# WAH Caribou Overview

Northwest Arctic Subsistence Regional Advisory Council Meeting
February 2022
Nicole Edmison – Wildlife Biologist ADF&G
(standing in for Alex Hansen)

- **Western Arctic Caribou Herd**
  - Abundance
  - Additional Biological Data
  - Management
  - Data Gap
  - Variation in Availability
  - Summary

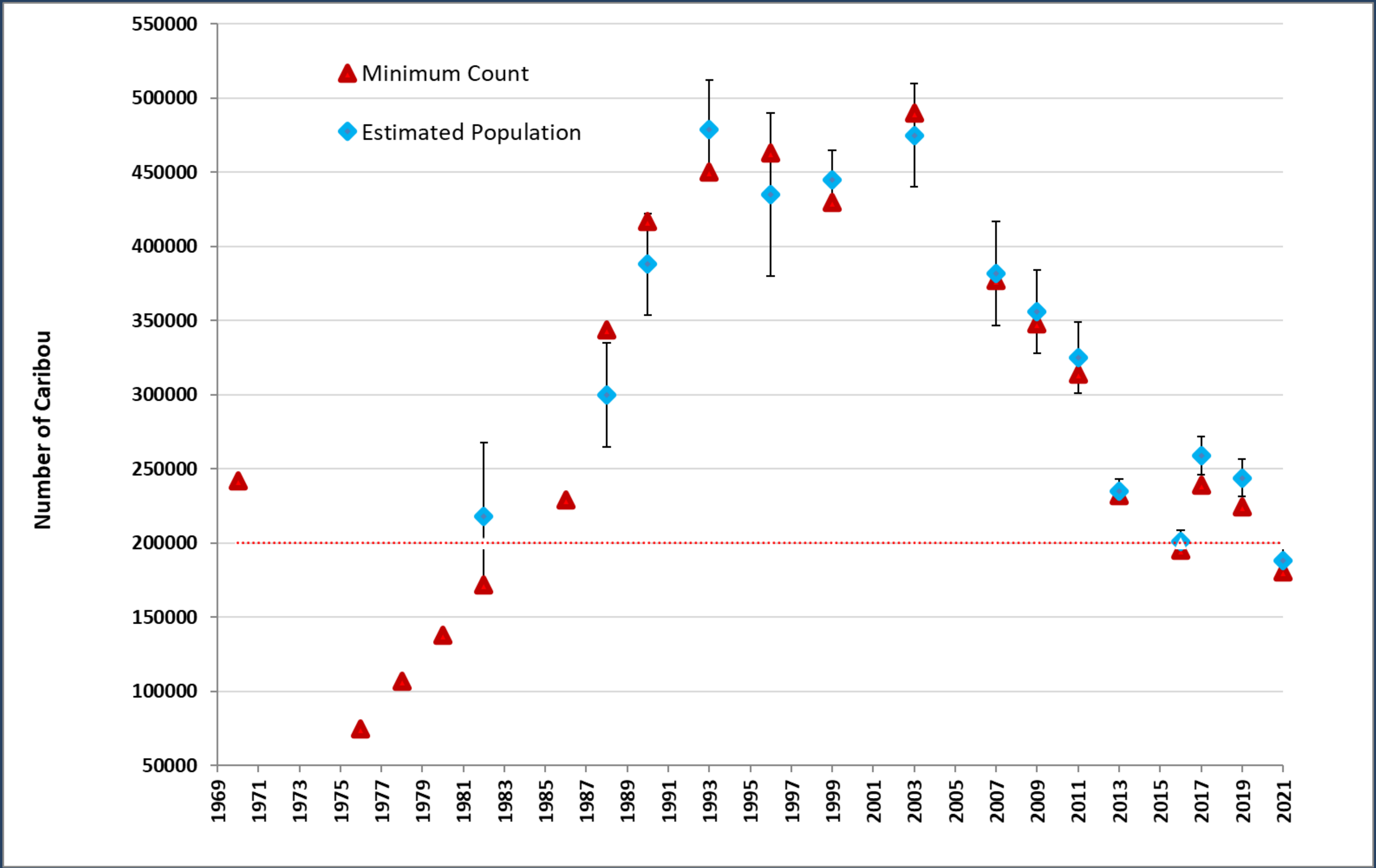
# WAH Abundance

## 2021 Photocensus Results

- Rivest Estimate: **188,000**
- +/- 11,855 (95% CI)
  - Minimum Count: 180,374

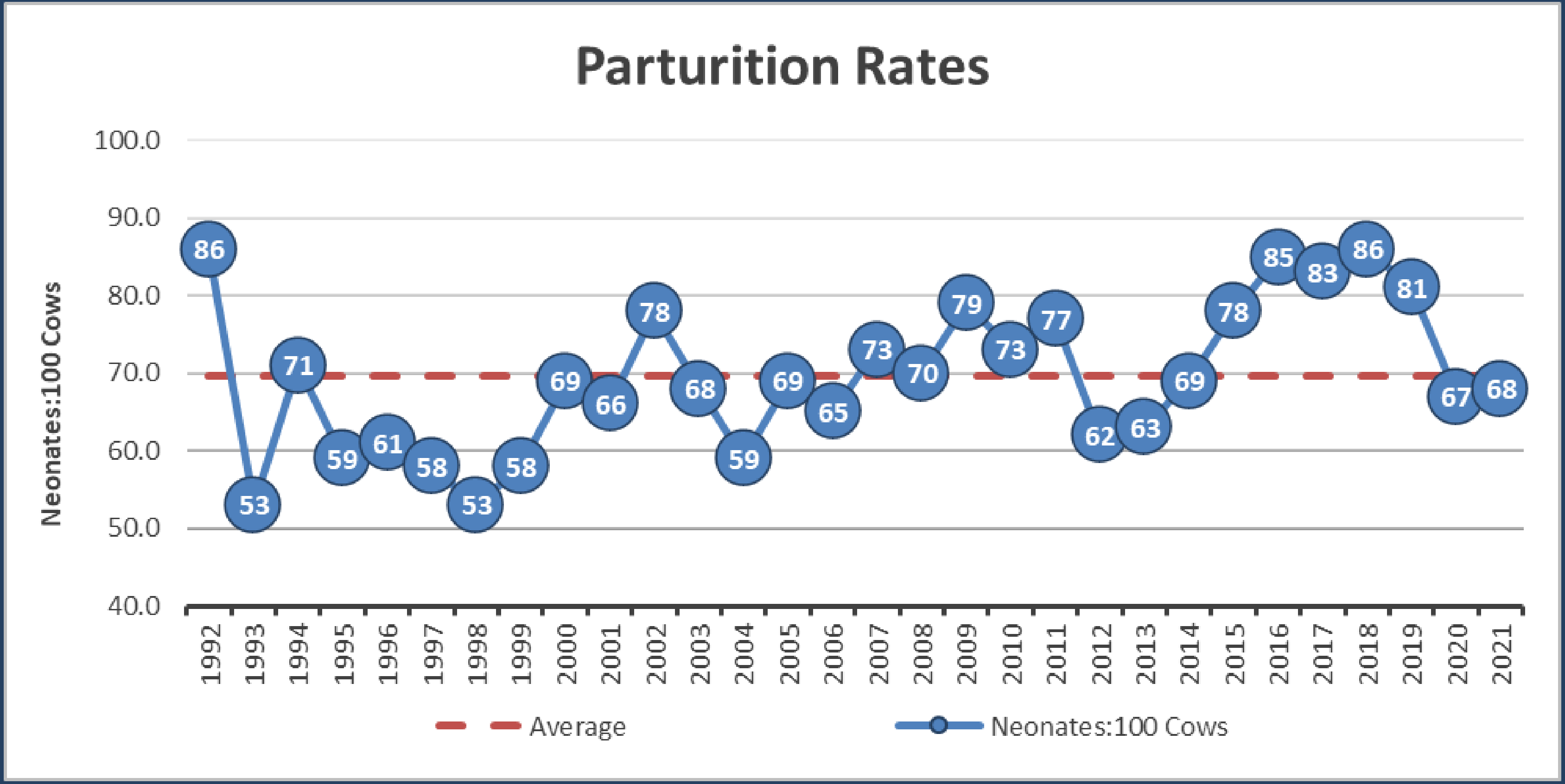
- 2020 - no census
- 2019 - 244,000
- 2018 - no census
- 2017 - 259,000
- 2016 - 201,000

# WAH Abundance Graph



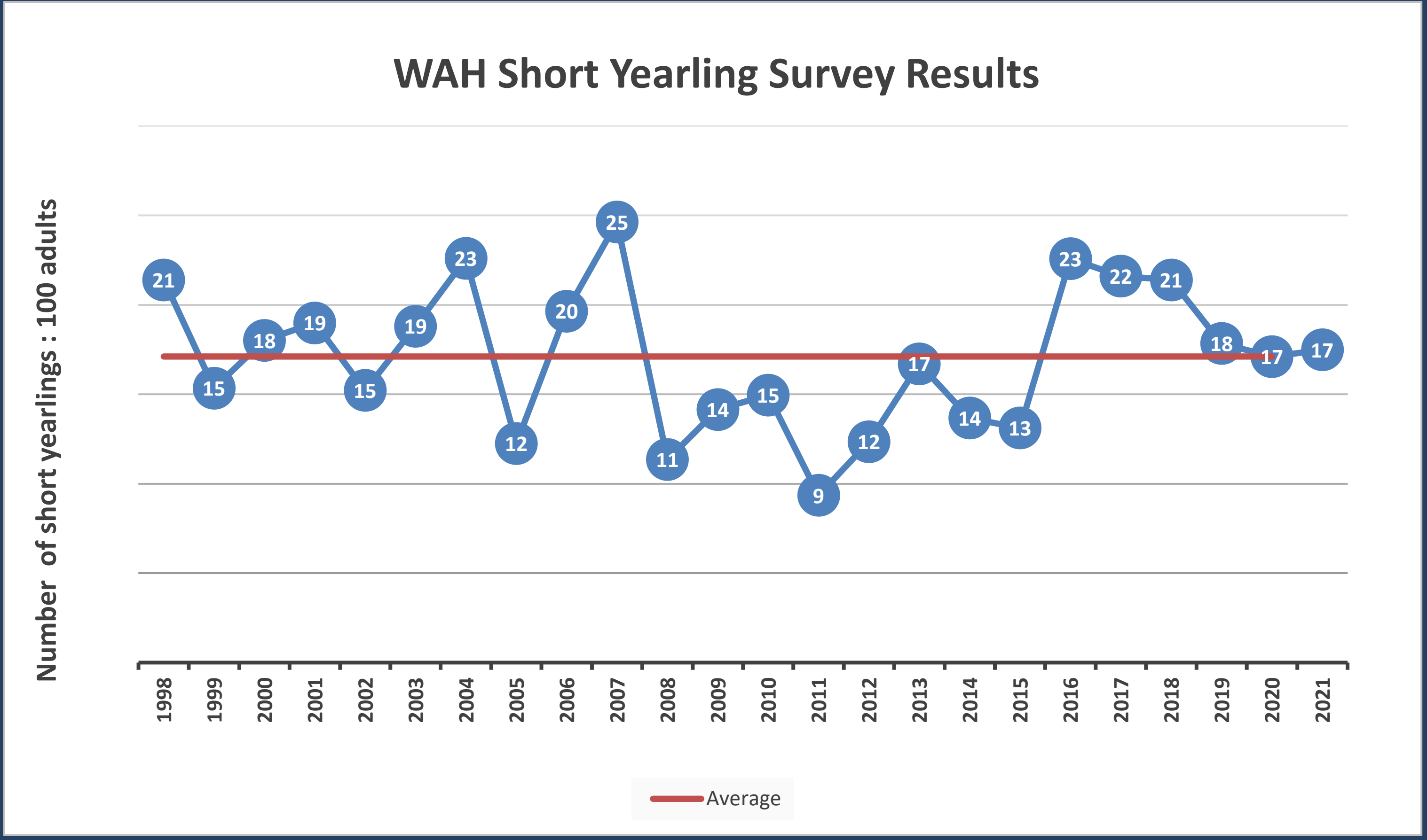
# Calving

- Parturition - 68% (below average)
  - Long-term average (70%)



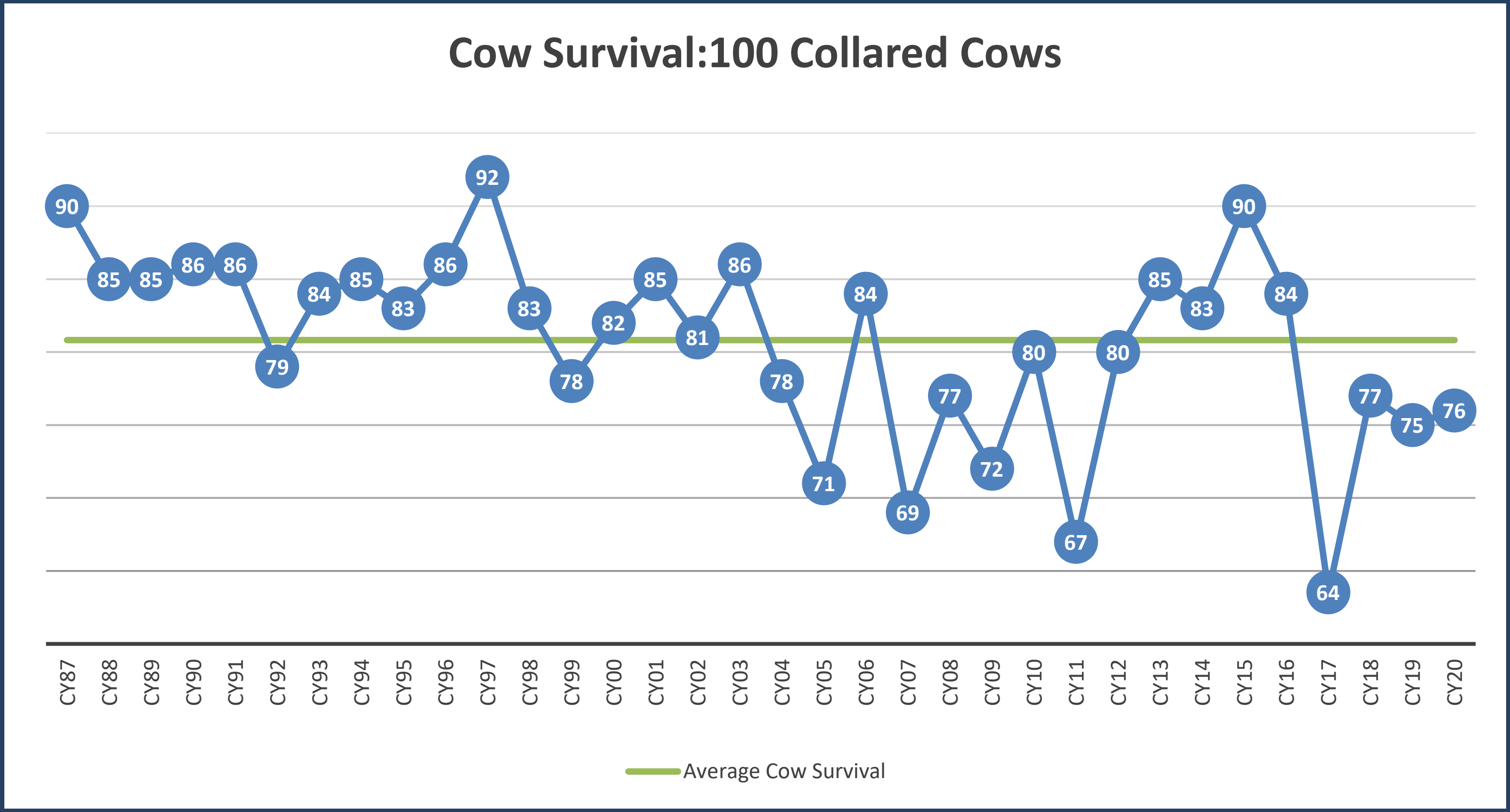
# Recruitment

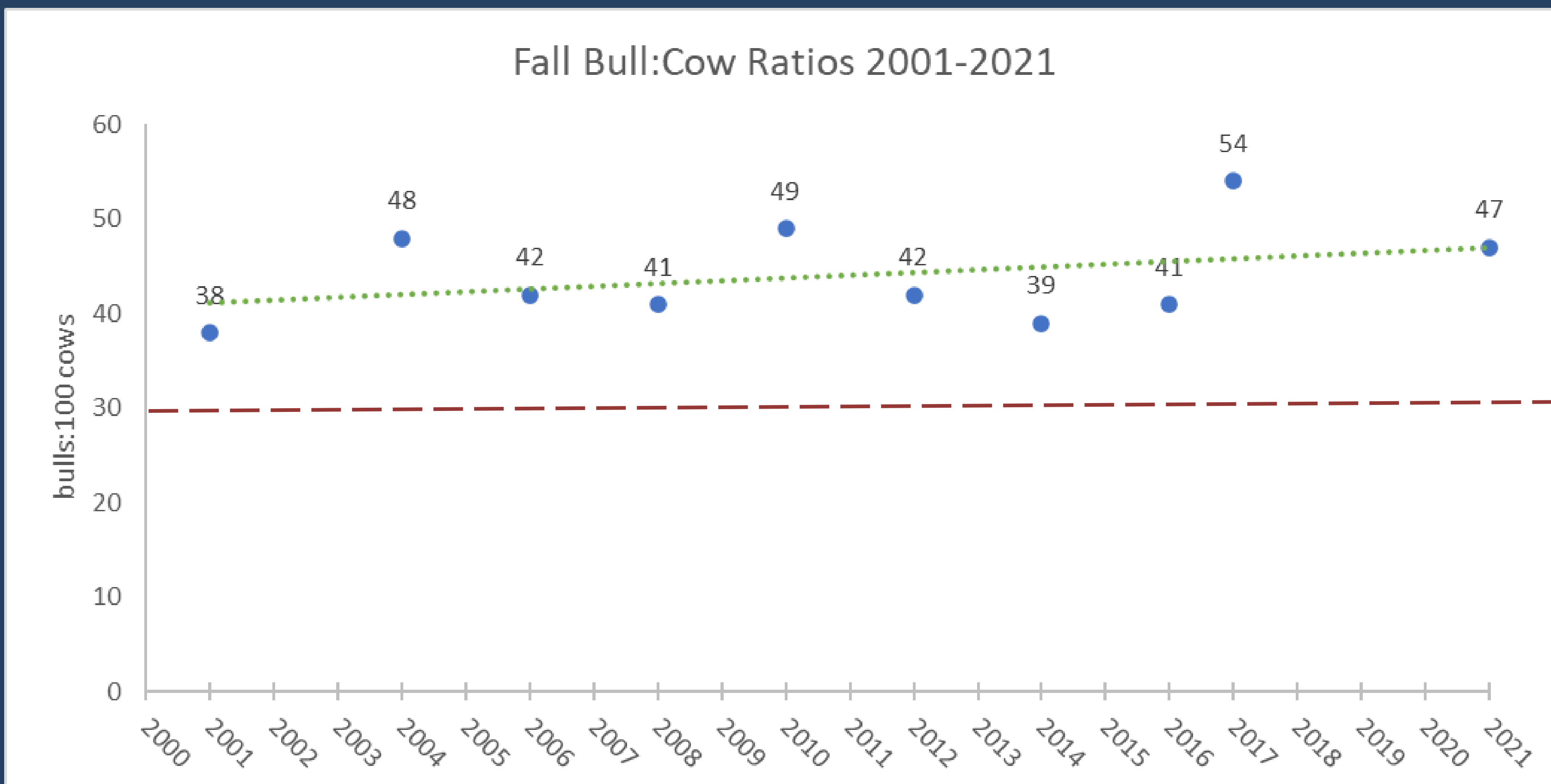
- Short Yearling Recruitment = 17:100 adults (average)
  - Long term average = 17



# Adult Survival

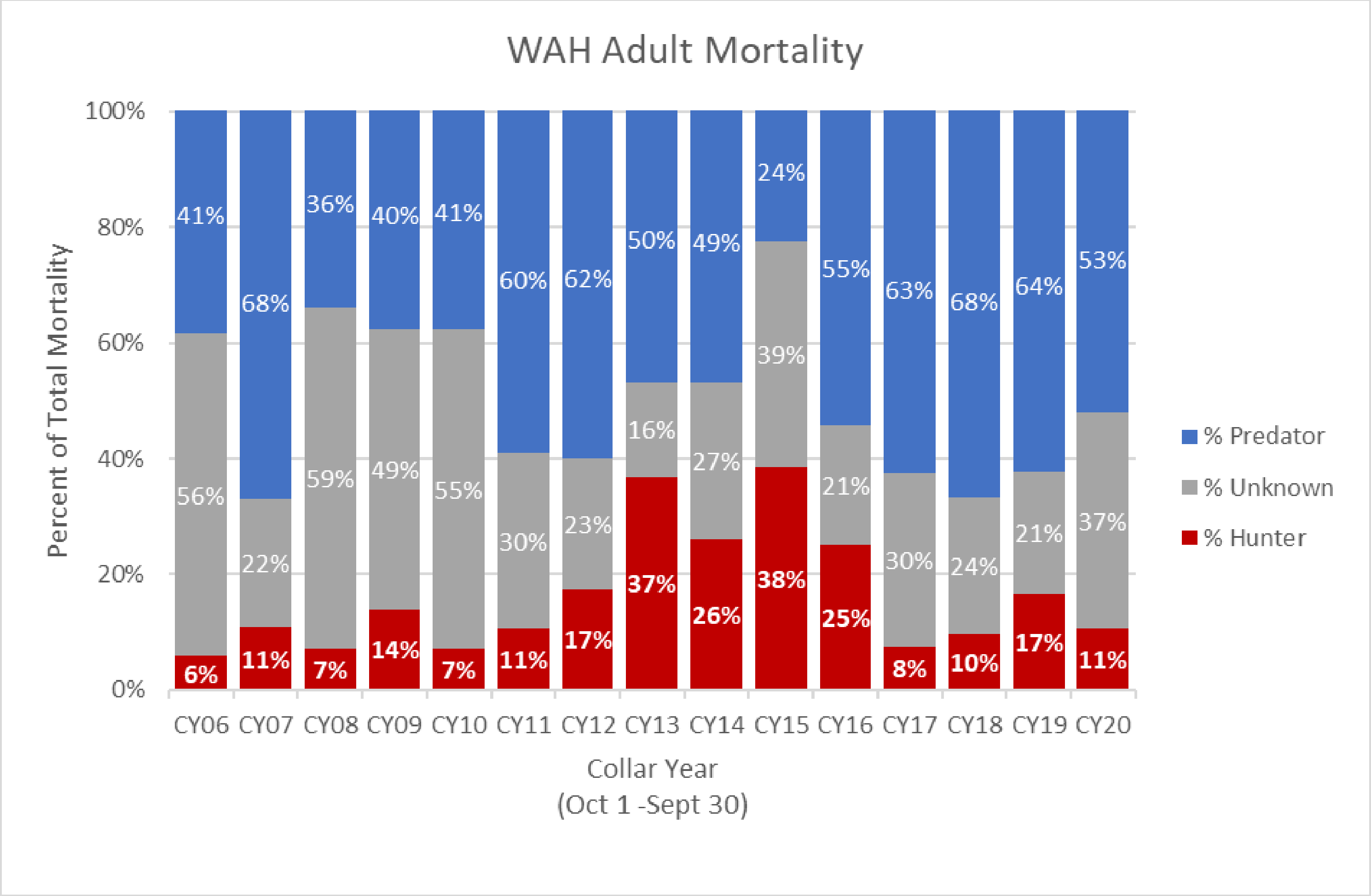
- Adult Female Survival – 73% (below average)
  - Long term average = 81%



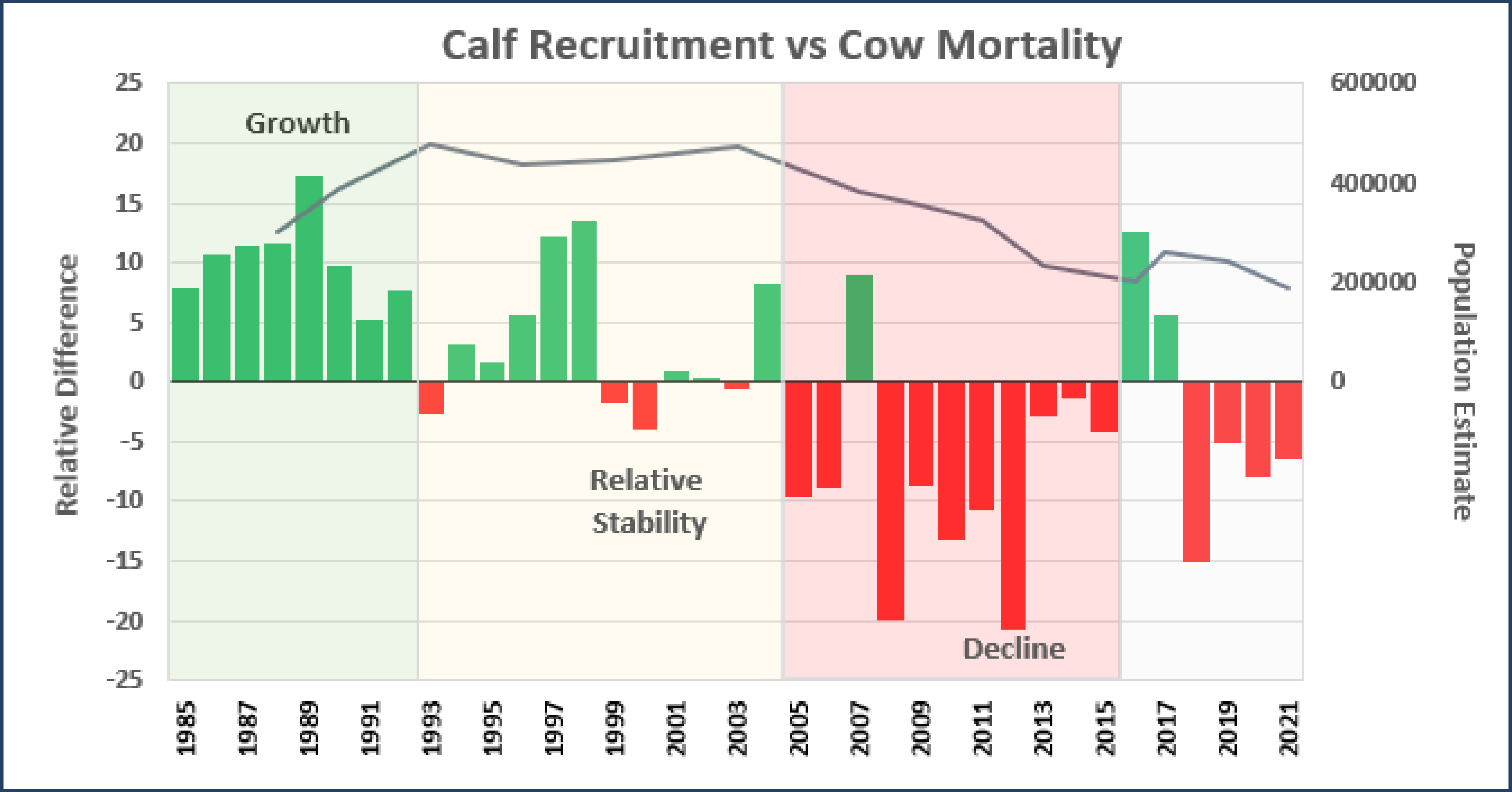


Fall Bull:Cow Ratios 2001-2021
bulls:100 cows
0
10
20
30
40
50
60
38
48
42
41
49
42
39
41
54
47
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021

# Cause of Mortality



# Population Trend



# Management Level Overview

| | Population Trend | | |
|---|---|---|---|
| Management Level | Declining<br>Adult Cow Survival<br><80%<br>Calf Recruitment<br><15:100 | Stable<br>Adult Cow Survival<br>80%-88%<br>Calf Recruitment<br>15-22:100 | Increasing<br>Adult Cow Survival<br>>88%<br>Calf Recruitment<br>>22:100 |
| Liberal | Pop: 265,000+<br>Harvest: 14,000+ | Pop: 230,000+<br>Harvest: 14,000+ | Pop: 200,000+<br>Harvest: 14,000+ |
| Conservative | Pop: 200,000-265,000<br>Harvest: 10,000-14,000 | Pop: 170,000-230,000<br>Harvest: 10,000-14,000 | Pop: 150,000-200,000<br>Harvest: 10,000-14,000 |
| Preservative | Pop: 130,000-200,000<br>Harvest: 6,000-10,000 | Pop: 115,000-170,000<br>Harvest: 6,000-10,000 | Pop: 100,000-150,000<br>Harvest: 6,000-10,000 |
| Critical | Pop: <130,000<br>Harvest: <6,000 | Pop: <115,000<br>Harvest: <6,000 | Pop: <100,000<br>Harvest: <6,000 |

# Management Level

## WAHWG Cooperative Management Plan: Harvest Recommendations

Conservative Management (orange, based on 2019 photo census)

1. Encourage voluntary reduction in calf harvest…√
2. No nonresident cow harvest √
3. Restrict nonresident bull harvest √
4. Encourage voluntary reduction in resident cow harvest √
5. Limit subsistence harvest of bulls only if < 30 bulls:100 cows

Preservative Management (yellow, based on 2021photo census)

1. No harvest of calves
2. Limit harvest of cows by residents through permit hunts and/or village quotas
3. Limit subsistence harvest of bulls to maintain at least 30 bulls:100 cows
4. Harvest restricted to residents only, according to State and federal law. Closure of some federal public lands may be necessary.

# WAH Management

C&T Finding: Positive

ANS: 8,000-12,000, WAH and TCH

Annual Harvest
Estimate: ~12,000 (+/- 1,750)
Includes ~3,600 cows

Intensive Management Objectives:
Population - 200,000 or less

Harvestable Surplus:
Approximately 11,300 (Bull and Cow combined)
At 6% harvest rate

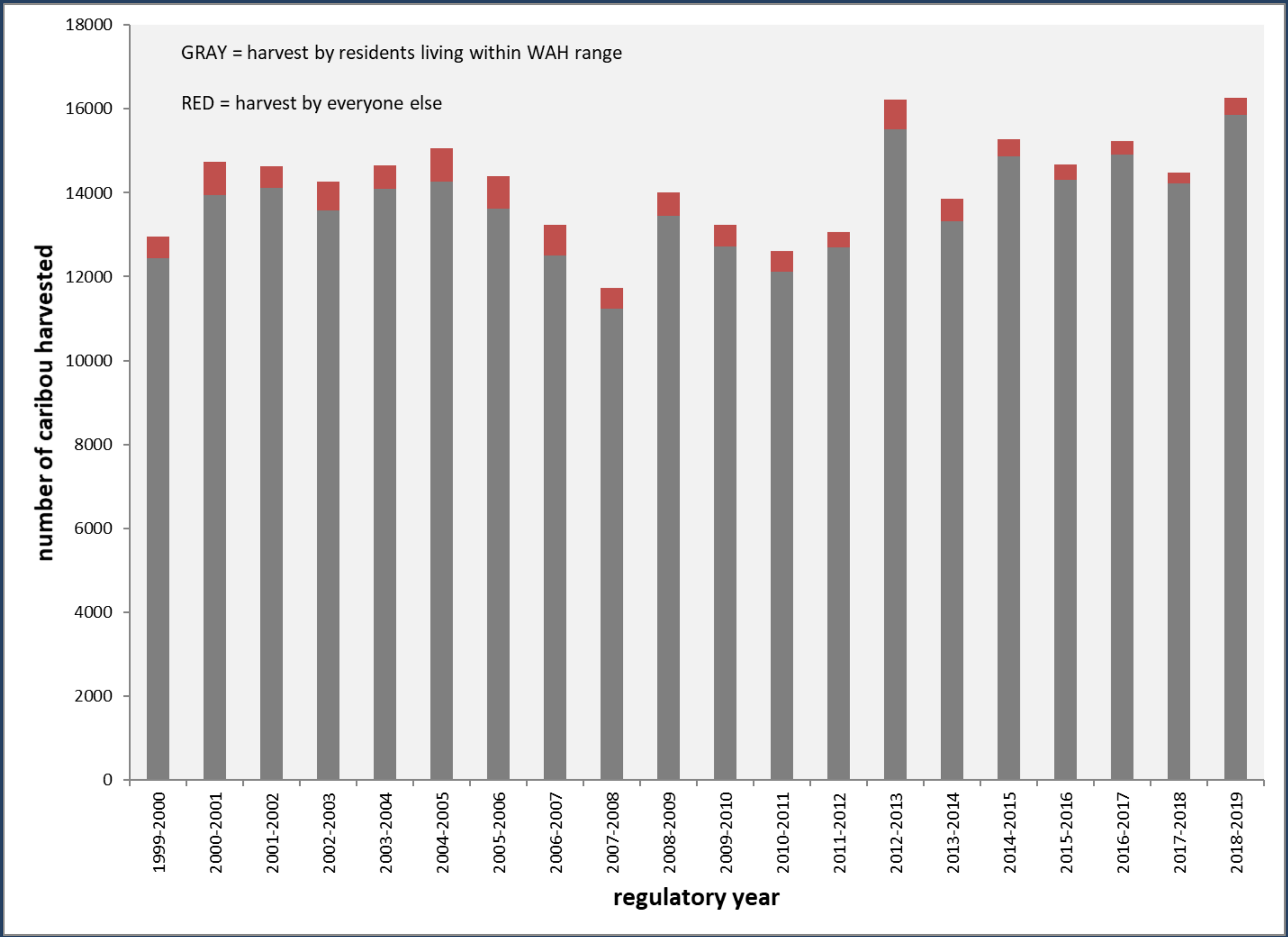
# WAH Management Challenges

RC907/800 participation is too low to provide a clear picture of harvest

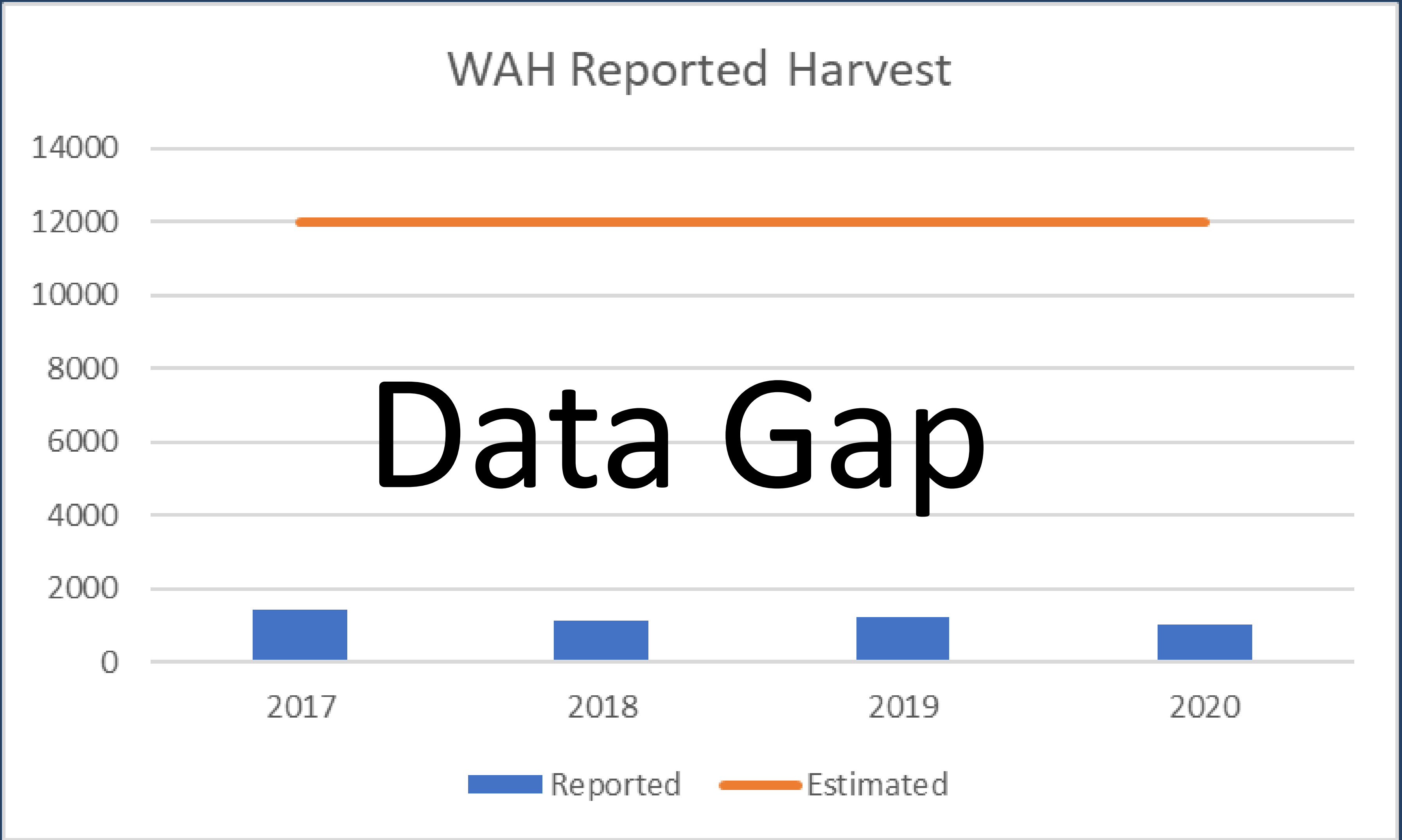
Harvest model is too course to provide meaningful data for management

Increased understanding of harvest is key to understanding human caused impacts

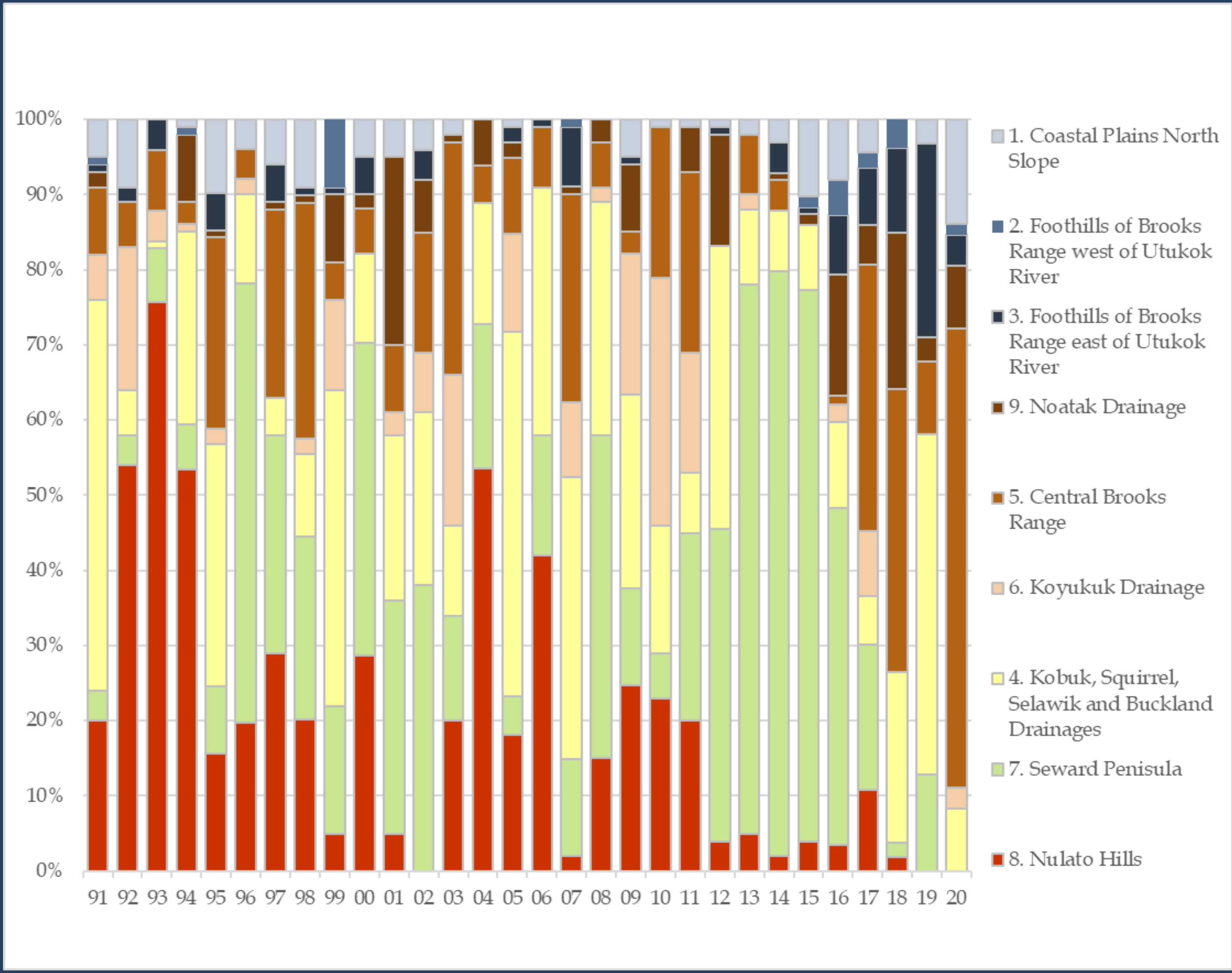
# Harvest Model



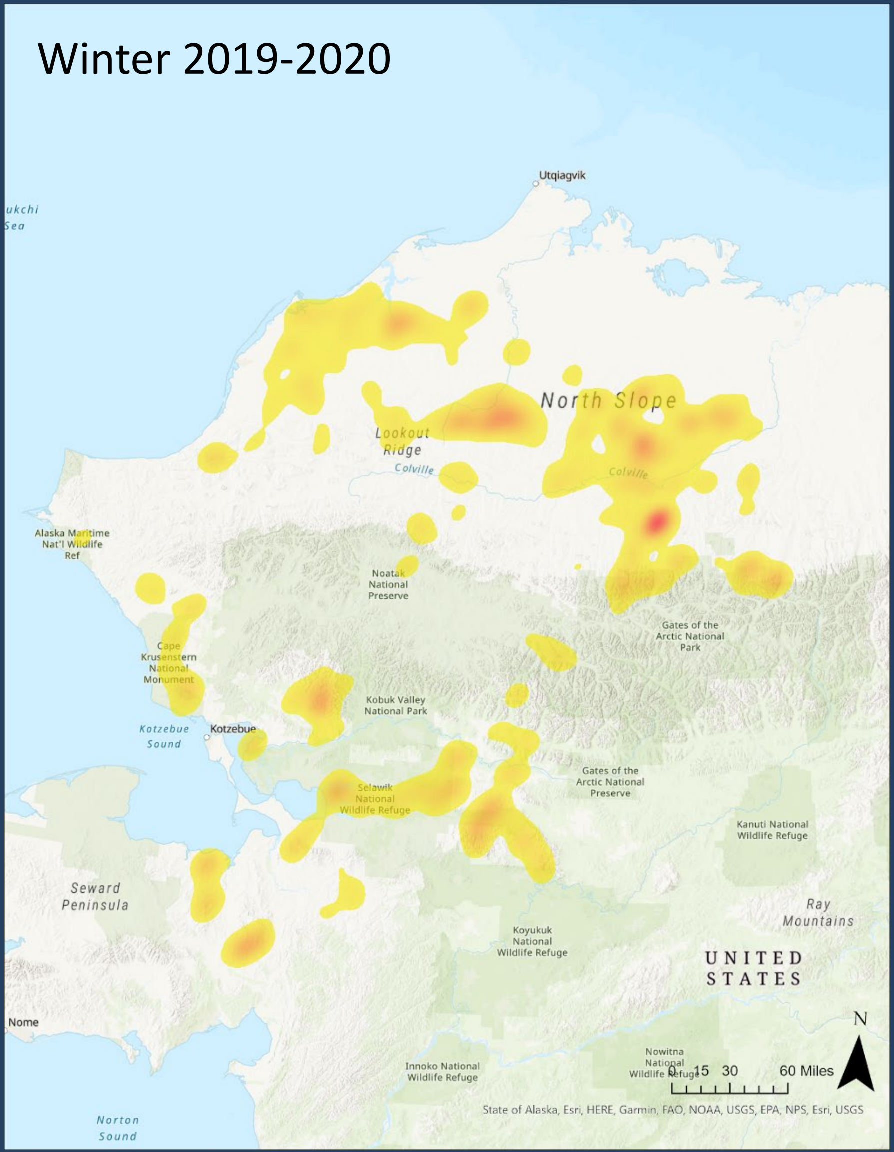
# Harvest Reporting

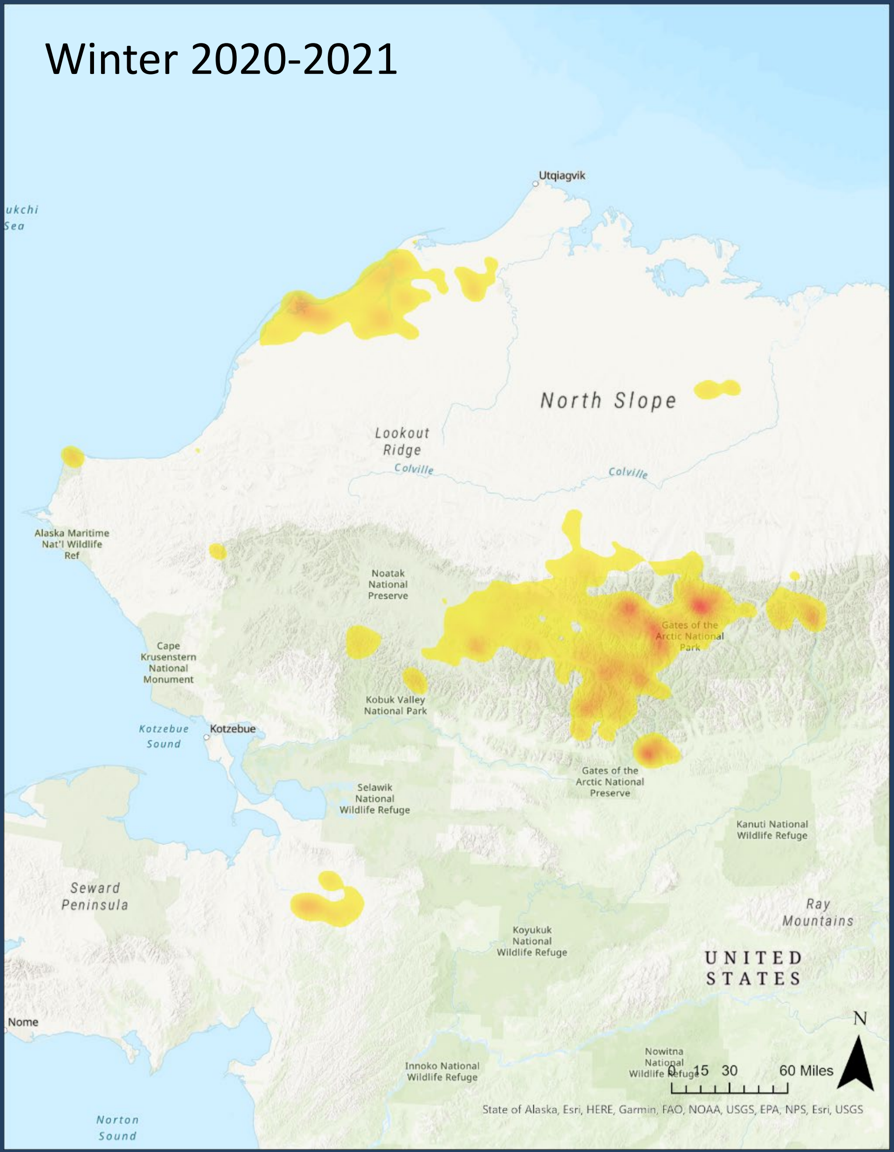


# Annual Variation



# Availability



# Summary

Biological Concerns:

- Hovering around critical thresholds (WACHMP)
  - Short-yearling recruitment – average
  - Calving – below average
  - Adult cow survival – below average
  - Harvestable Surplus – need data

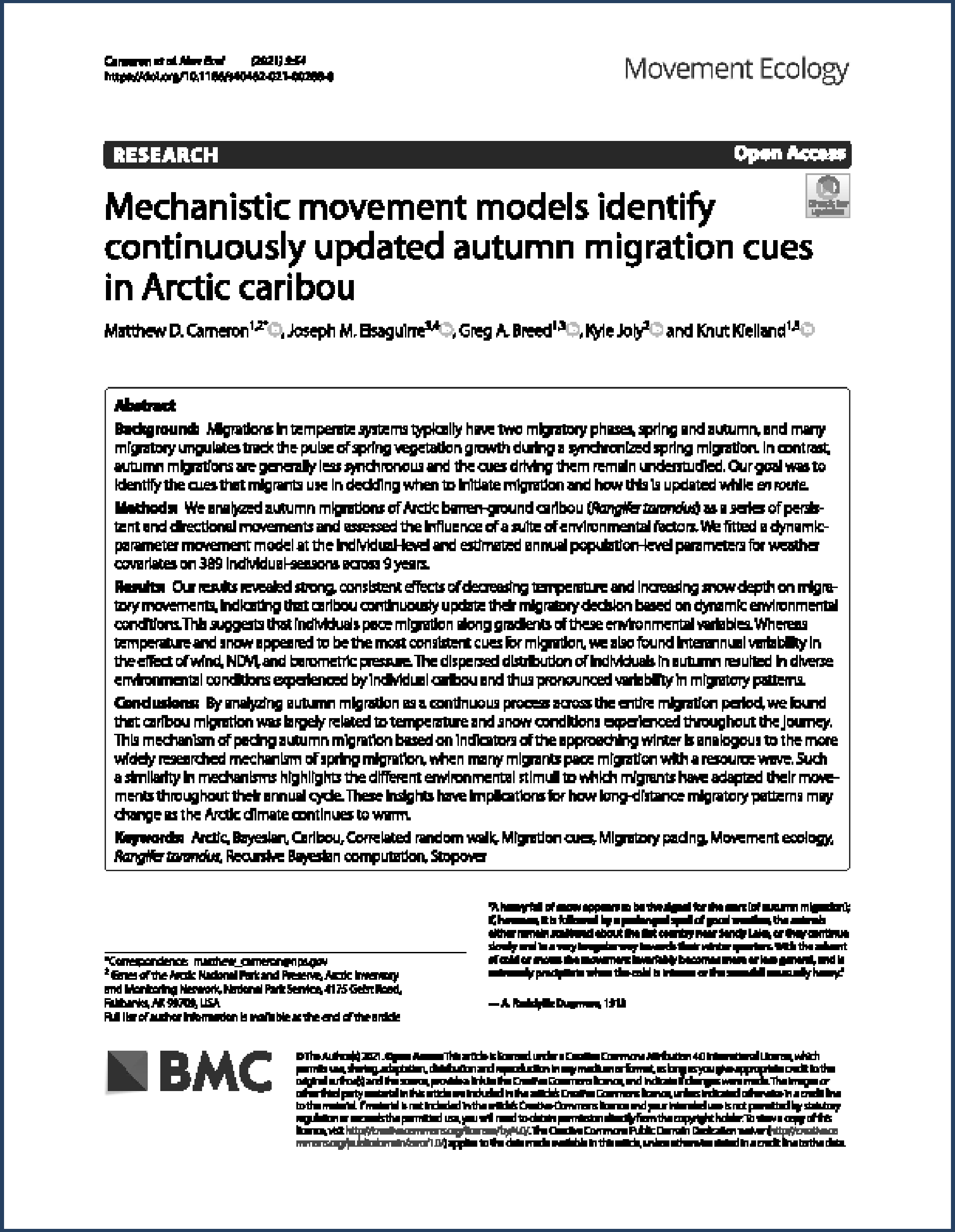
Biological Conclusions:

- Calving rates and cow survival rates are slightly below average
- NFQU harvest is a known and very small part of total harvest
- Fall migration is heavily tied to temp and snow (Cameron et al. 2021)
- Caribou winter ranges continuously shift (Caribou Trails 2021 graph)

# Questions

**Northwest Arctic RAC Meeting – February 2022**
**Nicole Edmison – Alaska Department of Fish & Game**

# Bonus Slide:


Cameron et al. Mov Ecol (2021) 9:54
https://doi.org/10.1186/s40462-021-00288-8
Movement Ecology

RESEARCH | Open Access

Mechanistic movement models identify continuously updated autumn migration cues in Arctic caribou

Matthew D. Cameron[1,2*], Joseph M. Eisaguirre[3,4], Greg A. Breed[1,3], Kyle Joly[2] and Knut Kielland[1,4]

Abstract
Background: Migrations in temperate systems typically have two migratory phases, spring and autumn, and many migratory ungulates track the pulse of spring vegetation growth during a synchronized spring migration. In contrast, autumn migrations are generally less synchronous and the cues driving them remain understudied. Our goal was to identify the cues that migrants use in deciding when to initiate migration and how this is updated while en route.
Methods: We analyzed autumn migrations of Arctic barren-ground caribou (Rangifer tarandus) as a series of persistent and directional movements and assessed the influence of a suite of environmental factors. We fitted a dynamic-parameter movement model at the individual-level and estimated annual population-level parameters for weather covariates on 389 individual-seasons across 9 years.
Results: Our results revealed strong, consistent effects of decreasing temperature and increasing snow depth on migratory movements, indicating that caribou continuously update their migratory decision based on dynamic environmental conditions. This suggests that individuals pace migration along gradients of these environmental variables. Whereas temperature and snow appeared to be the most consistent cues for migration, we also found interannual variability in the effect of wind, NDVI, and barometric pressure. The dispersed distribution of individuals in autumn resulted in diverse environmental conditions experienced by individual caribou and thus pronounced variability in migratory patterns.
Conclusions: By analyzing autumn migration as a continuous process across the entire migration period, we found that caribou migration was largely related to temperature and snow conditions experienced throughout the journey. This mechanism of pacing autumn migration based on indicators of the approaching winter is analogous to the more widely researched mechanism of spring migration, when many migrants pace migration with a resource wave. Such a similarity in mechanisms highlights the different environmental stimuli to which migrants have adapted their movements throughout their annual cycle. These insights have implications for how long-distance migratory patterns may change as the Arctic climate continues to warm.
Keywords: Arctic, Bayesian, Caribou, Correlated random walk, Migration cues, Migratory pacing, Movement ecology, Rangifer tarandus, Recursive Bayesian computation, Stopover

"A heavy fall of snow appears to be the signal for the start [of autumn migration]; if, however, it is followed by a prolonged spell of good weather, the animals either remain scattered about the flat country near Sandy Lake, or they continue slowly and in a very irregular way towards their winter quarters. With the advent of cold or snow the movement invariably becomes more or less general, and is extremely precipitate when the cold is intense or the snowfall unusually heavy."

— A. Radclyffe Dugmore, 1913

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