

Energy, Agriculture, & Wildlife

Topaz Solar Farms San Luis Obispo County

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Topaz Solar Farms

- Constructed from November 2011 to December 2014
- 3,350 acres
- 550-megawatt
- Passive photovoltaic solar
- 9-million solar panels
- Electricity generated will displace approximately 377,000 tons of CO₂ annually
 - 73,000 cars off the road
 - 180,000 homes powered



Topaz Solar Farms Wildlife





Management Goals

1. Reduce predation
2. Maintain artificial escape dens
3. Monitor population
4. Maintain and enhance habitat
5. Data analysis





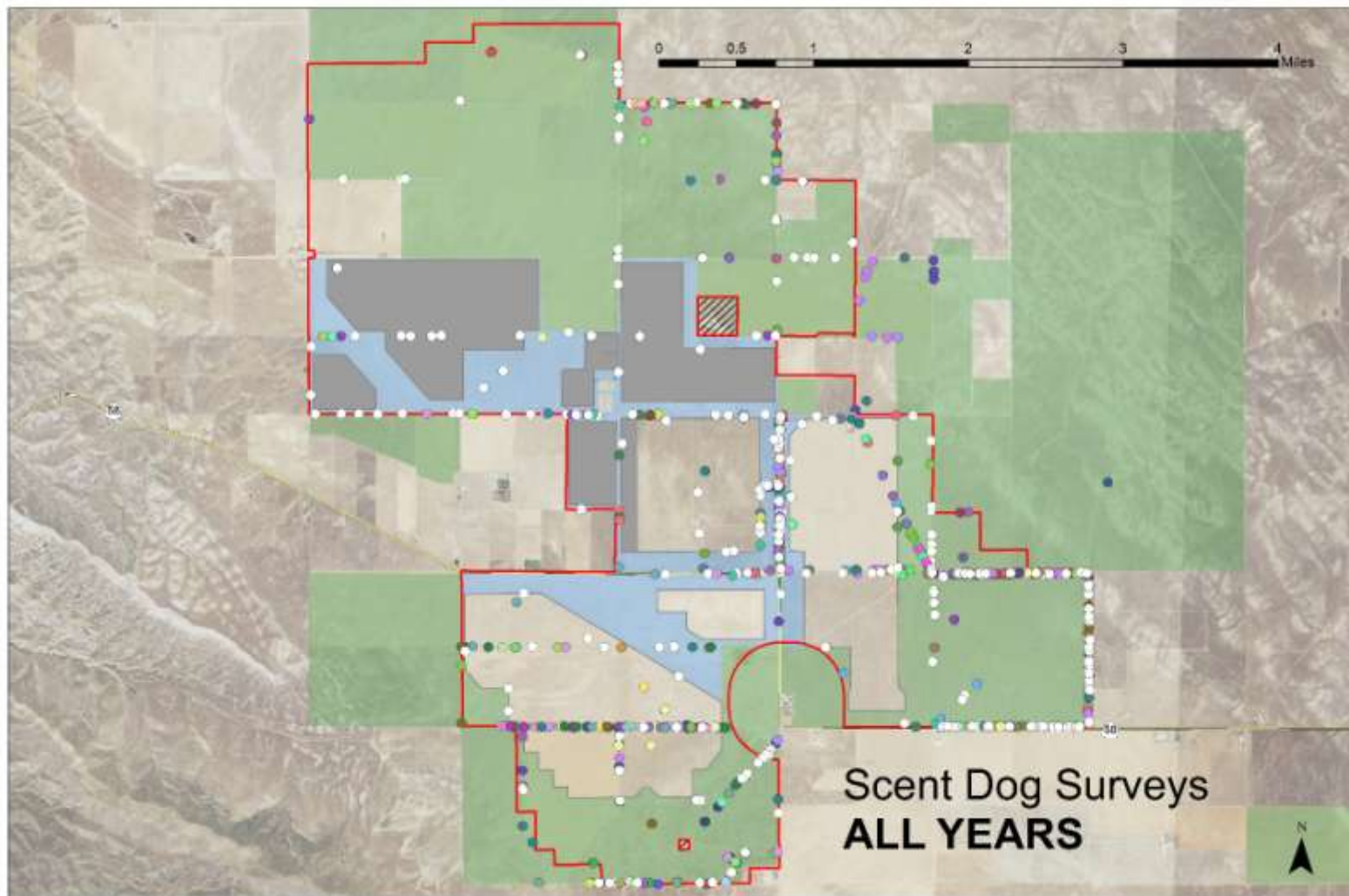


San Joaquin Kit Fox Scat Detection Surveys





SJKF Scat Surveys 2009 – 2015





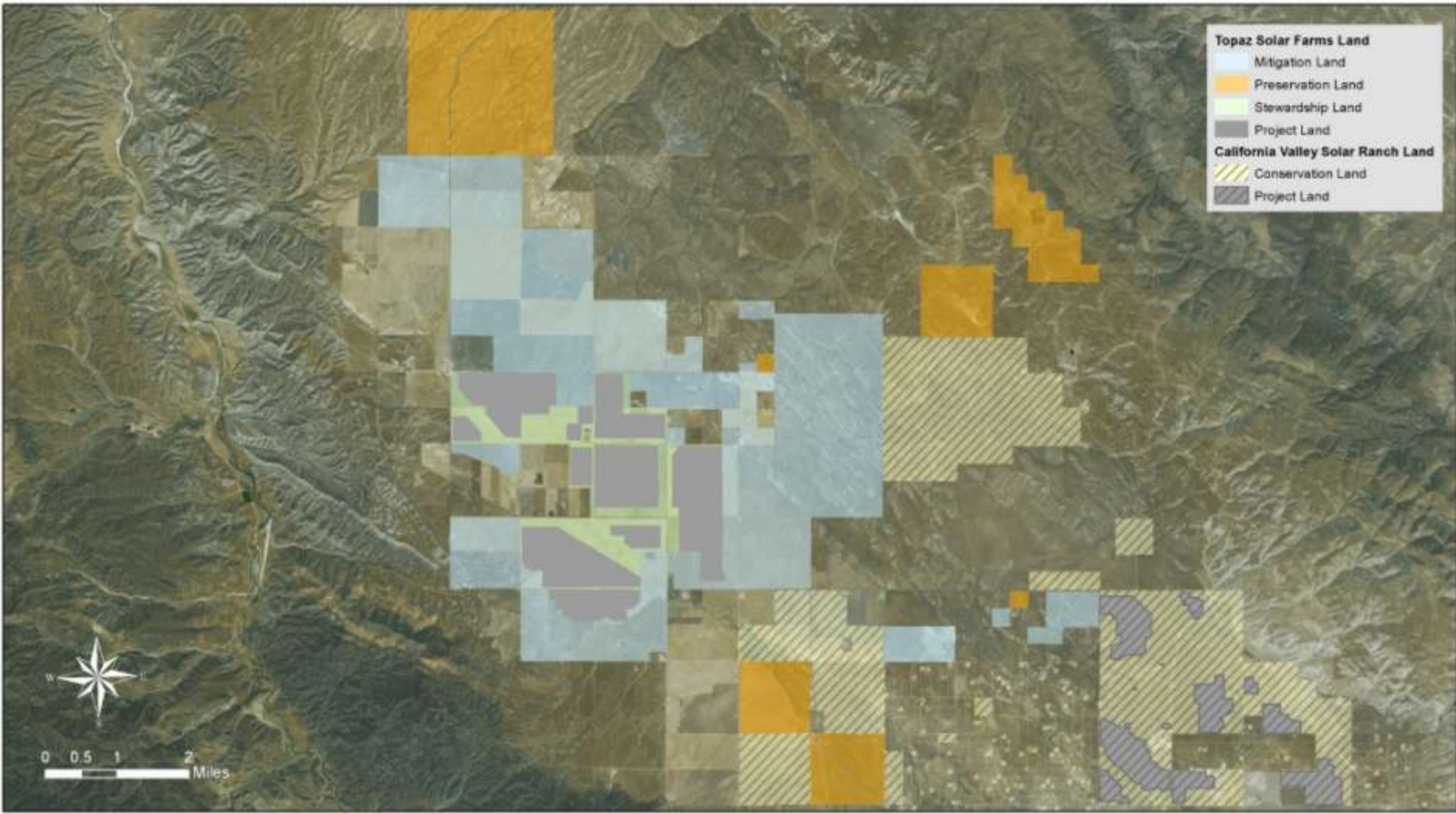
Non-invasive baseline genetic monitoring of the endangered San Joaquin kit fox on a photovoltaic solar facility

Tammy R. Wilbert^{1,2,*}, Deborah A. (Smith) Woollett³, Alice Whitelaw³,
Jason Dart⁴, Joseph R. Hoyt¹, Spencer Galen¹, Katherine Ralls¹, Daniel E. Meade⁴,
Jesús E. Maldonado^{1,5}

“...estimates of population size using samples collected during annual
November surveys indicated that ~33 individuals used the TSF over a 3 year period.”

San Joaquin Kit Fox Collaring Study

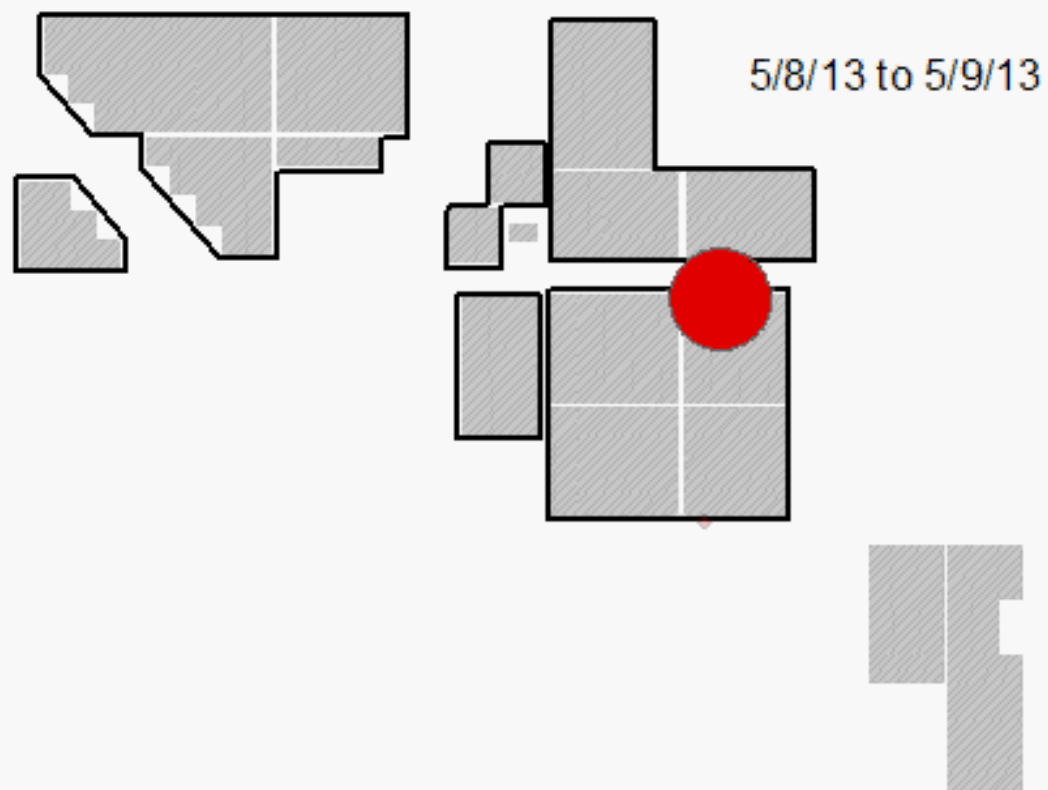




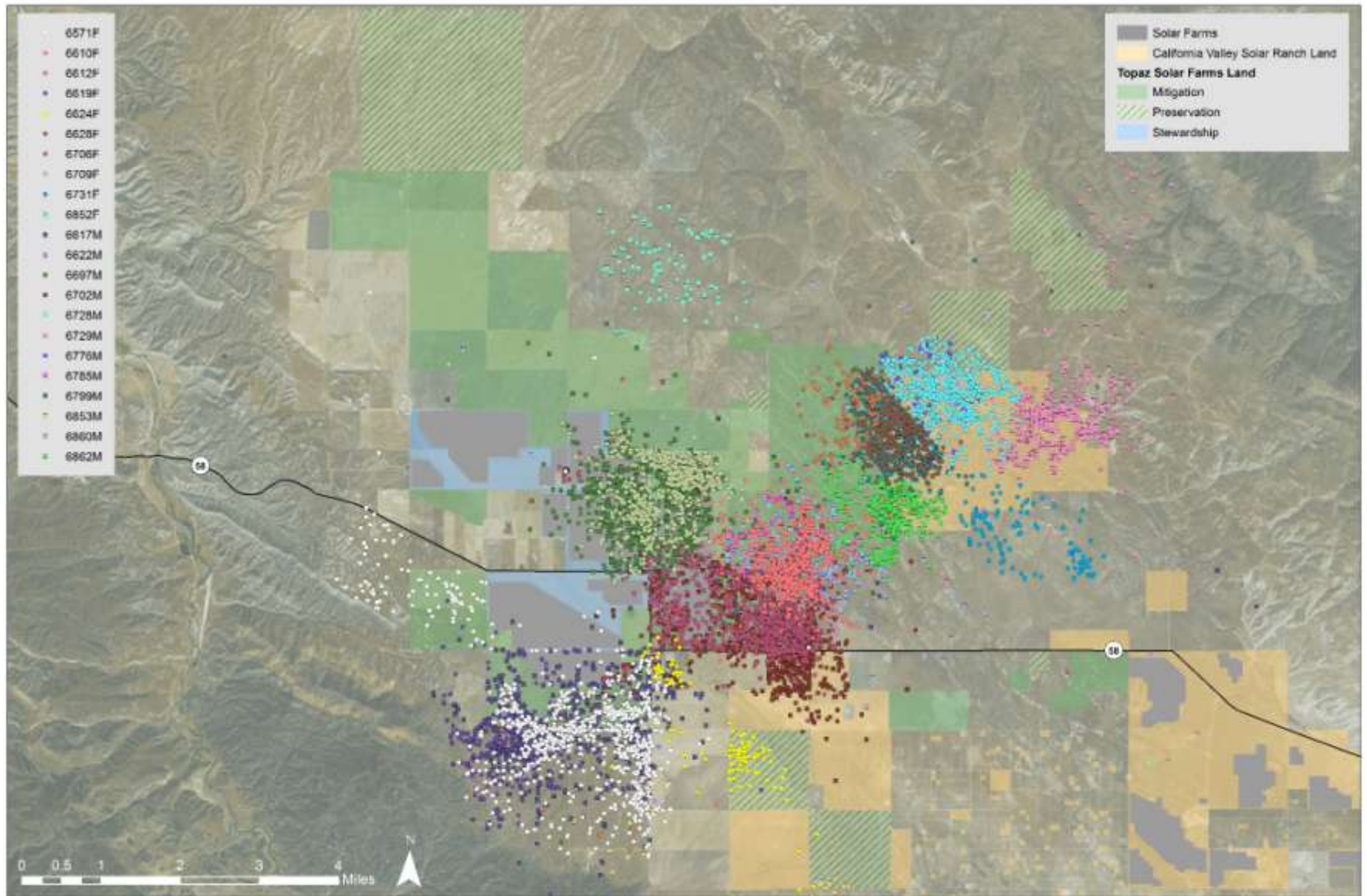
SJKF Radio Collaring

Status	Onsite Foxes	Reference Foxes
Currently Monitoring	5	3
Expired Collars	3	6
Mortalities	8	6
Moved – CVSR	1	1
Total	17	16





SJKF Telemetry 2013 – 2016

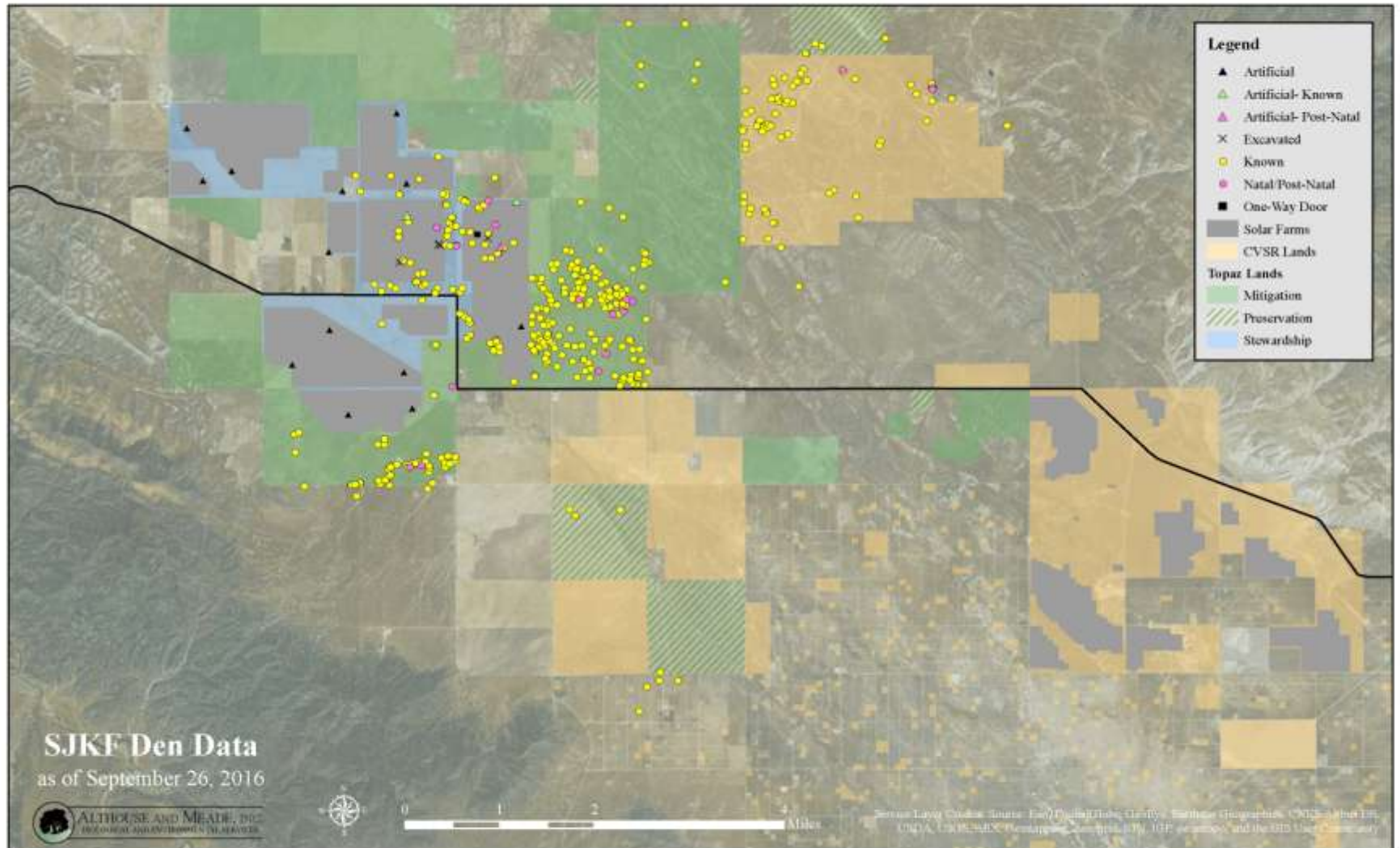








SJKF Dens





2016 Reproductive Assessment

Remote Camera Results

Ear Tag	Mate	Study Area	Minimum No. Pups
6571F	6792M	On-Site	6
6709F	6697M	On-Site	6
6652F, 6610F	6680M	On-Site	8
6706F	6702M	On-Site	4
6852F	6776M	Reference	7
6628F	6799M	Reference	4
Unknown Female	6862M	Reference	4











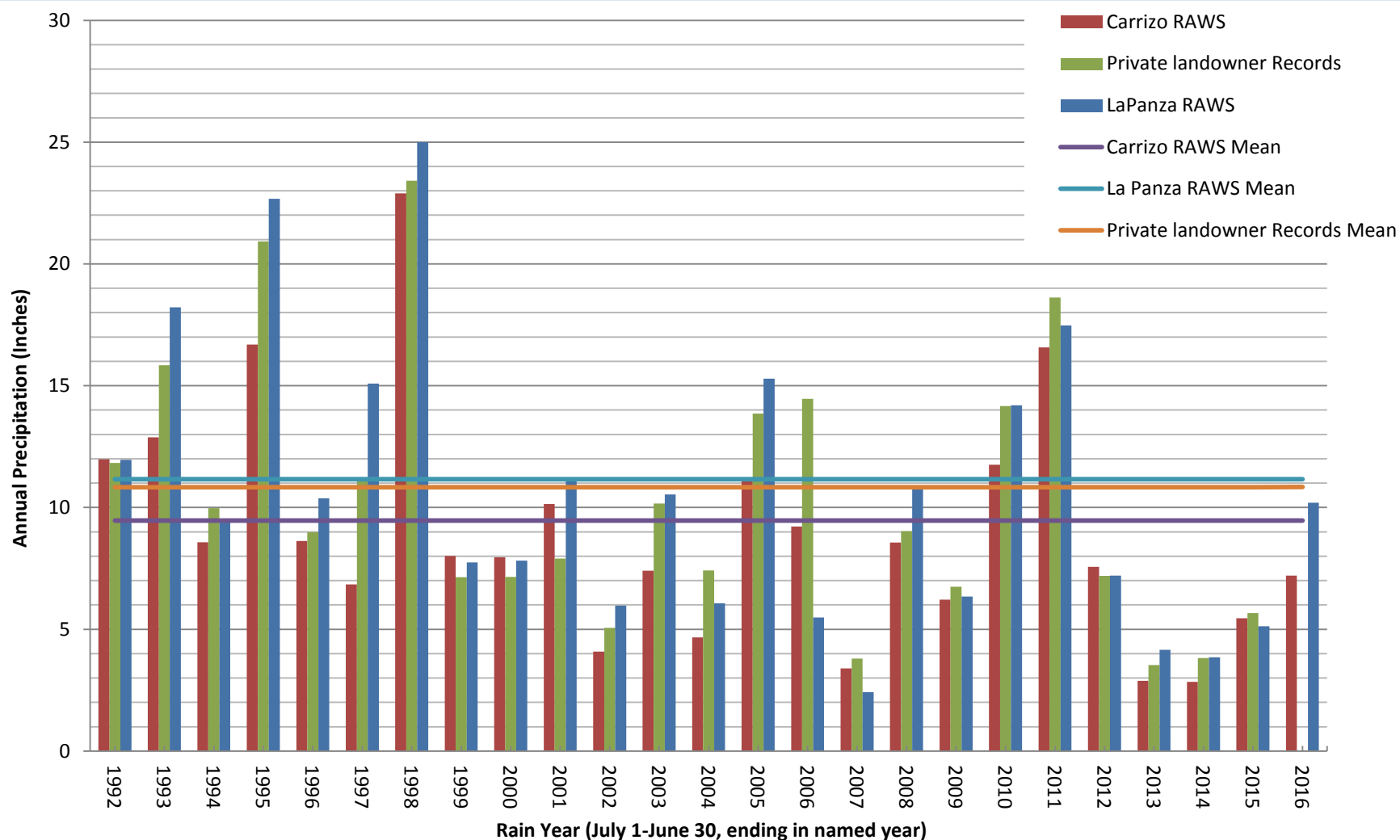




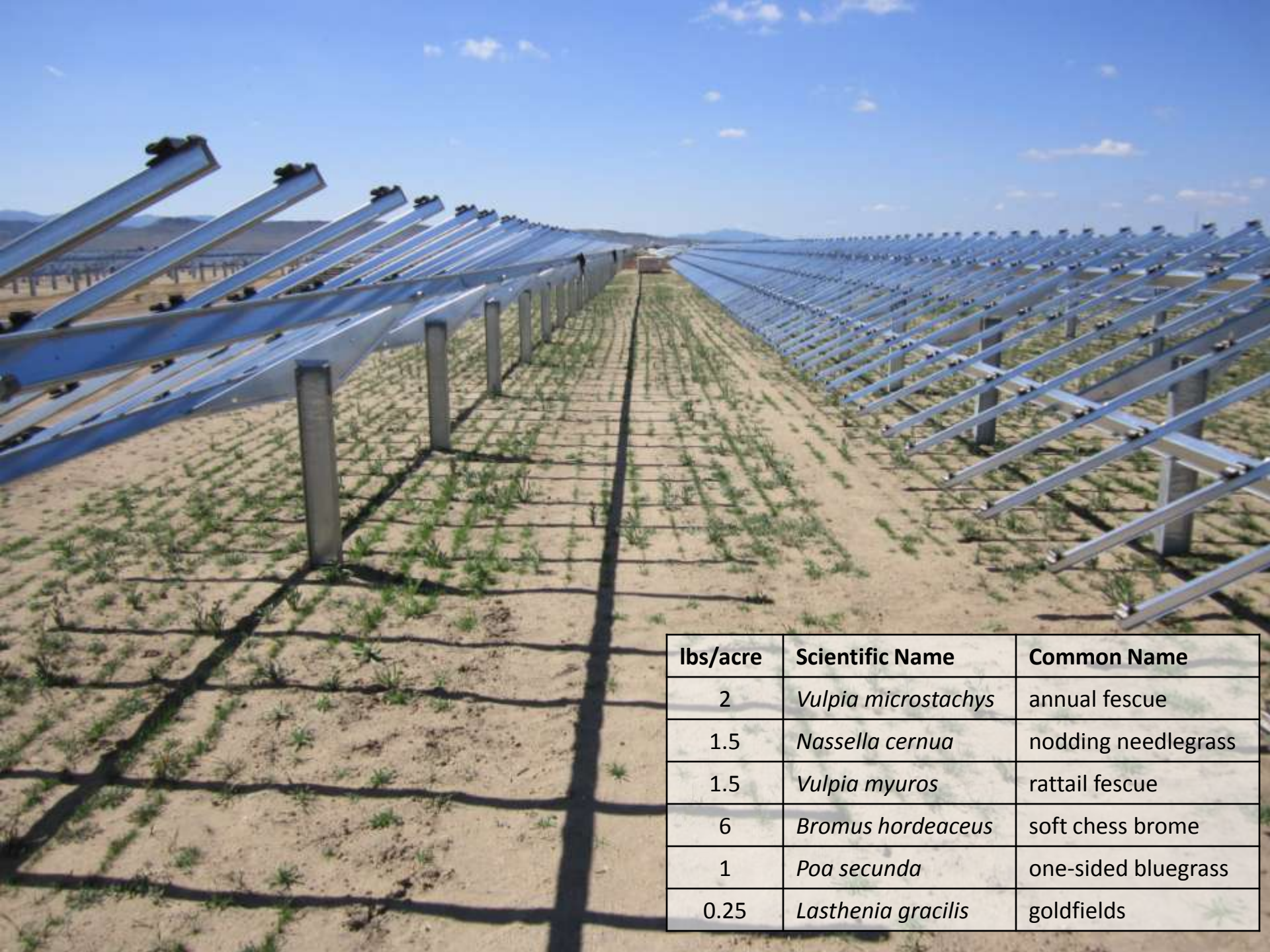
Topaz Vegetation Restoration



Annual Precipitation by Rain Year



RAWS = Remote Area Weather Station



lbs/acre	Scientific Name	Common Name
2	<i>Vulpia microstachys</i>	annual fescue
1.5	<i>Nassella cernua</i>	nodding needlegrass
1.5	<i>Vulpia myuros</i>	rattail fescue
6	<i>Bromus hordeaceus</i>	soft chess brome
1	<i>Poa secunda</i>	one-sided bluegrass
0.25	<i>Lasthenia gracilis</i>	goldfields





Vegetation Monitoring

- Spring Measurements
 - Production
 - Species composition
 - Percent cover
 - Average height
- Fall Measurements
 - Residual dry matter
 - Species composition
 - Percent cover
 - Average height

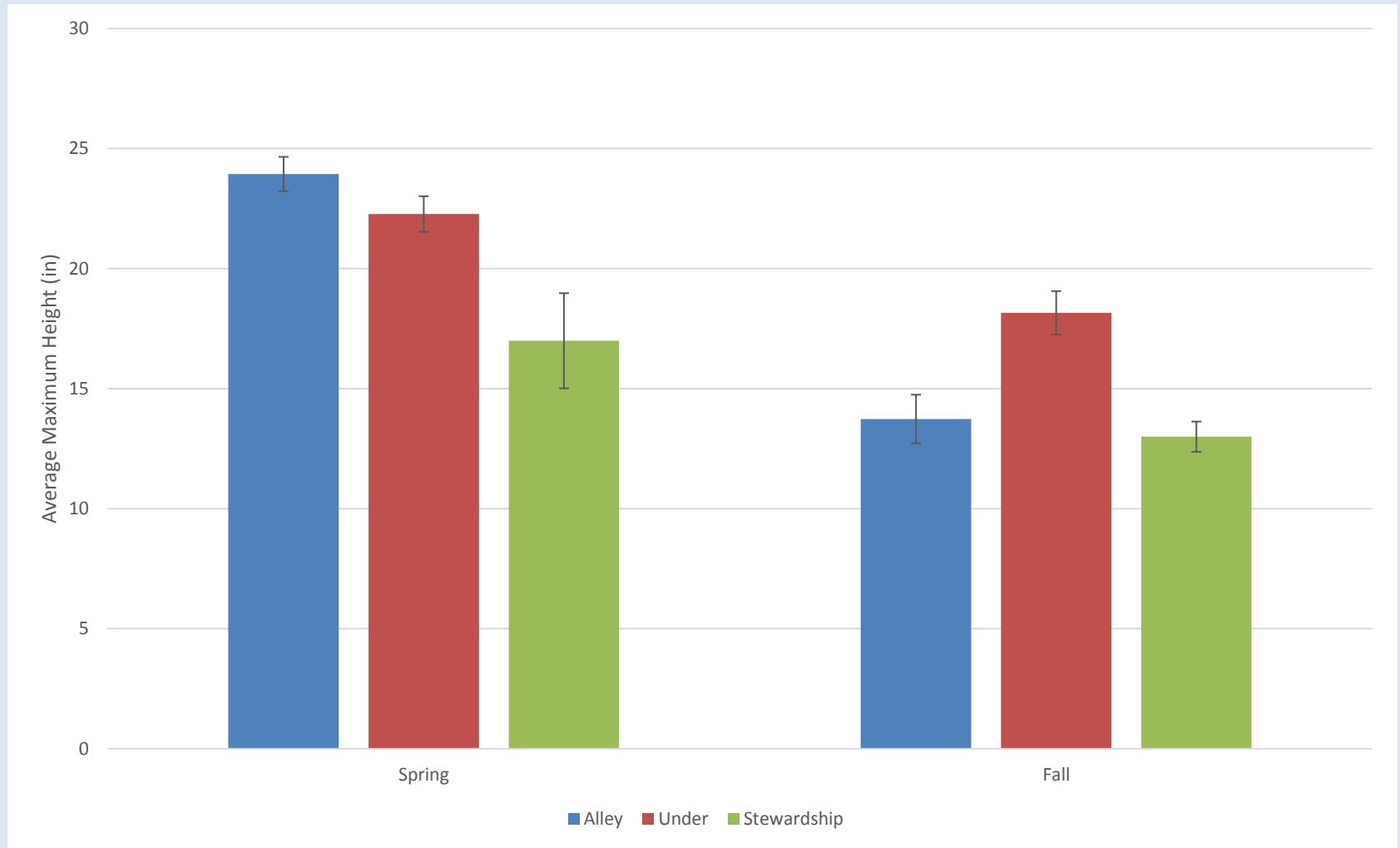


Vegetation Monitoring Results

- Relative percent cover of native species is similar between arrays and reference sites
- Vegetation is taller in arrays than in reference sites
- Percent bare ground in arrays and reference sites are similar



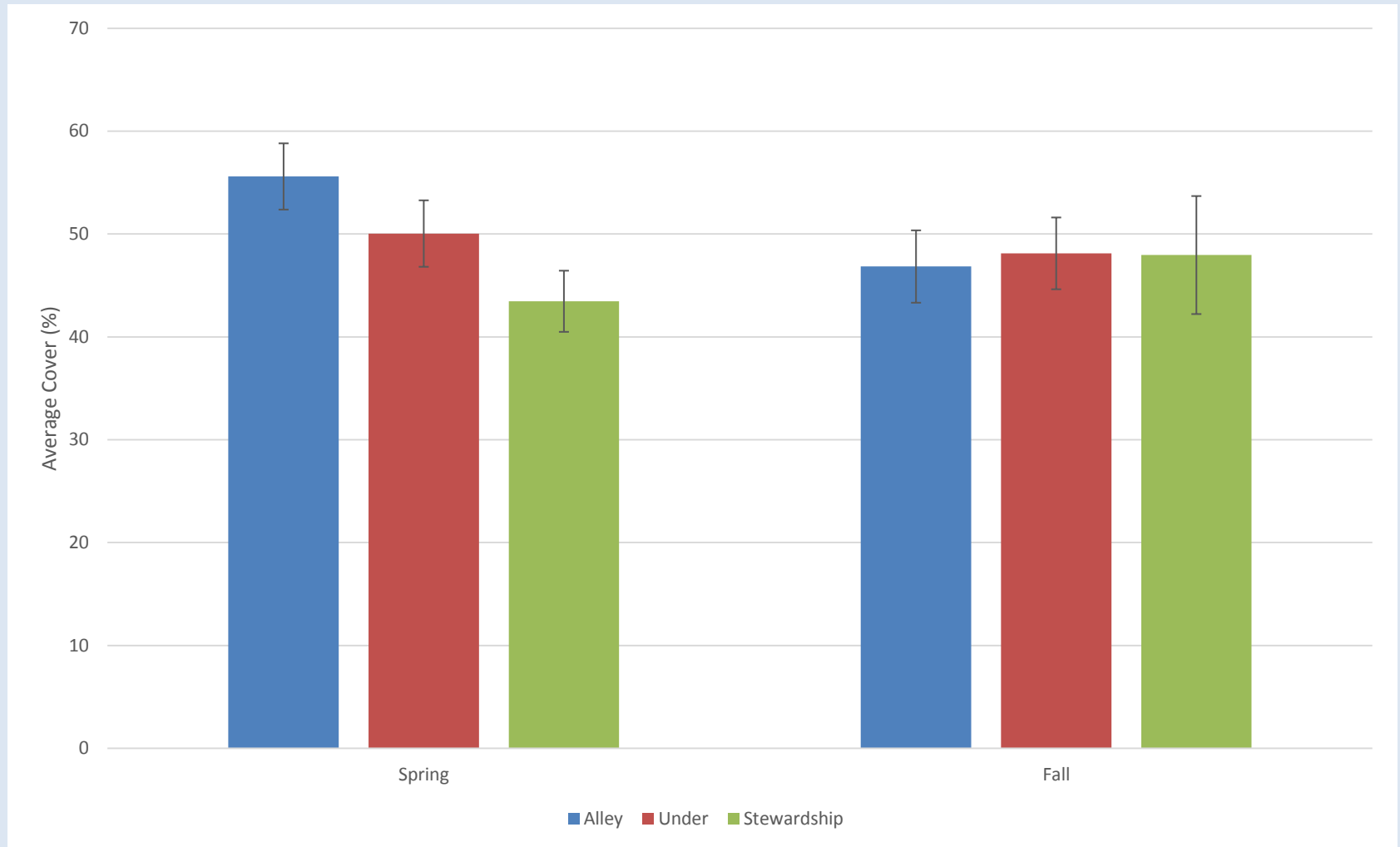
2015 Vegetation Height by Season



Error bars are one SE from the mean. Data provided by Terra Verde.



2015 Percent Cover by Season

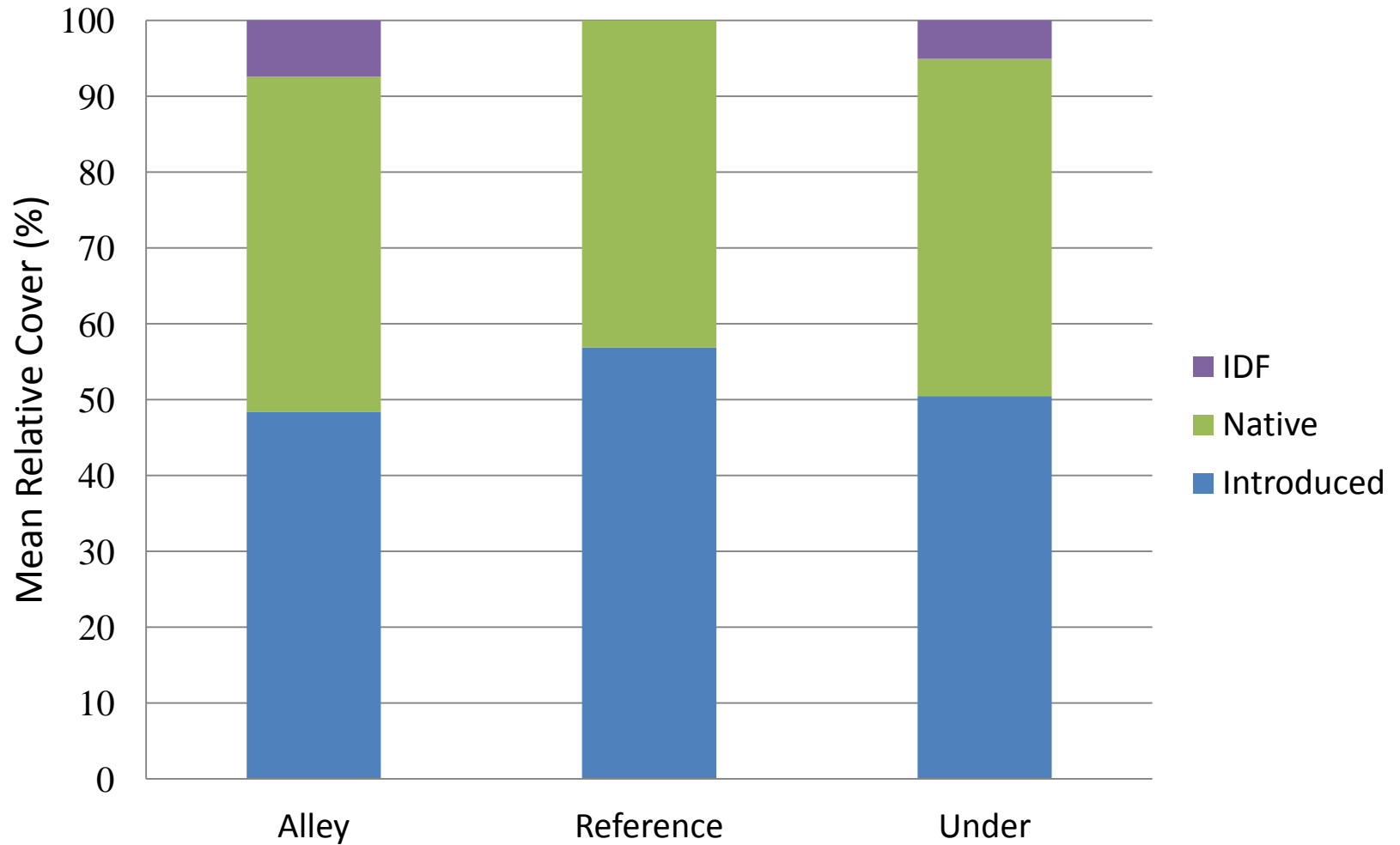


Error bars are one SE from the mean. Data provided by Terra Verde.





Relative Percent Cover of Native and Introduced Species



Habitat Management







Topaz Vegetation Production and Residual Dry Matter

Year	Spring Production (lbs/acre)		Fall RDM (lbs/acre)	
	Arrays	Reference	Arrays	Reference
2013	630	934	809	1,533
2014	604	477	923	1,032
2015	1,730	1,636	1,158	1,008
2016	922	660	tbd	tbd

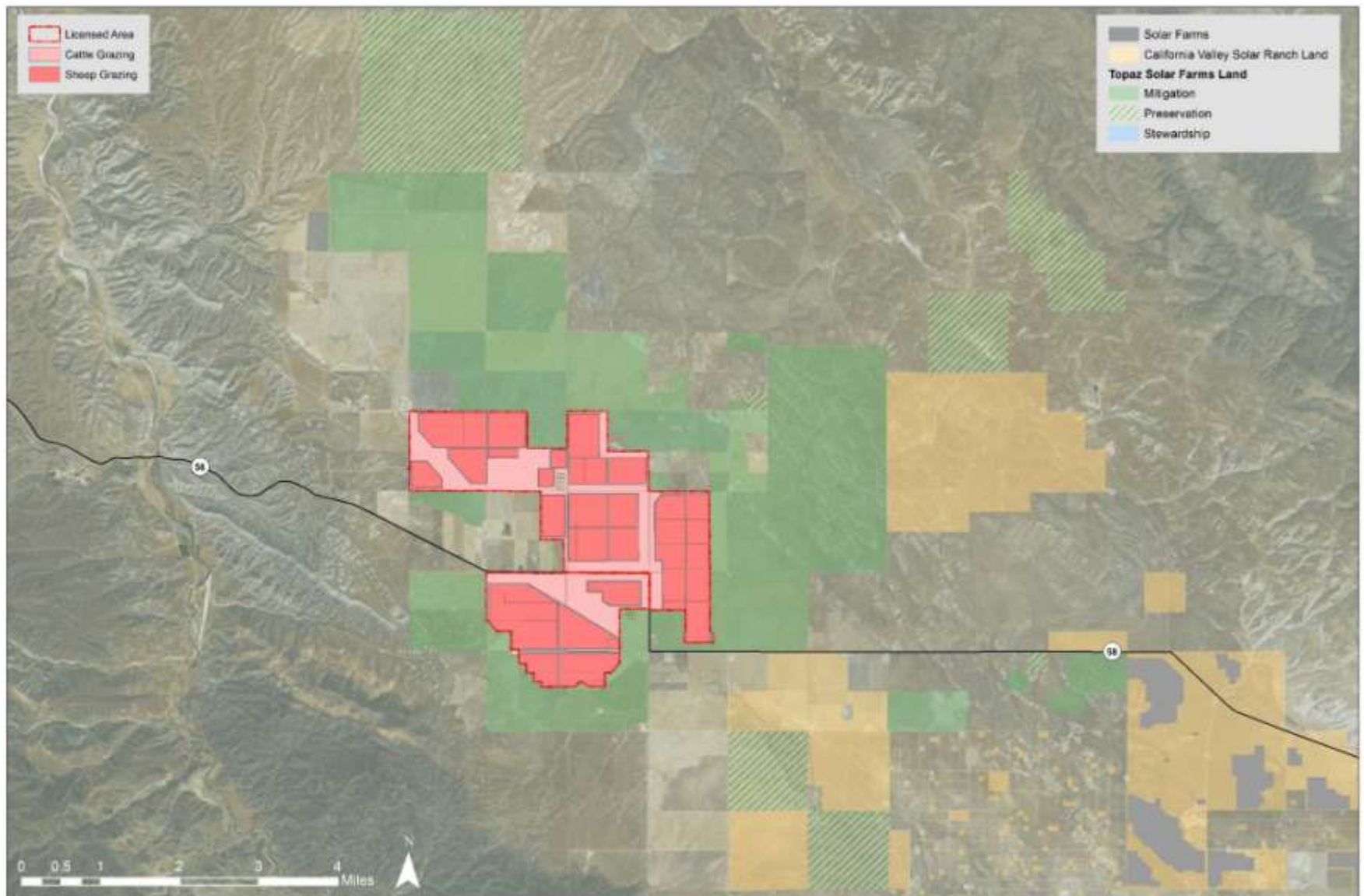


Grazing Overview

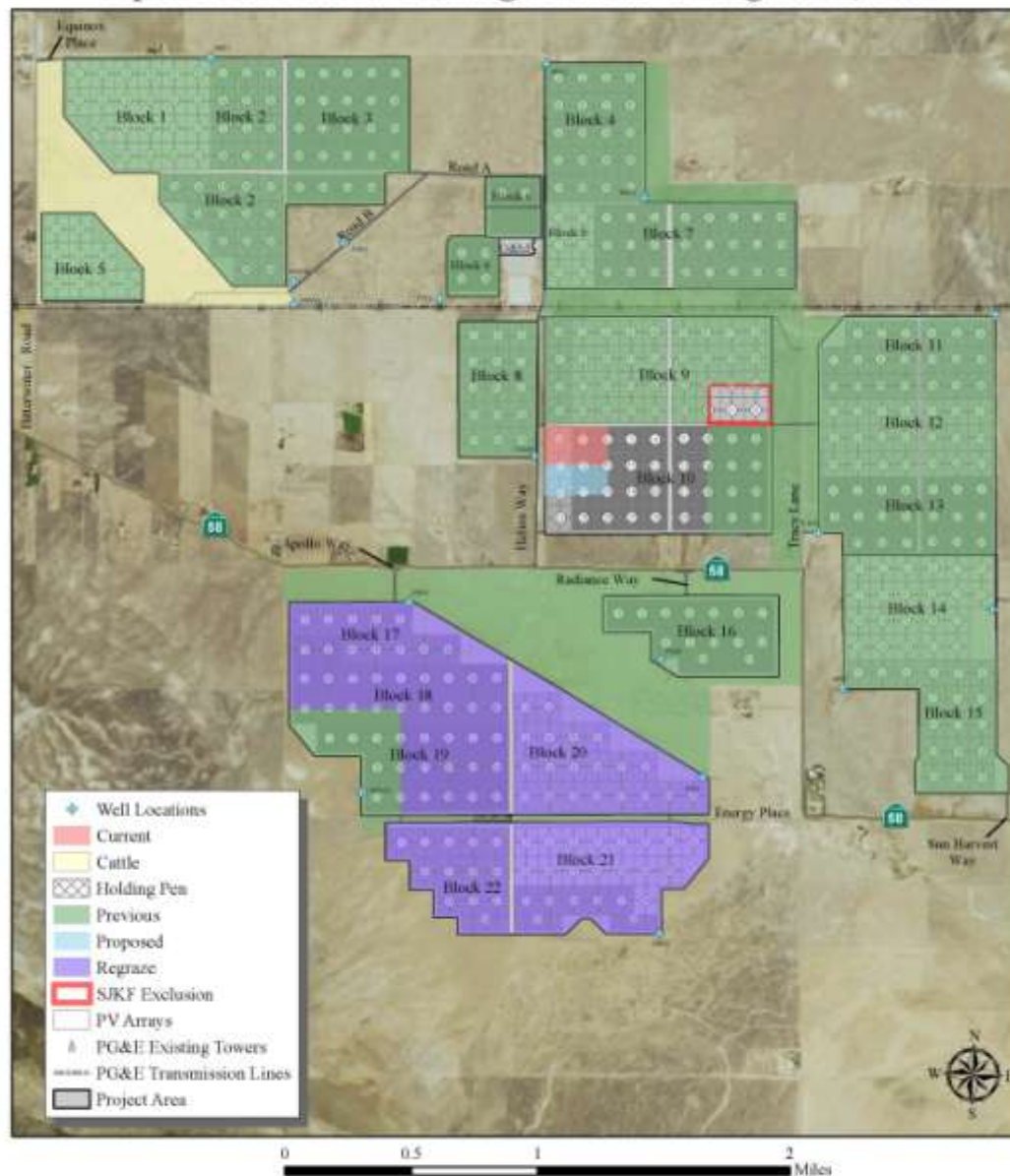
- 4,700 acres of leased grazing land
- Cattle grazing
- Sheep grazing
 - Rambouillet, Suffolk, and Crossbreds
 - Ewes, lambs, rams
 - Onsite during spring
 - March—May
 - Removed late summer
 - July—August
 - Potential fall second grazing event



Lease Boundaries



Topaz Solar Farm: Grazing Areas as of August 11, 2016



Array Grazing Summary

Year	Dates	Total Days	Total Acres	Number of Bands	Average Band Size	Average Stocking Density
2013	May 9, 2013 through August 19, 2013	102	965	1	686	35 sheep/acre
2014	April 17, 2014 through July 31, 2014	105	2,274	1	1,000	37 sheep/acre
2015	March 24, 2015 through September 3, 2015	163	3,350	2	1,000	74 sheep/acre*
2016	March 18, 2016 through September 17, 2016	183	3,350	3	1,260	46 sheep/acre*



*Stocking density includes ewes and lambs







Fence Line Vegetation Management













Stewardship Land Grazing



Stewardship Land Grazing Summary

Year	Dates	Total Days	Total Acres	Average Herd Size	Average Stocking Rate (Average Stocking Density)
<i>Cattle Grazing</i>					
2015	June 12, 2015 through September 8, 2015	87	408	30	13.6 acres/head (0.07 head/acre)
2016	March 31, 2016 through September 19, 2016	111	868	45	6.42 acres/head (0.05 head/acre)
<i>Sheep Grazing</i>					
2016	July 1, 2016 through July 31, 2016	31	389	1260	0.03 acres/head* (31.5 head/acre)*



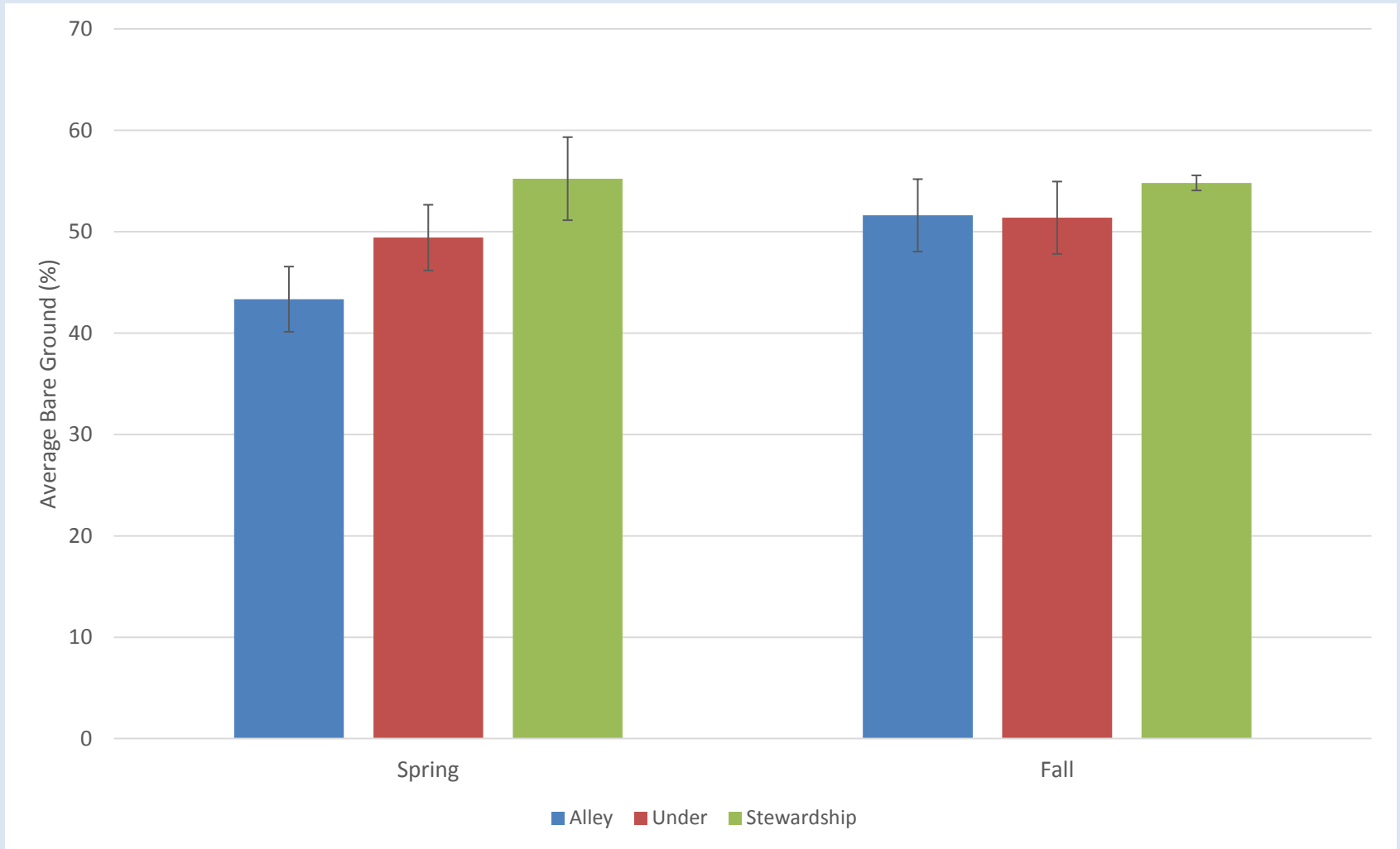
*Stocking density includes ewes and lambs



Questions?



2015 Percent Bare Ground by Season



Error bars are one SE from the mean. Data provided by Terra Verde.



2010 Grazing Trial



Project Grazing Timeline



Native Bunchgrass Establishment

