

# RC 2, Tab #1

## Dall's sheep research in the Chugach Range, GMUs 13D and 14C



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Slide1/58

# Caution:

Today's talk covers almost four years of research from 13D but only 9 months from 14C. All data should be considered preliminary, especially that from 14C.

Not appropriate to compare study areas as datasets are incomplete at this point.

This presentation is a progress report, rather than a completed analysis.

# Study area background and goals

## 13D – Declining sheep populations

### Study area estimates

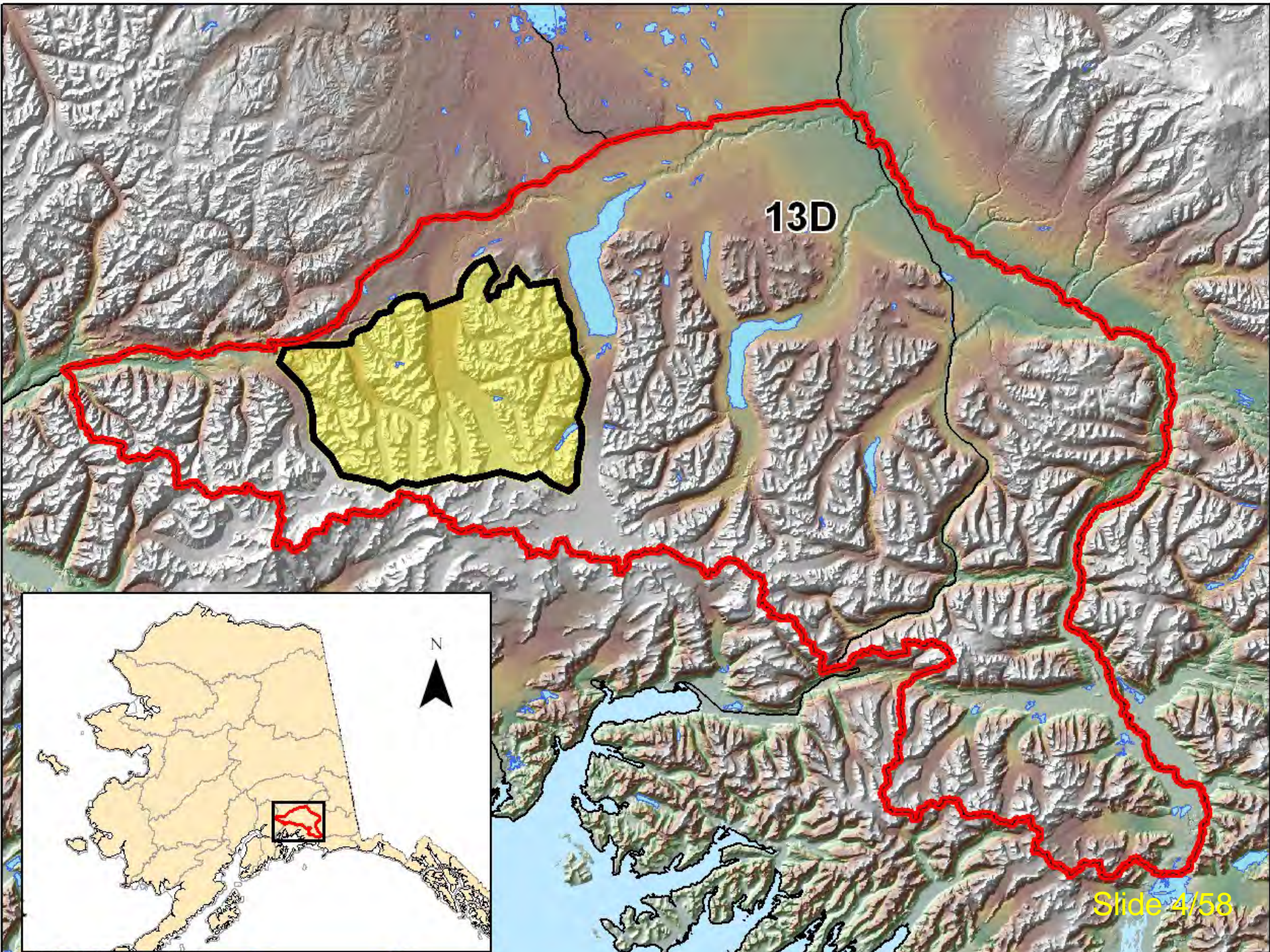
≈650-750 1960s through 1980s

≈350-430 2007 and 2009

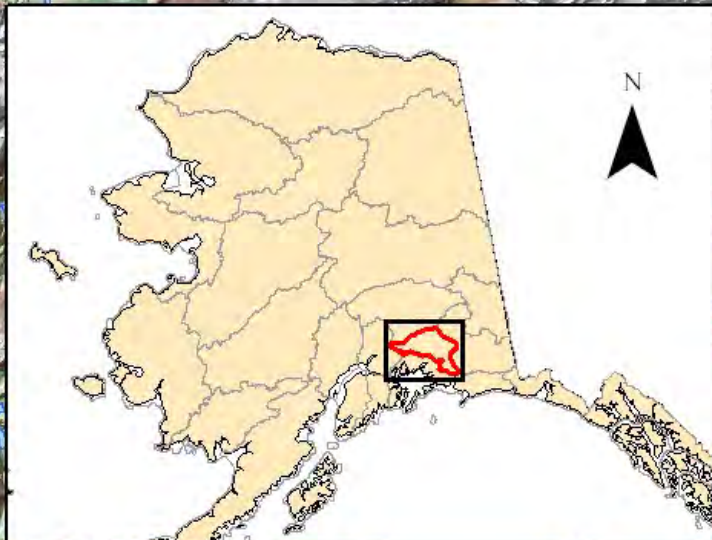
- Until 2005, declines approximately equal in ram and ewe component

Project goals: Establish a baseline demographic picture...“What is driving sheep population trends in southcentral Alaska?”

Pregnancy, recruitment, rates and causes of mortality, disease



13D



# Study area background and goals

14C – Cyclic sheep population

GMU-wide estimates

≈900-1100 1970s through early 1980s

≈2000-2100 late 1980s through 2000

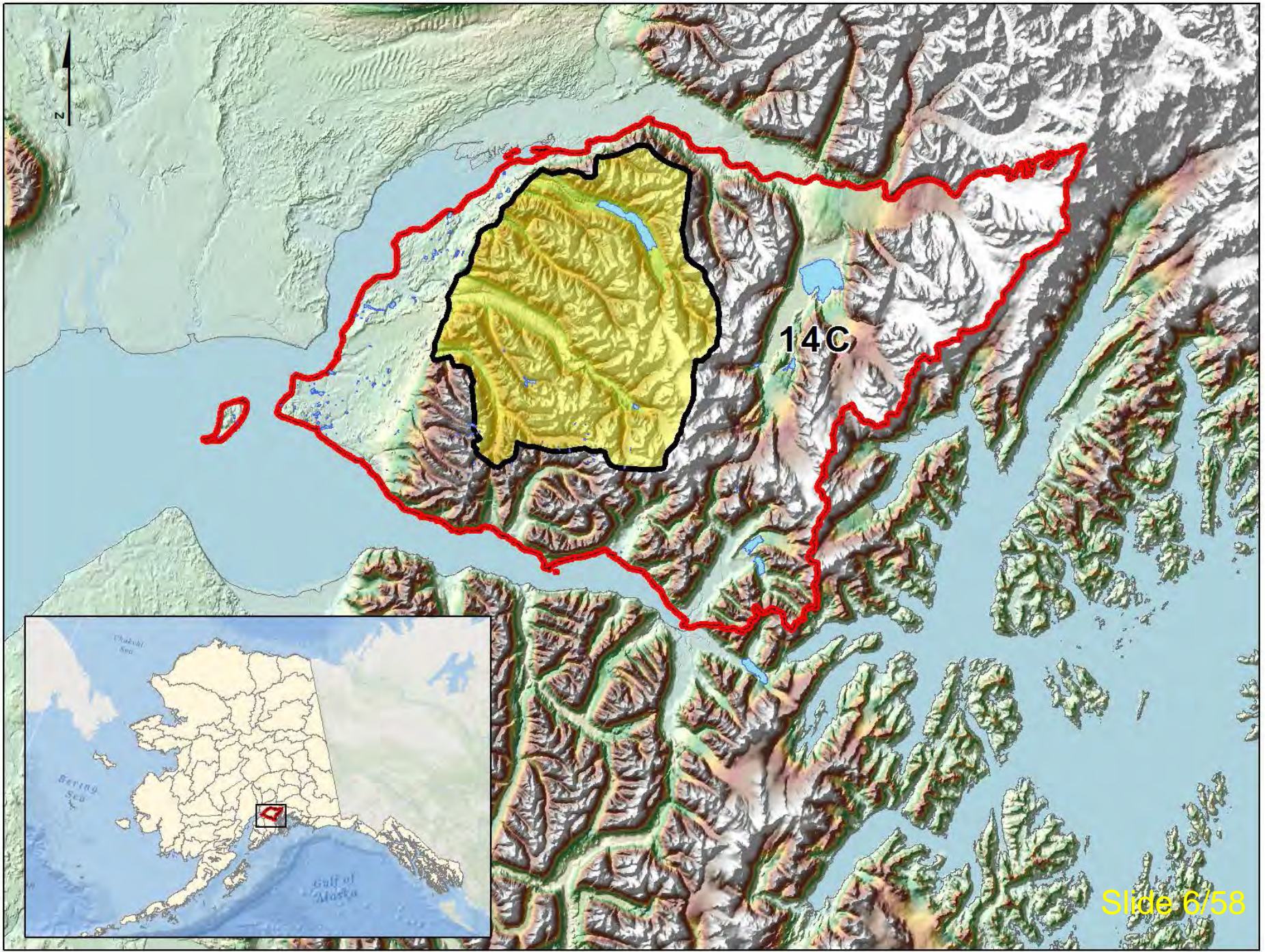
≈900-1100 2007 through 2011

➤ Changes similar in ram and ewe component

Primary project goals: 1) Are the driving factors similar between the northern and southern Chugach?

2) Can we generalize between study areas?

Secondary project goals: What are the rates and causes of mortality in juvenile rams?



# Background

## Weather

Late, heavy spring snows

Ice formation

## Predation

AK range studies (Arthur 2003 and Scotton 1998)

≈ 90% of lamb mortality due to predation

coyotes 47%, eagles 30%

100% adult mortality caused by predation

wolves 57%, bears 7%, wolverines 7%

Lamb survival to 1 yr = 22% (Arthur 2003)

Annual adult survival = 85% (Arthur 2003)

# Background

## Habitat and nutrition

- Mineral deficiencies

- Malnutrition

## Disease

- Pneumonia or other disease

  - Reports of dead sheep in both study areas from hunters and during annual surveys



# Adult Captures – March and April



# GMU 13D

## Captures and handling

March 2009-2012 ≈40 adult ewes  
captured/recaptured annually

VHF radiocollar, blood, fecal samples, nasal and  
pharyngeal swabs, qualitative body condition  
assessment, pregnancy test

# GMU 14C

## Captures and handling

March 2012 - 35 adult ewes and 19 juvenile rams captured and radiocollared to start project

VHF or GPS radiocollar, blood, fecal samples, nasal and pharyngeal swabs, qualitative body condition assessment, pregnancy test in ewes

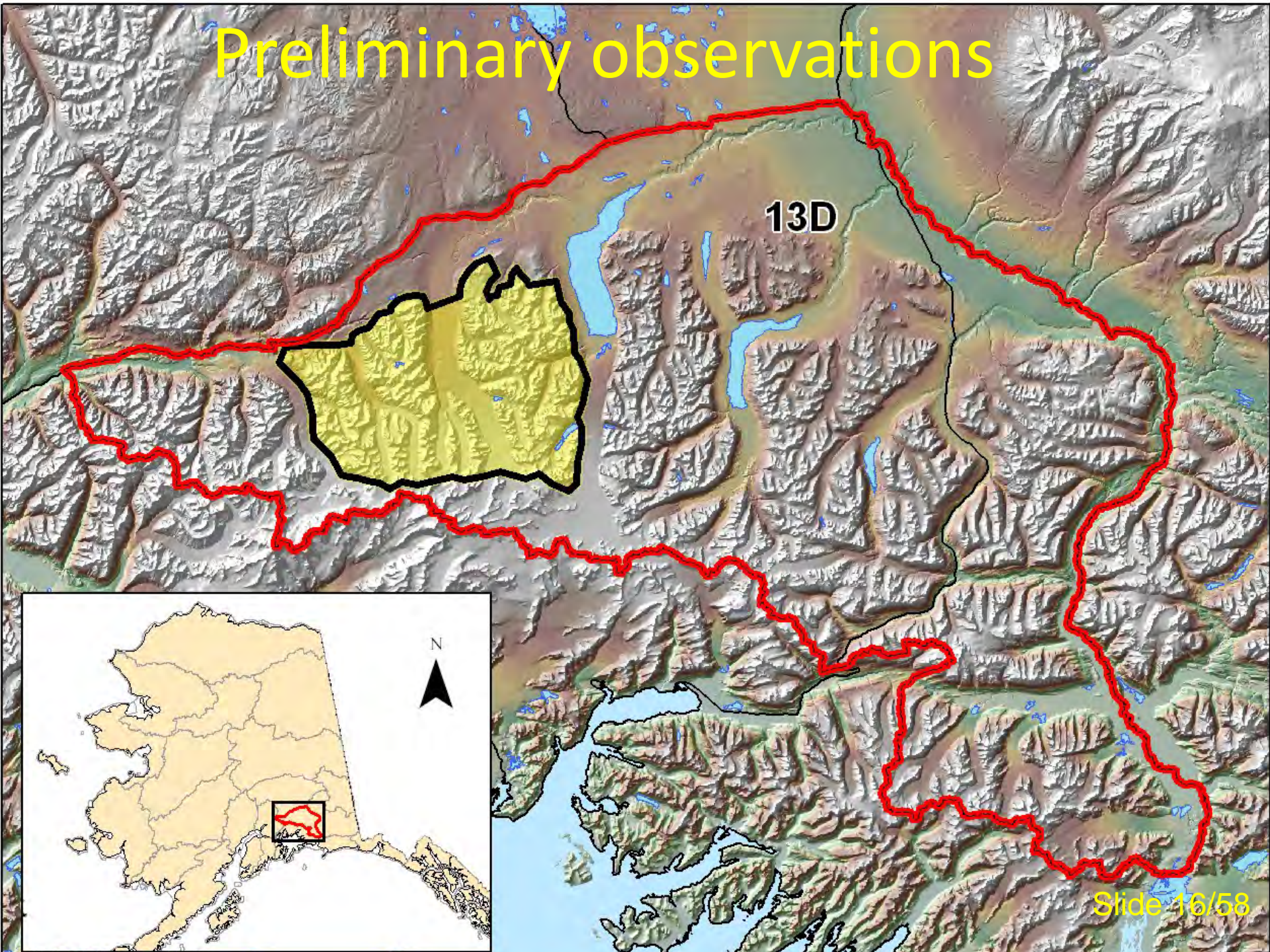








# Preliminary observations





# Preliminary observations

## Nutritional condition – GMU 13D

Body condition appeared extremely poor, even for late winter (1-2 on a 0-5 scale)

No subcutaneous (SQ) fat present

All bony structures of neck, spine, withers, pelvis evident (0.5-1.0 cm between spine and muscle)

S. Arthur (ADF&G, Fairbanks) reports all ewes captured in Brooks and AK ranges all carry SQ fat and are well-muscled

# Preliminary observations

## Reproductive status – 13D

2009 -Pregnancy rate lower than expected at 62%  
( $\geq 3$  y.o. ewes)

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

2010 -Pregnancy rate 88%

2011 -Pregnancy rate 69%

2012 -Pregnancy rate 21%\*

# Preliminary observations

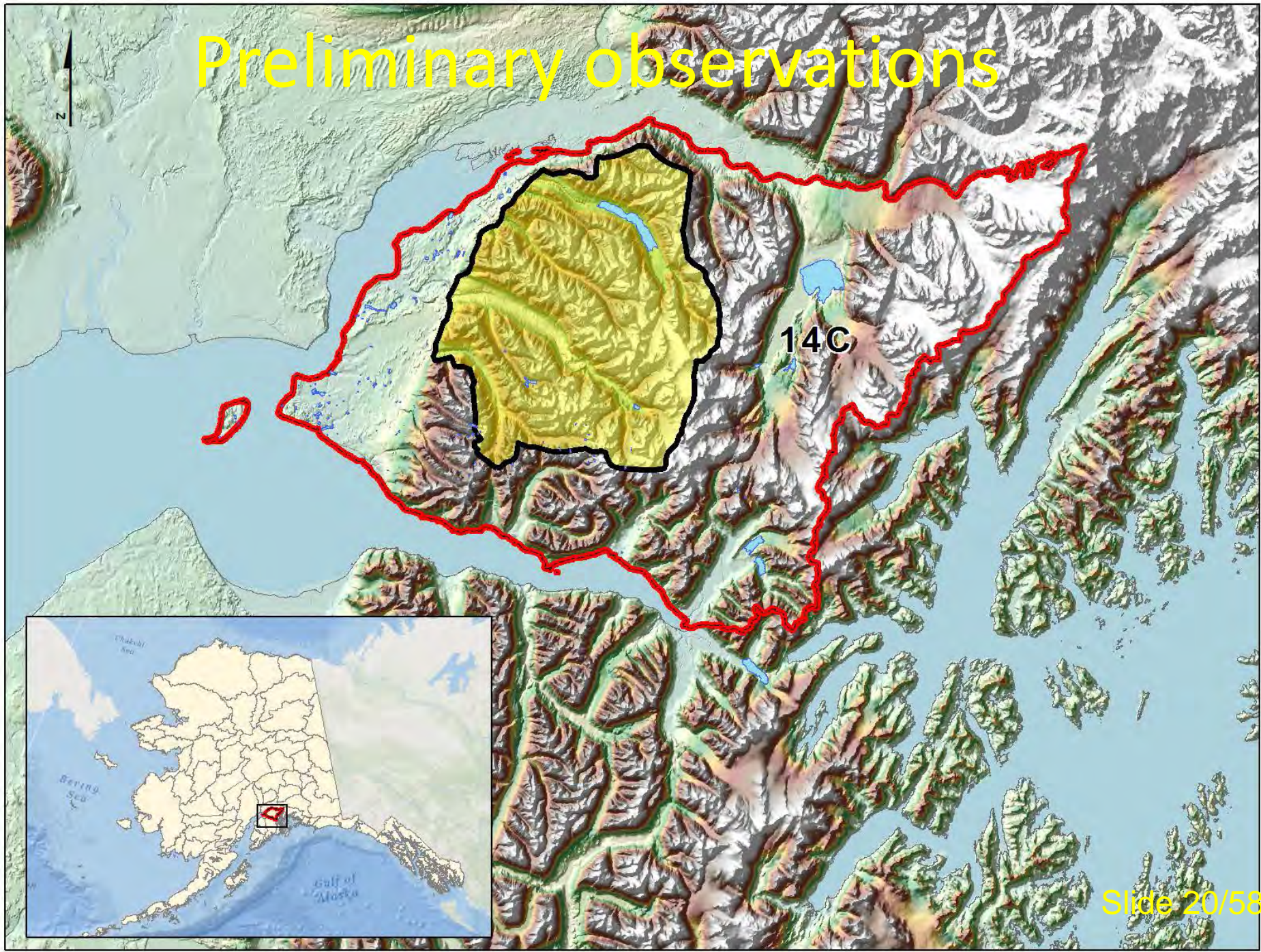
## Disease – 13D

Nasal and pharyngeal swabs from 37 adult ewes cultured for bacteria, blood samples tested for exposure to viral disease

28/37 positive for one of two “families” of bacteria associated with respiratory disease in BHS in lower 48.  
Note: both required for large scale die-off

0/37 positive for viral diseases

# Preliminary observations



# Preliminary observations

## Nutritional condition – GMU 14C

Body condition appeared poor, though slightly better than GMU 13D ewes (2-2+ on a 0-5 scale)

No subcutaneous (SQ) fat present

All bony structures of neck, spine, withers, pelvis evident (0.0-0.50 cm between spine and muscle)

S. Arthur (ADF&G, Fairbanks) reports ewes captured in Brooks and AK ranges all carry SQ fat and are well-muscled

# Preliminary observations: Reproductive status -14C

2012: Low pregnancy rate at 43%

# Preliminary observations

## Disease - 14C

Nasal and pharyngeal swabs from 35 adult ewes and 13 rams cultured for bacteria, blood samples tested for exposure to viral disease

27/48 positive for one of two “families” of bacteria associated with respiratory disease in BHS in lower 48.  
Note: both required for large scale die off

2/48 positive for viral diseases

# Monitoring – Adult sheep

Flights 2x/mo. Check animal, record location

Radio telemetry – Collar emits 60 bpm as long as animal is alive

Mortality mode (4 hrs adults, 1 hr lambs) 90 bpm

When a mortality signal is detected, we investigate as quickly as possible.



# Adult Mortality



# Adult Mortality

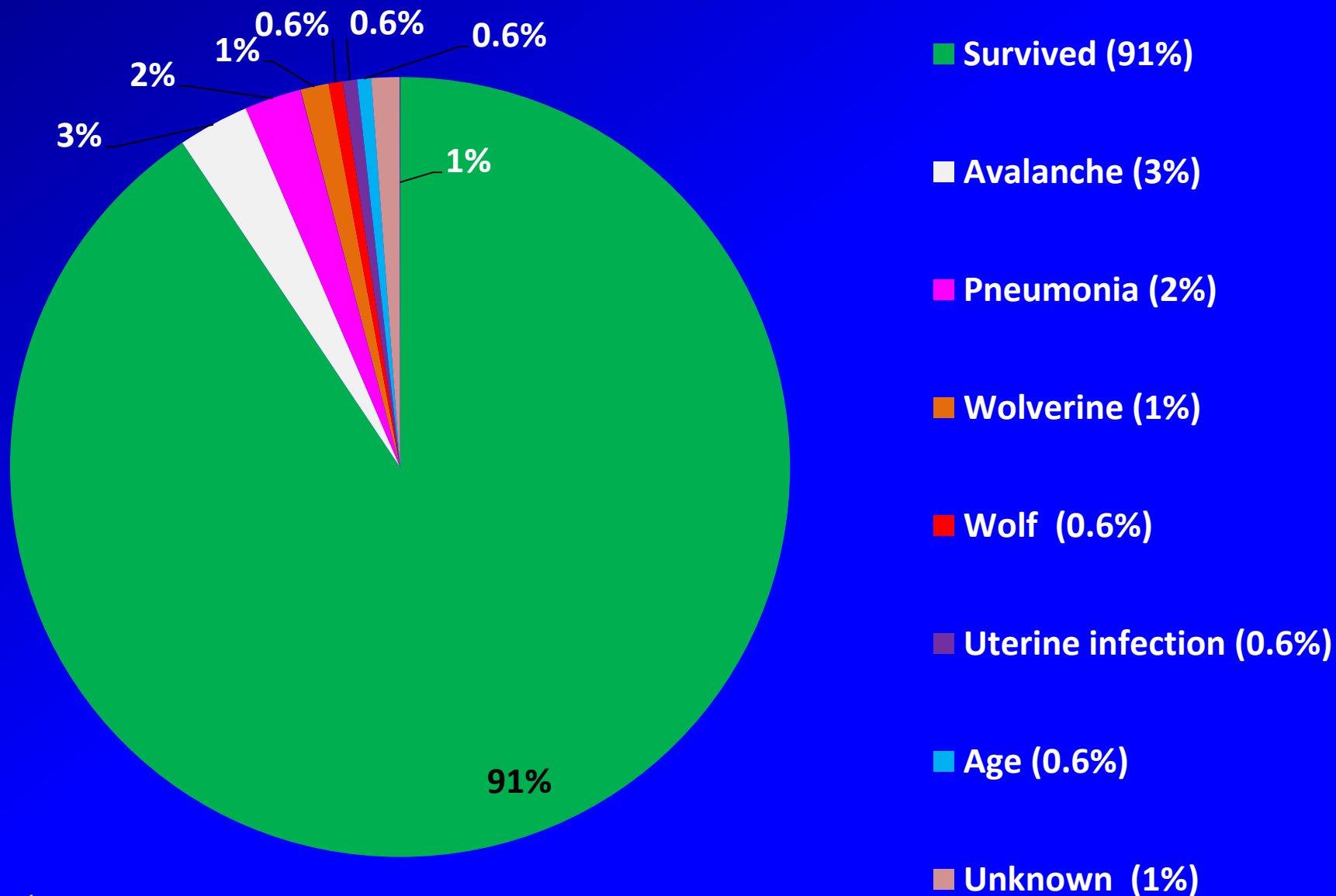


# Adult Mortality

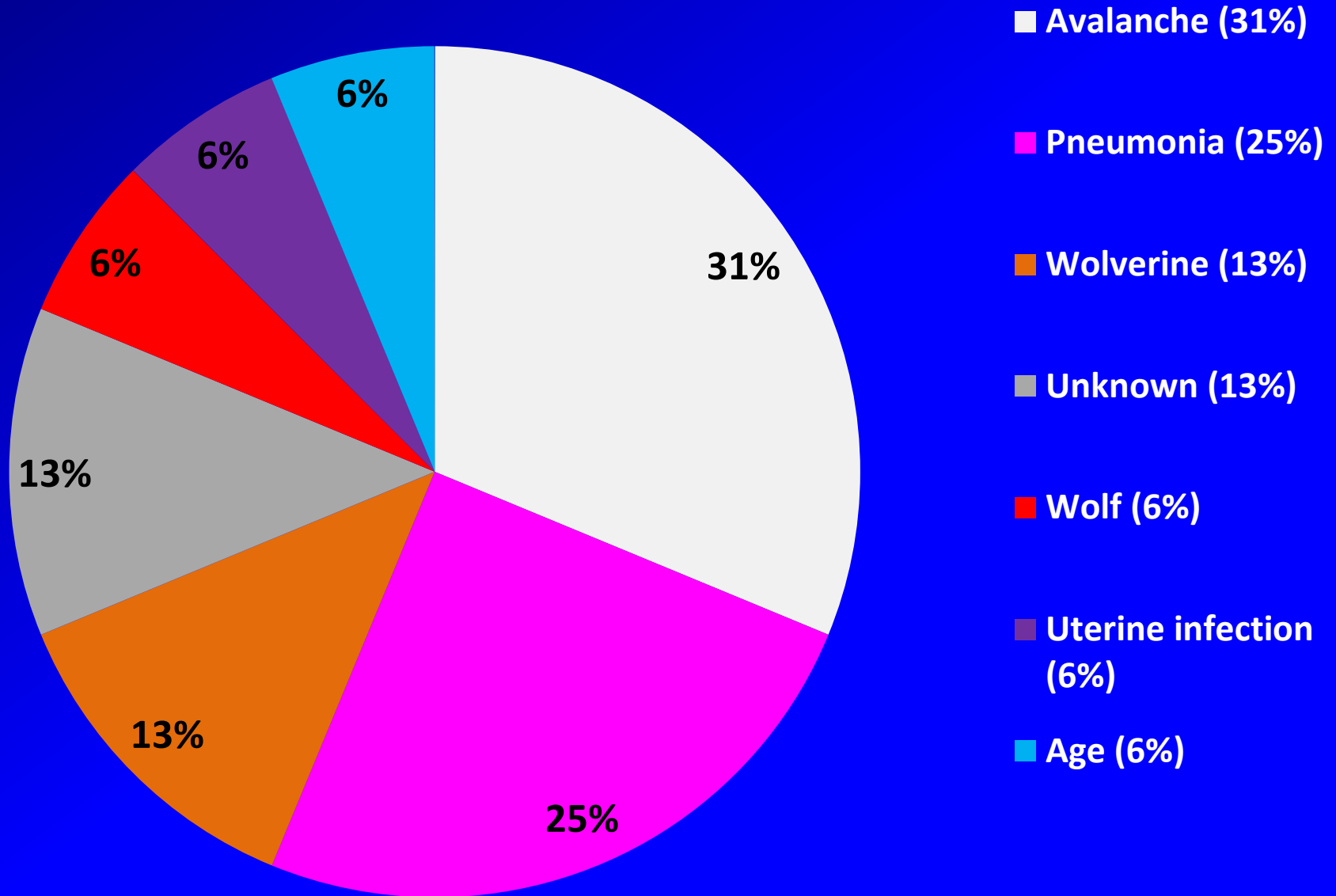




# Fate of GMU 13D adult ewes ( $\approx 40$ sheep/yr)



# GMU 13D ewe mortality (16 deaths)



# Preliminary observations ewe mortality – GMU 14C

April – December 2012

1 ewe killed in avalanche (4/2012)



# Lamb Captures - May 15-June 15











# Monitoring Schedule

Daily flights May 15 - June 15 to determine parturition, locate lambs for capture, and check for mortality of collared lambs

June 15 – July 1	flights 2x/week.
July 1 – Aug 10	flights 1x/week.
After Oct. 1	flights 2x/mo.

When a mortality is detected via radio signal, we investigate as soon as possible

# Lamb survival rates – 13D

8/19 (42%) 2009 lambs survived to one year

2/21 (9%) 2010 lambs survived to one year

4/26 (15%) 2011 lambs survived to one year

# Timing of lamb mortality (2009 cohort)

## Predation (5/19, 26%)

2 Eagles at 9d and 17d

Brown bear at 2d

Unknown pred at 15d

Wolf at  $\pm 9$  mo

## Nonpredation (6/19, 32%)

Starvation at 2d

Drowning at 4d

Pneumonia/lungworm at 35 d

Malnutrition/CE at  $\pm 7$  mos.

Malnutrition at  $\pm 8$  mos.

Avalanche at  $\pm 9$  mos.

# Timing of lamb mortality (2010 cohort)

## Predation (10/21, 47%)

2 Eagles at 15d. and 16d.

Unknown pred at 1 mo.

4 Brown Bear at 4.5 -5  
and 11 mo.

2 Wolverine at  $\pm$  9 mo.

Wolf/coyote/lynx at  $\pm$  7 mo.

## Nonpredation (9/21, 43%)

Fall at 2d.

2 Drownings at 2d. and 6 d.

Starvation at 2d.

Pneumonia at 45 d.

Unknown nonpred at 1-2 mo.

3 Avalanches at  $\pm$  9, 10, 11 mo.



# Timing of lamb mortality (2011 cohort)

## Predation (10/26, 38%)

3 Eagles at 5, 8, and 14 d.

Black bear at 2 d.

Unknown pred at 1 mo.

Coyote at 6 mo.

3 Wolverine at  $\pm$  7-9 mo.

Wolf/wolverine at 10 mo.

3/26 (12%) Not recovered at 10 mo.

## Nonpredation (9/26, 35%)

2 Rockslide at 2 and 14 d.

Fall at 1 mo.

Pneumonia at 45 d.

2 Avalanches at  $\pm$  6 and 7 mo.

Unknown nonpred at 6 mo.

2 Malnutrition at 7 and 8 mo.

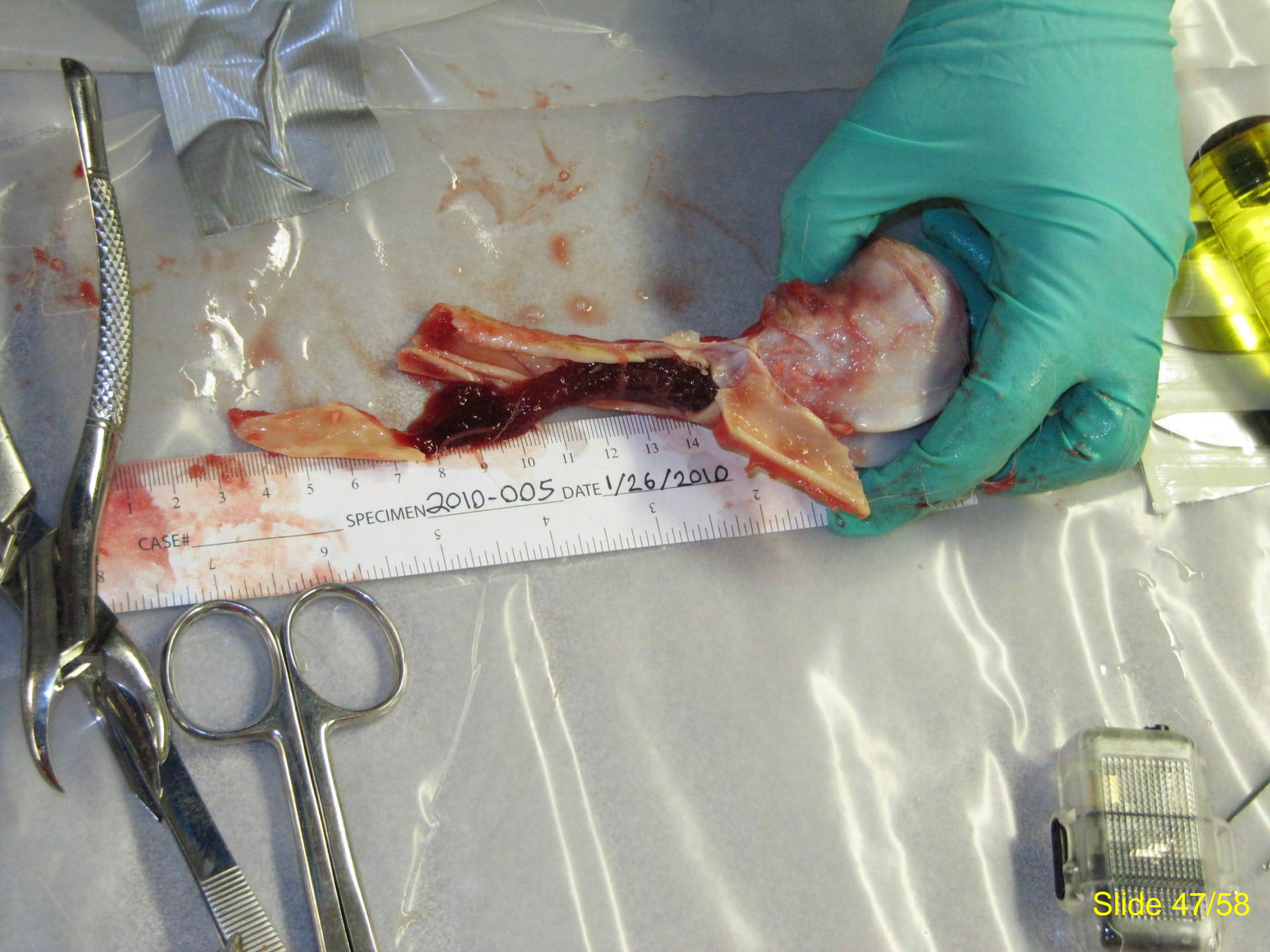






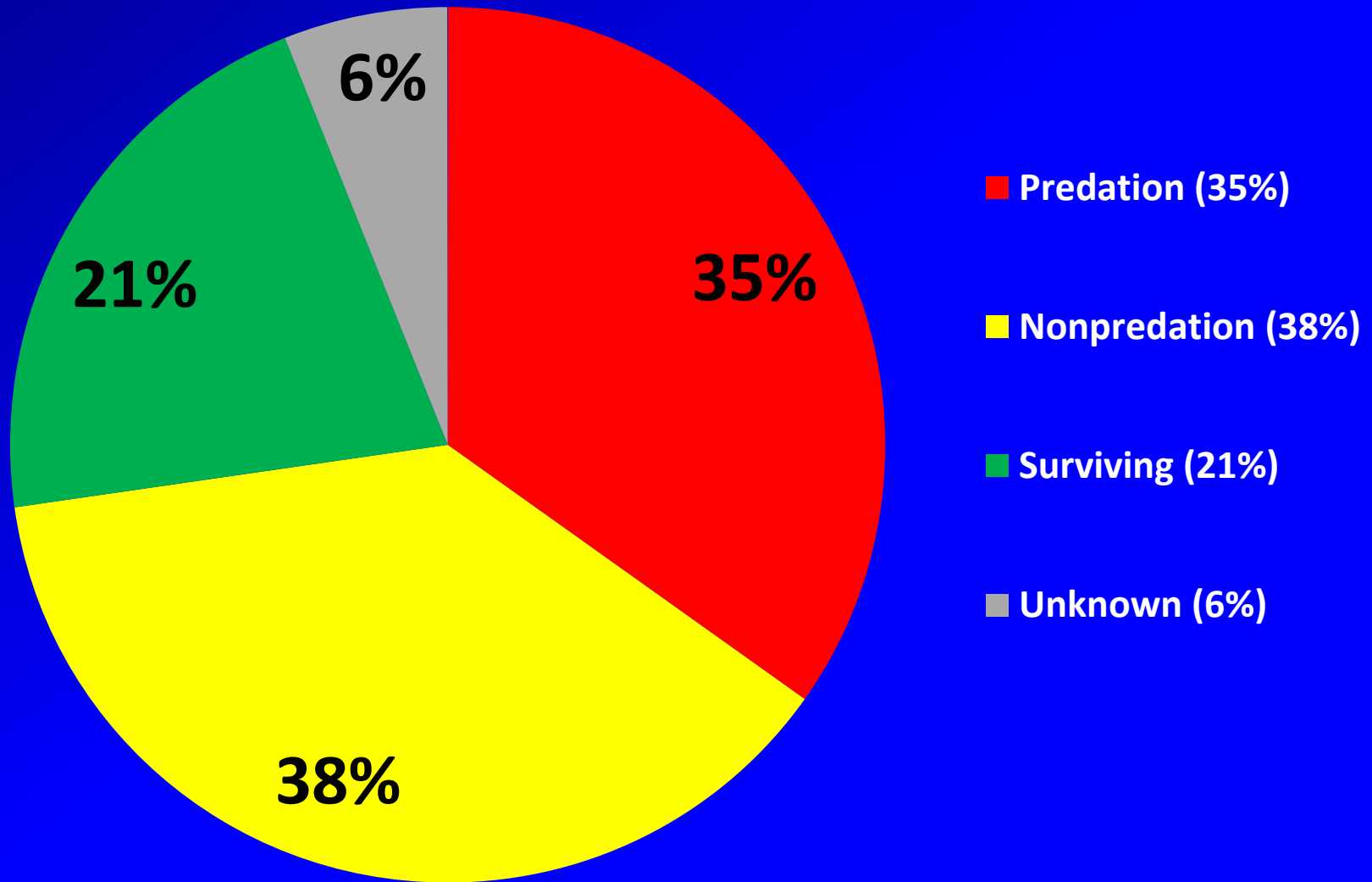






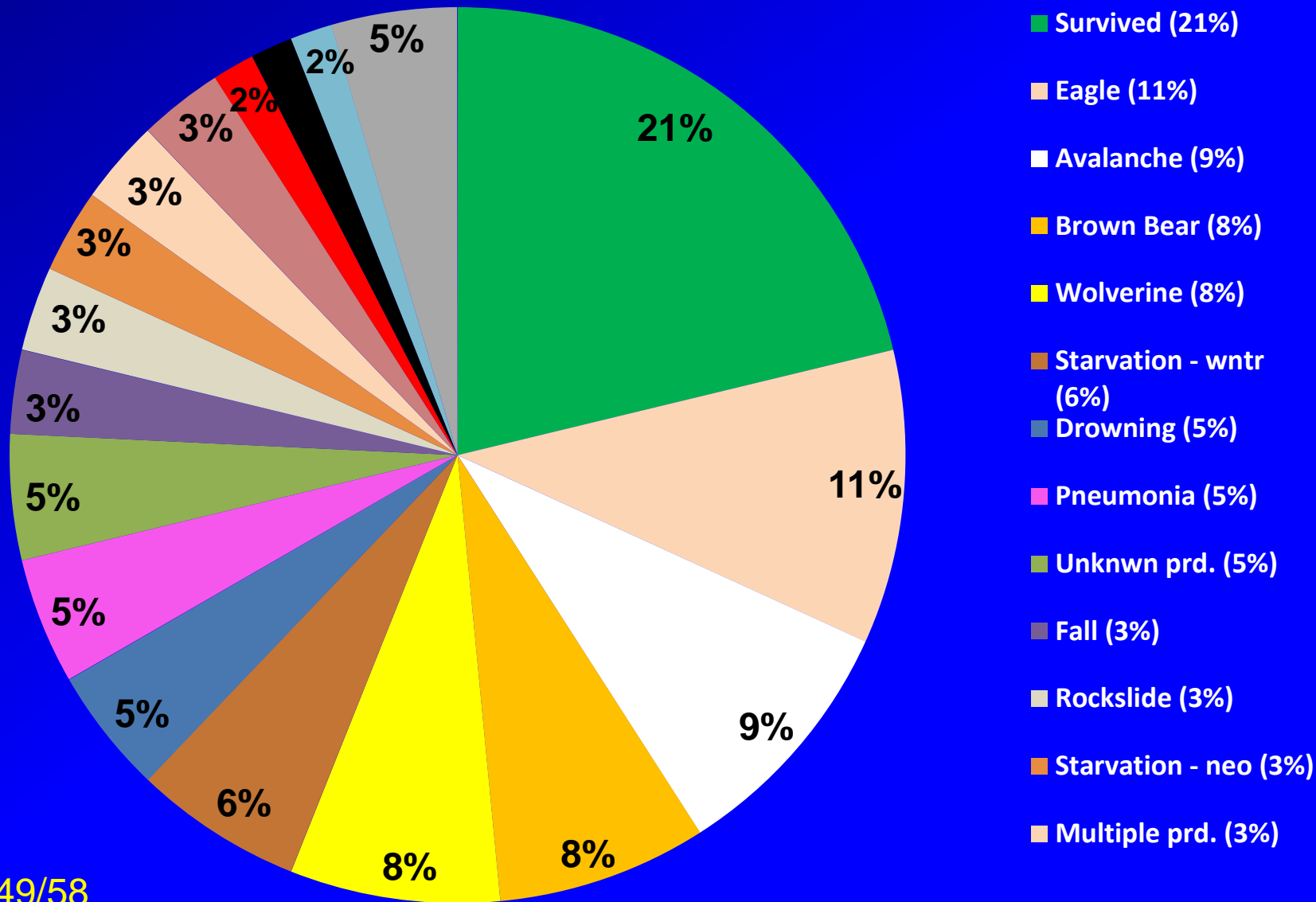
CASE#  
SPECIMEN 2010-005 DATE 1/26/2010

# GMU 13D - Fate of 2009-2011 lambs (n=66)





# GMU 13D - Fate of 2009-2011 lambs (n=66)



# Preliminary observations lamb mortality – GMU 14C

26 lambs collared and monitored beginning in  
May 2012

6 killed by eagles (5/2012-6/2012)

1 killed by coyote (5/2012)

1 drowned (6/2012)

# Summary - GMU 13D

Annual adult survival rate  $\approx$  91%

AK range 1999-2003 = 76-91% (Arthur 2003)

Brooks 2009-2011 = 77-88% (Arthur 2012)

22% adult mortality due to predation

78% adult mortality to nonpredation

AK range 1999-2003 = 100% adult mortality to predation

Brooks 2009-2011 = 100% adult mortality to predation

(Arthur 2003; Arthur 2012)

# Summary - GMU 13D

Lamb survival to 1 year 2009-2011  $\approx$  42%, 9%, 15%, respectively

AK range 1999-2003 = 12%, 23%, 16%, 36% (Arthur 2003)

Brooks 2009-2011 = 68%, 48%, 28% (Arthur 2012)

50% of lamb mortality due to predation (24/48 lamb deaths caused by predators)

AK range 1999-2003 = 90% (Arthur 2012)

Brooks 2009-2011 = 72% (Arthur 2012)

50% of lamb mortality to nonpredation

# Preliminary conclusions - GMU 13D

Predation -Accounts for only 1/5 adult, 1/2 lamb deaths

Low percentage, and broad distribution across predator species suggests population is not predation limited

Disease - Low presence/prevalence major wildlife diseases

Disease does not have population-level effects

Some animals succumb to pneumonia (additional stressors?) but overall, disease not a major factor

# Preliminary conclusions - GMU 13D

Annual pregnancy rates in 3 of 4 years (62%, 88%, 66%, and 21%) lower than observed in other populations

Appears to be chronically low, suggests nutrition/  
habitat/weather issue

Low lamb survival combined with low productivity is a concern.

Population not growing at this time

# Future direction – GMU 13D

GMU 13D-

Slated to end after 2013 project year (it's time to ask more focused questions)

Upcoming analyses:

- Long term reproductive history

- Predation effects since hare decline

- Weather/limited winter range due to snow/ice?

  - Satellite imagery

  - Temperature records

- Trace mineral levels

# Future Direction - GMU 14C

2 year study, March 2012 - June 2014

30-35 ewes – captured once each year

20-25 rams – captured once, radiocollared, monitored for movement and survival

25-30 lambs/year



# Research Goals – GMU 14C

Are demographics similar to other areas of the Chugach?

Weather

Predation

Habitat

Can we generalize data across southcentral Alaska?

Information on ram movement, dispersal, distribution, survival rates – Evaluate “full curl” harvest

# Thanks

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