WASHINGTON STATE UNIVERSITY

World Class. Face to Face.

Prey Use By Male and Female Cougars In An Elk and Mule Deer Community

Kevin White
Large Carnivore Conservation Lab


Wonder what's on the menu tonight?

Hypothesis:

- Males > Elk
- Females > Mule Deer

Objectives

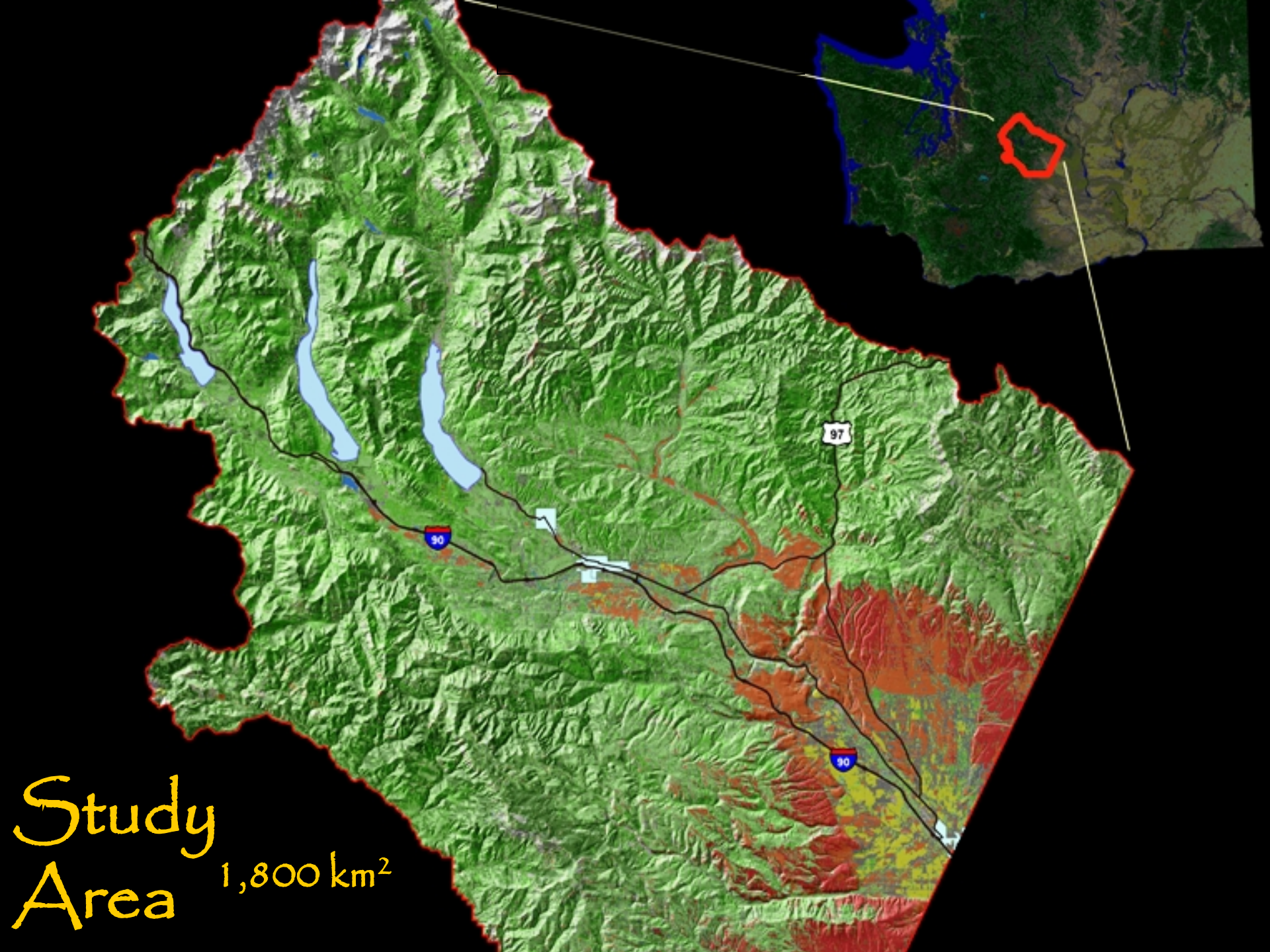
Cougar Prey Use Among 3 Social Classes

- Females
- Females with Offspring
- Males

Kill Rates

- Seasonal & Annual
- Species Specific
- Social Class Differences

Differential Effects?

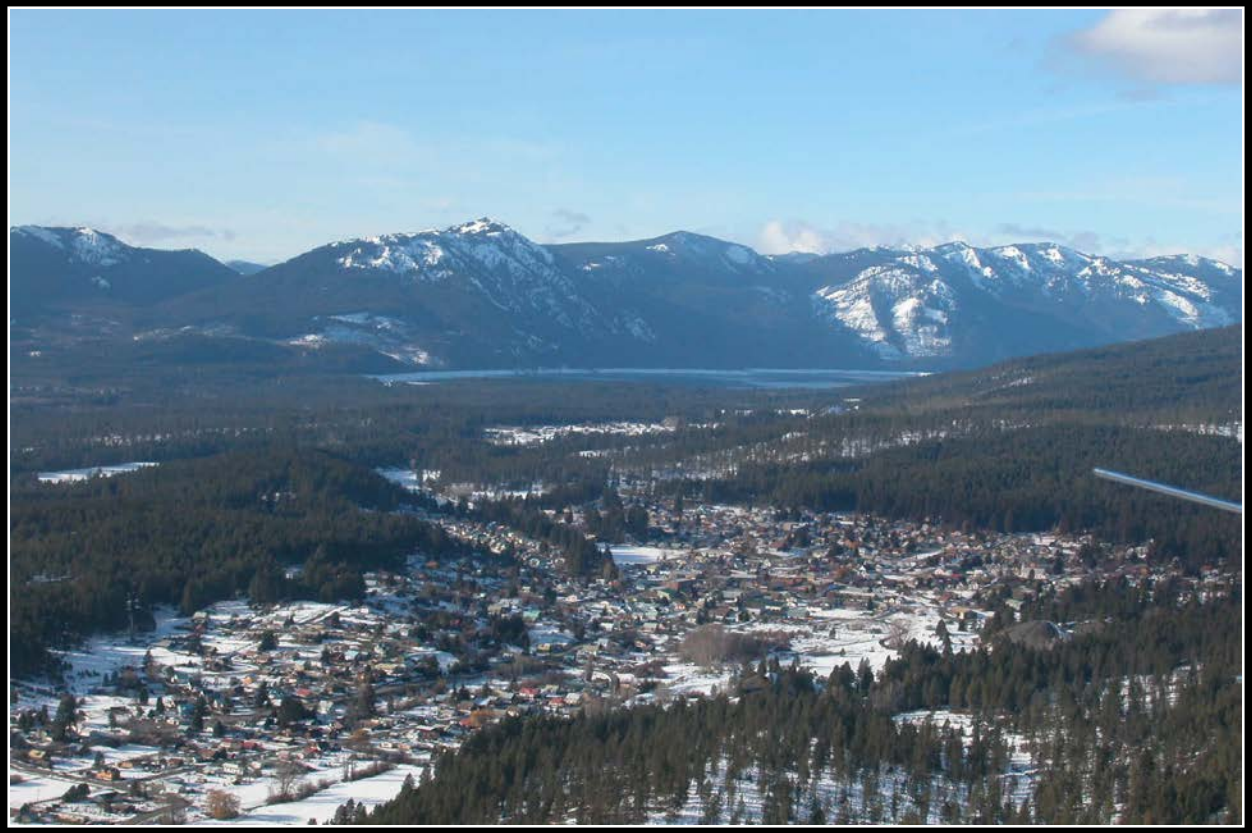

Study Area
1,800 km²
90
97
90

Study Area

- Elevation: 462 – 2,279 m
- Shrub Steppe < 550 m
- Intermixed Douglas-fir – ponderosa pine

Study Area

- Annual precipitation: 54 cm, 80% as snow
  - Douglas-fir
  - Grand fir
  - Western hemlock



Study Area

- Silver fir
- Sub-alpine fir
- Engelmann spruce
- Lodgepole-pine

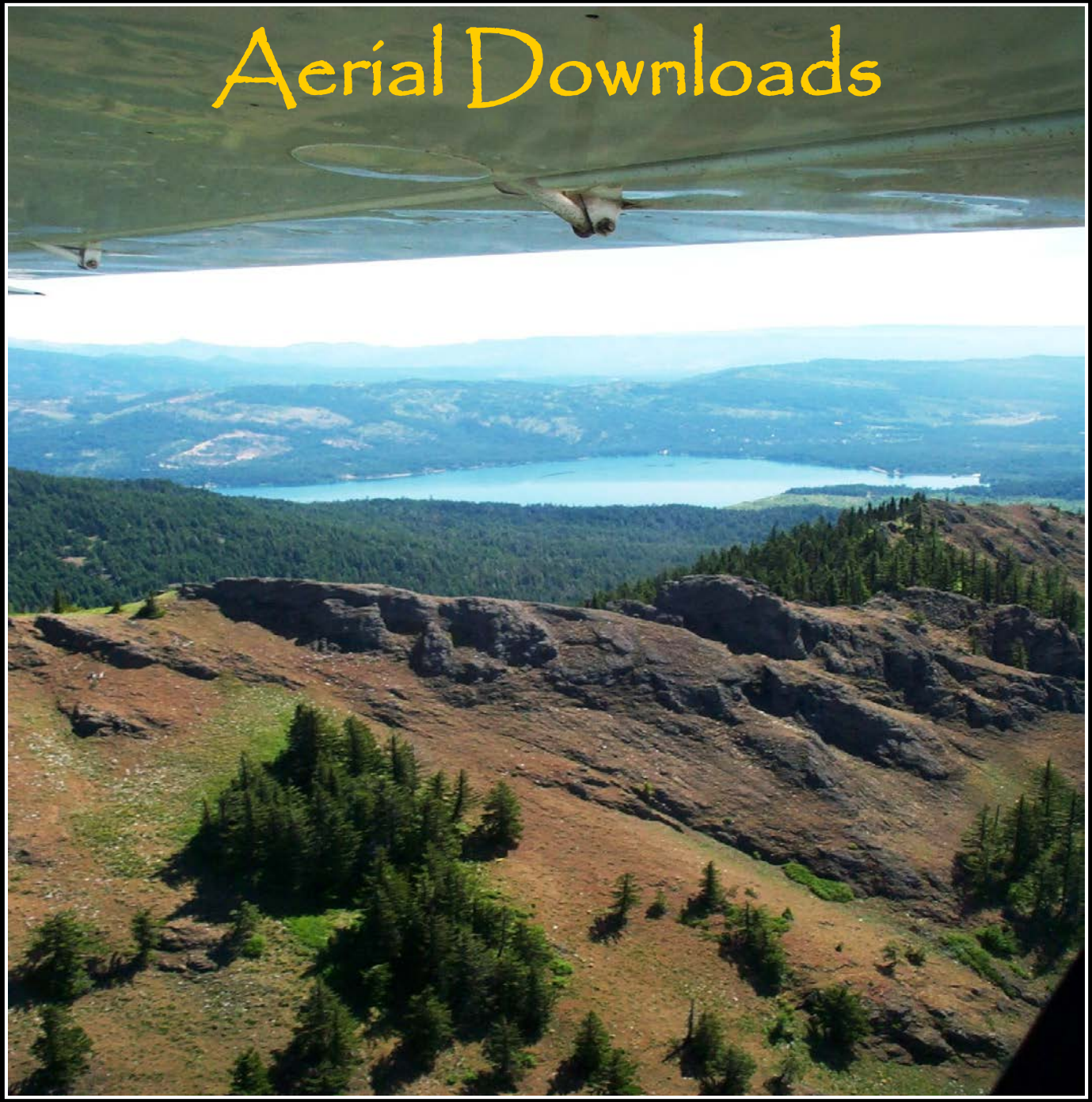
Rural Development

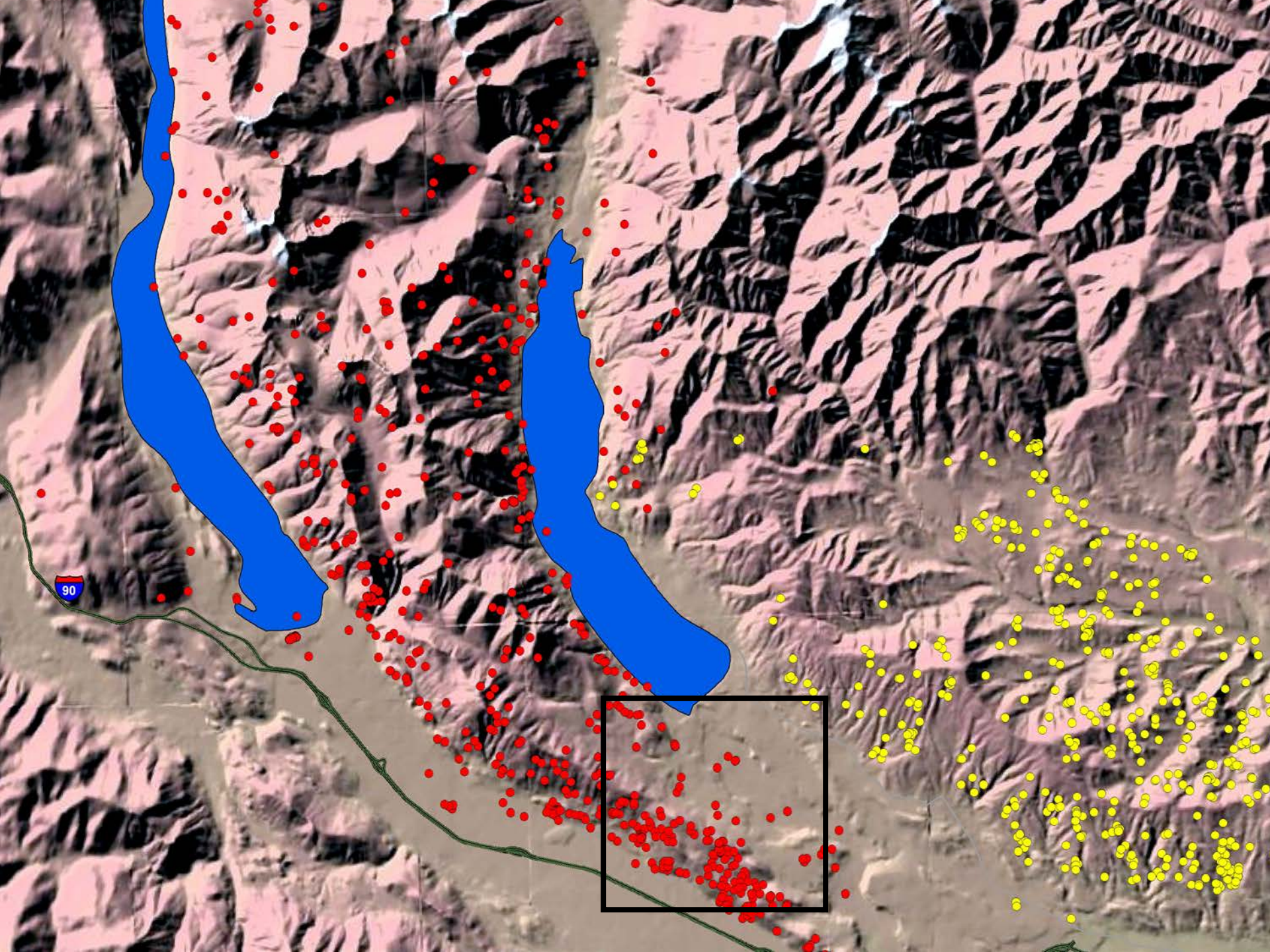
Proximity to houses

- Concerns
- Animal Husbandry
- Feeding Wildlife

Field Methods

Collar Downloads
~ Every 2 weeks

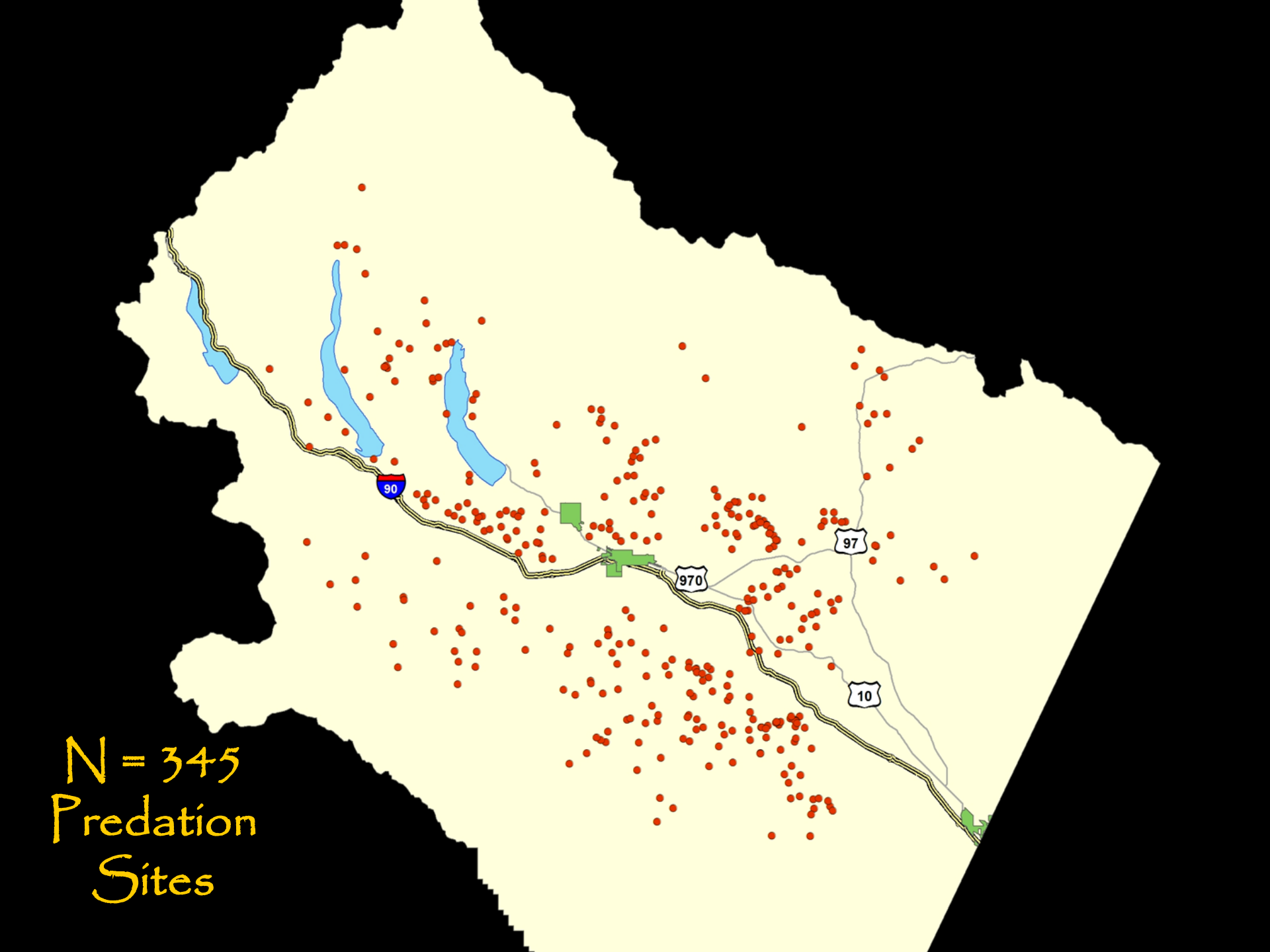

Aerial Downloads


90

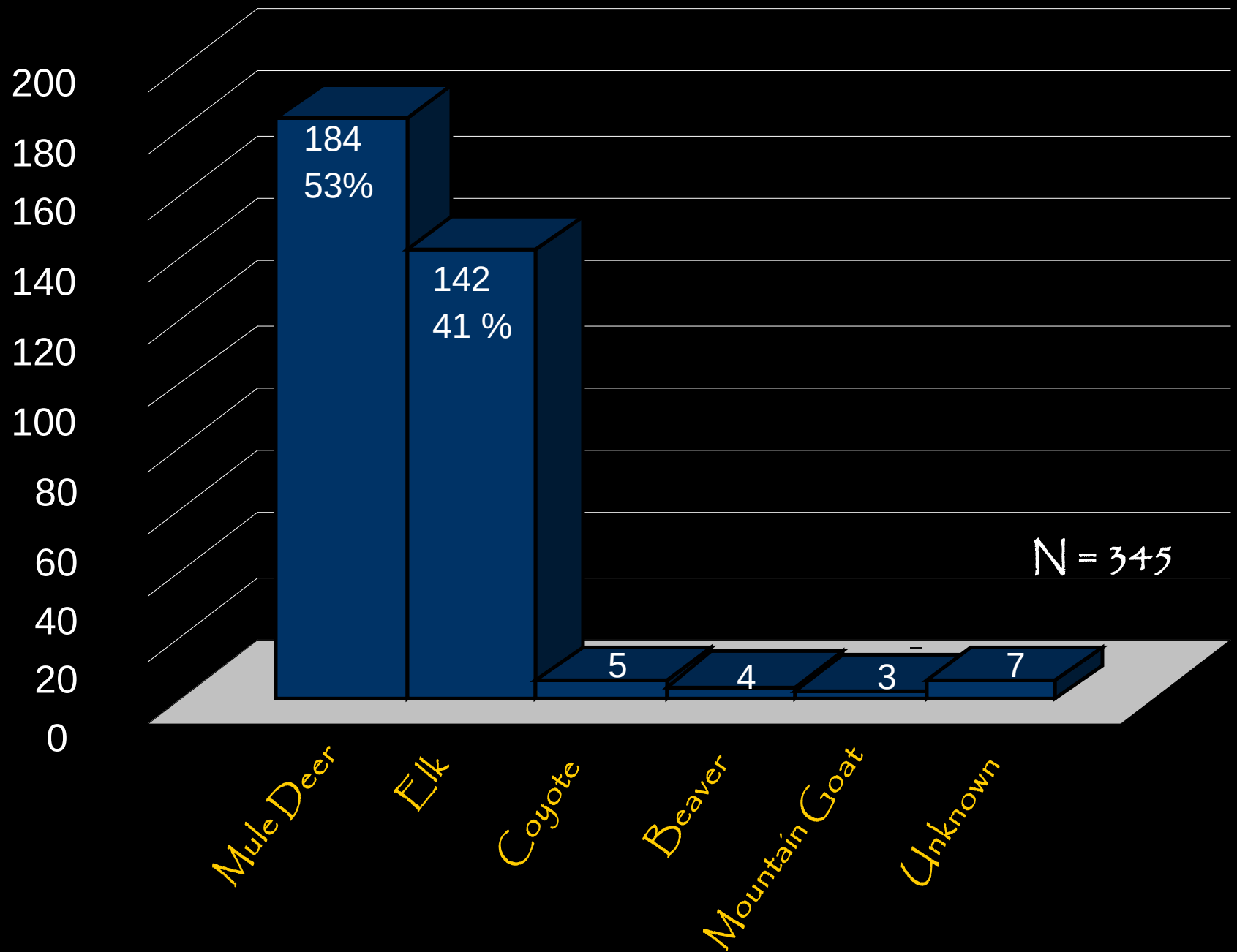
Data Collection

- Species, sex-age
- Habitat: elevation aspect, slope, habitat type

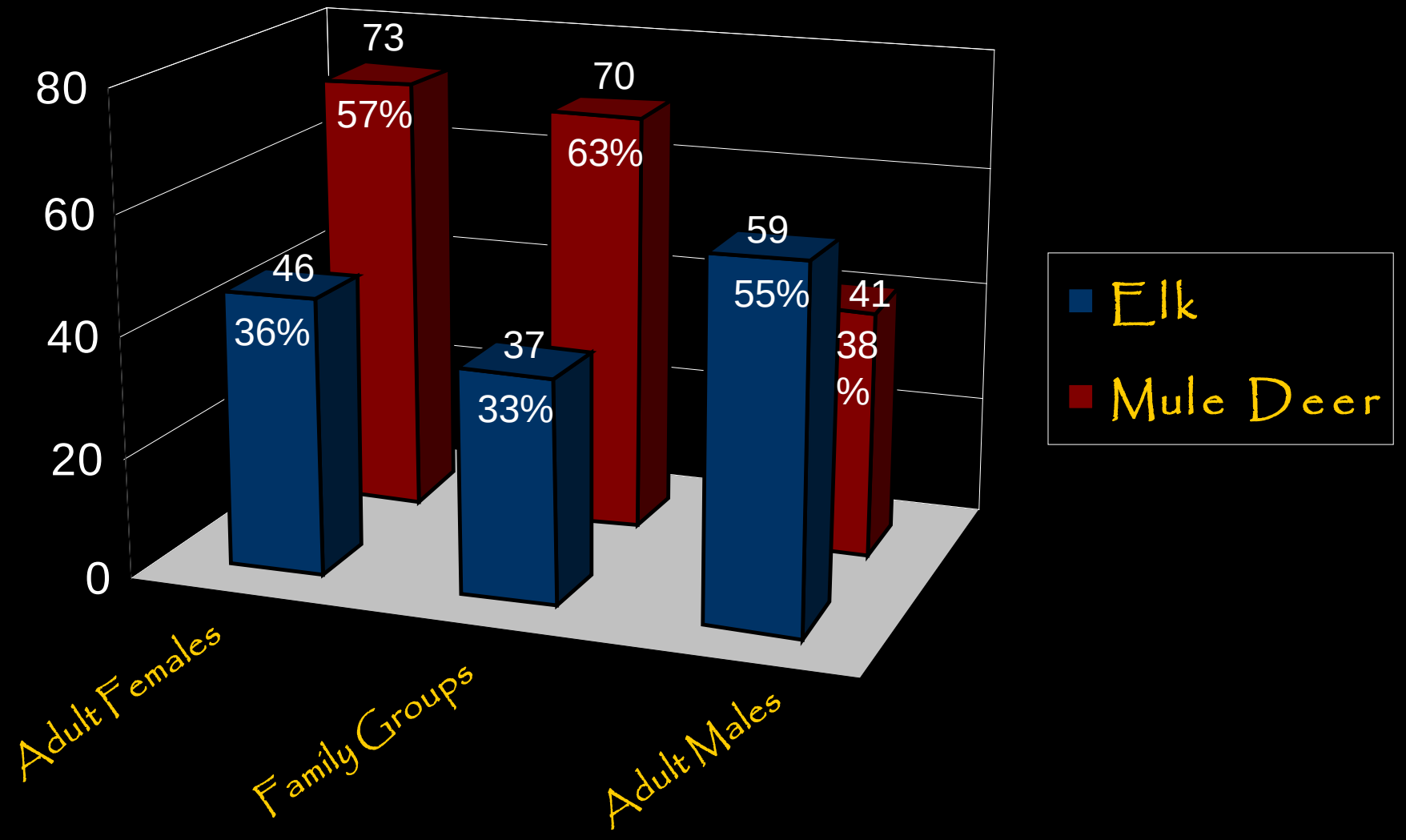

Data From 18 Cougars
9 M & 9 F


90
970
97
10
N = 345
Predation
Sites

Total Prey Composition



Social Class Prey Use



Loglinear model

Observed Frequencies

Age	Species	Cougar Sex: Female	Cougar Sex: Male
Juvenile	Mule Deer	73	19
	Elk	65	37
Adult	Mule Deer	51	14
	Elk	13	22

Loglinear model

Model Term Tested	Removal of Model Terms Chi-square	DF	P-Value
Cougar Sex	22.18	1	0.000
Species	0.452	1	0.501
Age	25.689	1	0.000
Age x Species	7.375	1	0.007
Age x Cougar Sex	3.518	1	0.061
Cougar Sex x Species	20.863	1	0.000
Cougar Sex x Species x Age	3.238	1	0.072

Likelihood Ratio Chi-Square: 0.000 P-Value: 0.000

Standardized Parameter Estimates

Cougar Sex	
Female	Male
4.729	-4.729

Species	
Elk	Mule Deer
-0.673	0.673

Age	
Juvenile	Adult
4.935	-4.935

Age	Species	
	Elk	Mule Deer
Juvenile	2.702	-2.702
Adult	-2.702	2.702

Age	Cougar Sex	
	Female	Male
Juvenile	1.875	-1.875
Adult	-1.875	1.875

Species	Cougar Sex	
	Female	Male
Elk	-4.435	4.435
Mule Deer	4.435	-4.435

Age	Species	Cougar Sex	
		Female	Male
Juvenile	Elk	1.786	-1.786
	Mule Deer	-1.786	1.786
Adult	Elk	-1.786	1.786
	Mule Deer	1.786	-1.786

Kill Rates

N = 136 inter-kill intervals

Variable	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	F, P
Species	Mule Deer			Elk						4.183, < 0.000
	6.49	3.61	44	9.78	4.24	32				
Season	Winter			Summer						0.307, 0.58
	6.77	3.94	61	6.98	3.92	75				
Class	Females			Females with offspring			Males			1.092, 0.34
	6.69	4.00	48	6.32	3.76	44	7.66	3.90	44	
Class x Season	Females			Females with offspring			Males			0.993, 0.37
Winter	6.14	3.44	18	6.90	4.42	18	7.14	4.02	25	
Summer	7.16	4.40	30	5.92	3.30	26	8.37	3.74	19	
Class x Species	Females			Females with offspring			Males			0.72, 0.48
Mule Deer	6.16	3.43	20	6.43	3.55	21	9.10	5.11	3	
Elk	10.14	4.71	10	8.35	4.02	9	10.02	4.30	14	

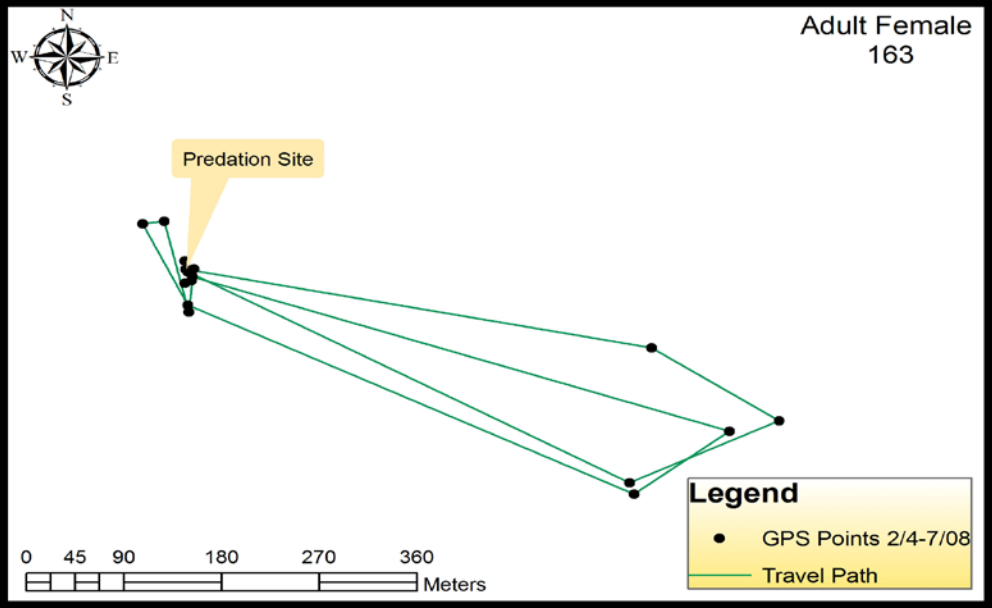
Duration on Kills

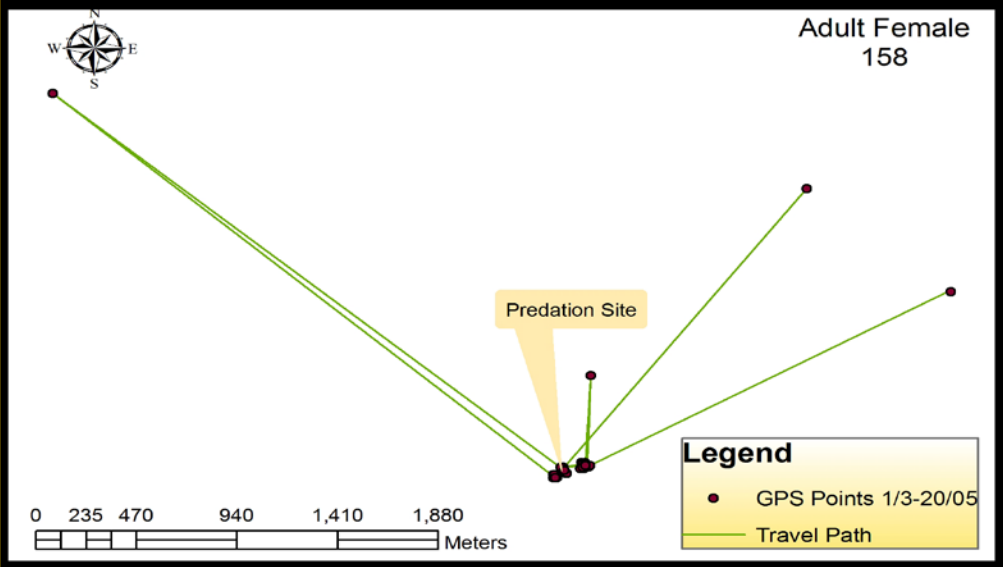
Variable	$\bar{X}$	SD	N	$\bar{X}$	SD	N	$\bar{X}$	SD	N	F, P
Species	Mule Deer			Elk						37.29, < 0.000
	3.10	1.91	184	4.81	3.50	142				
Season	Winter			Summer						18.56, <0.000
	4.43	3.08	150	3.35	2.54	176				
Class	Females			Females with offspring			Males			11.72, < 0.000
	A 4.72	3.25	119	B 3.65	2.43	107	B 3.43	2.62	100	
Species x Season	Mule Deer			Elk						6.79, 0.01
Winter	3.42	2.08	84	5.69	3.64	66				
Summer	2.82	1.72	100	4.05	3.20	76				
Class x Season	Females			Females with offspring			Males			.802, 0.44
Winter	A 5.24	3.21	46	B 3.80	2.94	46	B 4.27	2.99	58	
Summer	A 3.98	3.21	73	AB 3.08	1.93	61	B 2.64	1.62	42	

Estimated Annual Prey Killed

Cougar Sex	Mule Deer	Elk
Males	15	20
Females	33	13
Females with Offspring	36	14

Female Movements





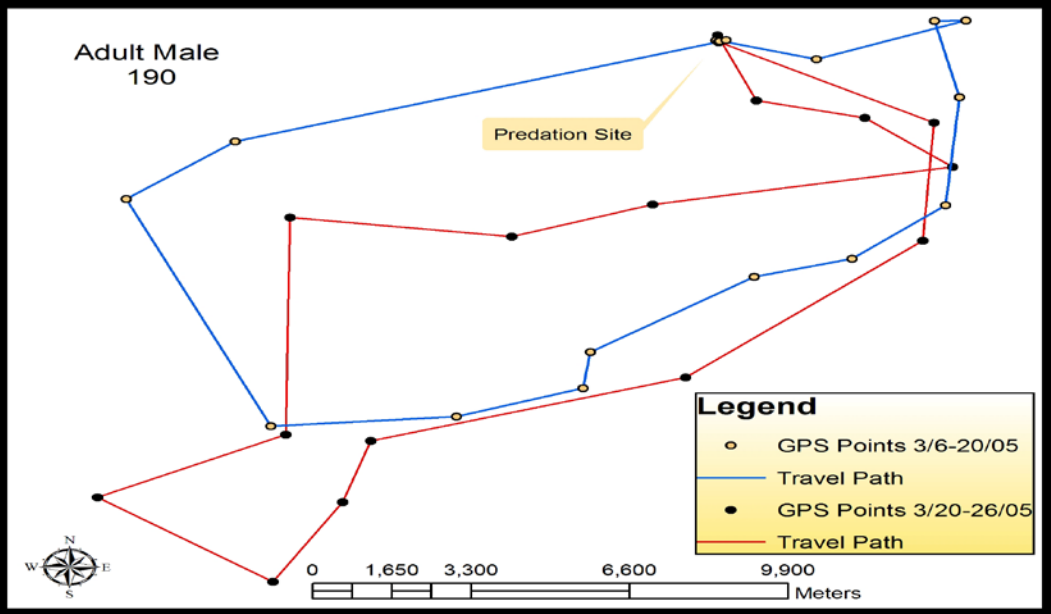
Times left: $t_{109} = 1.59$, $P = > 0.05$

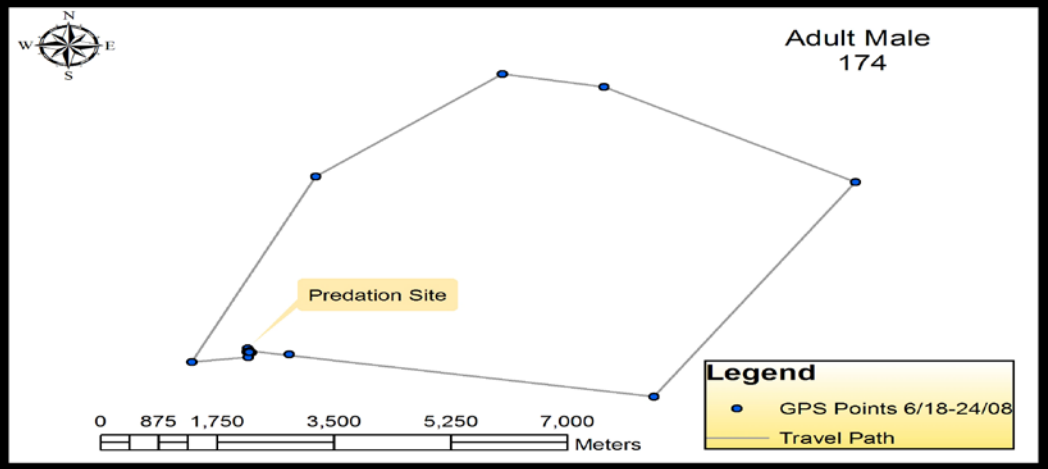
Distance Traveled

$t_{60} = -3.90$, $P = < .000$

Average: 684 m Range: 100 – 3,325 m

Male Movements





Average: 1,622 m

Range: 101 – 8,330 m

Summary

- More mule deer were killed than elk.
- Females had higher proportional use of mule deer.
- Males had higher proportional use of elk.
- Males proportionately killed more adult prey than females .
- Males proportionately killed 4 times as many adult elk as females.
- Relative to males, females killed more adult mule deer and more juvenile elk.

Acknowledgements

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Washington State Department of Transportation

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National Science Foundation
WHERE DISCOVERIES BEGIN

Thank You