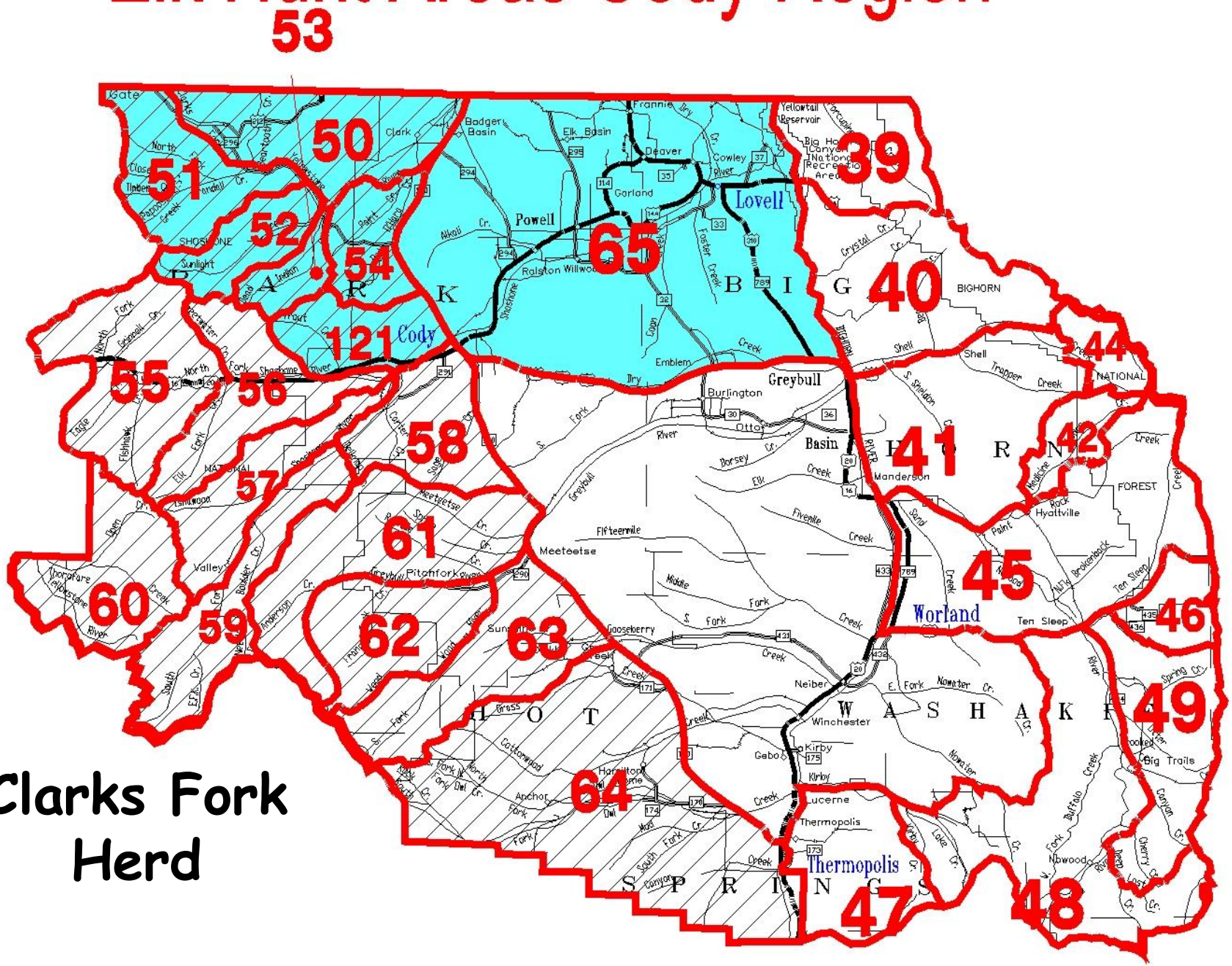
February 11, 2009

Elk Hunt Areas Cody Region



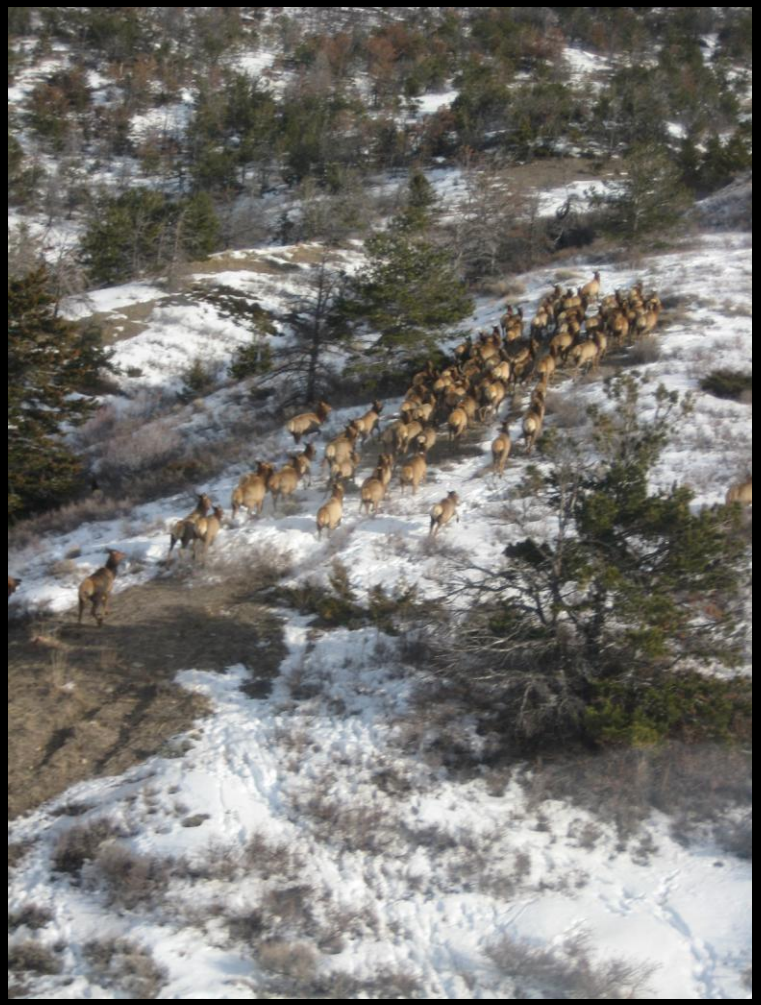
Trend Counts

January-February with variable frequency

Consistently surveyed through time

Obtain Total Count (minimum)

Classification Surveys



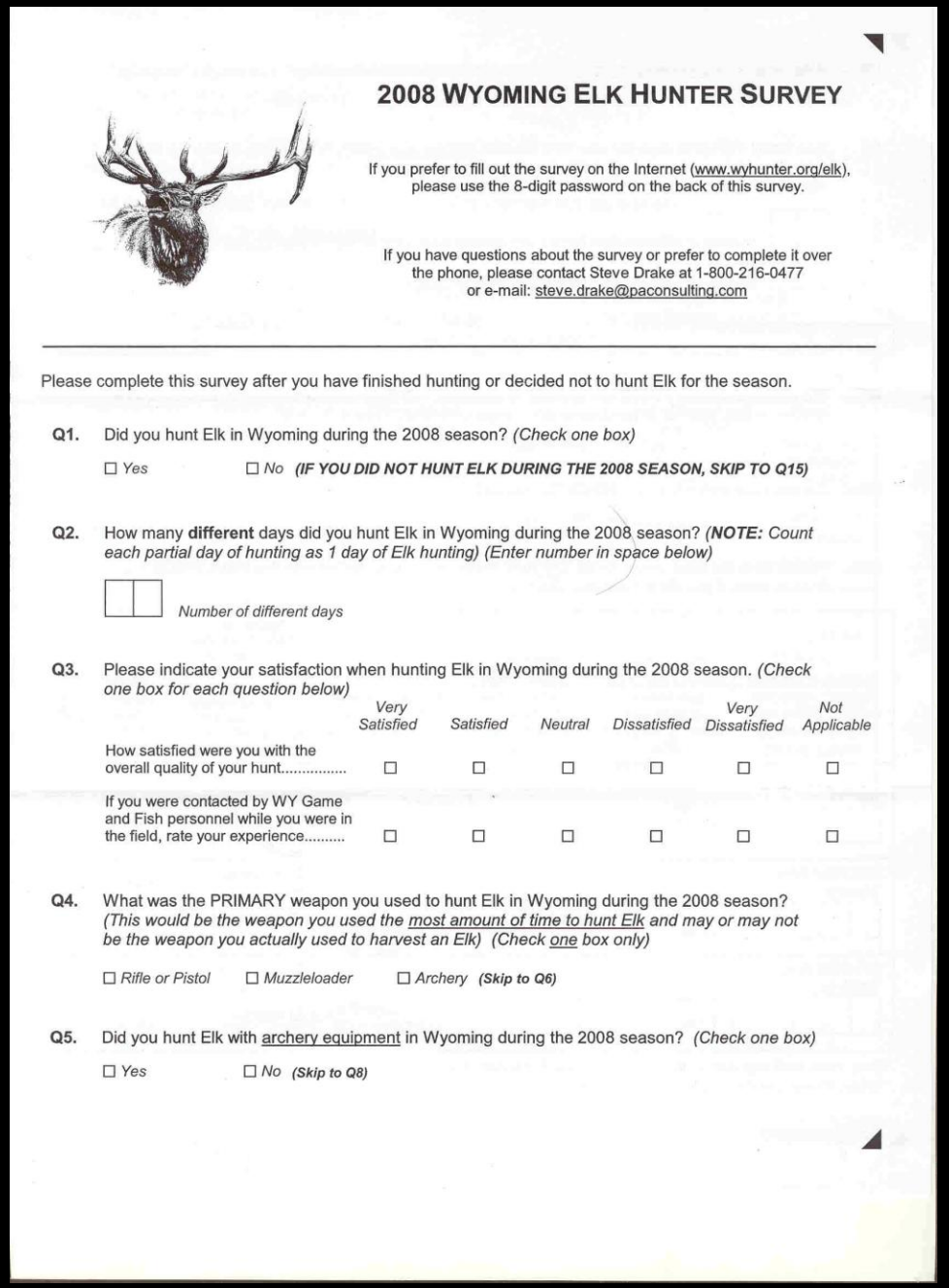
January-February each year
Samples
Obtain Ratios
- **Calves:100 Cows**
- **Yrlg Bulls:100 Cows**
- **Mature Bulls:100 Cows**

Hunter Checks

- **Composition of harvest**
  - % yearlings, etc
- **Gather age data**
- **Gauge hunter success**
  - Assess hunter attitudes and perceptions
- **Check compliance**

Harvest Survey

- Total Harvest
- Harvest Composition
  - Bulls, Cows, Calves
- Harvest by License Type
  - General, Type 1, Type 9
- Hunter Success
- Hunter Effort



2008 WYOMING ELK HUNTER SURVEY

If you prefer to fill out the survey on the Internet (www.wyhunter.org/elk), please use the 8-digit password on the back of this survey.

If you have questions about the survey or prefer to complete it over the phone, please contact Steve Drake at 1-800-216-0477 or e-mail: steve.drake@paconsulting.com

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Please complete this survey after you have finished hunting or decided not to hunt Elk for the season.

Q1. Did you hunt Elk in Wyoming during the 2008 season? *(Check one box)*

☐ *Yes* ☐ *No* ***(IF YOU DID NOT HUNT ELK DURING THE 2008 SEASON, SKIP TO Q15)***

Q2. How many **different** days did you hunt Elk in Wyoming during the 2008 season? ***(NOTE:** Count each partial day of hunting as 1 day of Elk hunting) (Enter number in space below)*

☐☐ *Number of different days*

Q3. Please indicate your satisfaction when hunting Elk in Wyoming during the 2008 season. *(Check one box for each question below)*

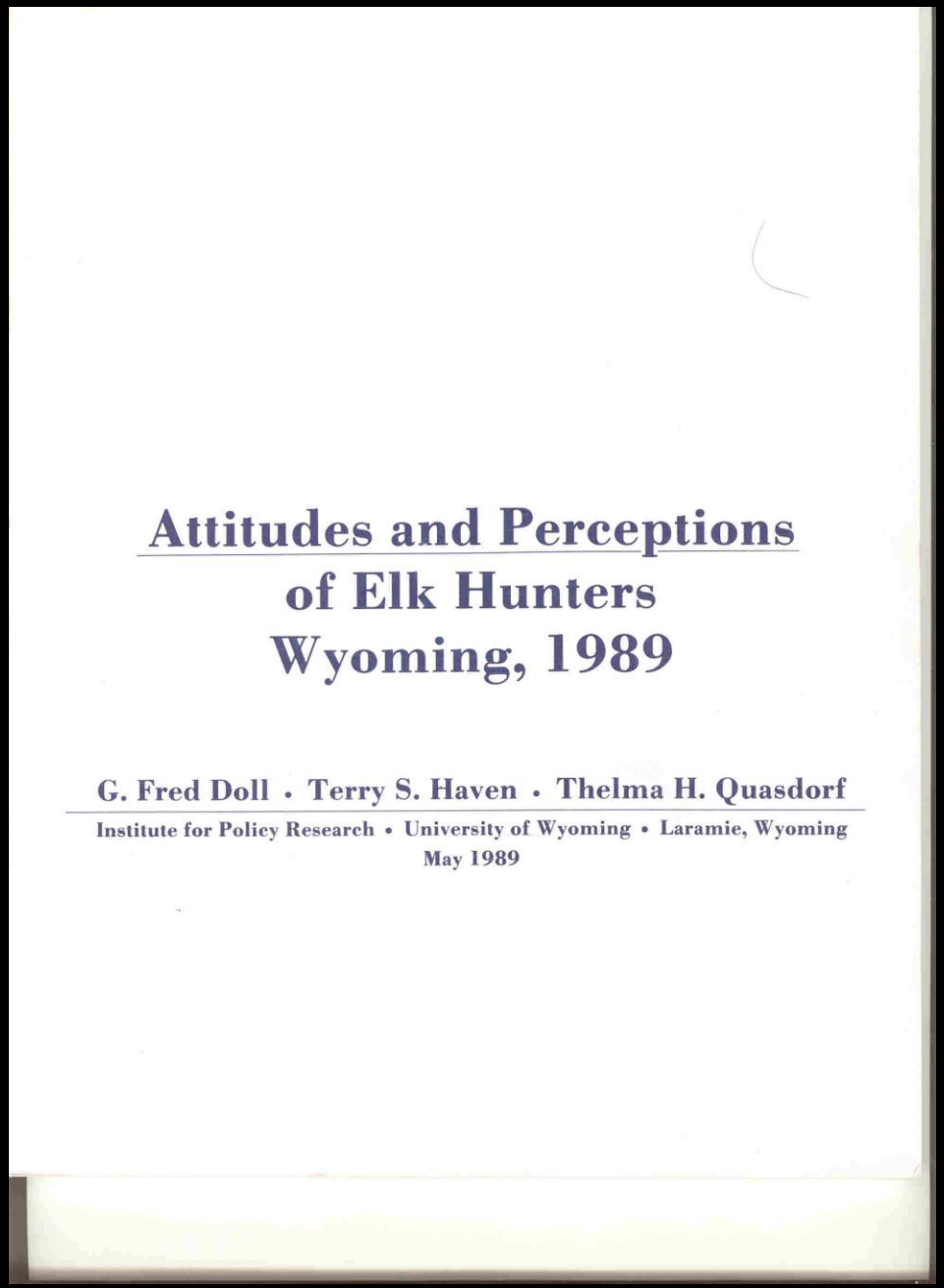
	Very Satisfied	*Satisfied*	*Neutral*	*Dissatisfied*	*Very Dissatisfied*	*Not Applicable*
How satisfied were you with the overall quality of your hunt.....	☐	☐	☐	☐	☐	☐
If you were contacted by WY Game and Fish personnel while you were in the field, rate your experience.....	☐	☐	☐	☐	☐	☐

Q4. What was the PRIMARY weapon you used to hunt Elk in Wyoming during the 2008 season? *(This would be the weapon you used the most amount of time to hunt Elk and may or may not be the weapon you actually used to harvest an Elk) (Check one box only)*

☐ *Rifle or Pistol* ☐ *Muzzleloader* ☐ *Archery* ***(Skip to Q6)***

Q5. Did you hunt Elk with archery equipment in Wyoming during the 2008 season? *(Check one box)*

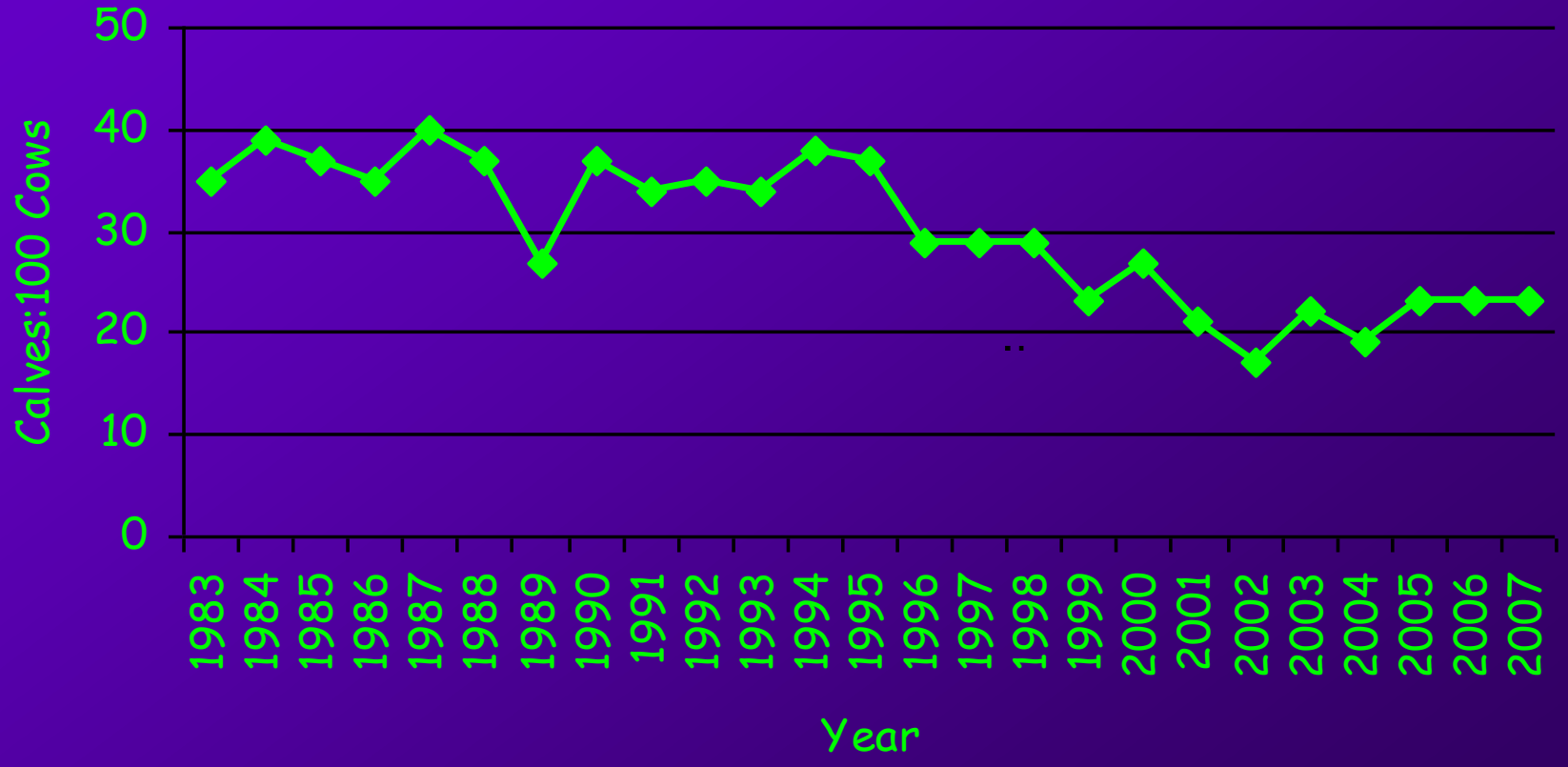
☐ *Yes* ☐ *No* ***(Skip to Q8)***



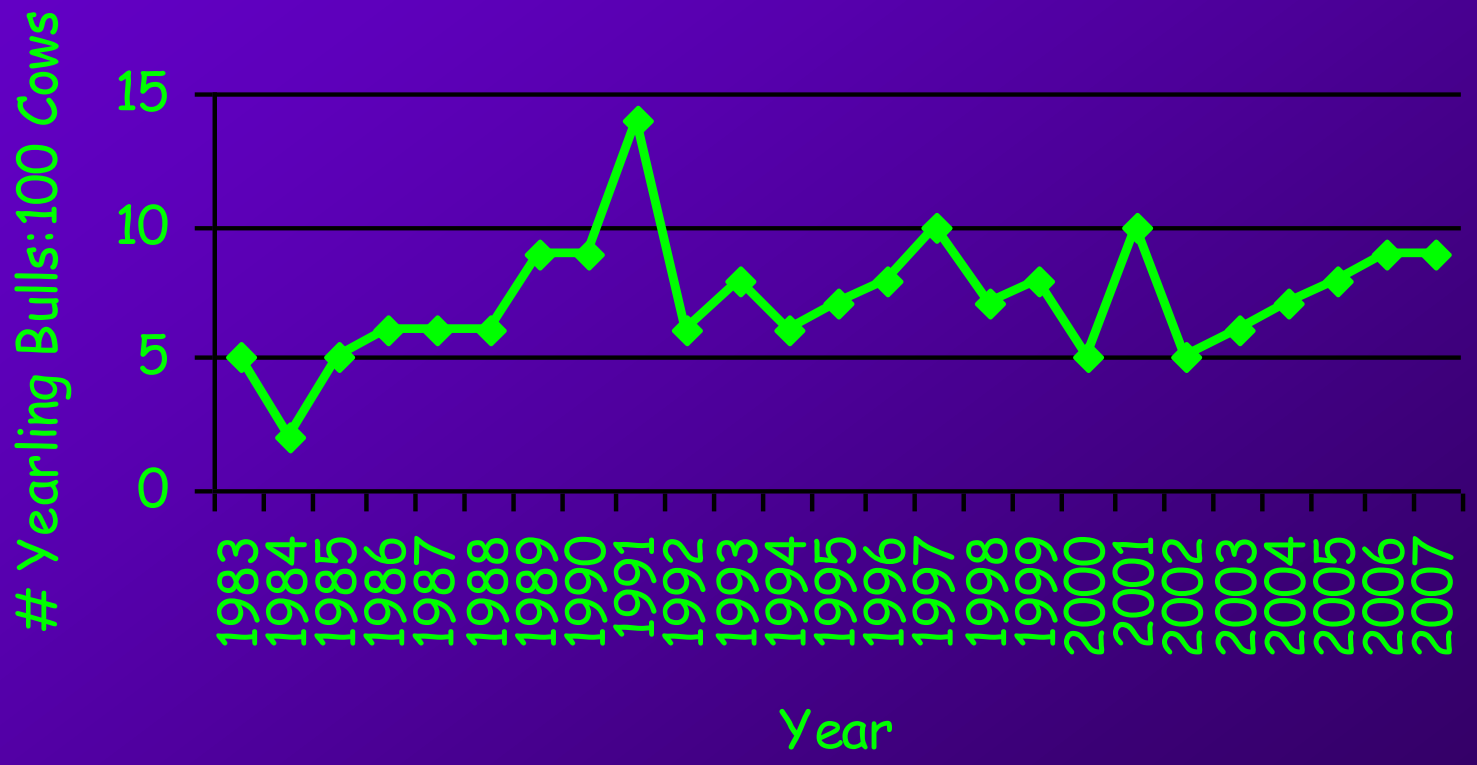
Attitude Surveys

- Conducted Periodically
- Assess Satisfaction
- Views on Management, rules, and regulations
- Trophy Management Attutudes
- Special Issue Responses

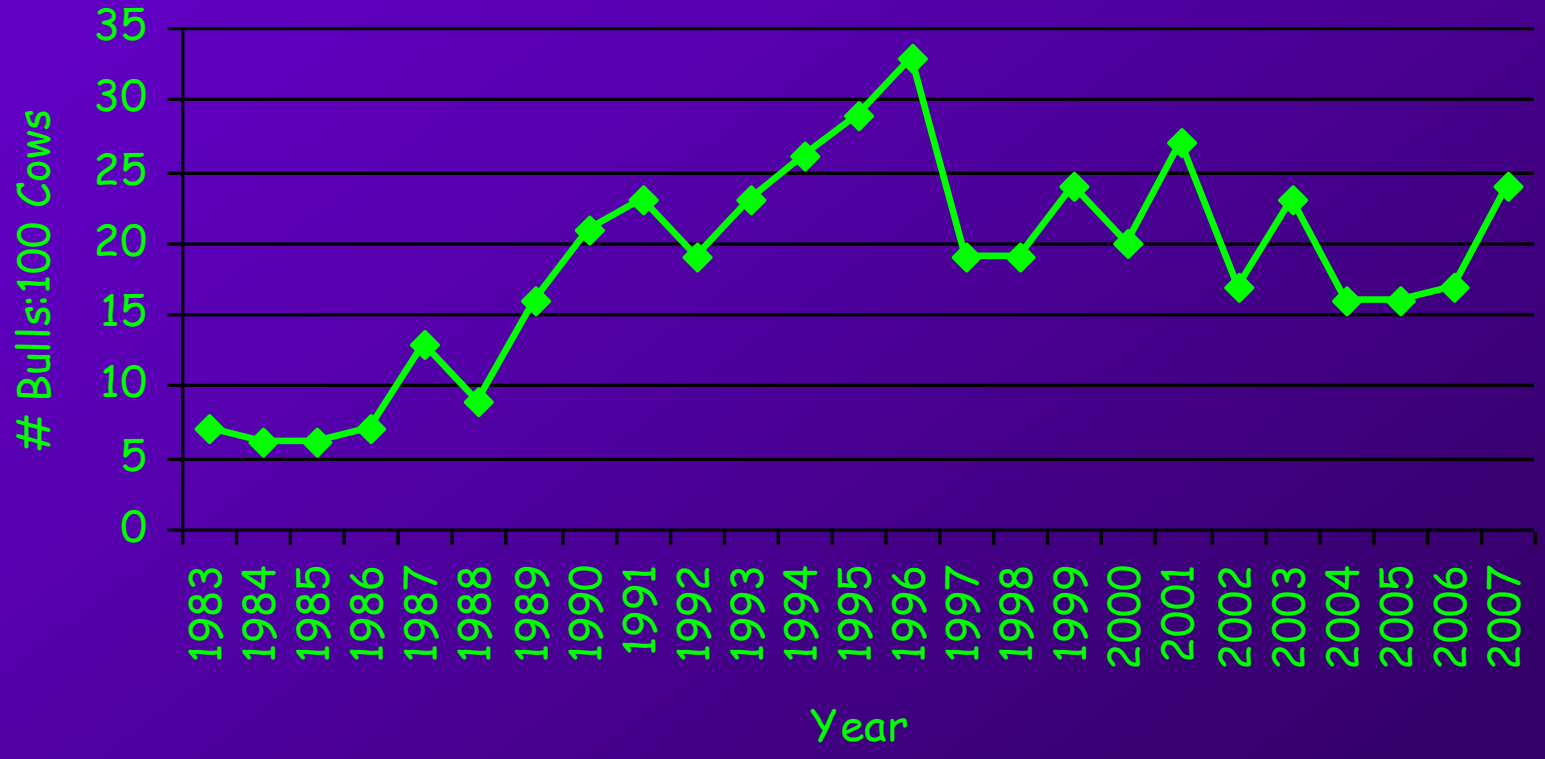
Clarks Fork Elk Calf:Cow Ratios



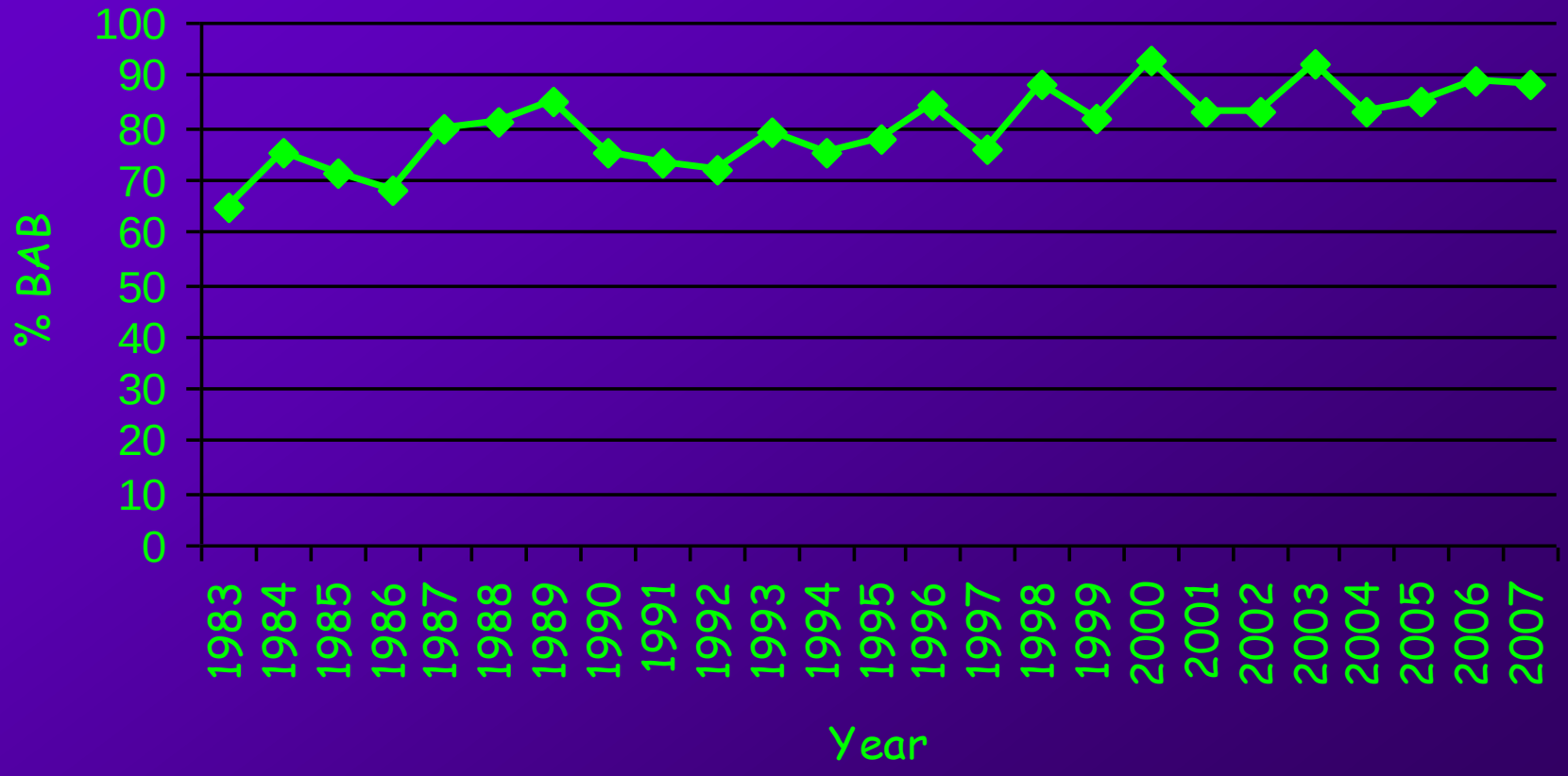
Clarks Fork Elk Yearling Bull:Cow Ratios



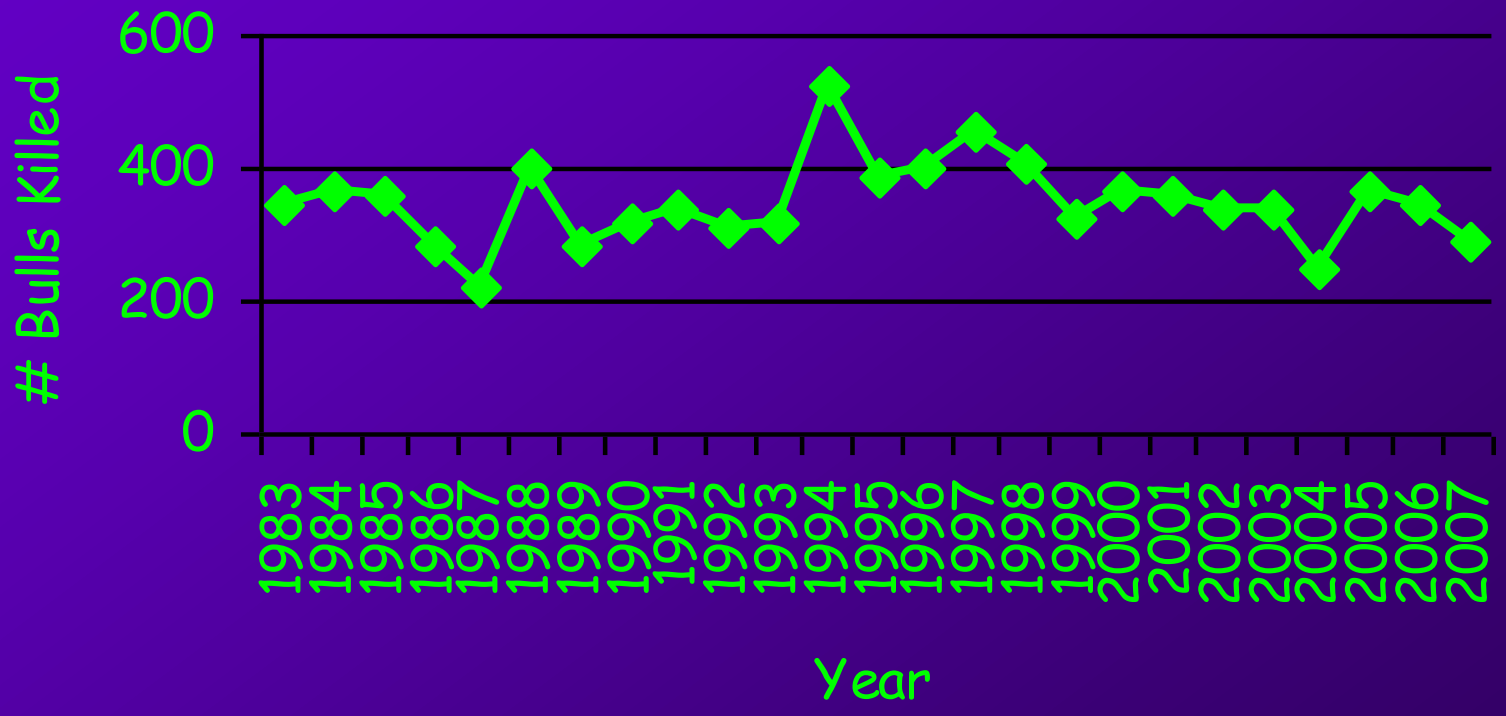
Clarks Fork Elk Bull:Cow Ratios



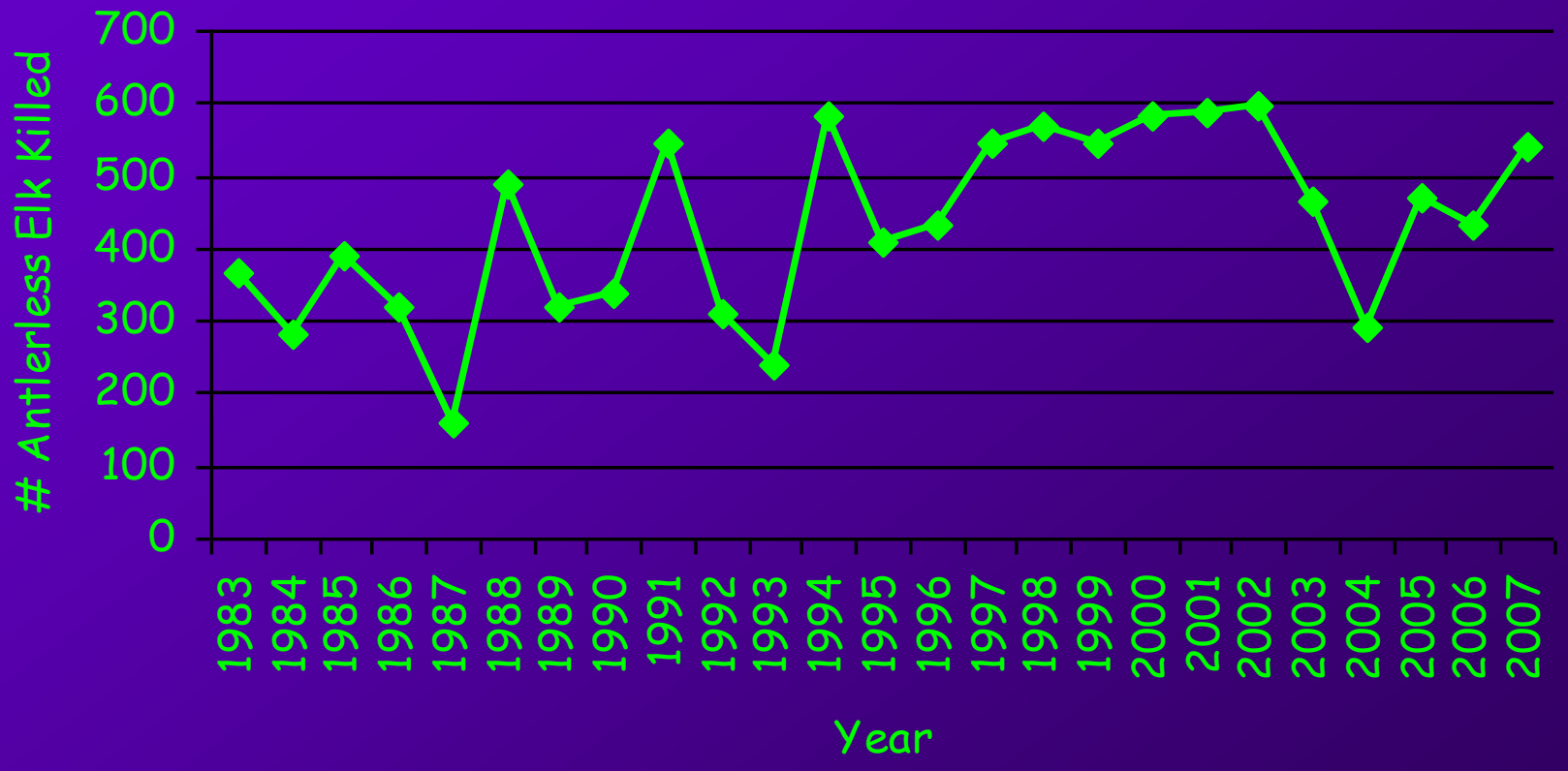
Clarks Fork Elk Branch-Antlered Bull Harvest



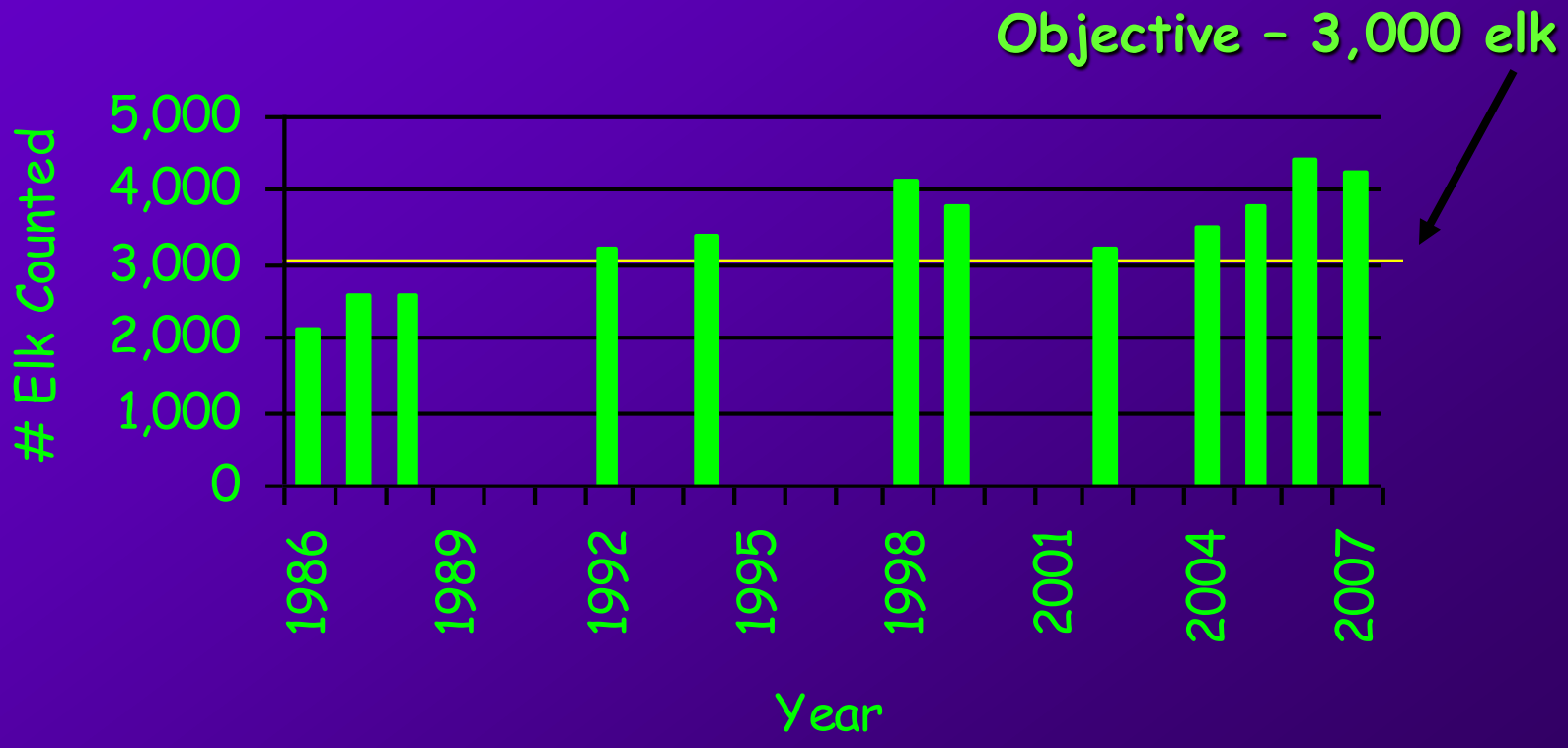
Clarks Fork Elk Bull Harvest



Clarks Fork Elk Antlerless Harvest



Clarks Fork Elk Trend Counts



Postseason 2004 Elk Surveys

Clark's Fork Herd Unit

	50	51	52	53	54	65	121	Total
Calf:Cow Ratio	33	12	10	-	27	37	19	19
# Elk Classified	324	101	1,305	5	679	280	535	3,229

Total elk counted - 3,495

Postseason 2005 Elk Surveys

Clark's Fork Herd Unit

	50	51	52	53	54	65	121	Total
Calf:Cow Ratio	25	20	9	10	37	15	39	23
# Elk Classified	450	171	1,139	25	919	193	766	3,620

Total elk counted – 3,813

Postseason 2006 Elk Surveys

Clark's Fork Herd Unit

	50	51	52	53	54	65	121	Total
Calf:Cow Ratio	27	-	13	-	35	30	28	23
# Elk Classified	608	39	1,530	0	839	790	616	4,422

Total elk counted – 4,422

Postseason 2007 Elk Surveys

Clark's Fork Herd Unit

	50	51	52	53	54	65	121	Total
Calf:Cow Ratio	41	13	12	-	28	32	28	23
# Elk Classified	562	215	1,376	41	844	636	587	4,261

Total elk counted - 4,261

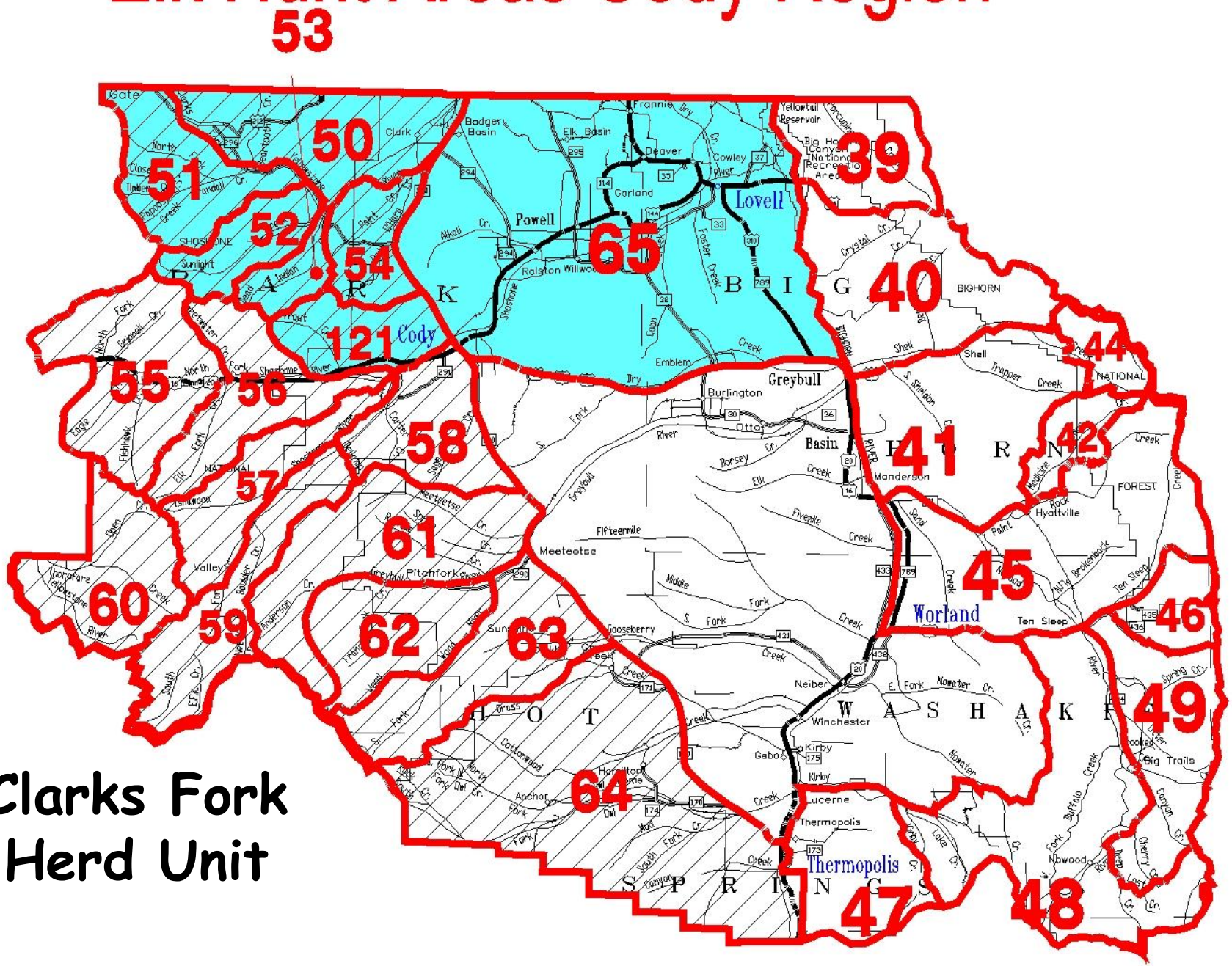
Elk Ecology Project

U.S. FISH & WILDLIFE SERVICE

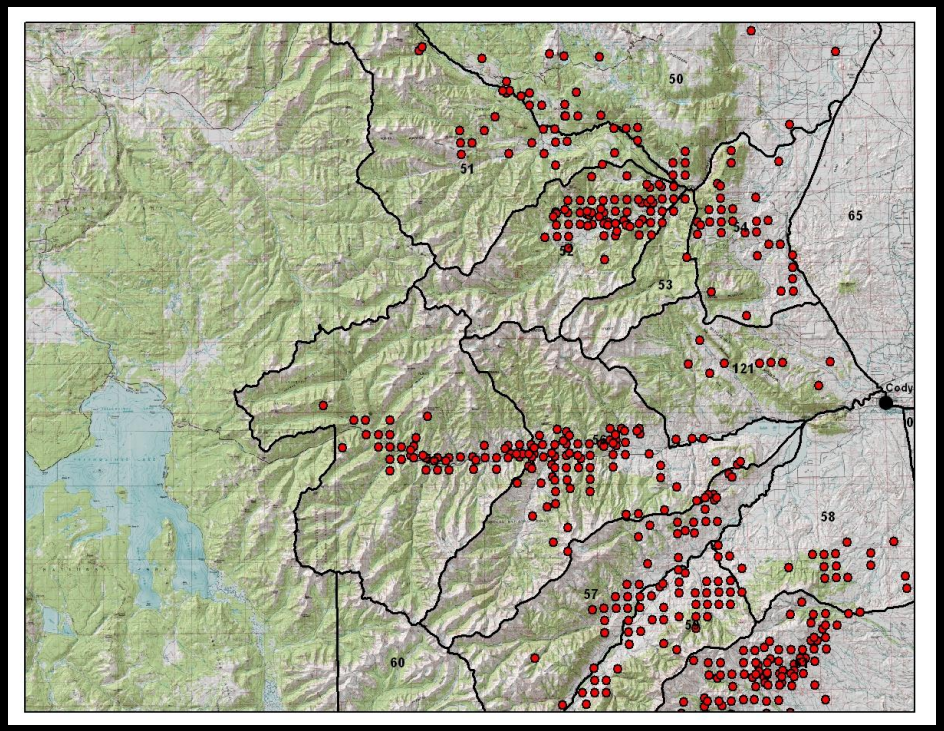
UNIVERSITY OF WYOMING

WYOMING GAME & FISH DEPARTMENT

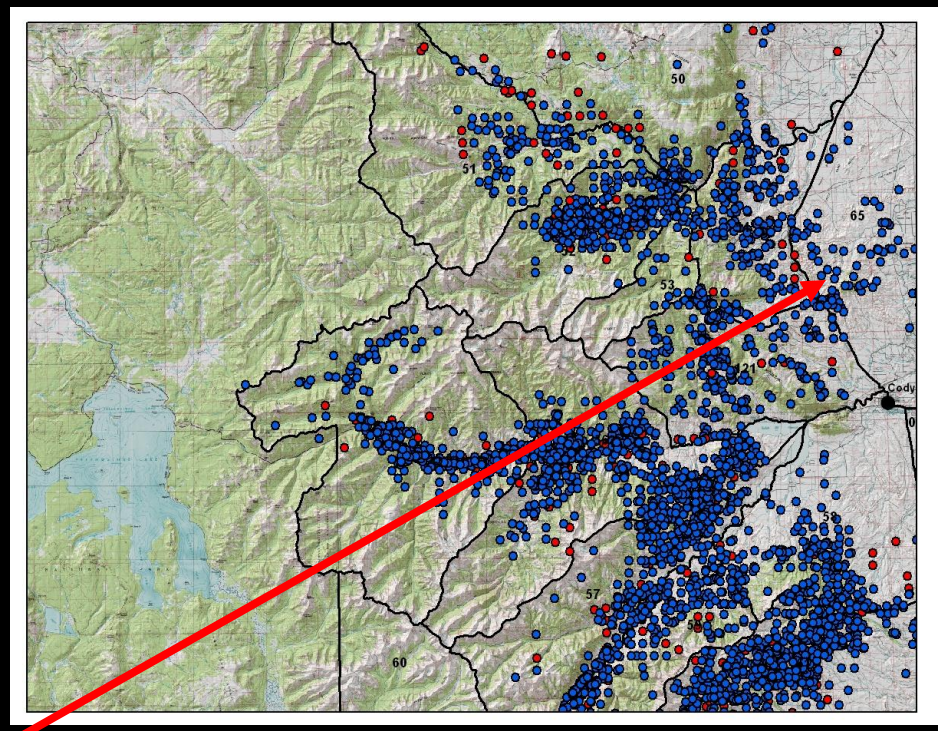
Elk Hunt Areas Cody Region



Elk Winter Observations 1978-1988



Elk Winter Observations 1989-2007



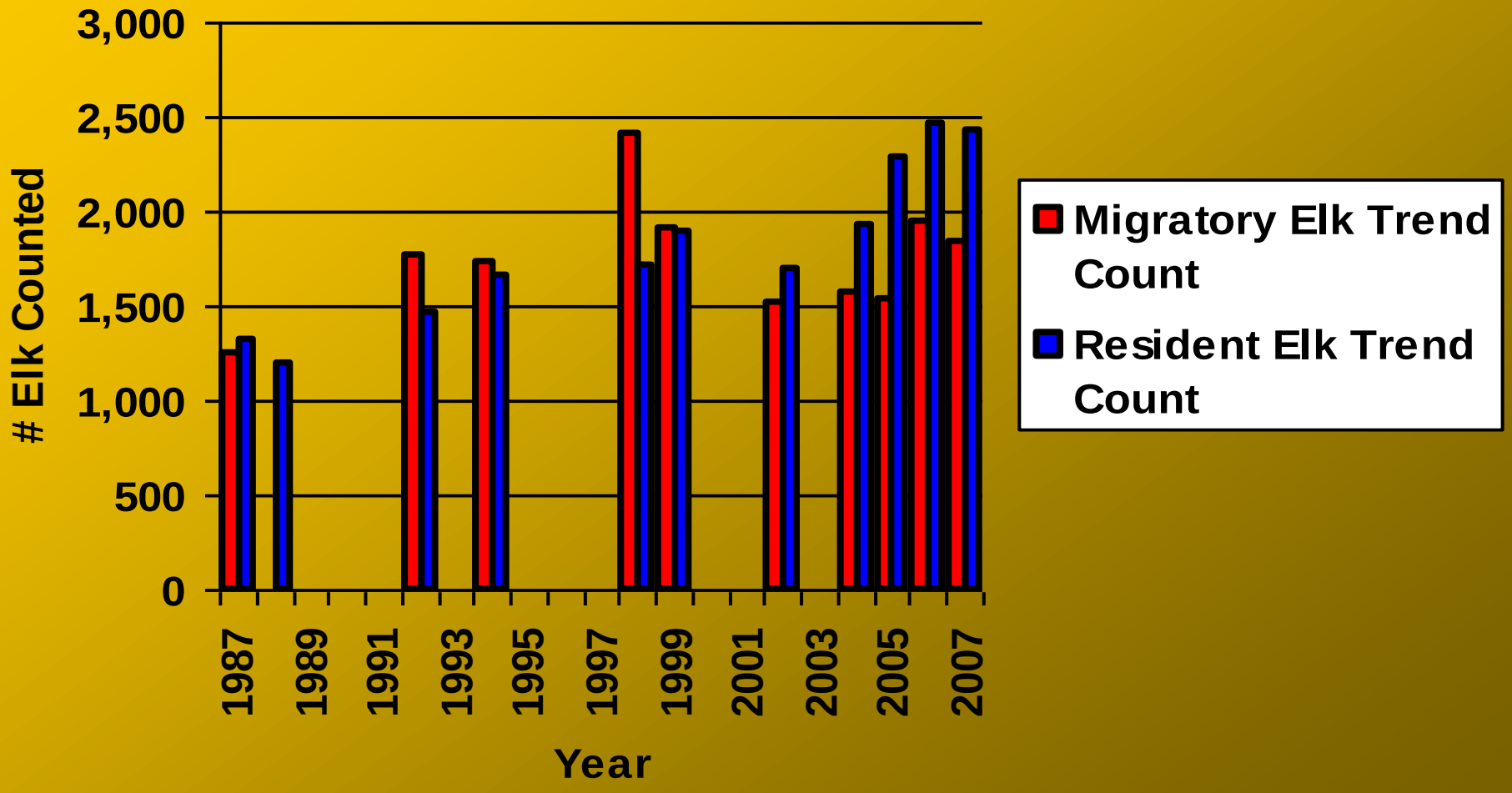
Range expansion eastward onto private lands

Elk first trend counted on Heart Mountain – 1998 (n=190)

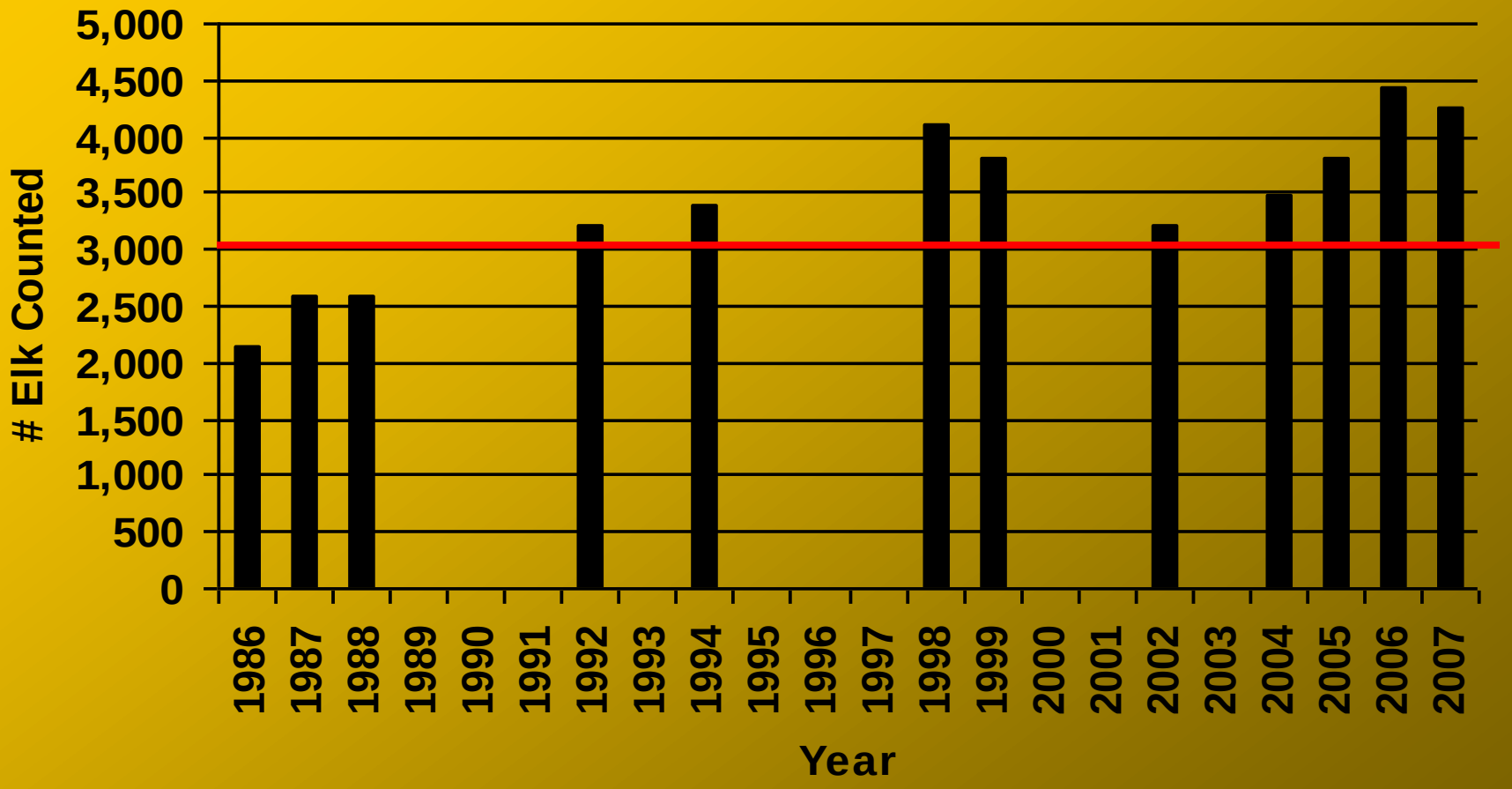
Elk first classified on Heart Mountain – 1999 (n=207)

Clarks Fork Elk Trend Counts

Migratory versus Resident

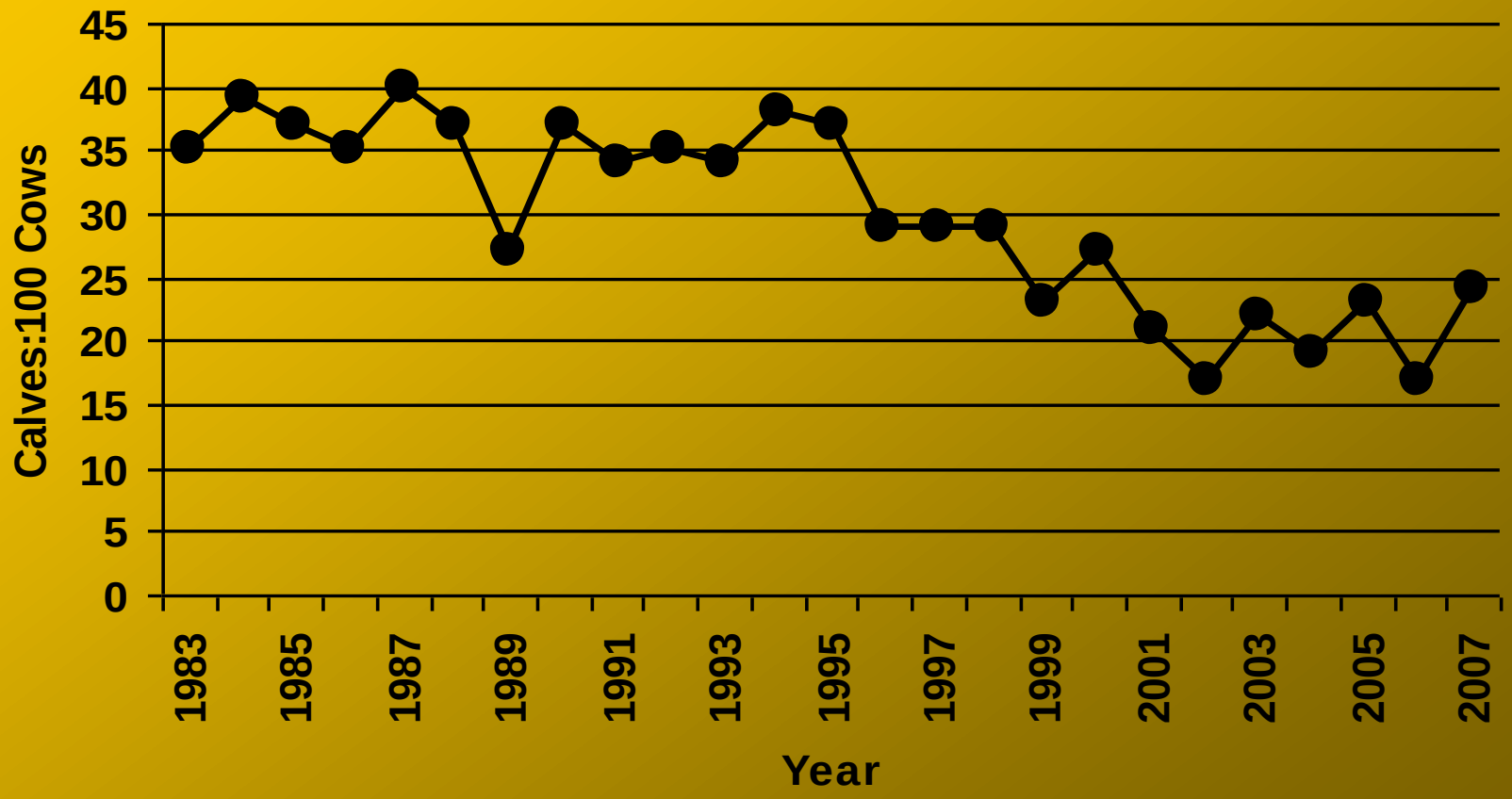


Clarks Fork Elk Trend Counts



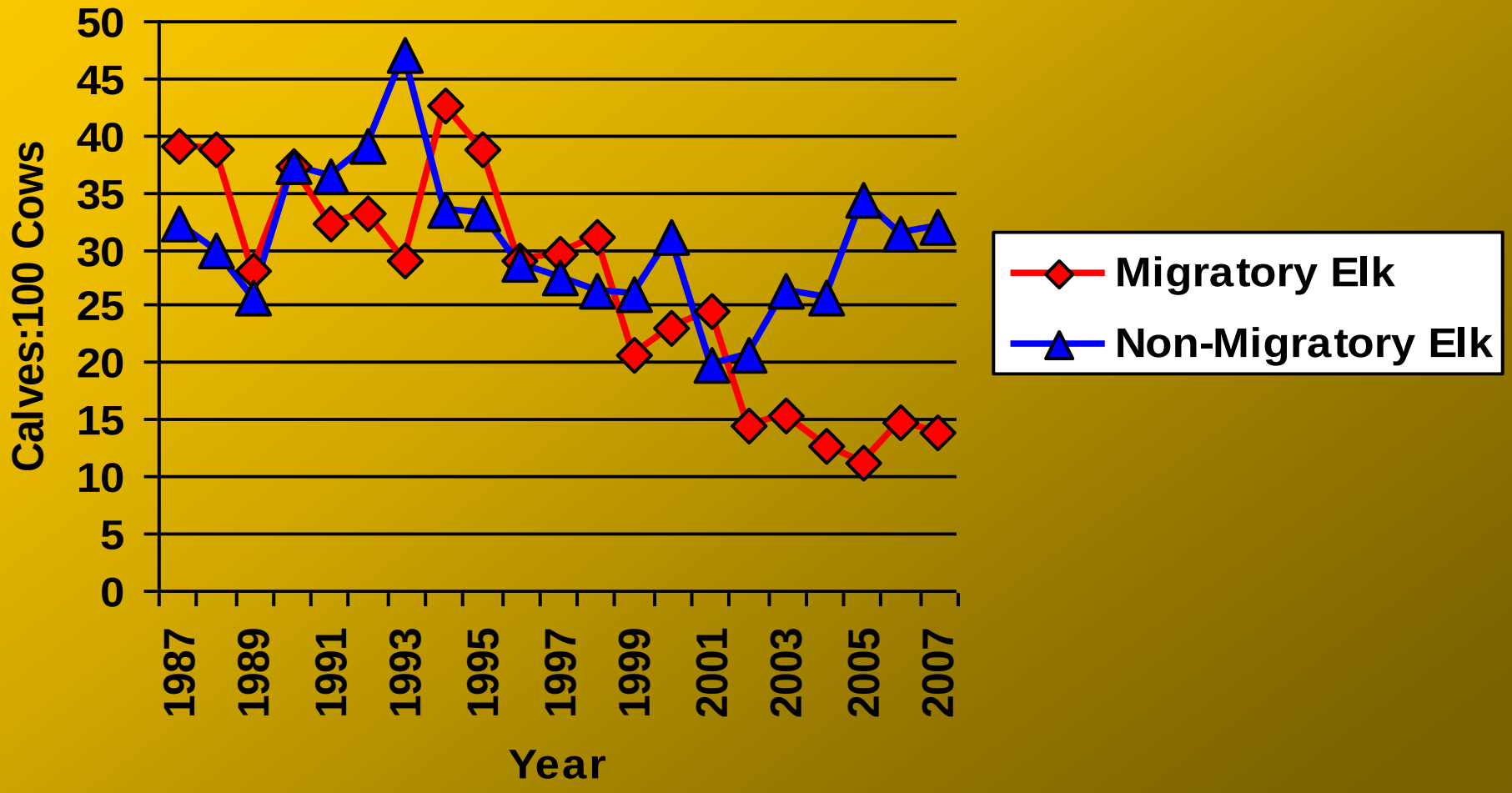
Objective = 3,000 elk

Clarks Fork Elk
Herd Unit Calf Ratios



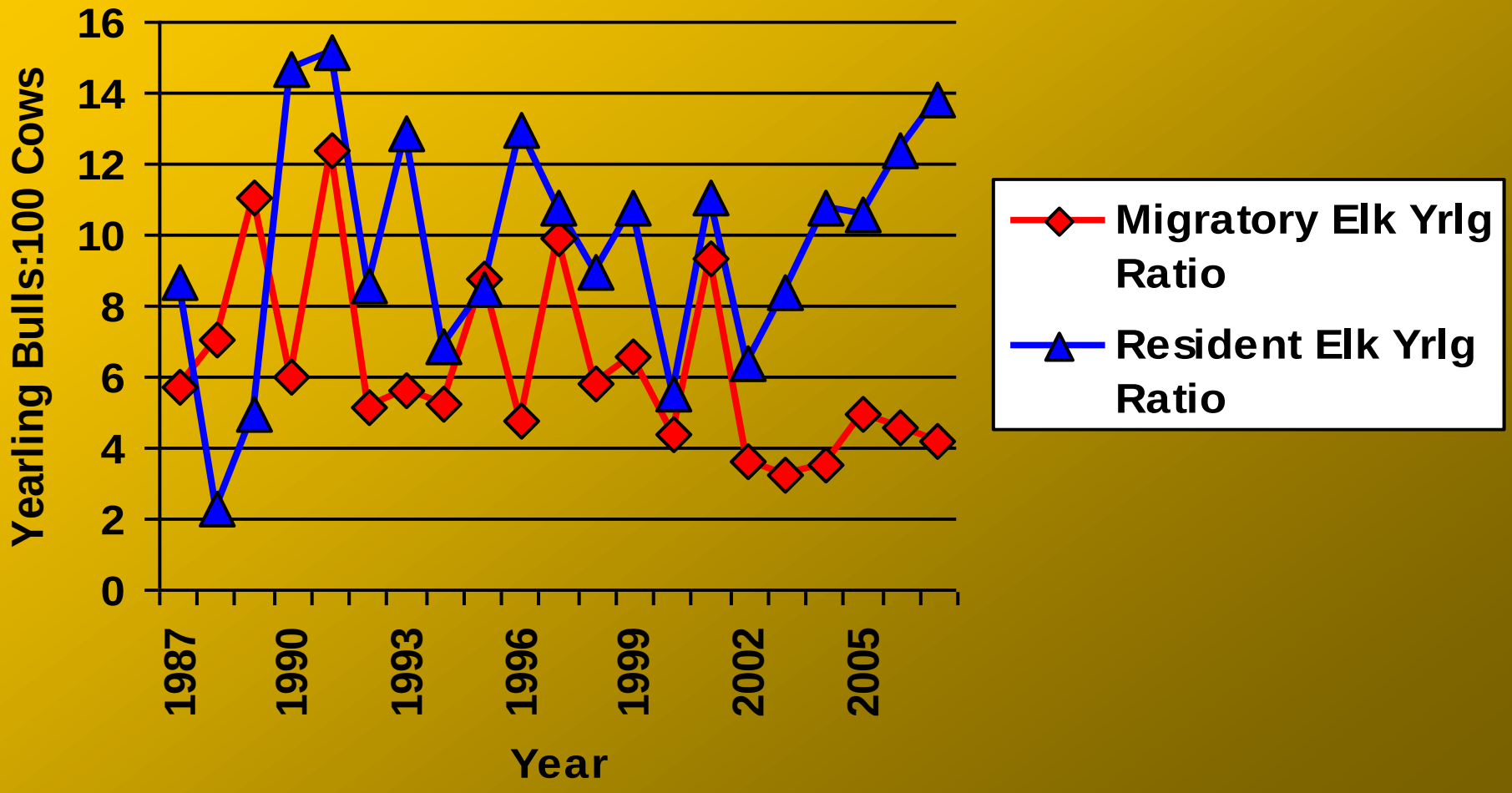
Clarks Fork Elk Calf:Cow Ratios

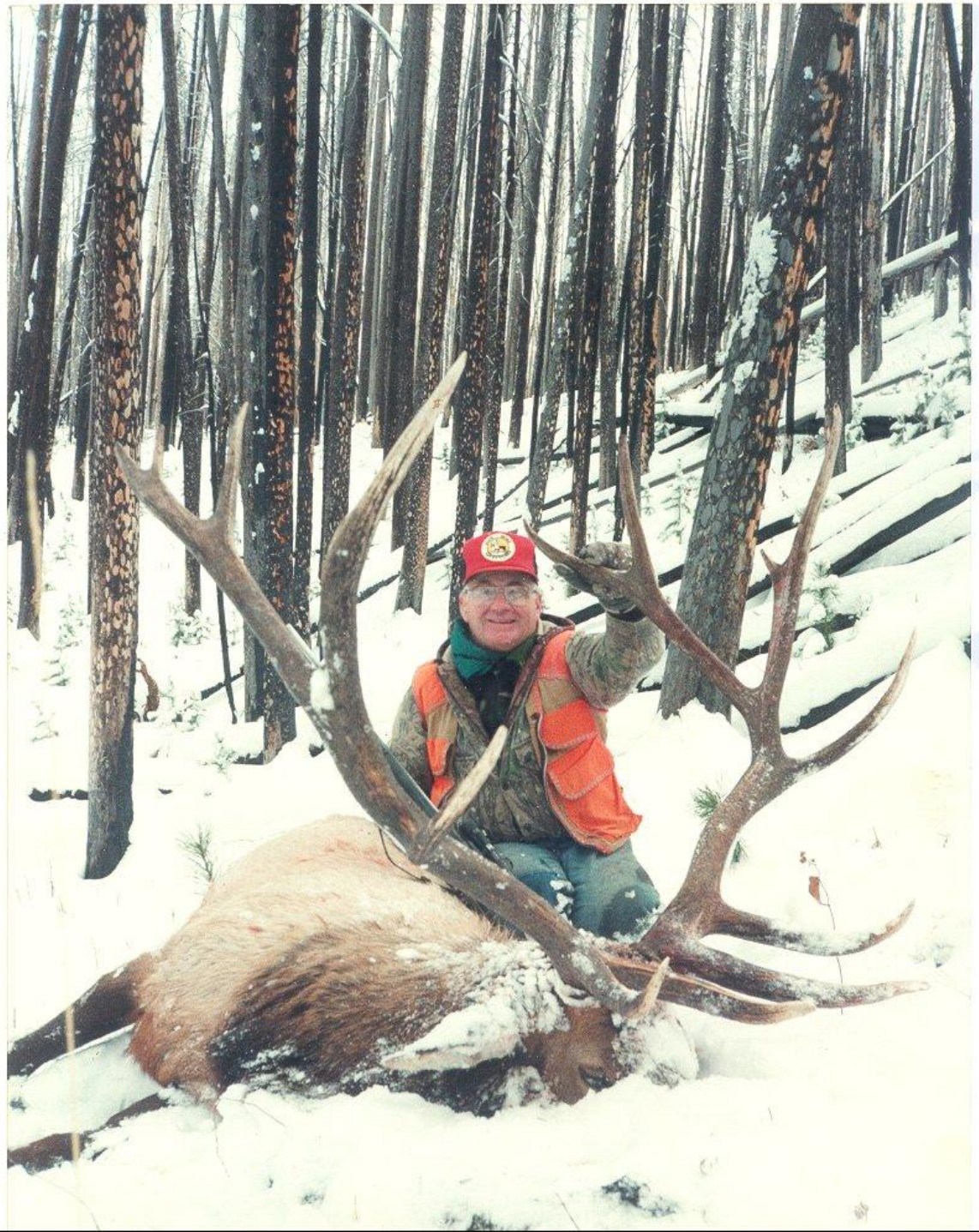
Migratory versus Non-Migratory



Clarks Fork Elk Yearling Bull:Cow Ratios

Migratory versus Non-Migratory





Future Hunting Opportunities For Migratory Elk?

Project Objectives

- Determine the proportion of resident and migratory elk.
- Determine the timing and routes used by migratory elk.
- Increase understanding of elk use of private lands.
- Obtain information on adult elk survival.
- Evaluate the influence of wolves on elk habitat use and movements.

108 adult female elk captured January 07 - January 08

86 store-on-board GPS Collars

22 VHF collars

GPS Duty Cycle

Nov–Mar = 1 location/3 hrs

Apr–June = 1 location/24 hrs

July-Aug = 1 location/3 hrs

Sept-Oct = 1 location/8 hrs

Collar drop-off April 1, 2010

Capture & monitor wolves in 5 packs

(Sunlight, Beartooth, Absaroka, Crandall, Druid)

ARGOS GPS collars (n=14)

Jan–Dec = 1 location/3 hrs
ARGOS download 1/7 days
Collar drop-off each year

LOTEK GPS collars (n=5)

July – Oct = 1 location 20 minutes
Remote download

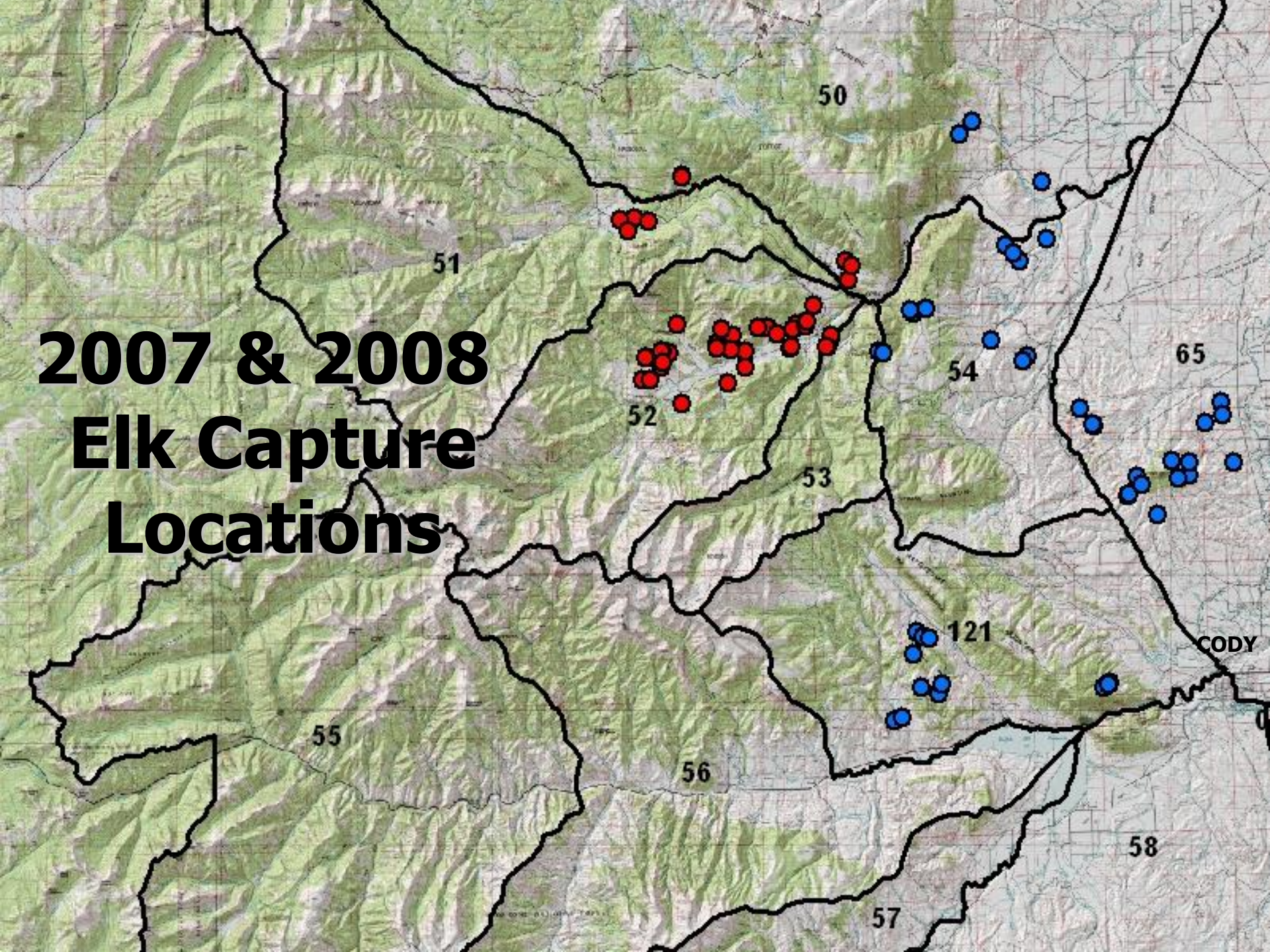
Telonics Store-On-Board GPS (n=2)

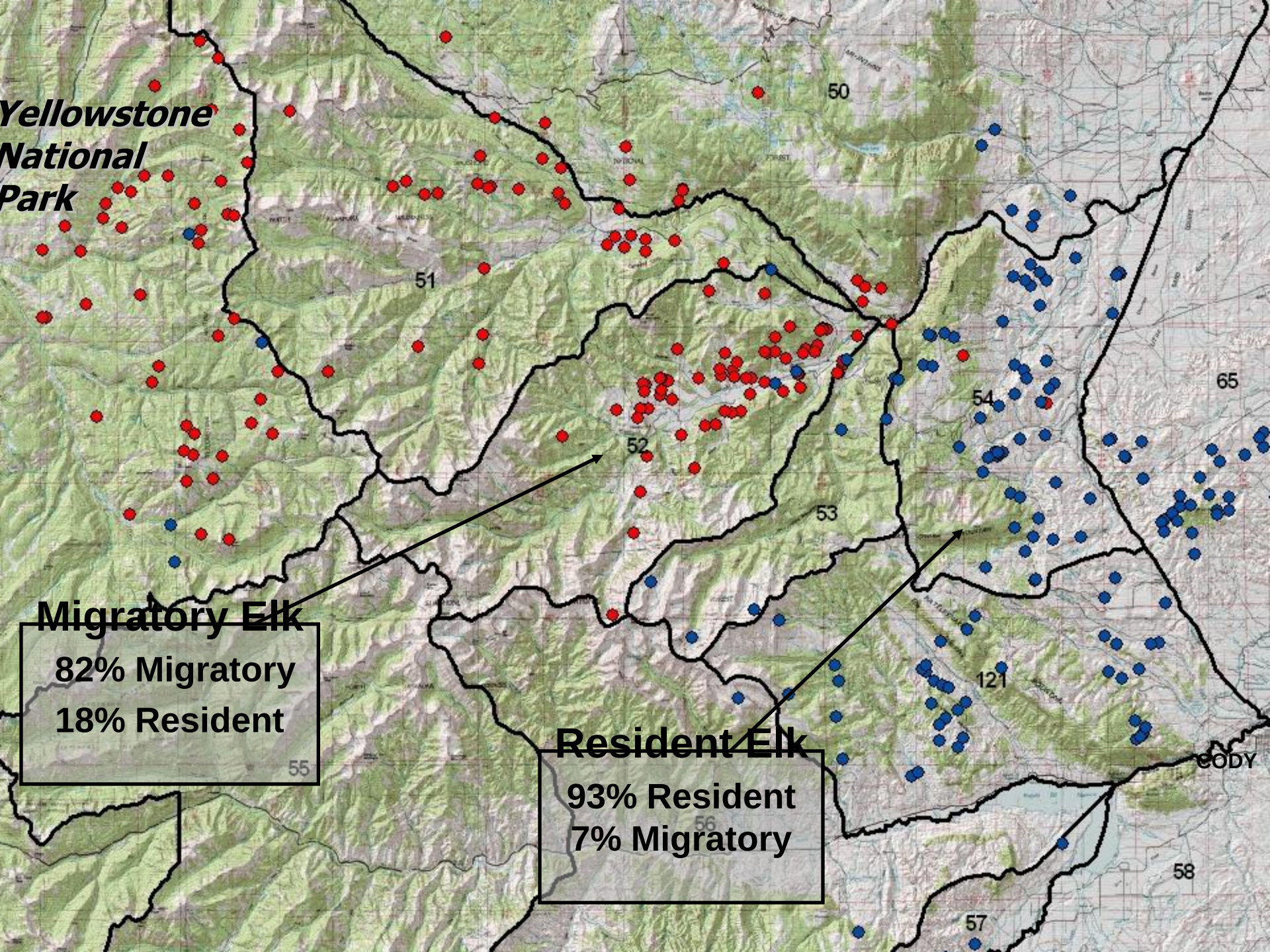
Jan-Dec = 1 location/3 hrs

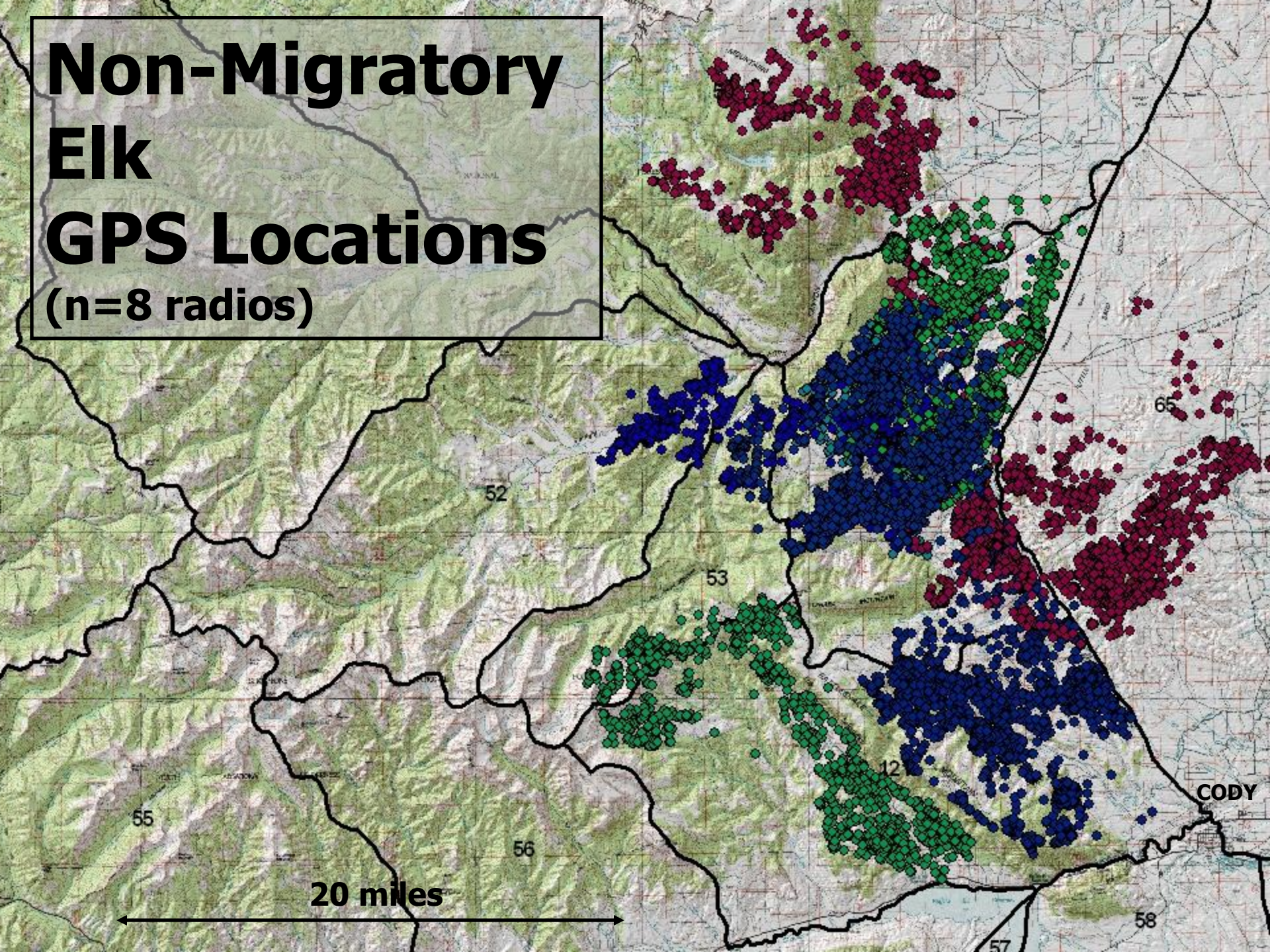
VHF Collars (n= 15)

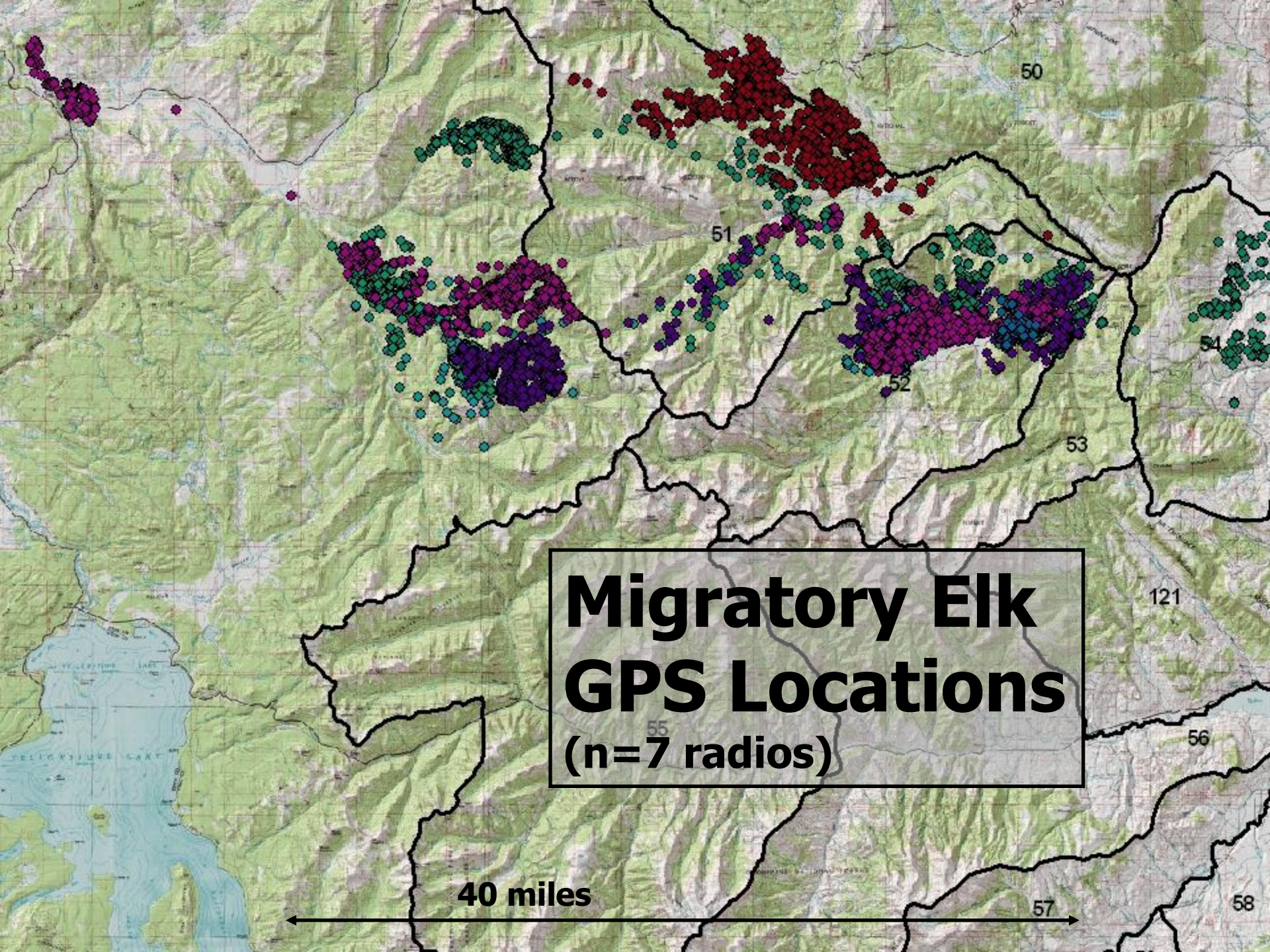
Deployed opportunistically

Annually deploy new collars

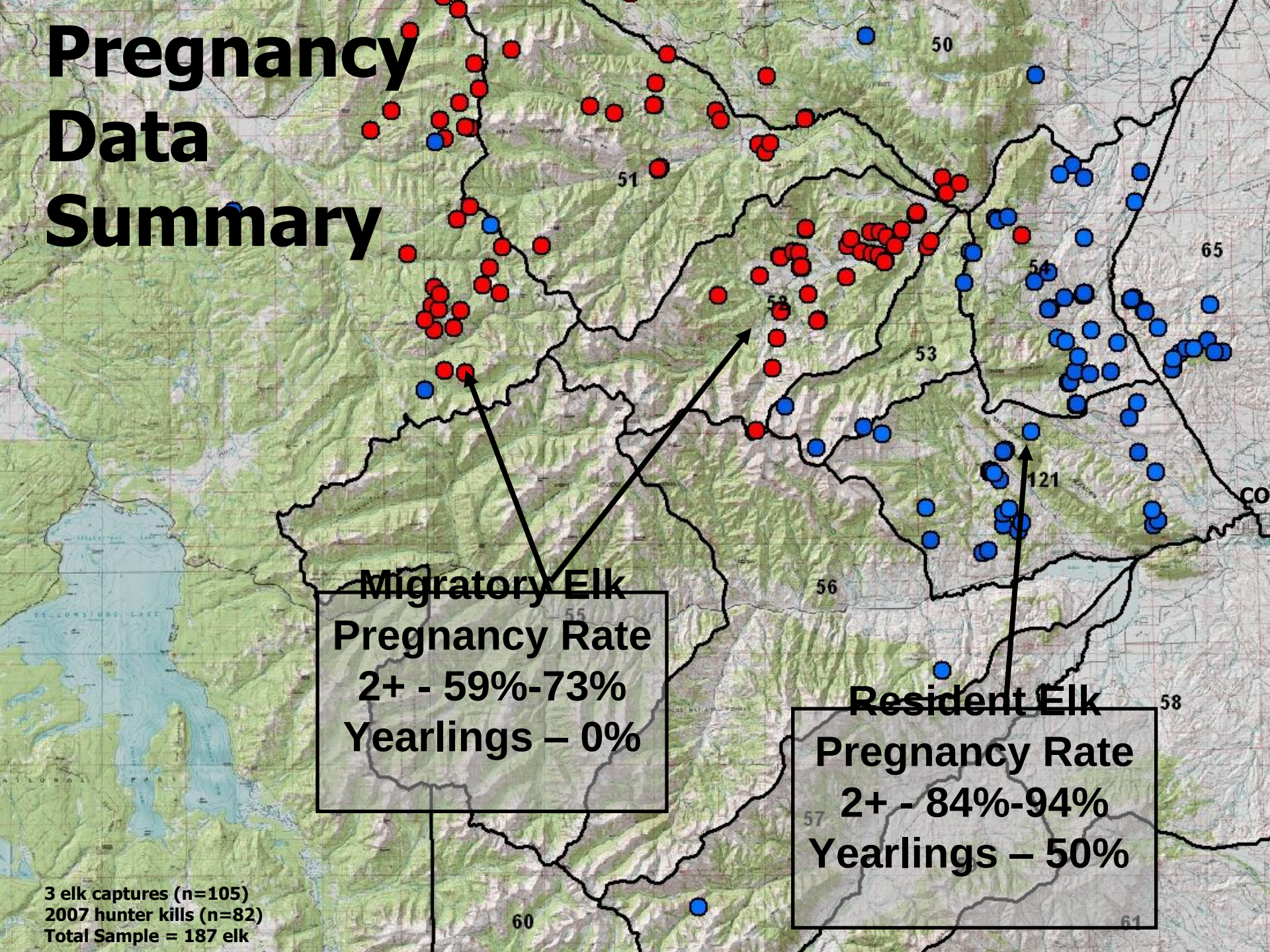

2007 & 2008
Elk Capture
Locations
50
51
52
53
54
65
121
CODY
55
56
57
58


Yellowstone National Park
50
51
52
53
54
65
121
55
56
57
58
CODY
Migratory Elk
82% Migratory
18% Resident
Resident Elk
93% Resident
7% Migratory


Non-Migratory
Elk
GPS Locations
(n=8 radios)
52
53
65
12
55
56
58
57
CODY
20 miles


Migratory Elk
GPS Locations
(n=7 radios)
40 miles
50
51
52
53
54
55
56
57
58
121

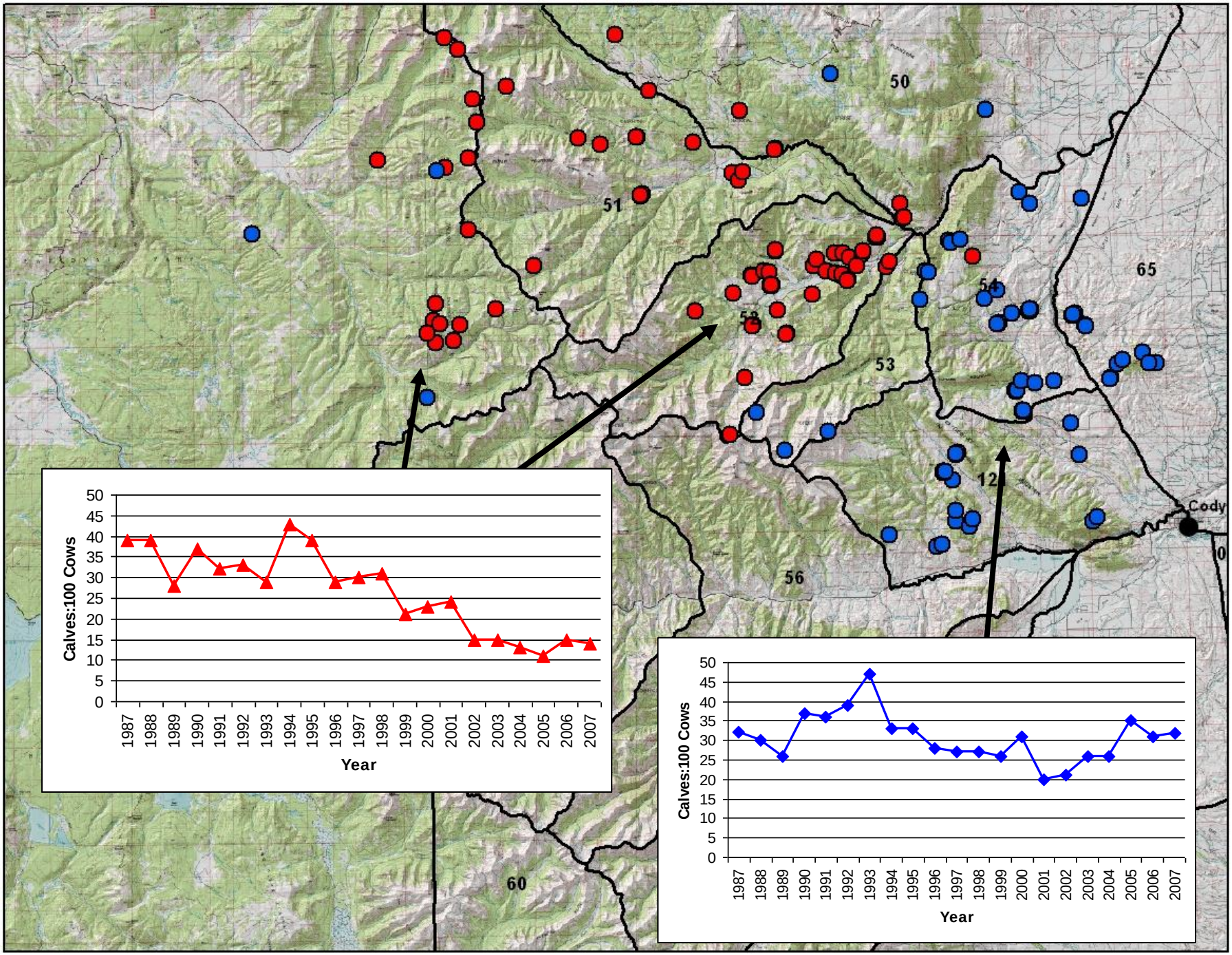
Pregnancy Data Summary

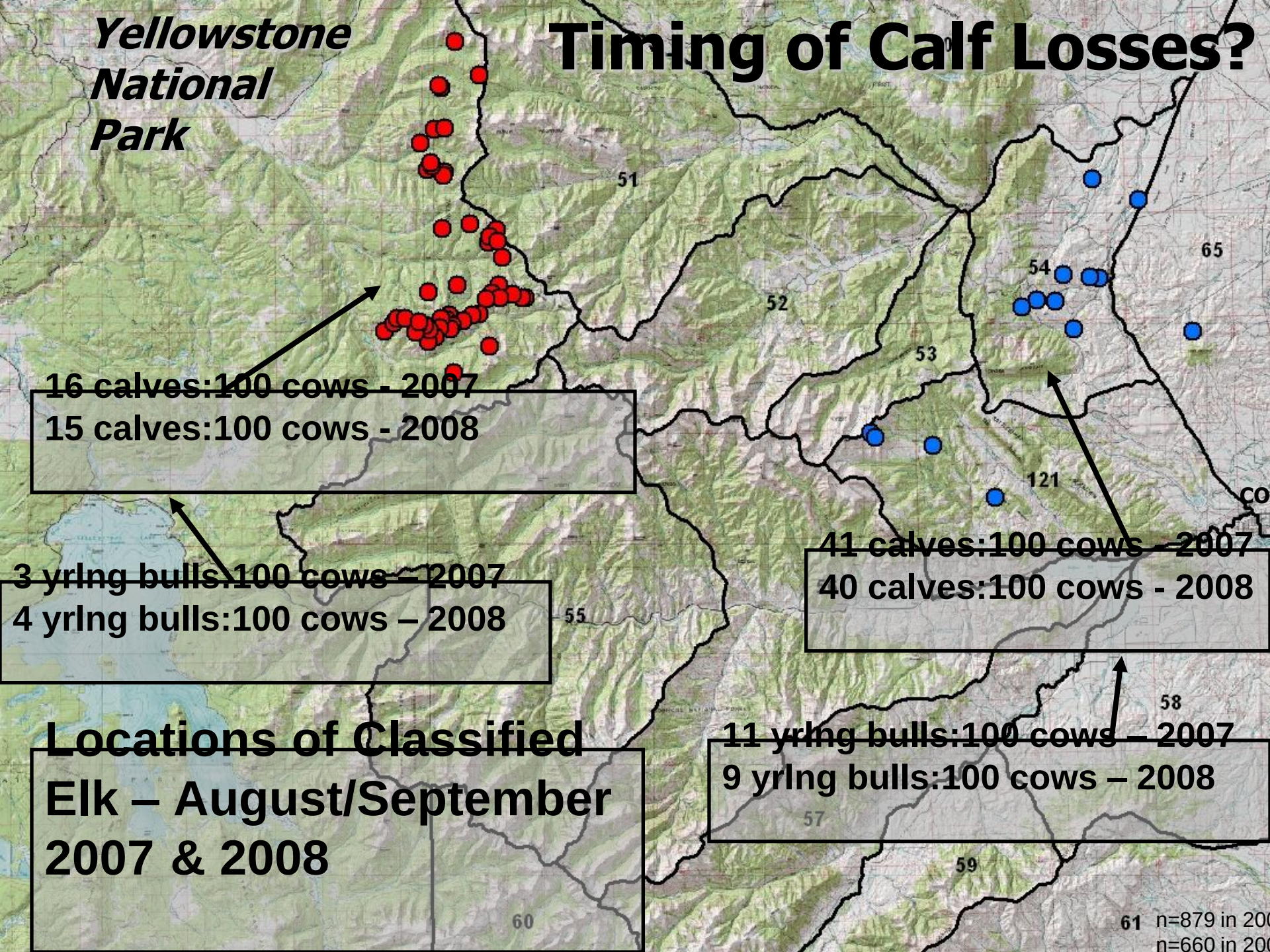


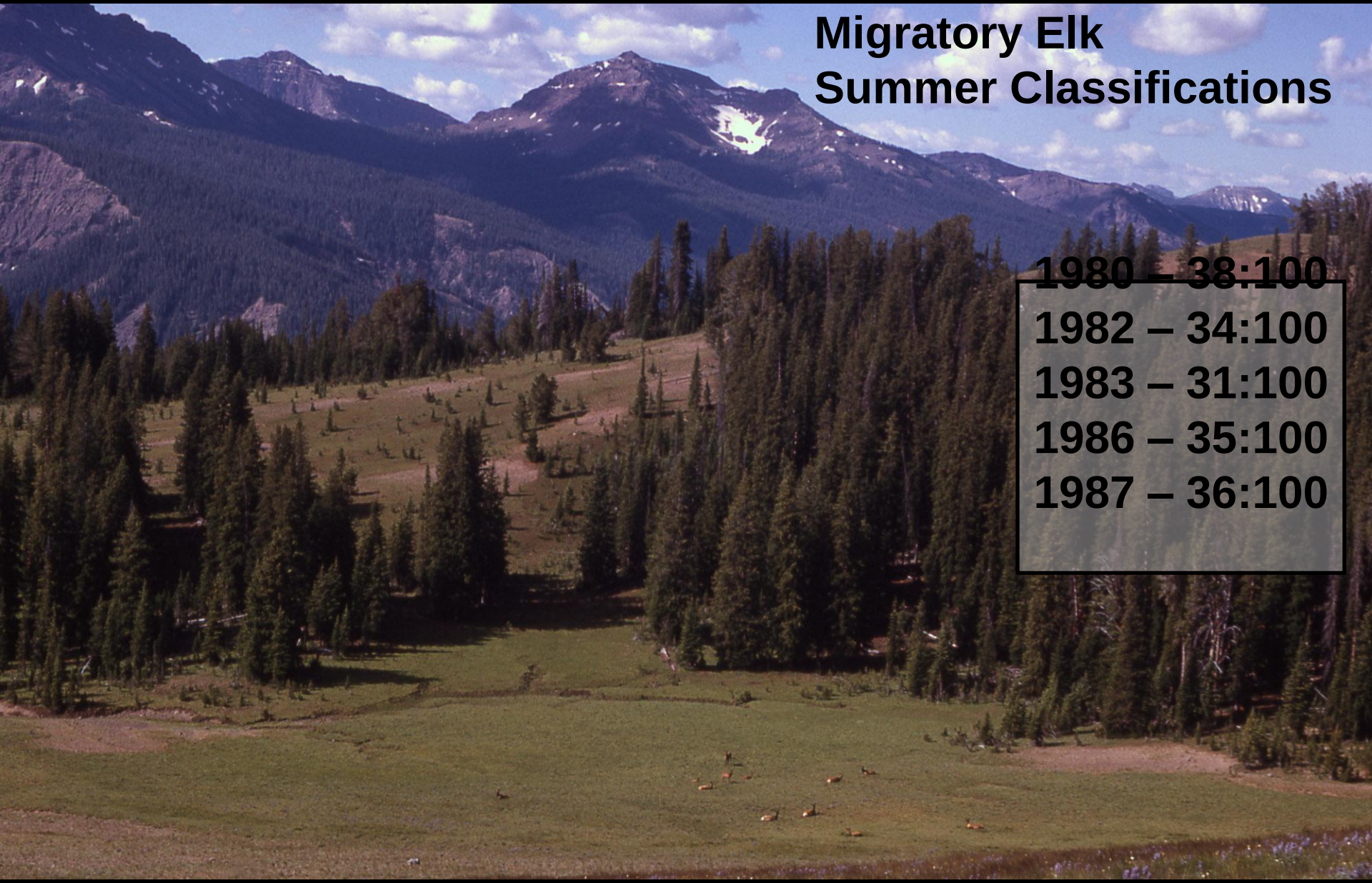
Migratory Elk
Pregnancy Rate
2+ - 59%-73%
Yearlings – 0%

Resident Elk
Pregnancy Rate
2+ - 84%-94%
Yearlings – 50%

3 elk captures (n=105)
2007 hunter kills (n=82)
Total Sample = 187 elk


50
51
65
53
12
Cody
56
60
Calves:100 Cows
Year
Calves:100 Cows
Year

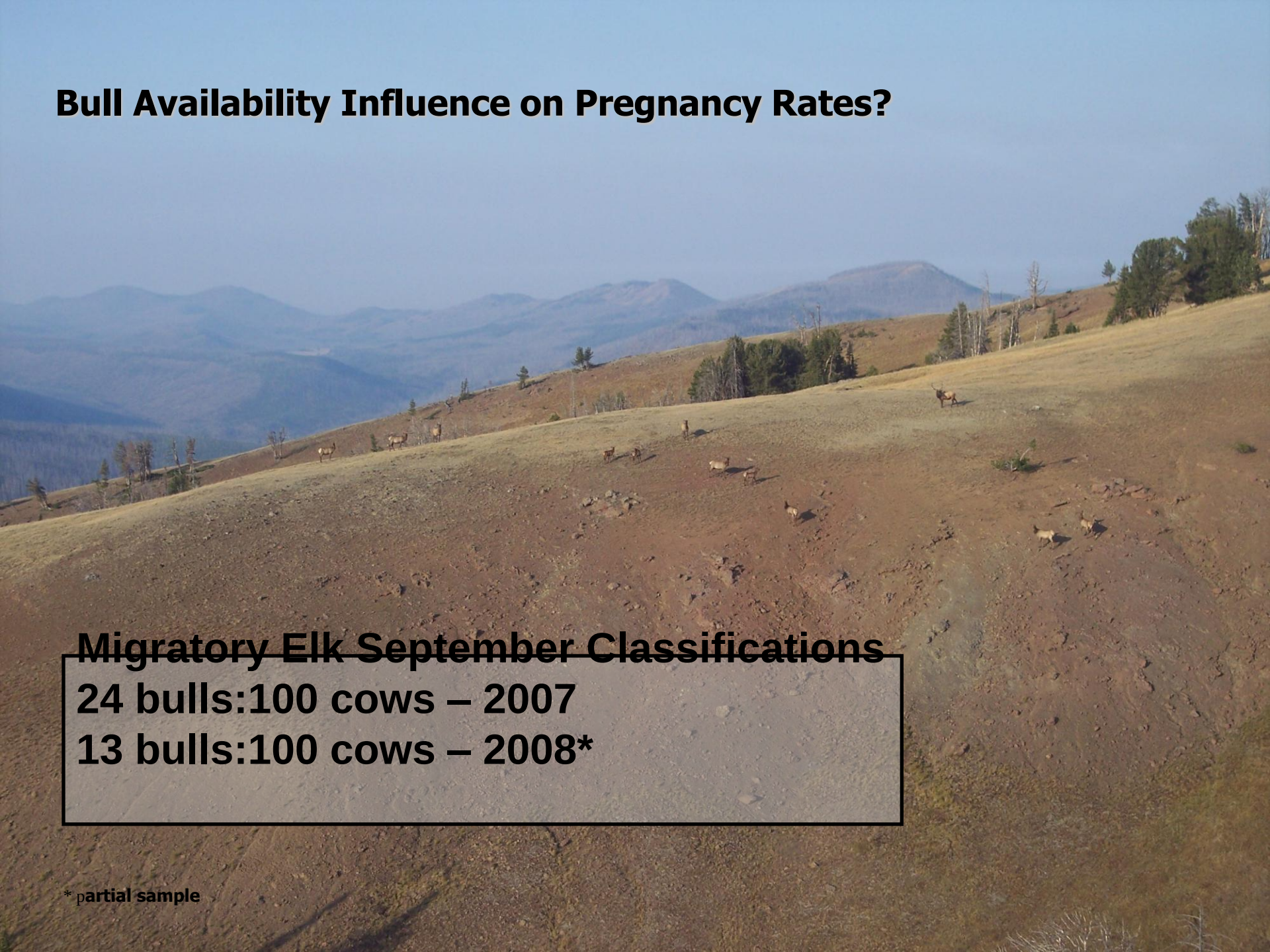

Yellowstone National Park
Timing of Calf Losses?
16 calves:100 cows - 2007
15 calves:100 cows - 2008
3 yrlng bulls:100 cows – 2007
4 yrlng bulls:100 cows – 2008
41 calves:100 cows – 2007
40 calves:100 cows - 2008
11 yrlng bulls:100 cows – 2007
9 yrlng bulls:100 cows – 2008
Locations of Classified Elk – August/September 2007 & 2008
51
52
53
54
55
57
58
59
60
61
65
121
n=879 in 200
n=660 in 200


Migratory Elk
Summer Classifications
1980 – 38:100
1982 – 34:100
1983 – 31:100
1986 – 35:100
1987 – 36:100

Additional Project Objectives

- Determine why pregnancy rates are so low for migratory elk.
- Evaluate the the relationships between elk habitat selection, elk body condition, and elk pregnancy rates.
- Evaluate how wolf predation risk may influence elk behavior, habitat selection, and therefore body condition, and ultimately, pregnancy rates.

Bull Availability Influence on Pregnancy Rates?

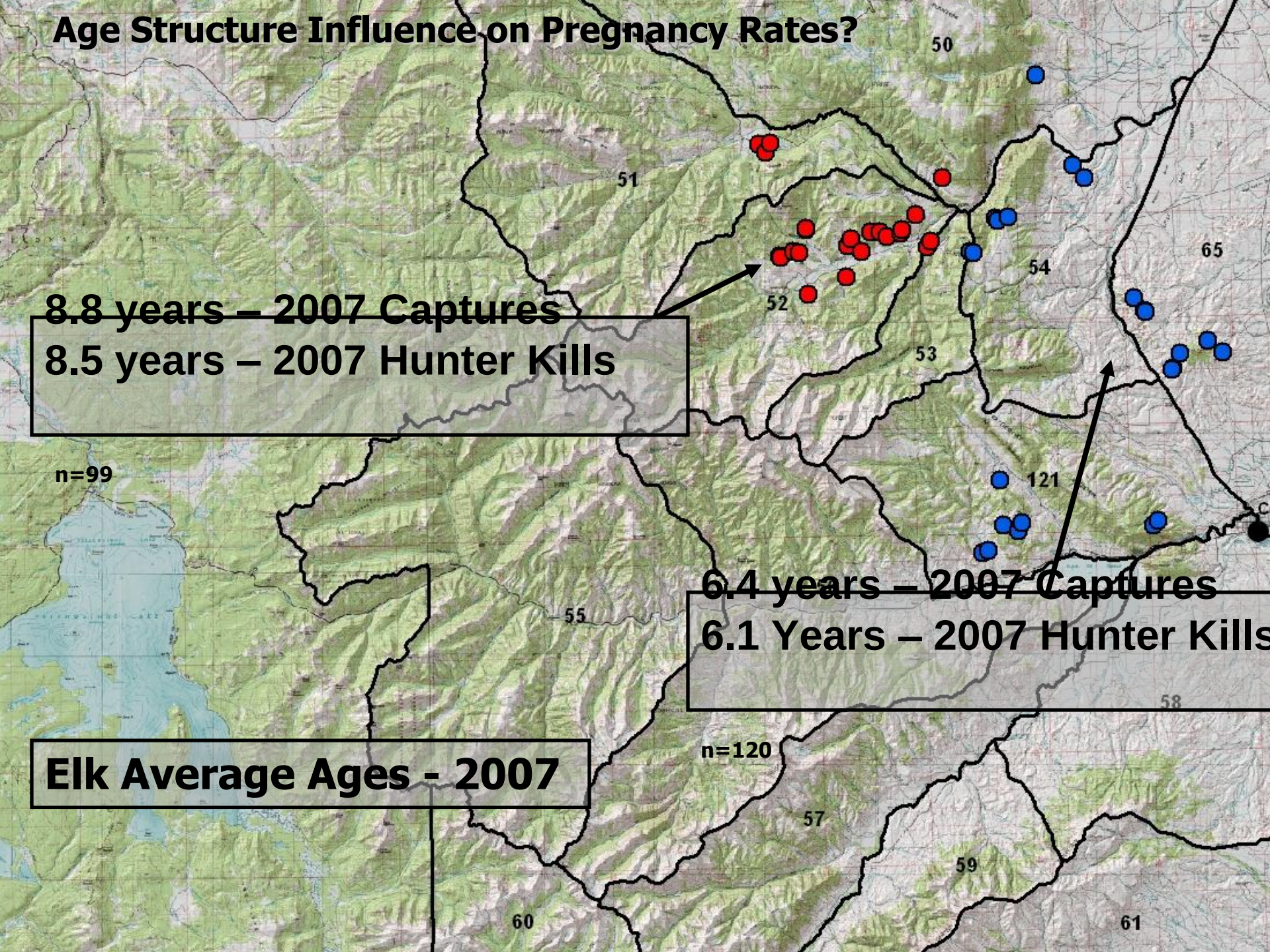


Migratory Elk September Classifications

24 bulls:100 cows – 2007

13 bulls:100 cows – 2008*

* partial sample

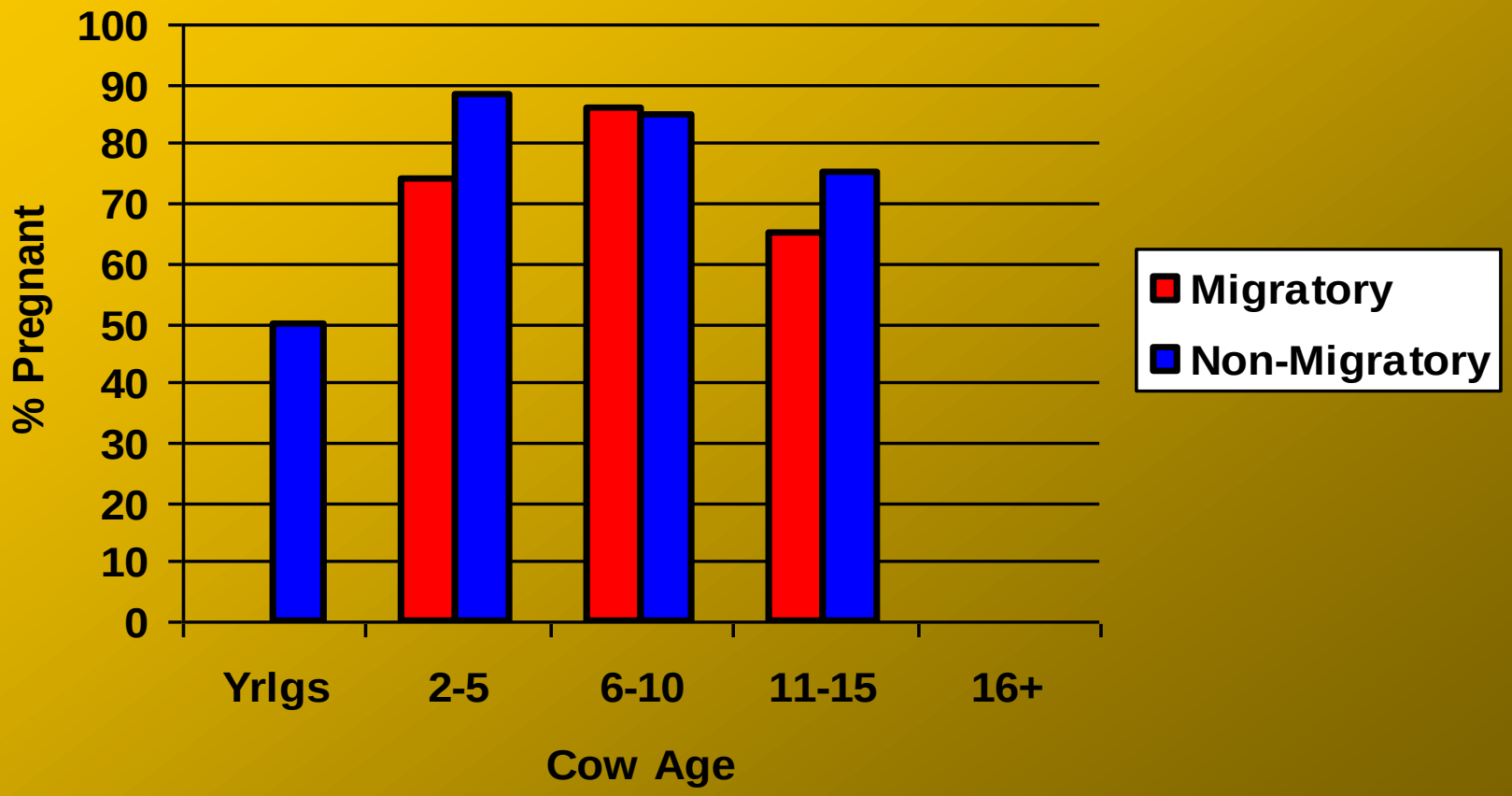

Age Structure Influence on Pregnancy Rates?
8.8 years – 2007 Captures
8.5 years – 2007 Hunter Kills
n=99
6.4 years – 2007 Captures
6.1 Years – 2007 Hunter Kills
n=120
Elk Average Ages - 2007
50
51
52
53
54
55
57
58
59
60
61
65
121

Clarks Fork Elk Cow Age Structure

Migratory versus Non-Migratory

n=99 migratory elk
n= 120 non-migratory elk

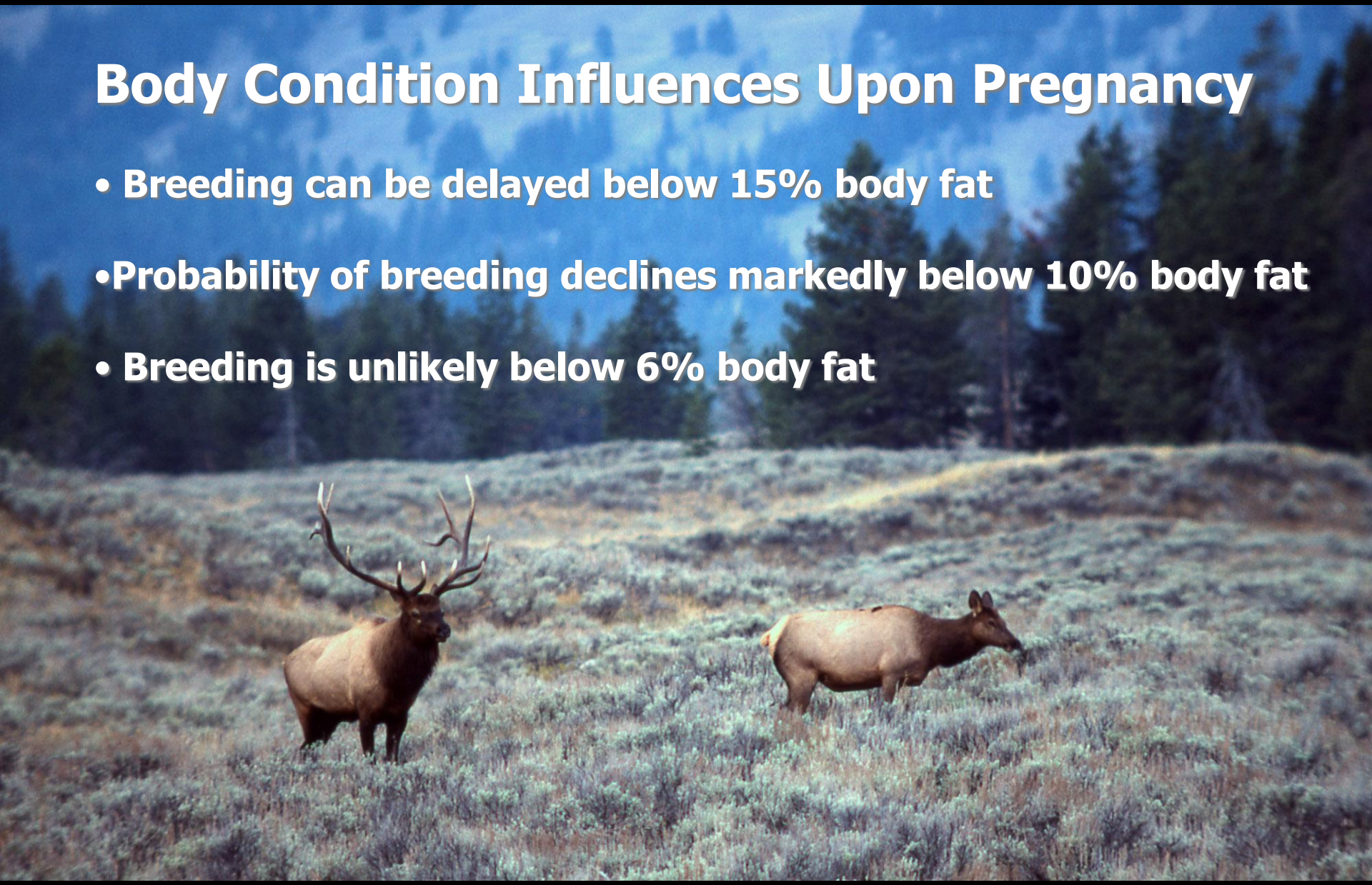
Clarks Fork Elk
Age-Specific Pregnancy Rates
Migratory versus Non-Migratory



n=187 elk

Body Condition Influences Upon Pregnancy

- Breeding can be delayed below 15% body fat
- Probability of breeding declines markedly below 10% body fat
- Breeding is unlikely below 6% body fat



Body Condition Effects Upon Calves

- With good nutrition, calves stop growing in mid-October
- With poor nutrition, calves stop growing in mid-September
- Winter survival of calves is related to their size at the onset of winter
- With good nutrition as calves, will become pregnant as yearlings despite near starvation in winter

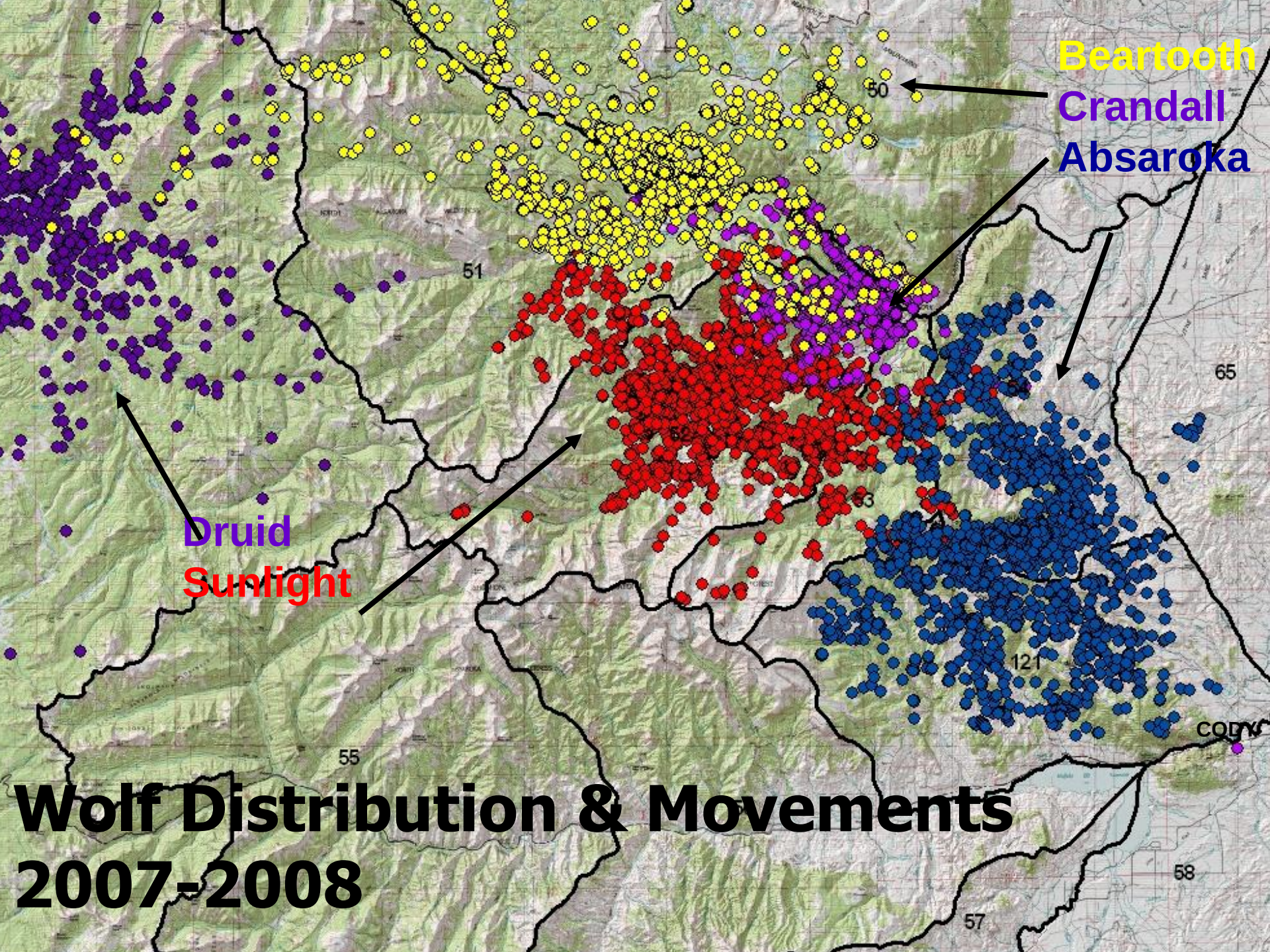
Body Condition Sampling Hunter-Killed Elk

Whole-Body Carcass Scoring

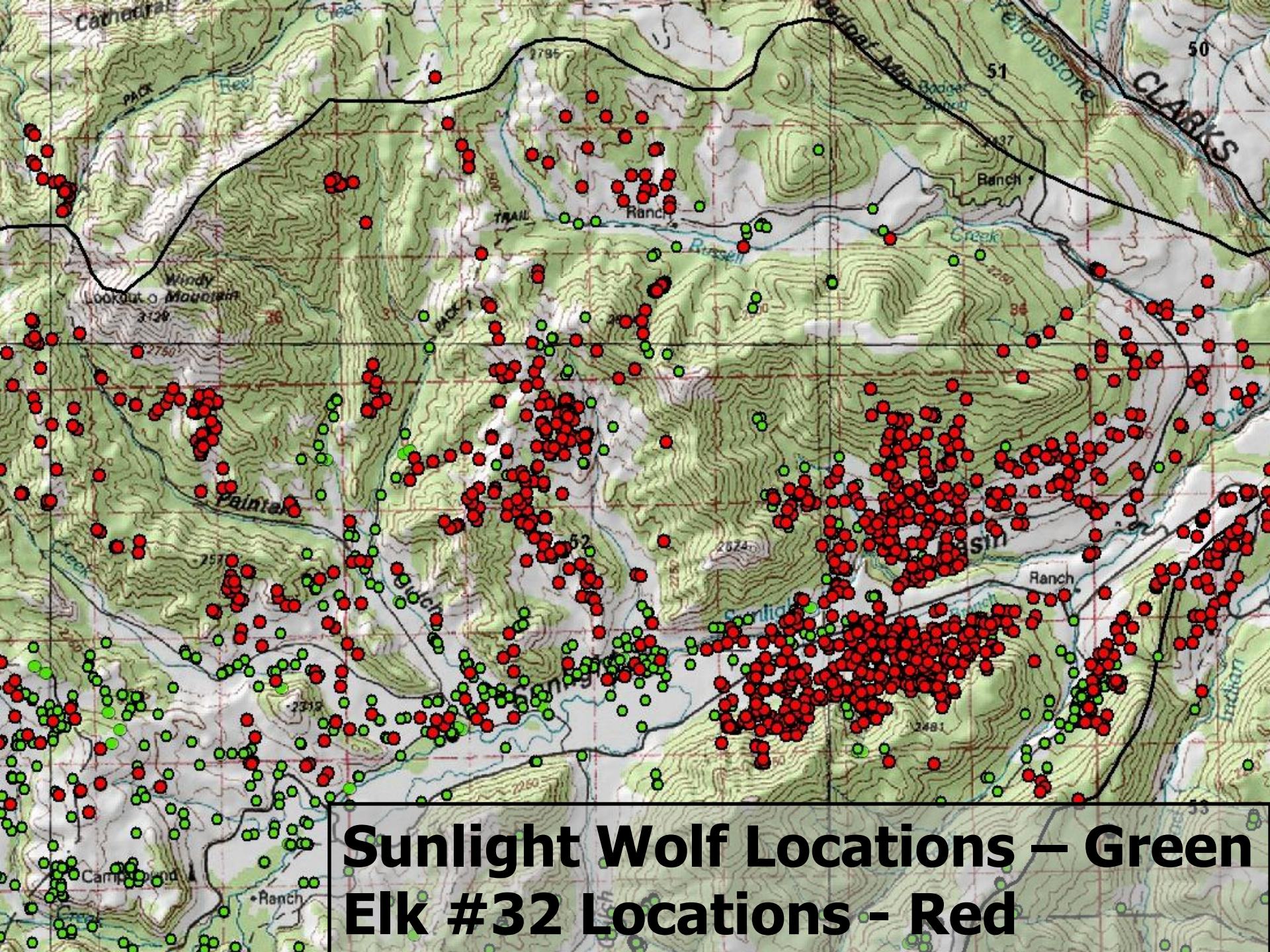
Both Support Other Data Collected On Pregnancy Rates & Lactation Status

Body Condition Sampling

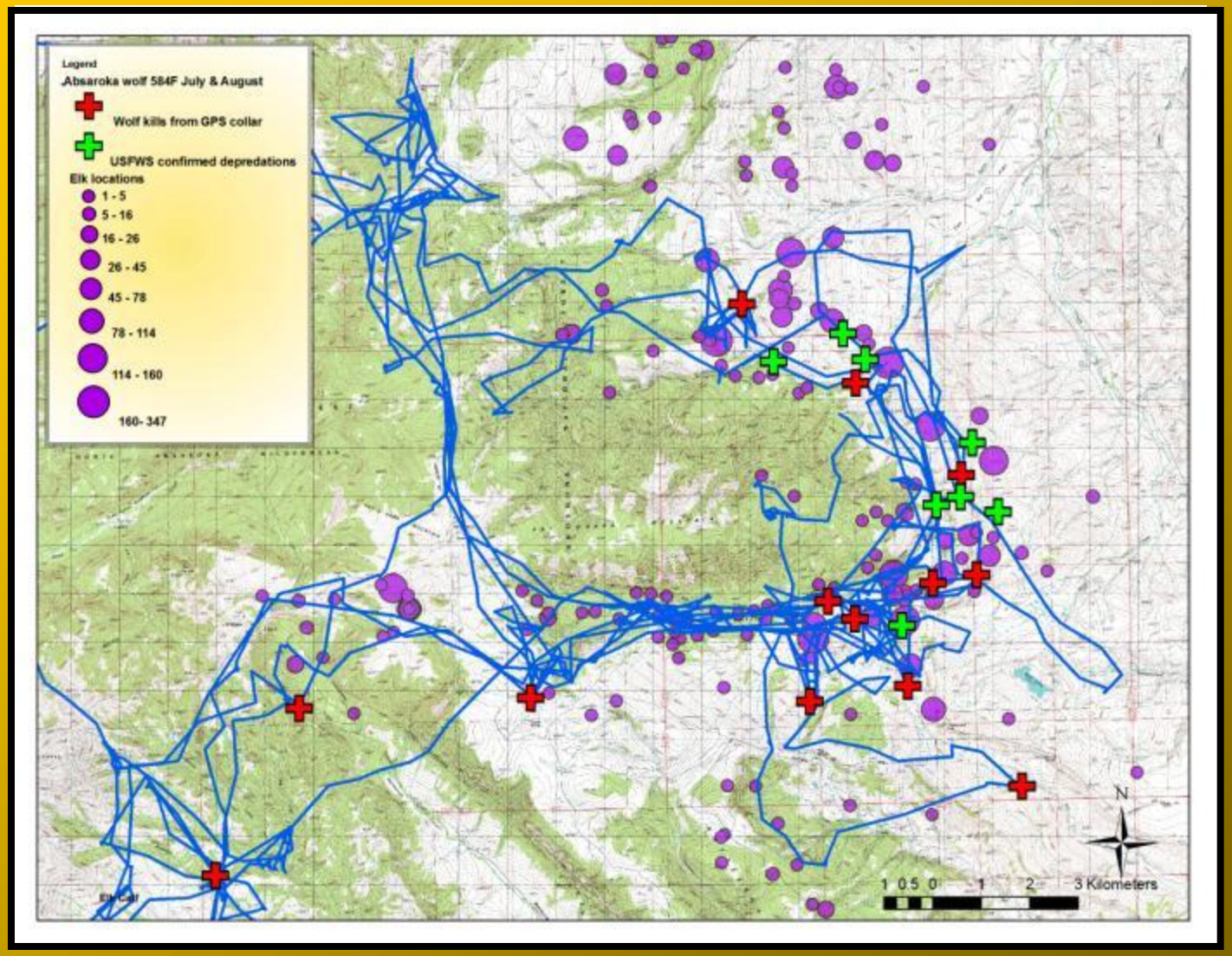
Detailed Sampling of GPS-Collared Elk



Wolf Distribution & Movements 2007-2008


Sunlight Wolf Locations – Green
Elk #32 Locations - Red

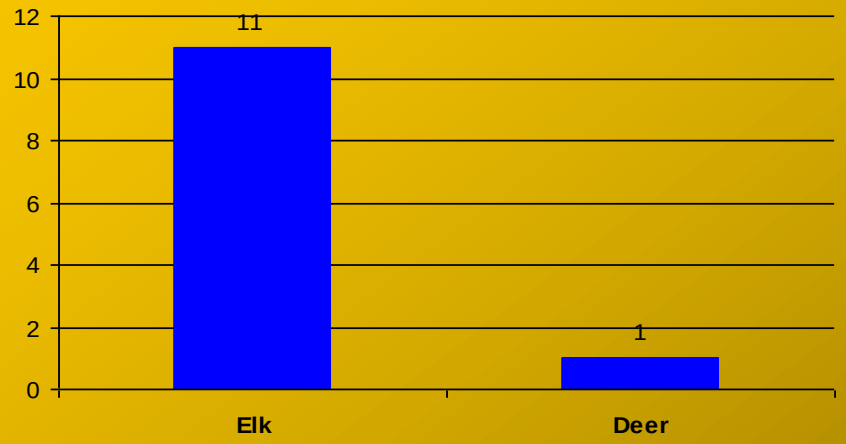
Wolf- cattle conflicts in resident elk areas



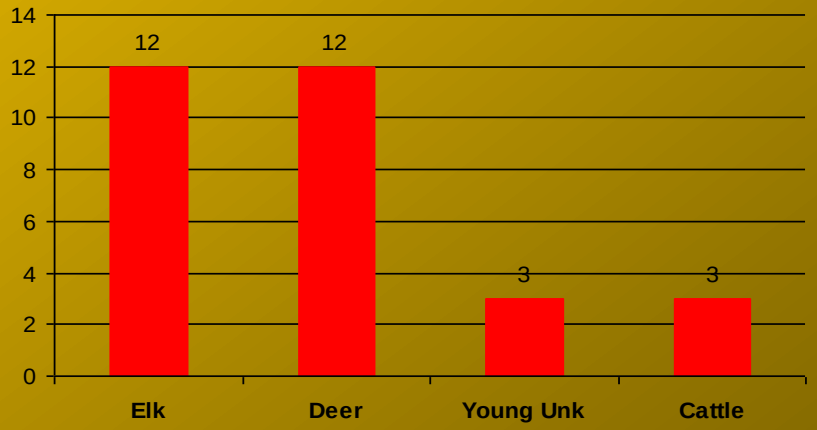
Abby Nelson, Matt Kauffman. Wolf habitat selection and predation patterns in the Absaroka Mountains of Wyoming: Identifying the drivers of wolf-livestock conflicts.

Wolf-killed prey species found at GPS clusters

Non-Migratory Elk Areas



Migratory Elk Areas



Abby Nelson, Matt Kauffman. Wolf habitat selection and predation patterns in the Absaroka Mountains of Wyoming: Identifying the drivers of wolf-livestock conflicts.

Elk Mortality & Survival

Summer Mortality of Elk Calves YNP

2003-2005

69% die of all causes (Birth-October)

94% of these deaths are predator caused

77% of predation occurs within 1st 15 days of life

1st 30 days of calf life

bears 69% of deaths

wolves 12% of deaths

coyotes 11% of deaths

Barber-Meyer, et al. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. Wildlife Monographs 169.

Summer Mortality of Elk Calves-YNP

Variable Summer Predation

Avg age at death - 25 days

- **Bears – 10 days**
- **Coyotes – 29 days**
- **Wolves – 35 days**
- **Mtn Lions – 107 days**

Median Birth Date – May 28
(range – May 16 – June 10)

Mortality Rate

Mammoth - 36%
Lamar Valley - 85%

Barber-Meyer, et al. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. Wildlife Monographs 169.

Elk Calf Mortality YNP

	1987-90	2003-05
Annual Mortality Due To Predation	45%	94%
Bear Predation	23%	58%-60%
Wolf Predation	0%	14%-17%
Coyote Predation	17%	10%-11%
Mtn Lion Predation	2%	3%
Winter Malnutrition (% of winter deaths)	58%	0%

Singer, F.J. A. Harting, K.K. Symonds, and M.B Coughenour. 1997. Density dependence, compensation, and environmenatl effects on elk calf mortality in Yellowstone National Park. Journal of Wildlife Management 61:12-25.

Barber-Meyer, et al. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. Wildlife Monographs 169.

Elk Calf Survival

Yellowstone National Park

	1987-90	2003-05
Summer Survival	65%	31%
Winter Survival	72%	90%
Annual Survival	43%	22%

n= 127 radio marked calves 1987-90
n=152 radio marked calves 2003-05

Singer, F.J. A. Harting, K.K. Symonds, and M.B Coughenour. 1997. Density dependence, compensation, and environmenatl effects on elk calf mortality in Yellowstone National Park. Journal of Wildlife Management 61:12-25.

Barber-Meyer, et al. 2008. Elk calf survival and mortality following wolf restoration to Yellowstone National Park. Wildlife Monographs 169.

Predation on Elk YNP

Wolf Prey Selection 1995-2000

90% Elk

- **43% Calves (+)**
- **28% Cows (-)**
- **21% Bulls (=)**

Smith, D.W., T.D. Drummer, K.M. Murphey, D.S. Guernsey, and S.B. Evans. 2004. Winter prey selection and estimation of kill rates in Yellowstone National Park, 1995-2000. Journal of Wildlife Management 68:153-166.

Predation on Elk YNP

Wolf Prey Selection
1995-2000

90% Elk
- 43% Calves (+)
- 28% Cows (-)
- 21% Bulls (=)

Smith, D.W., T.D. Drummer, K.M. Murphey, D.S. Guernsey, and S.B. Evans. 2004. Winter prey selection and estimation of kill rates in Yellowstone National Park, 1995-2000. Journal of Wildlife Management 68:153-166.

Wolf Prey Selection
2007

84% Elk
- 21% Calves
- 29% Cows
- 41% Bulls

Smith, D.W., D.R. Stahler, D.S. Guernsey, M. Metz, E. Albers, L. Williamson, N. Legere, E. Almberg, and R. McIntyre. 2008. Yellowstone Wolf Project: Annual Report, 2007. National Park Service, Yellowstone Center for Resources, Yellowstone National Park, Wyoming, YCR-2008-01.

Adult Cow Survival

Yellowstone National Park

2000-2004

Cows (1-15 yrs)	83%
All Cows (1-18 yrs)	80%

Cause Specific Annual Mortality

Hunting	8%
Predation – Wolves	7%
Predation – Bear/Lion/Unknown	2%

n= 85 radio collared cows 2000-2004

Evans, S.B., L.D. Mech, D.W. Smith, P.J. White, and G.A. Sargeant. 2006. Survival and causes of mortality of cow elk in Yellowstone's northern range. Journal of Wildlife Management 70:1372-1378.

Radio-Collared Elk Deaths to Date
19 total

10 hunter kills
(7 non-migratory, 3 migratory)

3-6 probable wounding losses
(2 non-migratory, 1 migratory)

3-6 unknown
(non-hunting related)

Adult Cow Survival

Clarks Fork Elk

Annual Survival

	2007	2008
Non-Migratory	78%	87%
Migratory	77%	93%

Cause Specific Annual Mortality

Non-Migratory		
Hunting	19%	11%
Non-Hunting	4%	3%
Migratory		
Hunting	17%	0-7%?
Non-Hunting	4%	0-7%?

n=47 non-migratory radio collared cows
n=48 migratory radio collared cows

Adult Cow Mortality

		Clarks Fork	
	YNP	Non-Mig	Mig
Hunting	8%	11-19%	0-18%
Non-Hunting	11%	3-4%	0-7%
Survival (without hunting)	89%	96-97%	93-96%

Evans, S.B., L.D. Mech, D.W. Smith, P.J. White, and G.A. Sargeant. 2006. Survival and causes of mortality of cow elk in Yellowstone's northern range. Journal of Wildlife Management 70:1372-1378.

Migratory Elk -Vital Rates
65% Pregnancy
20% Calf Survival
85% Yrlg Survival
96% Adult Female Survival

<1% Growth Rate

Non-Migratory Elk -Vital Rates
90% Pregnancy
40% Calf Survival
85% Yrlg Survival
96% Adult Female Survival

10% Growth Rate

Contributors/Cooperators

Wyoming Game & Fish Department
University of Wyoming
U.S. Fish & Wildlife Service
U.S.D.A. Wildlife Services
Wyoming Animal Damage Management Board
Rocky Mountain Elk Foundation
Sportsmen for Fish & Wildlife – Bighorn Basin Chapter
Shoshone National Forest
Boone & Crockett Club
Safari Club International
Frank & Nanitta Pachmayr Foundation
Wyoming Governors Big Game License Coalition
Bowhunters of Wyoming
Pope & Young Club
Safari Club International – Montana Chapter
Wildlife Heritage Foundation of Wyoming
Cody Country Outfitter & Guides Association