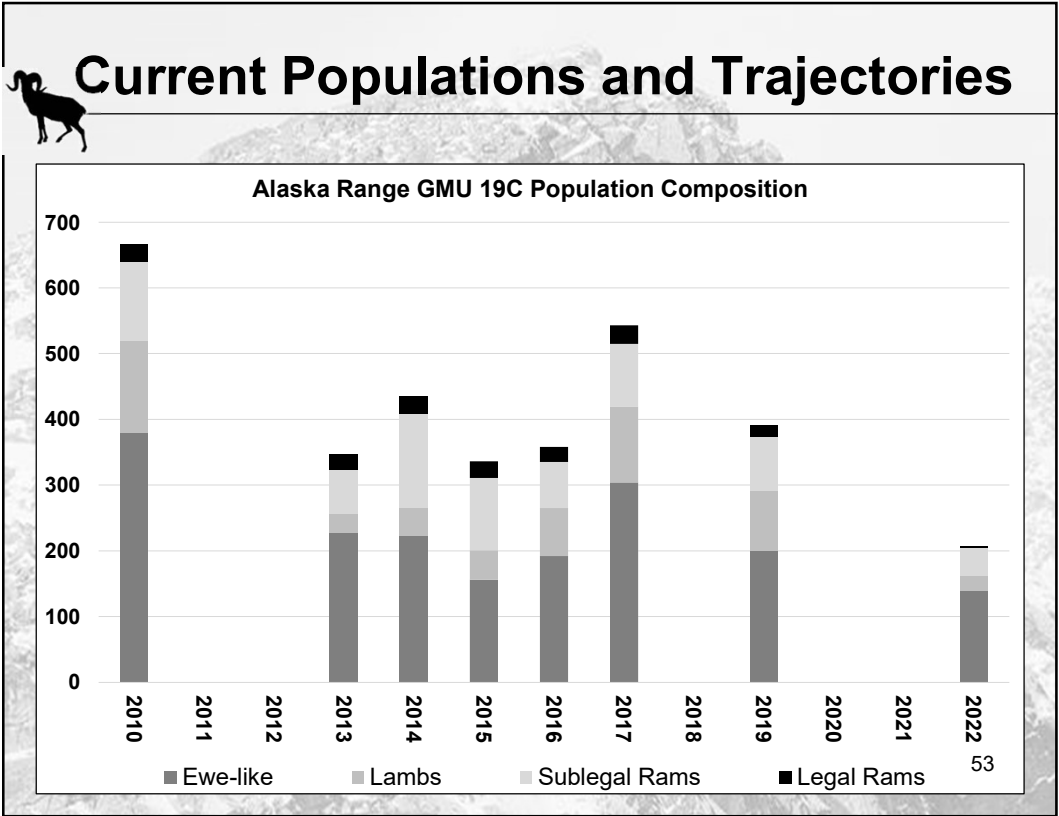
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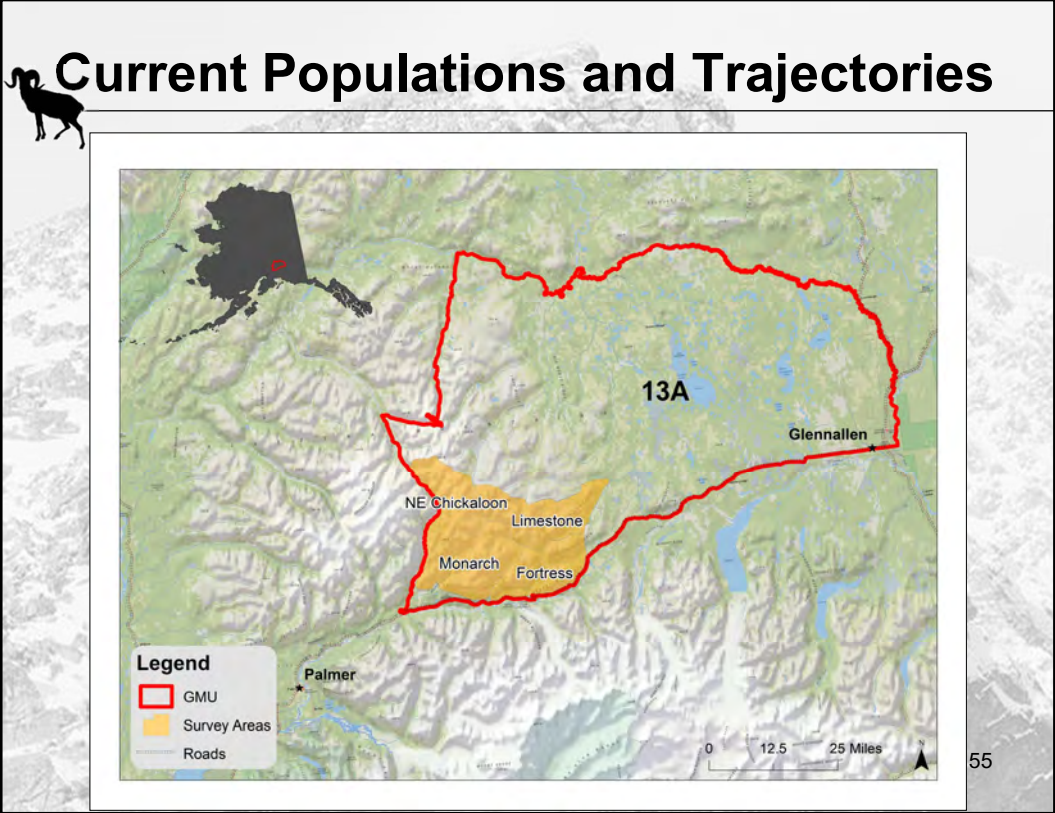


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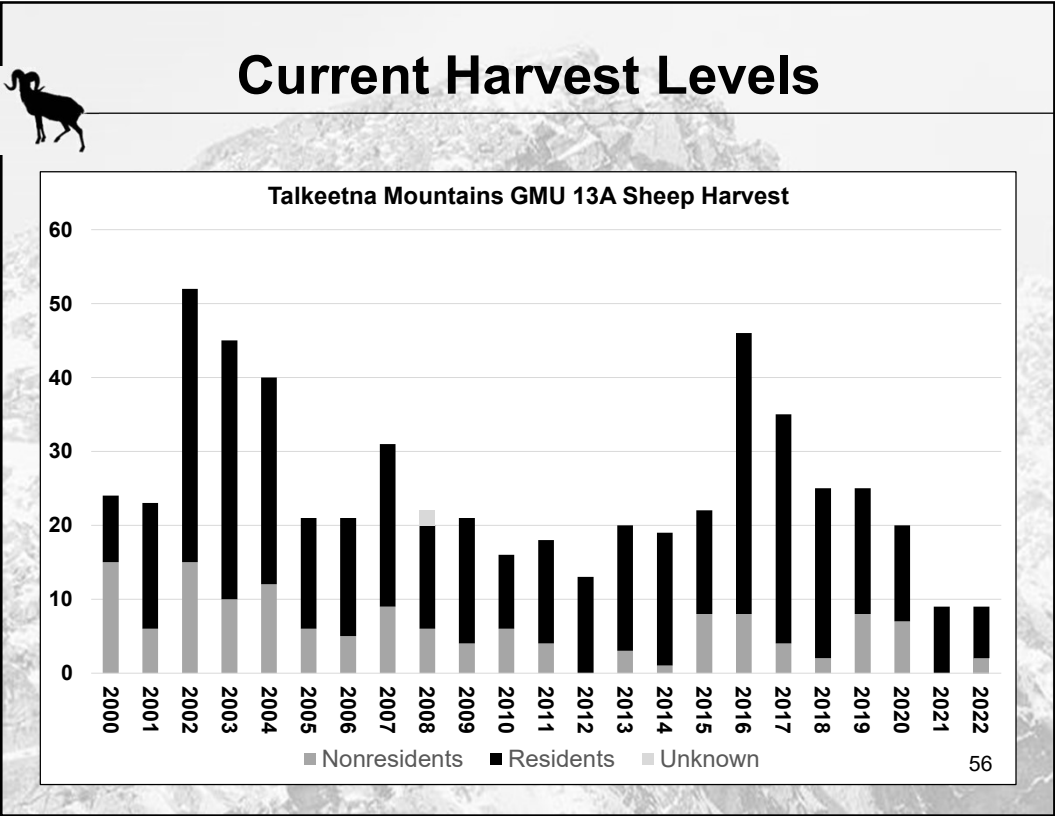


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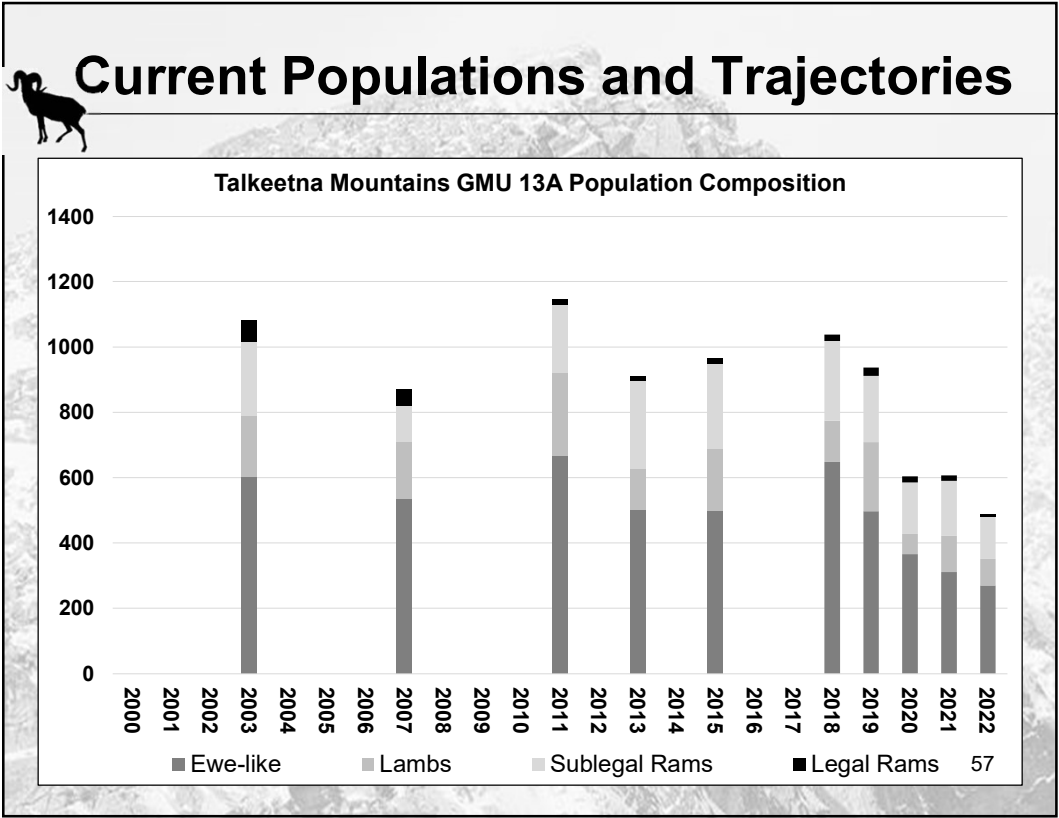




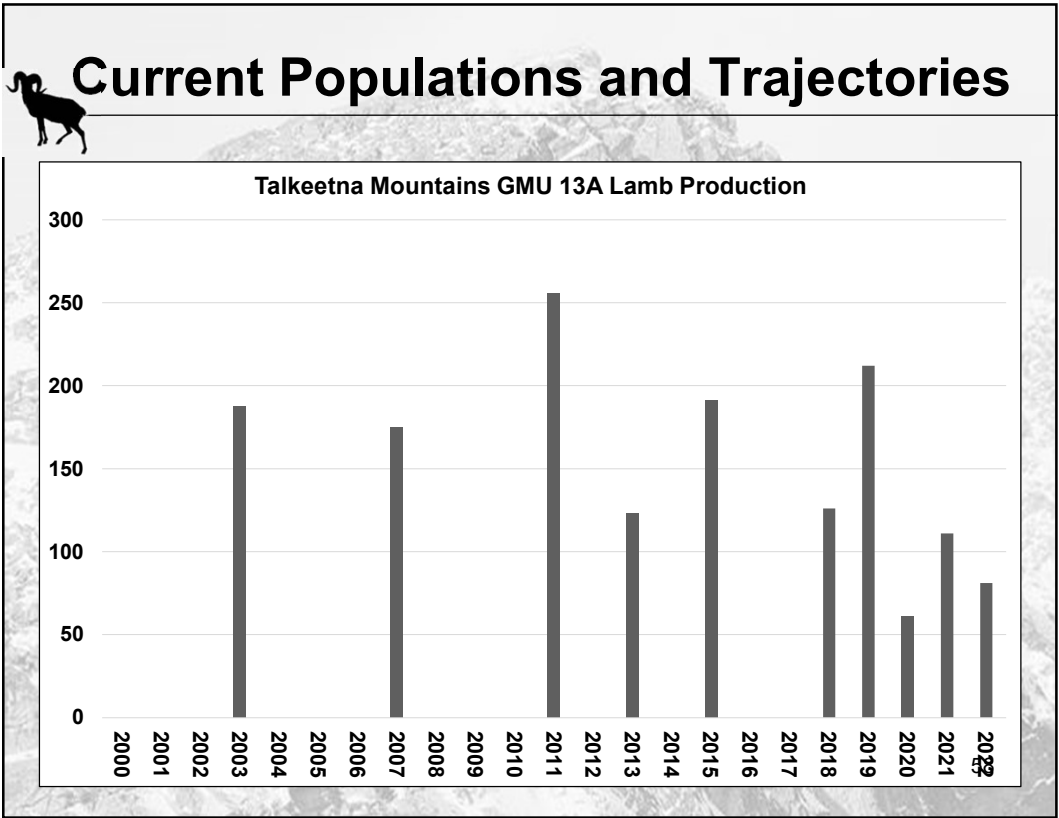
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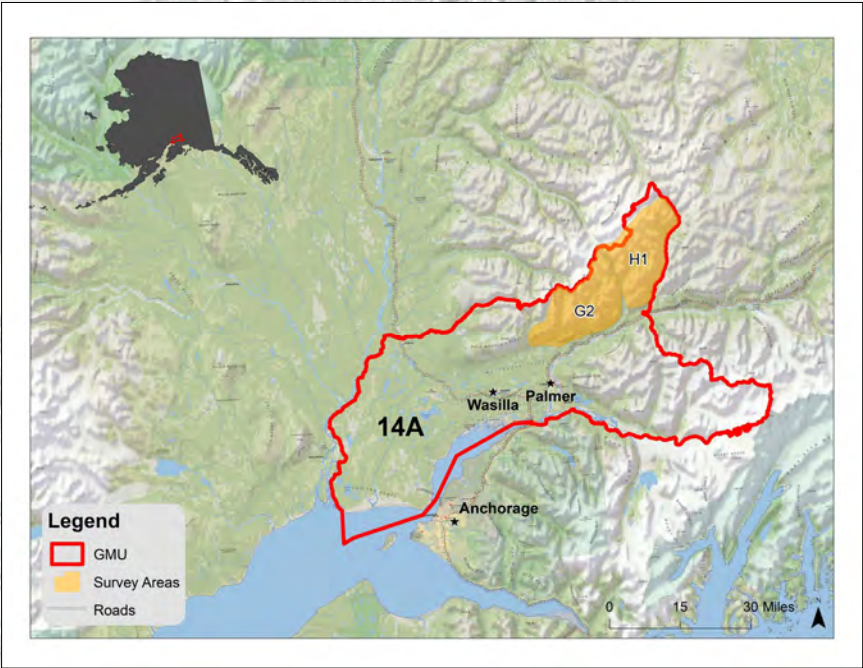
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Current Populations and Trajectories

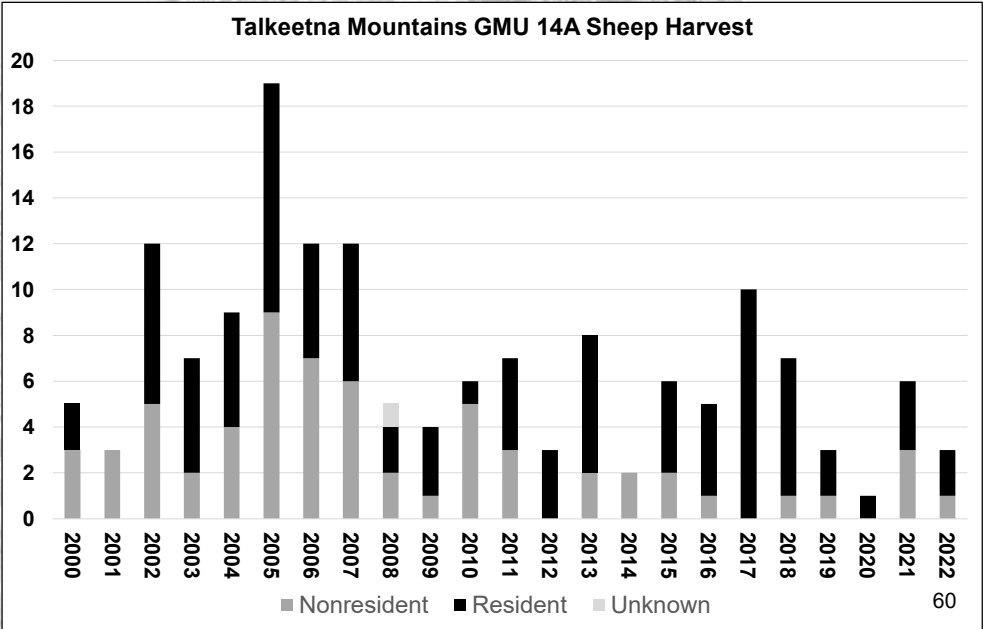


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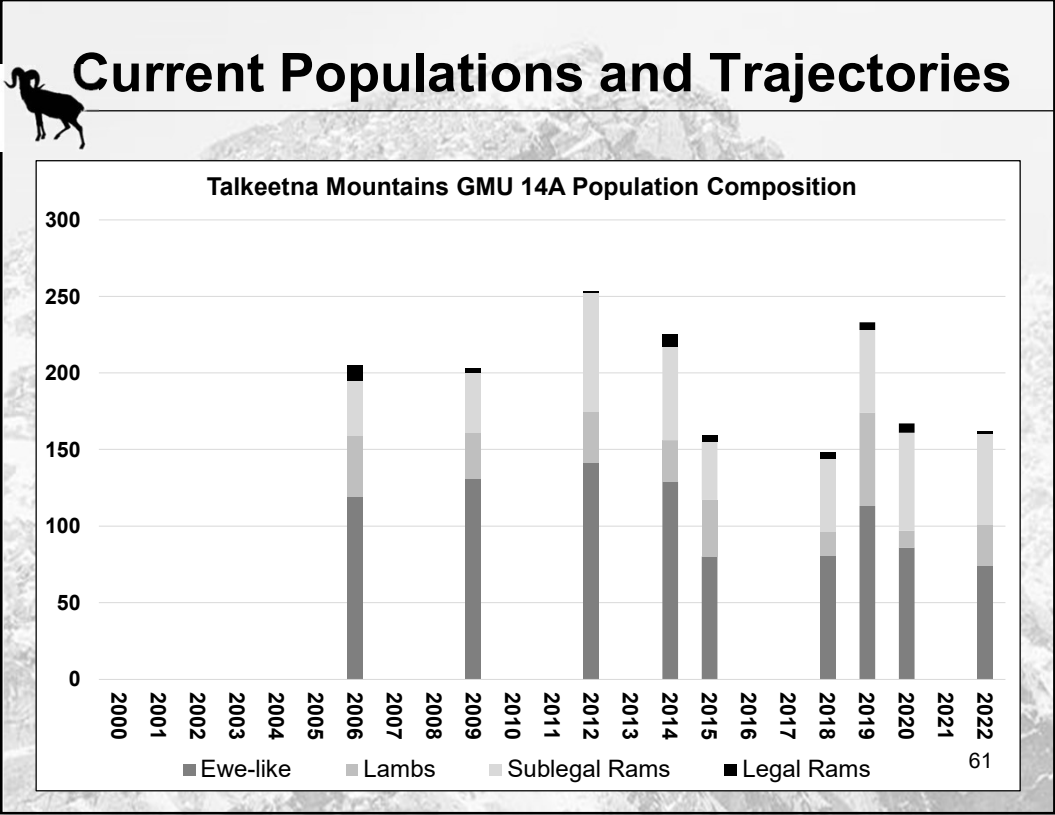


Current Harvest Levels

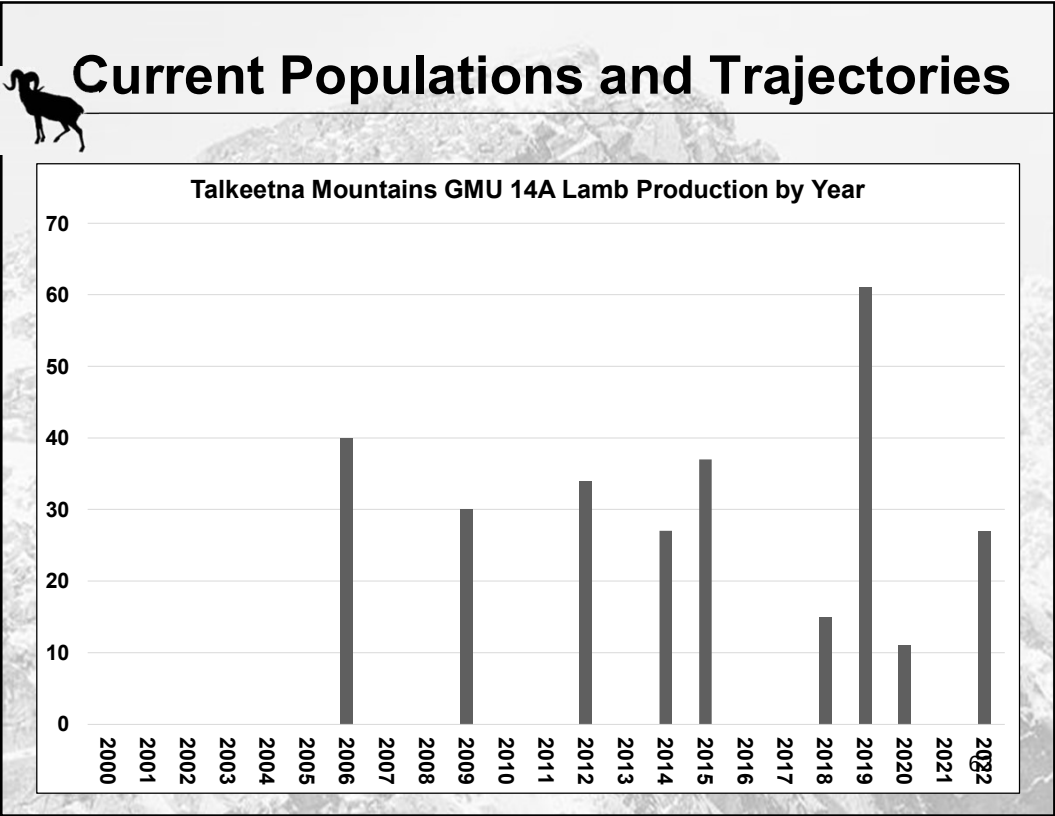


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Summary - Current Populations

Population decreases from recent peak

- 24A/25A Brooks Range down by ~66%
- 19C Alaska Range down by ~50-70%
- 20A Alaska Range down by ~60-70%
- TMA down by ~70%
- 13A/14A Talkeetnas down by 40-60%
- 13D Chugach down by 60-70%
- 14C Chugach down 50% 1990s-2007, stable since 2007
* ADFG survey data, 2000-2022

63

63



Summary - Current Populations

Hunted and unhunted populations both decline

- NPS estimates 2010, 2011-2020
 - Denali NP down by ~50%
 - NE Gates of the Arctic down by 60%
 - Southcentral Brooks down by 40-70%
 - Western Baird (W. Brooks) down by 70%+
 - Wrangell St. Elias stable until 2019, but no current data


*NPS Dall's Sheep Survey memos, Denali and Wrangell-St Elias Nat'l Parks, and Arctic Network Dall's Sheep Resource brief, December 2020

64

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Objectives

- Collect additional data at time of sealing: **1)** distance between annuli, and **2)** quantify degree of curl for each horn.
- Examine relationship between, degree of curl and **1)** age, and **2)** horn length.
- Estimate proportion of rams harvested that would have been legally available for harvest in previous hunting seasons based on degree of curl.

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Methods

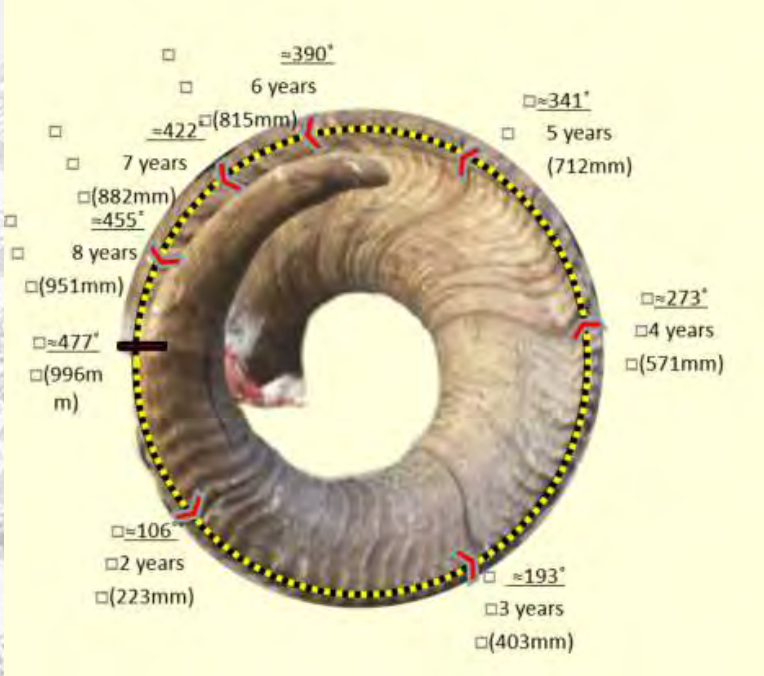
- Between 2016 - 2021 we measured and photographed ~ 2057 rams harvested statewide (~60% of harvest each season).
- No data collected in 2020 because of COVID
- Used central angle theorem and circumscribed angle theorem to quantify degree of horn curl from photographs.
- Quantified age, total horn length, total degree of curl, length between annulus segments, degree of curl by annulus segments for each horn.
- Made comparison to 1968 -1970 data set (n=527)

67

67



Methods

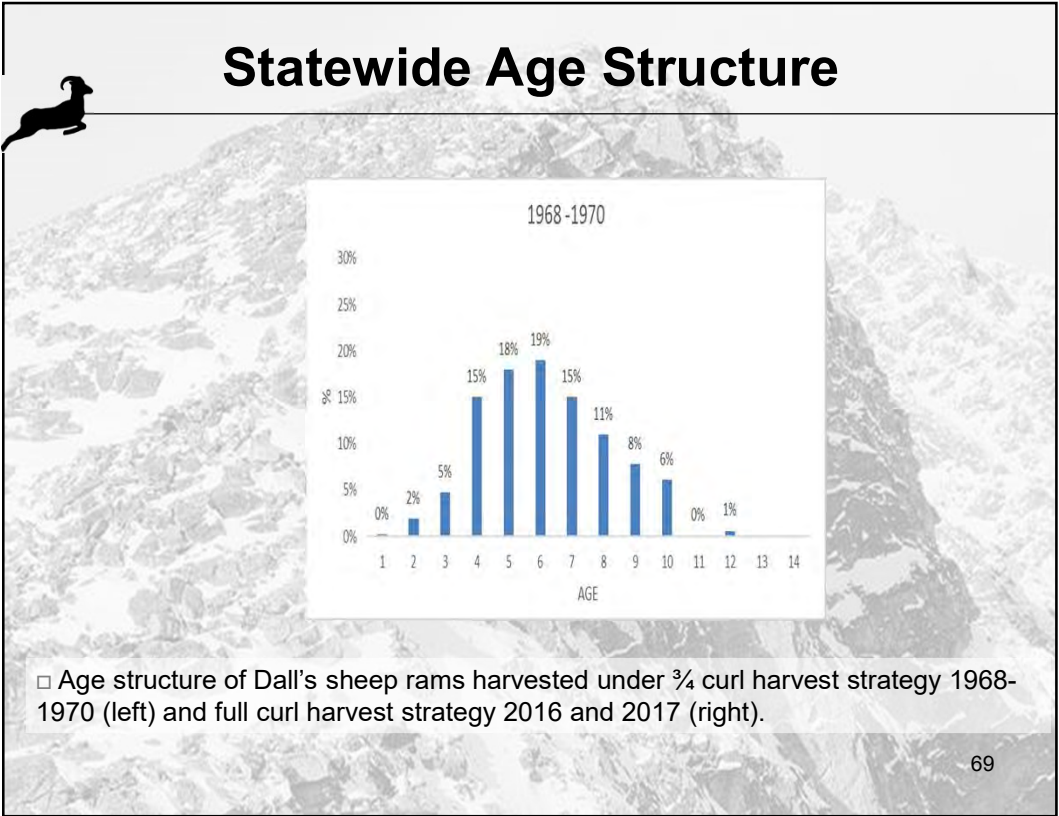


The diagram shows a ram's horn with various measurement points and age markers. The data points are as follows:

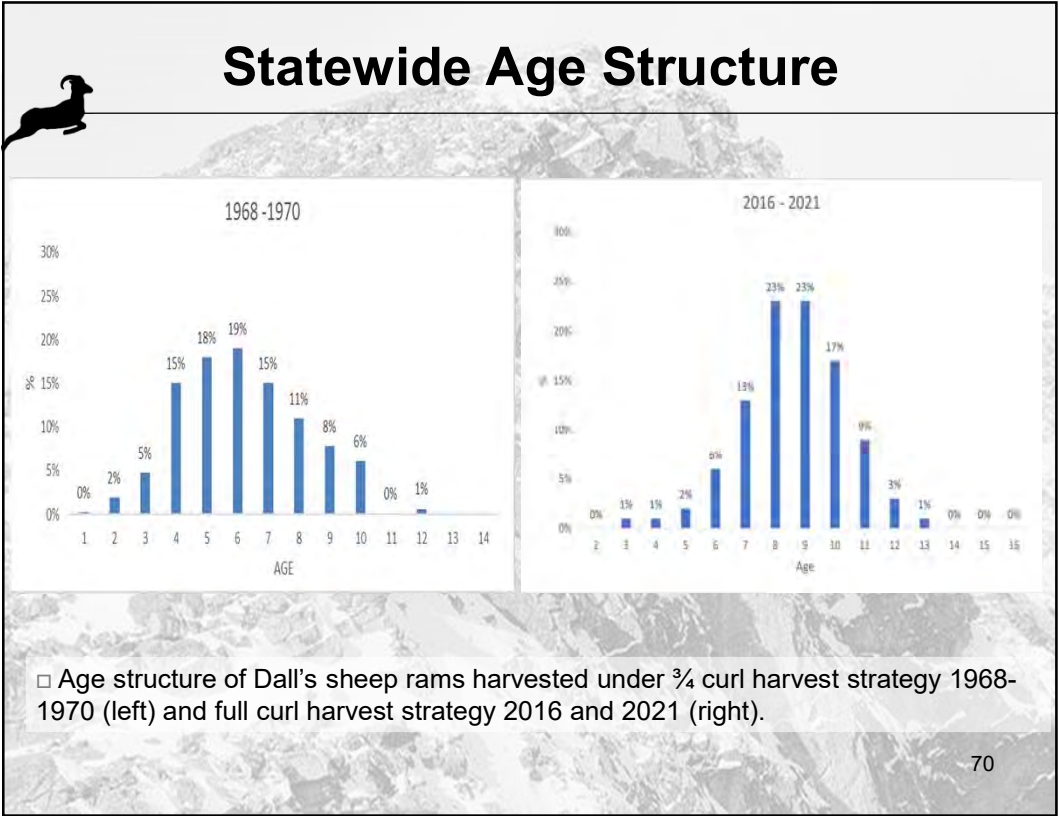
Age	Length (mm)	Angle (°)
6 years	815	390
5 years	712	341
4 years	571	273
3 years	403	193
2 years	223	106
8 years	951	477
7 years	882	455
6 years	815	422

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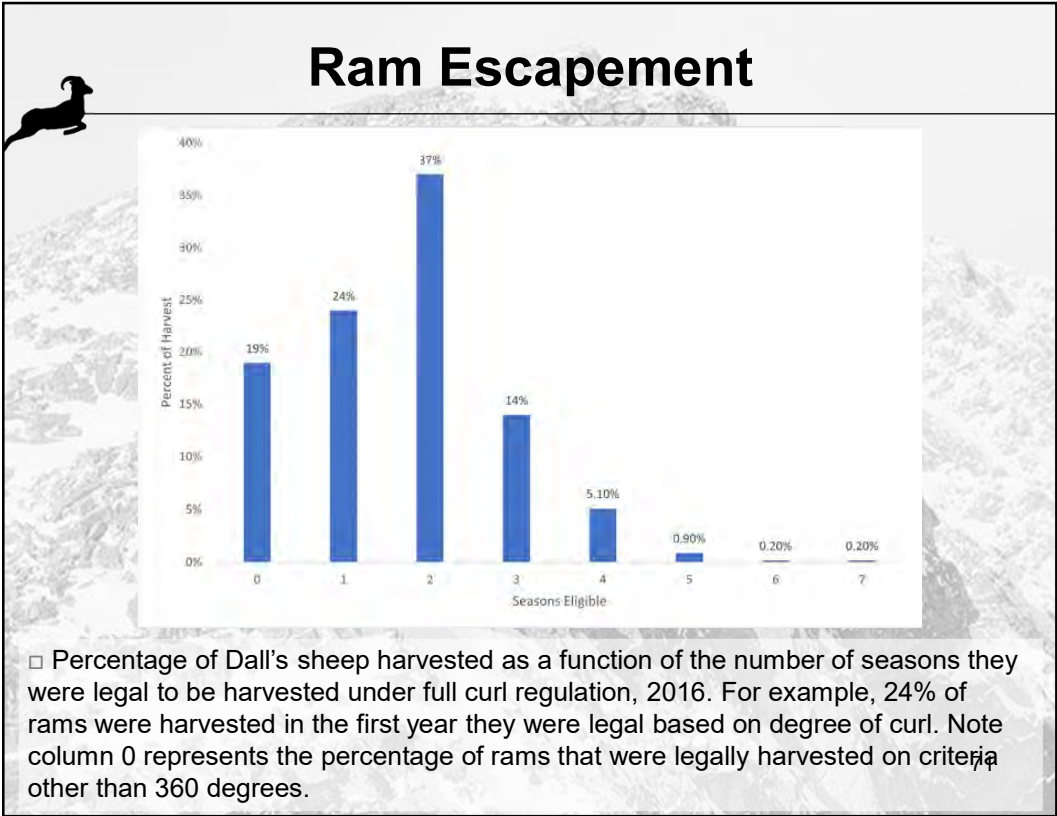
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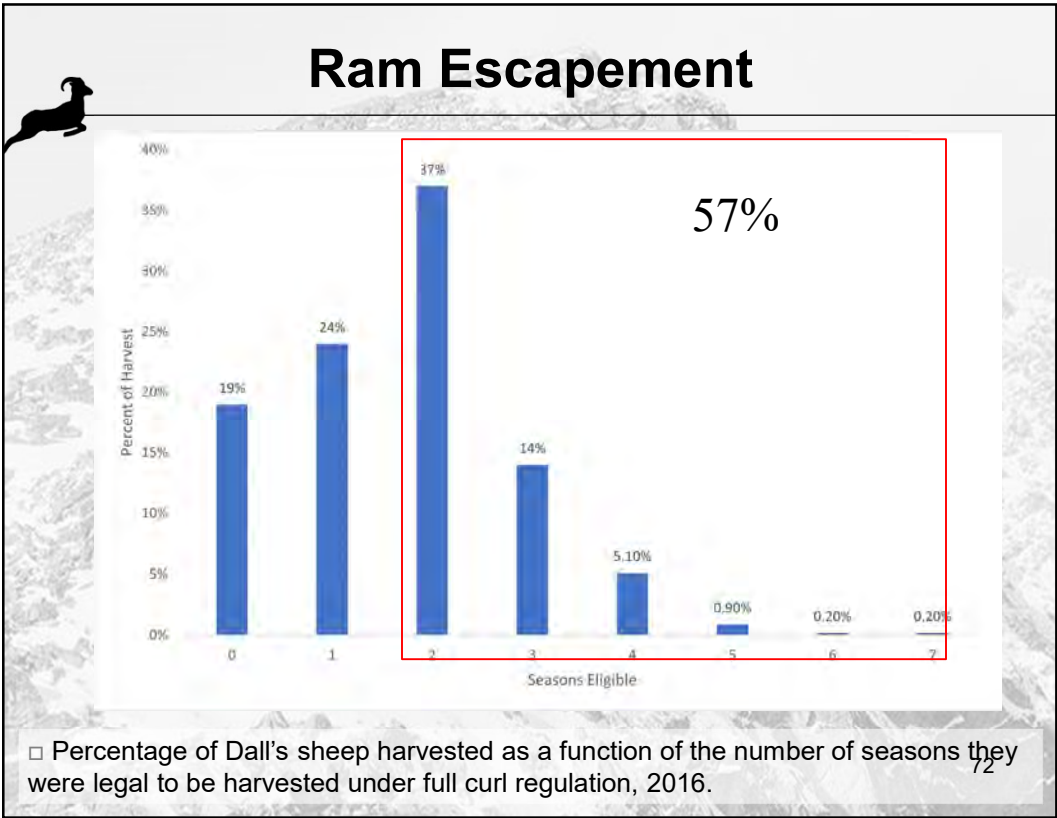
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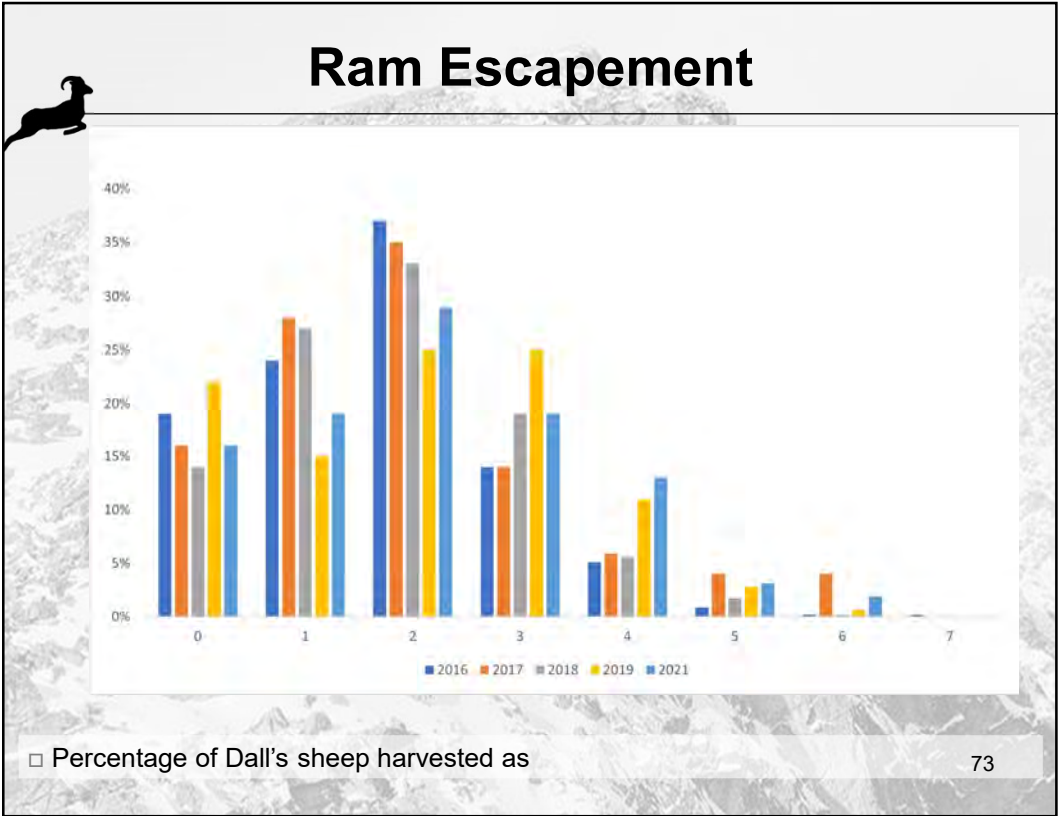
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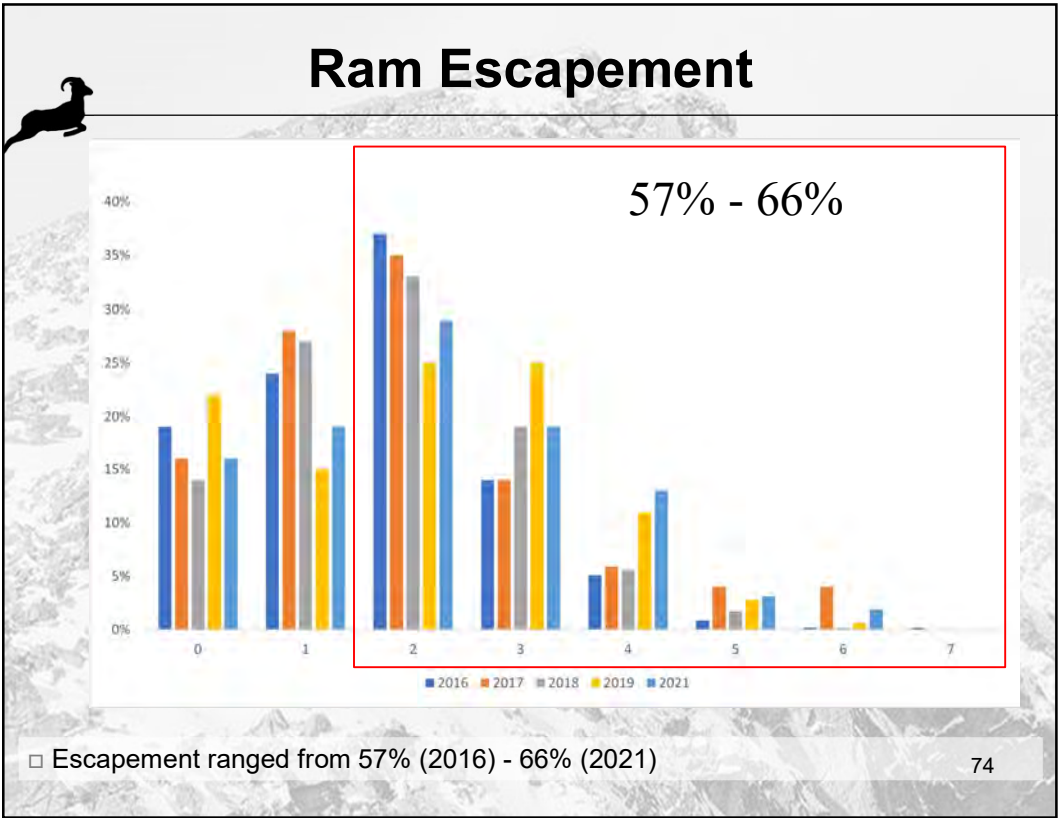
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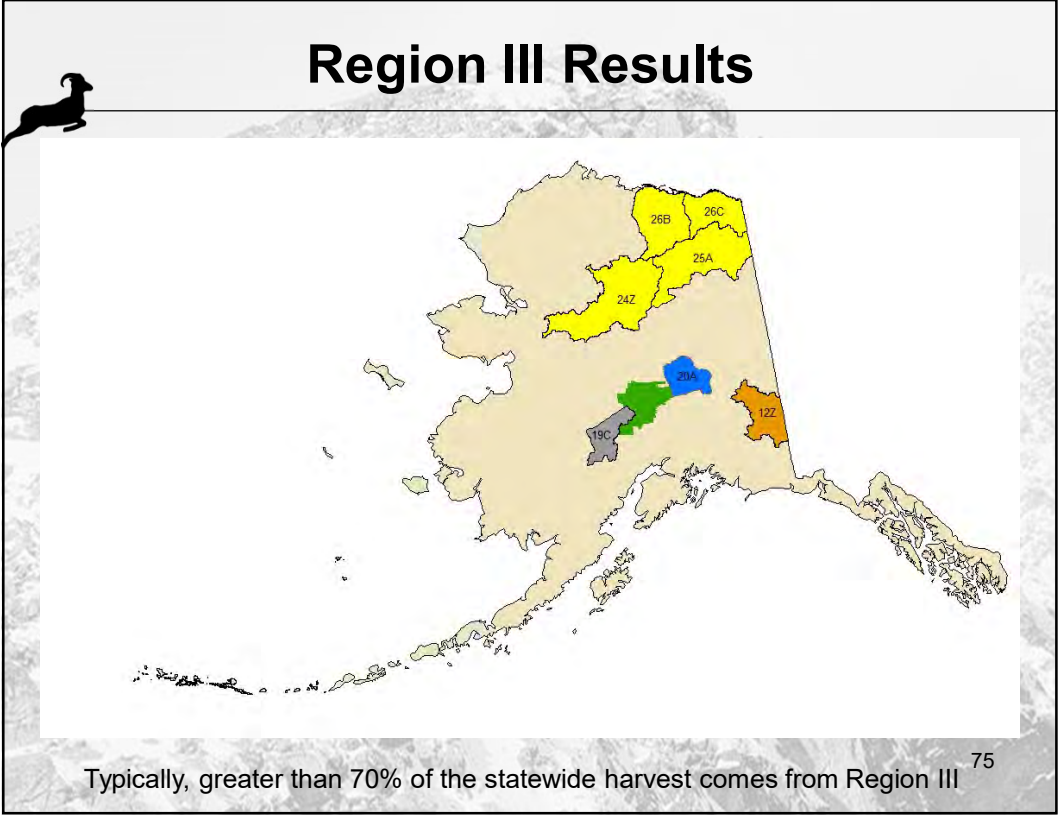
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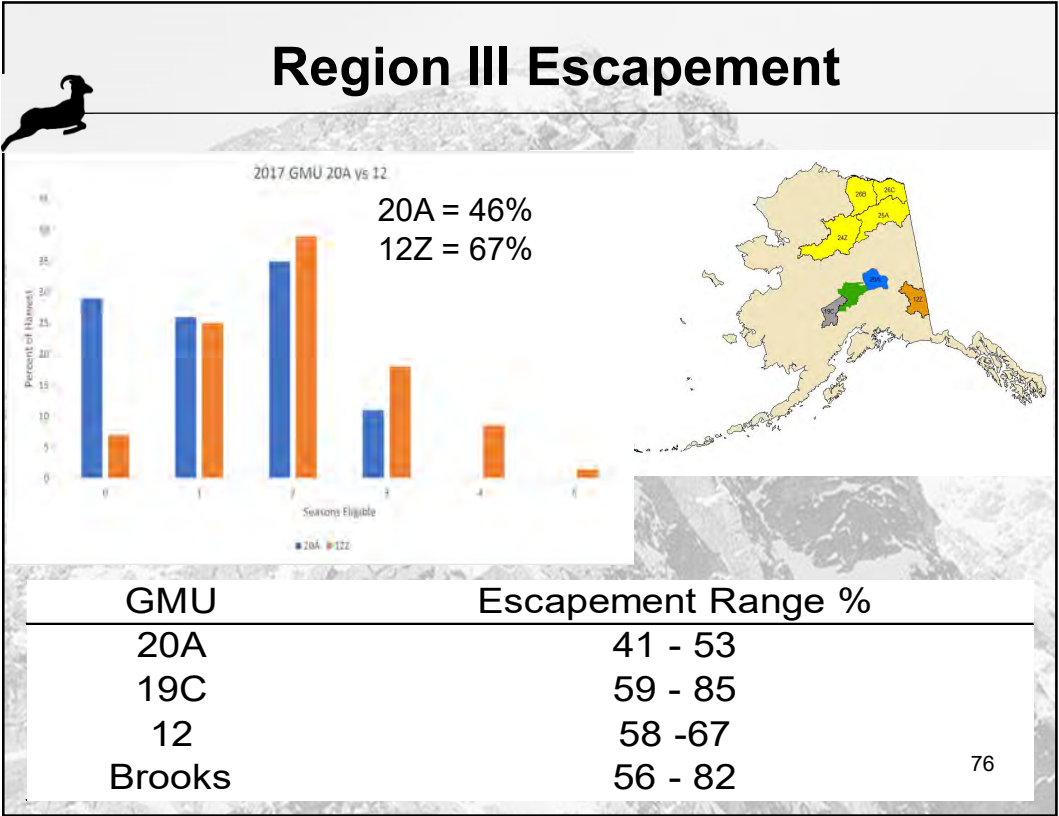
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Discussion



- Research examining the effects of selective harvest on mountain sheep has focused primarily on growth rates (e.g., total length, growth segments, horn volume), while the majority of North American sheep hunting harvest strategies are based on a defined minimum degree of curl.
- Our results show substantial variation of degree of curl for both ram age and horn length. Furthermore we demonstrate that between 2016 and 2021, under predominately full-curl hunting strategy, 57% - 66%, harvested rams were available for harvest for at least 1 hunting season after attaining 360° of curl.

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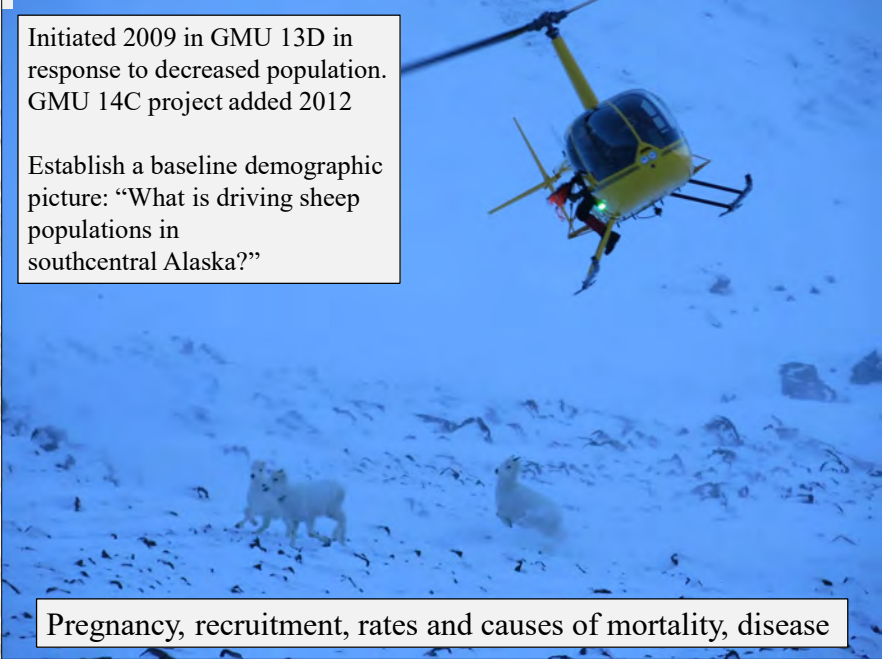
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Chugach Research

Initiated 2009 in GMU 13D in response to decreased population. GMU 14C project added 2012


Establish a baseline demographic picture: “What is driving sheep populations in southcentral Alaska?”





Pregnancy, recruitment, rates and causes of mortality, disease

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Chugach Research



Adults: Body condition, pregnancy status, disease, blood chemistry, rates and causes of mortality

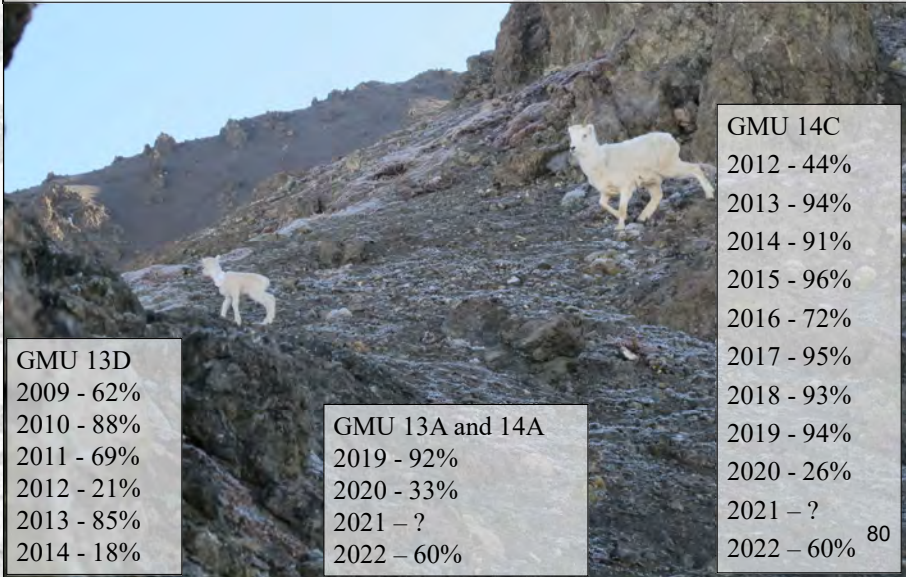
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Pregnancy Rates

Typically 85%-100% (AK Range, Arthur, 2003; BC Stone’s sheep, Wood et al. 2012)



GMU 13D	GMU 13A and 14A	GMU 14C
2009 - 62%	2019 - 92%	2012 - 44%
2010 - 88%	2020 - 33%	2013 - 94%
2011 - 69%	2021 - ?	2014 - 91%
2012 - 21%	2022 - 60%	2015 - 96%
2013 - 85%		2016 - 72%
2014 - 18%		2017 - 95%
		2018 - 93%
		2019 - 94%
		2020 - 26%
		2021 - ?
		2022 - 60%

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83





84




Chugach and Talkeetnas

40-80 GPS-collared sheep caught and sampled annually



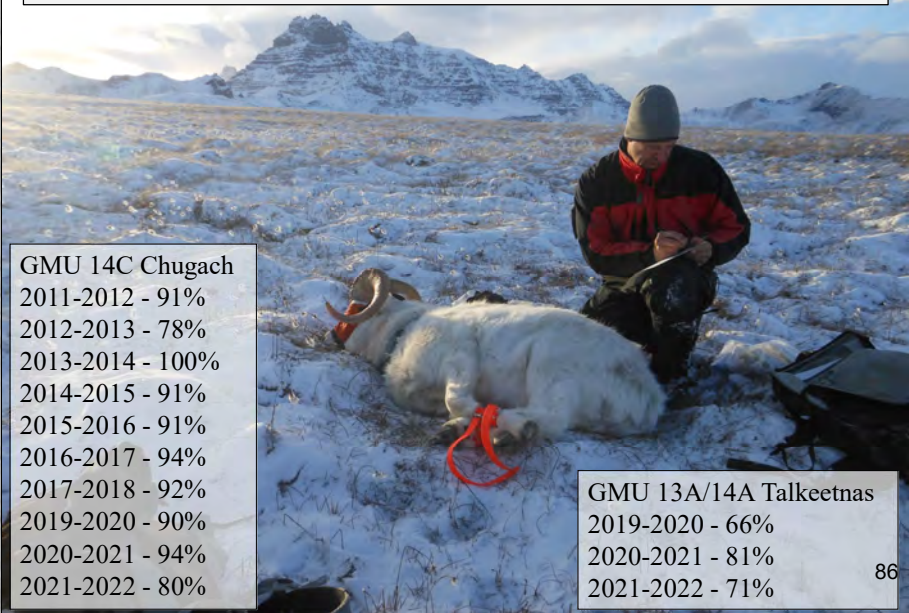
Ongoing research to track disease status, pregnancy rates, rates and causes of mortality, habitat use through time. ⁸⁵

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Chugach and Talkeetnas

Adult survival rates vary between ranges and years



GMU 14C Chugach

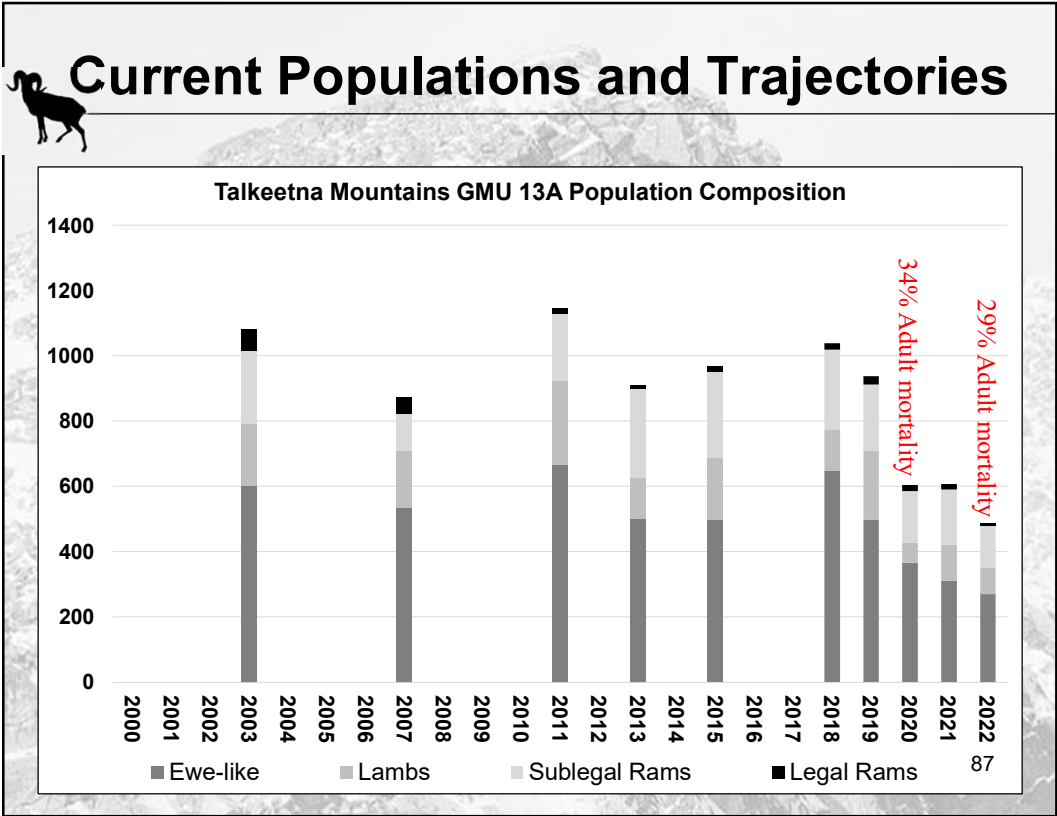
2011-2012	- 91%
2012-2013	- 78%
2013-2014	- 100%
2014-2015	- 91%
2015-2016	- 91%
2016-2017	- 94%
2017-2018	- 92%
2019-2020	- 90%
2020-2021	- 94%
2021-2022	- 80%

GMU 13A/14A Talkeetnas

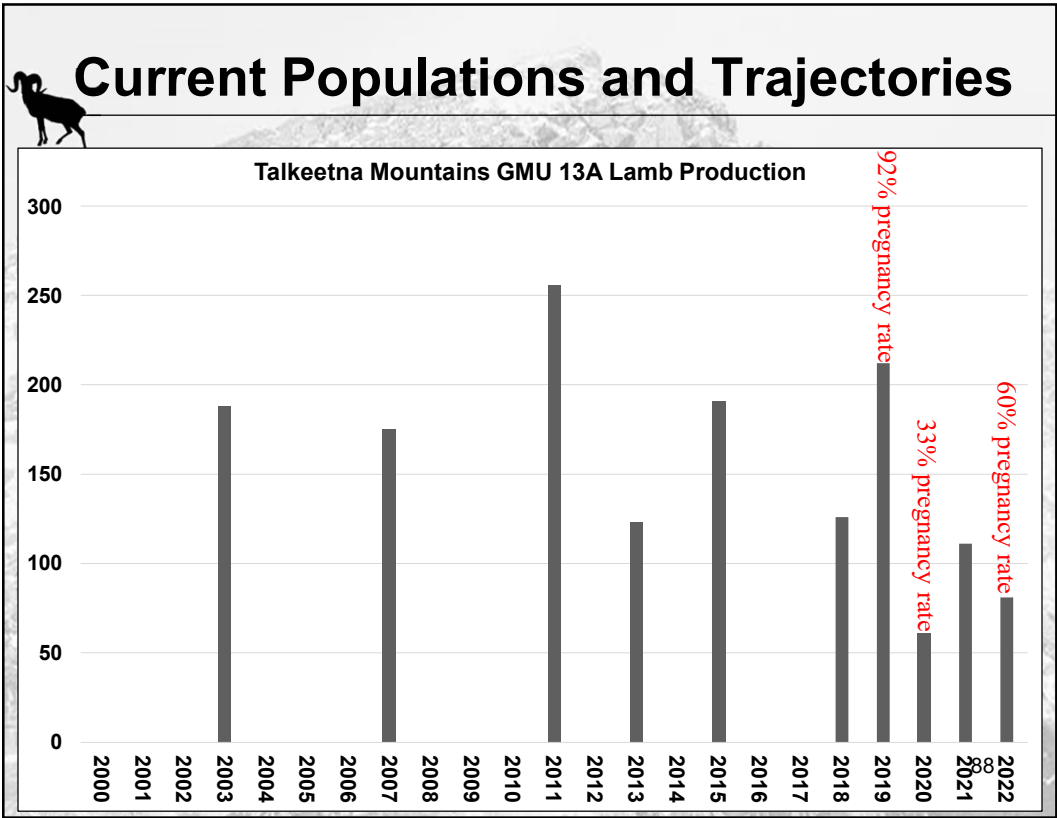
2019-2020	- 66%
2020-2021	- 81%
2021-2022	- 71%

⁸⁶


86



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88




Current Research Conclusions

M ovi, other pathogens present but do not appear to have population level effects.



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Current Research Conclusions


Predation and Disease

Predation – Accounts for less in Chugach sheep than in other ranges. ~1/4-1/6 adults, 1/3 lambs.

Low level loss, and broad distribution of mortality across several predator species suggests Chugach populations are not predation limited

Low level presence/prevalence of major wildlife diseases; no population-level effects


90



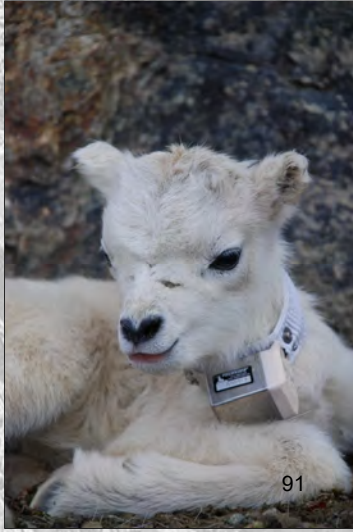
Current Research Conclusions

Nutrition and pregnancy


Low pregnancy + Poor body condition



= Changing nutrition, habitat,
weather conditions driving lamb
production



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Changing Climate

Future implications unknown, but...

Winter Conditions

➤ Icing, rain on snow, avalanches all cause elevated mortality

Habitat loss


➤ Advancing shrubline – Alder, willow growth into alpine

Summer nutritional changes

➤ Poor nutrition in hot, dry conditions

92

92




Changing Climate

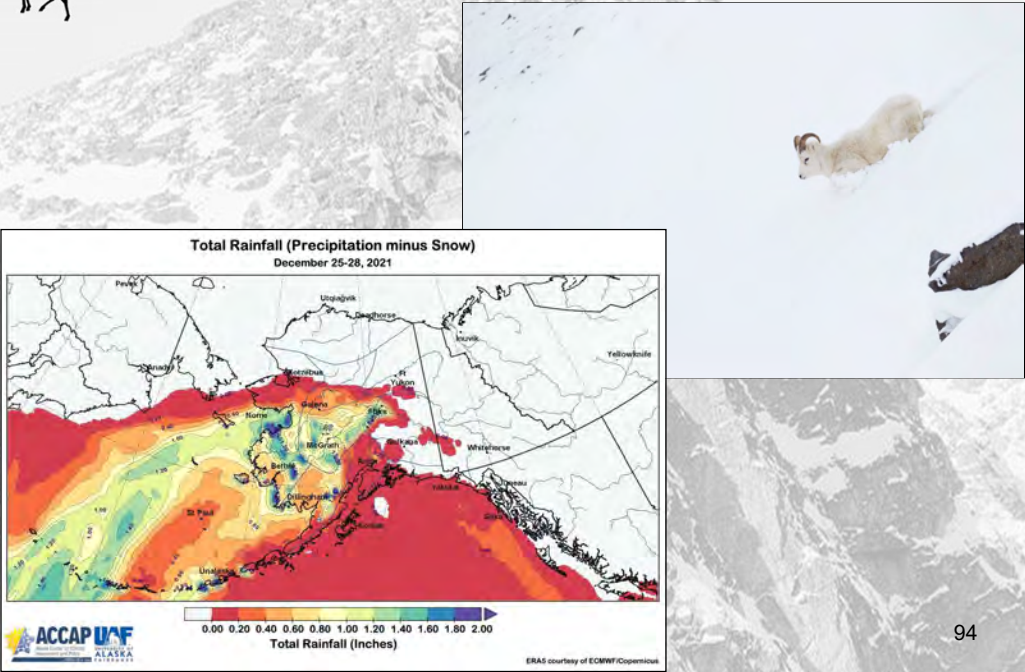
- Historic population declines seemed to be the result of a single event
 - Example = Early 1990s 20A decline probably related to 1991 Mt. Pinatubo eruption
- By some metrics (mortality rates on collared populations and lamb production) current populations have experienced 6 weather events in the last 10 years
- New paradigm with warming arctic
- Populations persist at lower density?
- Small isolated populations (e.g. Yukon-Tanana uplands, Glacier Mountain CUA, Kenai) of particular concern

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Winter Conditions

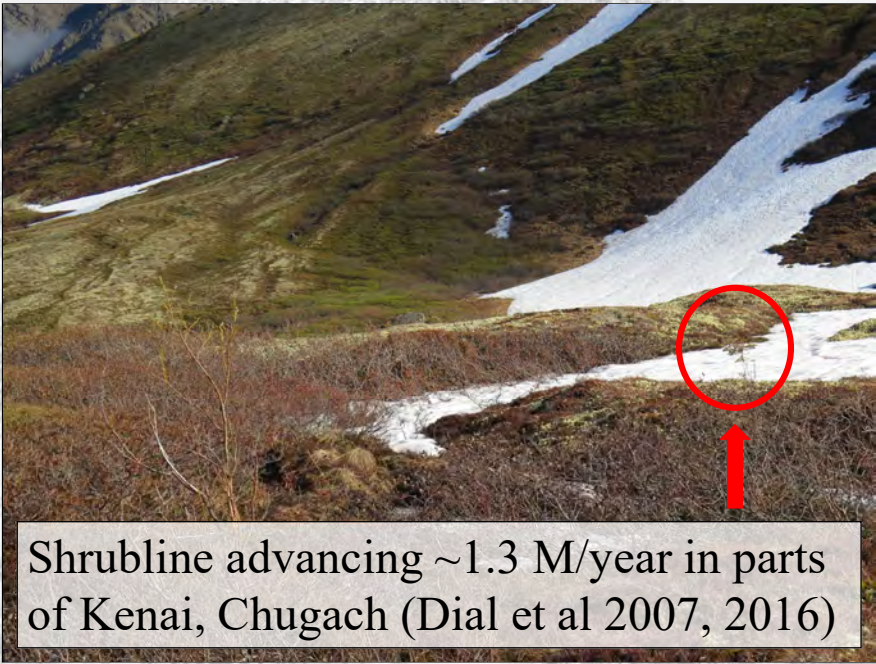


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Habitat Loss





Shrubline advancing ~1.3 M/year in parts of Kenai, Chugach (Dial et al 2007, 2016)

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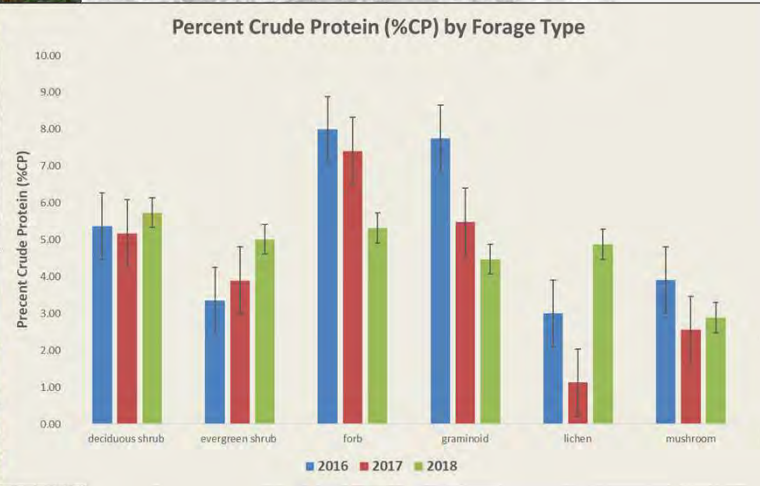
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Changes in Nutrition



Percent Crude Protein (%CP) by Forage Type



Forage Type	2016 (%CP)	2017 (%CP)	2018 (%CP)
deciduous shrub	5.4	5.2	5.8
evergreen shrub	3.4	3.9	5.0
forb	8.0	7.4	5.4
graminoid	7.8	5.5	4.5
lichen	3.0	1.2	4.9
mushroom	3.9	2.7	2.9

Changes in protein content in important forage types across years (L. Metherell MS research, UAF, in progress)

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Current Research Direction



Have we lost sheep habitat?
Winter movement and nutrition, Summer nutrition
Chugach, Talkeetnas research transitions Spring 2023⁹⁷

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Future Research Efforts

Christie Osburn – W. Brooks

Brad Wendling – Central Brooks

Potential comparative demographic work

- Federal partners and ADFG personnel

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Investigating factors limiting growth of a Dall sheep population in Northwestern Alaska

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- ▶ Quantify and identify causes of adult mortality within the Baird and De Long Mountains and assess mortality rates
- ▶ Determine pregnancy and lambing rates
- ▶ Assess health and body condition, and survey for disease and parasite presence and prevalence
- ▶ Track seasonal movements to identify home range and reproductive use areas
- ▶ Examine genetic relationships between areas

*Project start fall of 2023, stay tuned for results



Brooks Range Ram Ecology





DWC Region III
Brad Wendling: PI

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Why does ADF&G need this research?

- ❑ Geist (1971) postulated a Dominance Mortality Hypothesis
 - ❑ Male survivorship lowered because of rutting stress
 - ❑ Removal of large males increases the mortality of immature rams because of their increased participation in the rut.
 - ❑ This hypothesis has not been tested.
- ❑ The effects of selective harvest are not clear or settled.


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Purpose of Research


Examine potential impacts of full curl harvest:

- ❑ Short term
 - ❖ Energetics
 - ❖ Winter survival
- ❑ Long Term
 - ❖ Genetic ramifications
 - ❖ Effects on population dynamics and fitness





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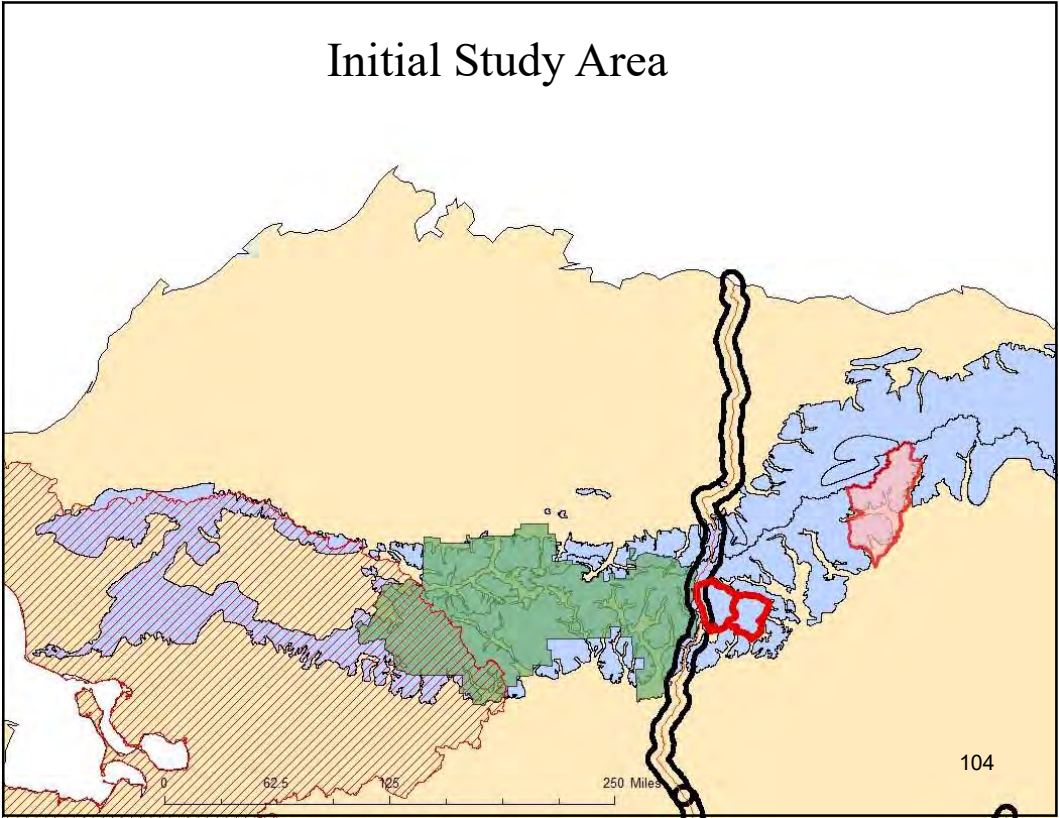


Experimental Design

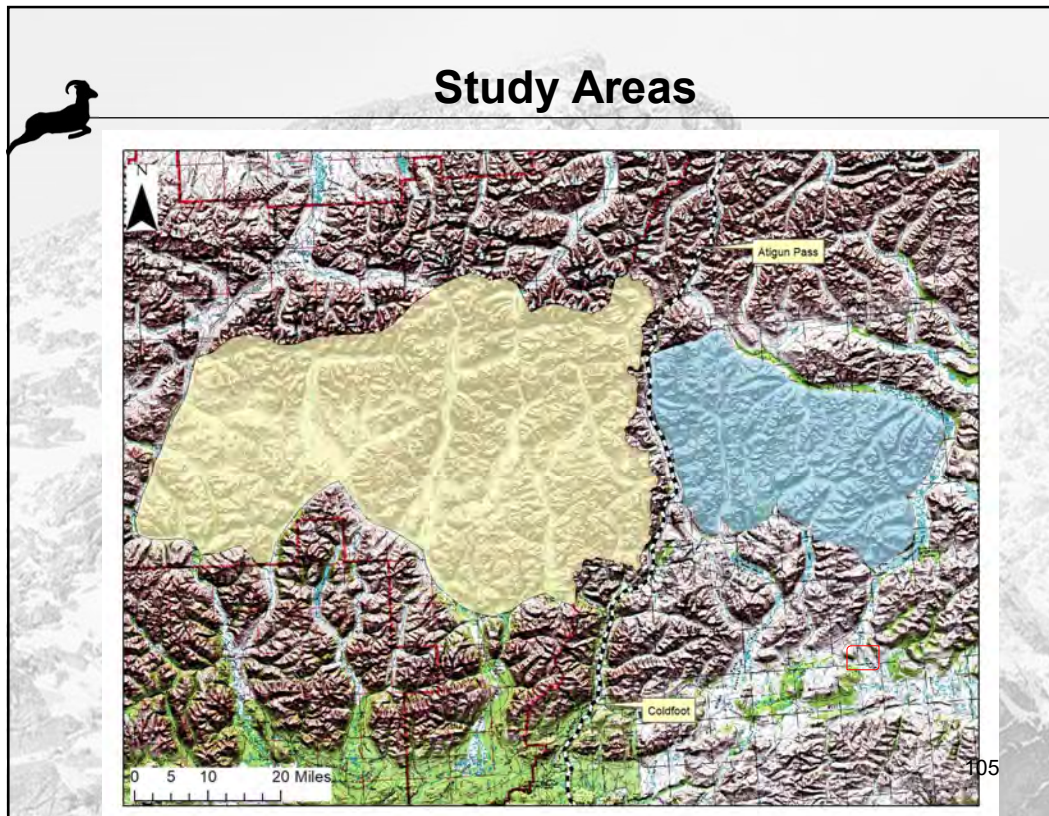
- 3 year study
- 2 Study areas with varying harvest intensity
- GPS/DNA mark sub full-curl rams
 - ❖ Follow rams through the life of GPS collars
- Intensively DNA sample lambs/yearlings, and harvested rams in the study area (muscle tissue and fecal samples)



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Research Questions

Under Full Curl Harvest Strategy:


1. Are horn lengths and body size smaller in areas of heavy hunting pressure?
2. Is the survival of 3 – 8 year old rams lower in areas of heavy harvest?
3. What is the reproductive contribution of immature males in heavy and lightly harvested systems?

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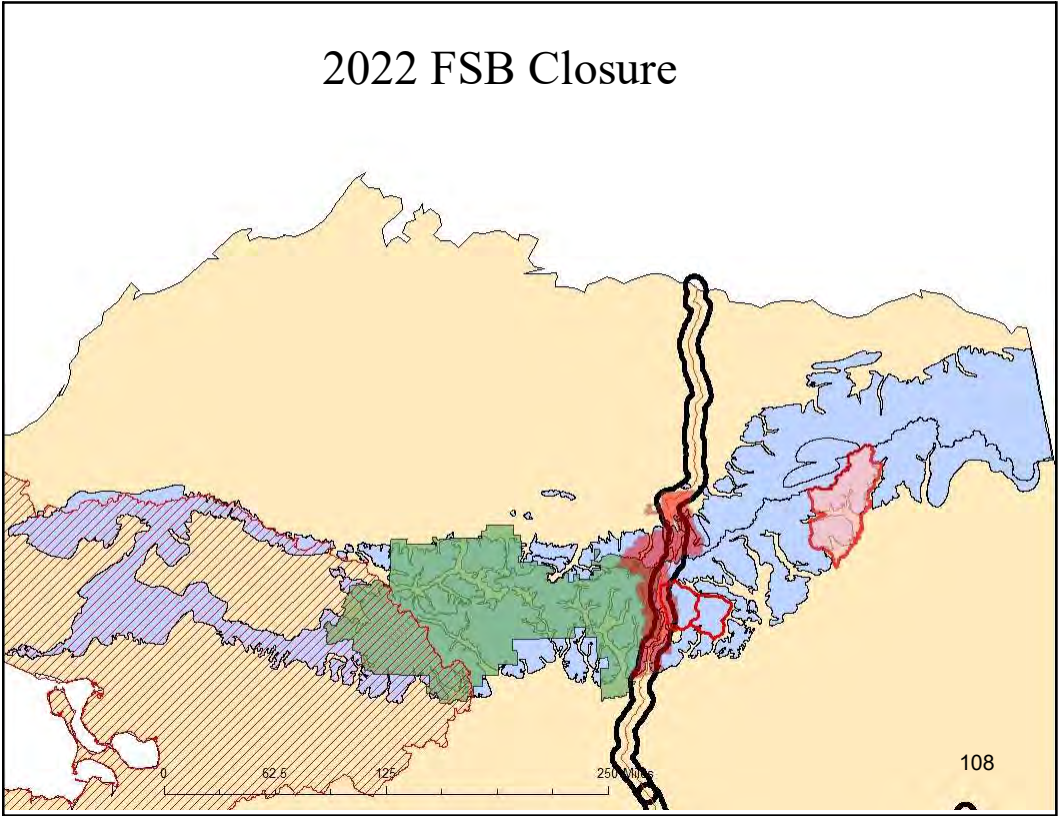


Improved Understanding of Dall's Sheep Ecology


- Survivorship curves of 2 ram cohorts
- Reproductive contribution of sub FC rams
- Home range size, movement rates, dispersal, habitat selection/use
- Herd Health
- Group size dynamics
- Sightability of marked animals?



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Biological Mitigation Strategies

Habitat improvement/burning

- (Cost, scale issues)

Transplants


- (Source population? Disease concerns)

Supplemental feeding

- (Cost, scale, concentrate animals and spread disease)

Predator control


- (Sheep not intensive management species, Eagles federally managed, multiple predator species utilize sheep)



***Strateg(ies) should be implemented in such a manner that we can rigorously and objectively evaluate success or failure**

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Allocative/Social Mitigation Strategies

- Unchanged
- Align season dates with moose/ caribou
- Truncate Season
- Access restrictions e.g. CUAs, nonmotorized zones
- Rotating hunt period based on last name
- 1 in 2, 3, or 4 years
- Statewide draw
- Complete closure

***Strateg(ies) should be implemented in such a manner that we can rigorously and objectively evaluate success or failure**

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