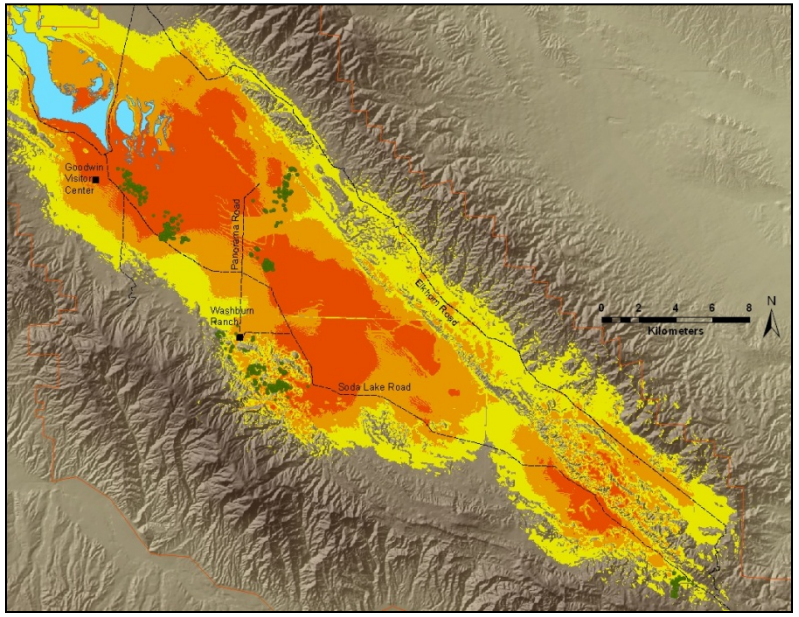
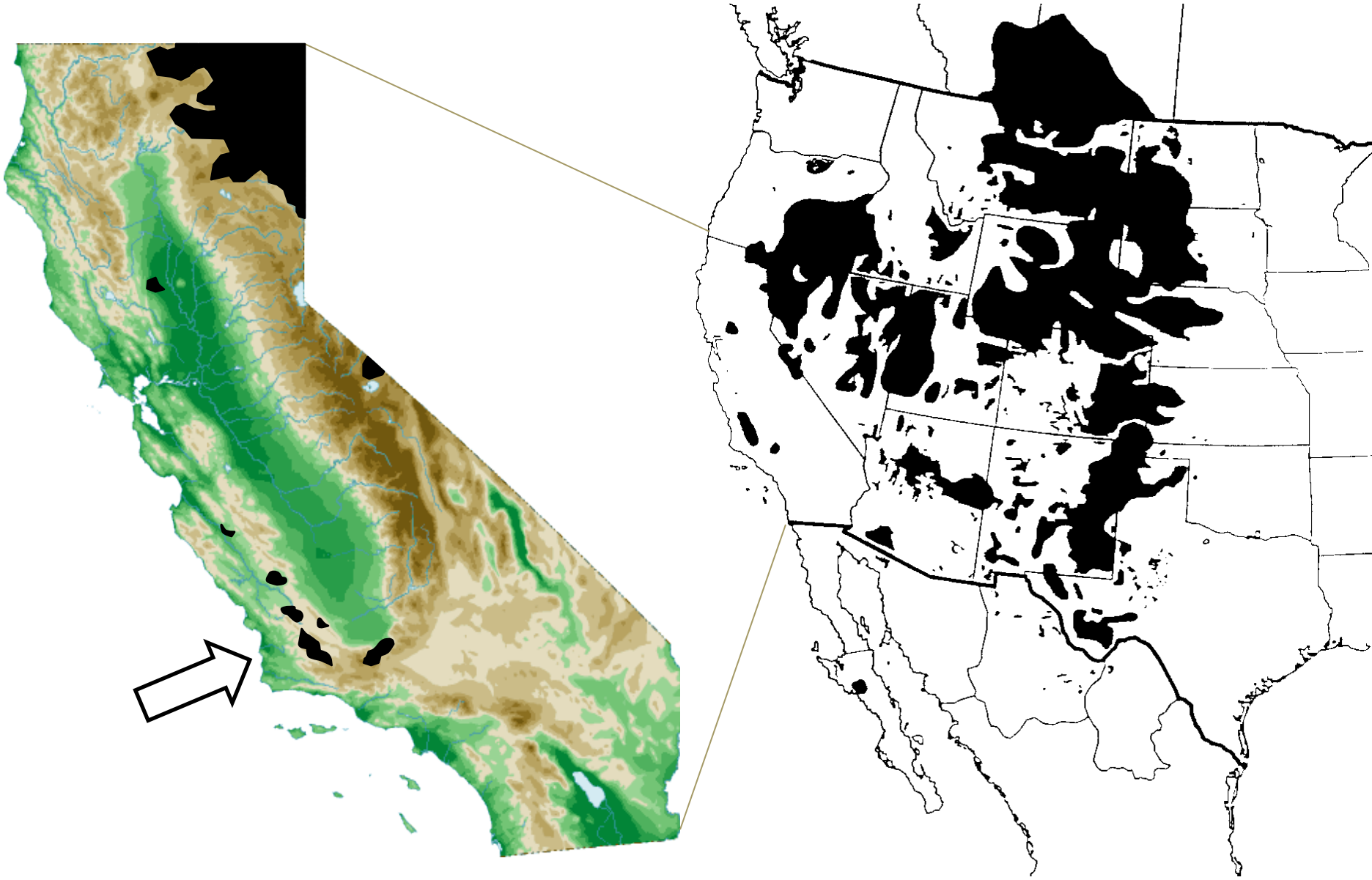
Pronghorn fawn survival on the northern Carrizo Plain



Diego Johnson[1,2], Matt Simes[1], Chris Lowrey[1], Kathleen Longshore[1]

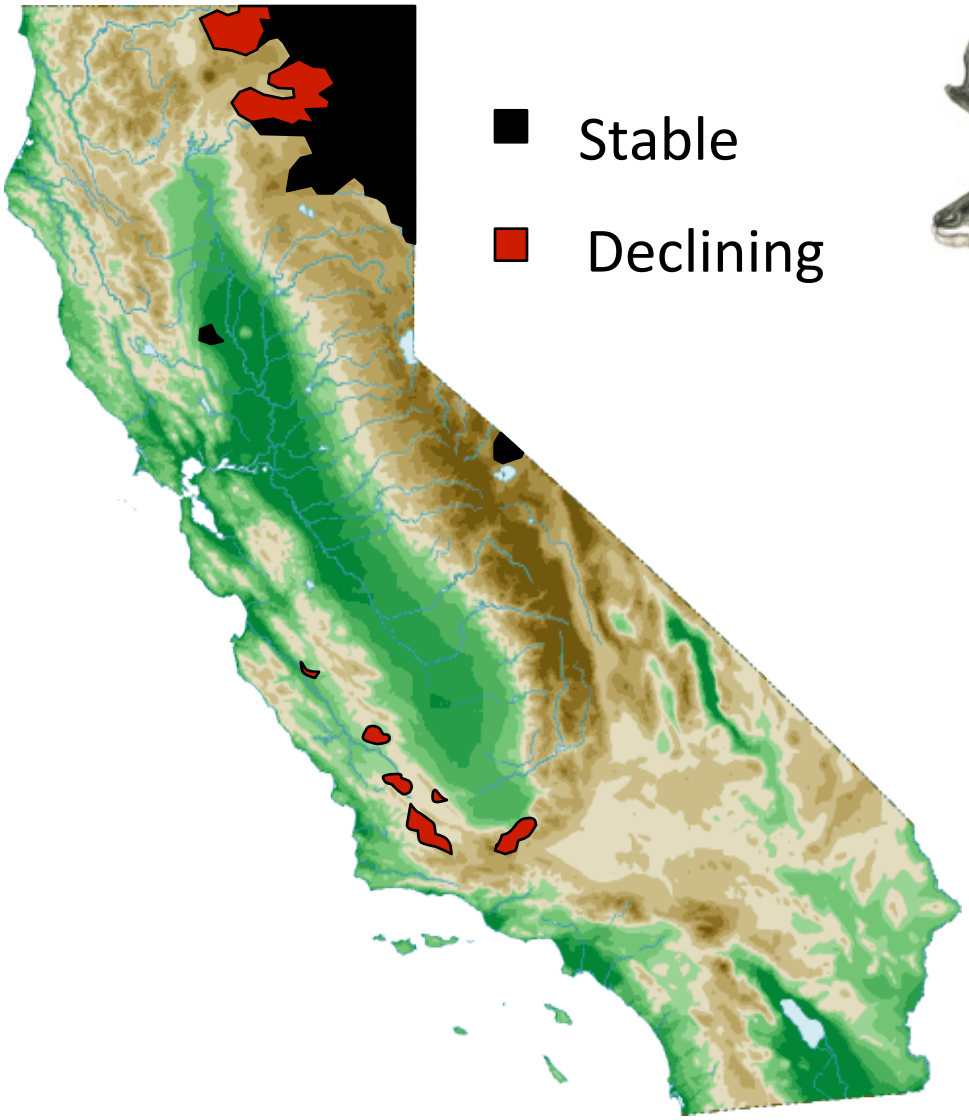
[1]USGS, Western Ecological Research Center
[2]Universtiy of Nevada, Las Vegas

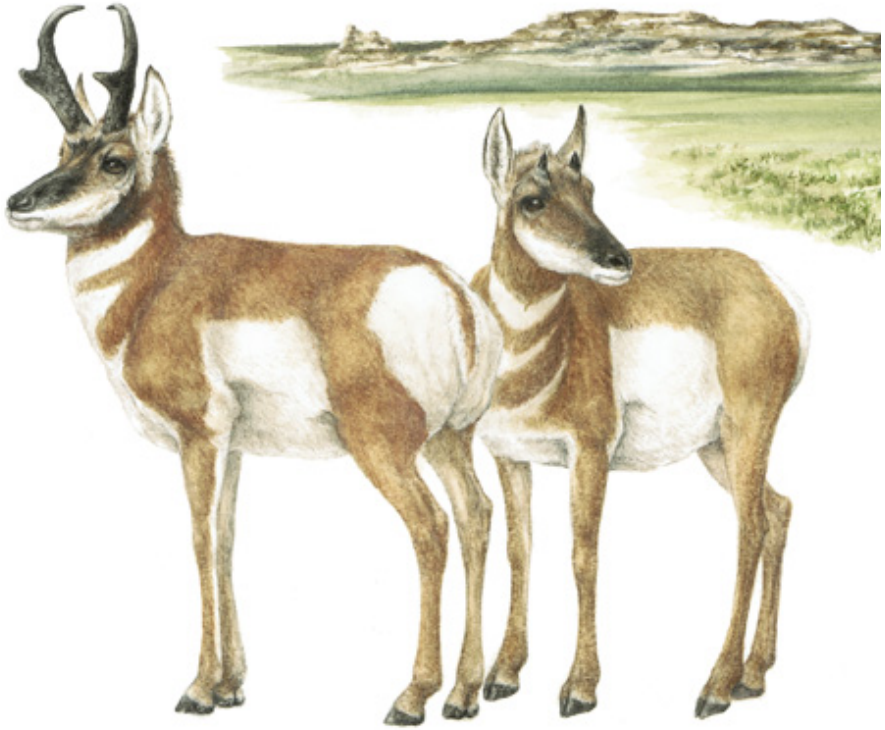
Pronghorn distribution in California and North America



(Calif. Dept. of Fish & Game 2012; Wildlife Management Institute 2001)

Current pronghorn distribution and status in California





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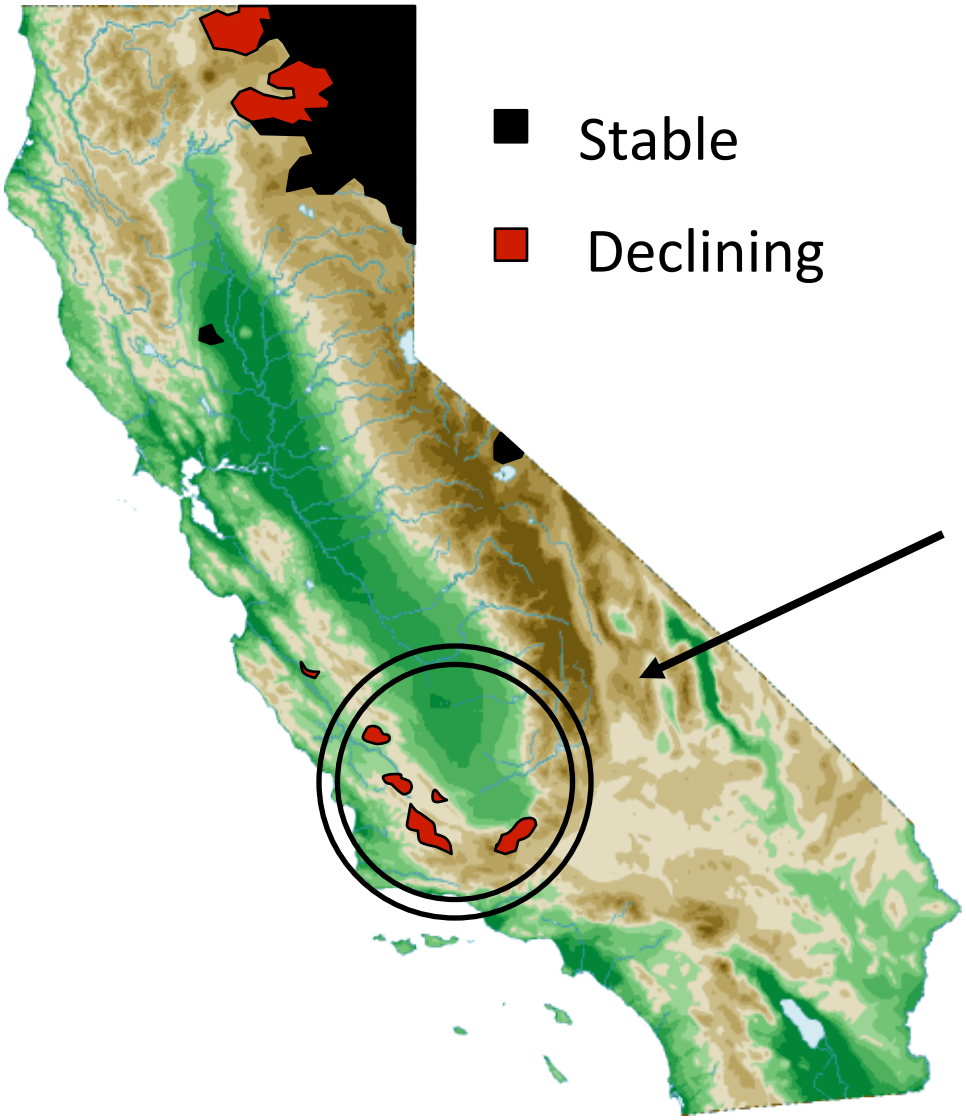
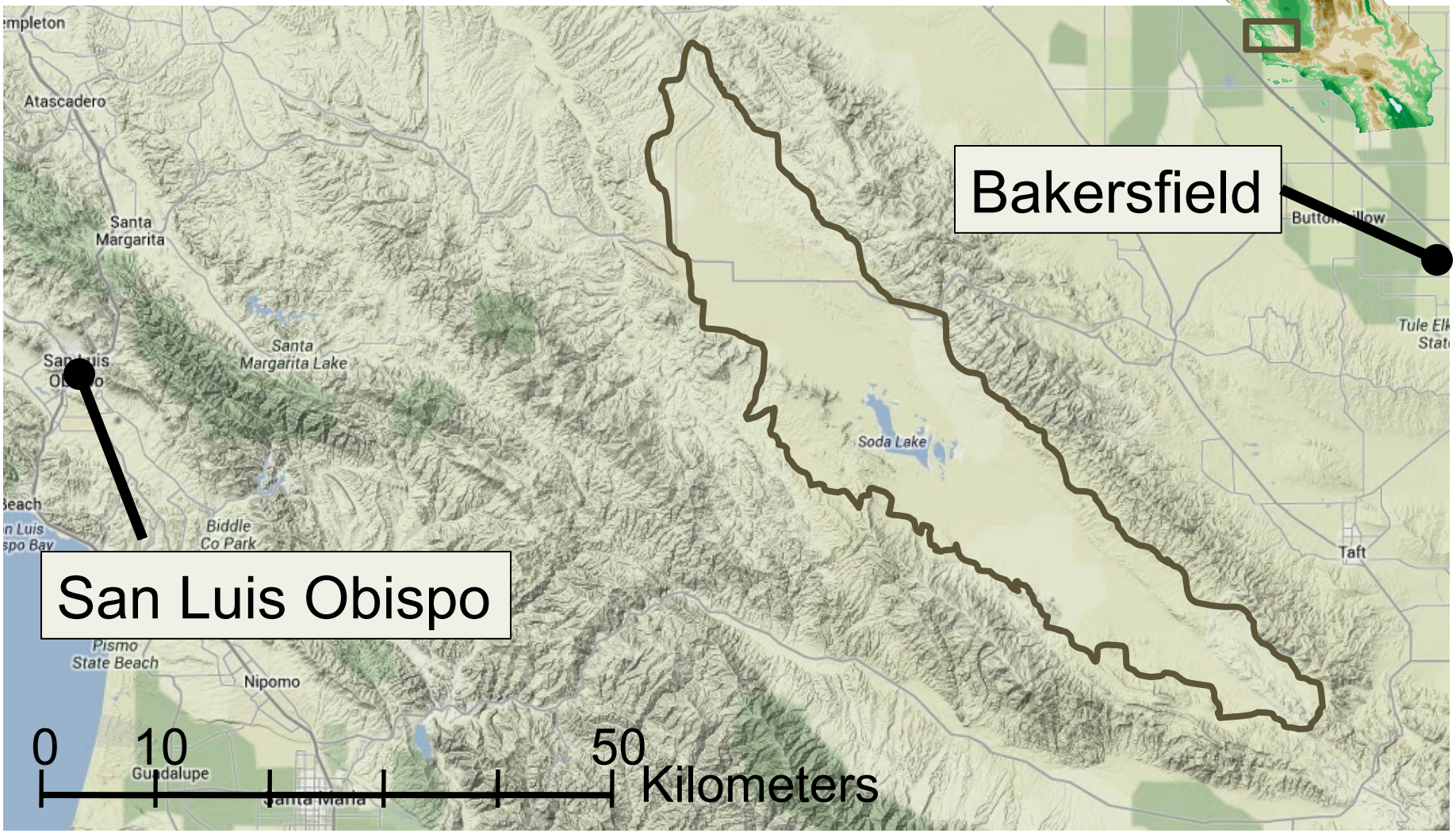


- All southern populations declining
- Significant decline for the Carrizo Plain

(Calif. Dept. of Fish & Game 2012; Wildlife Management Institute 2001)

The Carrizo Plain:



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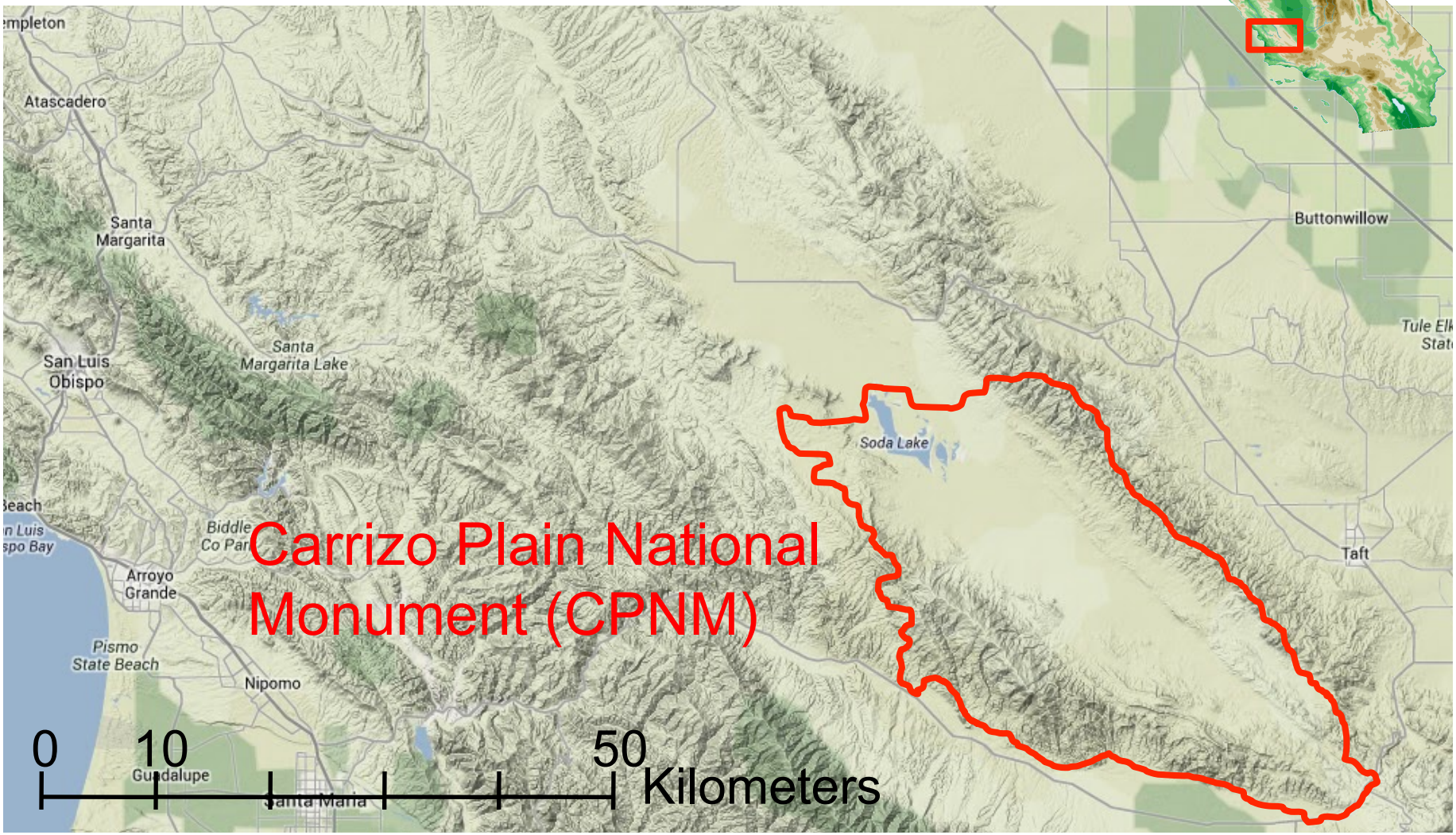

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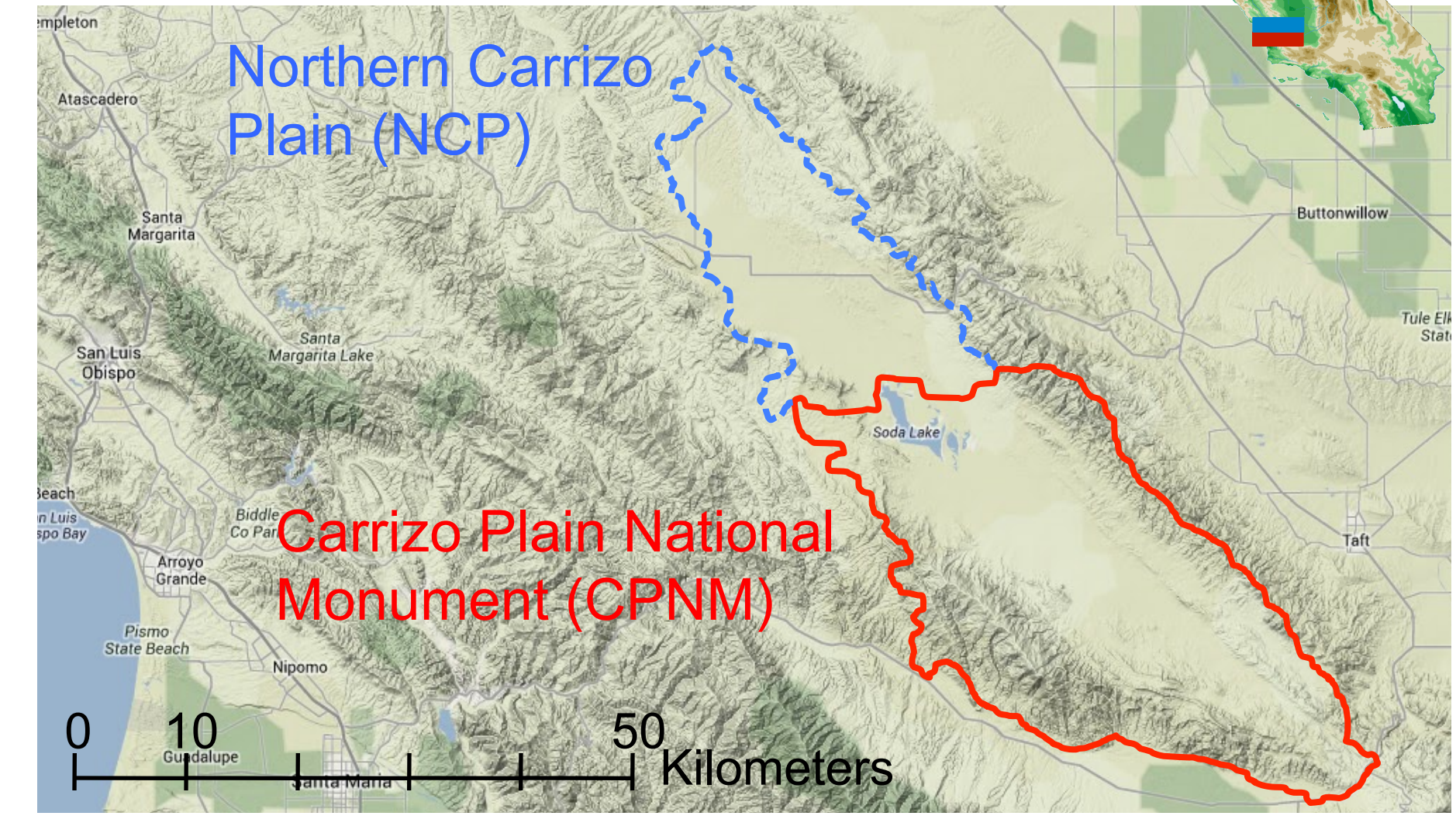
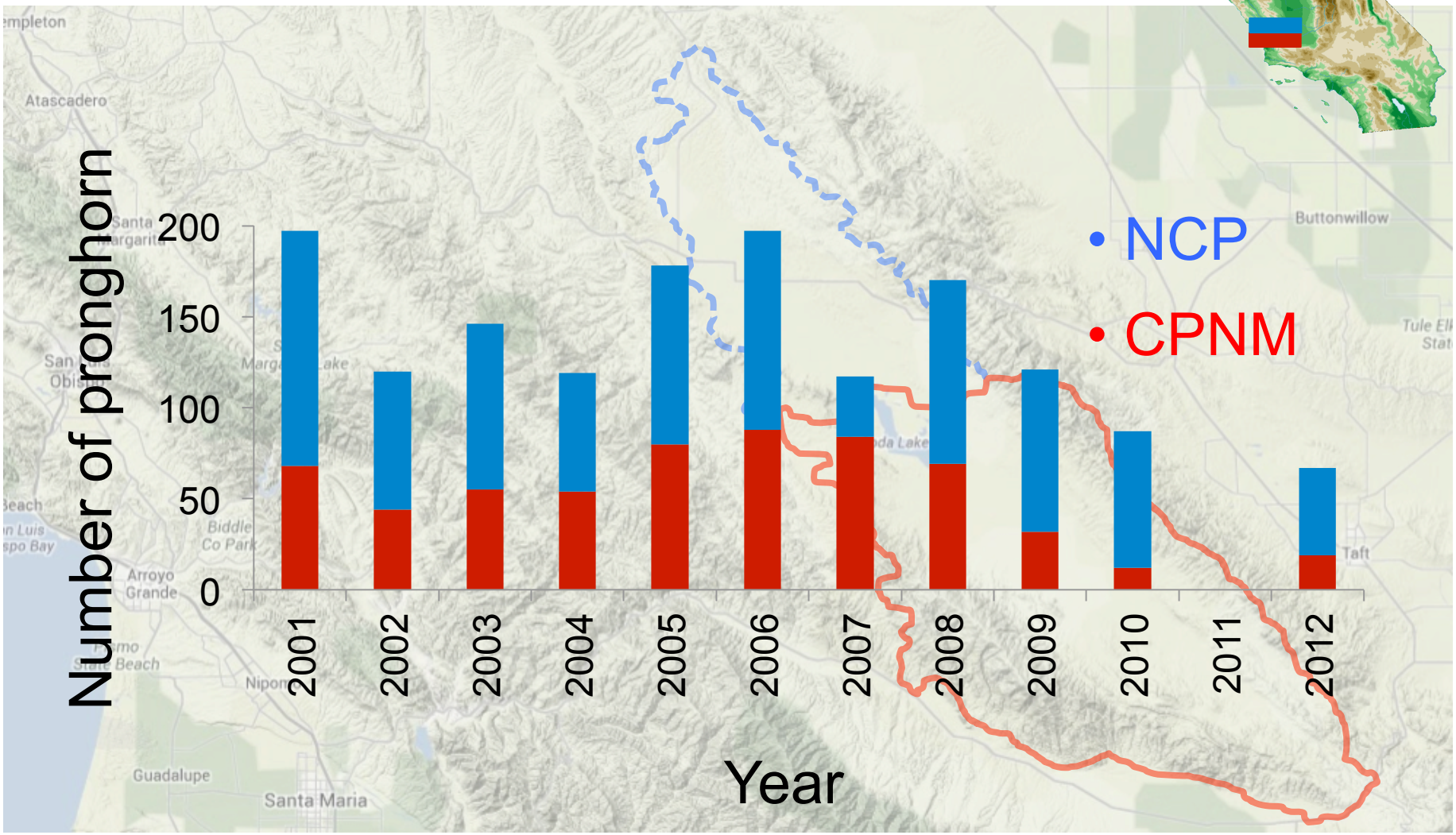


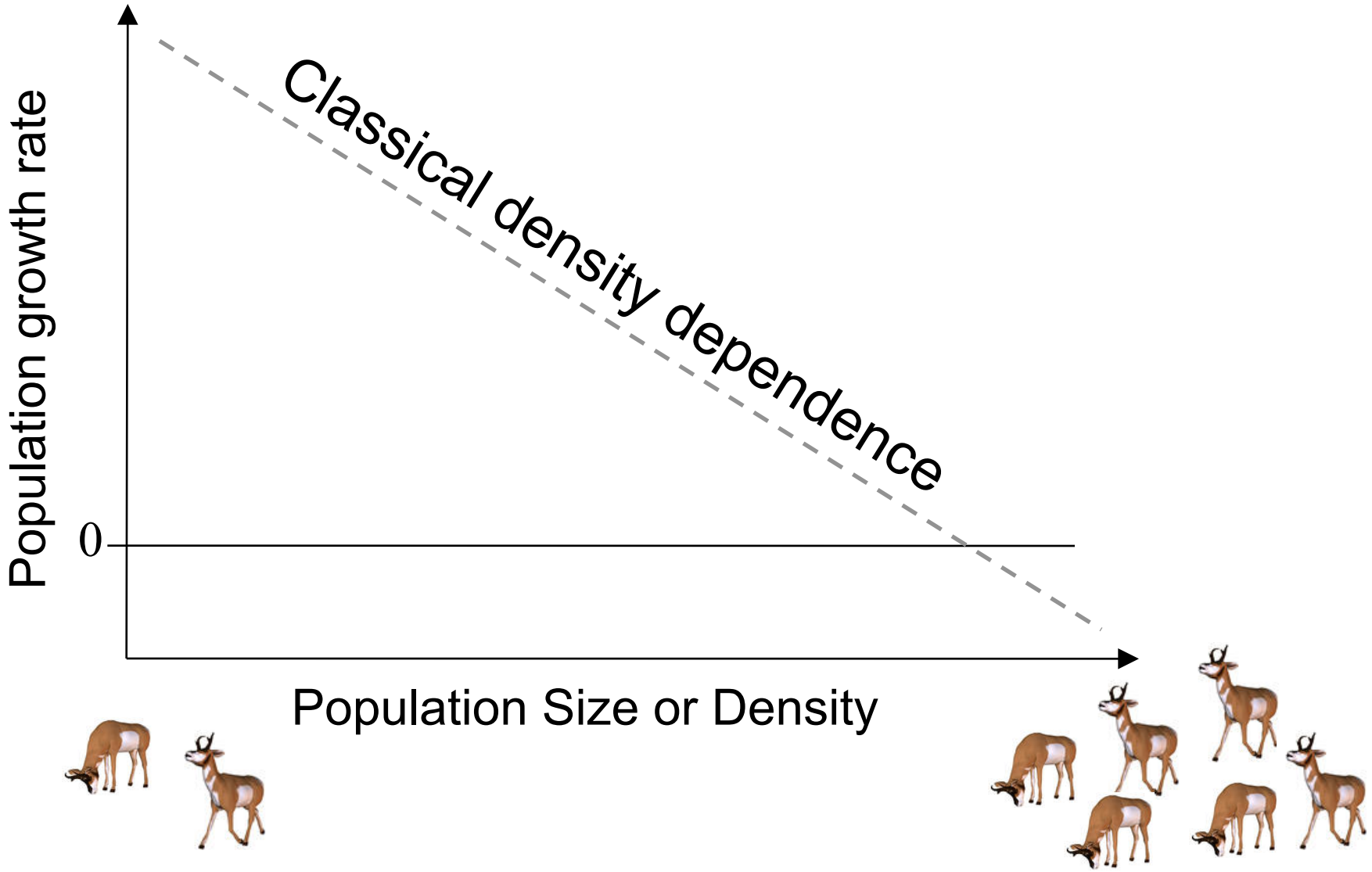
Population decline:

↳ **340** pronghorn translocated (1987-1990)

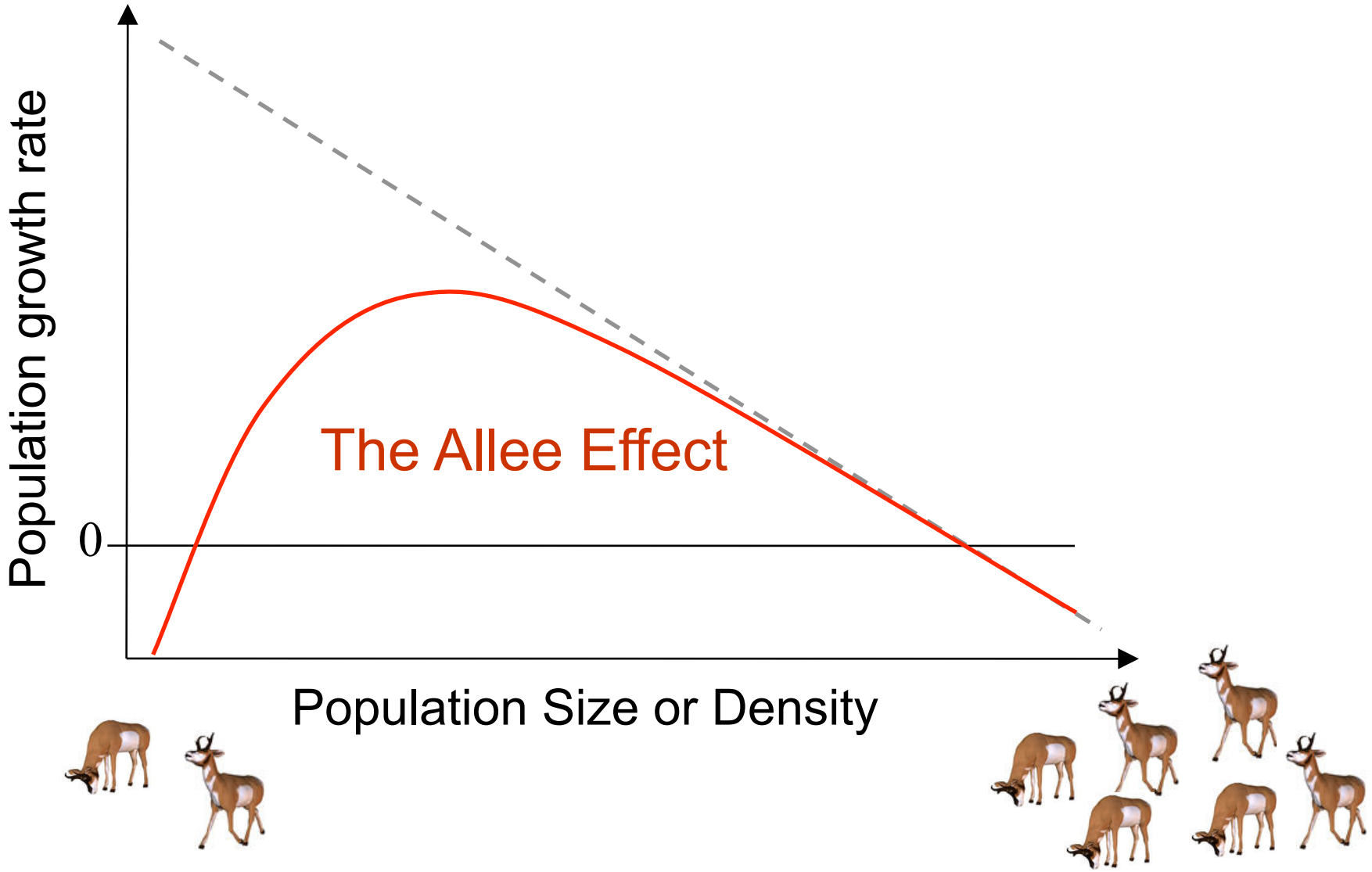


(Maher 1994, Cal Fish & Game 2012)

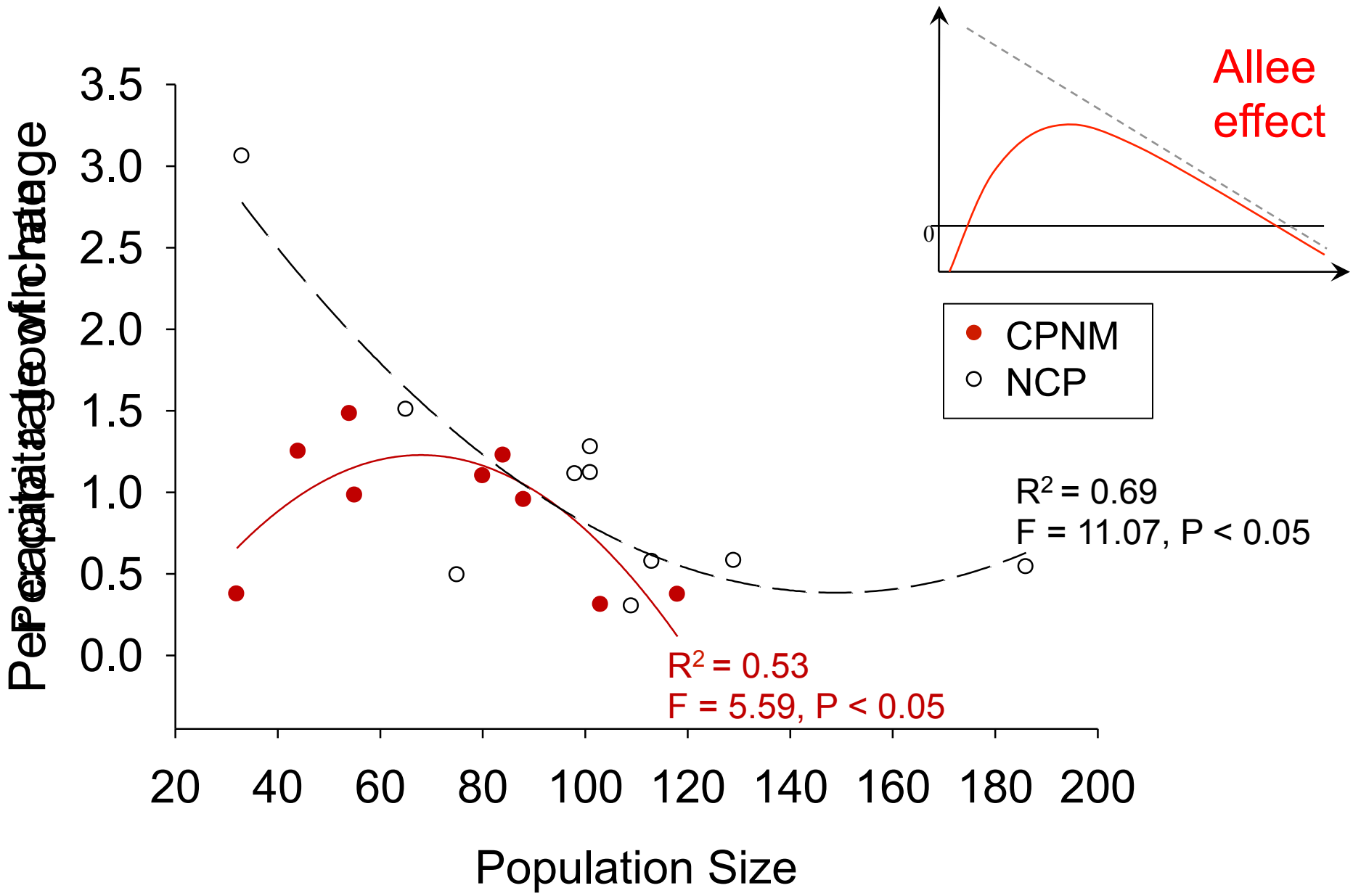
Small populations and the Allee Effect



Small populations and the Allee Effect

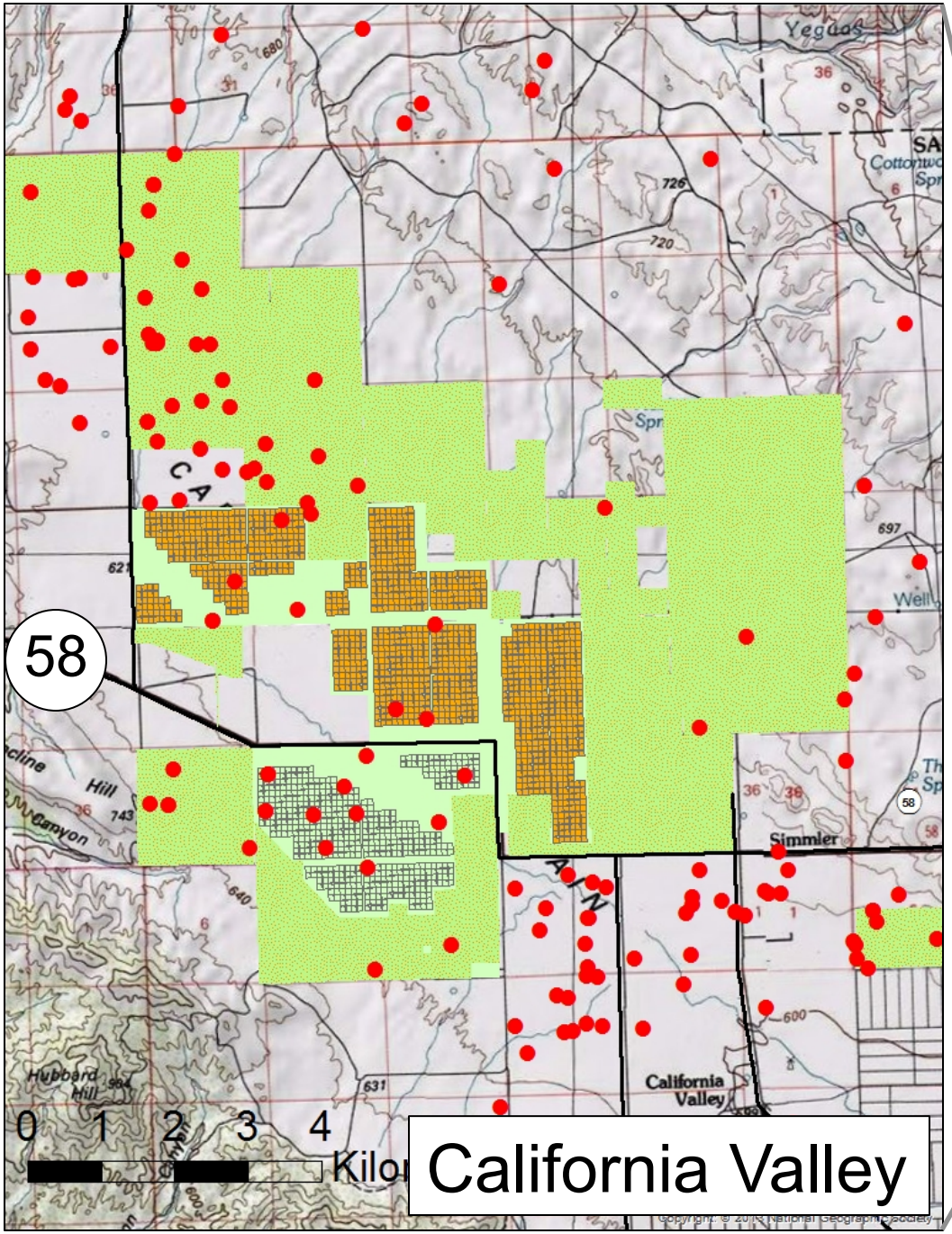


The Allee effect on the Carrizo Plain

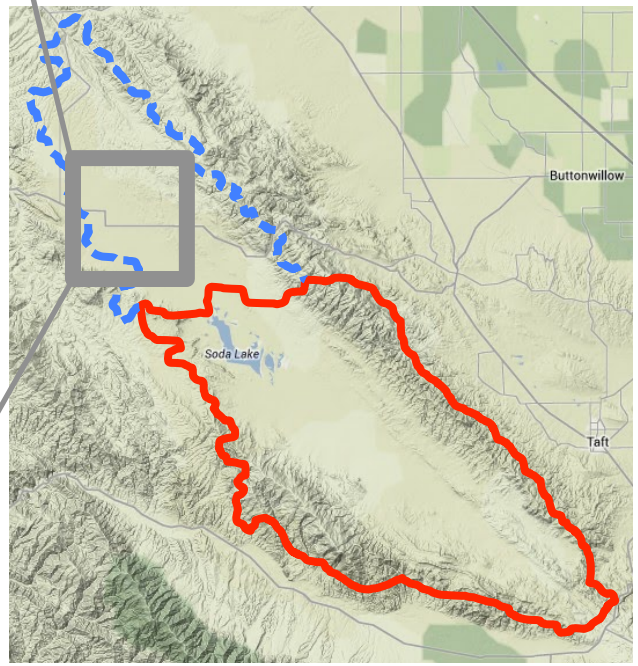


Topaz Solar Farms

- Pronghorn locations (2000 – 2013)
- Topaz Solar (Current)
- Topaz Solar (Planned)
- Major roads
- Mitigation Lands

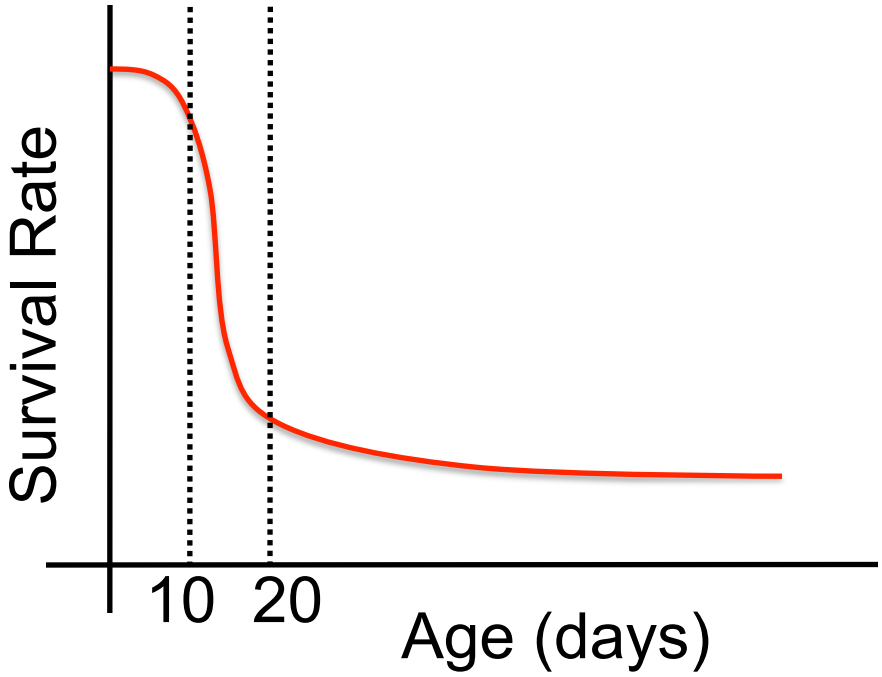


California Valley



Why study fawns?

- Fawns
  - Recruitment critical for population recovery
  - High mortality due to predation (10-20 days of age)
- Adults
  - Difficult and expensive to work with
  - Low mortality from predation and mild winter climate



Objectives

1. Measure fawn survival and determine causes of mortality.
2. Examine relationship between fawn habitat selection and survival.

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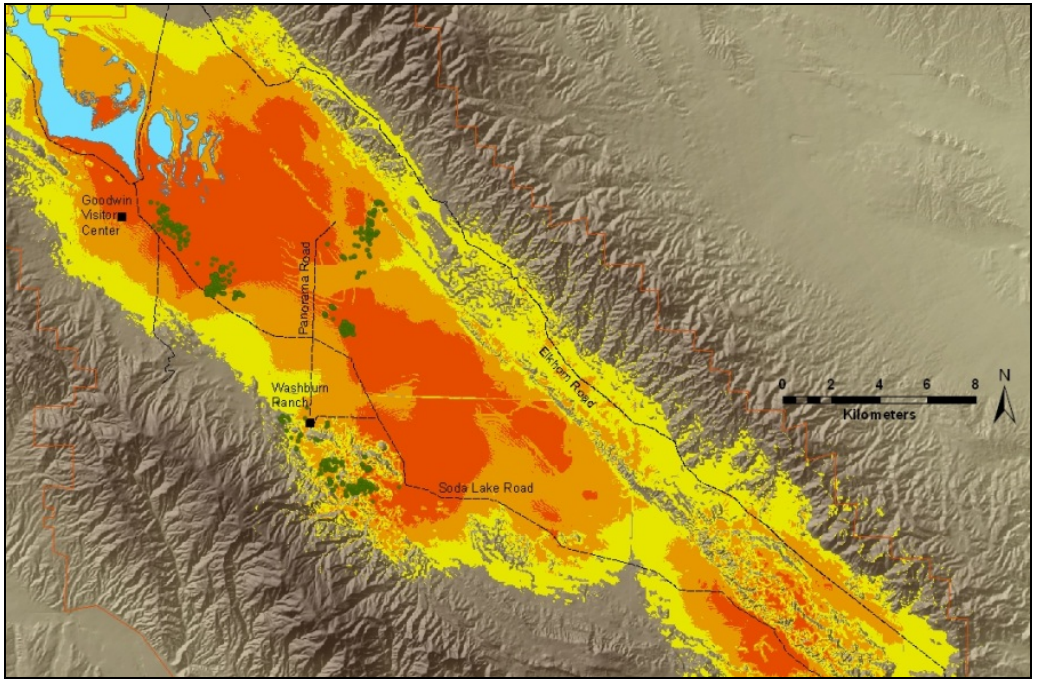
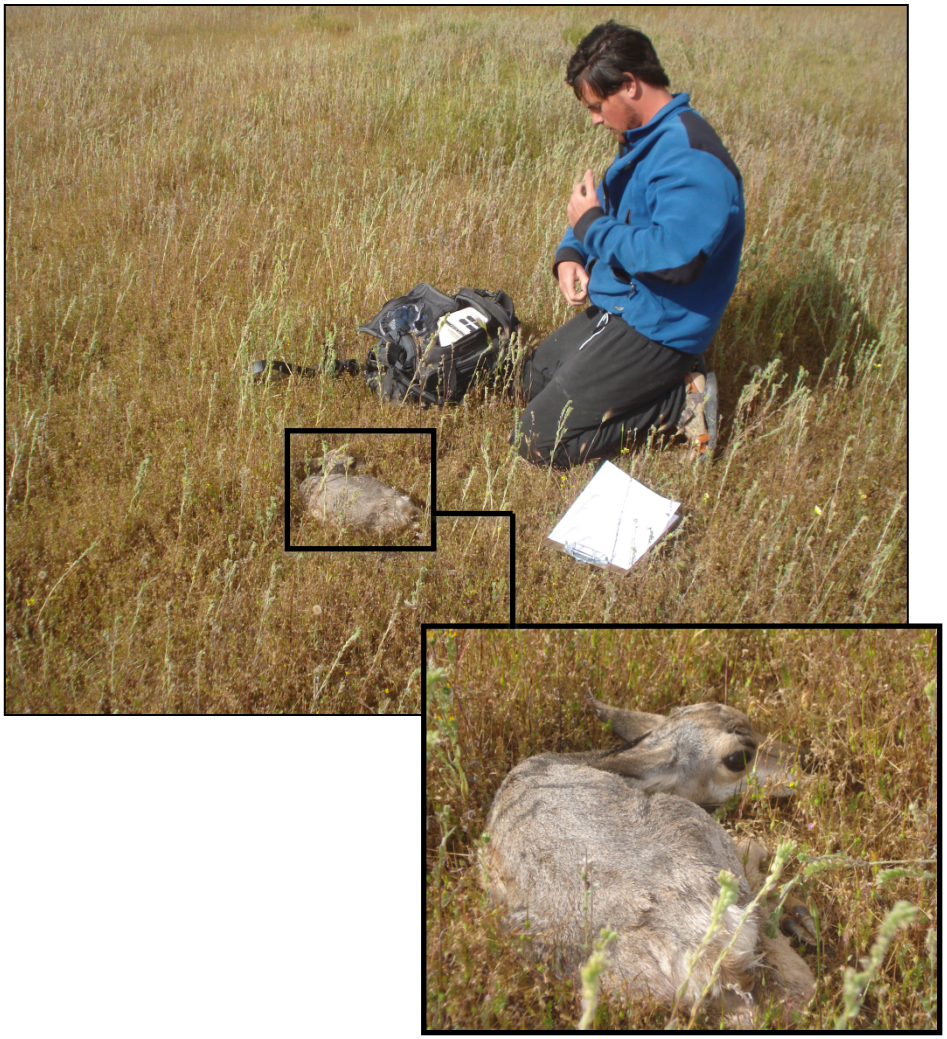


Collaring Fawns



GPS collars

- Lightweight (80 g)
- Expandable
- Detach (~ 60 days)
- Collect locations (2 hrs.)
- VHF tracking
- Mortality sensor

Locating fawns

⇨ Pregnant female:

- Bulging stomach
- Grouped with other adults
- Getting up and down

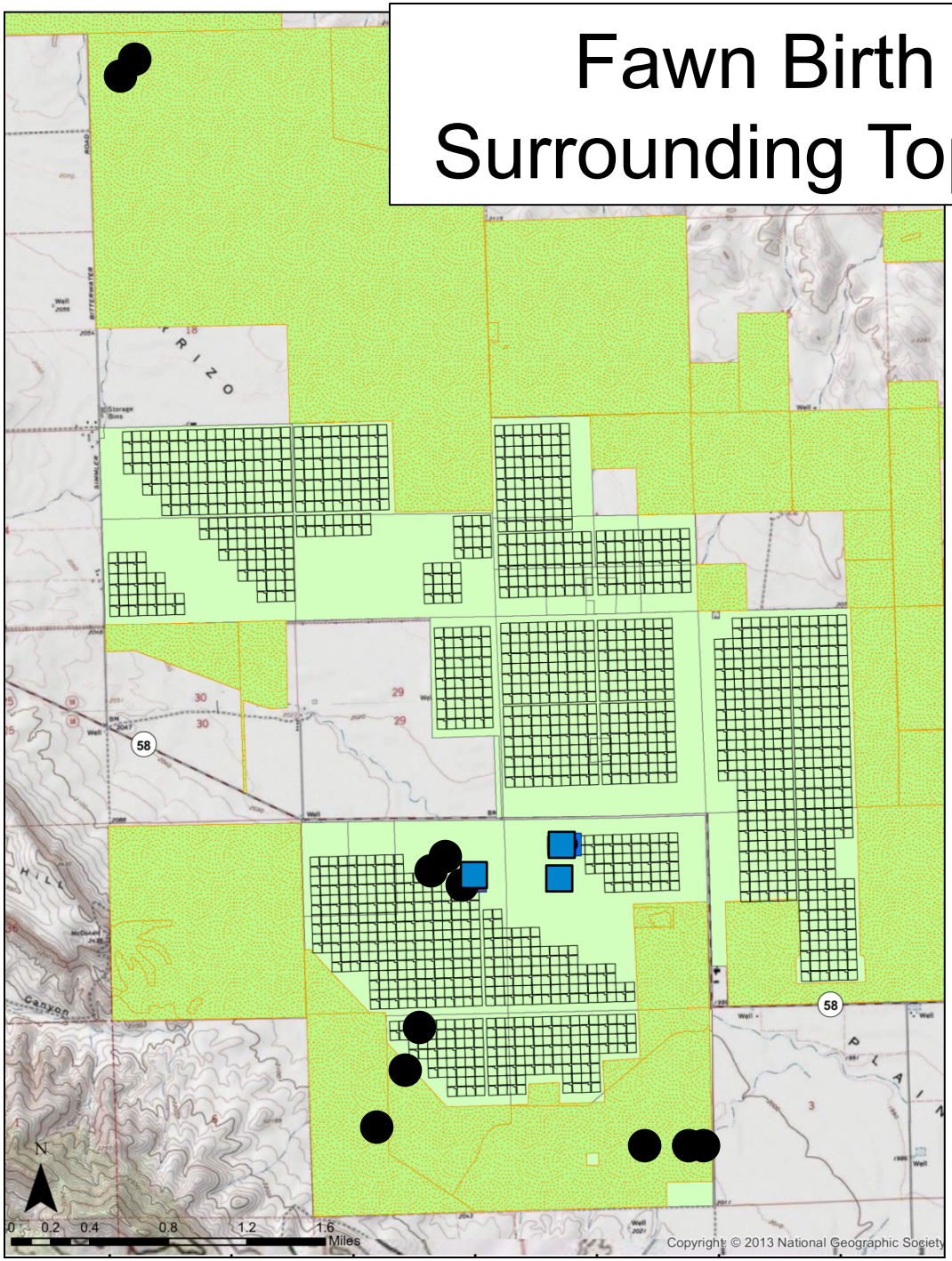
⇨ Female with fawns:

- Flat stomach
- Isolated from other adults
- Alert

Minimizing Impact/Disturbance

- <15 min. processing time
- Captured at 1 - 5 days of age
- Captured after reunion period
- Large secure net
- Equipment stored in local vegetation

Fawn Birth Sites Surrounding Topaz Farm



- Survivals
- Mortalities
- Mitigation lands
- Project Lands

Monitoring status of fawns

Collared Fawns:

VHF signal
(collar still attached)

Ear tag
(after collar detaches)

Monitoring status of Fawns

Uncollared Fawns:

Visual observation

- Collared sibling
- Pelage/markings on mother
- General daily location

Survivals:

- > 60 days = survival

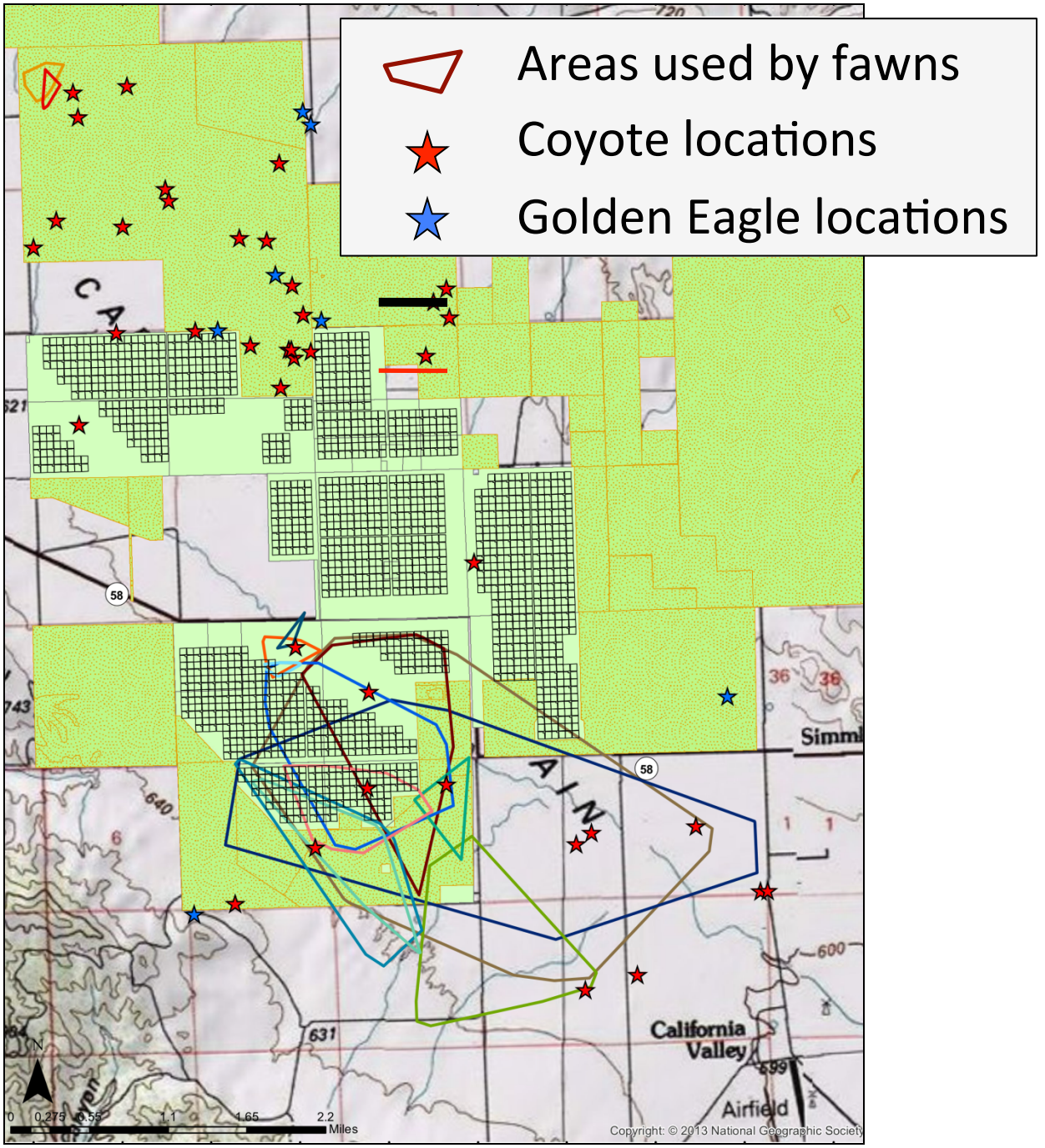
(90% of mortality occurs at < 20 days of age)

(Gregg et al. 2001)

Mortalities:

- Field necropsies
    1. Predation?
    2. Type of predator
- Laboratory necropsies
    1. Health related?
    2. Additional information

Predator sightings and fawning areas (April –July 2013)



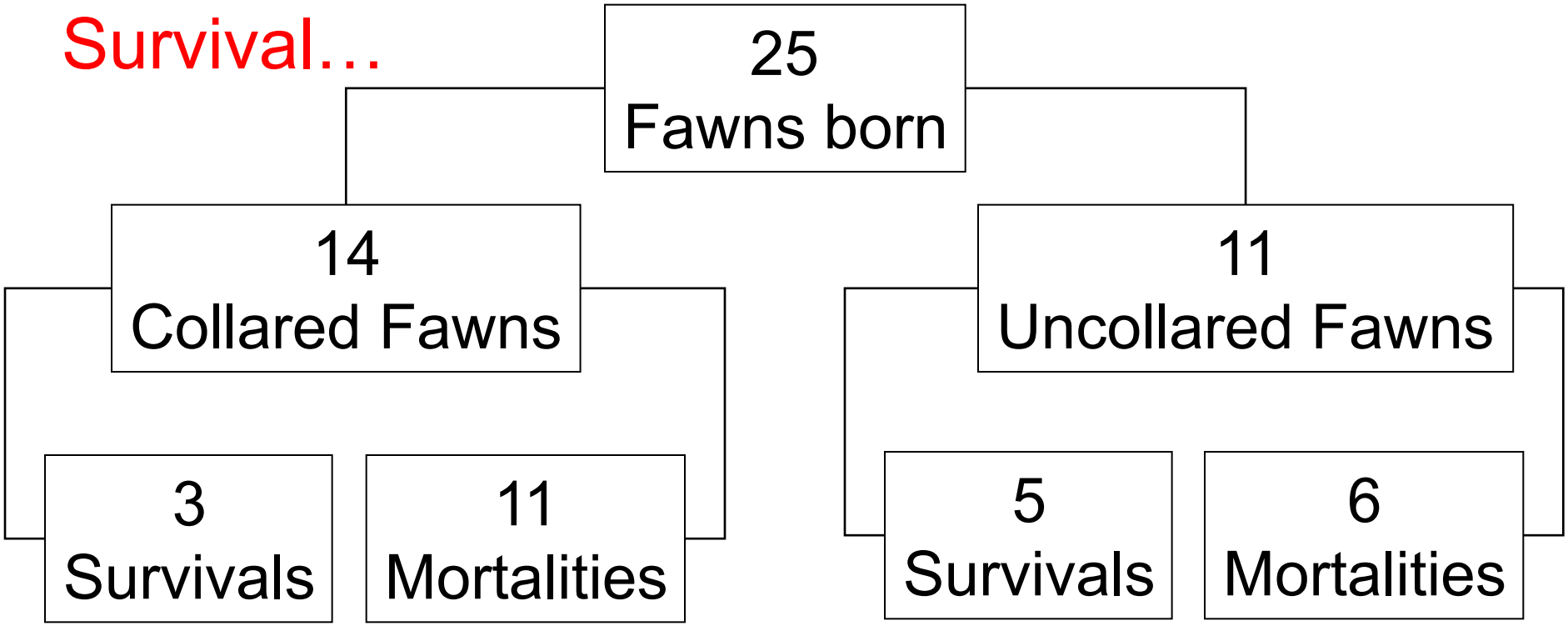
Survival…

25
Fawns born

14
Collared Fawns

11
Uncollared Fawns

Survival…


25
Fawns born
14
Collared Fawns
11
Uncollared Fawns
3
Survivals
11
Mortalities
5
Survivals
6
Mortalities

Survival compared to other studies…

Location	Year	# born	# survived
Northern CP	2013	25	8 (32%)
CPNM	2011	11	4 (36%)
CPNM	2010	12	5 (42%)
CPNM	2009	22	3 (14%)
Across range*	1976 - 1999	995	293 (29%)

(*O'Gara and Shaw, 2004)

(z = -0.18, p = 0.86)

(z = -0.10, p = 0.92)

Cause of mortality…

10 Necropsies

Northern Carrizo Plain:

7 **(70%)** Evidence of predation (Coyote)

3 **(33%)** No evidence of predation (Cause unknown)

Cause of mortality…

10 Necropsies

Northern Carrizo Plain:

7 **(70%)** Evidence of predation (Coyote)

3 **(33%)** No evidence of predation (Cause unknown)

Compared to….

*Other populations:

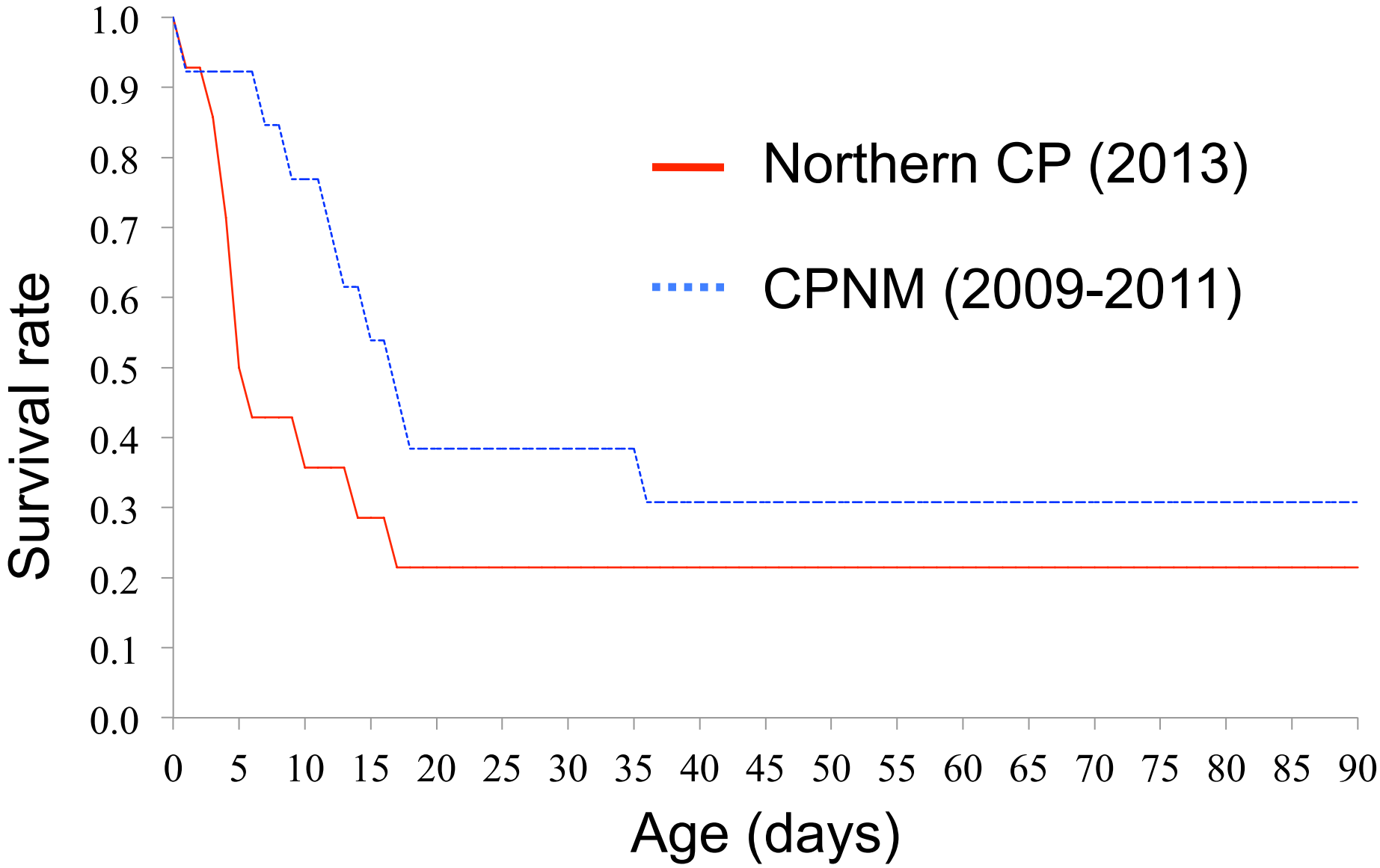
76% Evidence of predation (Coyote, Eagle, Bobcat)

24% No evidence of predation (Starvation or disease)

*O'Gara & Shaw 2004

$z = -1.07$, $p = 0.29$

Survival curves for pronghorn fawns



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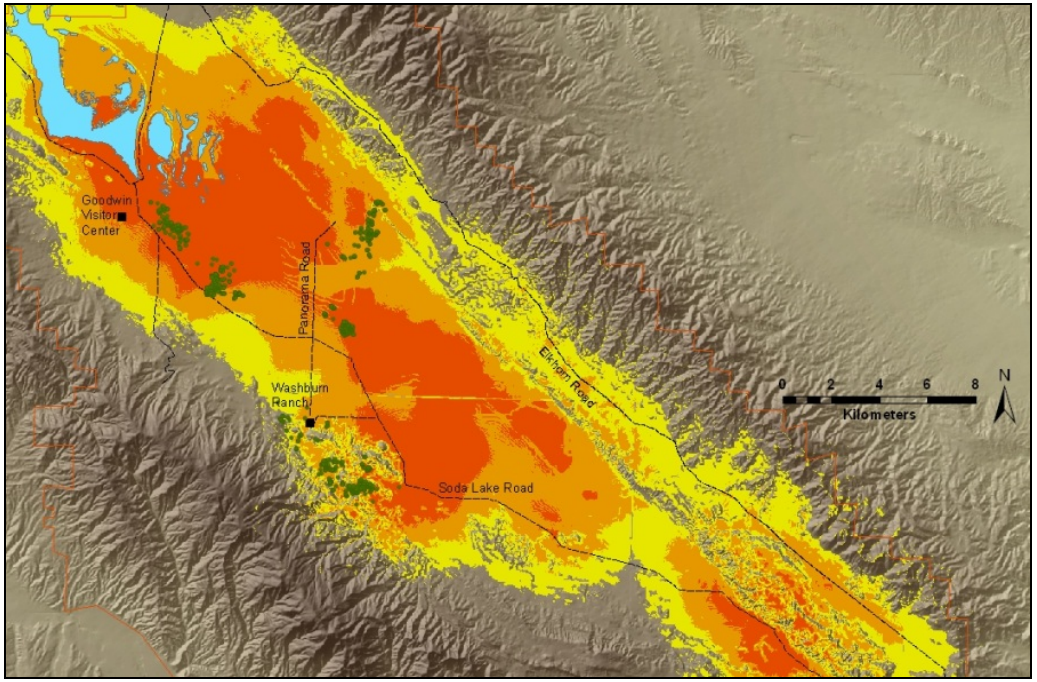


Habitat at different scales:

Micro-habitat

- Fawn selects bedsite
- < 100 m distance
- Subtle habitat characteristics

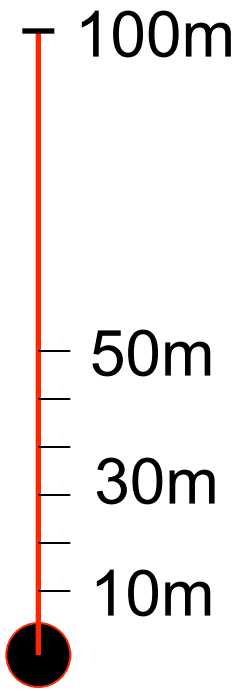
Macro-habitat

- Doe selects birth site and general fawning habitat
- large scale landscape features

Measuring micro-habitat:

1. Vegetation height
2. Vegetation type (grass, forb, shrub, bare ground)
3. Visibility at adult height (1 m)
4. Visibility at fawn height (0.5 m)

~ 1,000 Fawn locations from GPS collars



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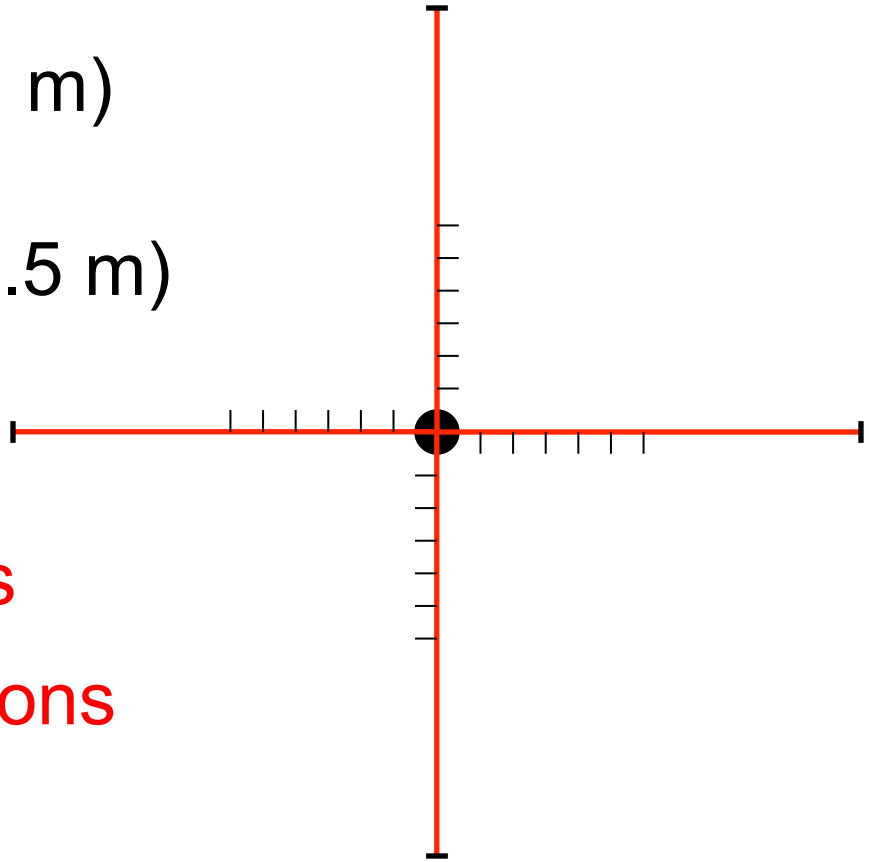


- 136 Fawn locations
- 132 Random locations

Measuring macro-habitat:

- Generated using a GIS (Geographic Information System)

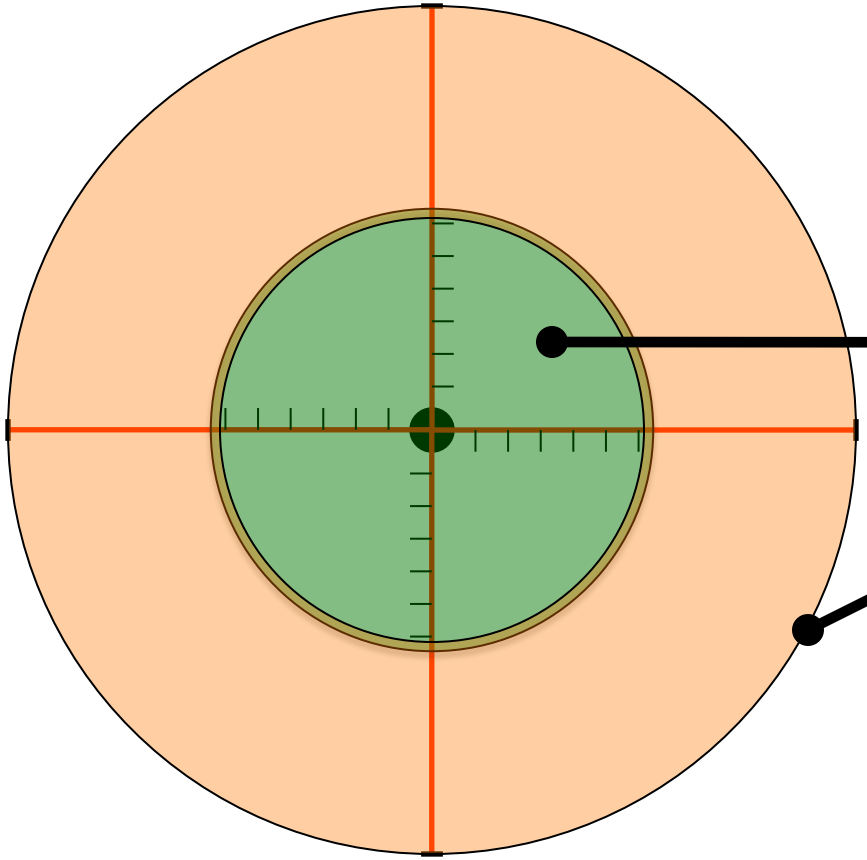
- Distance to…
    1. Solar development (as of June 2013)

    2. High use roads (Hwy 58, Soda Lake Rd)

    3. Low use roads (dirt roads)

    4. Ephemeral drainages

Habitat model results: Micro-habitat features

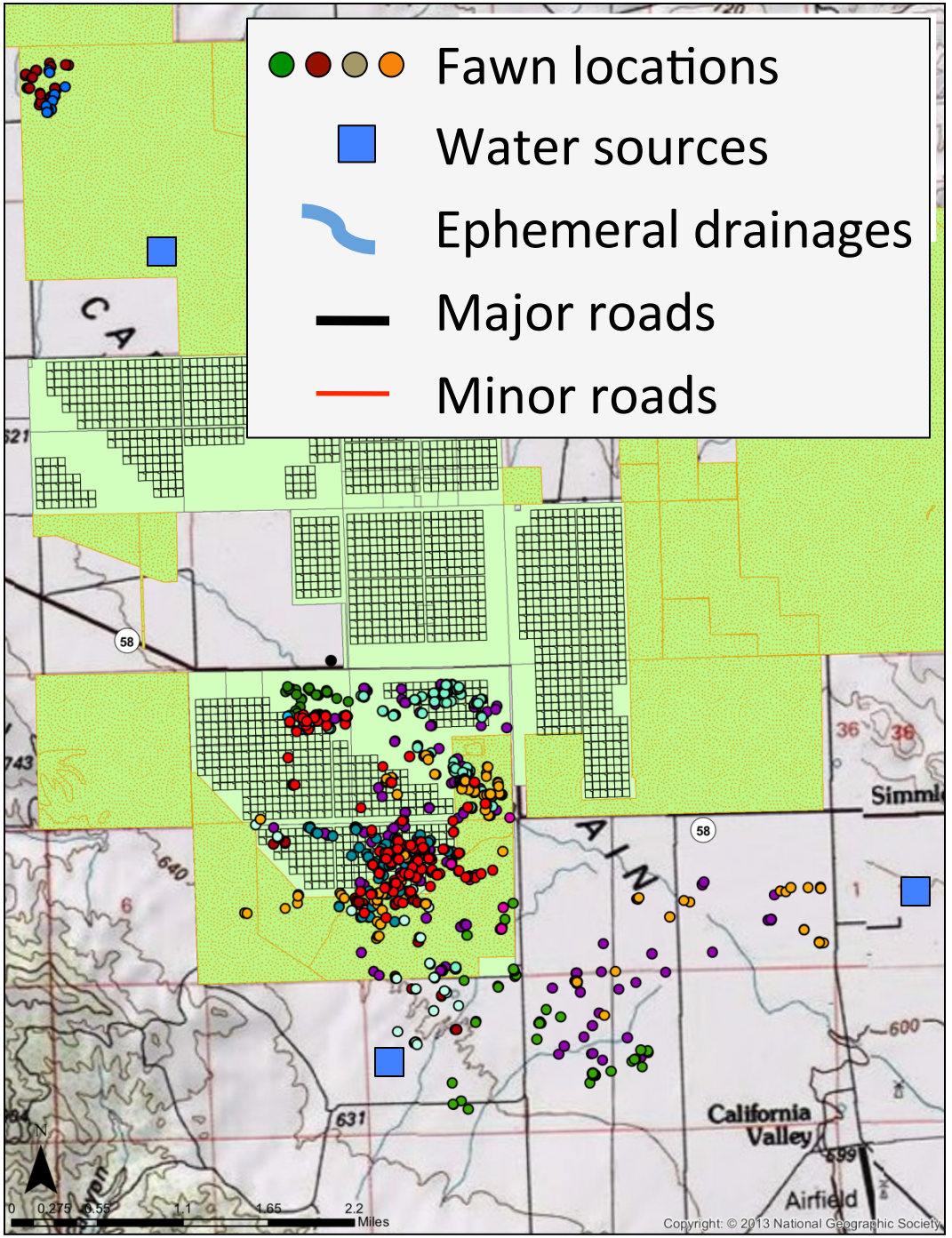


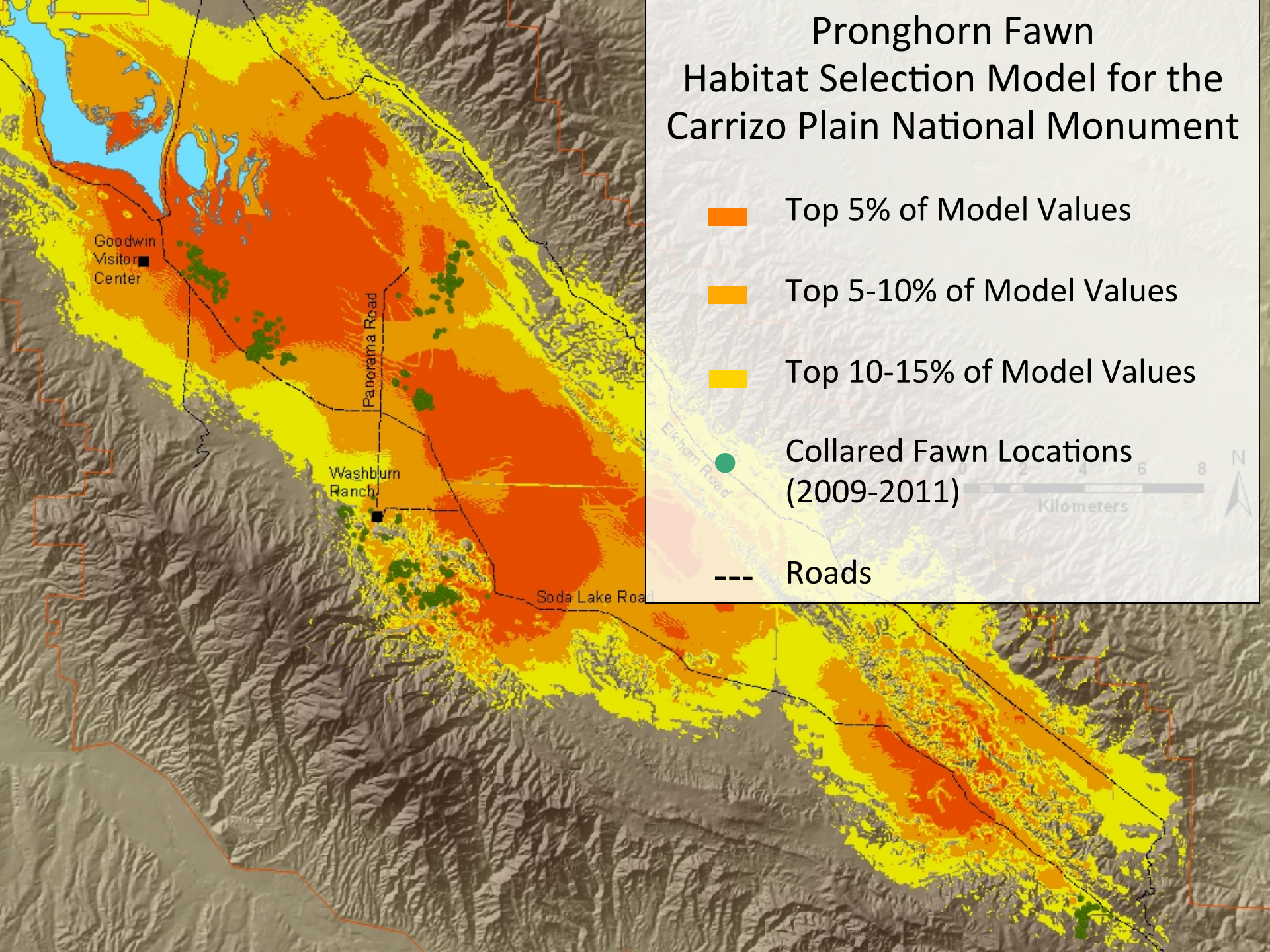
Distance	Visibility
0 – 50 meters	⇩
100 meters	⇧

Note: Vegetation height and type were not significant

Habitat model results:
Macro-habitat variables

Variable	Distance
Solar development	⇧
Minor roads	⇧
Water sources	⇧
Major roads	⇩
Ephemeral drainages	⇩




Pronghorn Fawn
Habitat Selection Model for the
Carrizo Plain National Monument
Top 5% of Model Values
Top 5-10% of Model Values
Top 10-15% of Model Values
Collared Fawn Locations
(2009-2011)
Roads
Goodwin
Visitor
Center
Panorama Road
Washburn
Ranch
Soda Lake Road
Elkhorn Road
Kilometers
N

Conclusions and Discussion

1. Fawn survival

- Similar to CPNM and other populations

- However - Low raw numbers of recruited individuals

  - High annual variability common

  - Vulnerable to environmental and demographic stochasticity

Conclusions and Discussion

1. Causes of mortality

- Predation similar to CPNM and other populations

- However…
  - Importance of predation increases for small populations in marginal habitats

  - Mean survival time low (6.75 days)

Conclusions and Discussion

2. Habitat

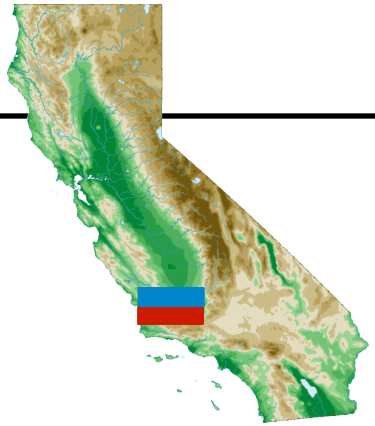
- Low availability of vegetative concealment
- Low forage opportunities for adults (high % bare ground)
- Ephemeral drainages likely provide habitat for both fawns and adults.

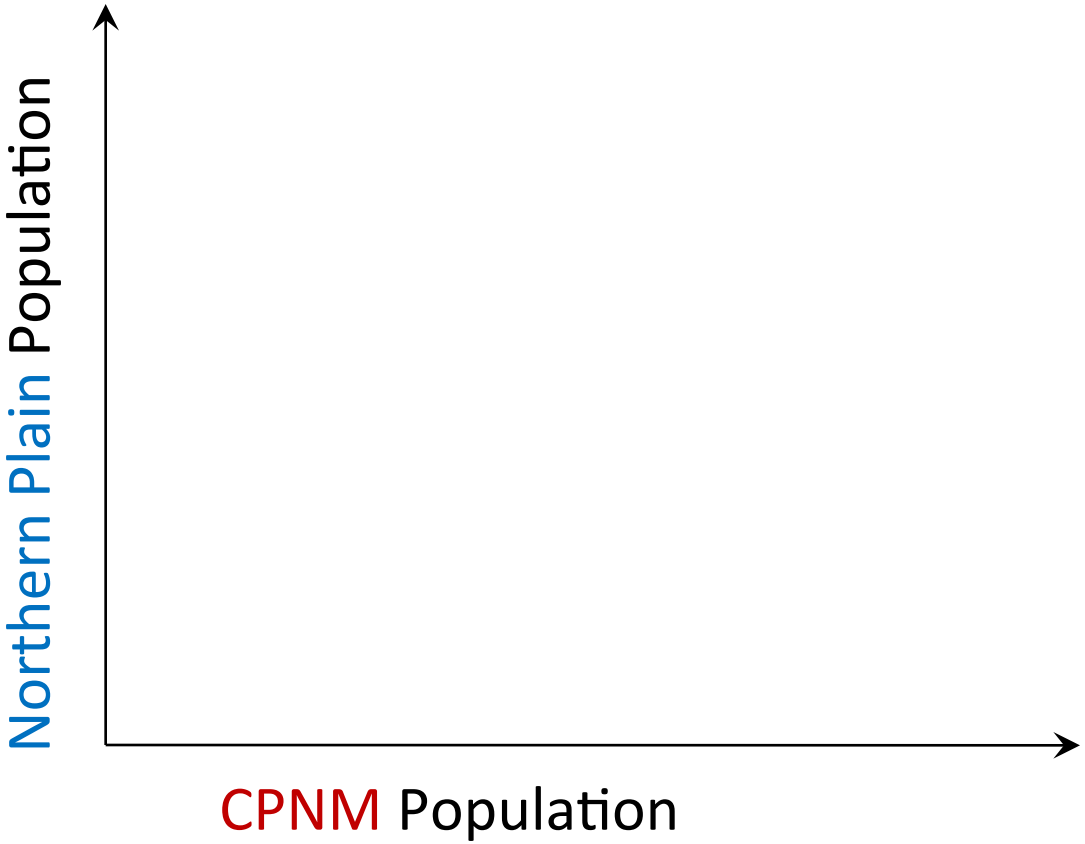

Questions?

	Mean vegetation height	Mean adult visibility	Mean fawn visibility	Mean vegetation composition			
				Forb	Grass	Shrub	Bare ground
Fawn locations	3.6 cm (0.2 cm)	97.8 % (0.8 %)	97.7 % (0.9 %)	17.7 % (0.3 %)	32.1 % (0.7 %)	0.0 % (0.0 %)	50.1 % (0.9 %)
Random locations	5.9 cm (0.3 cm)	94.2 % (2.2 %)	92.0% (2.7 %)	18.7 % (0.7 %)	34.7 % (1.0 %)	0.3 % (0.1 %)	46.3 % (1.3 %)

Methods

Emigration from CPNM to Northern Plain?





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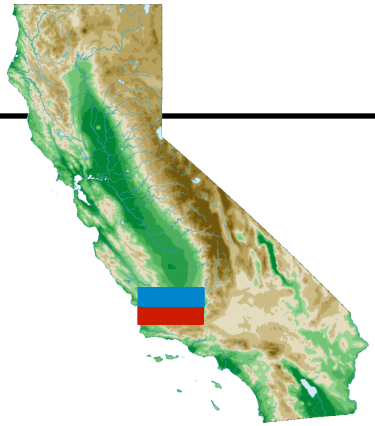

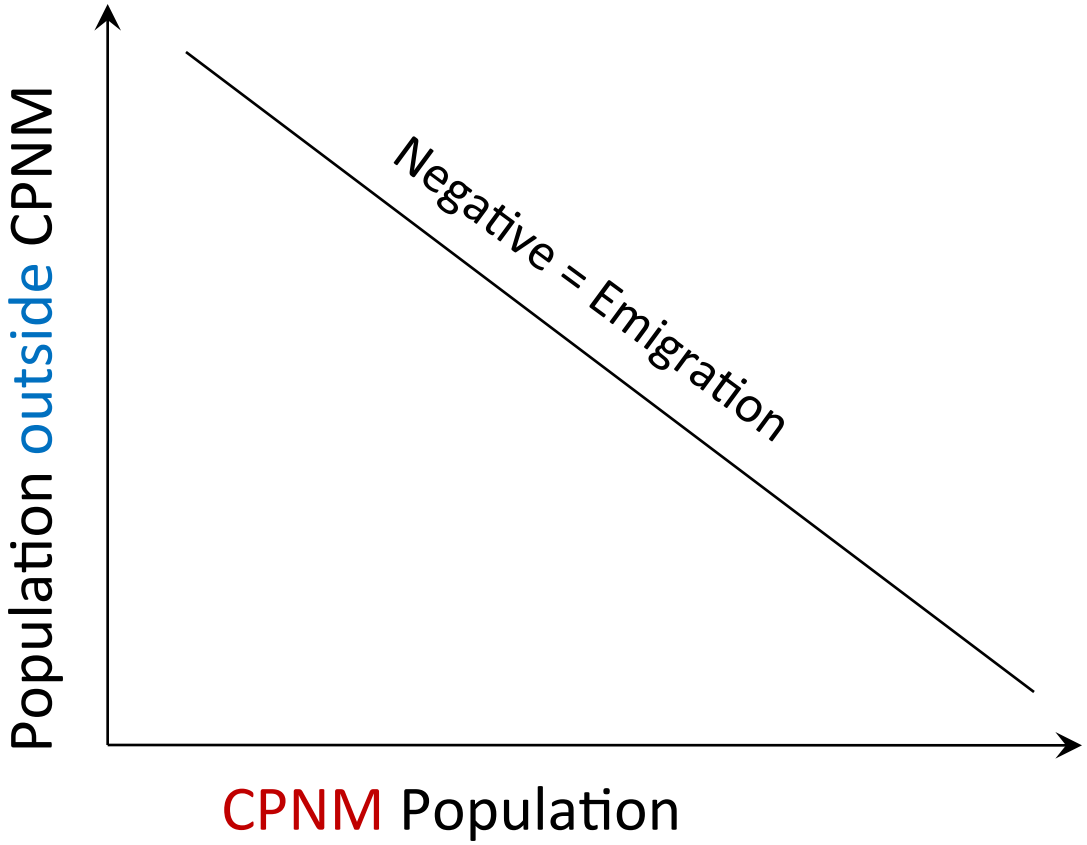

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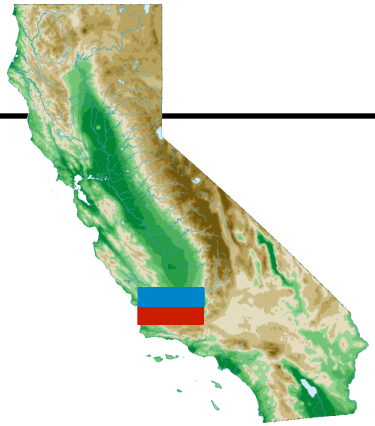

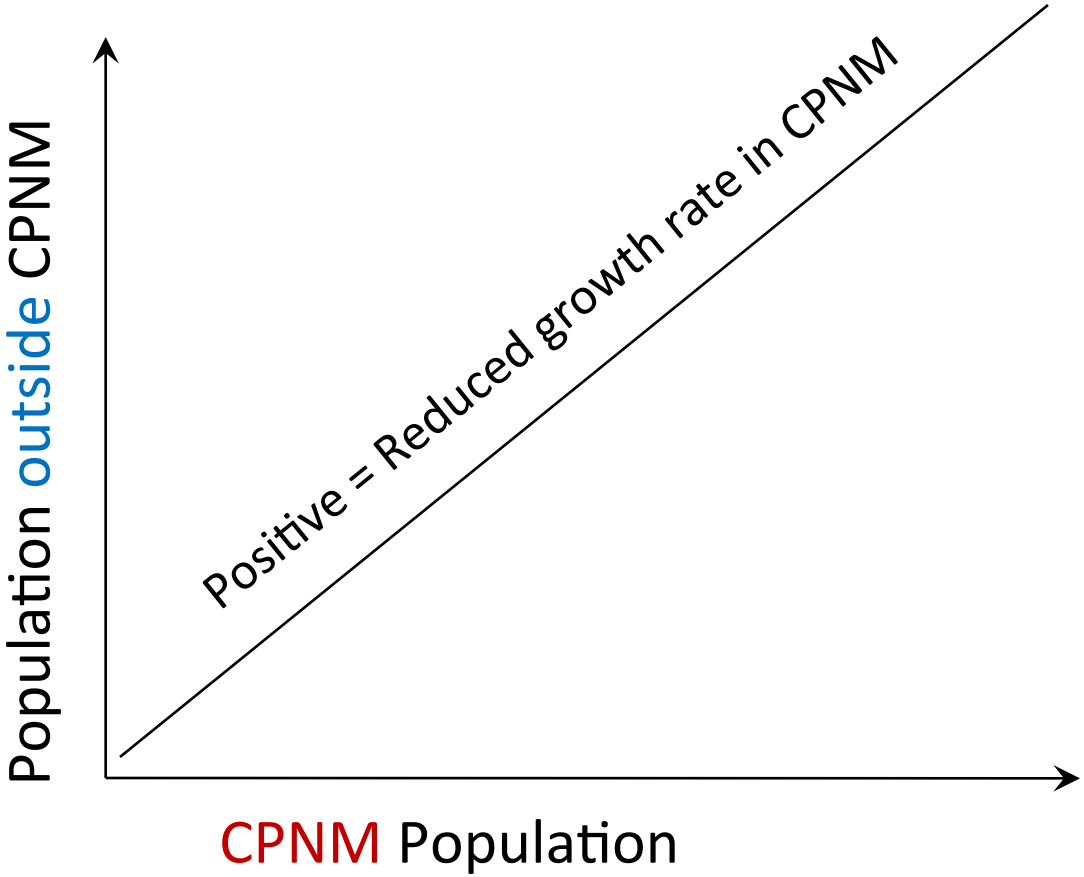

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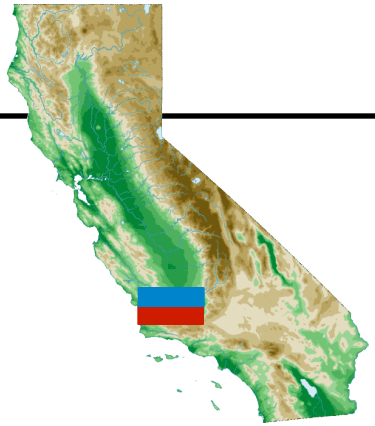

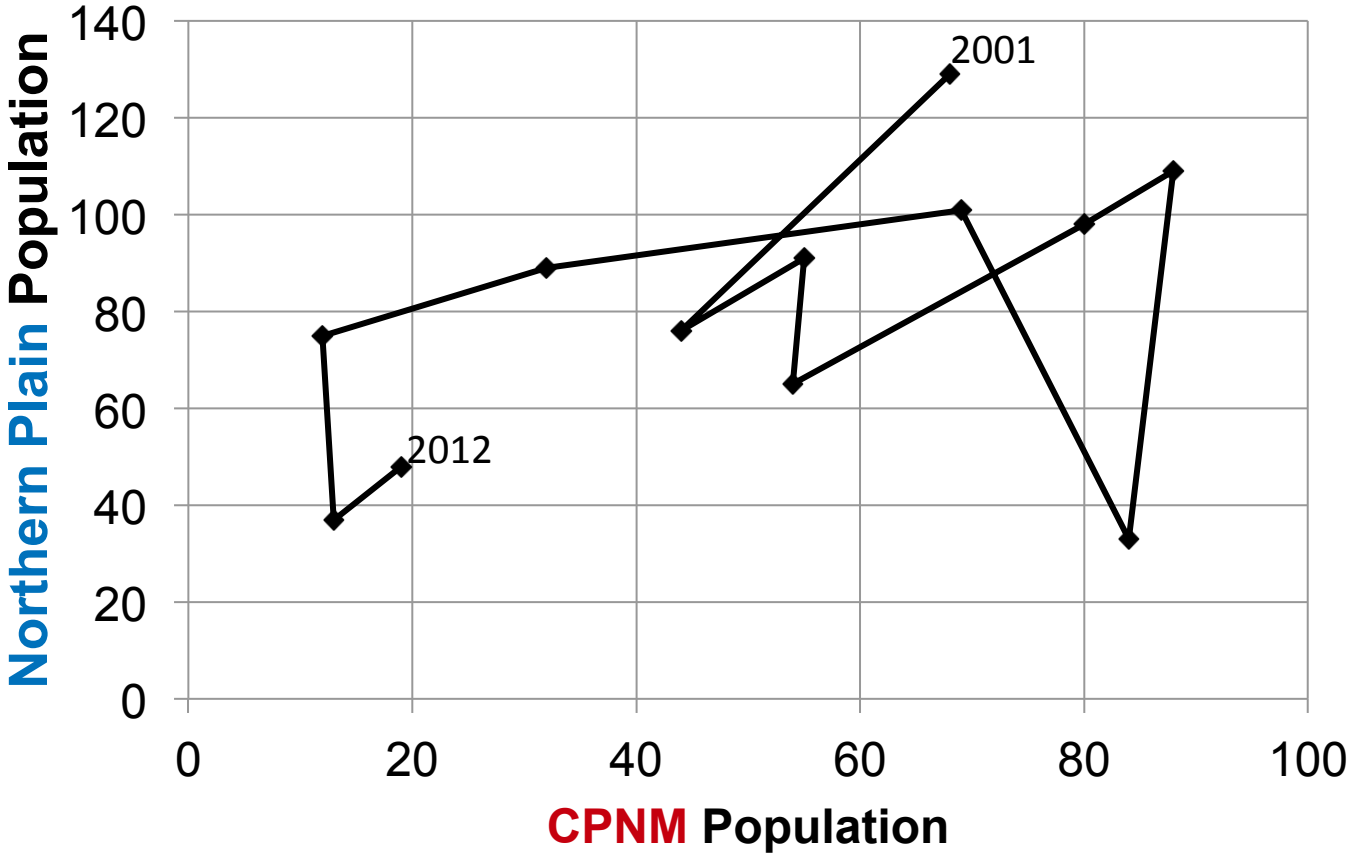

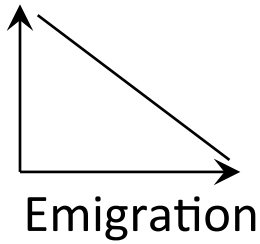

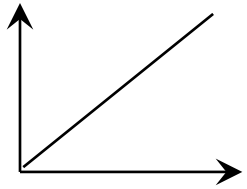

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