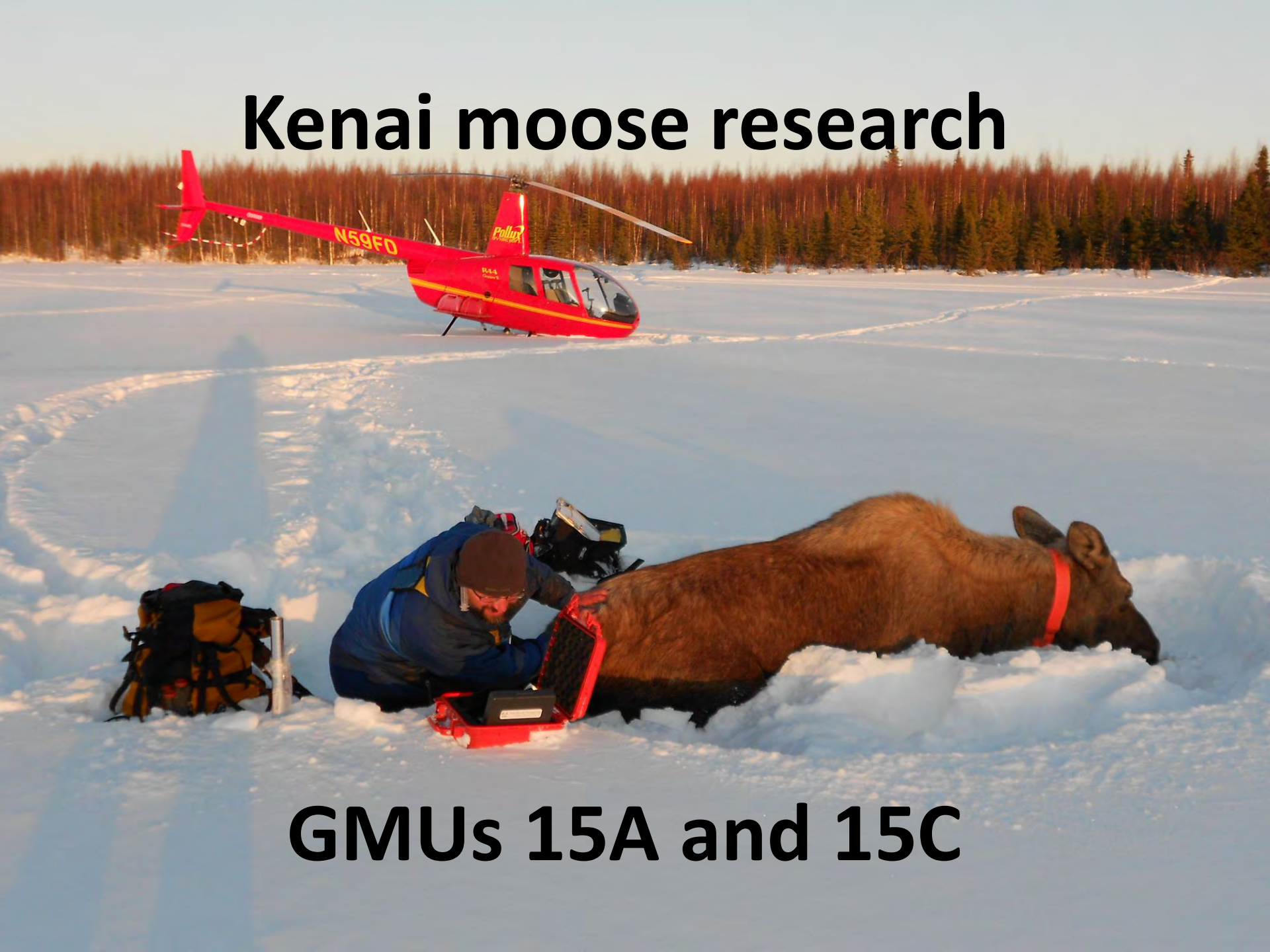
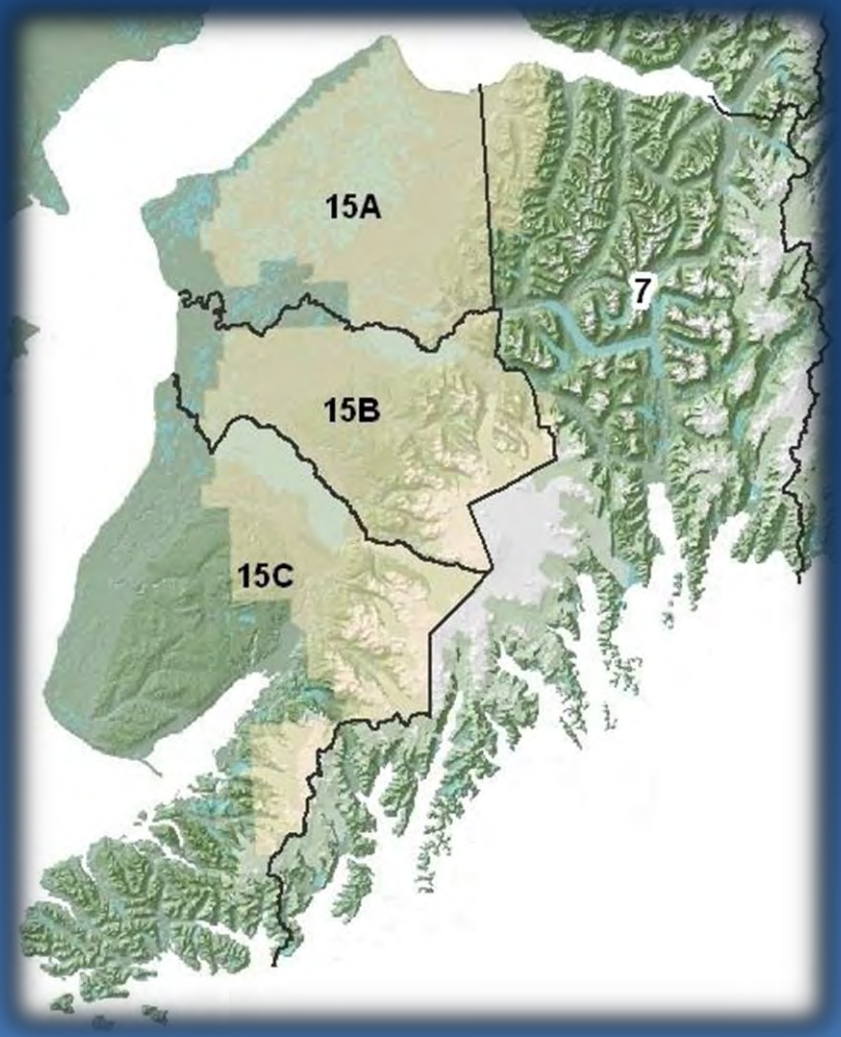
Kenai moose research



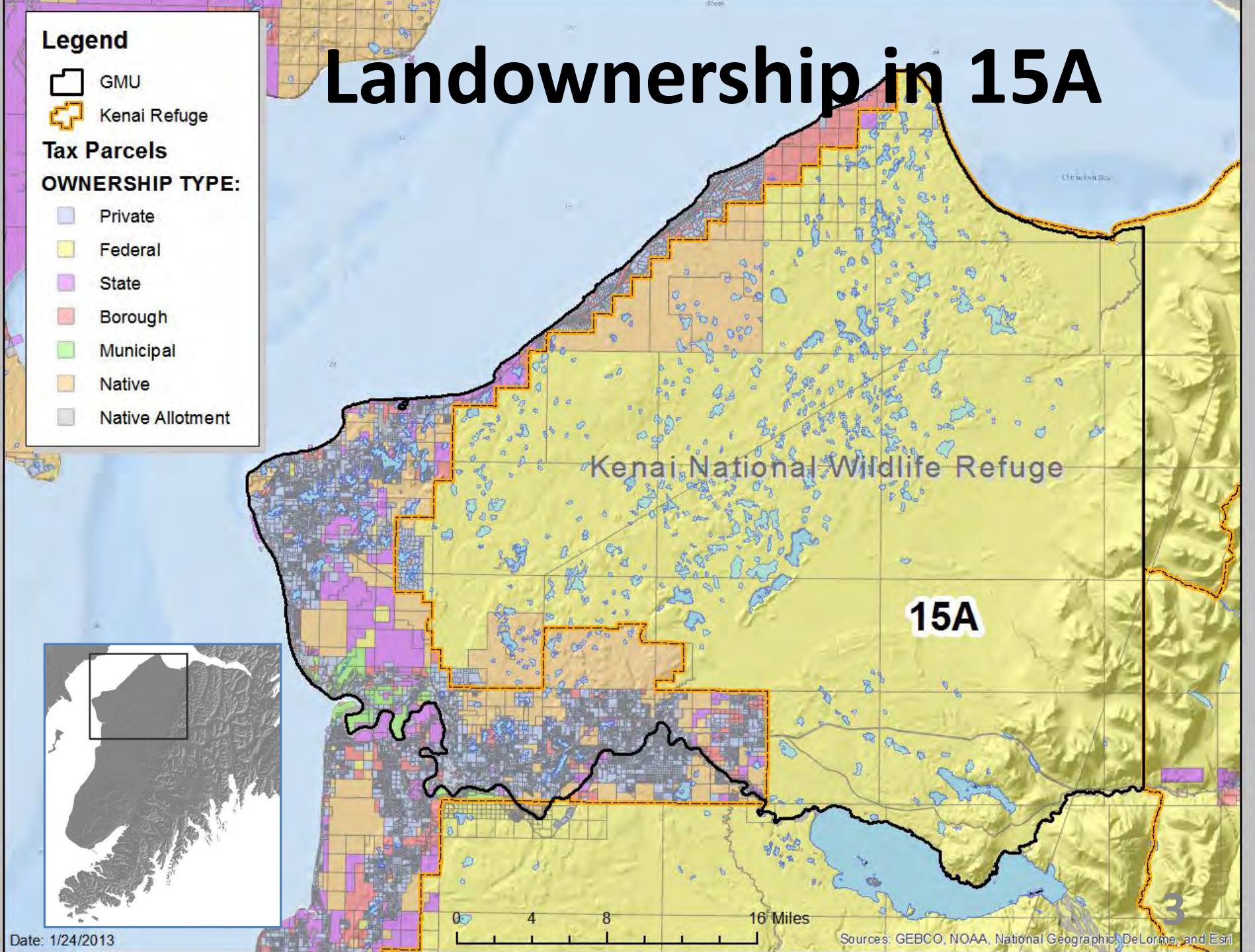
GMUs 15A and 15C

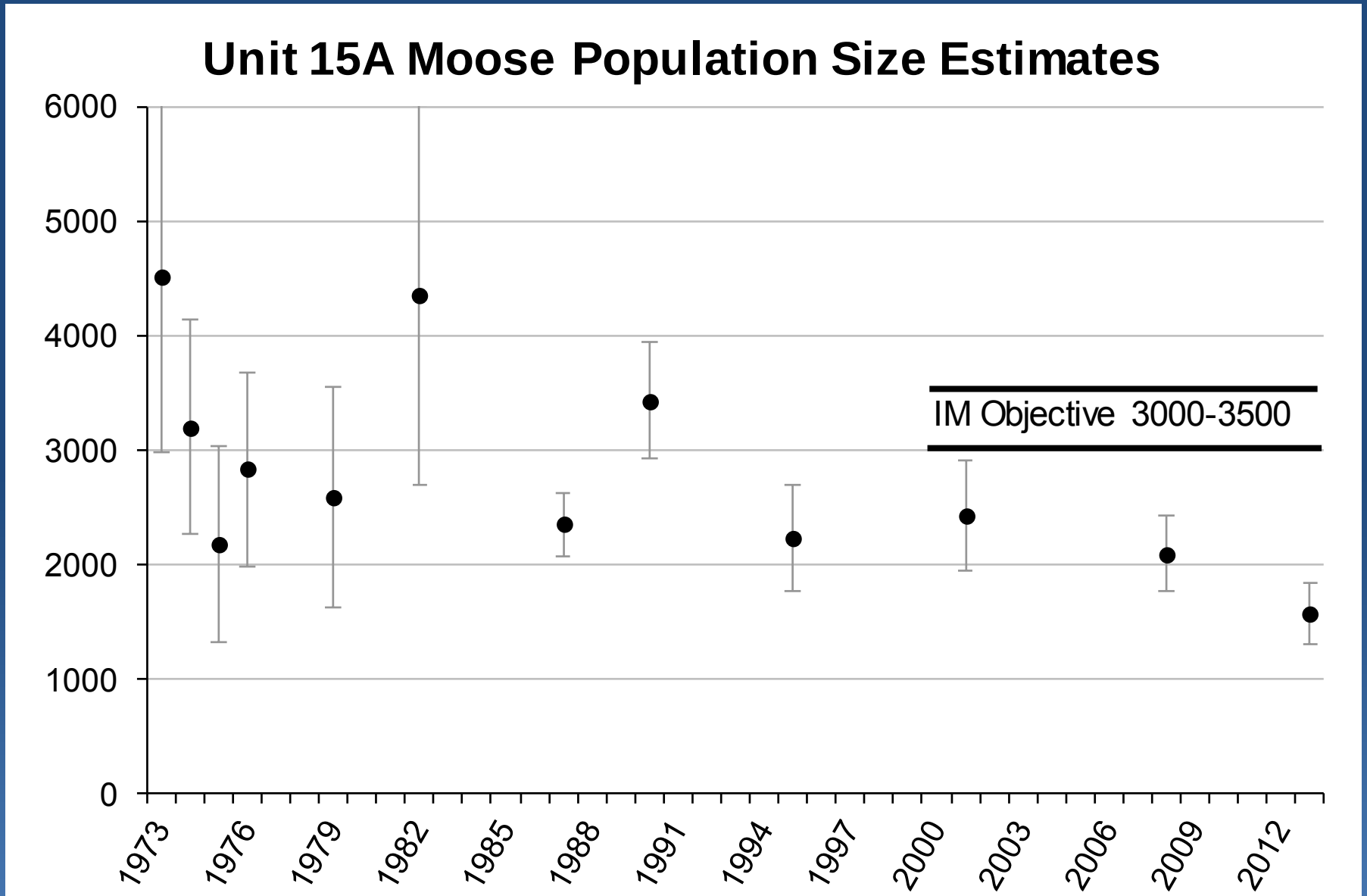
IM areas 15A and 15C



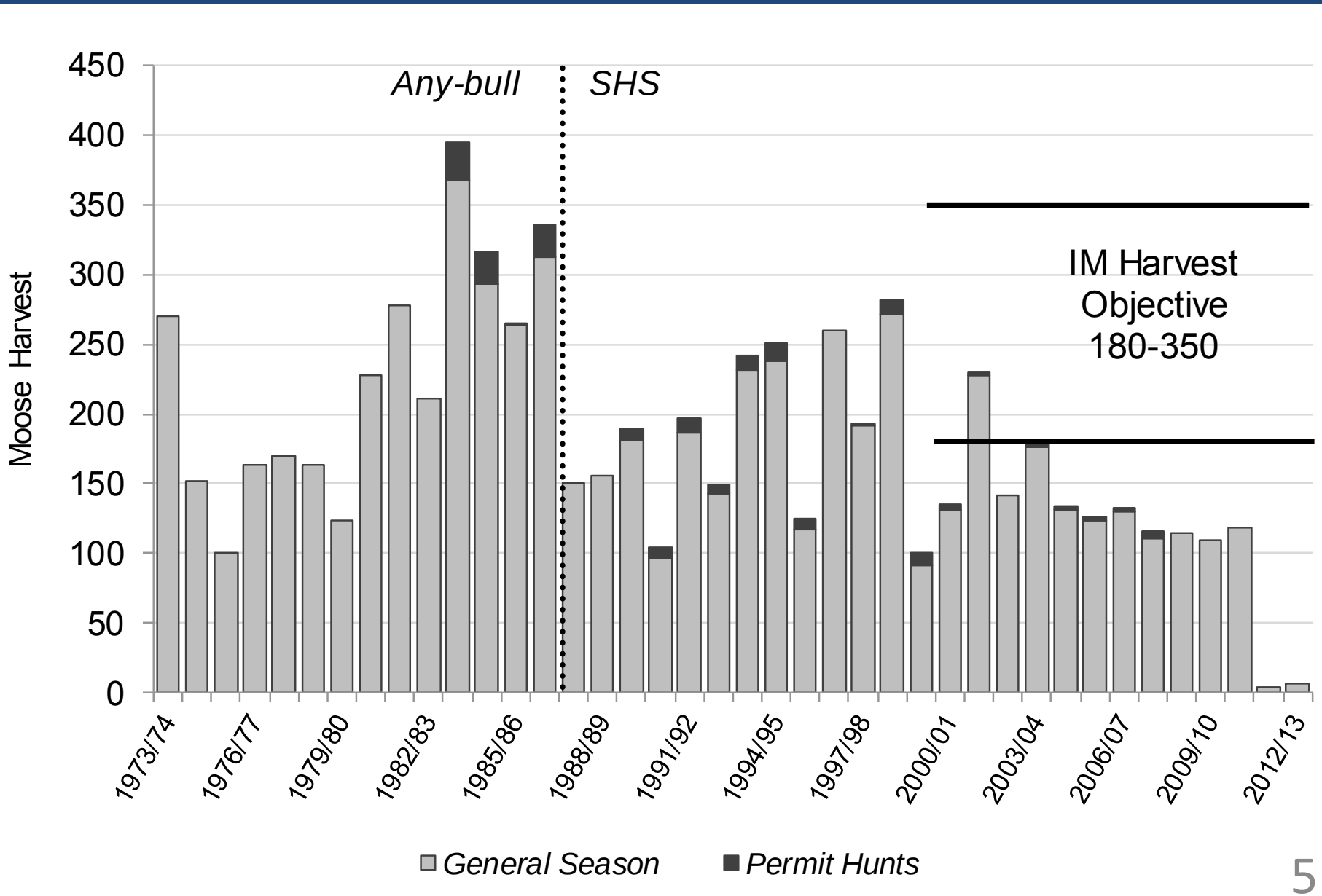
- Review history
- Productivity and survival studies in 15A and 15C
- Calf mortality study in 15C
- Future research plans

Landownership in 15A

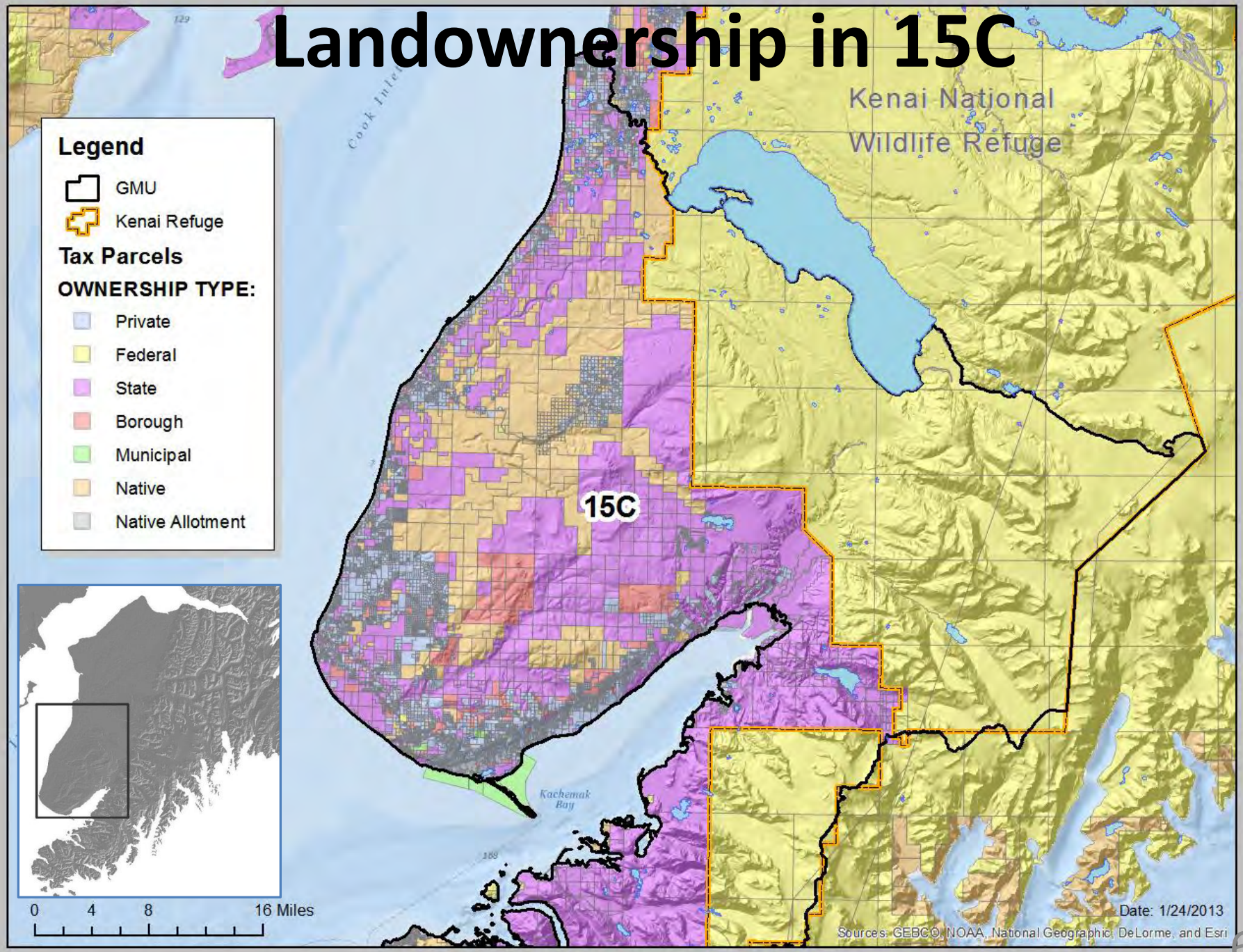



Unit 15A Moose Population Size Estimates
6000
5000
4000
3000
2000
1000
0
IM Objective 3000-3500
1973
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012

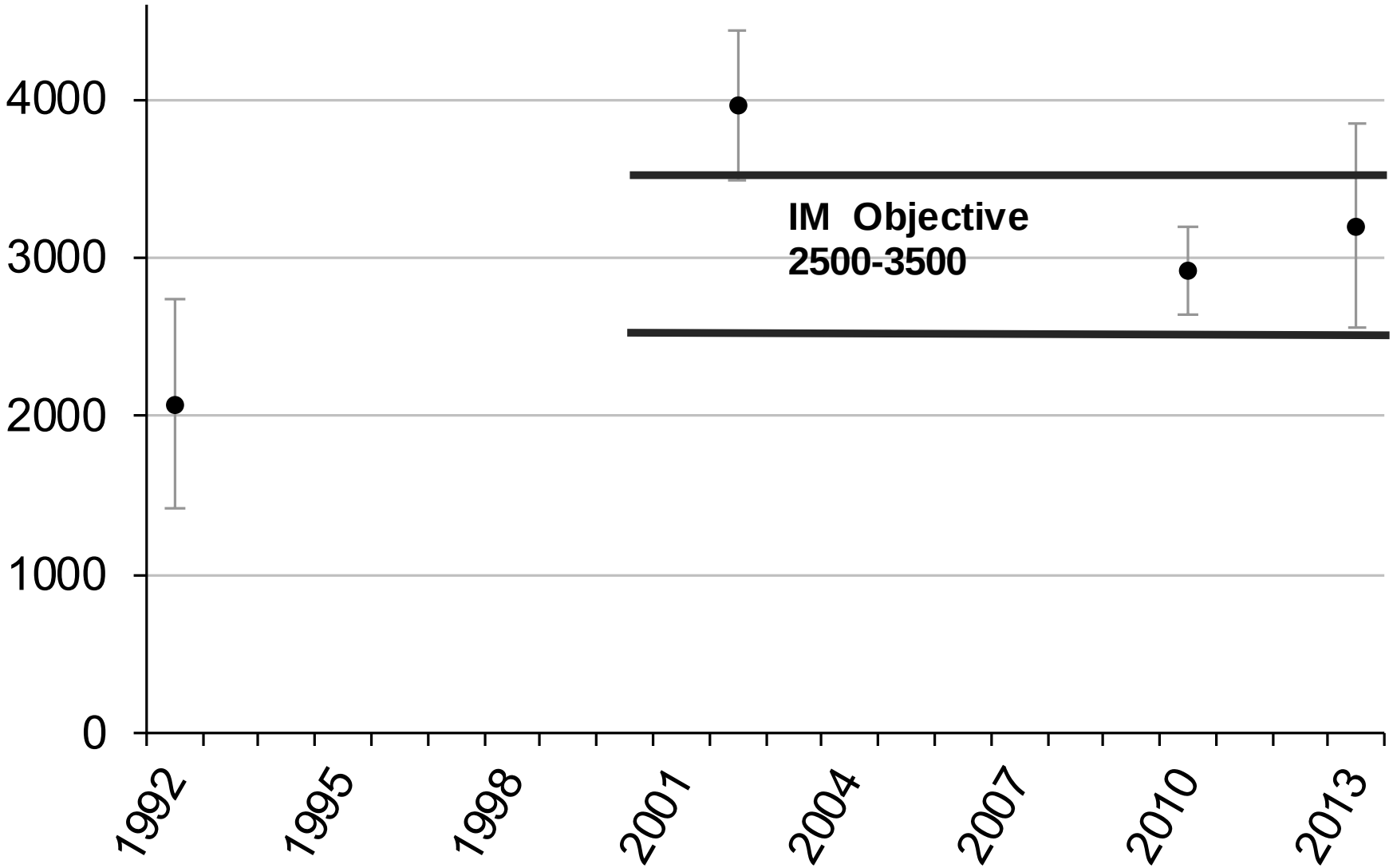
15A moose harvest



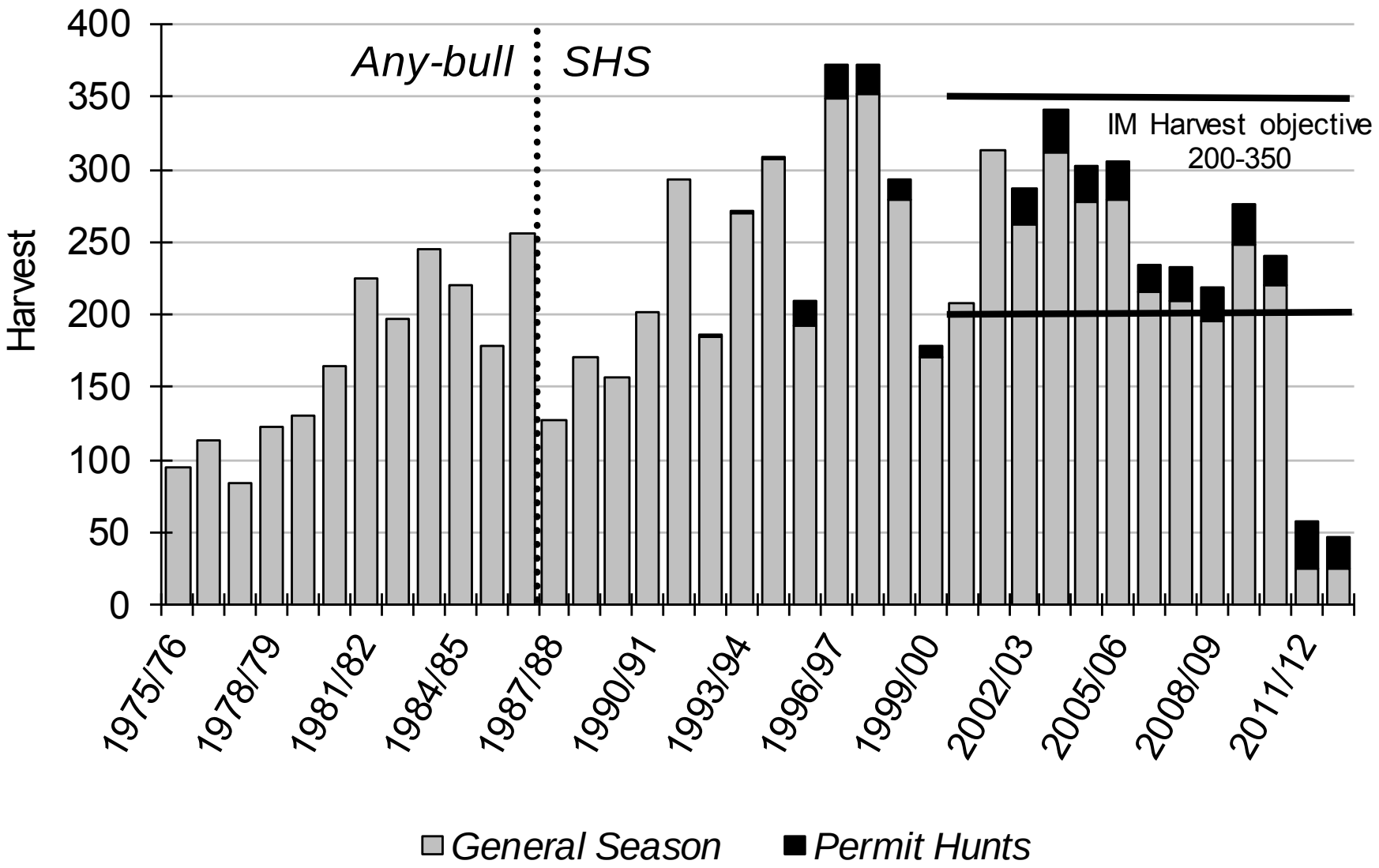
Landownership in 15C



Unit 15C Moose Population Size Estimates



15C moose harvest

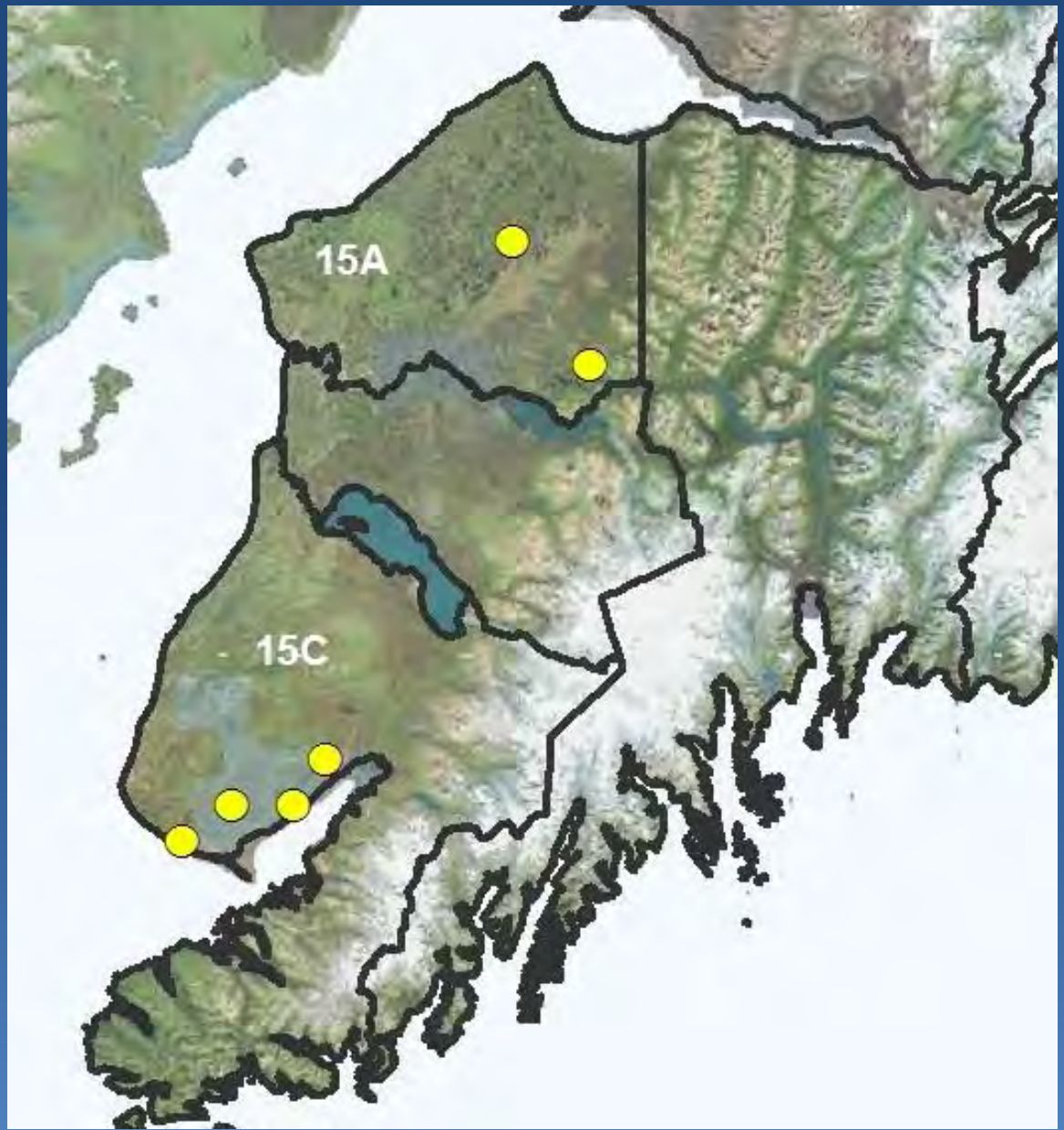


Methods / Data collected

- Snow history
- Collared 50 cows in each subunit and measured:
  - Age
  - Seasonal body condition
  - % pregnancy, twinning, and parturition
  - Timing of parturition
  - Cow survival
  - Calf survival

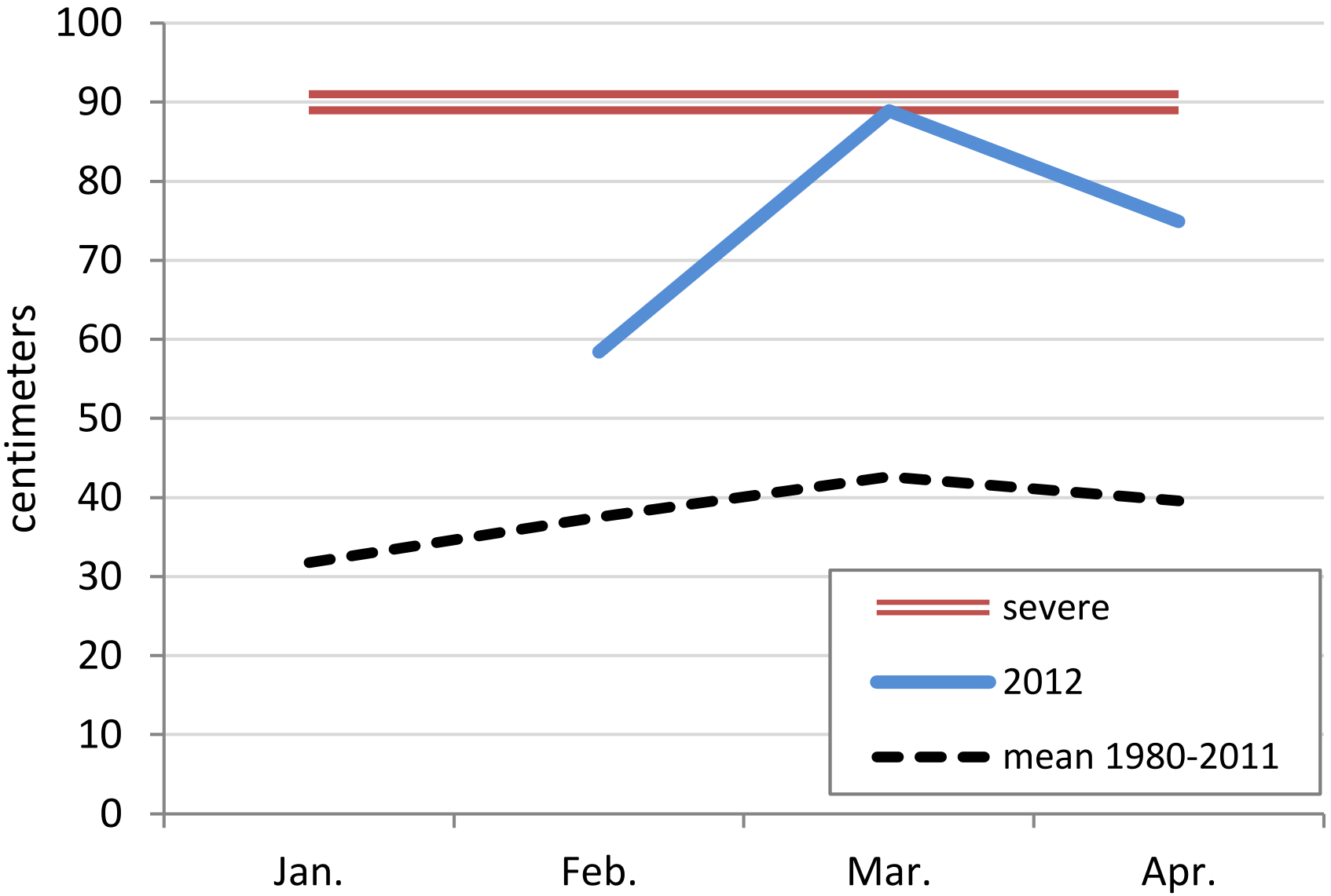
Snow depth

Snow Monitoring Sites in GMUs 15A and 15C



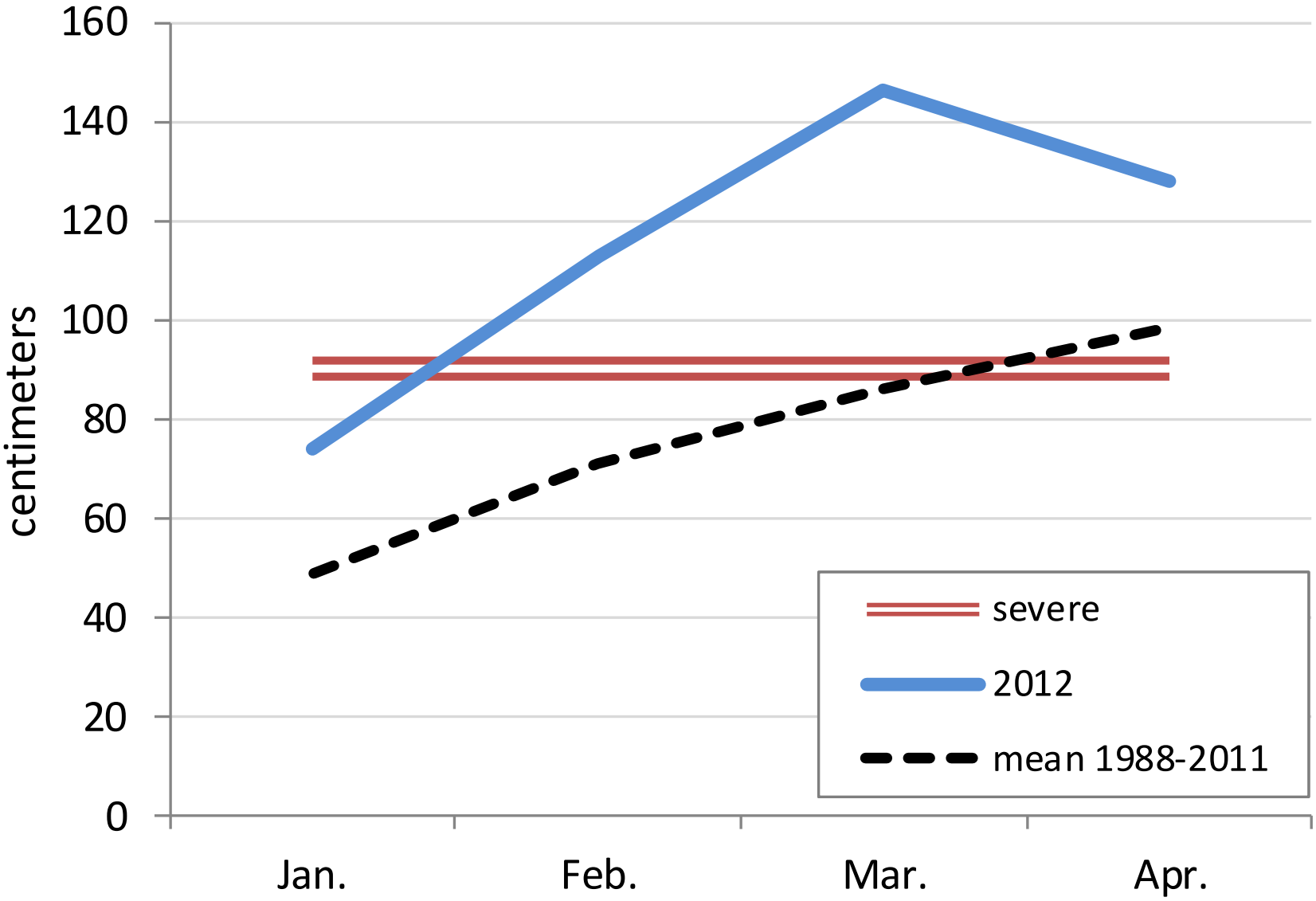
Snowdepth in GMU 15A

(MRC and Jean Lake)

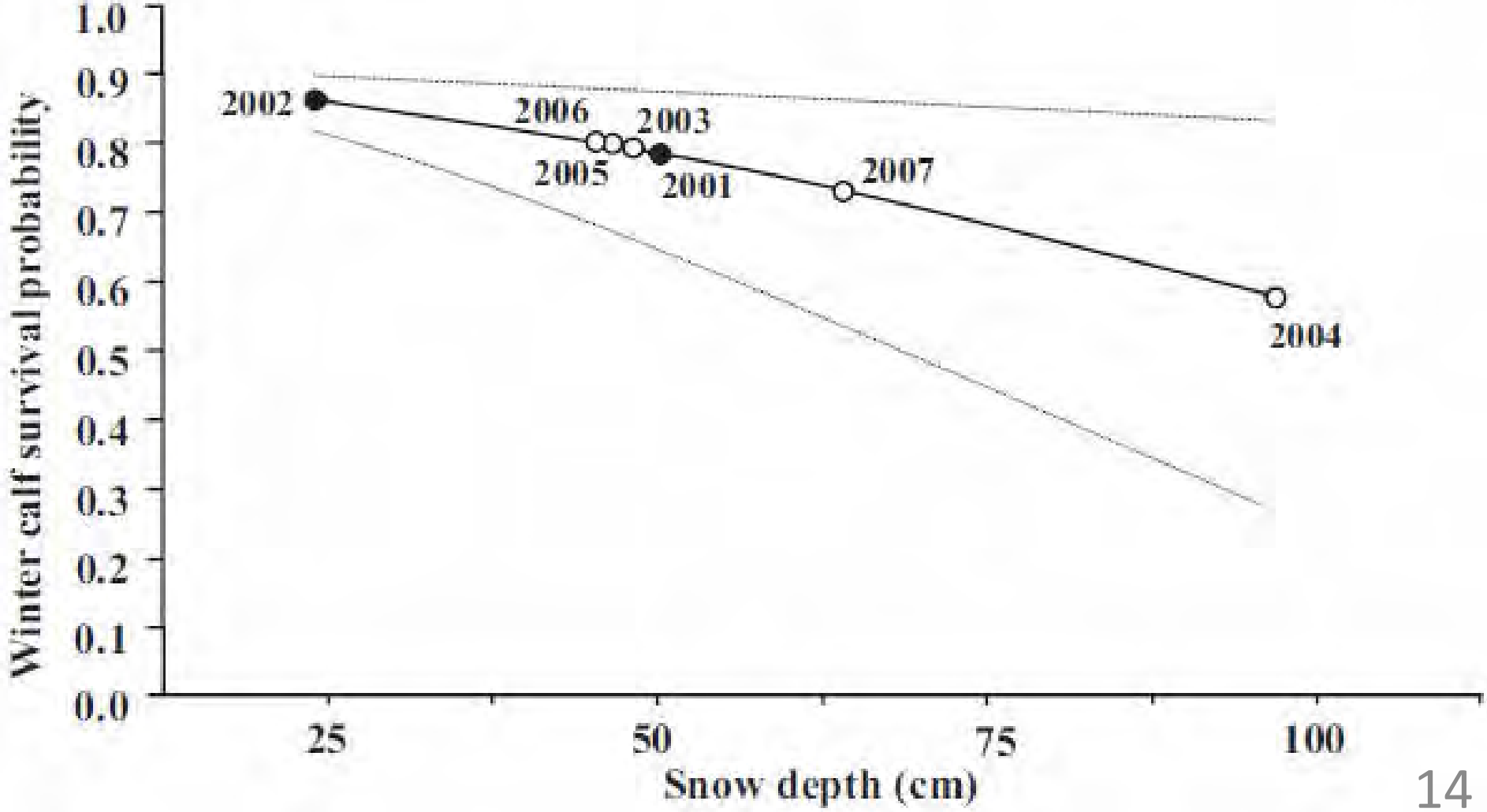


Snowdepth in GMU 15C

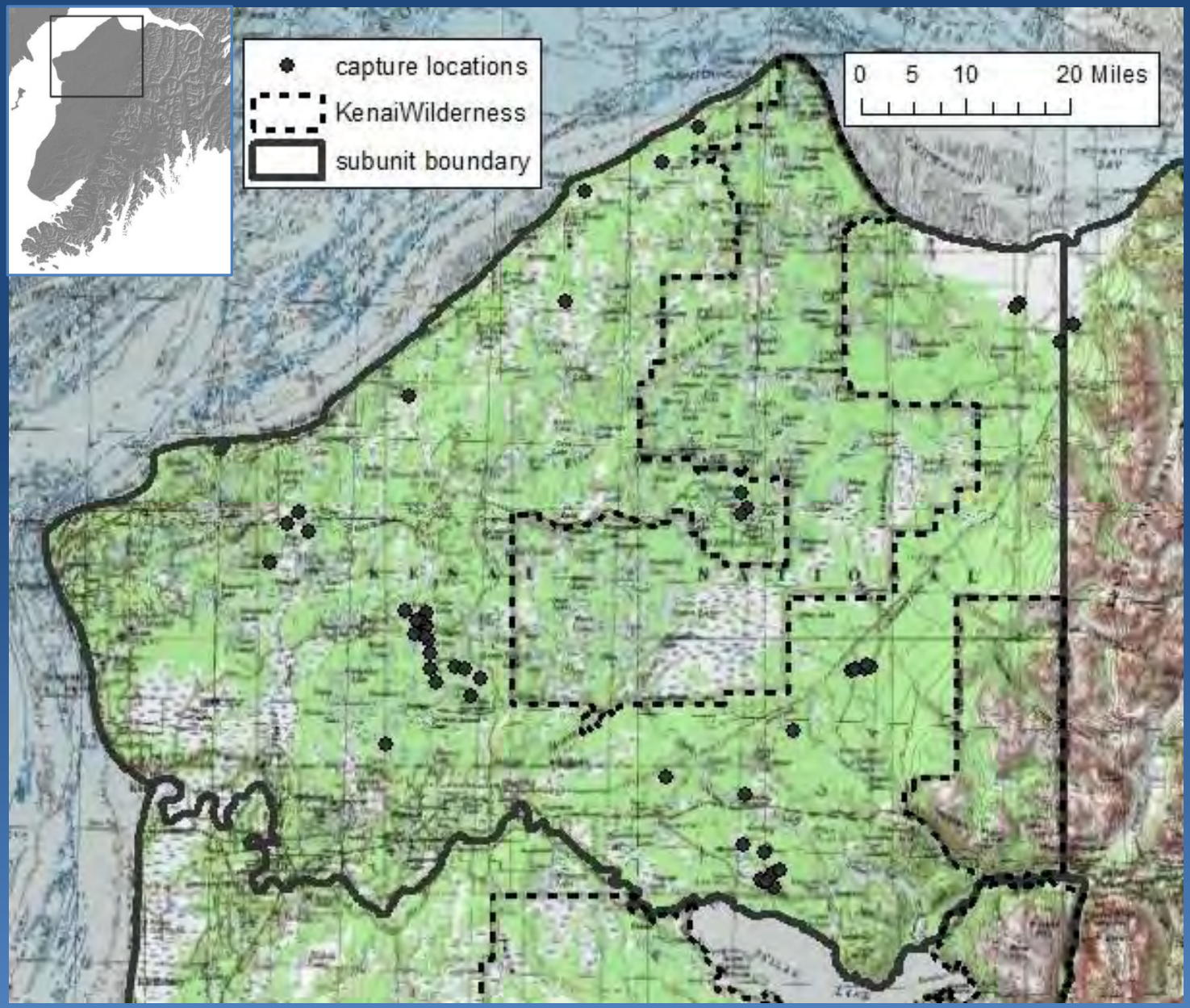
(Bridge Ck, Demo Forest, Eagle Lk, McNeil C)



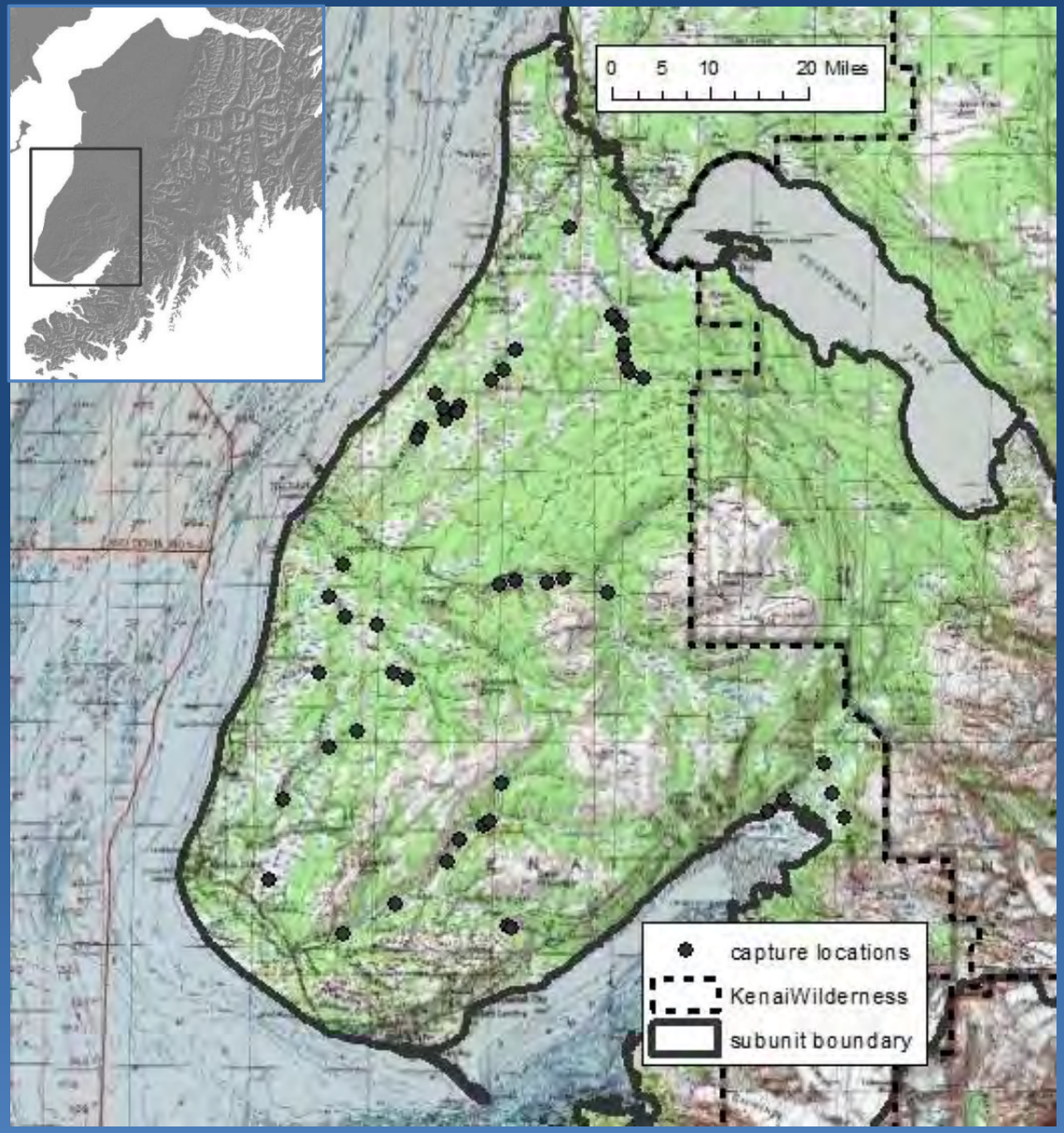
Keech et al. 2011 calf survival as a function of snow depth

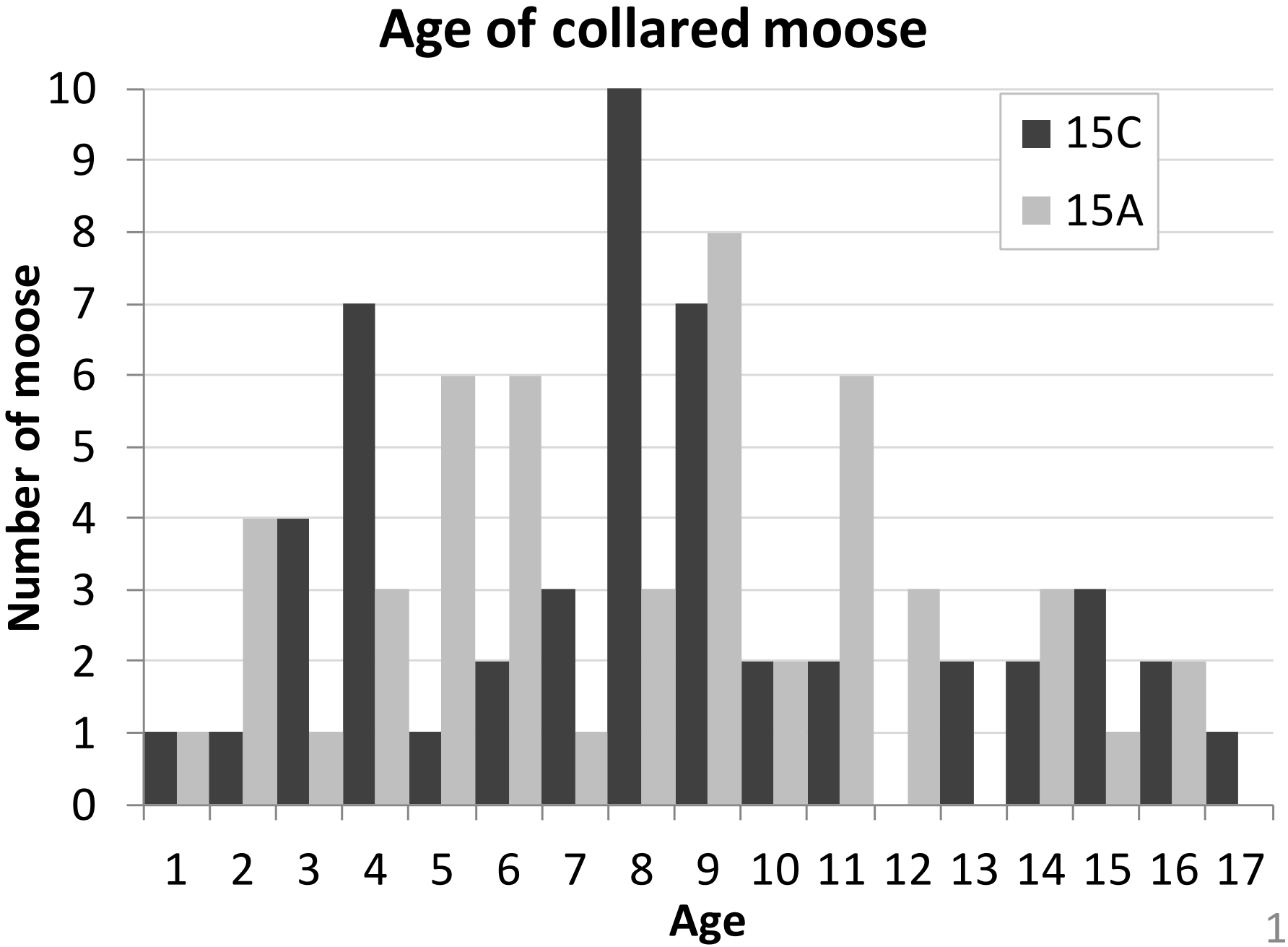


Unit 15A spring capture locations of adult cows



Unit 15C spring capture locations of adult cows

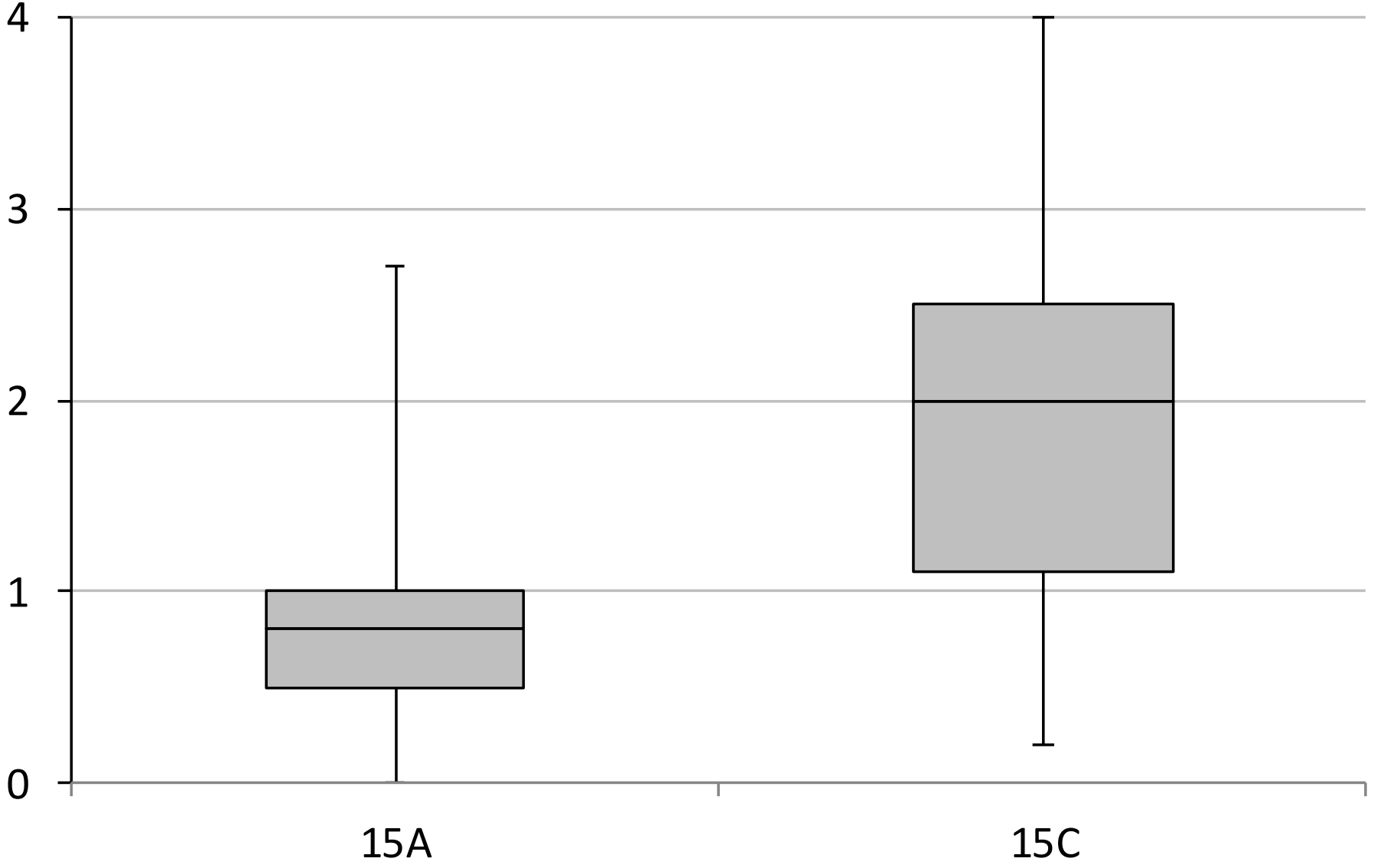



Age of collared moose
Number of moose
0
1
2
3
4
5
6
7
8
9
10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Age
15C
15A

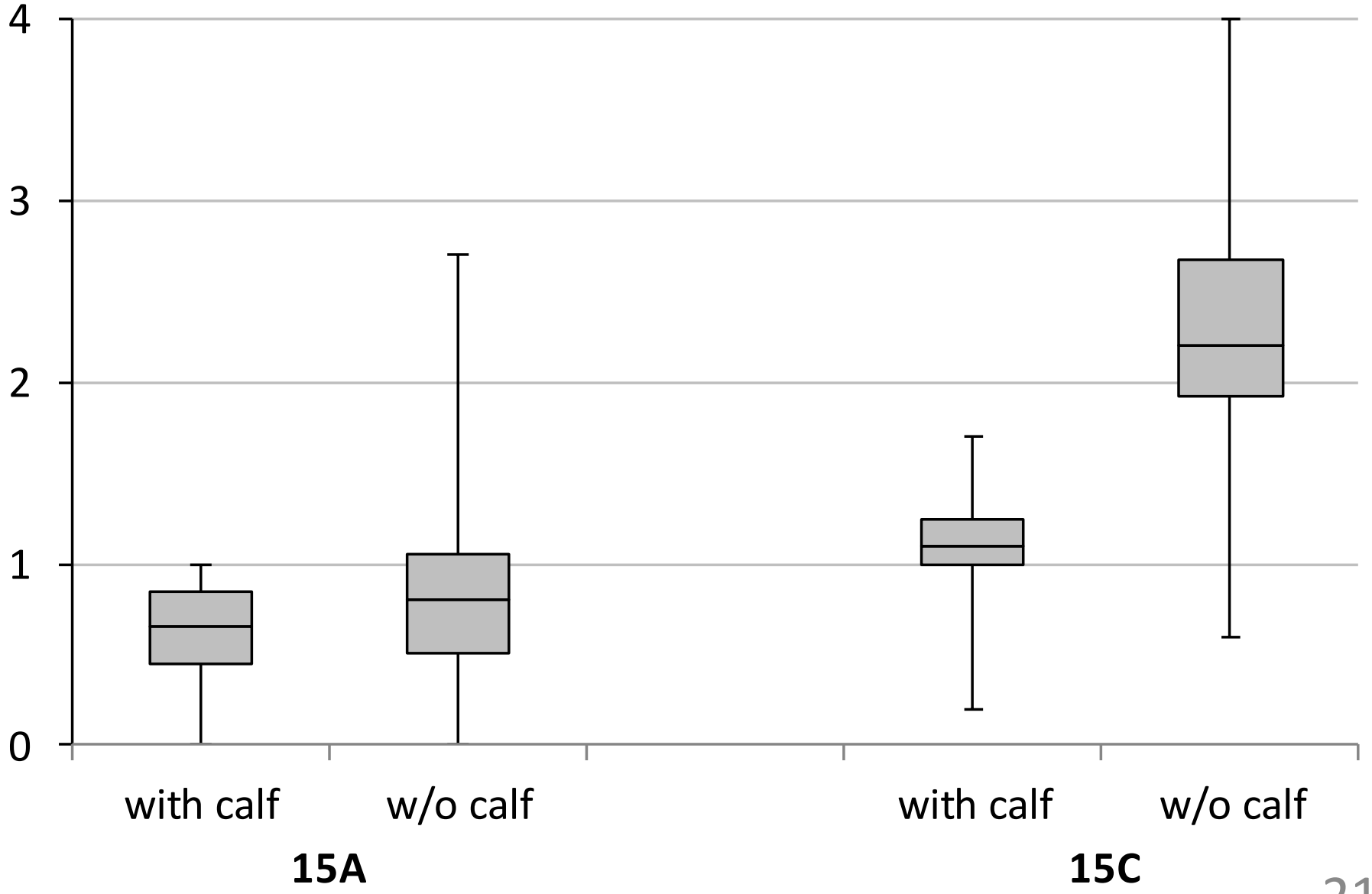
Measuring rump fat

Ultrasound image of rump fat

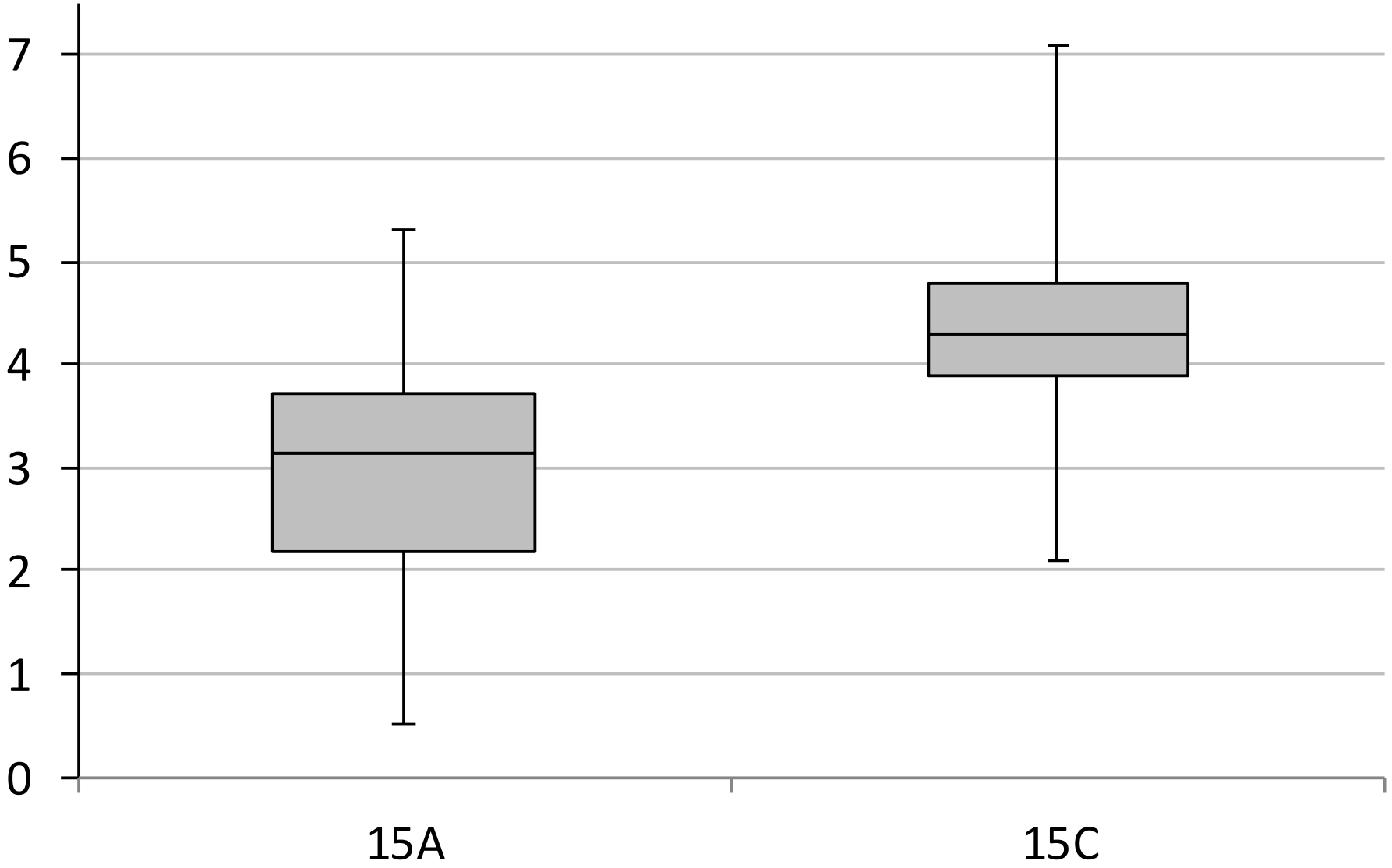
Rump fat (cm) of adult cows in spring 2012



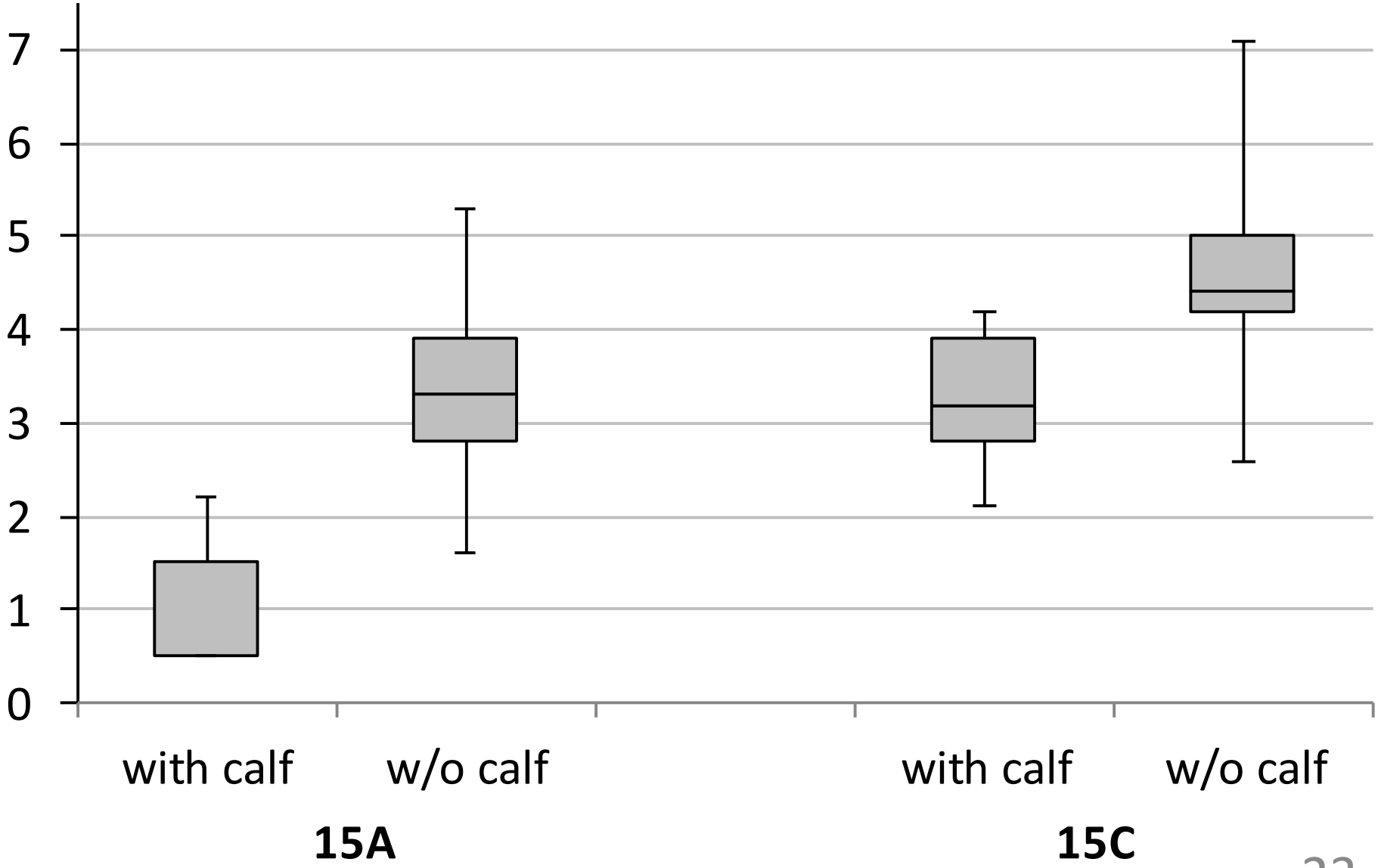
Rump fat (cm) of adult cows in spring 2012



Rump fat (cm) in adult cows in fall 2012

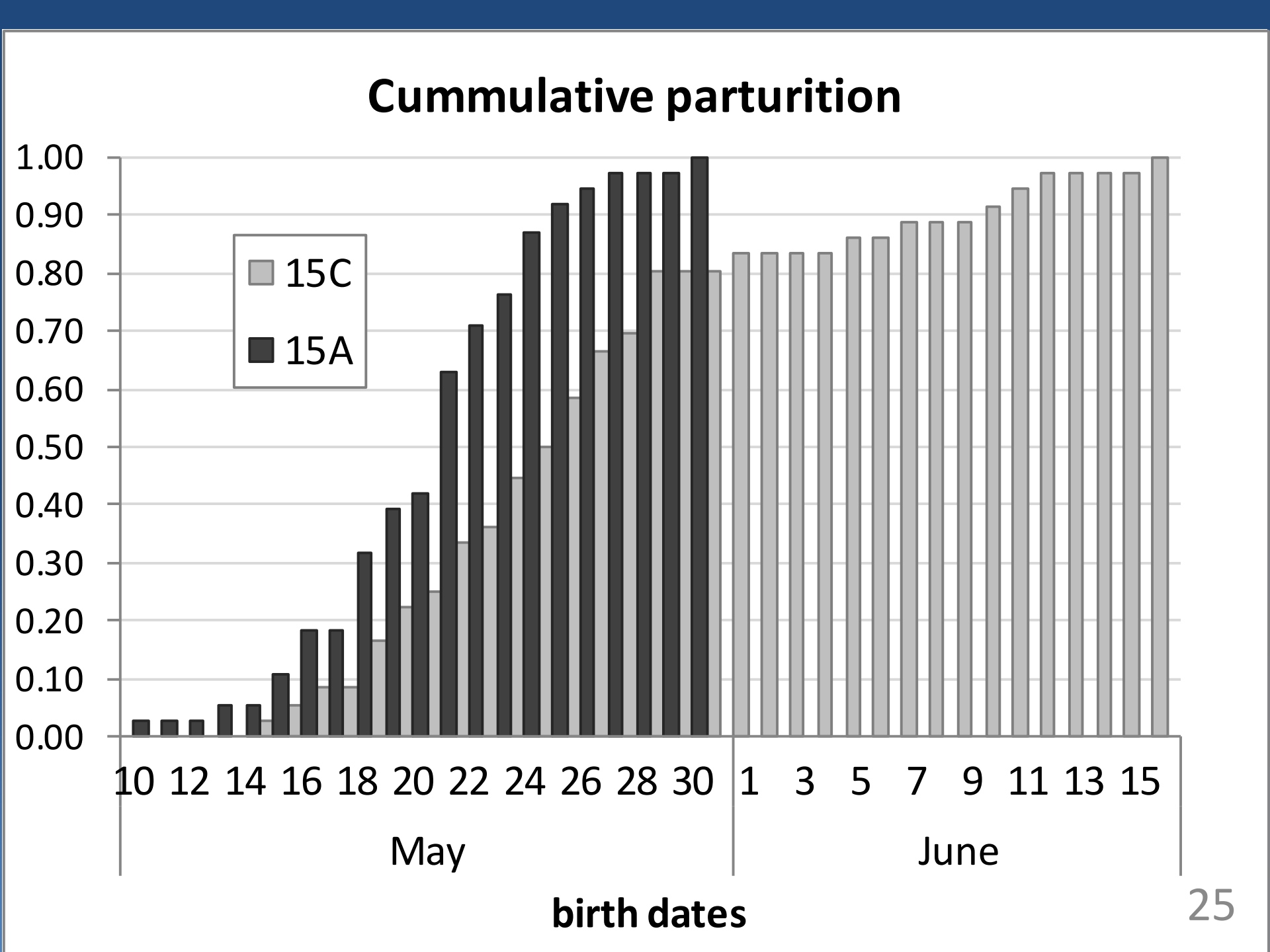


Rump fat (cm) in adult cows in fall 2012



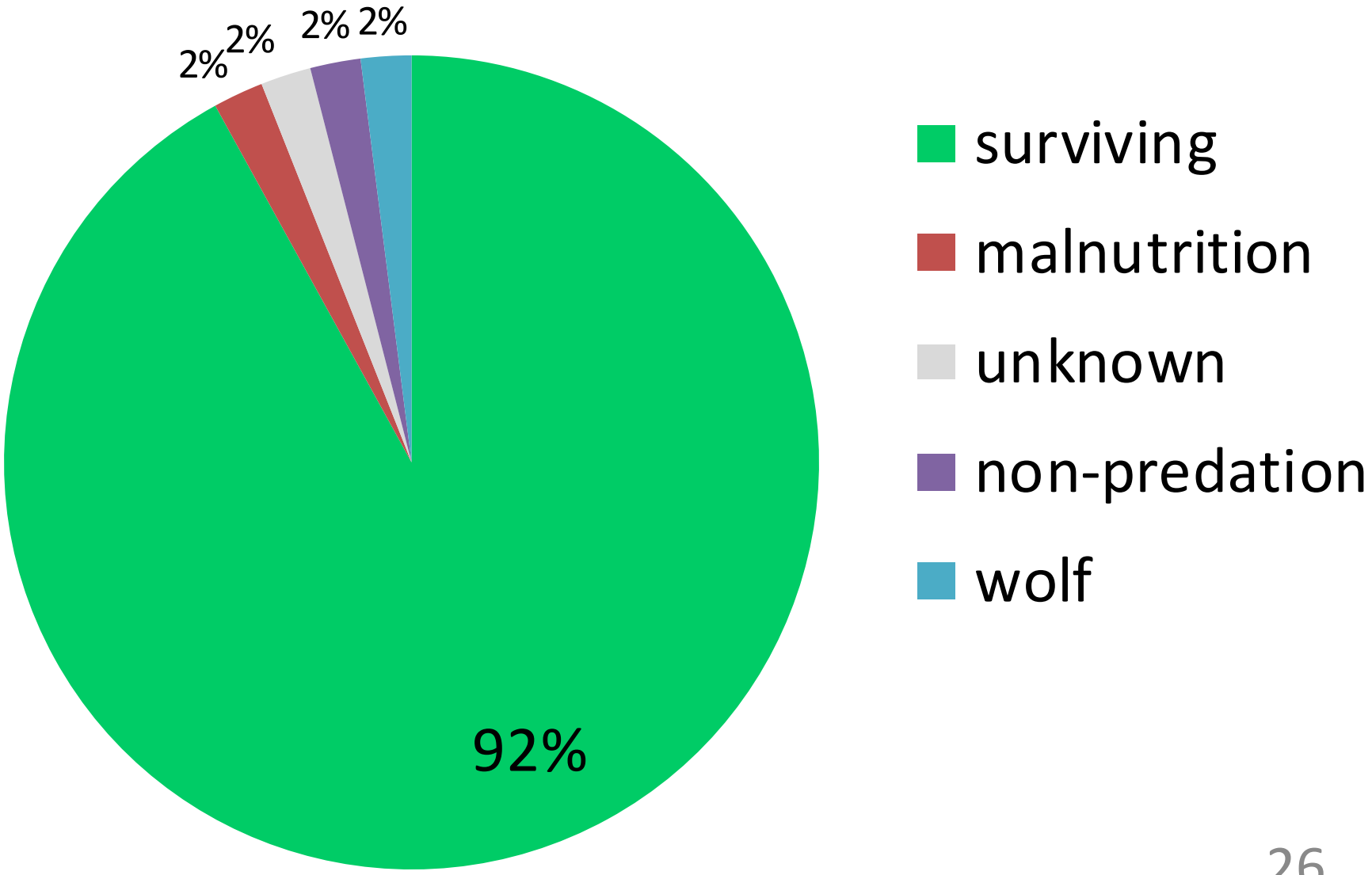
Moose productivity in 2012

	15A	15C
twinning rate	38%	38%
pregnancy rate	84%	84%
parturition rate	72%	68%


Cummulative parturition
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
15C
15A
10 12 14 16 18 20 22 24 26 28 30
1 3 5 7 9 11 13 15
May
June
birth dates

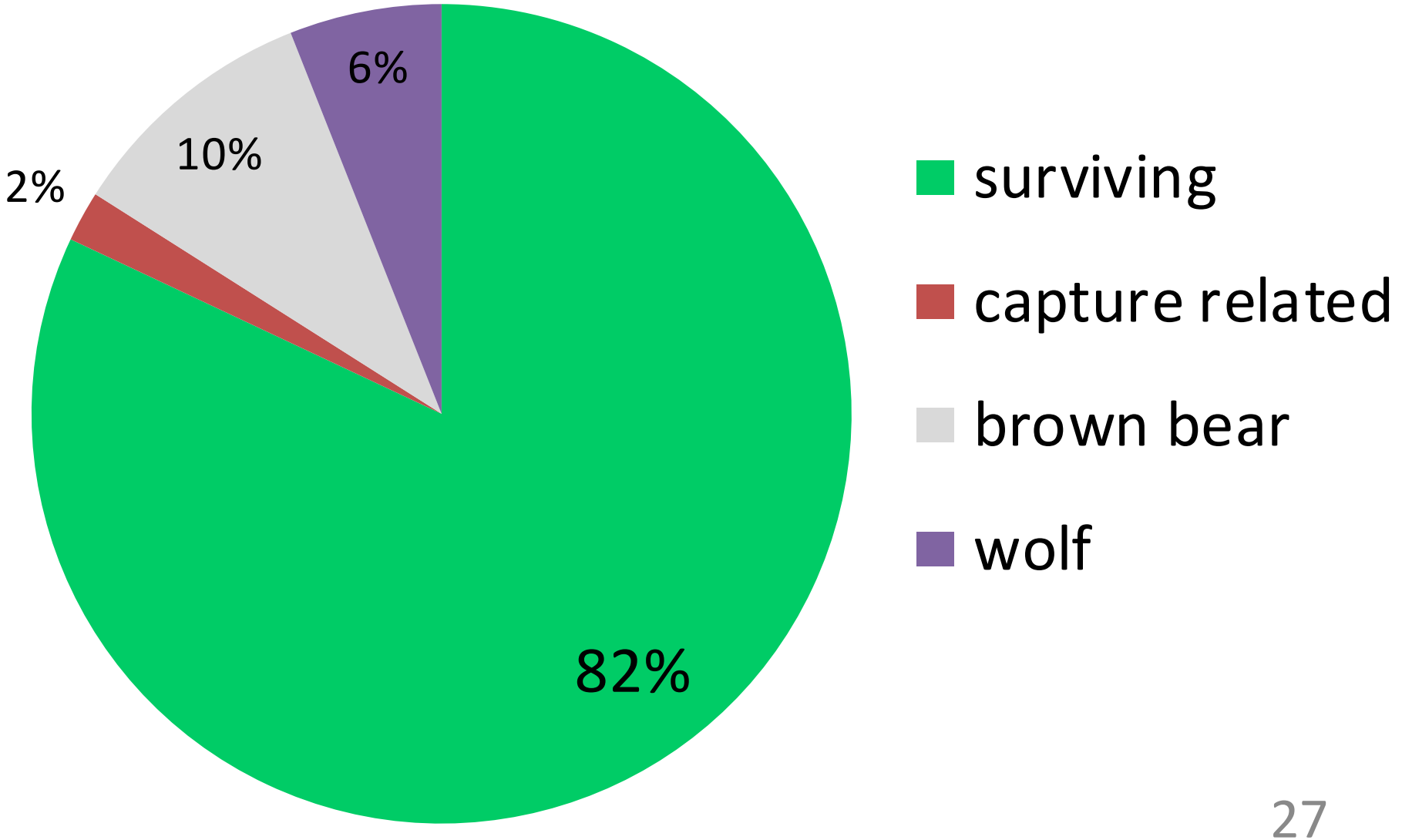
Fate of 50 adult cows in GMU 15A

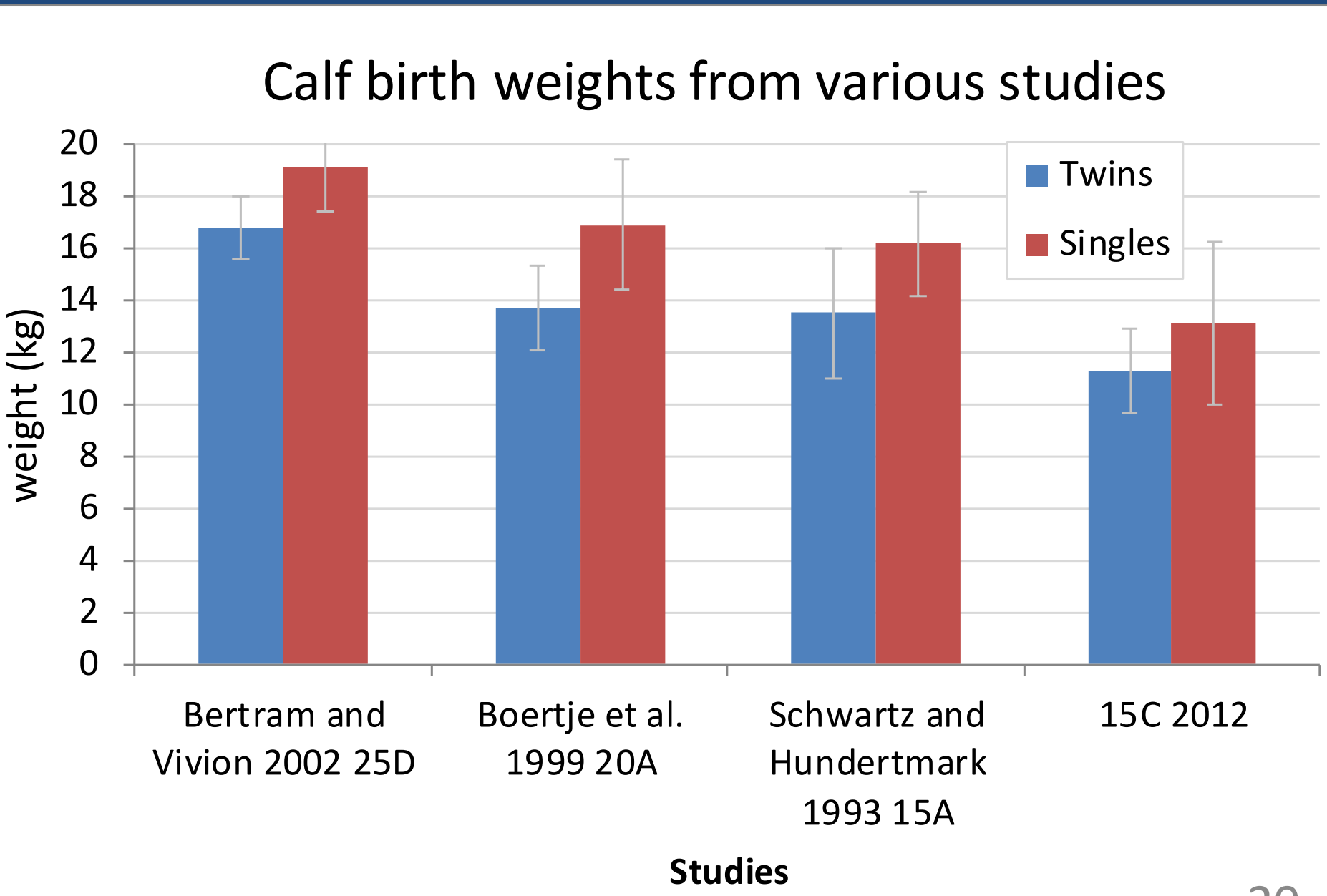
March 2012 - Feb. 2013



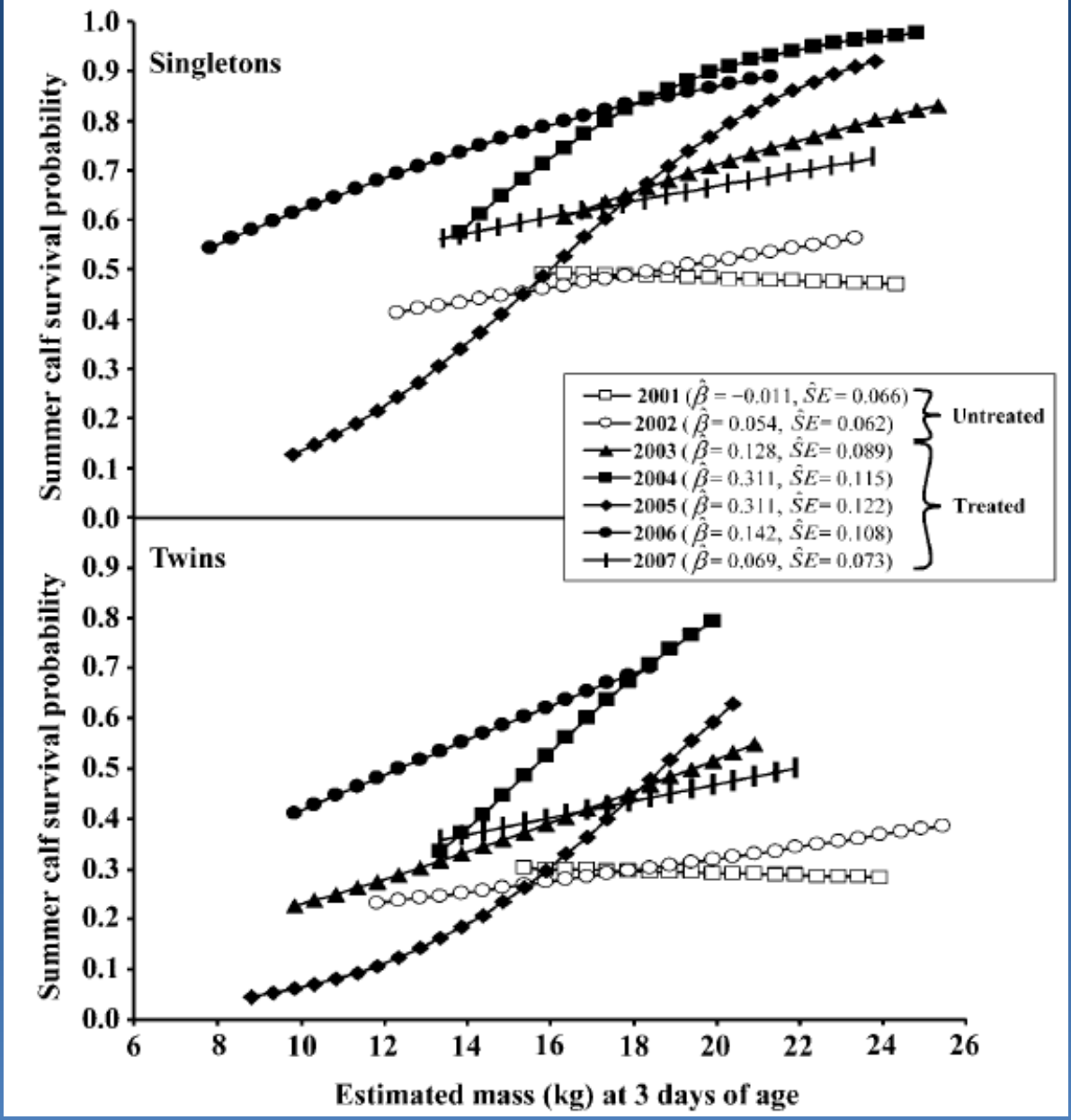
Fate of 50 adult cows in GMU 15C

Feb. 2012 - Feb. 2013

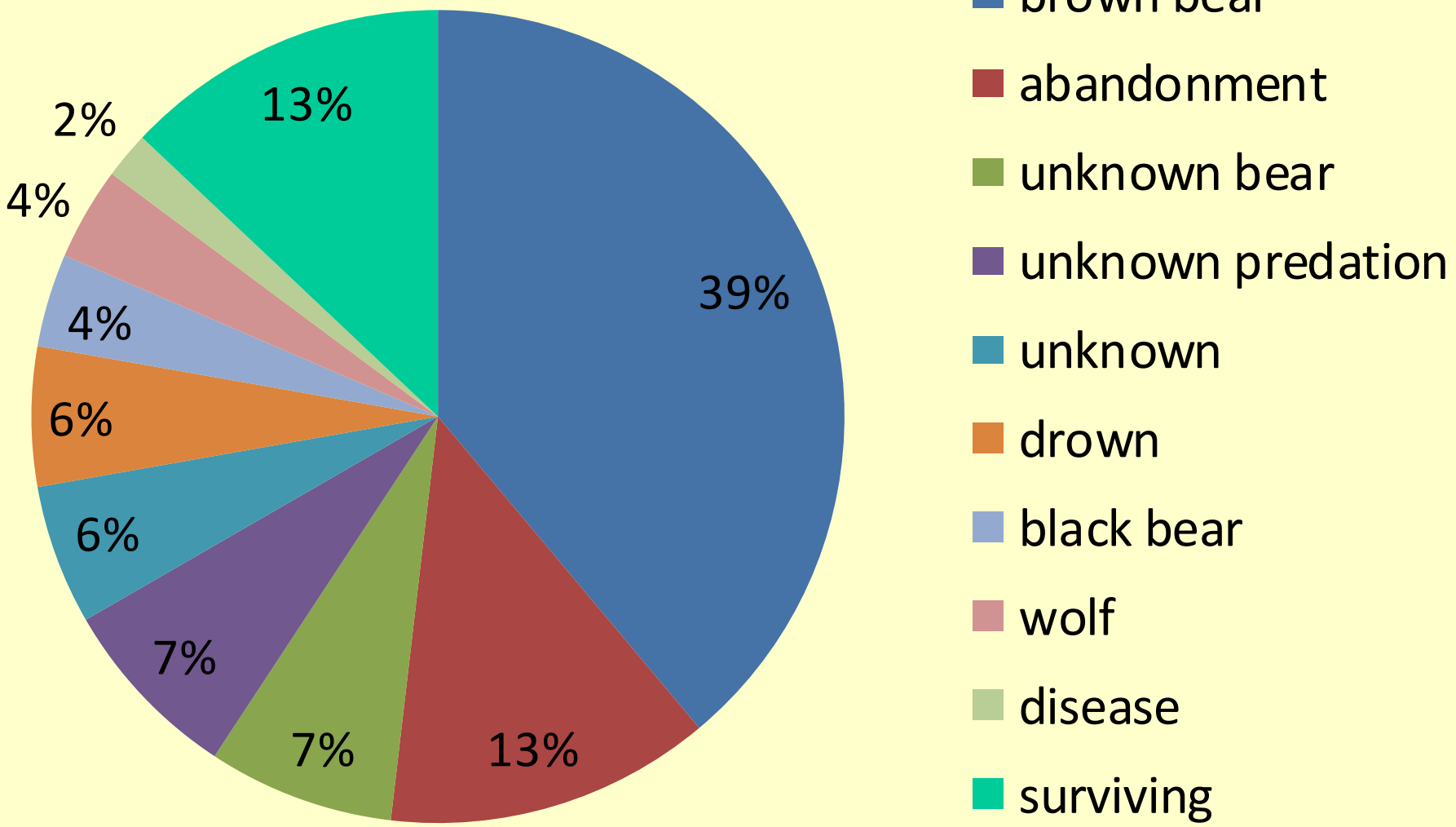



Calf birth weights from various studies
weight (kg)
20
18
16
14
12
10
8
6
4
2
0
Twins
Singles
Bertram and Vivion 2002 25D
Boertje et al. 1999 20A
Schwartz and Hundertmark 1993 15A
15C 2012
Studies

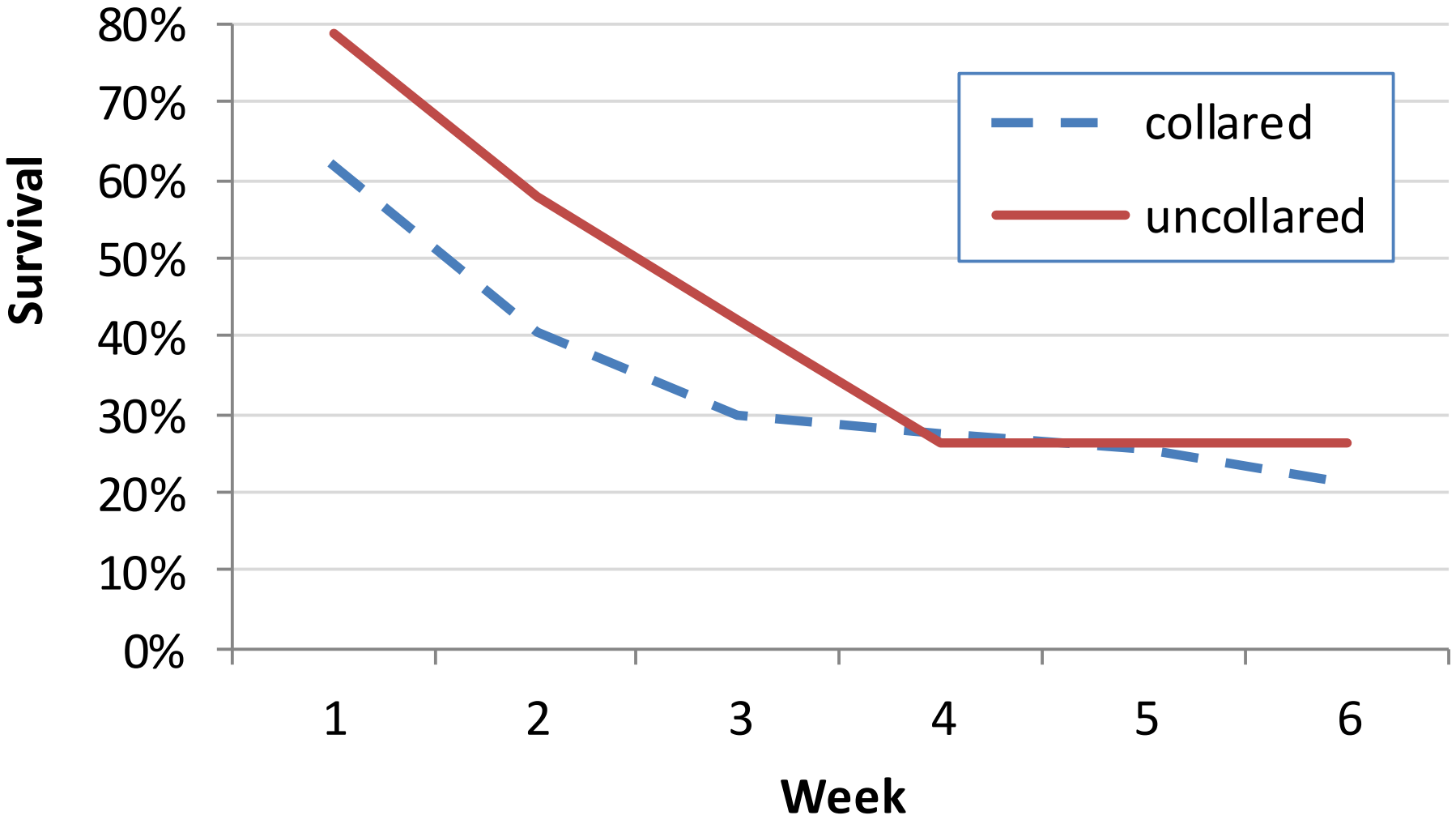
Keech et al. 2011 calf survival as a function of birth mass



Status of 54 collared calves in GMU 15C



Survival of collared vs uncollared calves in GMU 15C during first 6 weeks of life, 2012



Comparison of calf mortality studies

Study	Area	% brown bear mortality	Total % mortality	Timeframe (months)
Ballard et al. 1981	13	43	55	5
Franzmann et al. 1980	15A	6	57	2-2.5
Ballard et al. 1991	13	44	61	5
Keech et al 2011	19 (post-PC)	≤12	54	12
	19 (pre-PC)	≤12	70	12
Osborne et al. 1991	21B/24D	3	71	12
Testa 2004	13		74	5
Gasaway et al. 1992	20E	52	79-82	11
Bowyer et al 1998	Denali		80	<1
Larsen et al. 1989	Yukon	58	81	12
Bertram et al. 2002	25D	19	84	12
ADF&G 2010	16B	53	80	6
ADF&G 2012	16B	53	>80	<10
ADF&G 2012	15C	45	83	10

Status of calf moose in 15C

Calf status from collared cows

- 16.9% survival
  (calving 2012-Feb. 2013)
  (23 calves:100 cows)

Calf status from aerial surveys

- Fall: 10.8% calves
  (15 calves: 100 cows)
- Spring: 13.7% calves
  (est. 19 calves: 100 cows)

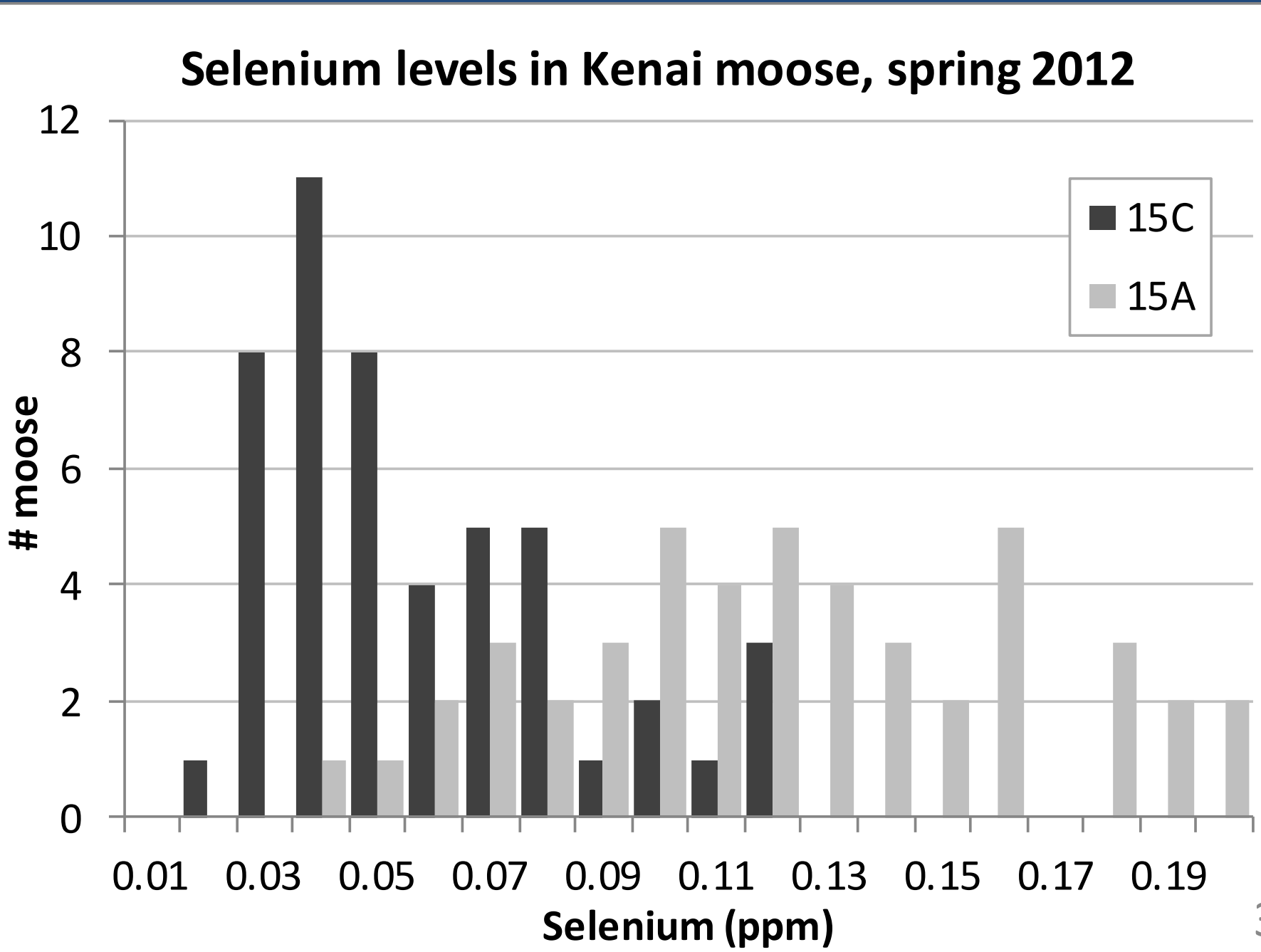
Status of calf moose in 15A

Calf status from collared cows

- 13.7% survival
  (calving 2012-Feb. 2013)
  (19 calves:100 cows)

Calf status from aerial surveys

- Fall: 16.1% calves
  (25 calves: 100 cows)
- Spring: 13.4 % calves
  (est. 20 calves: 100 cows)


Selenium levels in Kenai moose, spring 2012
12
10
8
6
4
2
0
moose
15C
15A
0.01
0.03
0.05
0.07
0.09
0.11
0.13
0.15
0.17
0.19
Selenium (ppm)

What influences calf survival?

- **Predation (proximate mortality)**
- Maternal condition
- Snow depth
- Calf birth weight
- Late parturition
- Captures?
- Selenium deficiency?

Summary

- Inferences are limited given only one year of data after a record snowfall
- 15A: cows in poor condition (relative to 15C), low calf survival
- 15C: late parturition, severe snow conditions, low calf and cow survival, high population densities
- Brown bears predominant proximate cause of mortality on cows and calves in 15C

Future Kenai work through 2015

- Monitor collared cows throughout the year
- Recapture collared cows each fall and spring to assess body condition/pregnancy
- Collar short-yearling cows in spring
- Monitor spring calving (parturition rates and timing, and survival)
- Conduct annual composition counts (fall/spring)
- Collaborate with KNWR