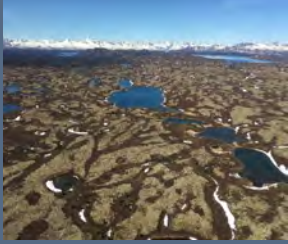
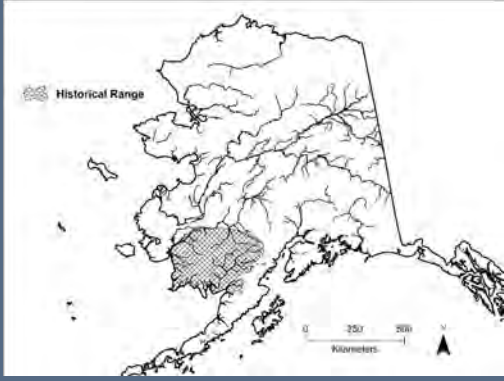


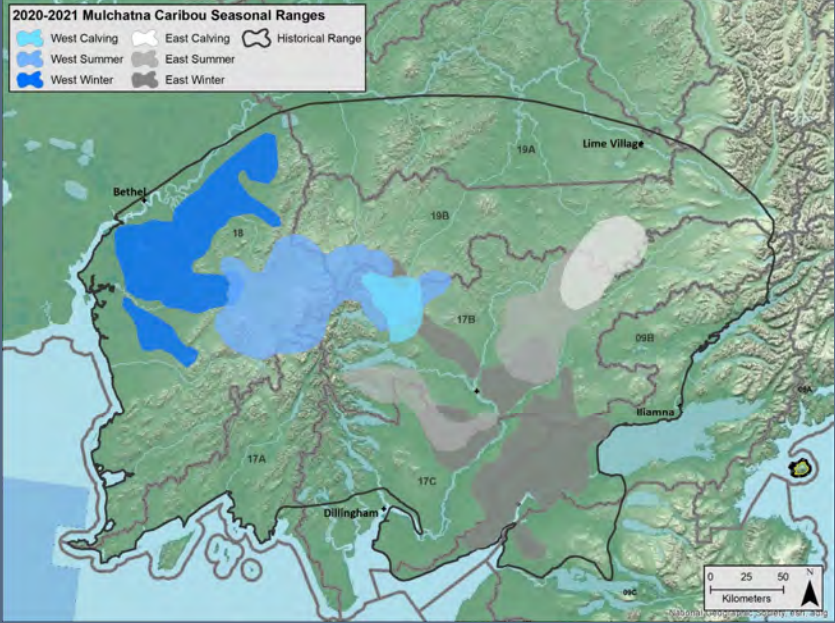
The Mulchatna Caribou Herd



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Mulchatna Caribou - Seasonal Distribution

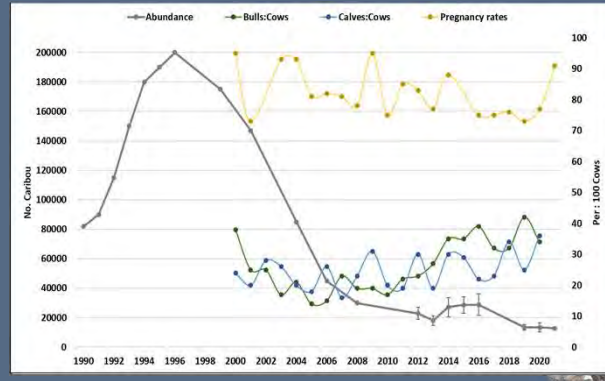


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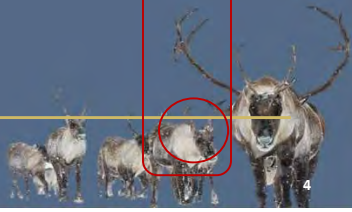
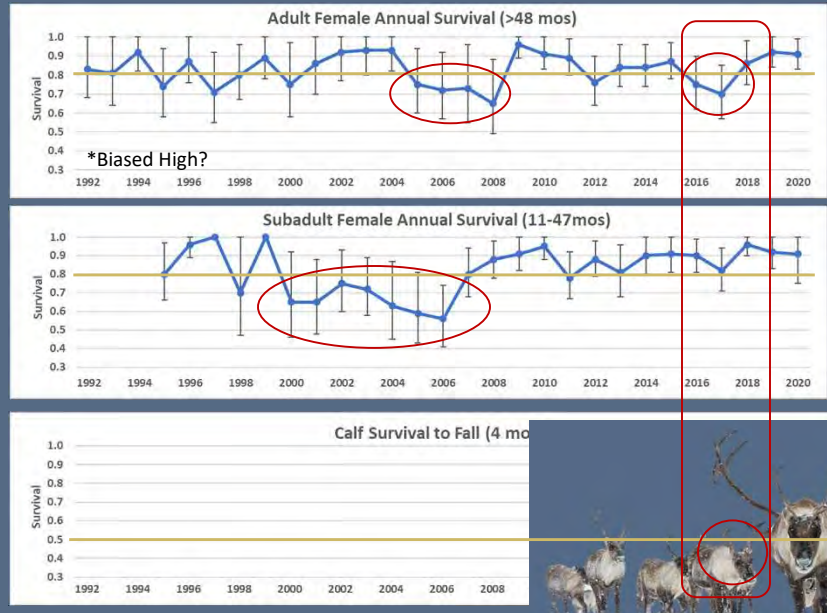
The Mulchatna Caribou Herd – What we know...

- 1. Survey & Inventory Data
 - a. Abundance Estimates
 - b. Fall Composition Survey
 - c. Parturition Survey

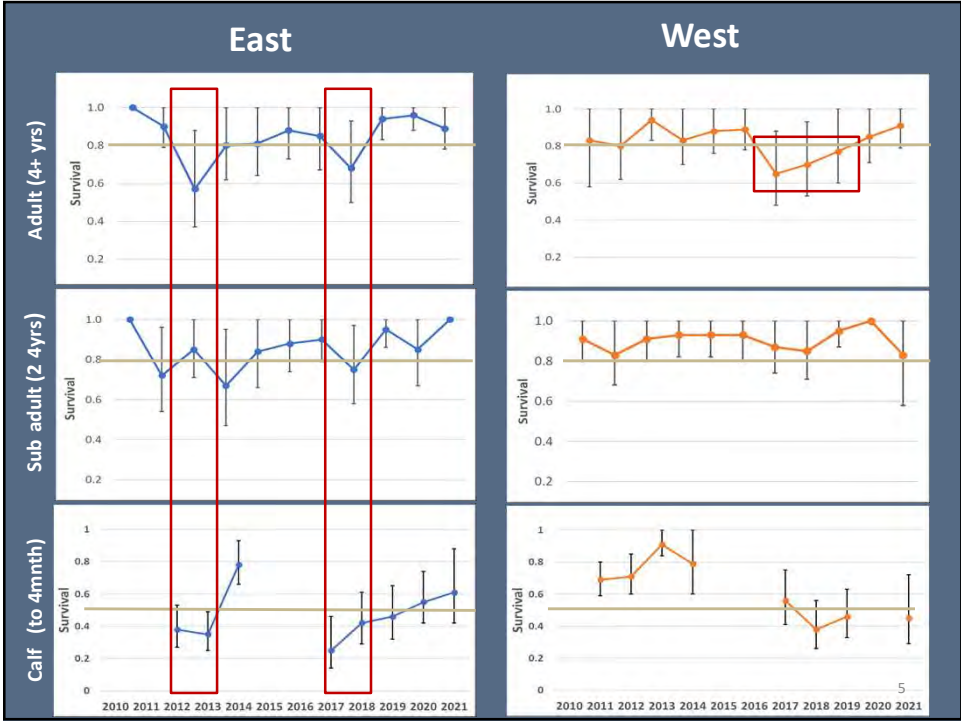


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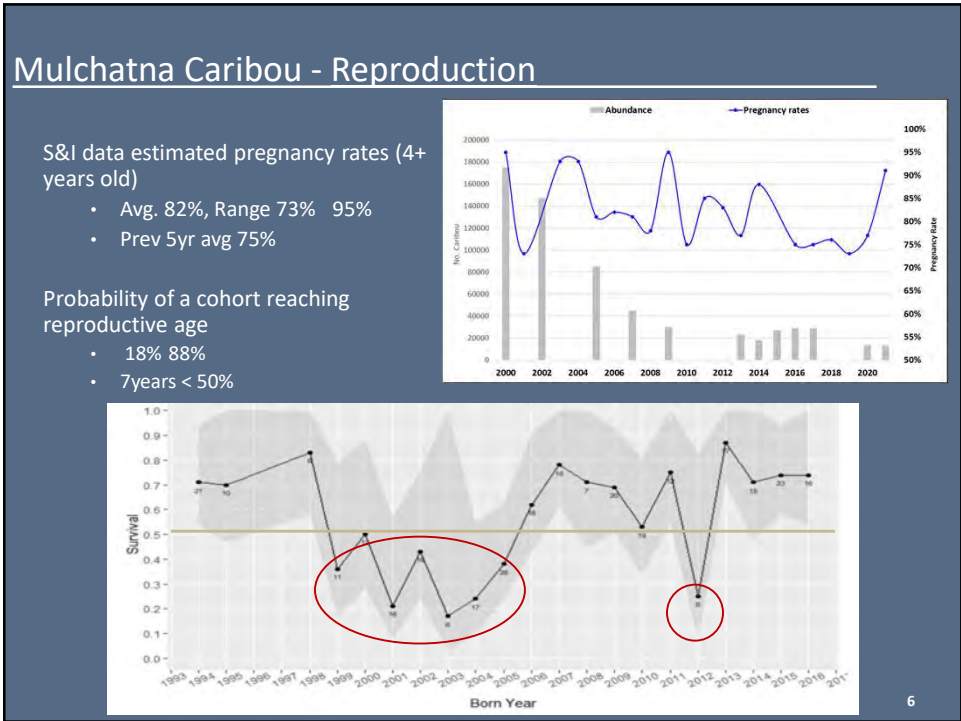
Mulchatna Caribou – Survival (95% CI)



4

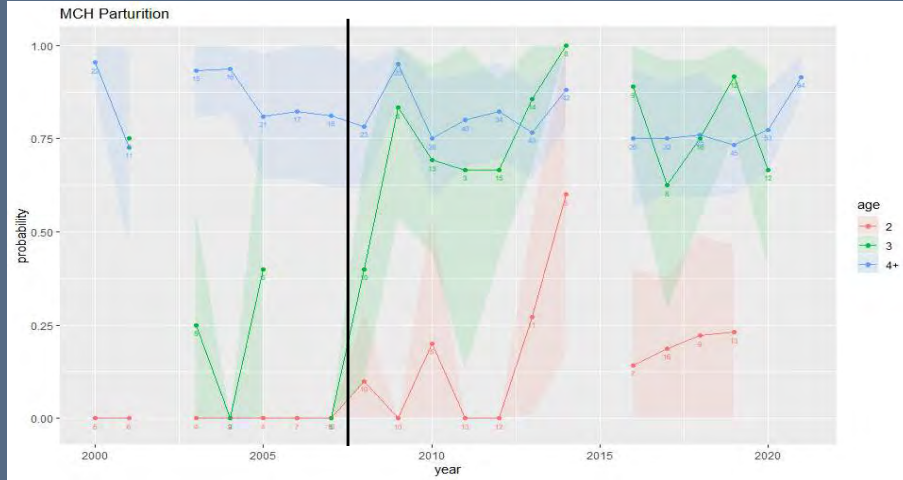


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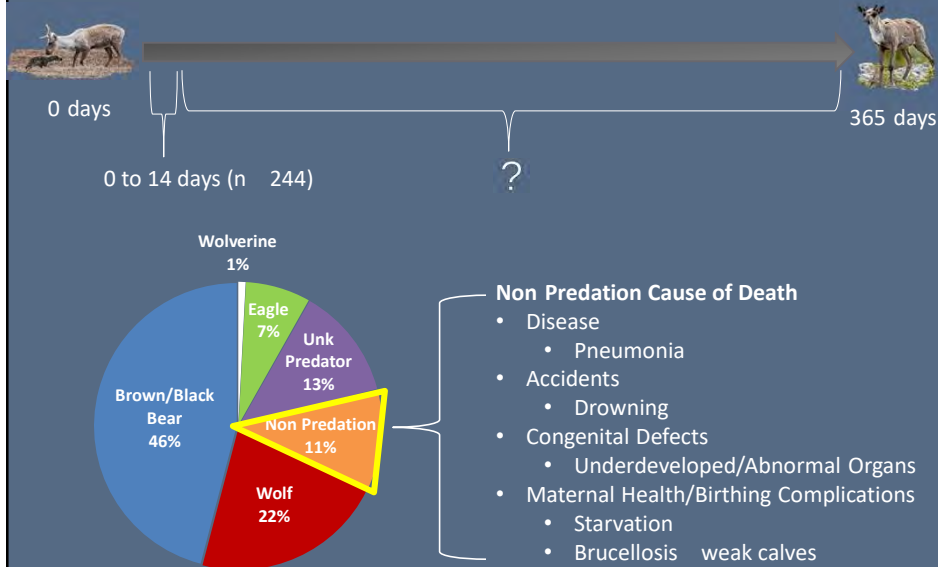
Mulchatna Caribou - Age-specific Pregnancy



7

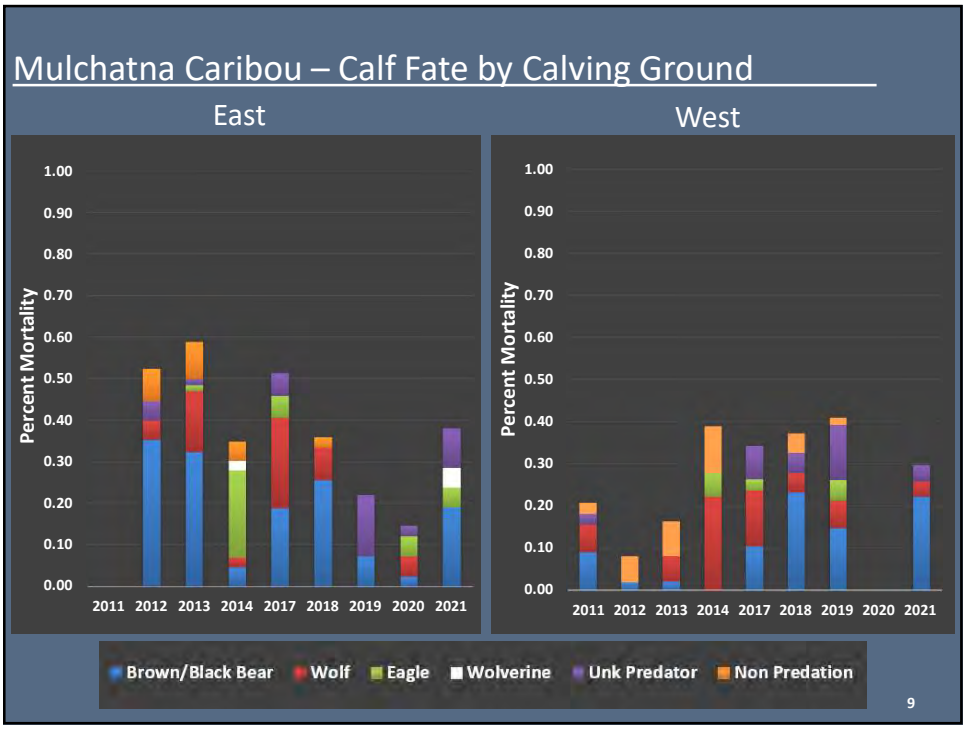
7

Mulchatna Caribou – Calf Fate

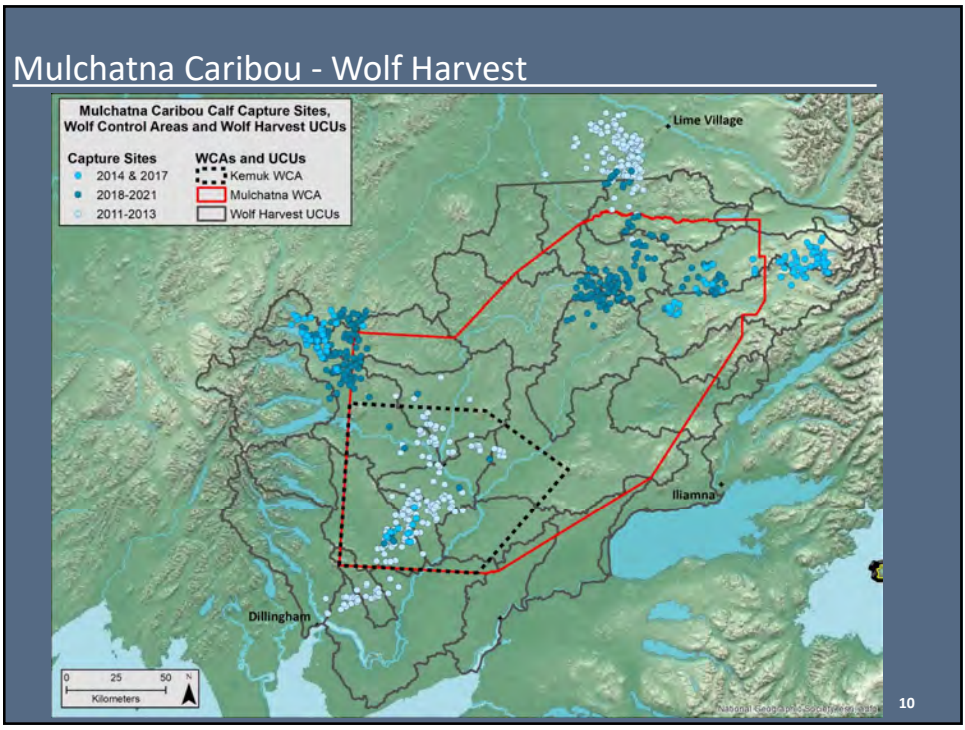


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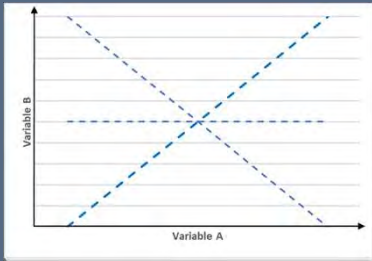
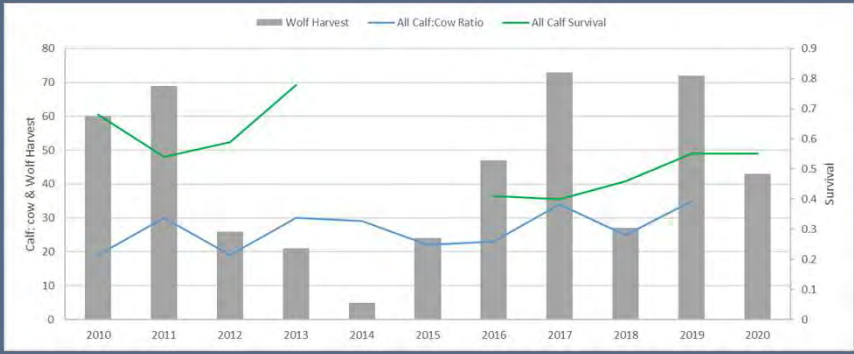


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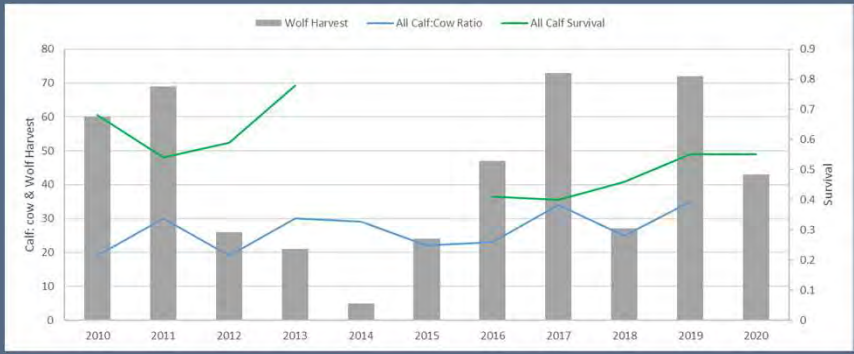
Mulchatna Caribou - Wolf Harvest



- Correlation 1 to 1
- Positive 1
 - No Relationship 0
 - Negative 1

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Mulchatna Caribou - Wolf Harvest



	Expect
Wolf Removal	
MCH abundance	+
All calf: cow ratio	+
All calf survival	++

Positive 1, No Relationship 0, Negative 1

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Mulchatna Caribou - Wolf Harvest

• Conclusions

- Lack of clear evidence that wolves were/are a primary factor driving calf survival or herd abundance
- Alternatively, the assumption that wolf harvest is a proxy for wolf density/wolf predation may not be appropriate



Review of successful wolf control programs
National Research Council (1997)

Mulchatna Unit 17 wolf control program

- 1) Wolves were the primary predator of all age classes of the targeted ungulate
- 2) Aerial wolf reduction occurs over areas of at least 10,000 km²
- 3) Wolves are reduced to at least 55% of their pre control numbers for at least 4 years
- 4) Weather is favorable for ungulate survival

- 1) Not Assessed the role of wolves in caribou mortality in any age class was not assessed.
- 2) Criteria met Mulchatna WCA is >25,000 km²
- 3) Not Assessed wolf abundance was not determined prior to control initiation, nor at the 2017 expansion of control area
- 4) Not Assessed

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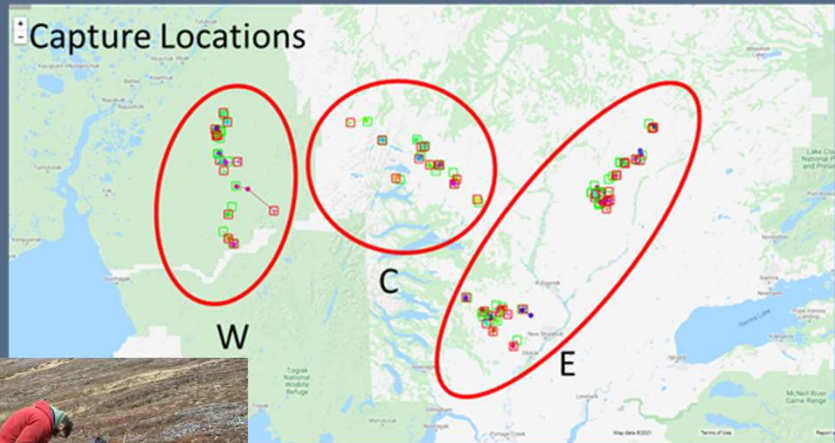
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Mulchatna Caribou - Adult Female Research



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Mulchatna Caribou - Adult Female Research

Health: What is the current health of MC?

Objective 1. Quantify caribou health metrics: body condition, disease, and variation in reproductive success.

1. What is and why do we care about body condition?

- Body Condition state of body components (i.e. fat, protein) that influences fitness
 - Individual survival
 - Reproductive success
 - Susceptibility to disease



2. Combined mass, body condition score, rump and loin fat and loin depth via u/s (Cook et al. 2021) to calculate an individual's % body fat



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Mulchatna Caribou - Adult Female Research

Objective 1. Quantify caribou health metrics: body condition, disease, and variation in reproductive success.

Health: What is the current health of MC?

3. Ungulate Nutrition (Cook et al. 2004, Gunn & Nixon 2008, Cook et al. 2021a, Cook et al. 2021b)

- Moderate Nutritional Limitation
 - depressed pregnancy rates
 - slow juvenile growth
 - increased winter mortality
- Mulchatna adult females
 - % Body fat $8.13\% \pm 2.96$ SD, ranged 4% 16%

4. Lactation and Fall Body condition

- Non lactating (n 19)
 - %BF $10.2\% (\pm 3.37$ SD)
- Lactating (n 26)
 - %BF $6.66\% (\pm 1.95$ SD)

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Mulchatna Caribou - Adult Female Research

Objective 1. Quantify caribou health metrics: body condition, disease, and variation in reproductive success.

Health: What is the current health of MC?

Brucellosis (*B. Suis*)

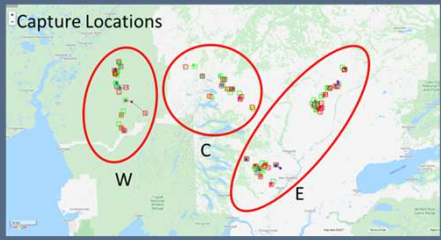
- Zoonotic disease bacterial infection in domestic feed animals and AK ungulates and other wildlife, transmitted through exchange of fluids (i.e. breeding and after birth)
- Symptoms
 - Lameness, joint inflammation
 - Late term abortions, retained placentas, weak calves, infertility
 - Implications for adult survival

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Mulchatna Caribou - Adult Female Research

Health: What is the current health of MC?

Objective 1. Quantify caribou health metrics: body condition, disease, and variation in reproductive success.



	2020			
	East	Central	West	
Positives	4	9	8	37%
Negatives	17	10	9	63%
Total	Total			57

Prevalence = proportion of the sample population with a condition at the sample period (%).



Mulchatna Caribou - Adult Female Research

Survival: How long do MC live and why do they die?

Objective 2: Estimate age specific survival rates and identify the proximate cause of death in adult caribou.



Mulchatna Caribou - Adult Female Research

Survival: How long do MC live and why do they die?

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Mulchatna Caribou – Take Home Message....

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Mulchatna Caribou – Take Home Message.....

Historic Challenges

1. Density Dependent Effects reduction in quantity and quality of forage cascades into reduced body condition, impacting pregnancy, susceptibility to disease, and survival
 - Sustained periods of reduced survival in young and prime aged breeding females in early 2000s
 - Age structure issues small and poor quality breeding stock
 - Pre/Post 2009 difference in pregnancy rates of 2 , 3 , and 4 year olds
 - Vegetation Community Changes
 - 20 50+ years for lichen dominated veg community recovery
 - Increase shrub incursion onto alpine tundra



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Mulchatna Caribou – Take Home Message.....

Current Challenges

1. Nutritional condition
 - Large variability in fall body condition, with lower % fat in lactating females (Moderate Nutritional Limitation)
2. Brucellosis
 - High prevalence rates, concentrated in Western/Central range
 - Increased observations of retained placentas and swollen joints and encounters of neonatal mortalities (e.g. stillborn, weak calves)
3. Mortality
 - *Out of Season harvest* wounding loss and Illegal harvest is currently the predominate cause of death in adult females
 - Need to understand past and present harvest dynamics (i.e. total animals taken and proportion of females harvested)
 - *Non human predation* none of our current data streams point to non human predators as a significant challenge to MC adults
 - Recommend a thorough review of Unit 17 IM program



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Mulchatna Caribou – Next Steps.....

We are in the 2nd of our 3 year of the study

- Process samples from fall 2021 captures brucellosis screening, diet, genetics
- Monitor for mortalities and determine cause of death
- Track the reproductive success of all collared females (n = 100) relative to calving grounds, fall body condition, and brucellosis exposure status



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