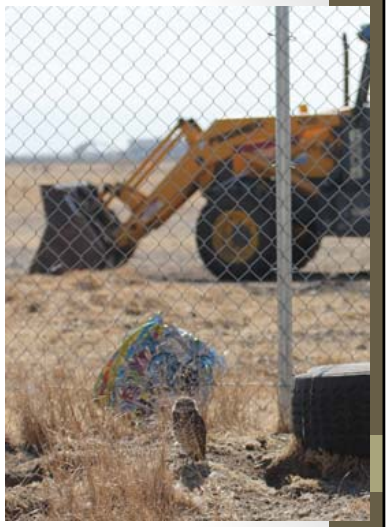


BuOw Partners Mtg
Nov 27, 2012

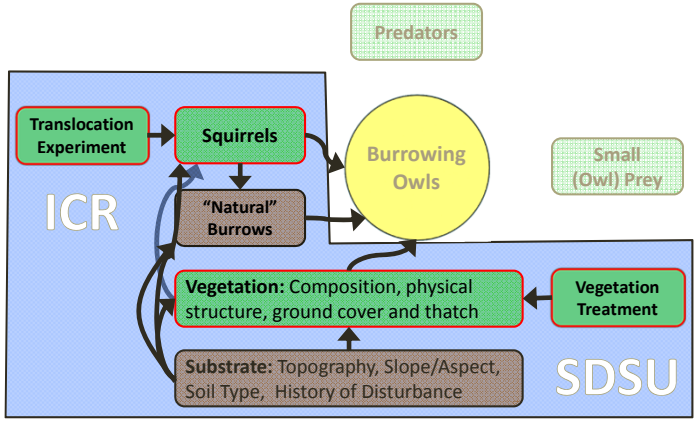
Outline

- Overview and Initial Objectives
- Study Design
- 1st year (2011) Final Results
- 2nd year (2012) Field Work
- 2nd year (2012) Initial Results
- Options for 3rd and final year (2013)

Initial Objectives

- Intended to resolve critical uncertainties about Burrowing Owls in southern San Diego County
- The proposed work will test the efficacy of habitat enhancement techniques for supporting populations
- We will primarily focus on burrow availability, the role of ground squirrels as ecosystem engineers, and the impact of vegetation and site factors such as soils and topography
- This program has been designed as a collaborative effort between SDSU and the ICR at the San Diego Zoo.

Conceptual Model for Management Experiment



Literature Used to Inform Conc. Model and Management Experiment

(SELECTED) **Burrowing owl conceptual model references**

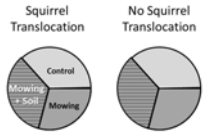
Natural burrows:
Coulomb, H. N. 1971. Behavior and Population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. The Condor 73:162-176.
Rosenberg, D. K. and K. A. Haley. 2004. The Ecology of Burrowing Owls in the Agroecosystem of the Imperial Valley, California. Studies in Avian Biology 27:120-135.

Artificial burrows:
Belthoff, J. R. and B. W. Smith. 2003. Patterns of artificial burrow occupancy and reuse by burrowing owls in Idaho. Wildlife Society Bulletin 31:138-144.
Smith, M. D., C. J. Conway, and L. A. Ellis. 2005. Burrowing owl nesting productivity: a comparison between artificial and natural burrows on and off golf courses. Wildlife Society Bulletin 33:454-462.

Vegetation:
Green, G. A. and R. G. Anthony. 1989. Nesting Success and Habitat Relationships of Burrowing Owls in the Columbia Basin, Oregon. The Condor 91:347-354.
Wolkovich, E. M., D. T. Bolger, and D. A. Holway. 2009. Complex responses to invasive grass litter by ground arthropods in a Mediterranean scrub ecosystem. Oecologia 161:697-708.

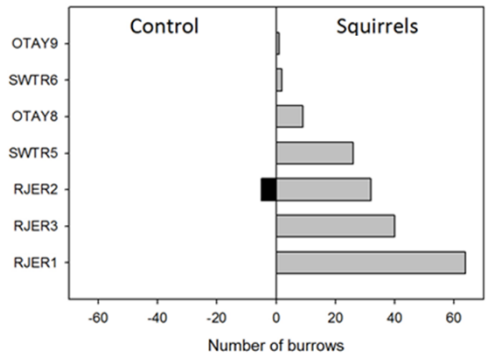
Squirrels as ecosystem engineers:
Fitch, H. S. 1948. Ecology of the California ground squirrel on grazing lands. American Midland Naturalist 39:513-596.
Lenihan, C. M. 2007. The Ecological Role of the California Ground Squirrel (Spermophilus beecheyi). Doctoral dissertation. Univesrity of California, Davis.

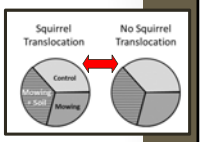
Overview of 2011 Results



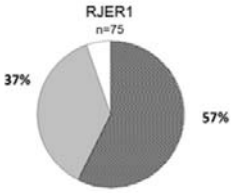
Site	Plot	X Coordinate	Y Coordinate
RJER	1C	-116.8632070	32.6951596
	1G	-116.8640860	32.6965543
	2C	-116.8701832	32.6938240
	2G	-116.8703999	32.6958499
	3C	-116.8661811	32.6845262
	3G	-116.8654600	32.6832400
SWTR	5C	-116.9679560	32.6936797
	5G	-116.9675031	32.6947163
	6C	-116.9849724	32.6872751
	6G	-116.9864818	32.6873812
OTAY	8C	-116.9674745	32.5784402
	8G	-116.9653895	32.5766168
	9C	-116.9661466	32.5829479
	9G	-116.9704841	32.5819183

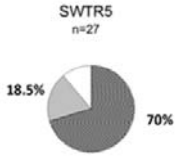
Overview of 2011 Results



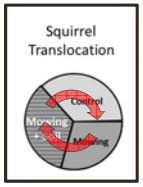


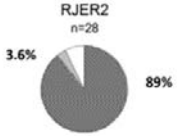
Overview of 2011 Results





March 2012

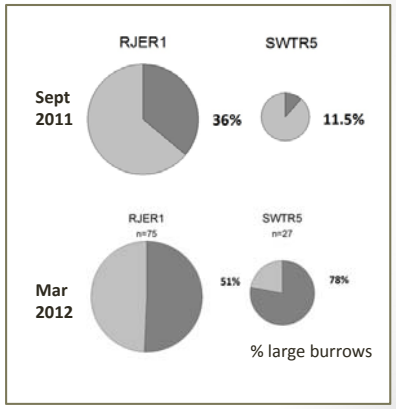




Percentage (%) of burrows in each plot by treatment

Control
Mowing
Mowing and auguring

Overview of 2011 Results

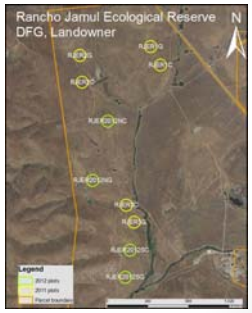


2012 Field Work

Site	Plot	X Coordinate	Y Coordinate
RJER	1C	-116.8632070	32.6951596
	1G	-116.8640860	32.6965543
	2C	-116.8701832	32.6938240
	2G	-116.8703999	32.6958499
	3C	-116.8661811	32.6845262
	3G	-116.8654600	32.6832400
	2012NC	-116.867	908910
	2012NG	-116.869	863860
	2012SC	-116.865	811170
	2012SG	-116.866	79062
SWTR	5C	-116.9679560	32.6936797
	5G	-116.9675031	32.6947163
	~~6C~~	~~-116.9849724~~	~~32.6872751~~
	~~6G~~	~~-116.986~~	~~873812~~
~~OTAY~~	~~8C~~	~~-116.967~~	~~764402~~
	~~8G~~	~~-116.965~~	~~766168~~
	~~9C~~	~~-116.966~~	~~829479~~
	~~9G~~	~~-116.9704641~~	~~32.5819183~~

Add 2 pairs

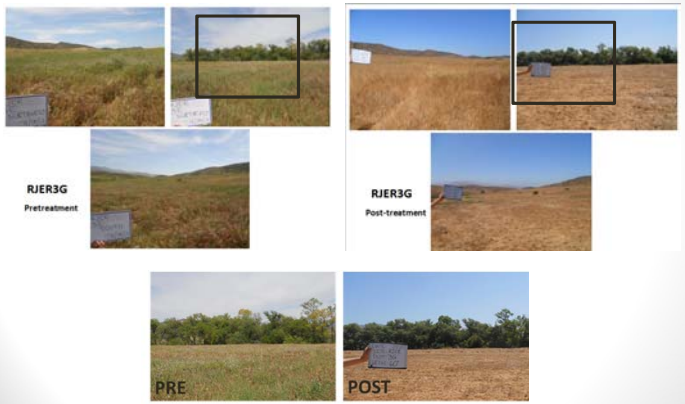
Drop 3 pairs



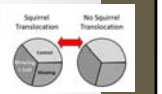
2012 Field Work

Dates	Site	Task
March 21 – April 23	RJER	Site selection and plot establishment
March 21 – March 27	RJER and SWTR	Pre-treatment squirrel activity assessment
April 16 – April 18	RJER and SWTR	Pretreatment photopoints
April 6 – April 20	RJER and SWTR	Pre-treatment vegetation assessment
April 17 – June 1	RJER and SWTR	Vegetation manipulation
July 2 – July 3	RJER and SWTR	Post-treatment photopoints
July 2 – July 6	RJER and SWTR	Post-treatment vegetation assessment
September 10 – September 27	RJER and SWTR	Post-treatment squirrel activity assessment

2012 Preliminary Results



2012 Preliminary Results



Burrows	Control	Translocation	Total	PCT Translocation
2012RJERN	2	43	45	96%
2012RJERS	20	53	73	73%
RJER1	1	136	137	99%
RJER2	10	72	82	88%
RJER3	47	128	175	73%
SWTR5	0	54	54	100%
Total	80	486	566	86%

2012 Preliminary Results

Burrows	Control (%)	Veg Treatment	Veg and Soil Treatment	Total
2012RJERN	0 (0%)	0	43	43
2012RJERS	3 (6%)	41	9	53
RJER1	5 (4%)	64	67	136
RJER2	14 (19%)	19	39	72
RJER3	30 (23%)	49	49	128
SWTR5	9 (17%)	13	32	54
Total	61 (13%)	186 (38%)	239 (49%)	486

2012 Preliminary Results

2011	Control	Veg	Veg+Soil	Total
Control	0	14	8	22
Squirrel	3	41	52	96
Total	3	55	60	118
	0%	64%	36%	
	3%	43%	54%	

2012	Control	Veg	Veg+Soil	Total
Control	8	28	22	58
Squirrel	58	145	187	390
Total	66	173	209	448
	14%	48%	38%	
	15%	37%	48%	

Both Yrs	Control	Veg	Veg+Soil	Total
Control	8	42	30	80
Squirrel	61	186	239	486
Total	69	228	269	566
	10%	53%	38%	
	13%	38%	49%	

Loglinear Model Results			
Term	Chi Square	df	P-value
Squirrel	324	1	<.001
Habitat	132	2	<.001
Year	186	1	<.001
Sq * Hab	6.76	2	0.034
Sq * Year	2.85	1	0.091
Hab * Year	12.6	2	0.002
Sq * Hab * Year	0.91	2	0.635

Options for 2013

Proposed

Effort (in pairs)	2011 Exp.	2011 Assess	2012 Exp.	2012 Assess	2013 Exp.	2013 Assess	2014 Assess
Otay	**2**	2	**0**	0	**0**	0	0
Sweetwater	**2**	2	**1**	1	**0**	1	0
Rancho Jamul	**3**	3	**5**	5	**2**	5	2
Totals	**7**	**7**	**6**	**6**	**2**	**6**	**2**

2013: Assess impacts of 2-yr experiment at 4 pairs
Assess and treat at 2 pairs

2014: Assess impacts of 2-yr experiment at 2 pairs

Since the experimental manipulation is labor-intensive relative to assessment, costs will continue to decline. 2012 was approximately 2/3^{rds} of 2011, and 2013 (as proposed) will be about 2/3^{rds} of 2012. Assessment at the final 2 pairs in 2014 will be very inexpensive.