San Joaquin Kit Fox Demography, Ecology, and Conservation in the Northern Carrizo Plains

Brian Cypher
Craig Fiehler

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Background

- Topaz Solar Farm
  - 550-megawatts
  - 3,510 acres project footprint
  - Approximately 18,000 acres of mitigation/ settlement land
- California Valley Solar Ranch
  - 250-megawatts
  - 1,500 acres project footprint
  - Over 12,000 acres of mitigation/settlement land

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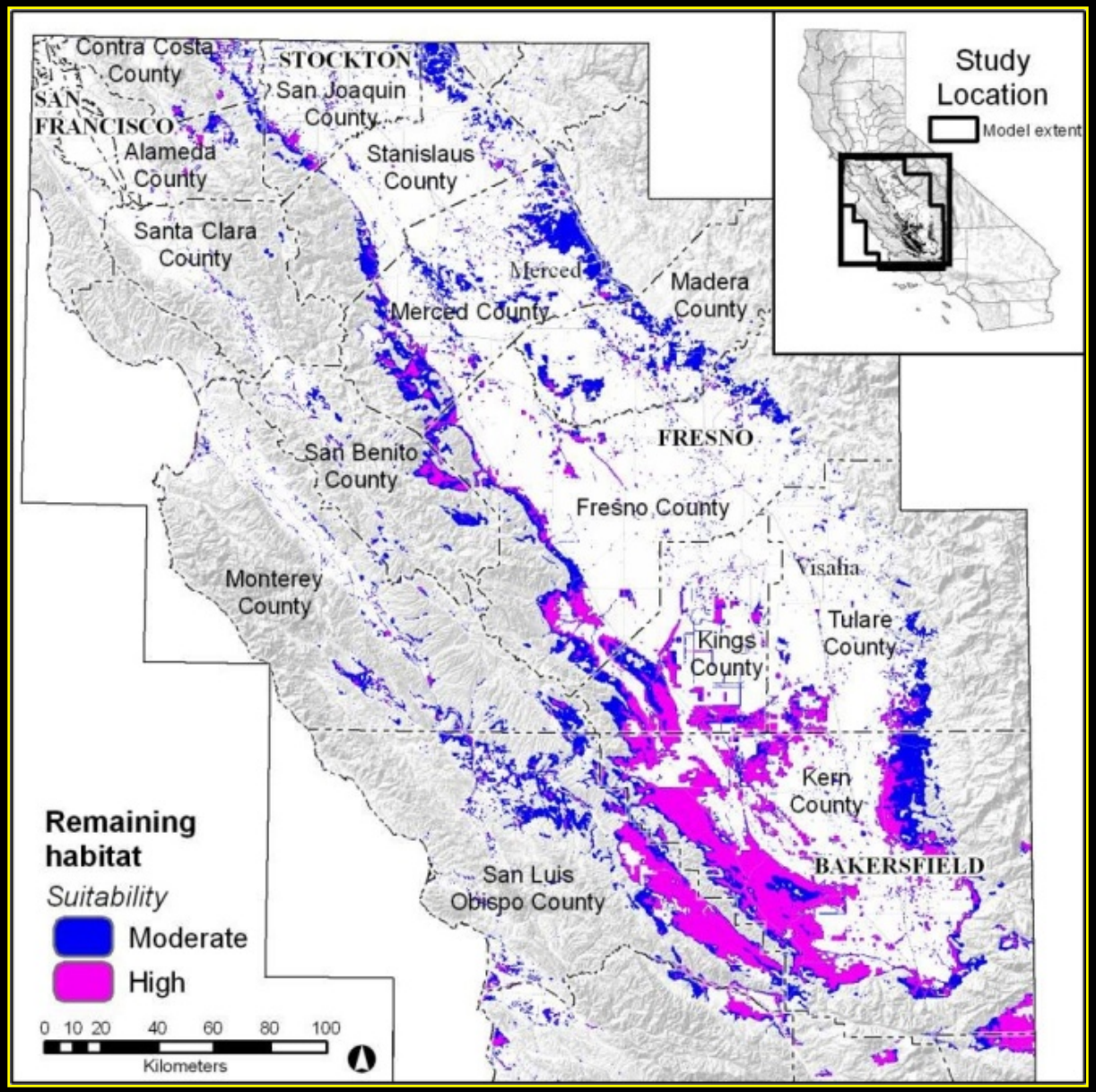
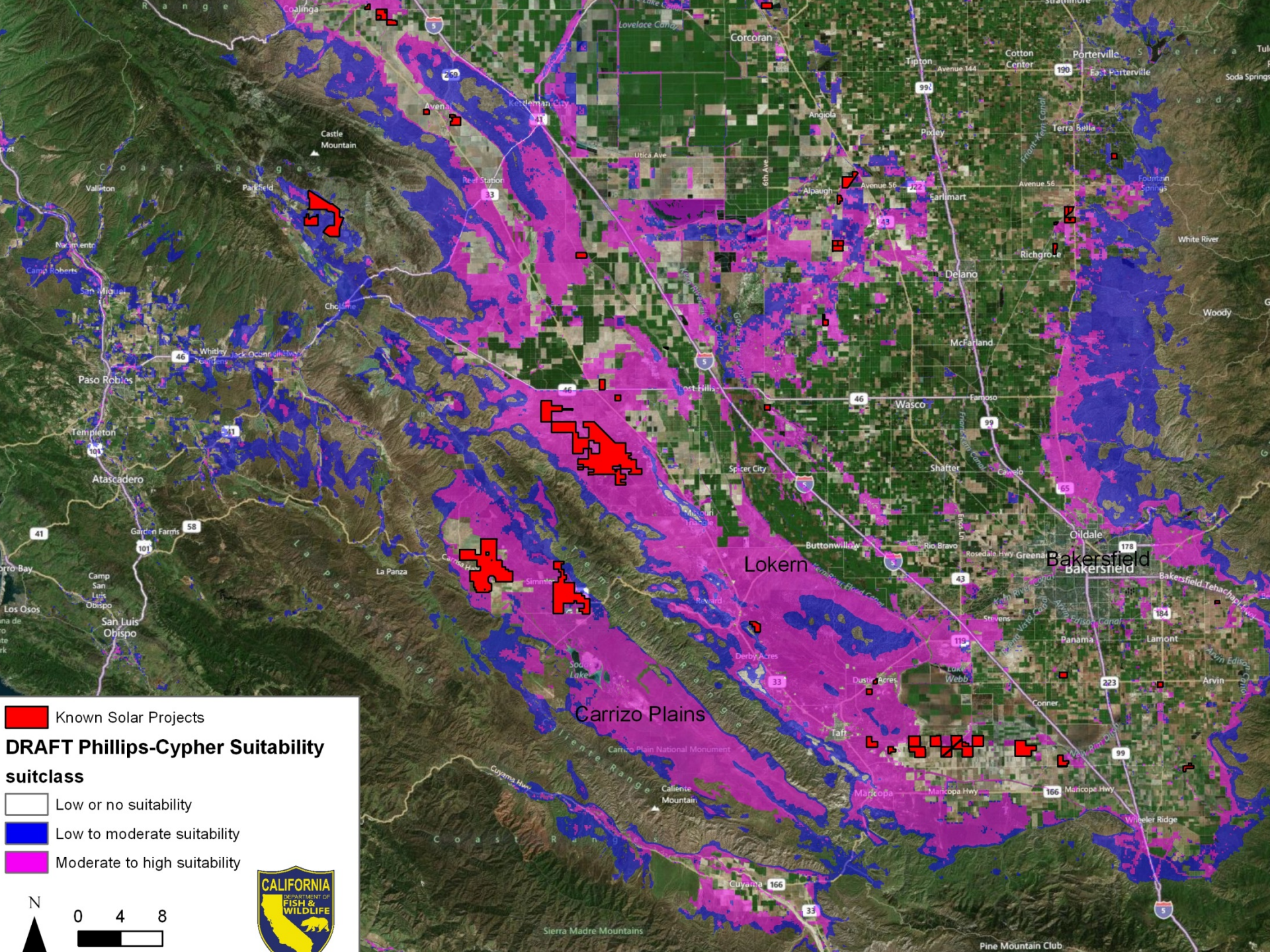
Kit Fox Habitat Suitability




Known Solar Projects
DRAFT Phillips-Cypher Suitability
suitclass
Low or no suitability
Low to moderate suitability
Moderate to high suitability
N
0 4 8
CALIFORNIA DEPARTMENT OF FISH & WILDLIFE
Lokern
Carrizo Plains
Bakersfield
Corcoran
Porterville
Delano
Wasco
Shafter
Taft
Maricopa
Arvin
Lamont
Oildale
Buttonwillow
Kettleman City
Avenal
Coalinga
Paso Robles
Atascadero
Templeton
San Luis Obispo
Los Osos
Castle Mountain
Caliente Mountain
Sierra Madre Mountains
Pine Mountain Club
Wheeler Ridge
Carrizo Plain National Monument
Coast Ranges
Lovelace Canal
Tipton
Cotton Center
Pixley
Terra Bella
Earlimart
Richgrove
McFarland
Fairmoss
Spicer City
Buttonwillow
Rio Bravo
Greenfield
Stevens
Panama
Conner
Derby Acres
Dustin Acres
Lake Webb
Soda Springs
White River
Woody
Fountain Springs
Avenue 144
Avenue 56
Utica Ave
6th Ave
Rosedale Hwy
Bakersfield Tehachapi Hwy
Maricopa Hwy
Cuyama Hwy
Cuyama
Garden Farms
La Panza
Camp San Luis Obispo
Camp Roberts
San Miguel
Whitley Gardens
Parkfield
Valleton
Nacimiento
Simmler
Reward
Missouri Triangle
Reef Station
Lost Hills
Angiola
Alpaugh
Fresno Canal
Friant-Kern Canal
Edison Canal
Arvin Edison Canal
Kern River Canal
Kern River Canal
Kern Water Bank Canal
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Kern River Canal
Kern River Canal
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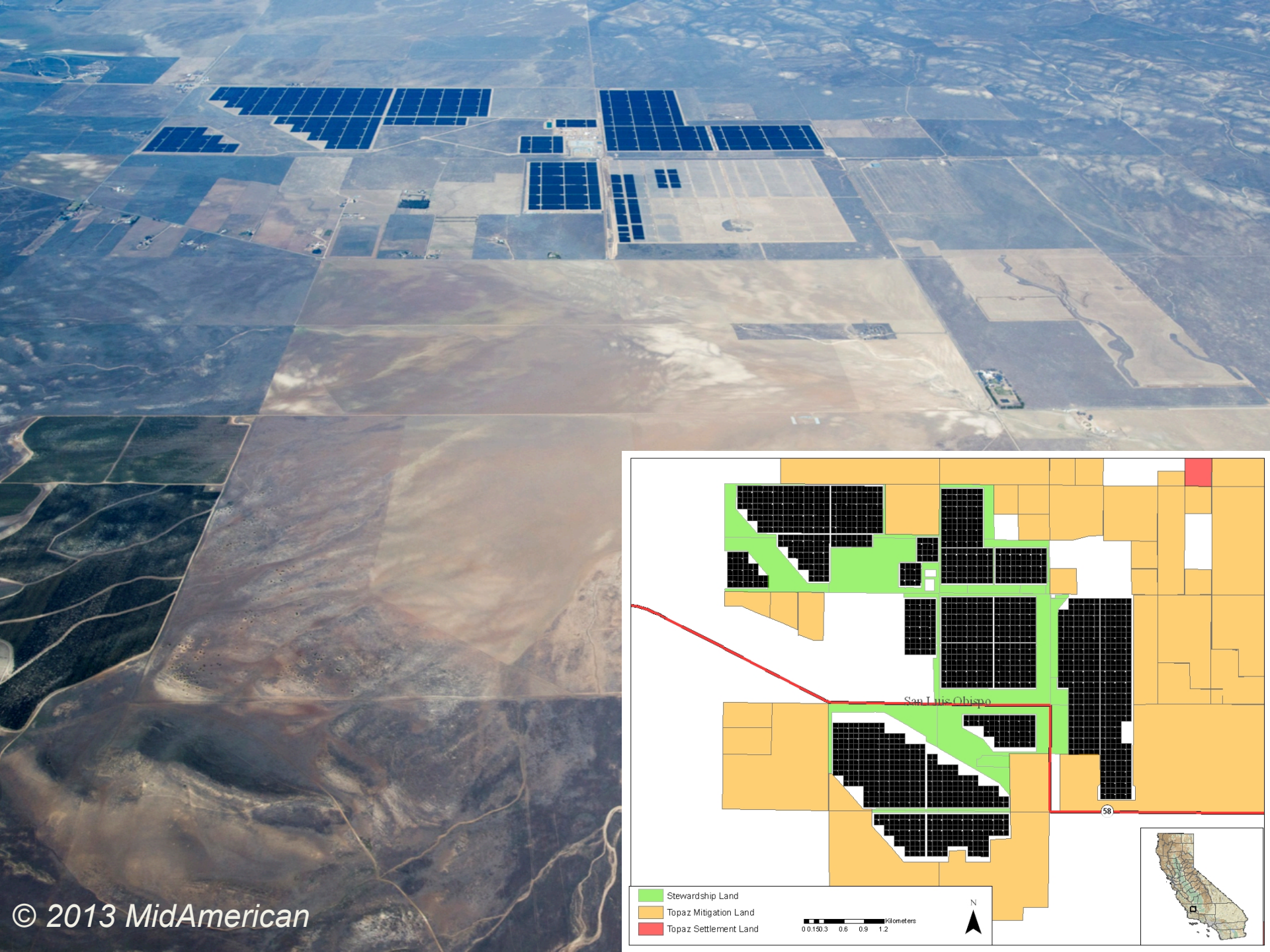
Kern Water Bank Canal
Kern Water Bank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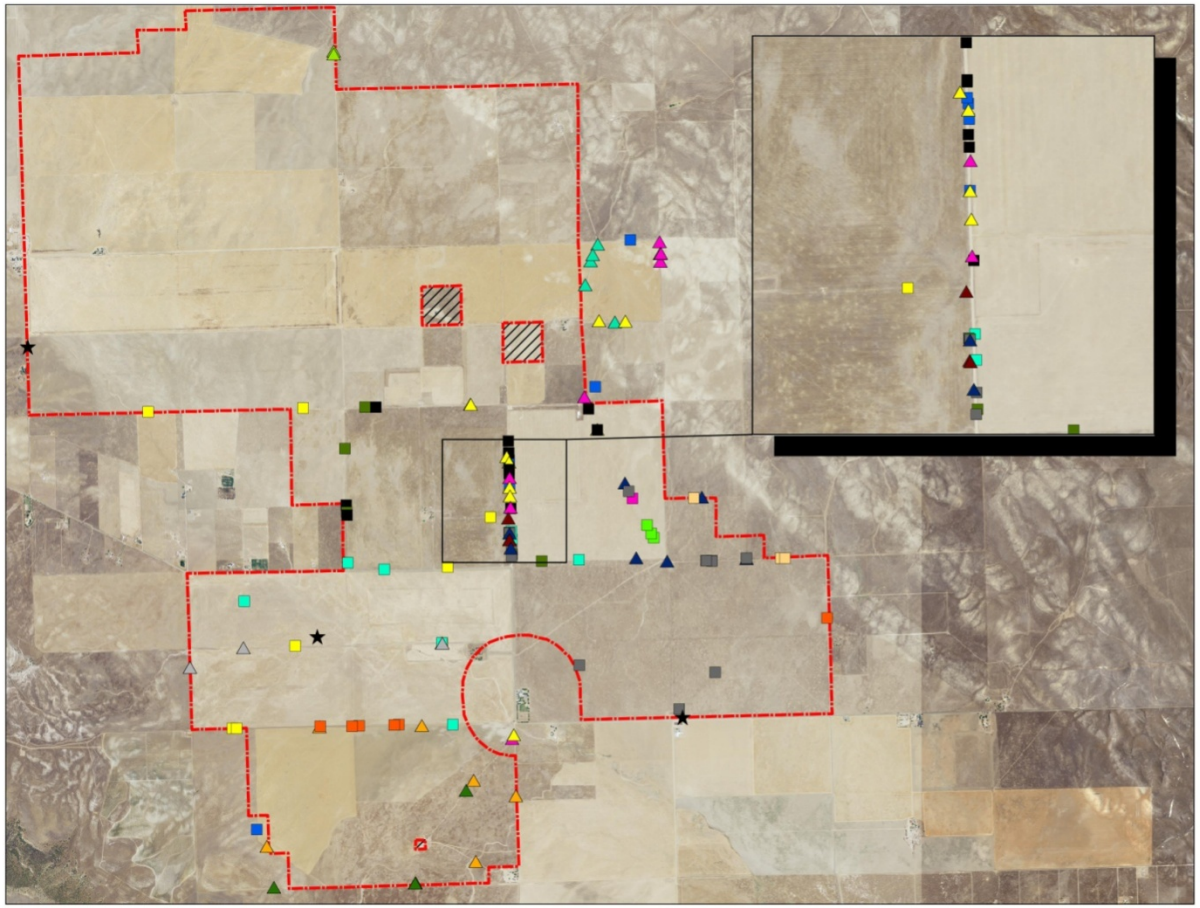
San Luis Obispo
58
Stewardship Land
Topaz Mitigation Land
Topaz Settlement Land
Kilometers
0 0.150.3 0.6 0.9 1.2
N

Search Dog Results – Topaz Solar Site 2009

BR Map 2: San Joaquin Kit Fox Genetic Results



Legend

- Project Study Area
- Excluded Area
- ★ Red Fox

Map Symbol	Sex	SJKF Individual	Number of Detections
	Male	2	8
	Male	3	14
	Male	7	6
	Male	8	4
	Male	9	6
	Male	13	4
	Male	14	8
	Male	15	1
	Male	17	7
	Male	19	13
	Female	1	4
	Female	4	3
	Female	5	6
	Female	6	2
	Female	10	4
	Female	11	5
	Female	12	7
	Female	16	8
	Female	18	10

Scat collection locations from Smith 2010
Genetic results from Maldonado 2010 (in prep.)

N W E S

0 0.25 0.5 1 Miles

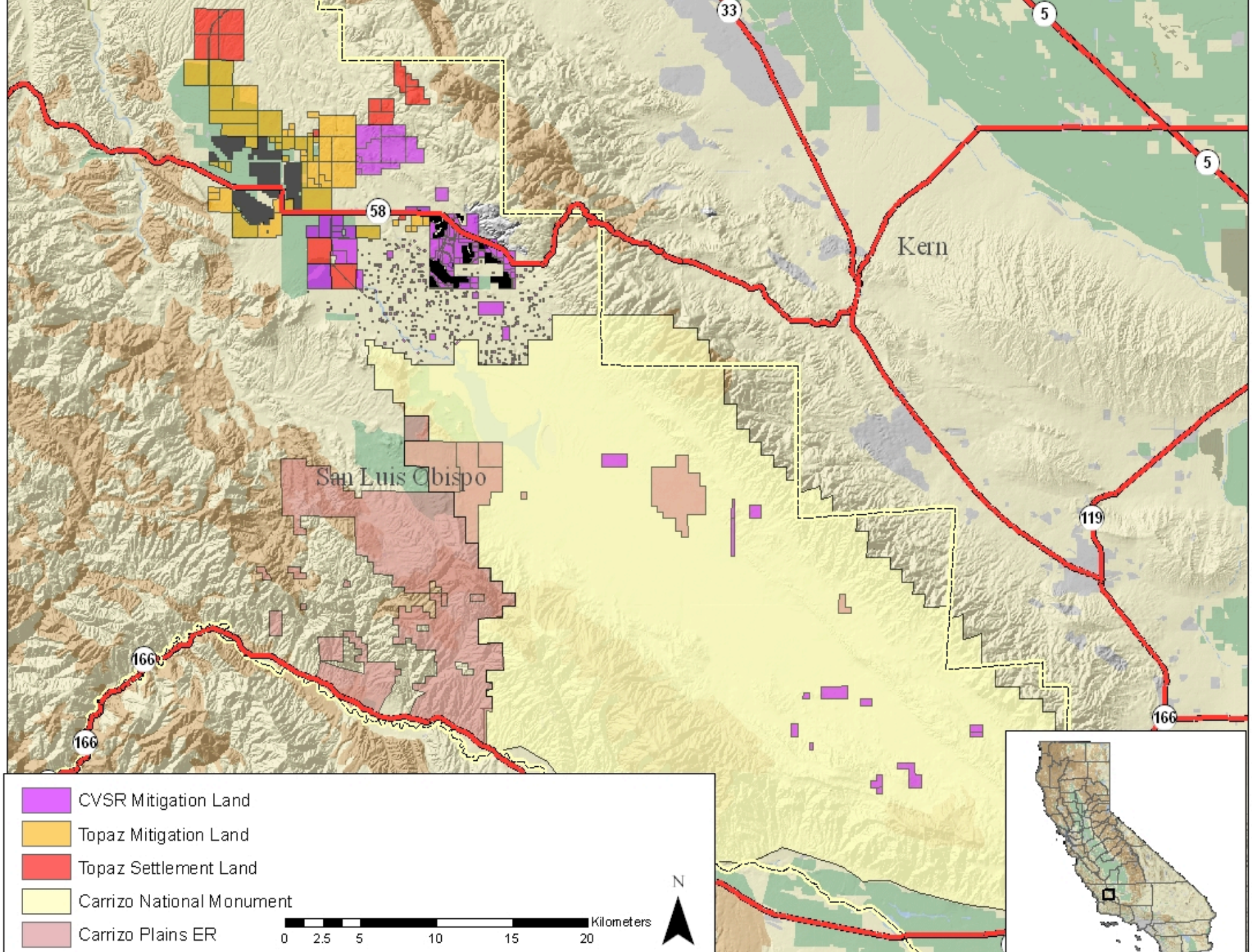
Topaz Solar Farms LLC
1111 Broadway, 4th Floor
Oakland, CA 94607

2009 San Luis Obispo County
NAIP Aerial Photography

Althouse and Meade, Inc.
1875 Wellsona Road
Paso Robles, CA 93446

Topaz Mitigation Land

- CDFW took fee title and will manage
- Habitat Mitigation and Monitoring Plan (HMMP)
- Habitat management
  - Wildlife friendly fencing
  - Keep veg structure low (cattle grazing)
  - Restore shrubs
  - Veg and prey monitoring


33
5
5
58
Kern
San Luis Obispo
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166
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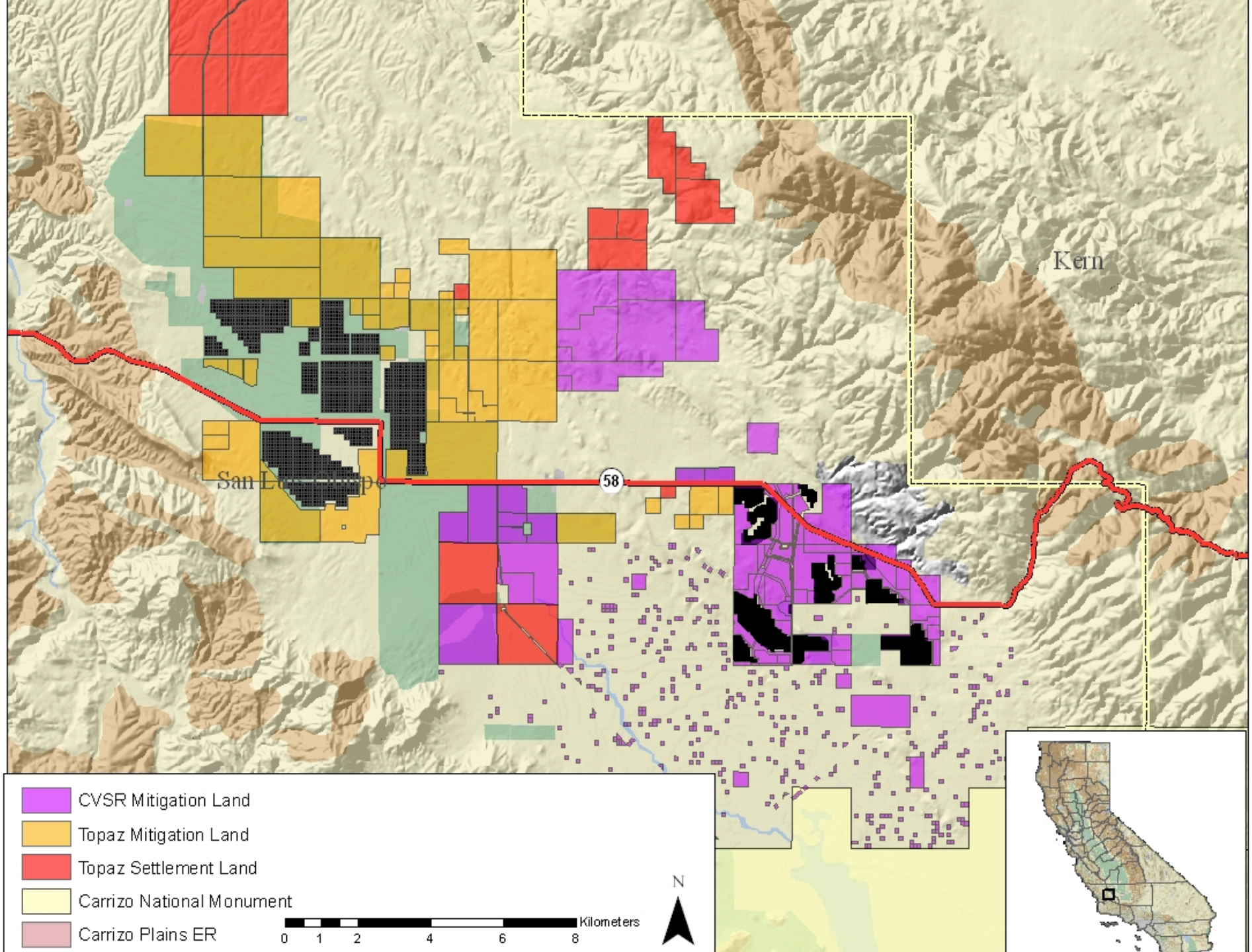
166
CVSR Mitigation Land
Topaz Mitigation Land
Topaz Settlement Land
Carrizo National Monument
Carrizo Plains ER
0 2.5 5 10 15 20
Kilometers
N


Kern
San Luis Obispo
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CVSR Mitigation Land
Topaz Mitigation Land
Topaz Settlement Land
Carrizo National Monument
Carrizo Plains ER
0 1 2 4 6 8
Kilometers
N

Kit Fox Study

- Goals:
  - Examine response of kit foxes to habitat management strategies, particularly grazing
  - Collect basic demographic and ecological data

- Specific objectives:
  1. Collect data on kit fox habitat use
  2. Collect data on demography (survival and reproduction) and ecology (movements, den use, food habits)
  3. Use information to develop/refine regional and site-specific conservation strategies

Methods

- GPS collars w/ VHF transmitters and mortality sensors
- Live trapping Jan. 2-15, 2013
- Weekly night monitoring and day sourcing
  - Monitor survival
  - Remotely download locations
  - Locate dens
- Suspected natal dens monitored for pups
- Scats collected for food habit analysis

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Results

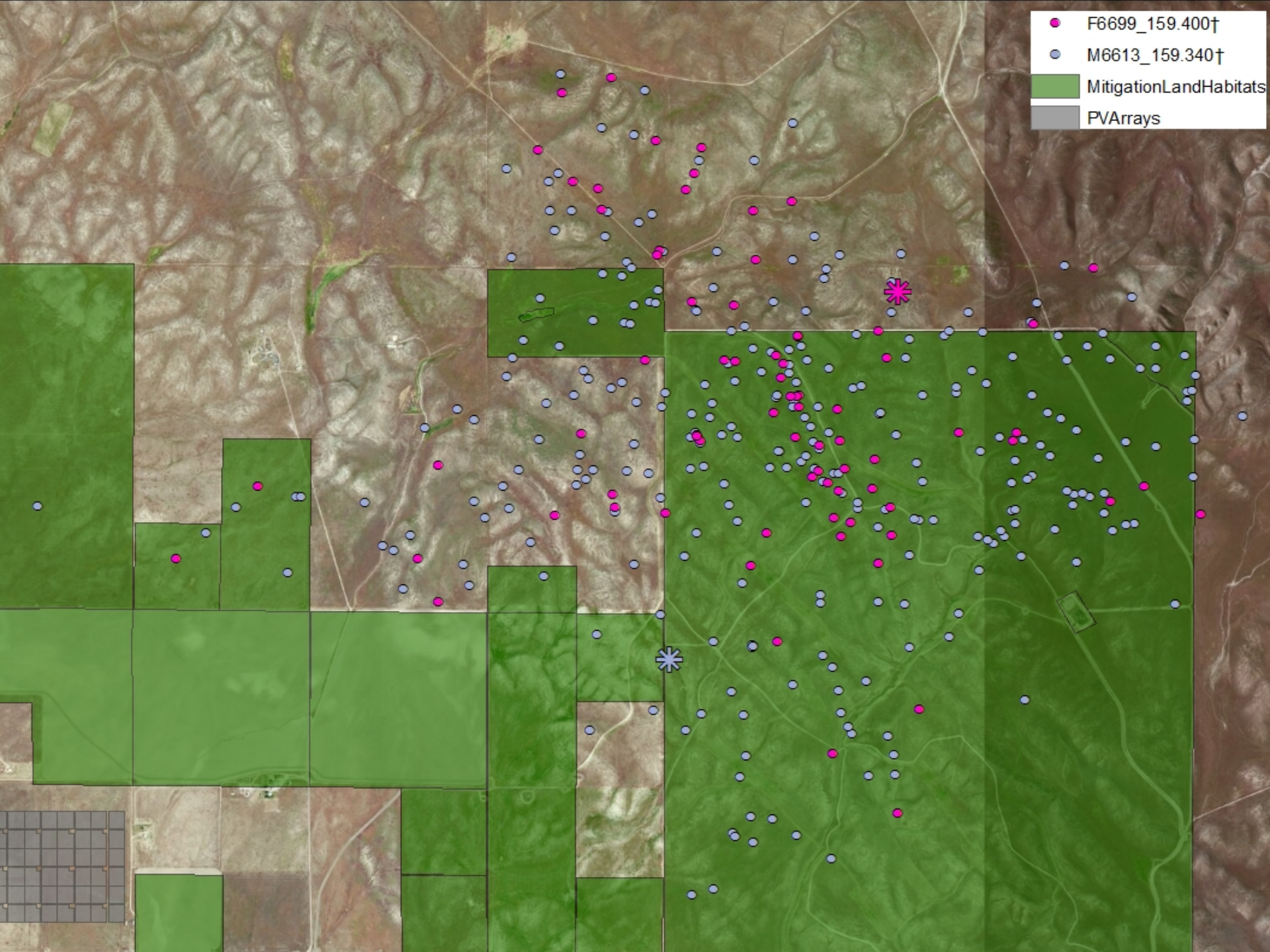
- 10 foxes trapped and collared in January on Klock property
  - 6 adult males and 4 adult females
- Foxes monitored weekly from January to June
- Two mortalities
  - Female and male, both suspected bobcat predations
- Seven foxes recaptured in August, 1 missing
- One animal entrapped in a hole, but rescued
- No evidence of successful reproduction
- 28 dens located
- 3,356 night locations (37-542/fox)
- Almost 200 scats collected – analysis in progress

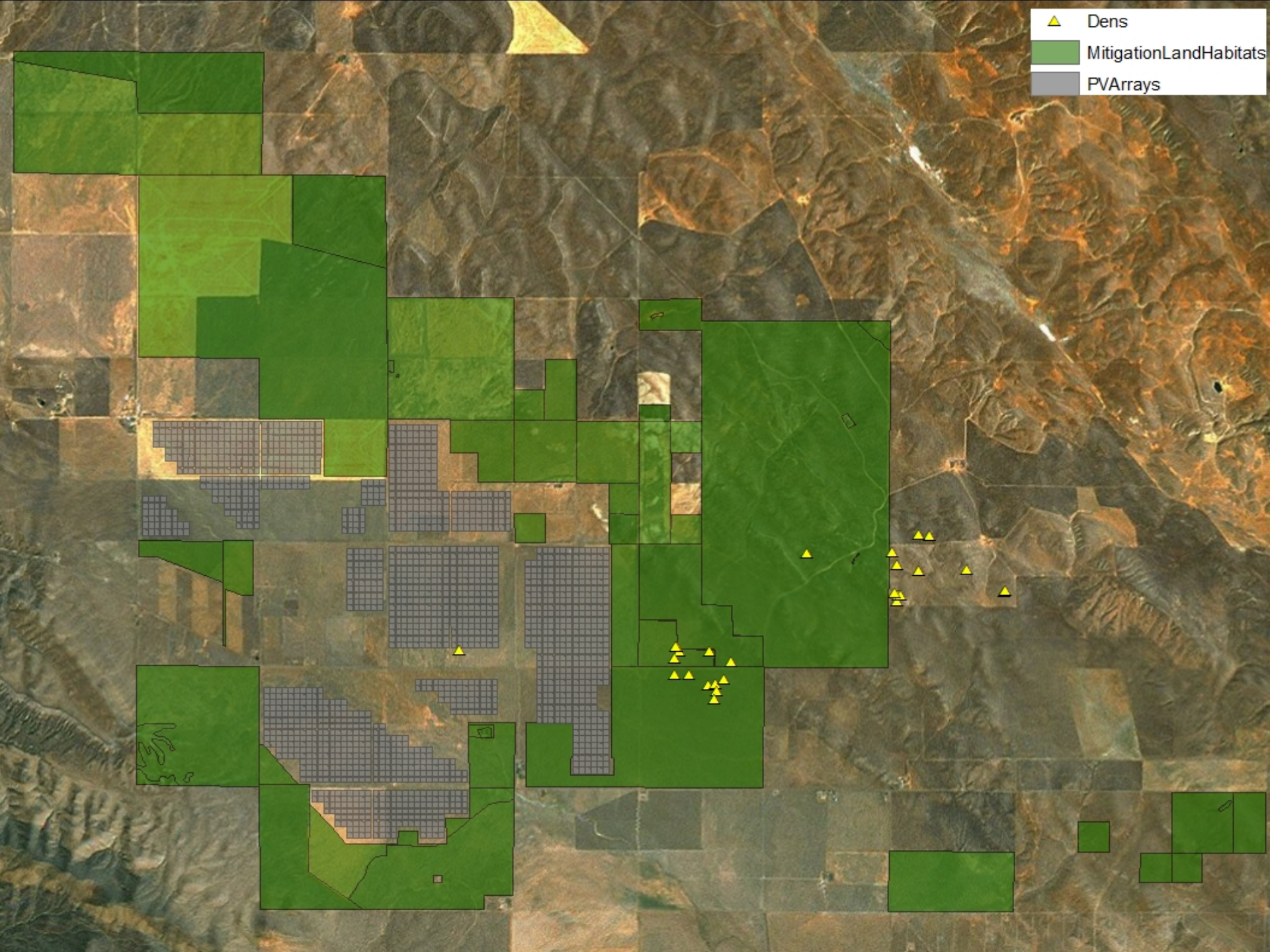
Fate of Collared Foxes

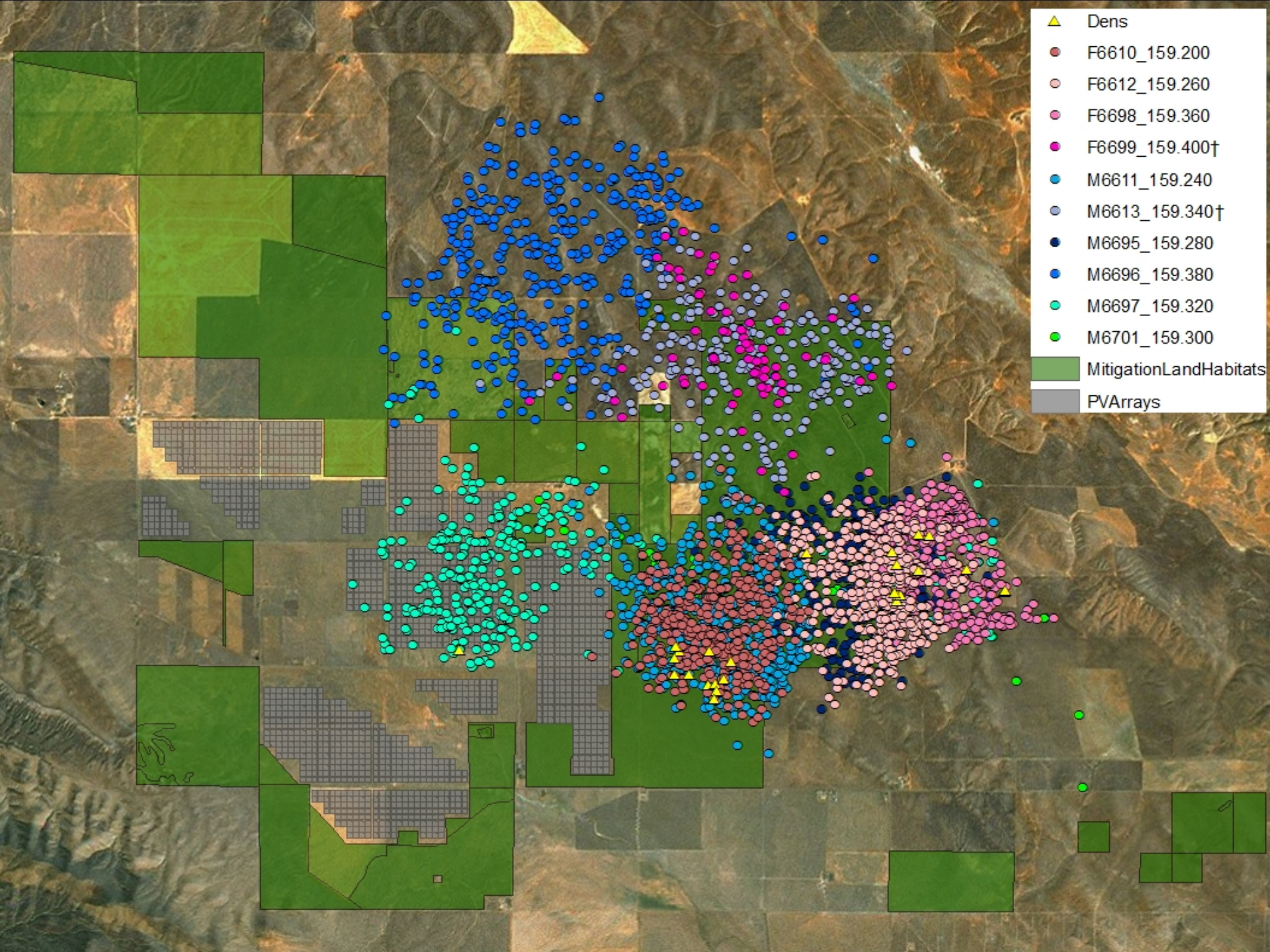
Fox	Collared	Locations	Fate
M 6695	1/3/13	391	Collar removed 8/6/13
F 6610	1/4/13	395	Collar removed 8/6/13
F 6612	1/5/13	483	Collar removed 8/7/13
M 6611	1/5/13	542	Collar removed 8/7/13
M 6613	1/5/13	283	Mortality 4/17/13 - bobcat
M 6696	1/12/13	408	Collar removed 8/14/13
F 6698	1/13/13	399	Collar removed 8/7/13
M 6697	1/14/13	356	Collar replaced 8/24/13 with VHF collar
F 6699	1/15/13	77	Mortality 2/14/13 - bobcat
M 6701	1/15/13	37	Last location 1/30/13 – not recaptured

Female 6699

Feb 2013


F6699_159.400†
M6613_159.340†
MitigationLandHabitats
PVArrays


Dens
MitigationLandHabitats
PVArrays


Dens
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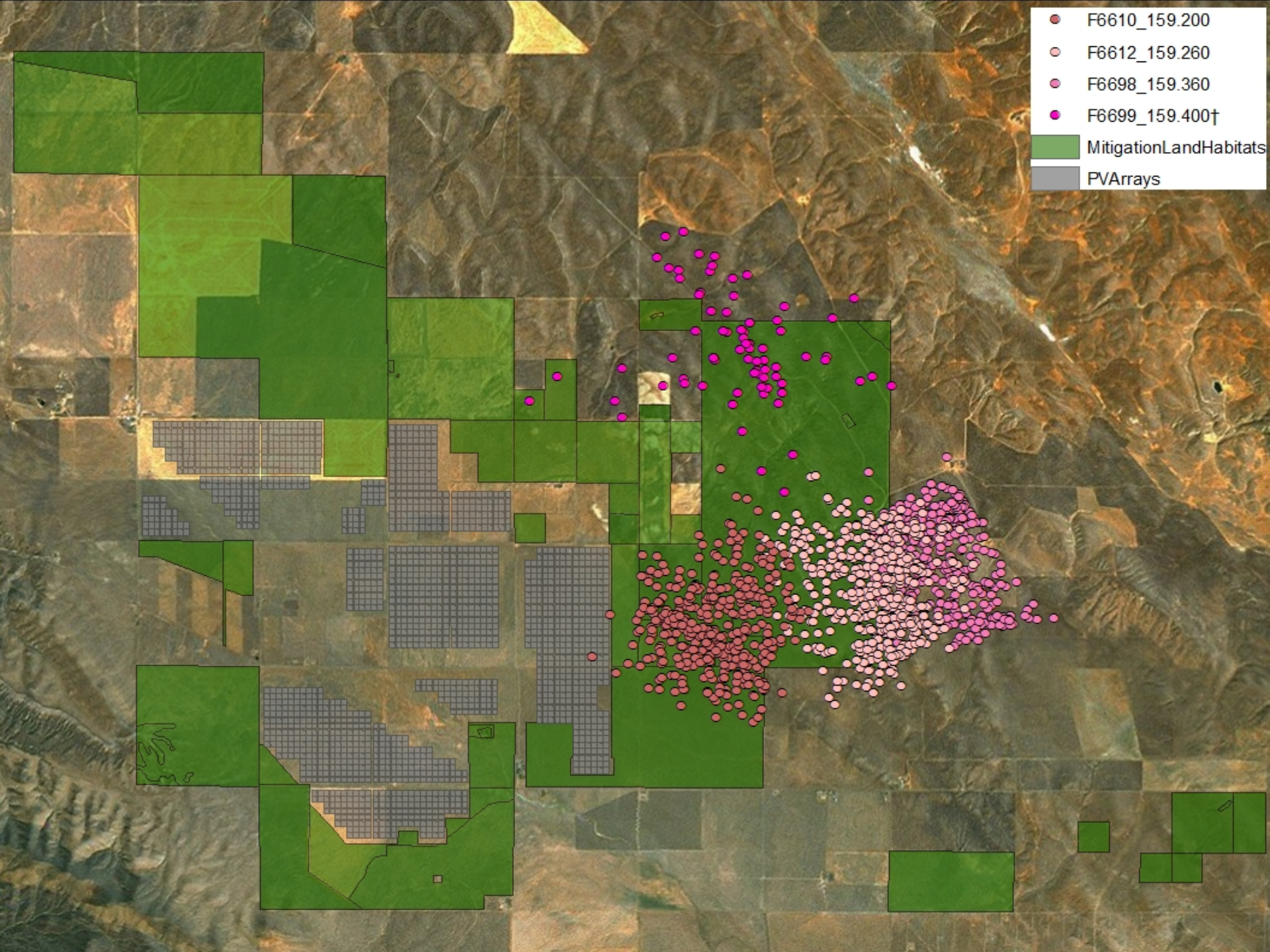
F6612_159.260
F6698_159.360
F6699_159.400†
M6611_159.240
M6613_159.340†
M6695_159.280
M6696_159.380
M6697_159.320
M6701_159.300
MitigationLandHabitats
PVArrays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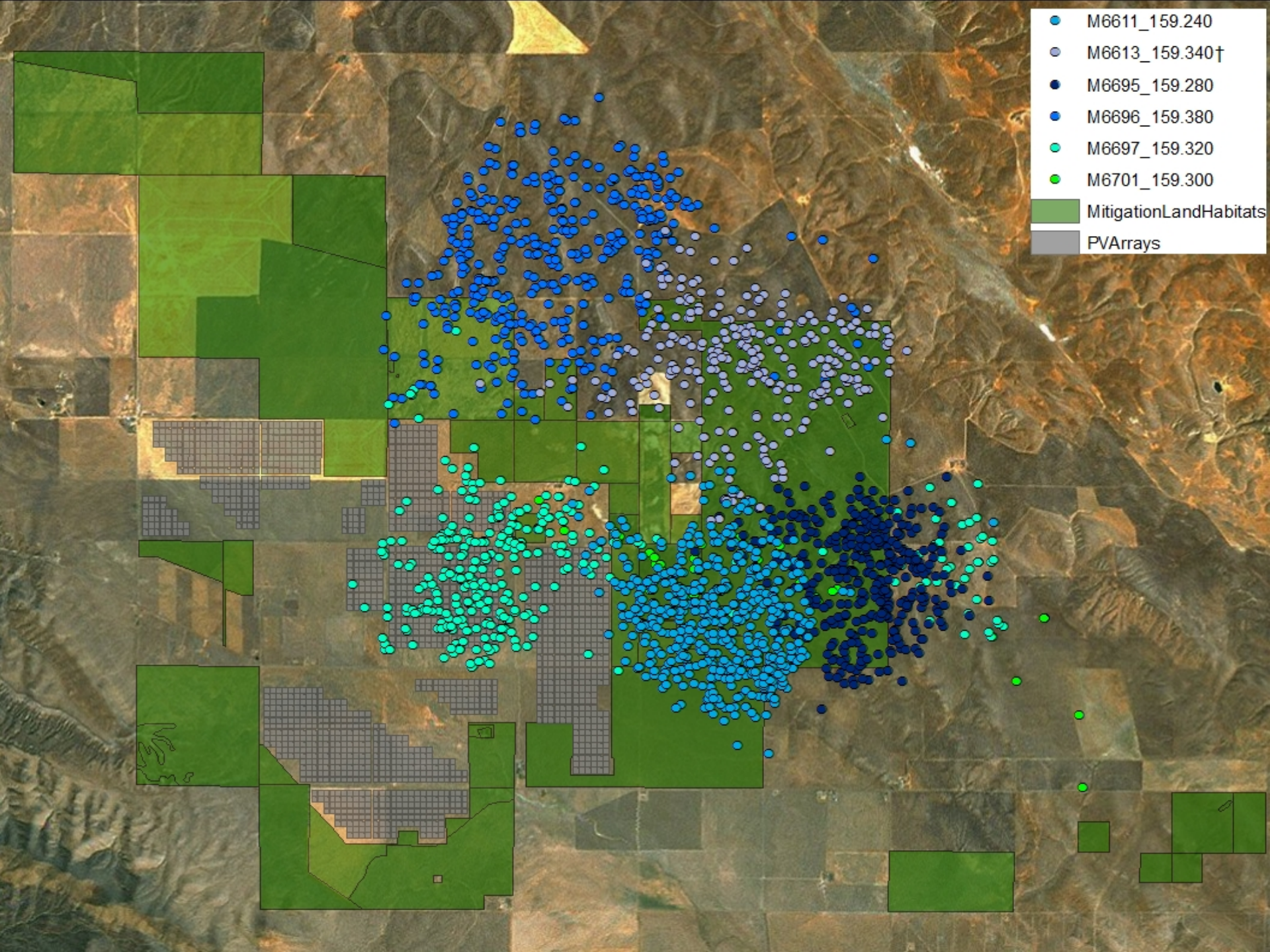
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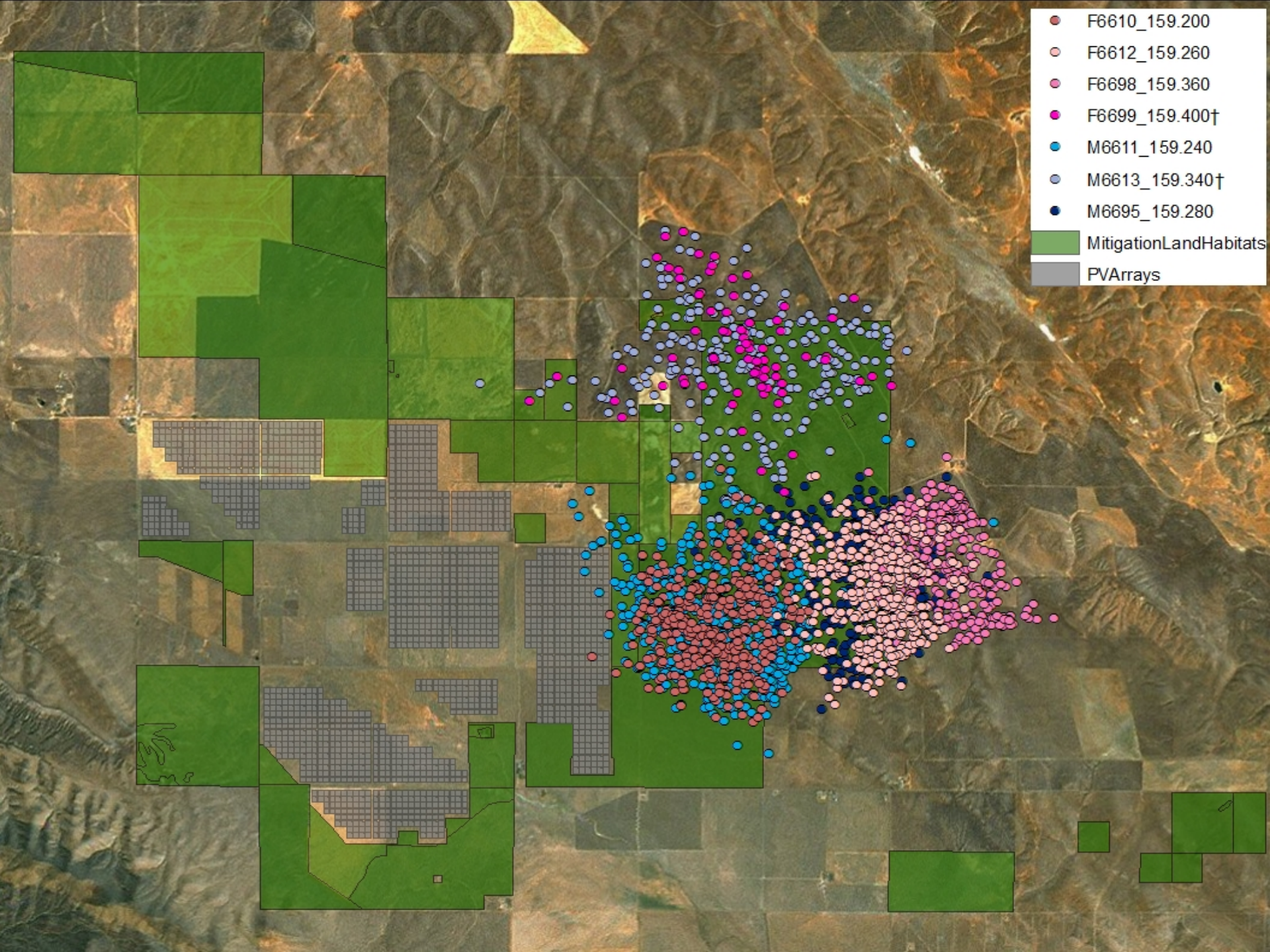
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M6613_159.340†
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MitigationLandHabitats
PVArrays

Home Range Size
(100% MCP – Sq Km)

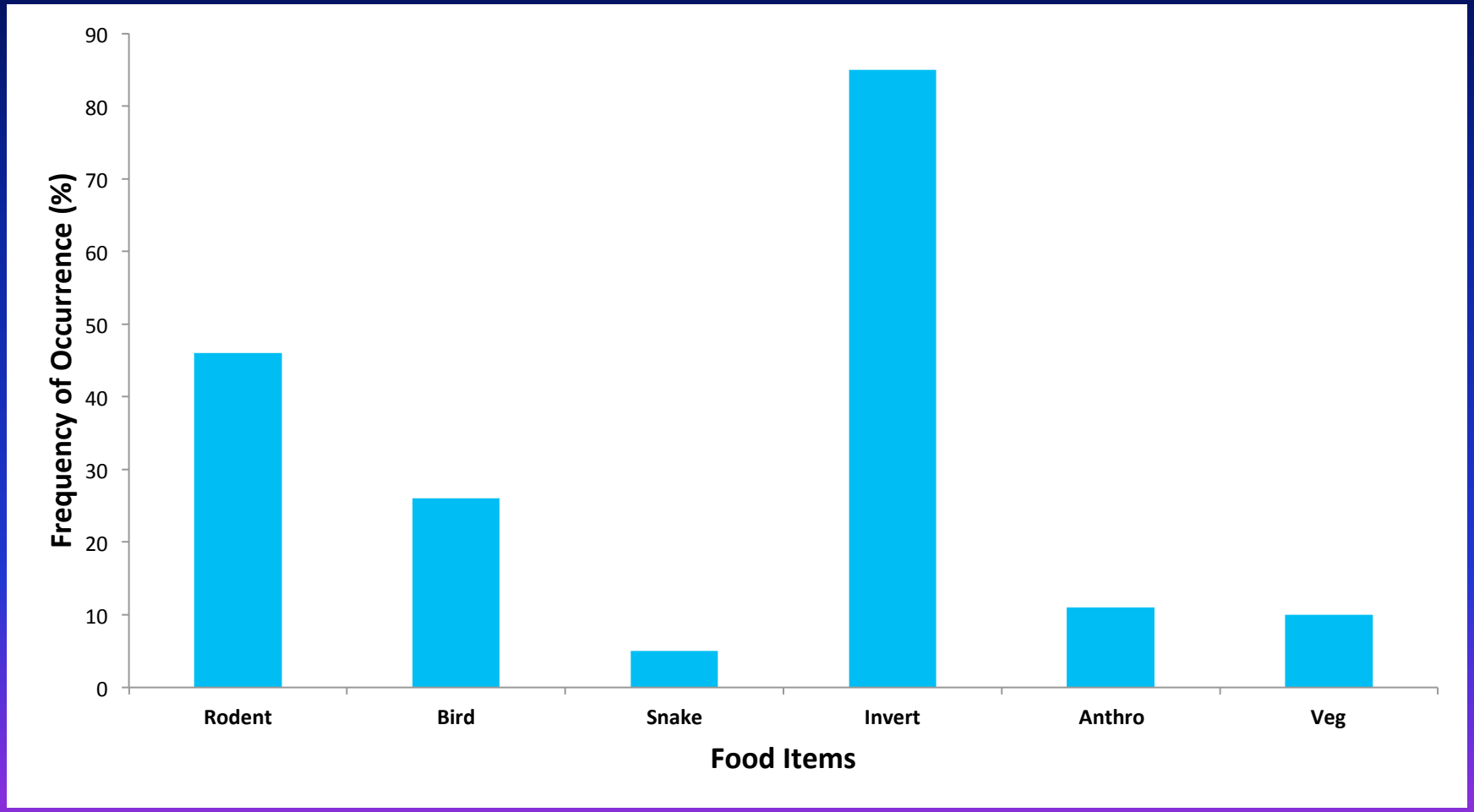
	All	Males	Females
Elk Hills (Koopman 1995)	3.5	5.7	2.2
Elk Hills (Zoellick et al. 2002)	4.6	5.2	4.2
Carrizo (White and Ralls 1993)	11.6	-	-
Topaz Mitigation Lands	10.0	12.9	6.4
w/ "Augie"	11.7	15.2	-

Topaz Mitigation Lands (w/o Augie)	6.4 sq km	95% MCP
Lokern (Spiegel and Bradbury 1992)	6.1 sq km	95% MCP
Lokern (Nelson 2005)	5.9 sq km	95% fixed kernel

Food Items in Scats
(n = 100)

- Rodents
  - Ground squirrels
  - Pocket mice
  - Pocket gophers
  - Kangaroo rats
- Birds
- Snakes
- Vegetation
  - Olive pits
  - Pistachios
- Invertebrates
  - Beetles
  - Jerusalem crickets
  - Scorpions
  - Grasshoppers
- Anthropogenic
  - Food wrappers
  - String
  - Chew toys

Food Item Use



We conclude that kangaroo rats constitute the "staff of life" of the kit fox in such localities.

Grinnell, Dixon, & Linsdale, 1937
Fur-bearing Mammals of California, p. 417

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ICE Industries

CAT
Diesel Power

Conclusions to Date

- GPS collars w/ VHF transmitters and mortality sensors performed well yielding abundant data
- Survival and reproduction difficult to quantify w/o multi-year data
- Den availability seems to be high
- Home ranges somewhat larger compared to home ranges in core areas
- High use of foods other than kangaroo rats
- Reduced repro success and larger HRs may reflect lower habitat quality, low rainfall, or both
- Foxes exhibiting some use of Topaz solar site

Future efforts

- Complete data analyses
- Complete report/manuscript
- GPS Collar re-deployment?
  - Would be extremely informative
  - Funding dependent
- Kit fox monitoring on Topaz site
  - 3 foxes with VHF collars from ESRP
  - 10 collars purchased by Althouse&Meade
- Post-construction monitoring on both Topaz and CVSR sites
- Ecosystem monitoring

Acknowledgements

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- MidAmerican

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