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

Tom Lohuis, Alaska Department of Fish and Game, Anchorage, AK

Study area background and goals

13D – Declining sheep population

Study area guesstimates

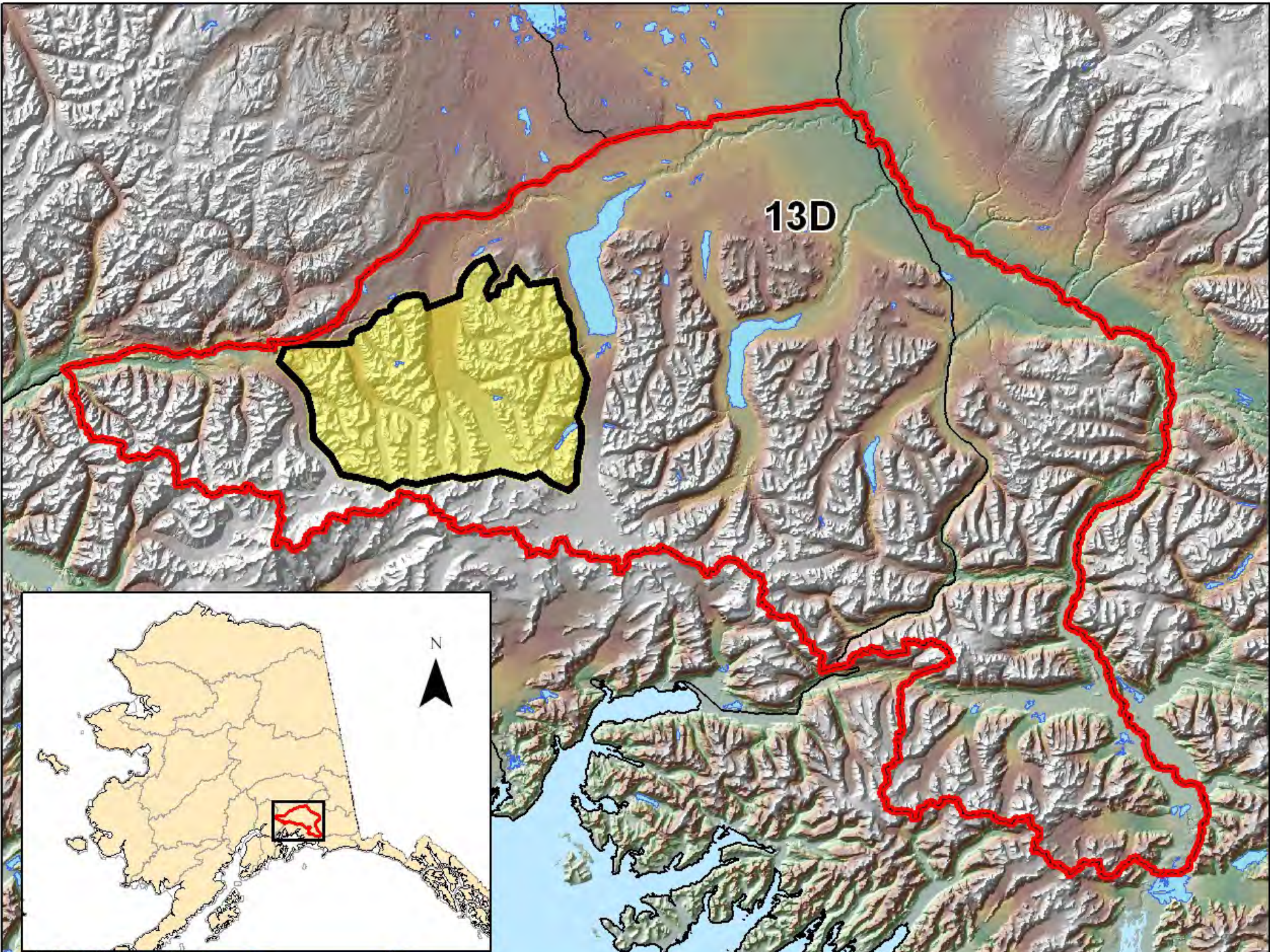
≈650-750 1960s through 1980s

≈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
N

Study area background and goals

14C – Cyclic sheep population

GMU-wide guesstimates

≈900-1100 1970s through early 1980s

≈2000-2100 late 1980s through 2000

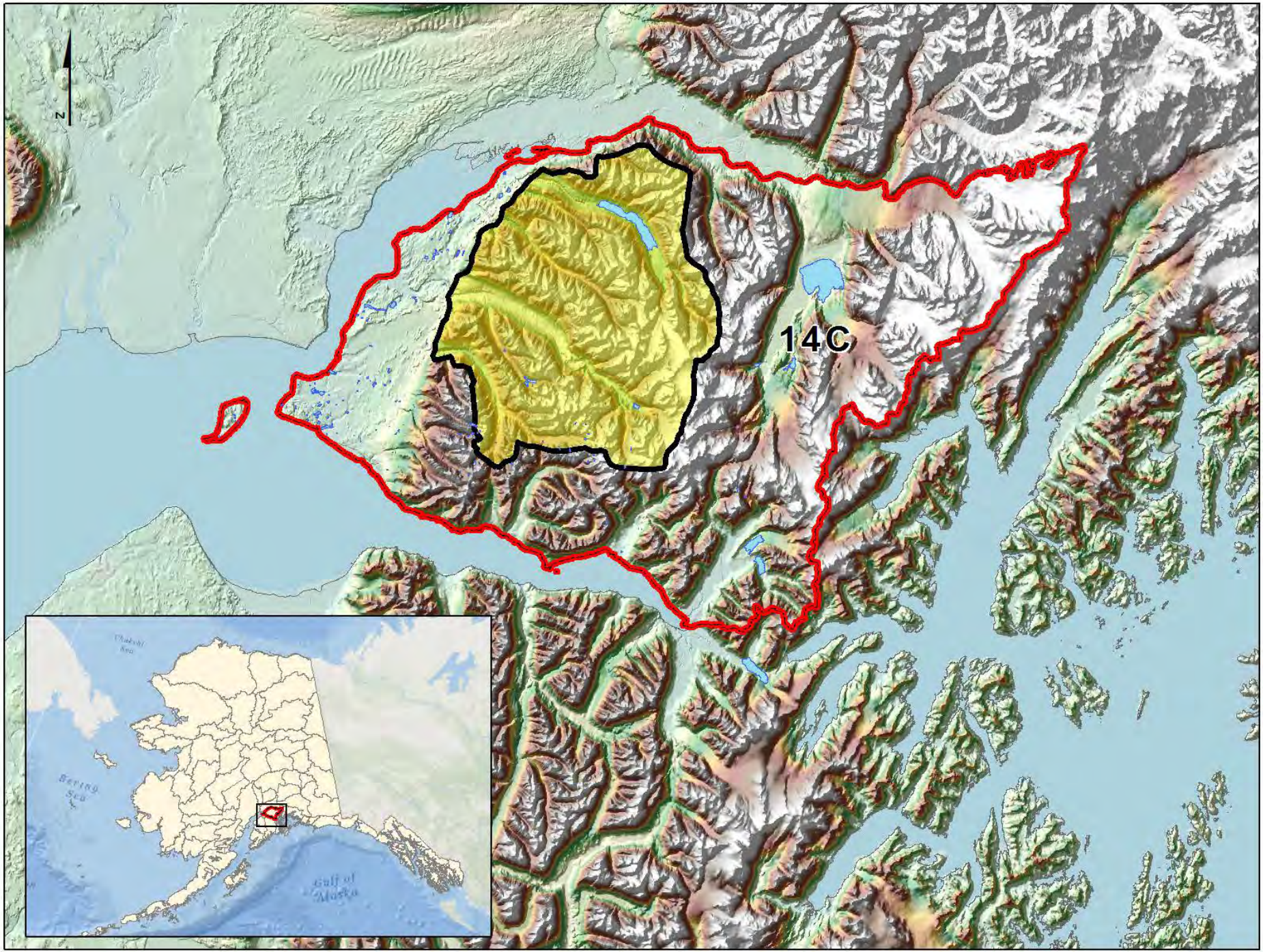
≈900-1000 2007 through 2011

≈1000-1100 2014 and 2015

- Trajectory 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 3-8 year old rams?


N
14C
Chukchi Sea
Bering Sea
Gulf of Alaska

Species 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%

Annual adult survival = 85%

Species 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

Captures and handling

GMU 13D ≈ 40 adult ewes captured/recaptured annually, March 2009-2014

GMU 14C - 35 adult ewes captured/recaptured annually, March 2012-2016, 19 juvenile rams captured and monitored 2012-2016

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

Captures and handling

Extremely stressful event for animal

- Limit helicopter chase time
- Slow them down before netting
- Monitor body temperature
- Limit handling time

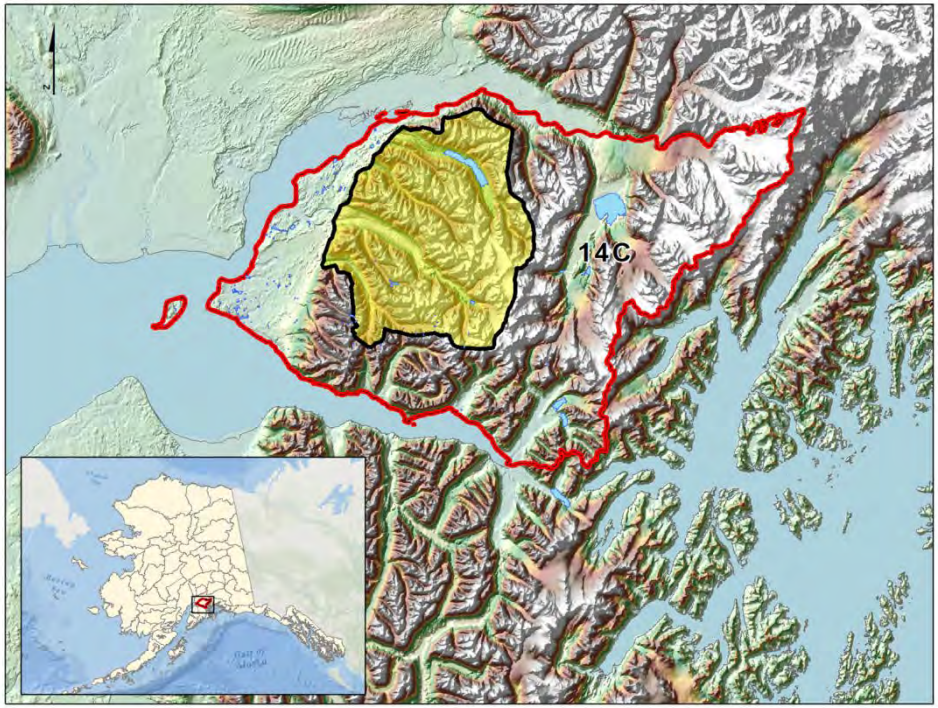

R44
Raven II

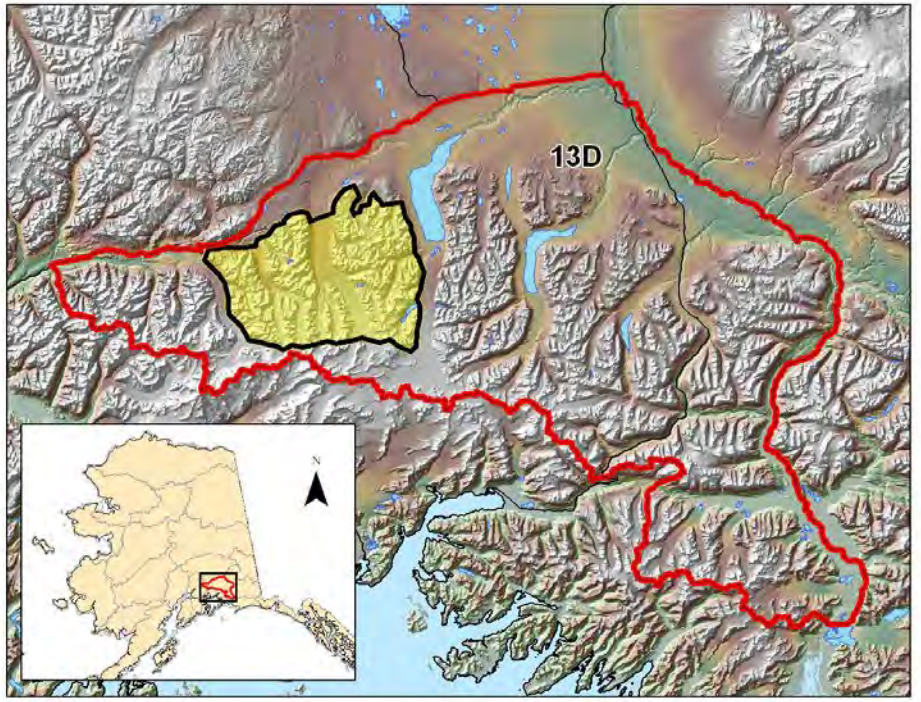

R44
Raven II


R44
Raven II


Pollux
aviation
R44
N7528Z

Results





Nutritional condition

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

14C ewes slightly better than 13D

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 ewes captured in Brooks and AK ranges all carry SQ fat and are well-muscled

Pregnancy rates

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

GMU 13D	GMU 14C
2009 - 62%	
2010 - 88%	
2011 - 69%	
2012 - 21%*	2012 - 44%
2013 - 85%	2013 - 94%
2014 - 18%**	2014 - 91%
	2015 - 96%
	2016 - 72%

Disease

Swabs cultured for bacteriology; blood samples for serology

50% - 60% positive for bacteria thought to be endemic to wild sheep herds in L48 and AK

No evidence of Mycoplasma ovipneumoniae

Extremely small number of animals positive for exposure to viral diseases, parasites

Monitoring

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


Adult Mortality

Adult Mortality

Ewe mortality

GMU 14C

17 mortalities 3/2012-Present

134 sheep-years of data

≈13.0 % adult mortality/year

GMU 13D

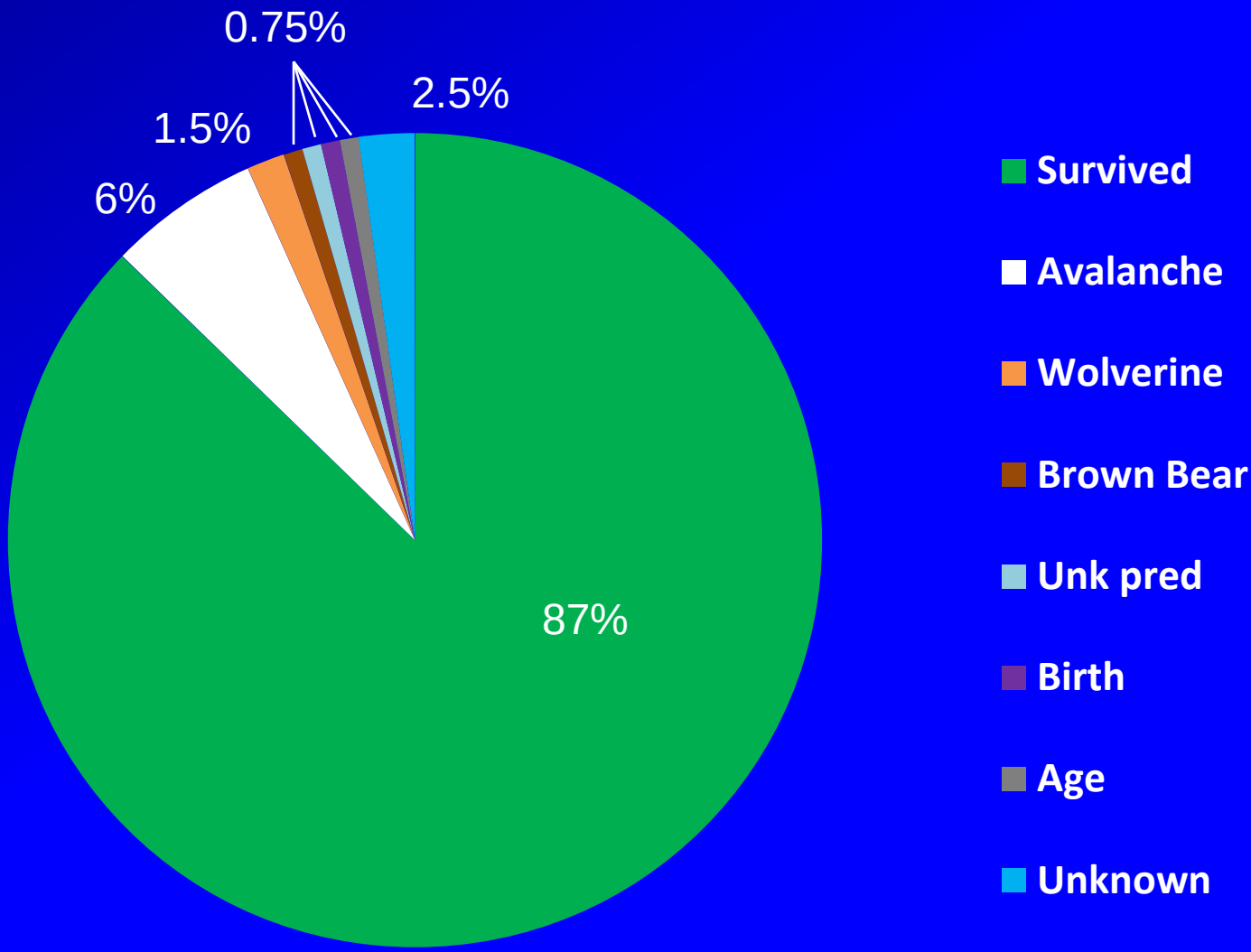
24 mortalities 3/2009-6/2014

183 sheep – years of data

≈13.0 % adult mortality/year

Ewe mortality – GMU 14C

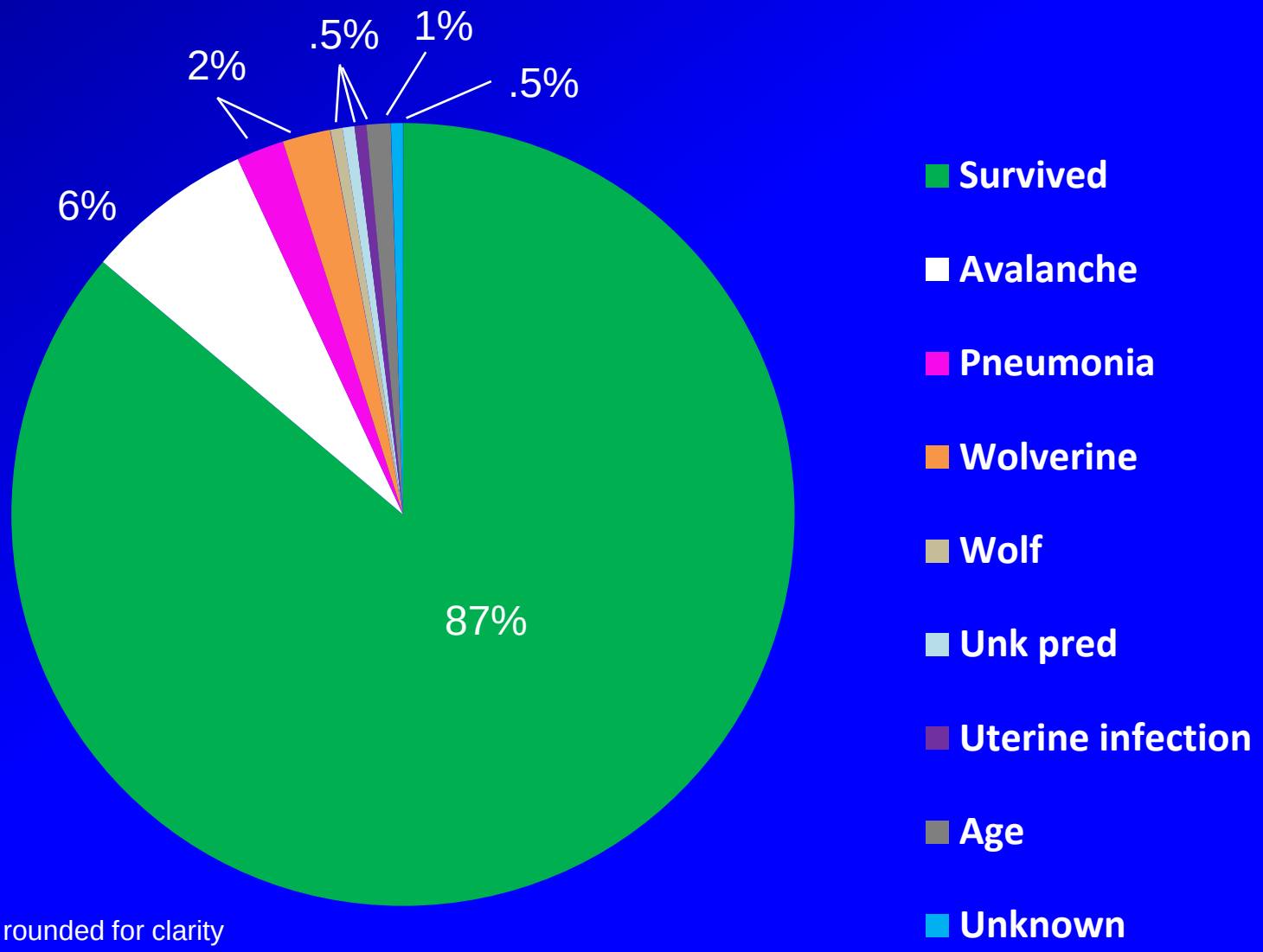
134 sheep-years of data, 17 deaths



Note: Percentages rounded for clarity

Ewe mortality – GMU 13D

183 sheep-years of data, 24 deaths



Note: Percentages rounded for clarity


Lamb Captures - May 15-June 15

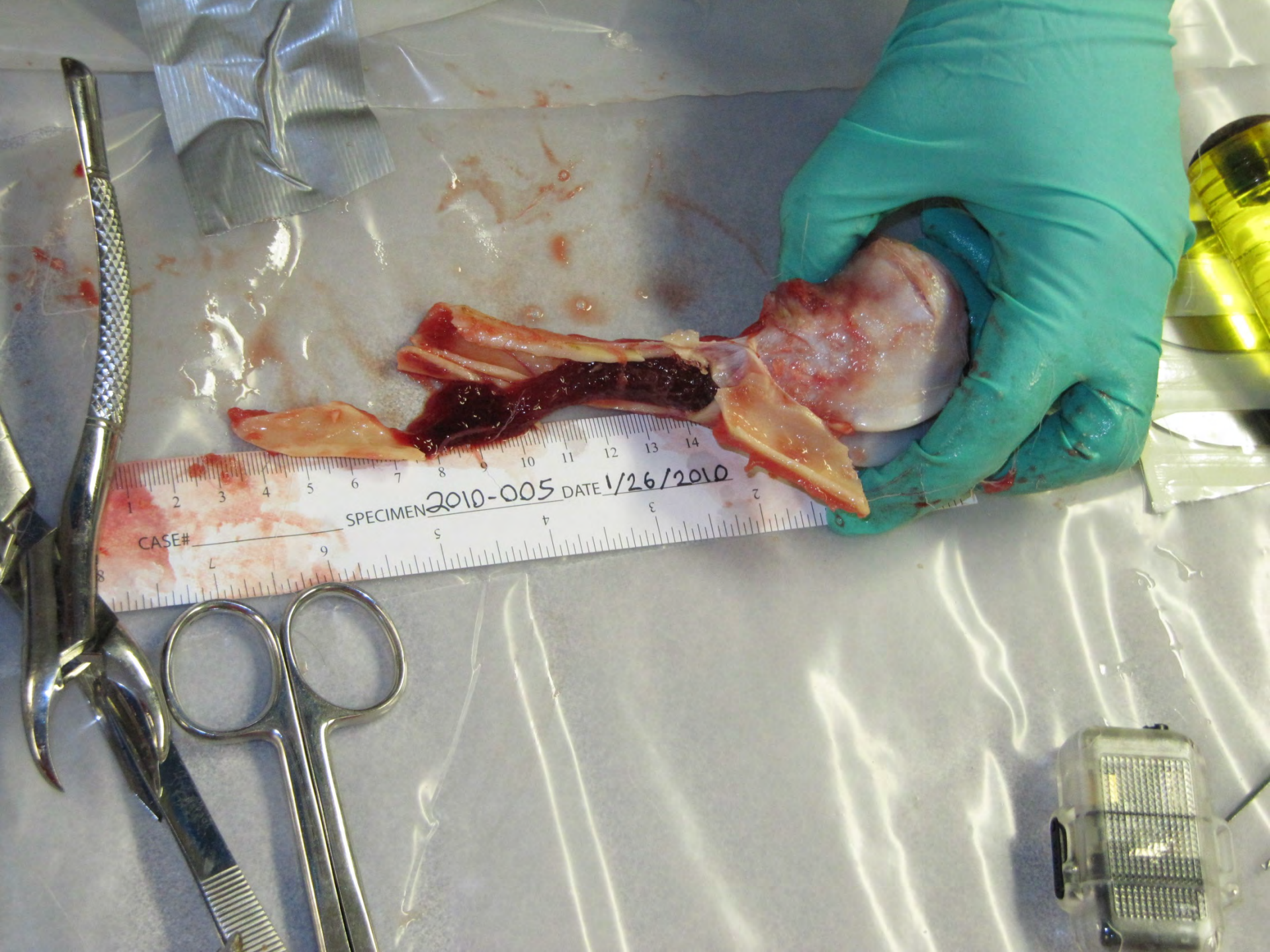

630313

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


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

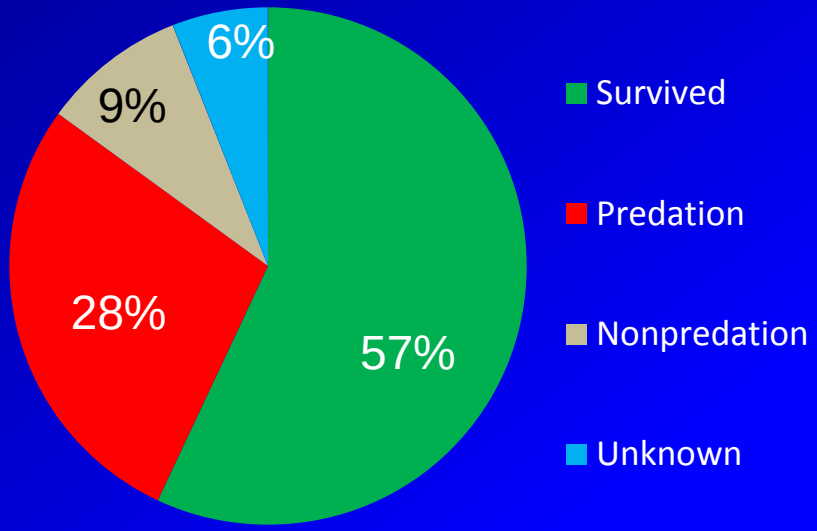
Lamb survival rates

GMU 13D	GMU 14C
2009 - 42%	
2010 - 9%	
2011 - 15%	
2012 - 64%*	2012 - 66%
2013 - 50%	2013 - 64%*
	2014 - 42%

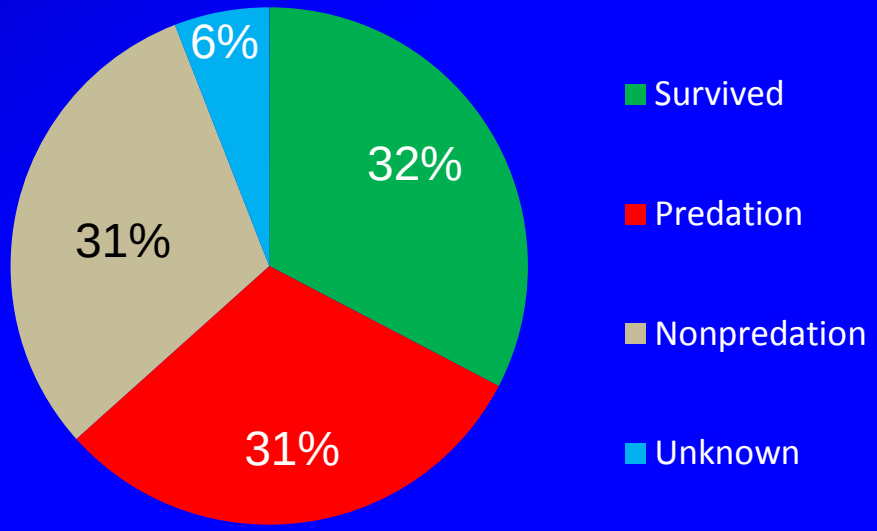
* Small sample size

Fate of newborn lambs

GMU 14C



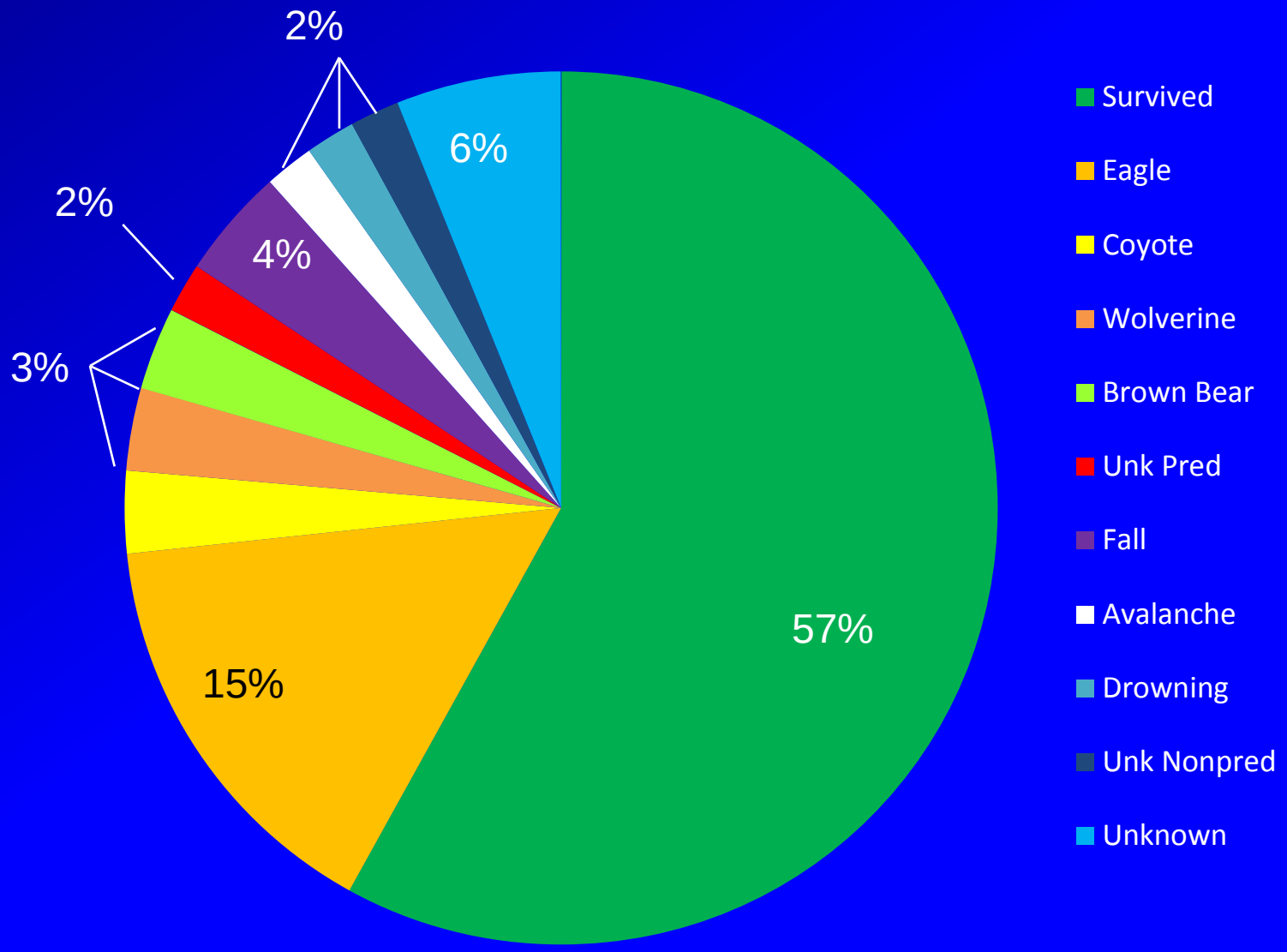
GMU 13D



Note: Percentages rounded for clarity

Lamb fates – GMU 14C

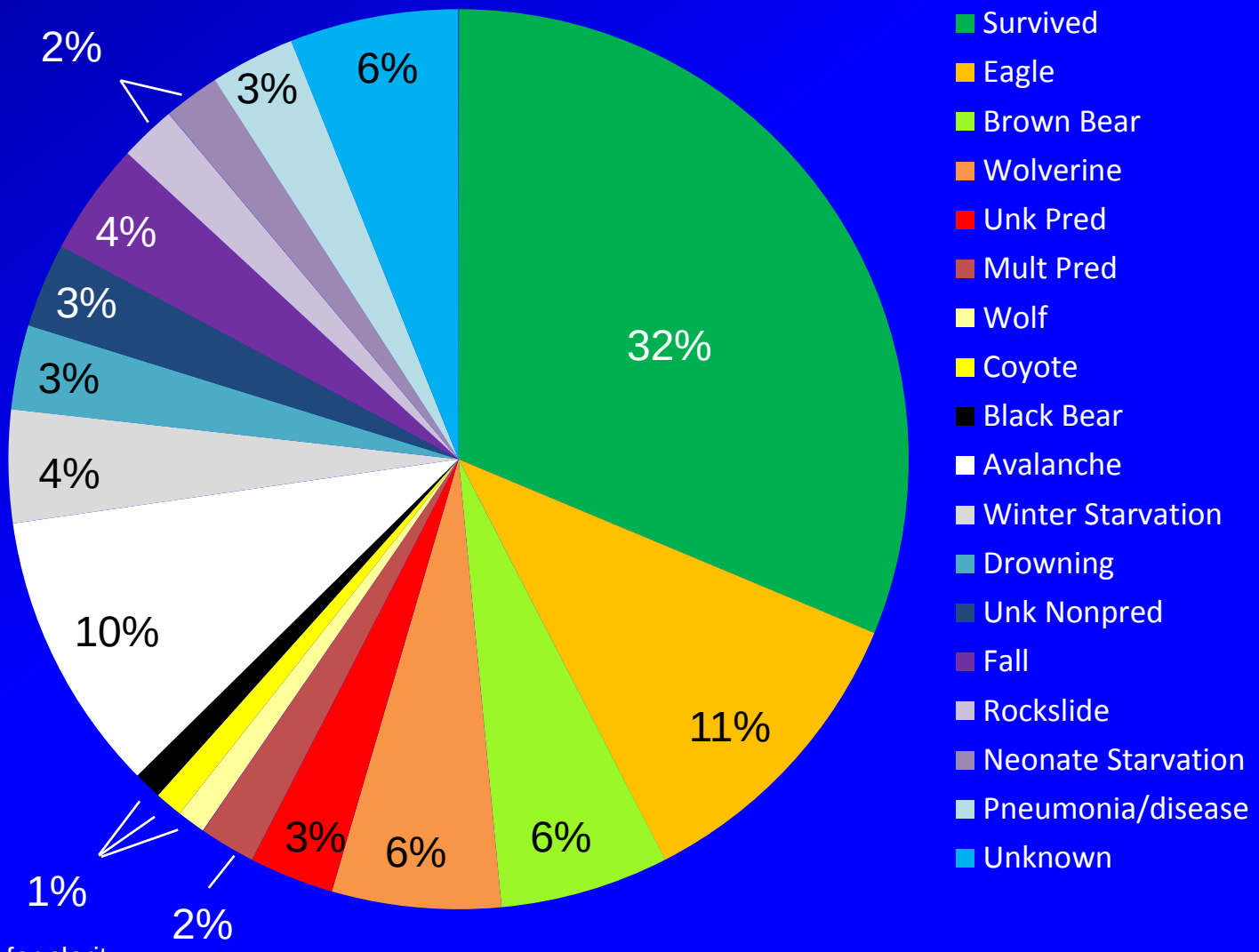
2012-2014, n=54



Note: Percentages rounded for clarity

Lamb fates – GMU 13D

2009-2013, n=101



Note: Percentages rounded for clarity

Summary – Adult survival

Annual adult survival rate both subunits ≈ 87%

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

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

17% (13D) and 24% (14C) adult mortality due to predation

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

Brooks 2009-2011 = 100% adult mortality to predation

(Arthur 2003; Arthur 2012)

Lamb survival - GMU 13D

Lamb survival to 1 year 2009-2013 ≈ 42, 9, 15, 64, 50% respectively (36% average)

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 (31/62 diagnosed lamb deaths caused by predators)

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

Brooks 2009-2011 = 72% (Arthur 2012)

Lamb survival - GMU 14C

Lamb survival to 1 year 2012-2014 ≈ 66, 64, 42%

(57% average)

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

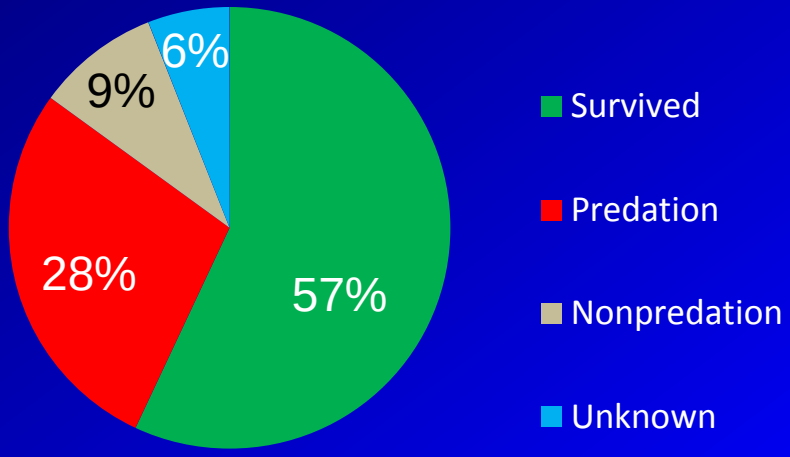
Brooks 2009-2011 = 68, 48, 28% (Arthur 2012)

Although 75% of lamb mortality due to predation (15/20 diagnosed lamb deaths caused by predators), survival is high and only 1 in 3 lambs that are born are killed by predators

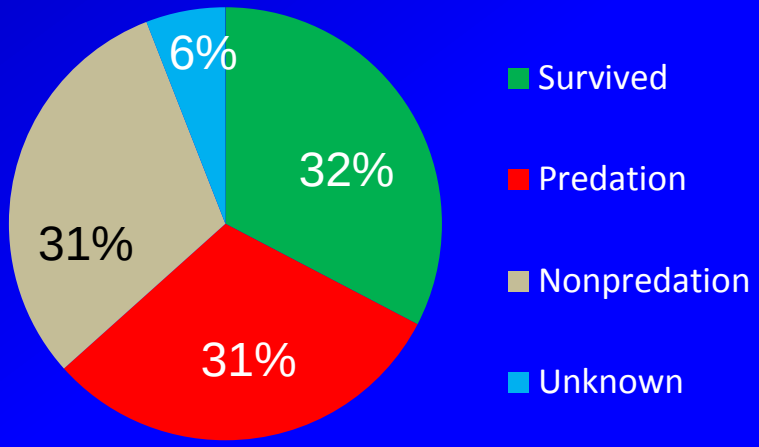
AK range 1999-2003 = 90% (Arthur 2012)

Brooks 2009-2011 = 72% (Arthur 2012)

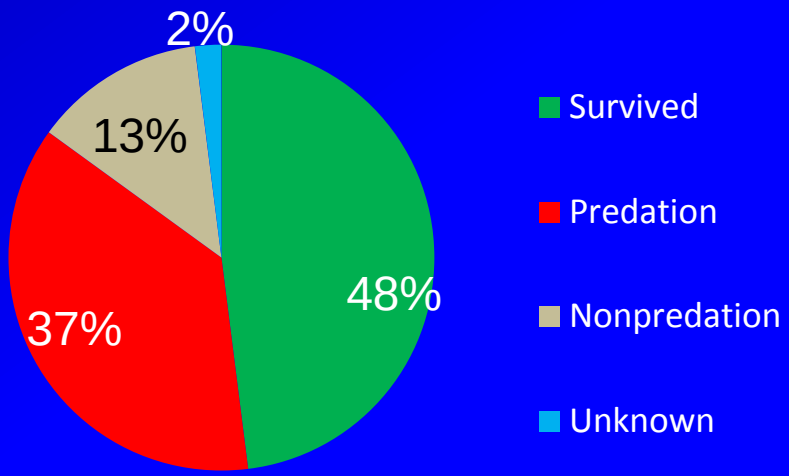
GMU 14C



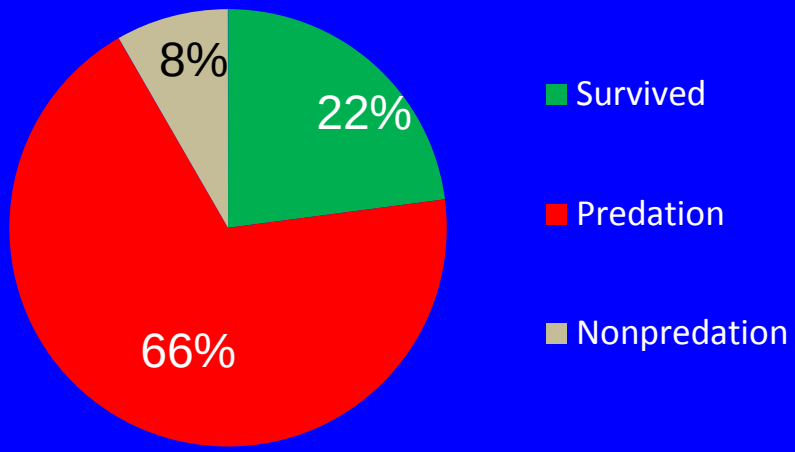
GMU 13D



GMU 24A



GMU 20A



Note: 24A and 20A data from S. Arthur, 2003 and 2013. Percentages rounded for clarity

Conclusions

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

In 14C, 3/4 lamb deaths are due to predation but overall lamb survival very good

Low percentage, and broad distribution across predator species suggests populations are not predation limited

Conclusions

Disease -

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

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

No evidence of Mycoplasma ovipenumoniae

Conclusions

13D - Annual pregnancy rates of 62%, 88%, 66%, 21%, 91%, and 18%.

14C - Annual pregnancy rates of 44%, 91%, 94%, 96%, 72%.

Low and variable compared to other thinhorn sheep populations

Conclusions

Low and/or variable pregnancy rates coupled with poor body condition strongly suggests nutrition/habitat/weather issue

Population appears close to carrying capacity

Current Research Questions

How do long term weather patterns affect sheep and/or habitat?

Can we estimate carrying capacity?

How many sheep should we expect the range to support?

-Estimate amount of habitat

-Estimate nutrition available in that habitat

Current Research Questions

Is summer or winter habitat limiting?

- Summer plant growth and protein
- Winter snowpack, temperature, avalanches

How do vegetation community changes and tree/shrub advance (Dial et al 2007) affect sheep populations?

- Have we lost sheep habitat?
- Does the nutritional content of sheep browse change as a function of summer weather?

Current Research Questions

Remote sensing/historical imagery to determine extent of historic habitat (Tom Day MS research, APU)

Maintain ~30 GPS collared animals to determine current habitat use (Kyle Smith MS research, APU)

Current – historical = estimate of habitat loss

Observational work to determine diet items and nutritional content (Luke Metherell BSc research, UAA)

Continue with annual captures and monitoring - body condition, pregnancy, mortalities

Additional research topics

Life history of rams?

- Mortality patterns appear similar to ewes
  - Additional hunting opportunity?

- Movement and dispersal
- Horn growth, annuli formation

Sightability

- Improve reliability, consistency of counts
- How many do we see vs how many are there?

North Wrangell Mountains project

Initiated Fall 2016

Focus on 3-6 year old rams, 40 GPS collars deployed

Nabesna Glacier to Sanford Glacier

Distributed between hard park and preserve

Density, weather, habitat similar between park and preserve

North Wrangell Mountains project
Research Goals

Baseline information on ram populations

Rates and causes of mortality, disease screen

Home range, movement, dispersal

Do management area boundaries accurately reflect sheep movement and home ranges?

North Wrangell Mountains project
Research Goals

Test dominance related mortality hypothesis –

Hard park – Hunted under subsistence, any ram

1/3 harvest mature rams, 1/3 4-6 y.o., 1/3 ≤ 4 y.o.

Preserve – Hunted under full curl

All harvest mature rams

Harvest similar proportion of population in hard park and preserve

North Wrangell Mountains project
Research Goals

Dominance related mortality hypothesis

(Geist 1971)

Male survival lower due to participation in rut

Heavy harvest of large rams increases the mortality of younger rams with increased rutting behavior

North Wrangell Mountains project
Research Goals

Measure energy expenditure during the rut and compare hard park to preserve

Pre- and post-rut capture

weights, measure fat and protein with ultrasound, triaxial accelerometer “fitbit”

Mike Harrington, Becky Schwanke, Tony Kavalok, Thomas McDonough, Chris Brockman, Gino Del Frate, Kyle Smith, Cory Stantorf, Brianne Boan, Wade Schock, Dave Battle, Todd Rinaldi, Tim Peltier

Mike Meekin, Mike Litzen, Matt Keller, Mark Shelton, David Rivers, Tommy Levanger, Chris Jordan, Troy Cambier, Joe Fieldman, Brandon Silvie, Chris Ramsey, Harley McMahon

Thanks!