

The Sun Also Rises: Successful Permitting and Compliance at a Large-Scale Solar Facility

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Jacqueline Tilligkeit



Topaz Solar Farms General Location Map

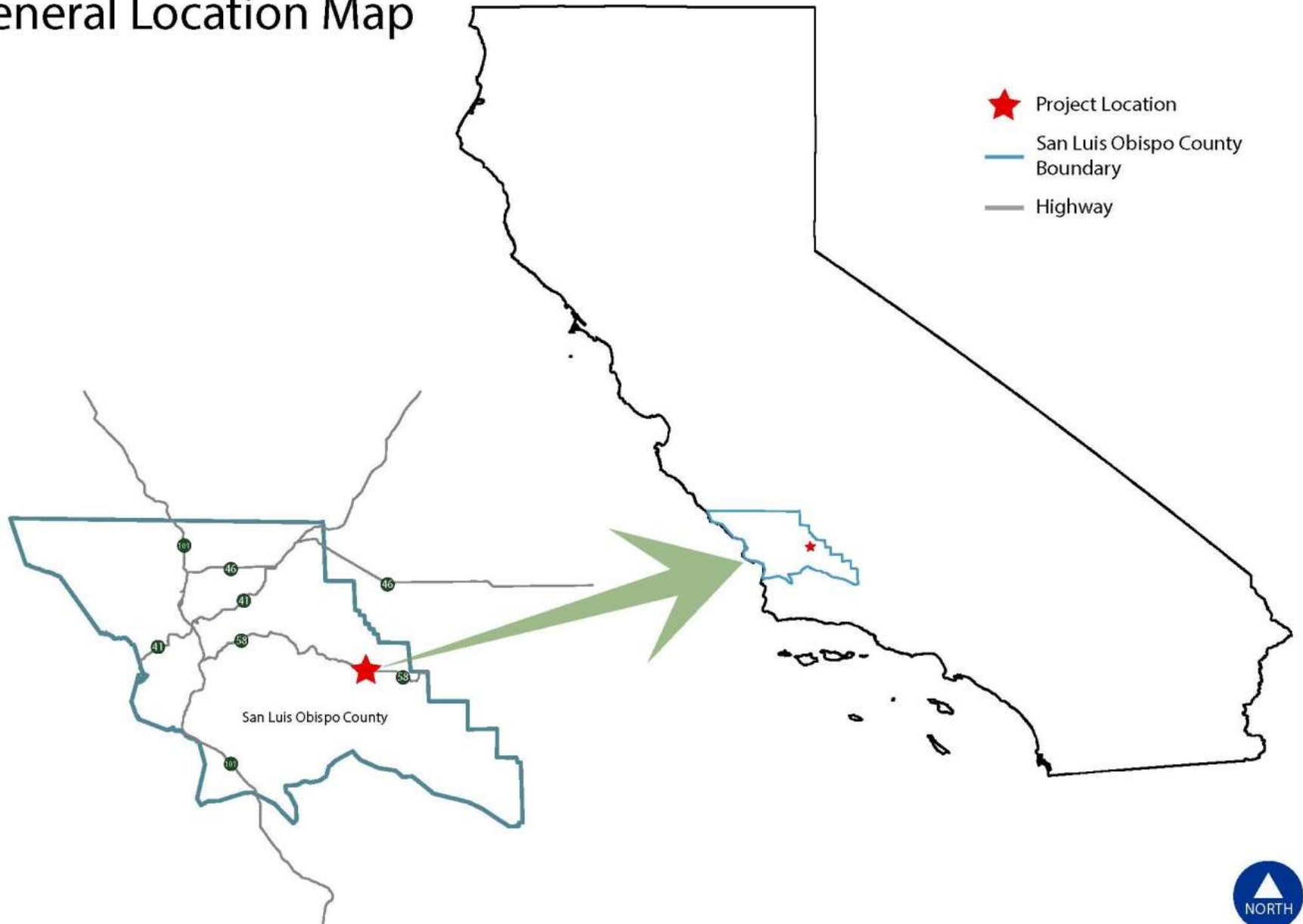






Photo credit: NASA
January 2, 2015





Project Description

- 3510 acres
- 4700 acres project and stewardship lands
- 8.4 million solar panels
- 550 megawatts
- Enough energy to power 180,000 homes
- Displaces 377,000 tons of carbon annually



Habitats 2009

Rain Year
6.75"



Dry farmed barley,
fallow agriculture field,
natural grassland

San Joaquin kit fox

Federally listed Endangered
State listed Threatened



Other Special Status Species



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Permits from Agencies

- County of San Luis Obispo Conditional Use Permit – Lead Agency
- United States Fish and Wildlife Biological Opinion
- California Department of Fish and Wildlife Incidental Take permit and Streambed Alteration Agreement
- United States Army Corps of Engineers CWA Section 404 authorization
- Regional Water Quality Control Board CWA Section 401 certification
- State Water Quality Control Board NPDES – General Permit



Agency Review



- CalFire
- County Health Department
- County Air Pollution Control District
- County Public Works
- County Sheriff's Department
- Kern County
- Regional Water Quality Control Board
- State Department of Fish and Game
- Caltrans (District 5 & 6)
- Federal Agencies - DOE, USACE, USFWS, Federal Aviation Administration (FAA)

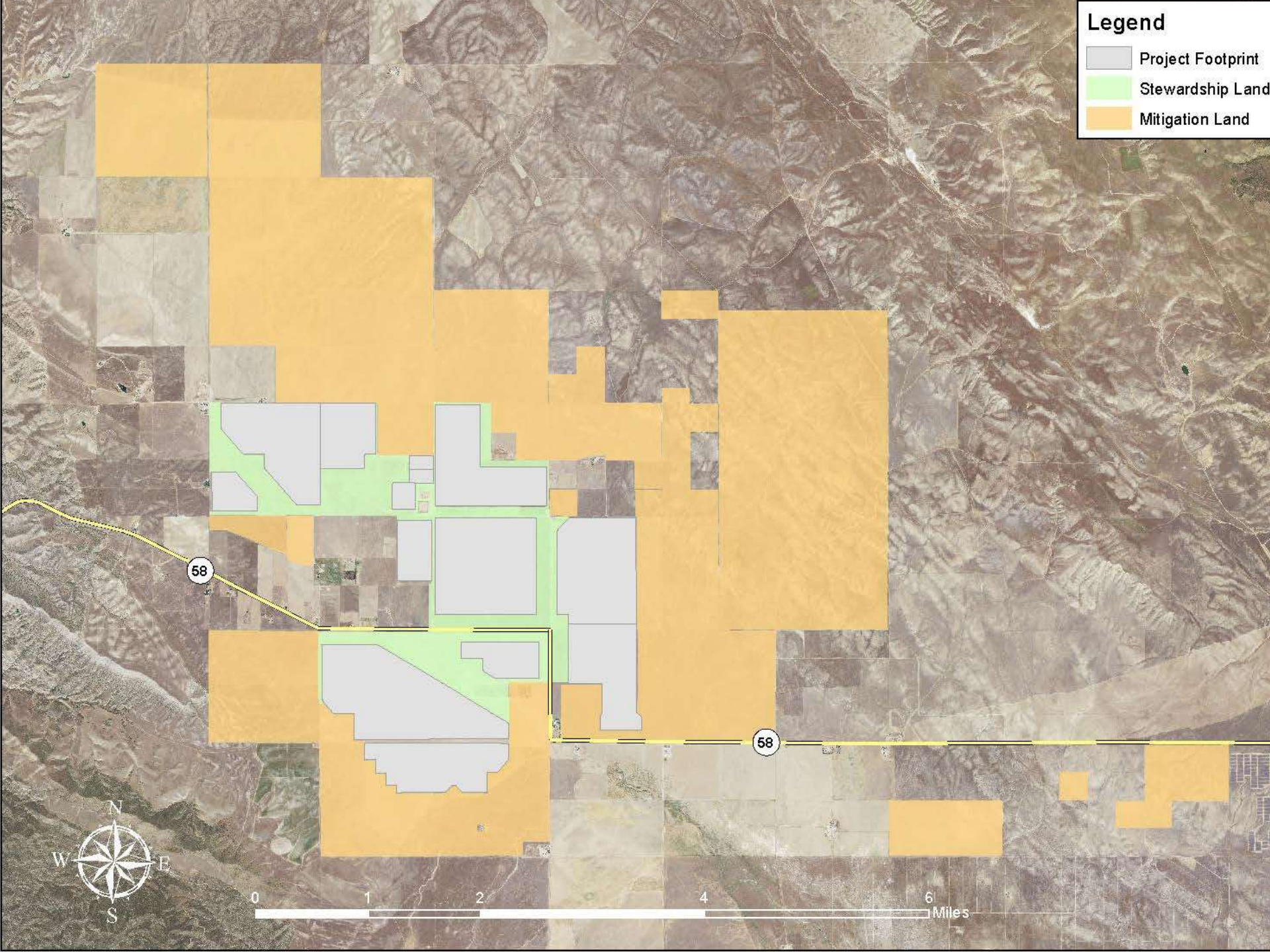
County of San Luis Obispo CUP

- 133 Conditions of Approval
 - Aesthetic
 - Agricultural
 - Air Quality
 - Biological
 - Cultural
 - Geological
 - Hazardous Materials
 - Land Use
 - Population and Noise
 - Public Services
 - Transportation
 - Water



Legend

-  Project Footprint
-  Stewardship Land
-  Mitigation Land



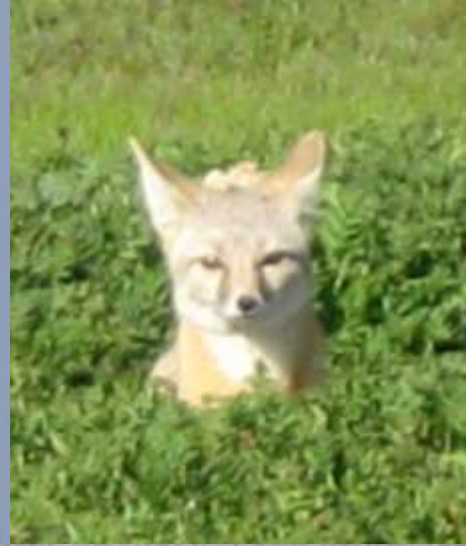
Management Plans

1. Avian and Bat Protection Plan and Bird Monitoring Avoidance Plan
2. Nesting Bird Management Plan
3. San Joaquin Kit Fox Conservation and Monitoring Plan
4. Habitat Mitigation and Monitoring Plan Resource Management Plan
5. Habitat Restoration Re-vegetation Plan
6. Vegetation Management Plan
7. Vegetative Scour Arrestor Installation, Maintenance, and Monitoring Plan
8. Drainage Mitigation Plan
9. Dust Control Pond Plan
10. Fencing Plan
11. Wildfire Management Plan and Fire Protection Plan
12. Unanticipated Archaeological Discovery Plan
13. Valley Fever Management Plan
14. Traffic Control Management Plan
15. Grazing Plan
16. Weed Control Plan
17. Spill Response Plan
18. Spill Prevention, Control and Countermeasures Plan
19. Hazardous Waste Management Plan
20. Hazardous Waste Business Plan
21. Groundwater Monitoring and Reporting Plan
22. Storm water Pollution Prevention Plan
23. Solar Module Recycling Plan



Employee Awareness and Training





Biological Resource Protection

- Special status plants (~50 species)
- Vegetation restoration
- Soil restoration
- Invertebrates
 - fairy shrimp, Kern primrose sphinx moth
- Reptiles & amphibians
 - blunt-nosed leopard lizards, legless lizards, coachwhip, coast horned lizard, and spadefoot toad
- Birds
 - condors, burrowing owl, any and all nesting birds
- Mammals
 - giant kangaroo rat, antelope squirrel, San Joaquin kit fox, badger, bats, pronghorn antelope, and tule elk

Burrowing Owl



Burrow Inspections

- All burrows inspected for sign of owls
- One-way doors used to close unused burrows
- Burrow buffering protocol



Burrowing Owl

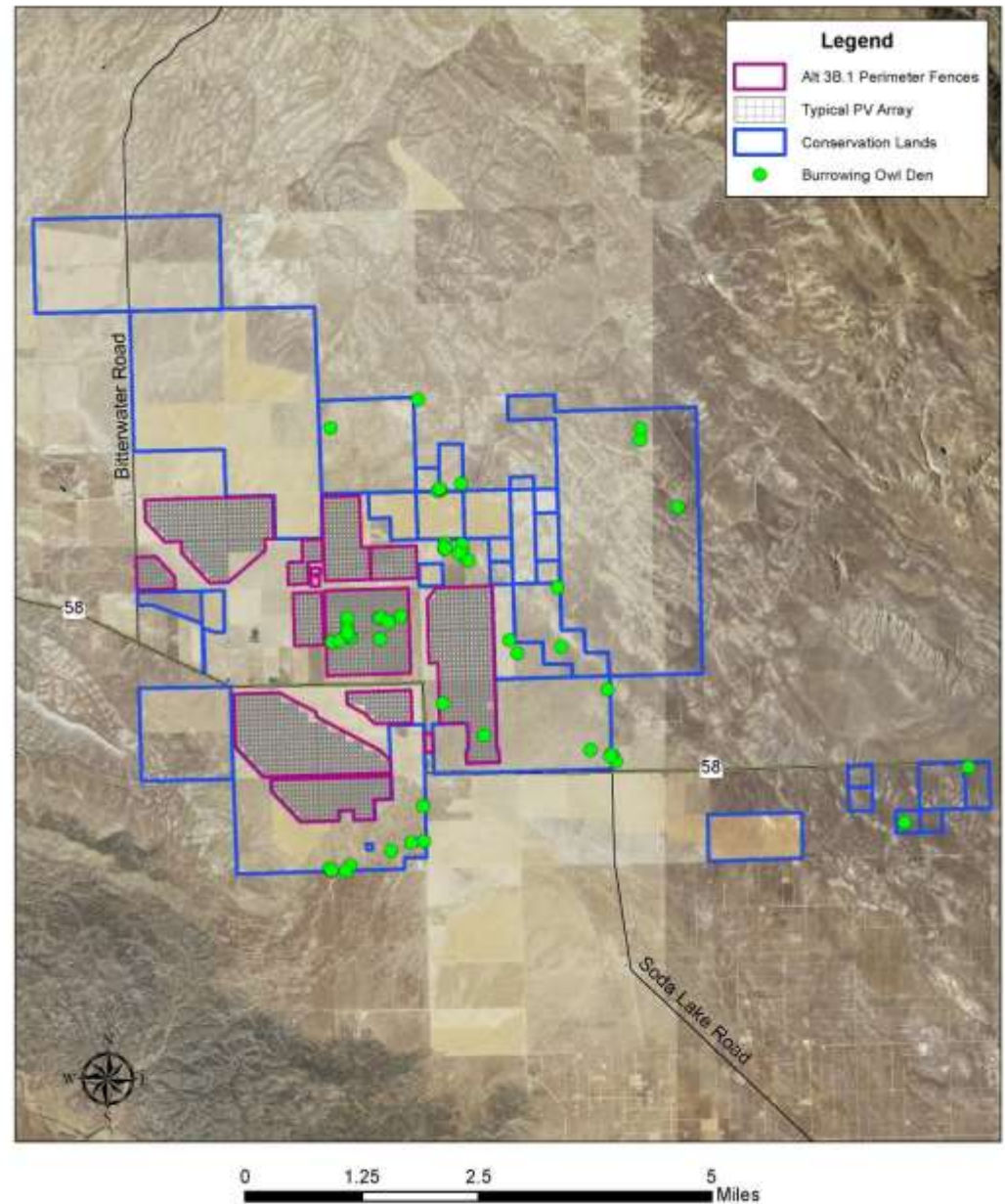
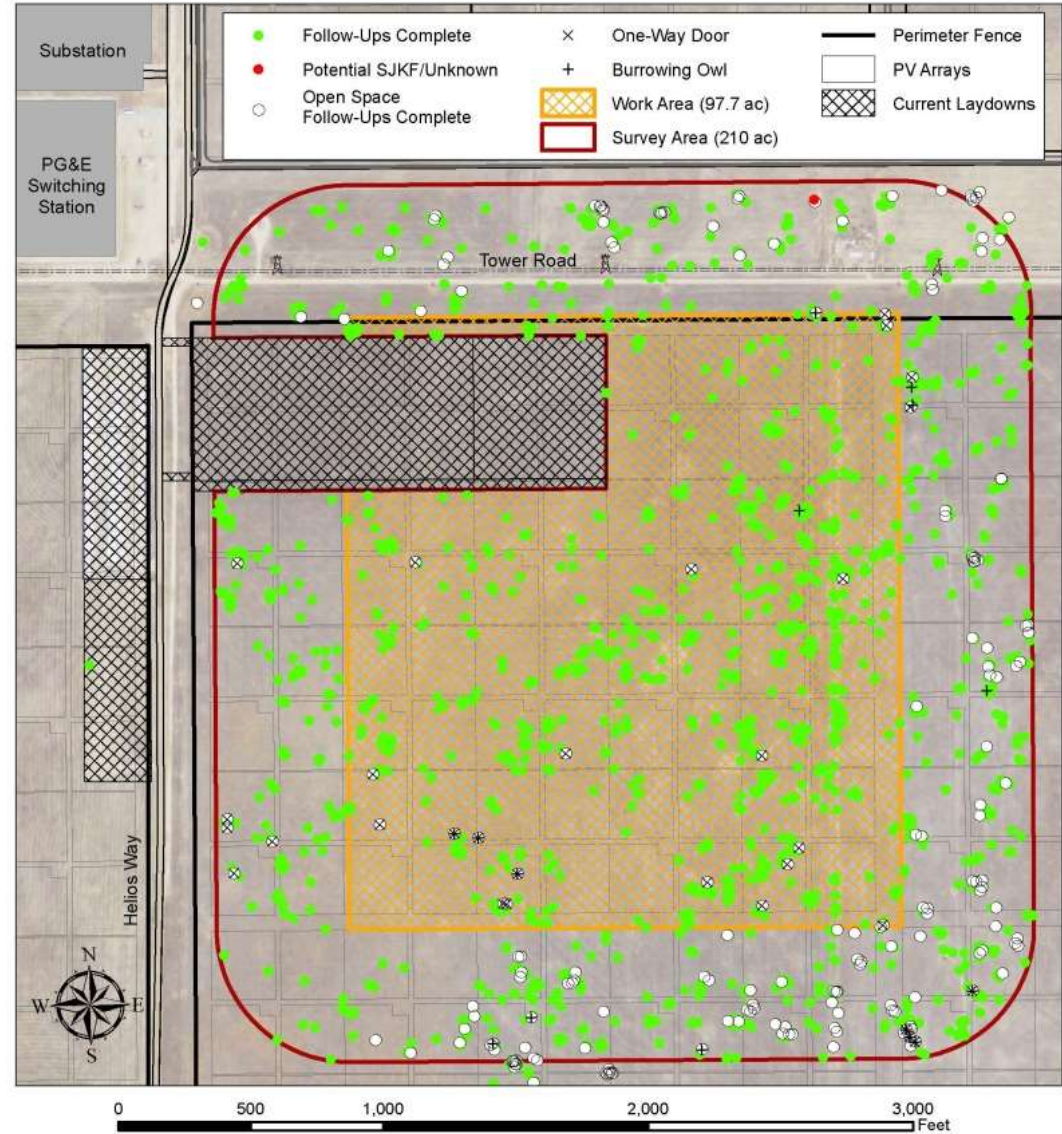
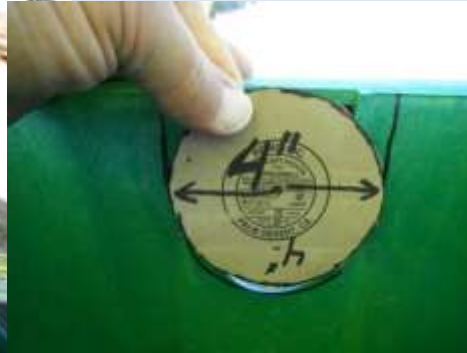


Figure 2. Block 9 West Preconstruction Survey
11/21/12 Results

Burrowing Owl



Artificial burrows



Artificial Burrowing Owl Dens As-Built - August 13, 2014



- Burrowing Owl Artificial Dens:**
- Installed July 2013
 - Installed August 2013
 - Installed August 2014
 - ⊠ PG&E Towers
 - == PG&E Transmission Lines
 - ~ Ephemeral Drainages
 - PV Arrays
 - ▭ Perimeter Fence
 - Project Area

0 0.5 1 2 Miles



Topaz Solar Farms LLC
10400 Helios Way
Santa Margarita, CA 93453



2012 San Luis Obispo County
NAIP Aerial Imagery
Map Updated: August 13, 2014, 10:23 AM



Althouse and Meade, Inc.
1602 Spring Street
Paso Robles, CA 93446

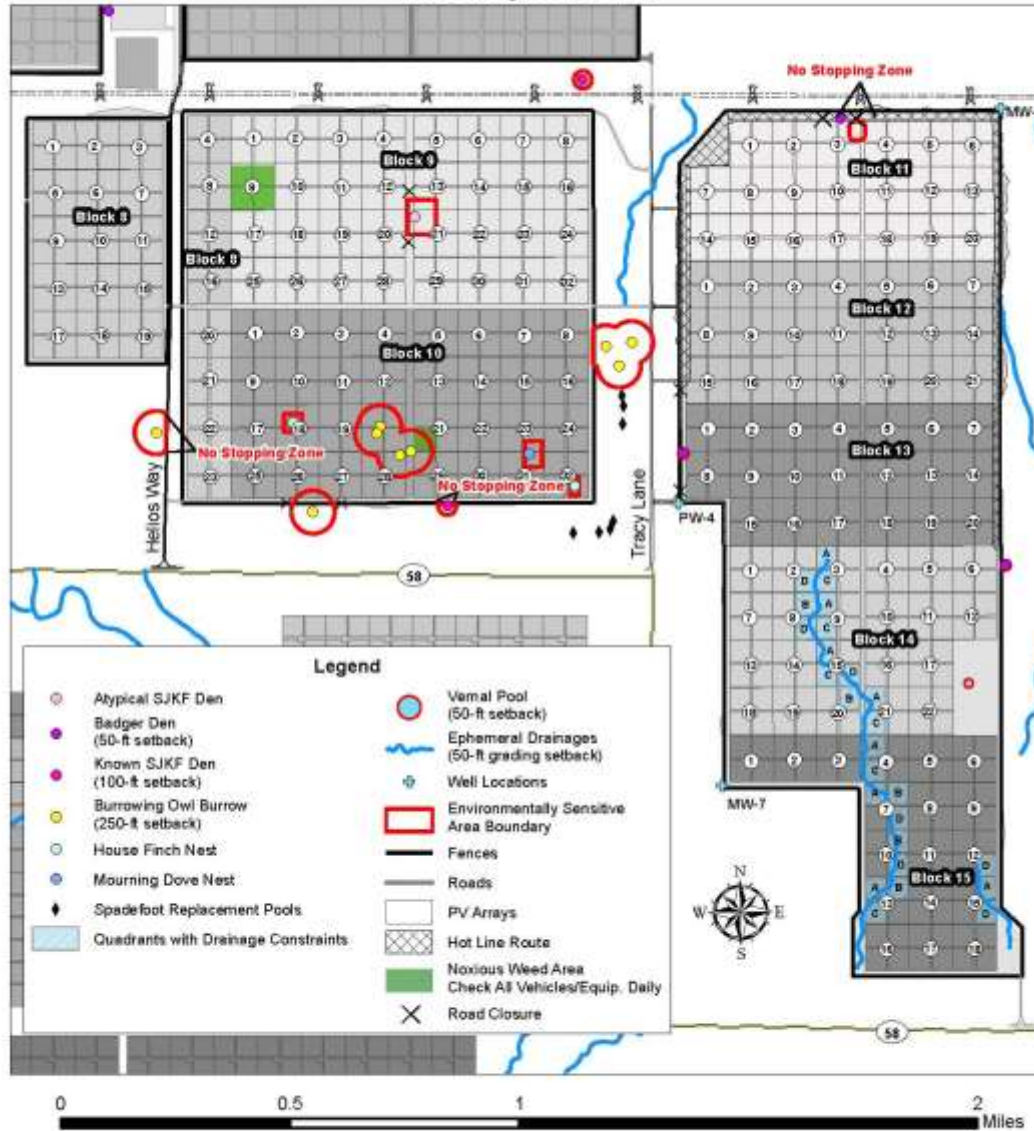
Birds

- Nest sweeps (nesting)

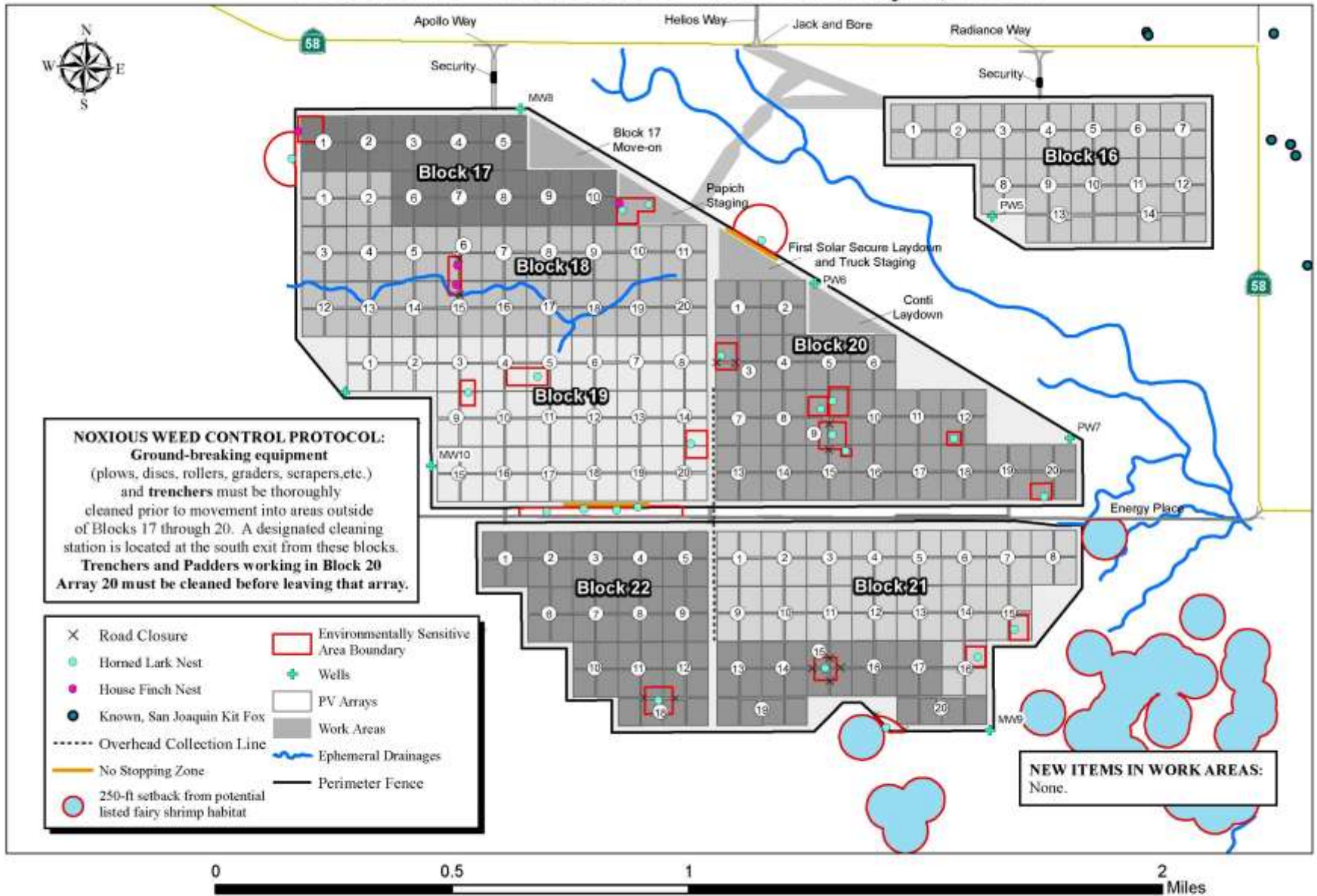


Blocks 8 - 15 Setback Detail

for May 30, 2013



Blocks 16 - 22 Setback Detail for May 8, 2014



Point counts (utilization)



Fatality Searches (mortality)

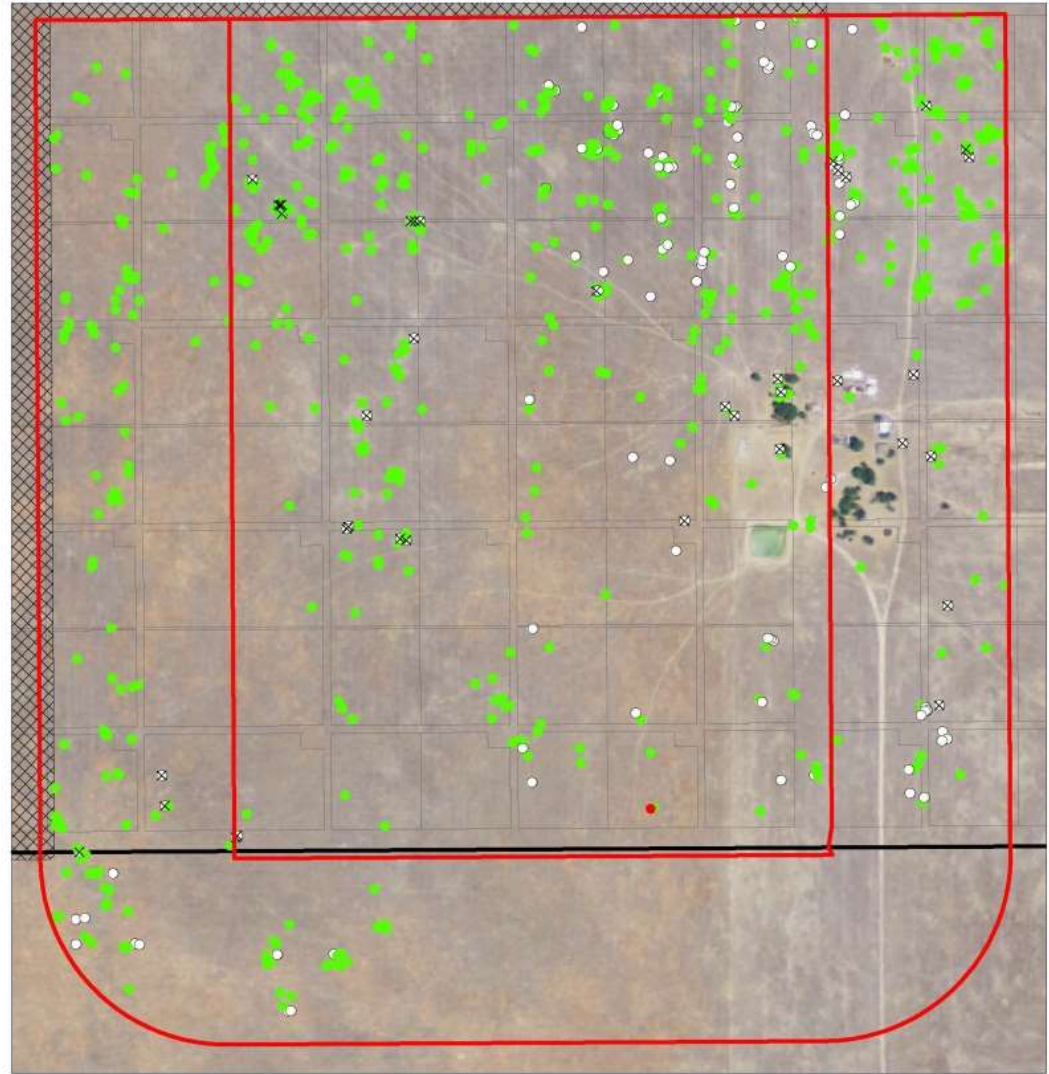




Kit fox



Block 10 West Preconstruction Survey



0 500 1,000 2,000 Feet



6-7-08





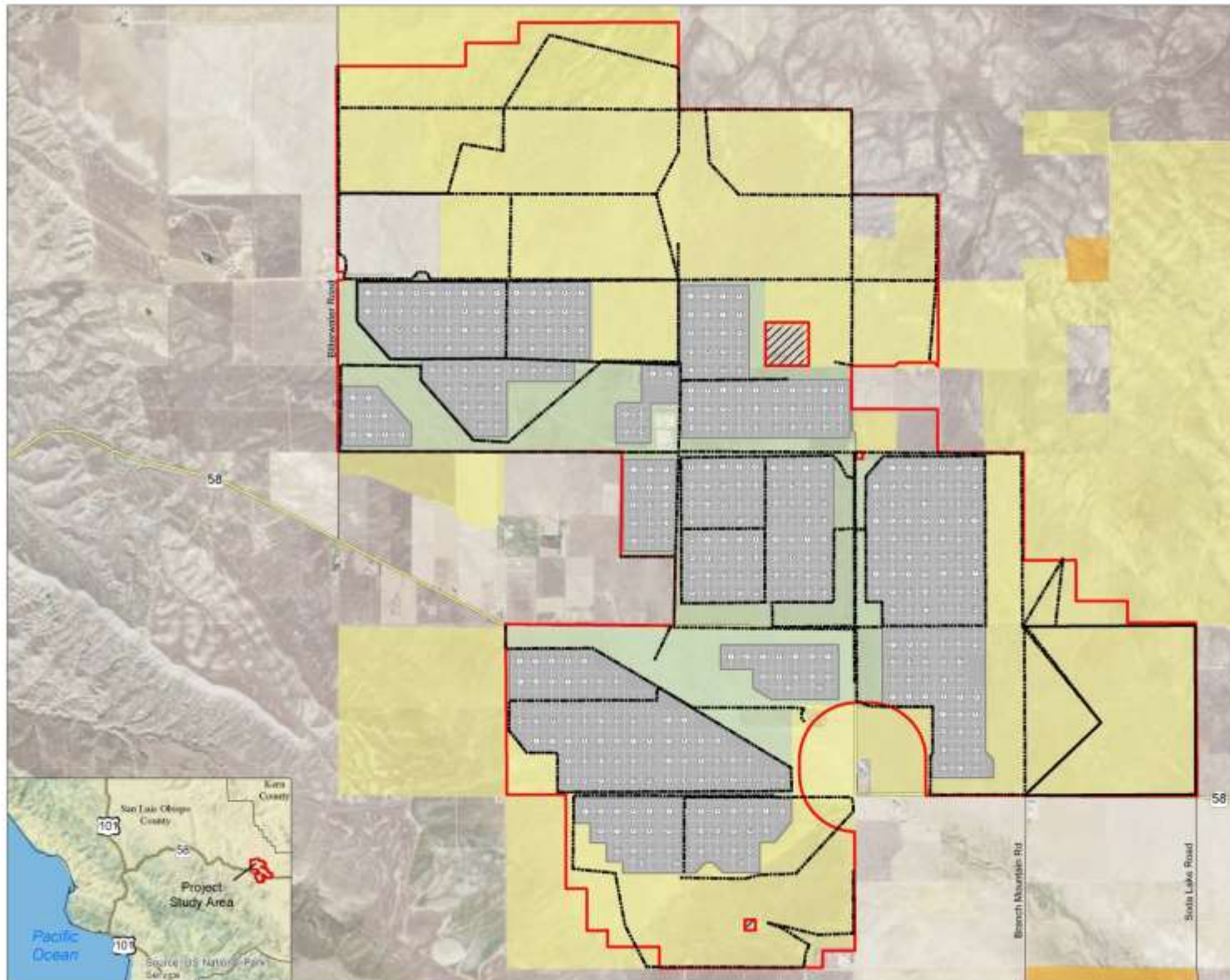
Scat Detection Dog Surveys

2014 Study Area
Survey Transects

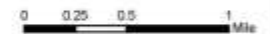
Working Dogs for
Conservation Foundation
Deborah A. Smith, Ph.D.

Prepared for

Topaz Solar Farms, LLC



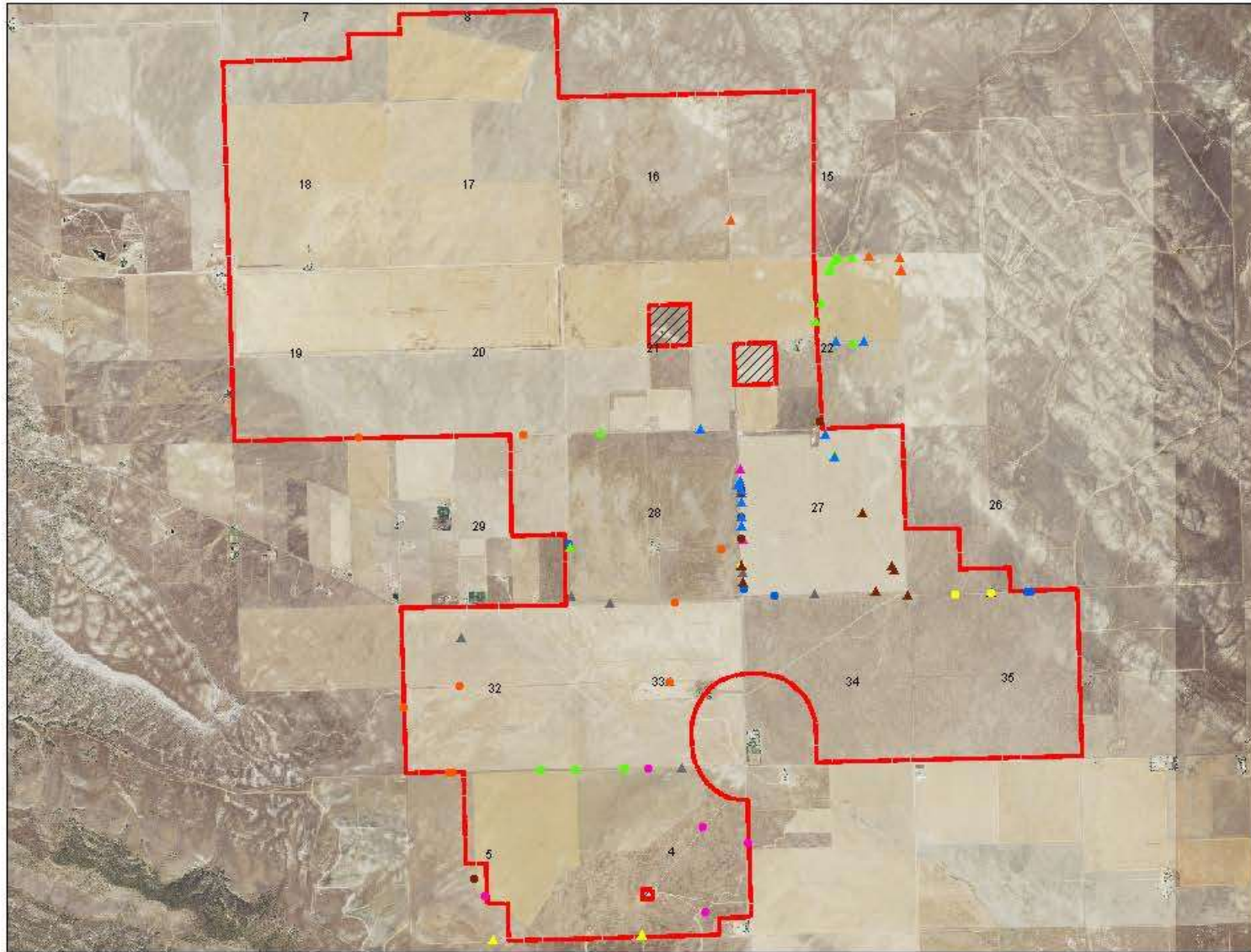
- Project Study Area
- Transects
- Project Area
- Mitigation Land
- Preservation Land
- Stewardship Land
- Excluded Area



2012 San Luis Obispo County
NAIP Aerial Photography
Map Updated: January 24, 2015, 10:00 AM




KitFox Individuals



2009

Legend

 Project Study Area

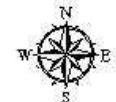
 Excluded Area

Kit Fox Individual

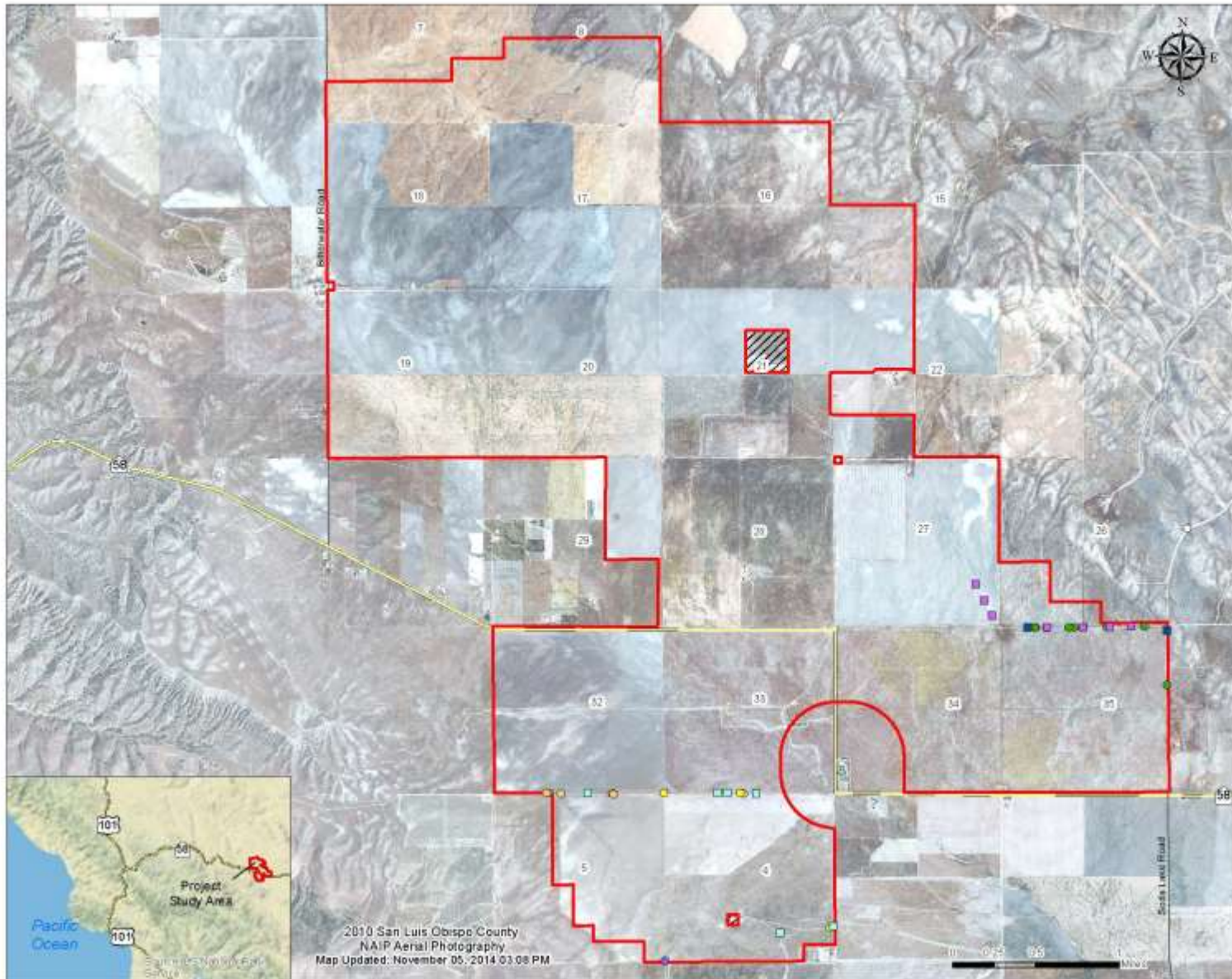
-  1
-  2
-  3
-  4
-  5
-  6
-  7
-  8
-  9
-  10
-  11
-  12
-  13



13



0 0.25 0.5 1 Miles



Scat Detection Dog Surveys

2010 Fresh Scat Genetic Results

Working Dogs for Conservation Foundation
Deborah A. Smith, Ph.D.

Prepared for


 Topaz Solar Farms, LLC
10400 Helios Way
Santa Margarita, CA 93453

Species, Sex, Individual


-  Kit Fox, Male, 2
-  Kit Fox, Male, 28
-  Kit Fox, Male, 29
-  Kit Fox, Female, 1
-  Kit Fox, Female, 20
-  Kit Fox, Female, 21

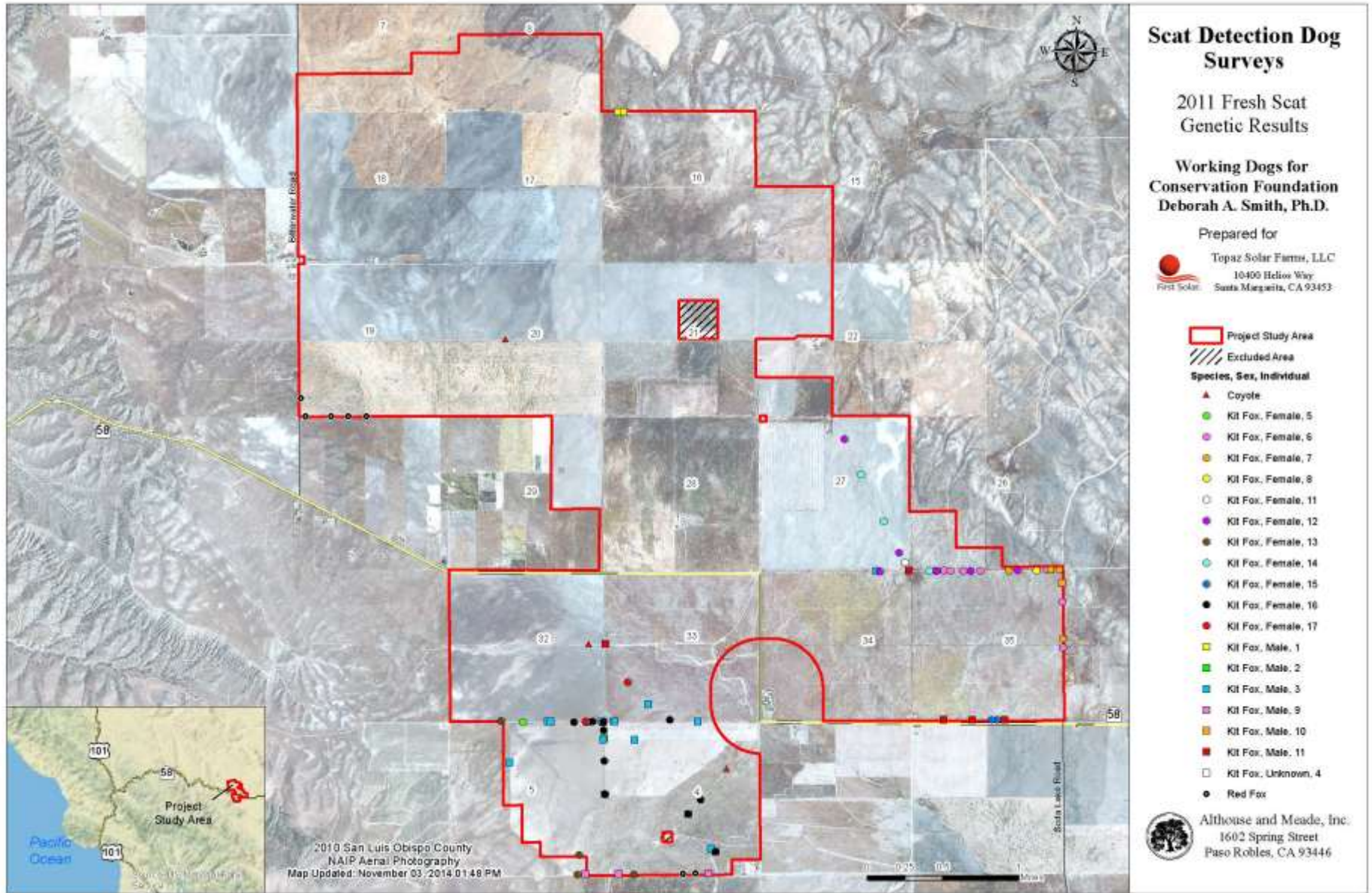
 Kit Fox, Female, 24

 Project Study Area

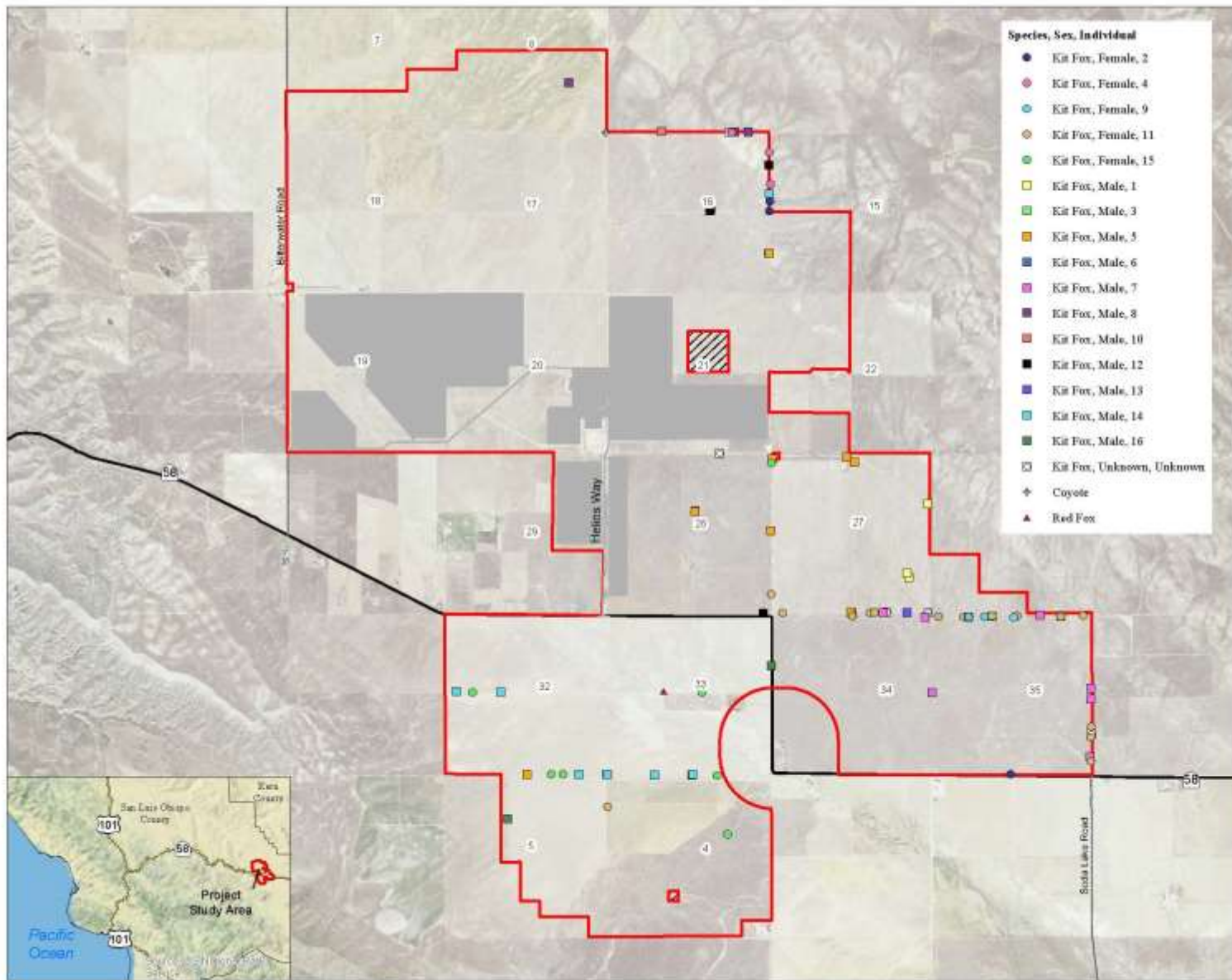
 Excluded Area



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Paso Robles, CA 93446



NON-INVASIVE BASELINE GENETIC MONITORING OF THE ENDANGERED SAN JOAQUIN KIT FOX ON A PHOTOVOLTAIC SOLAR FACILITY
 Tammy R. Wilbert, Deborah A. (Smith) Woollett, Alice Whitelaw, Jason Dart, Joseph R. Hoyt, Spencer Galen, Katherine Ralls, Daniel E. Meade, Jesus E. Maldonado. *Endangered Species Research*, Vol. 27:31-41, pp.31-41.



- Species, Sex, Individual**
- Kit Fox, Female, 2
 - ◆ Kit Fox, Female, 4
 - Kit Fox, Female, 9
 - ◆ Kit Fox, Female, 11
 - Kit Fox, Female, 15
 - Kit Fox, Male, 1
 - Kit Fox, Male, 3
 - Kit Fox, Male, 5
 - Kit Fox, Male, 6
 - Kit Fox, Male, 7
 - Kit Fox, Male, 8
 - Kit Fox, Male, 10
 - Kit Fox, Male, 12
 - Kit Fox, Male, 13
 - Kit Fox, Male, 14
 - Kit Fox, Male, 16
 - Kit Fox, Unknown, Unknown
 - ◆ Coyote
 - ▲ Red Fox

Scat Detection Dog Surveys


2012 Fresh Scat Genetic Results

Prepared for
Topaz Solar Farms, LLC
 10400 Helios Way
 Santa Margarita, CA 93453

- Legend**
- Project Work Area
 - Project Study Area
 - ▨ Excluded Area



2012 San Luis Obispo County
 NAIP Aerial Photography
 Map Updated: August 08, 2014 12:04 PM

 Althouse and Meade, Inc.
 1602 Spring Street
 Paso Robles, CA 93446

Scat Detection Dog Surveys

2013 SJKF Scat Dog Genetic Results

Working Dogs for Conservation Foundation
Deborah A. Smith, Ph.D.

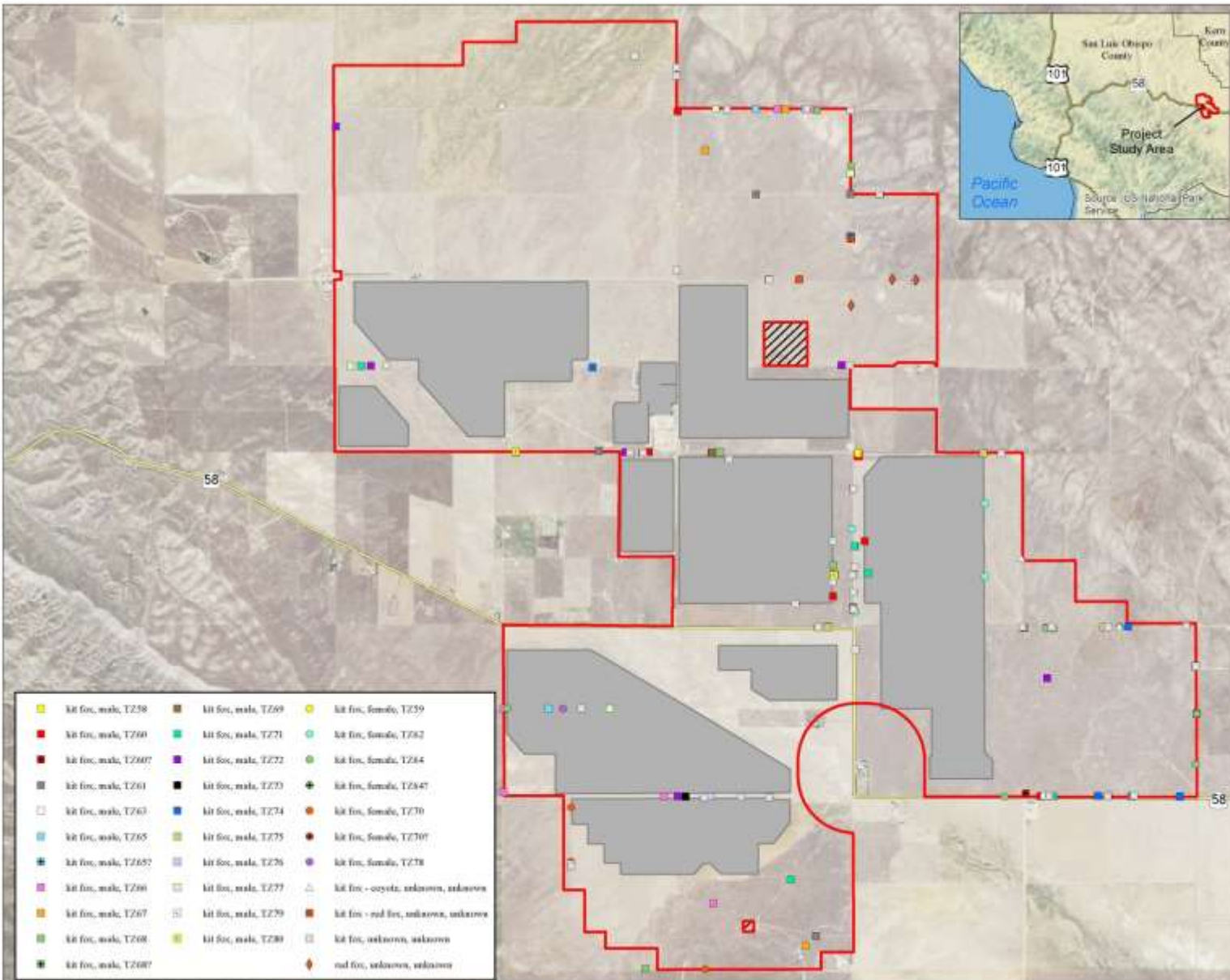
Prepared for


































Topaz Solar Farms, LLC

-  Project Study Area
-  Project Area
-  Excluded Area



2012 San Luis Obispo County
NAIP Aerial Photography
Map Updated: February 20, 2015, 10:38 AM



	kit fox, male, T238		kit fox, male, T269		kit fox, female, T239
	kit fox, male, T260		kit fox, male, T271		kit fox, female, T282
	kit fox, male, T2907		kit fox, male, T272		kit fox, female, T284
	kit fox, male, T261		kit fox, male, T273		kit fox, female, T2847
	kit fox, male, T263		kit fox, male, T274		kit fox, female, T270
	kit fox, male, T265		kit fox, male, T275		kit fox, female, T2707
	kit fox, male, T2657		kit fox, male, T276		kit fox, female, T278
	kit fox, male, T266		kit fox, male, T277		kit fox - coyote, unknown, unknown
	kit fox, male, T267		kit fox, male, T279		kit fox - red fox, unknown, unknown
	kit fox, male, T268		kit fox, male, T280		kit fox, unknown, unknown
	kit fox, male, T2687				red fox, unknown, unknown

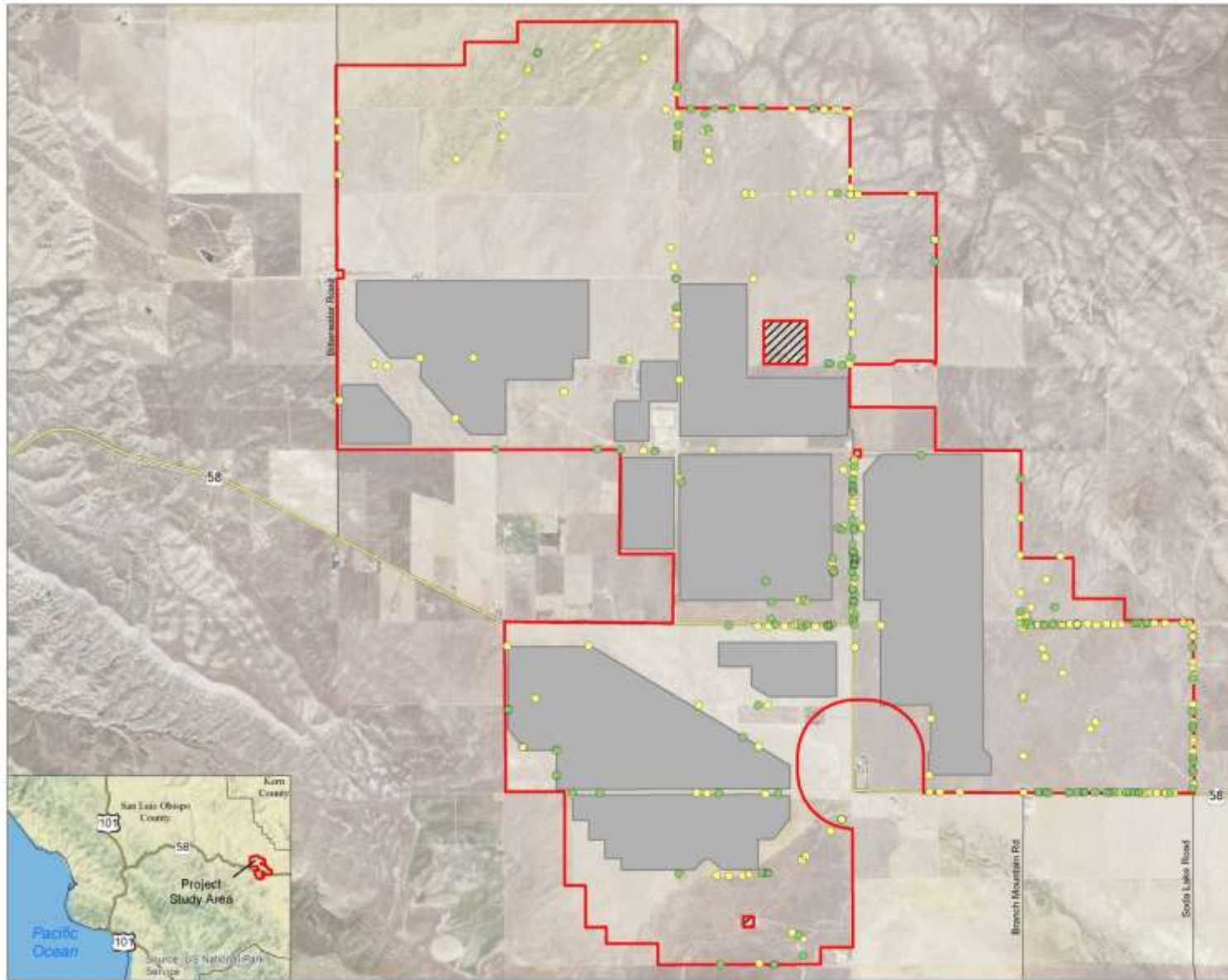
Scat Detection Dog Surveys

2014 Fresh
Scat Locations

Working Dogs for
Conservation Foundation
Deborah A. Smith, Ph.D.

Prepared for

Topaz Solar Farms, LLC



- Fresh Scat
- Non-Fresh Scat
- ▭ Project Study Area
- ▭ Project Area
- ▨ Excluded Area



2012 San Luis Obispo County
NAIP Aerial Photography
Map Updated: January 28, 2015, 11:47 AM



Radio Collared foxes – 9
2013-2014





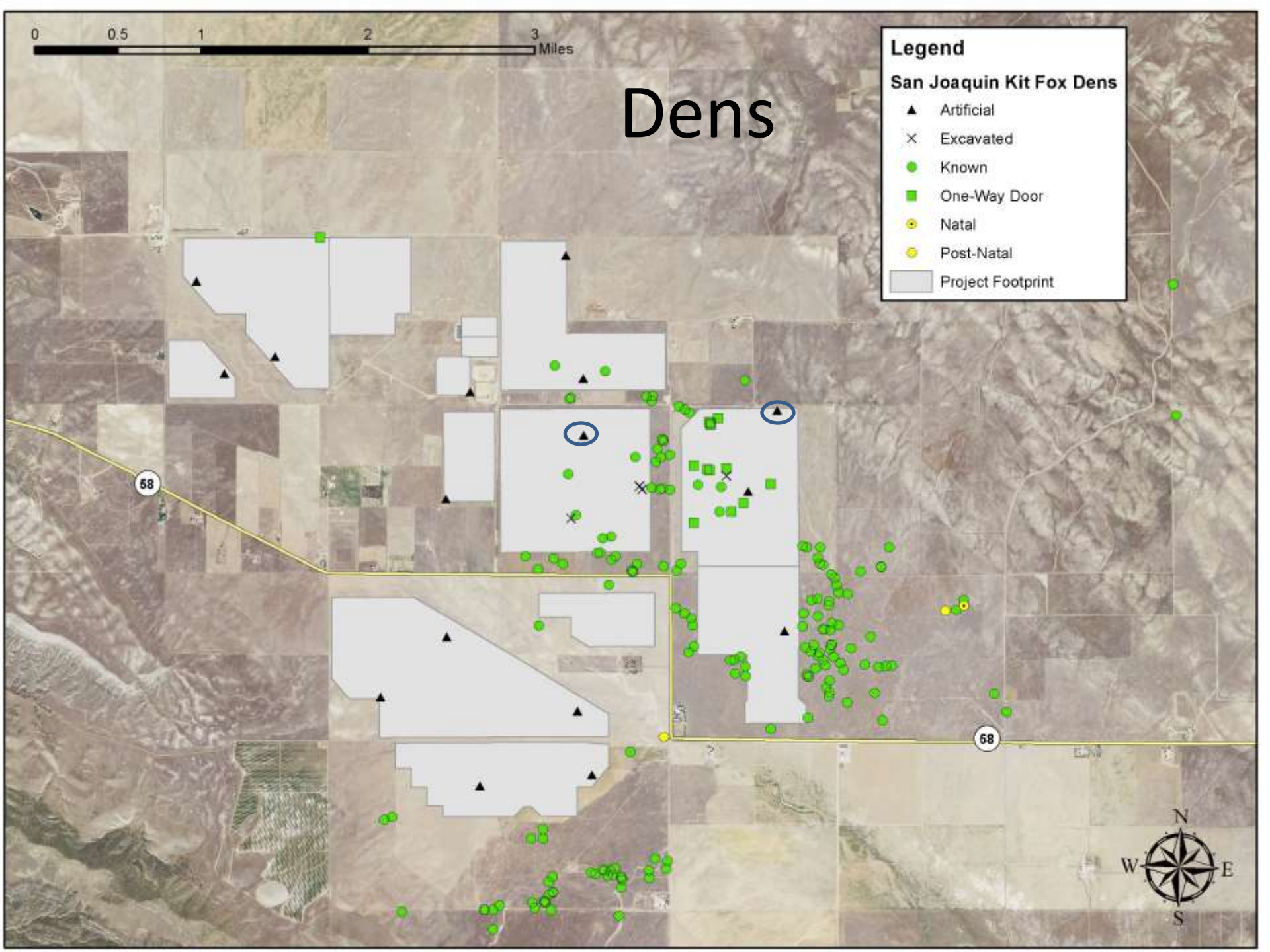
0 0.5 1 2 3 Miles

Dens

Legend

San Joaquin Kit Fox Dens

- ▲ Artificial
- × Excavated
- Known
- One-Way Door
- Natal
- Post-Natal
- Project Footprint





SJKF den









SJKF Habitat Utilization

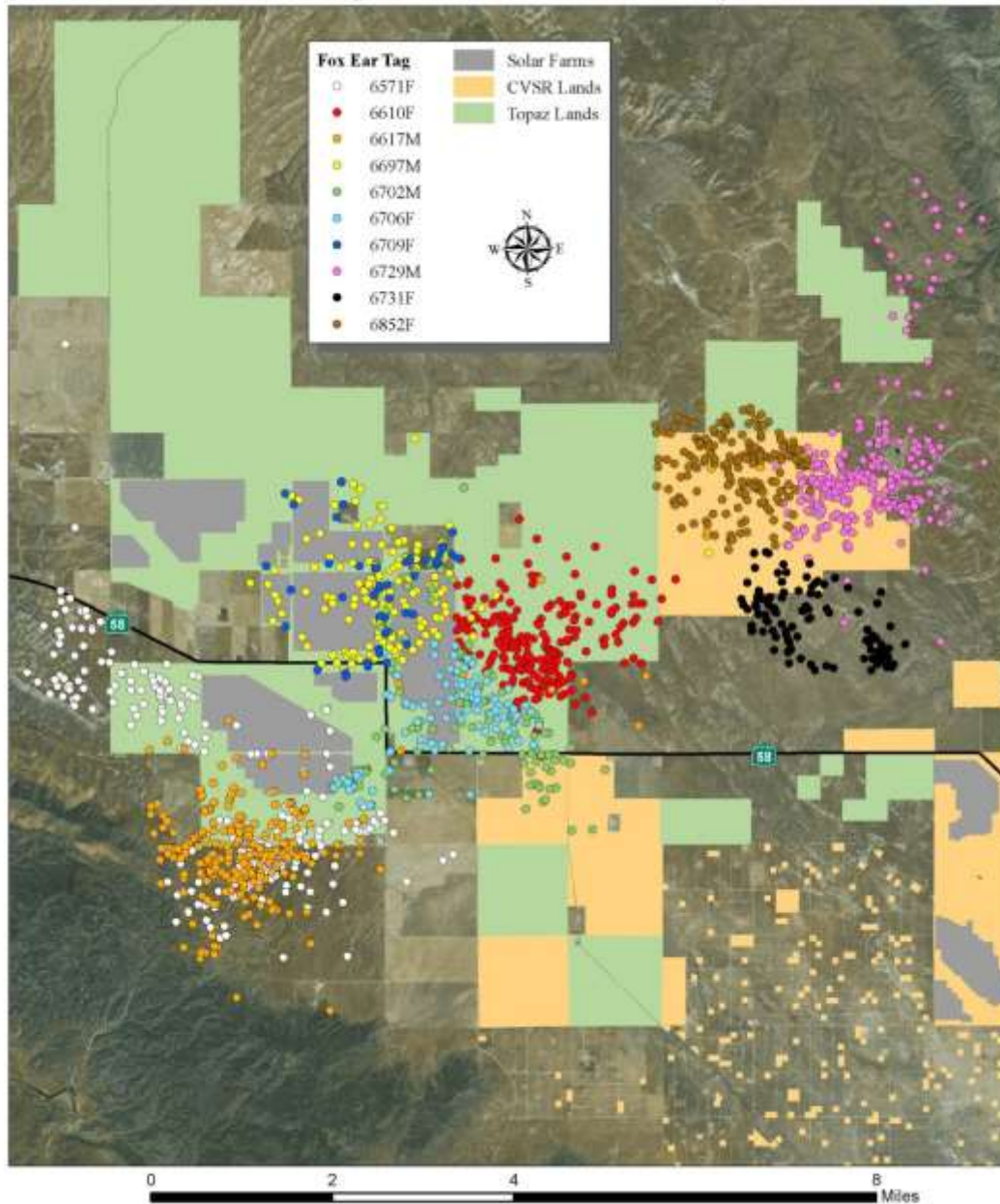
4,214 detections

	Within Arrays	Arrays and 1/4 Mile of Project	Further than 1/4 Mile From Project	Unknown Distance From Project
M6697	52%	99%	0%	1%
F6709	39%	97%	0%	2%
M6702	14%	69%	7%	25%
F6706	13%	65%	10%	25%
M6617	1%	5%	86%	10%
F6571	0%	0%	76%	24%
F6572*	0%	8%	81%	11%
F6619	0%	2%	83%	15%
M6618	0%	0%	91%	9%
M6705	0%	0%	100%	0%
Total	23%	61%	27%	12%

Collaring study 2014-2017
3 years, up to 20 collared foxes



San Joaquin Kit Fox Telemetry Data



Summary

- Extensive planning and rigorous compliance performance resulted in a “perfect project” – Senior Planner, SLO County.
- Collaborative approach to resource protection – began in planning, implemented during construction, and ongoing into the future.
- Wildlife utilize Topaz Solar Farms and benefit from extensive protected mitigation lands.



Acknowledgments

Debbie Woollett, Alice Whitelaw, Ngaio Richards



- Tory Westall, Christine Van Horn Job
Endangered Species Recovery Program



- Tammy Wilbert, Jesus Maldonado



Smithsonian Conservation Biology Institute
Center for Conservation and Evolutionary Genetics



