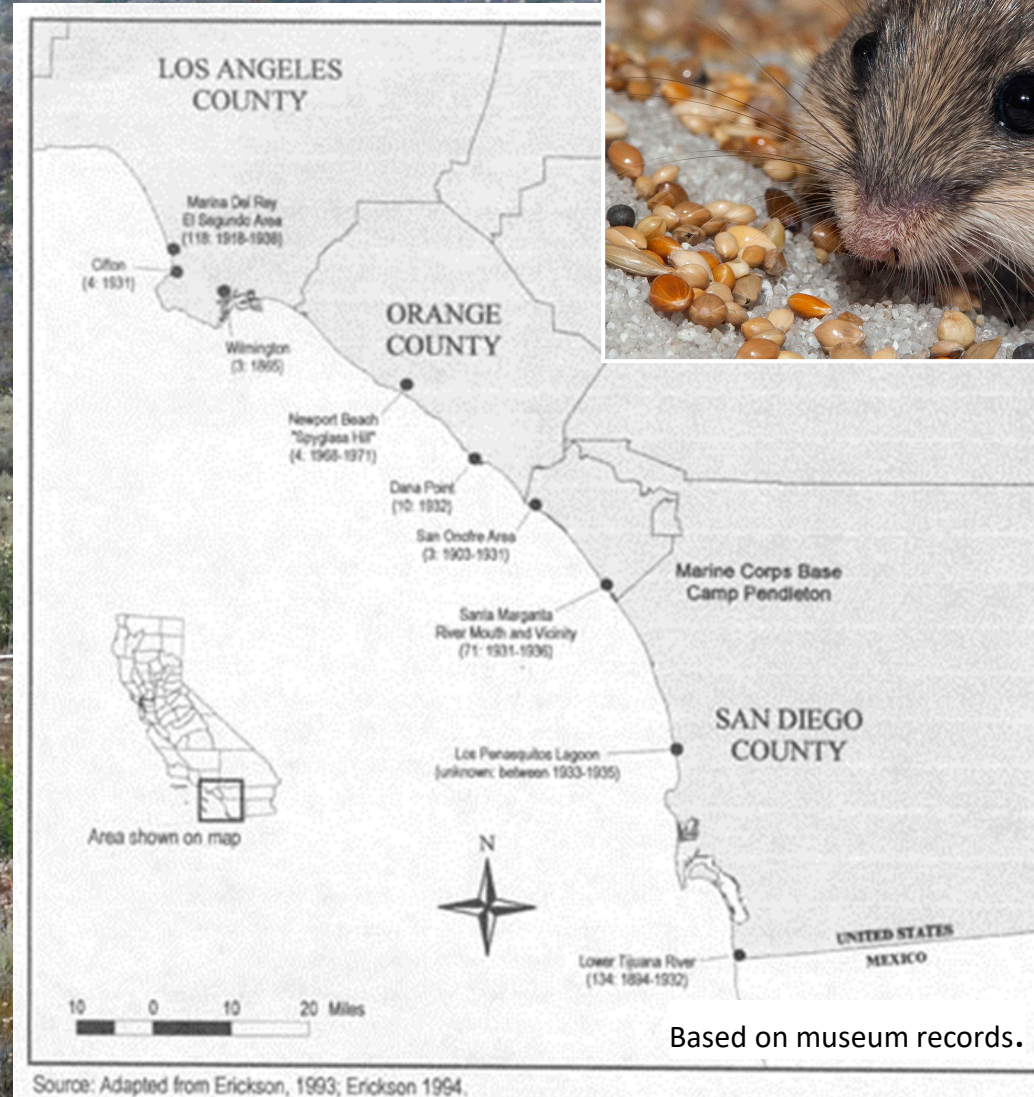


**PURSUING  
RECOVERY OF  
THE  
ENDANGERED  
PACIFIC POCKET  
MOUSE**

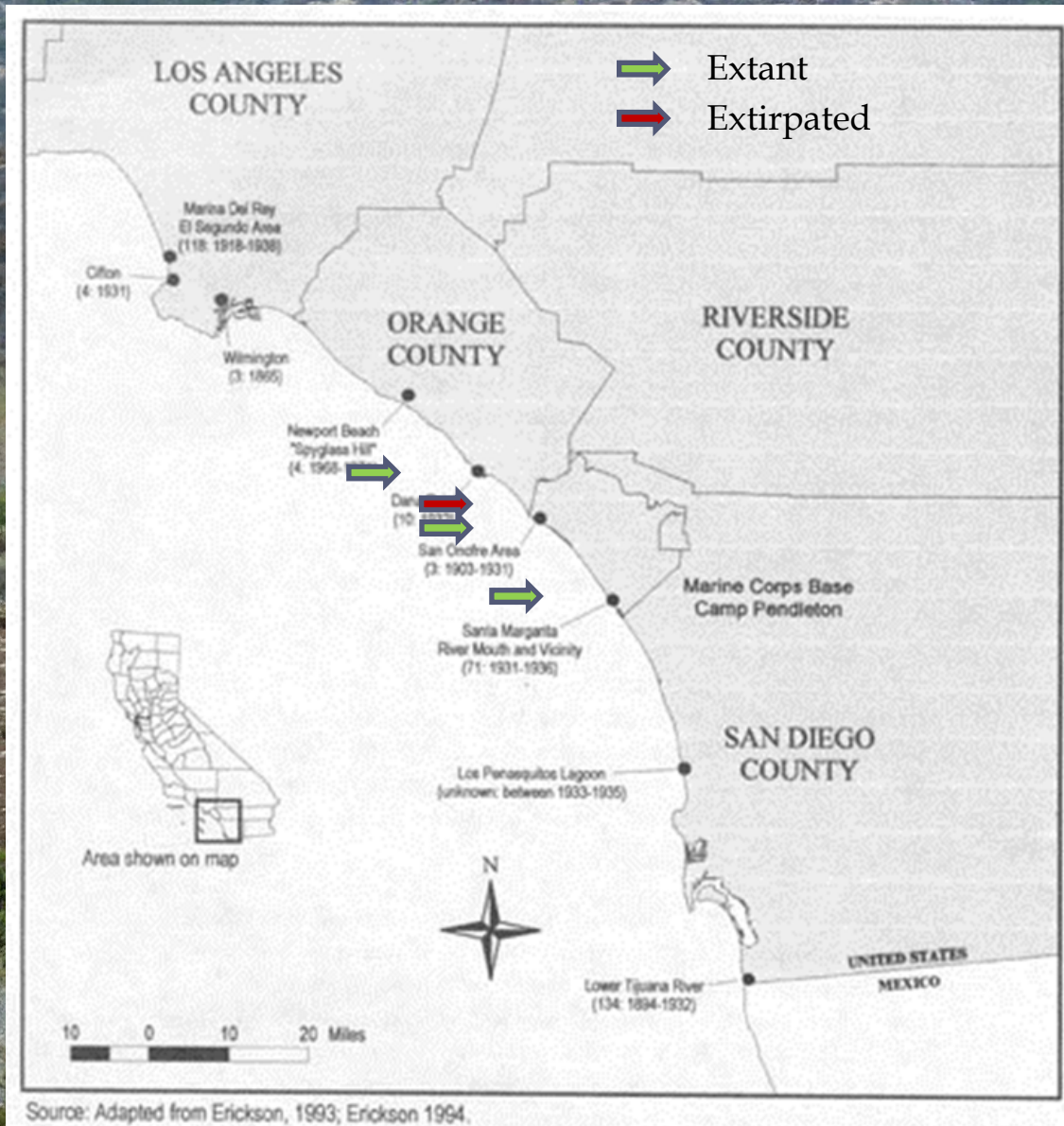


# PPM LIFE HISTORY

- Historically distributed within ~2.5 miles of coast from LA to U.S./Mexico border
- Habitat limited by soils and vegetation
- Seed eaters, long lived
- Nocturnal burrowing rodent, inactive ~6 - months/year
- Last seen 1971 in San Joaquin Hills - presumed extinct



# REDISCOVERY & LISTING



- 1993, 25-36 individuals found within ~20 ac at Dana Point Headlands
- 1994, Emergency listed as endangered
- 1995, Discovered at 3 locales on Camp Pendleton
  - ~~North San Mateo 32 ac. area~~
  - Extirpated
  - South San Mateo – 260 ac. area
  - Santa Margarita- 2,187 ac. area

# THREATS

- Habitat loss
- Habitat fragmentation
  - Edge effects
  - Loss of ecological processes
  - Isolation
- Military Training
- Firebreak, road and utility maintenance
- Small population size
  - Catastrophes
  - Demographic stochasticity
  - Environmental stochasticity
  - Genetic factors
    - Inbreeding depression
    - Loss of genetic variation
  - Recreation

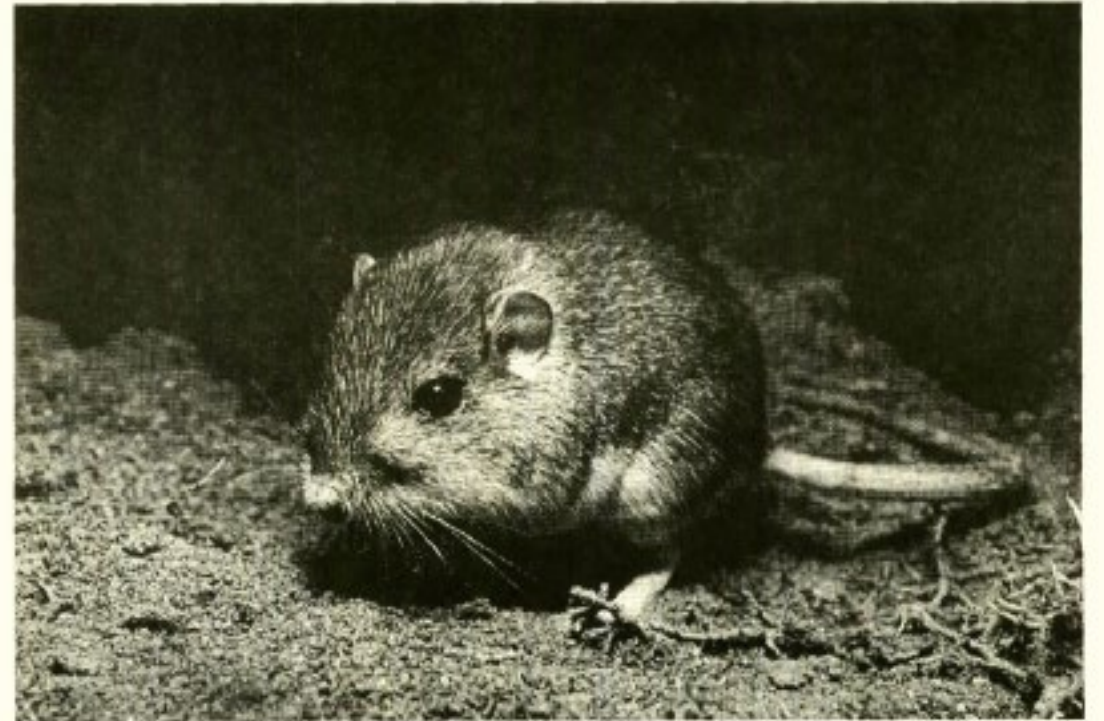
# PPM Recovery Strategy

Conserve 10 independently-viable populations

- Stabilize and conserve existing populations
- Search for and protect unknown populations
- Create additional populations through translocation or captive propagation

U.S. Fish & Wildlife Service

## Recovery Plan for the Pacific Pocket Mouse (*Perognathus longimembris pacificus*)



501 - Mouse Pocket 9/91

# ORANGE COUNTY CENTRAL-COASTAL NCCCP/HCP (1996)



- ❑ Developed by the County of Orange, Irvine Company and other public and private interests (e.g. Cities, water districts, SCE, State Parks, UCI, Dana Point Headland Landowners)
- ❑ Satisfies CA Natural Community Conservation Planning Act of 1991, CESA and FESA
- ❑ 39 Identified Species: California gnatcatcher, coastal cactus wren, orange throated whiptail, Laguna Beach Dudleya, Pacific pocket mouse, etc.

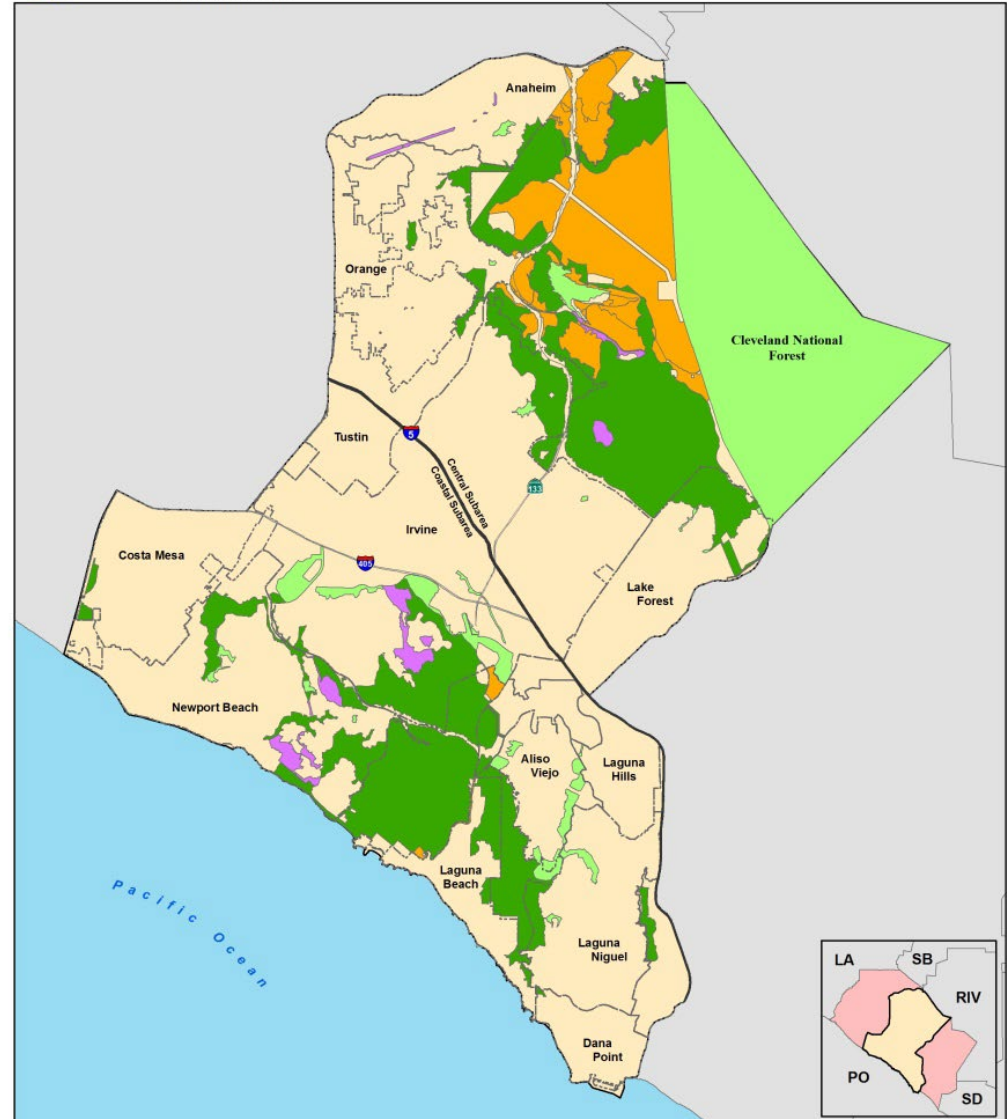
# NCCP/HCP PROVISIONS FOR PPM

- Dana Point Headlands
  - Temporary Preserve
  - Funding for studies
  - Purchase Option
- Adaptive Management Program
  - Relocation
  - Enhancement/Restoration
  - Propagation
  - Monitoring



U.S. Fish and Wildlife Service  
Carlsbad Fish and Wildlife Office  
2177 Salk Ave., Suite 250  
Carlsbad, CA 92008

Orange County Central-Coastal NCCP/HCP



Carlsbad Fish and Wildlife Office  
GIS Services



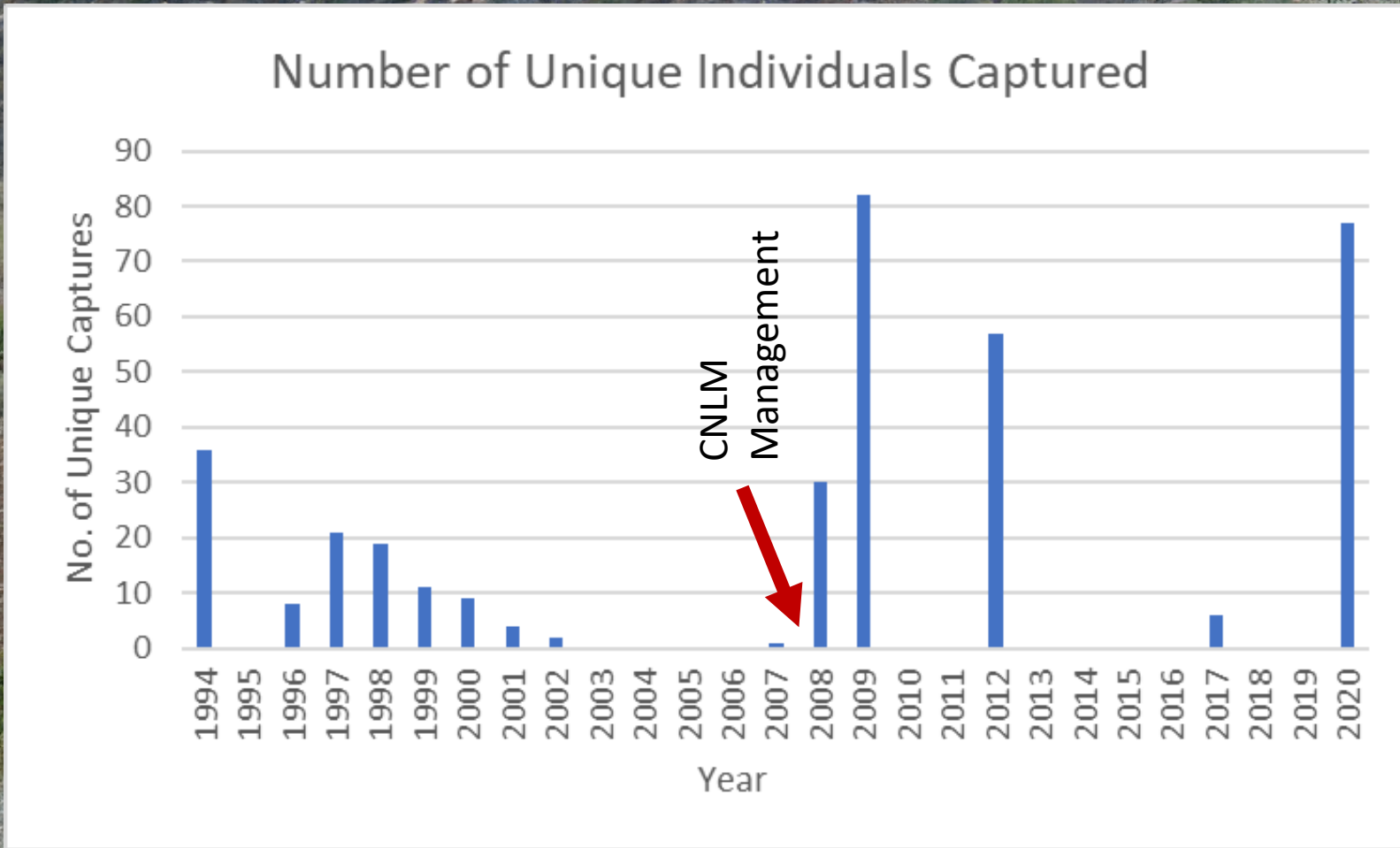
Reserve

Non-Reserve Open Space

Conservation Easement

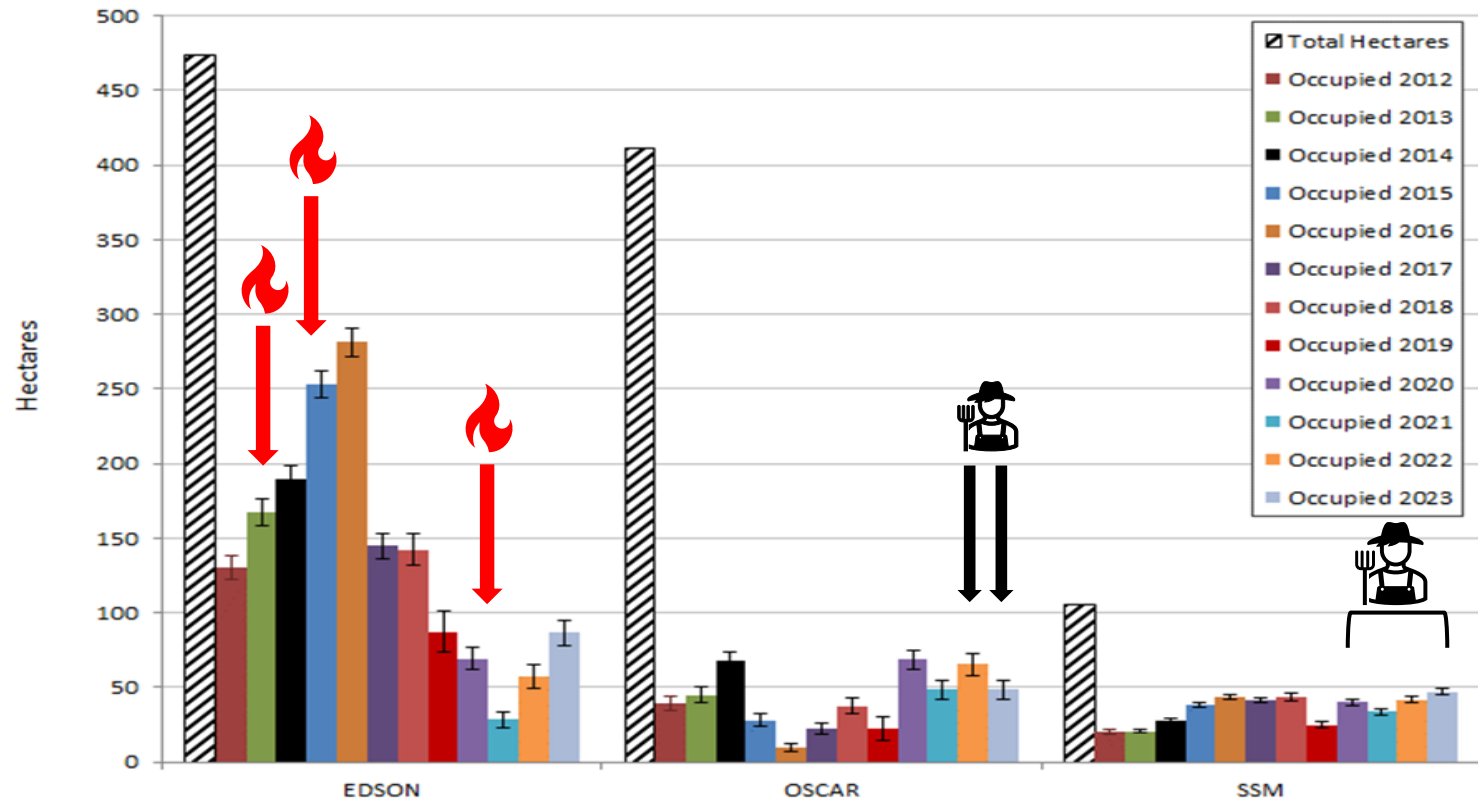
Special Linkage

# DANA POINT: MINIMUM KNOWN ALIVE





# CAMP PENDLETON OCCUPANCY AND HABITAT MANAGEMENT



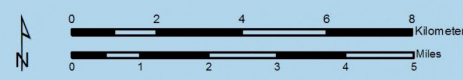


**Pacific Pocket Mouse Modeled Habitat in Orange County**

**Potential Habitat Suitability**

- Very High
- High

— Highway  
 County Line



Map Date: 24 January 2012  
 Data: FWS, CASIL  
 Image: Bing Aerial Map

*Final*

# Pacific Pocket Mouse Studies Program

## Phase III Report:

Task 5- Translocation Receiver Site Study  
 Task 6- Laboratory Surrogate Study  
 Task 7- Field Surrogate Study and Other Associated Studies

Prepared for:

**Foothill/Eastern Transportation Corridor Agency  
 and  
 U.S. Fish and Wildlife Service**

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Prepared by:

**Principal Investigator**  
 Wayne Spencer, Ph.D.  
 Conservation Biology Institute

**Project Manager**  
 Christina Schaefer  
 EDAW, Inc.

**EDAW**

Contributing Researchers  
 Shana Dodd  
 Stephen J. Montgomery  
 Charles Holland

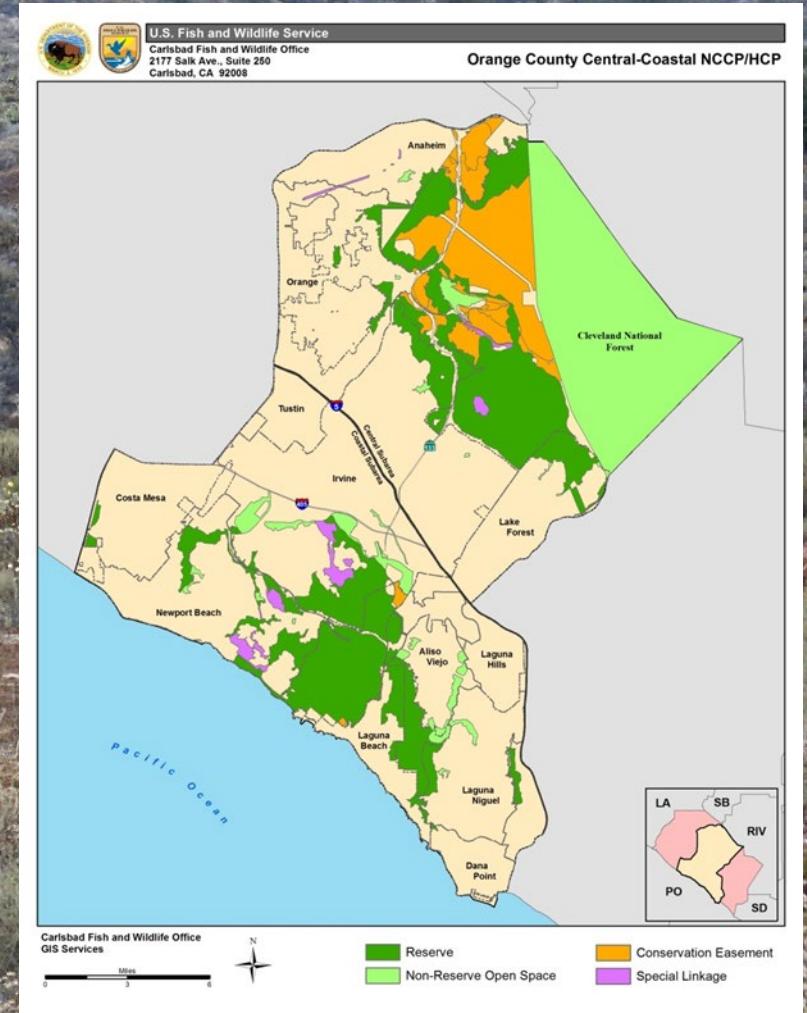
# CAPTIVE BREEDING EST. 2012



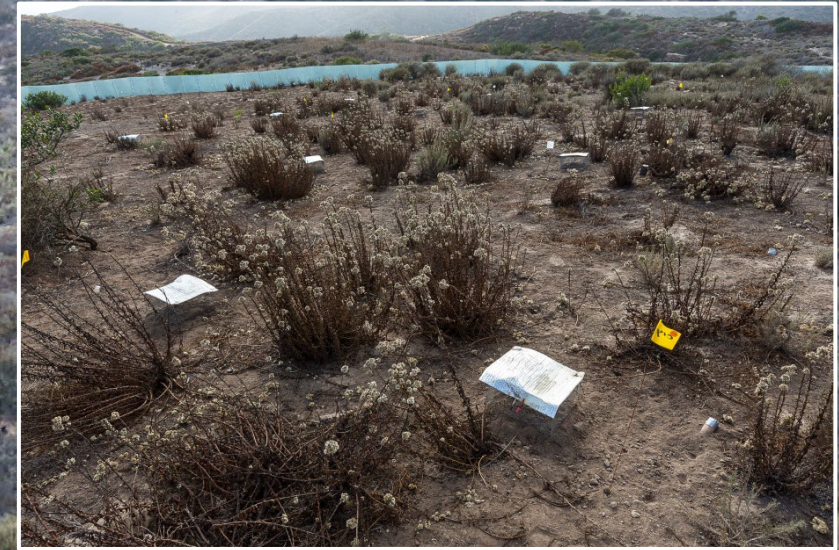
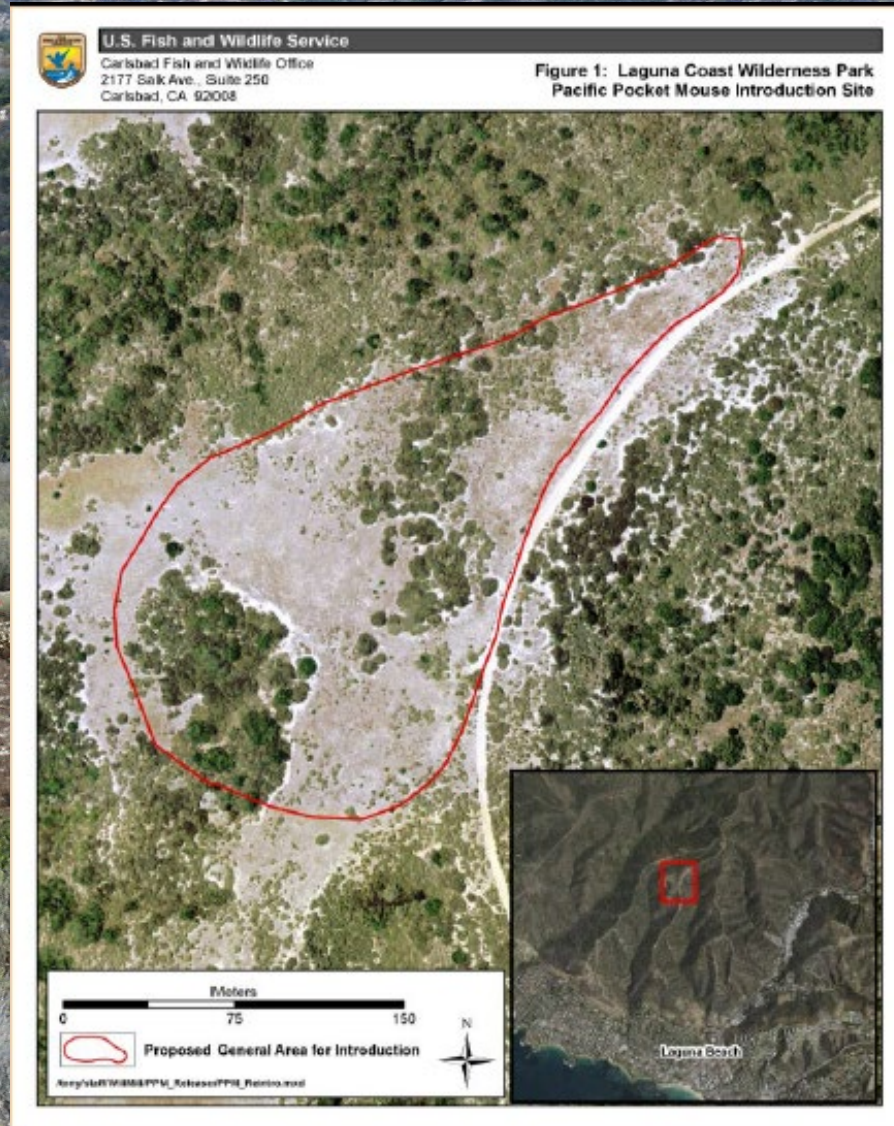
San Diego Zoo  
Wildlife Alliance

# WHERE TO REINTRODUCE?

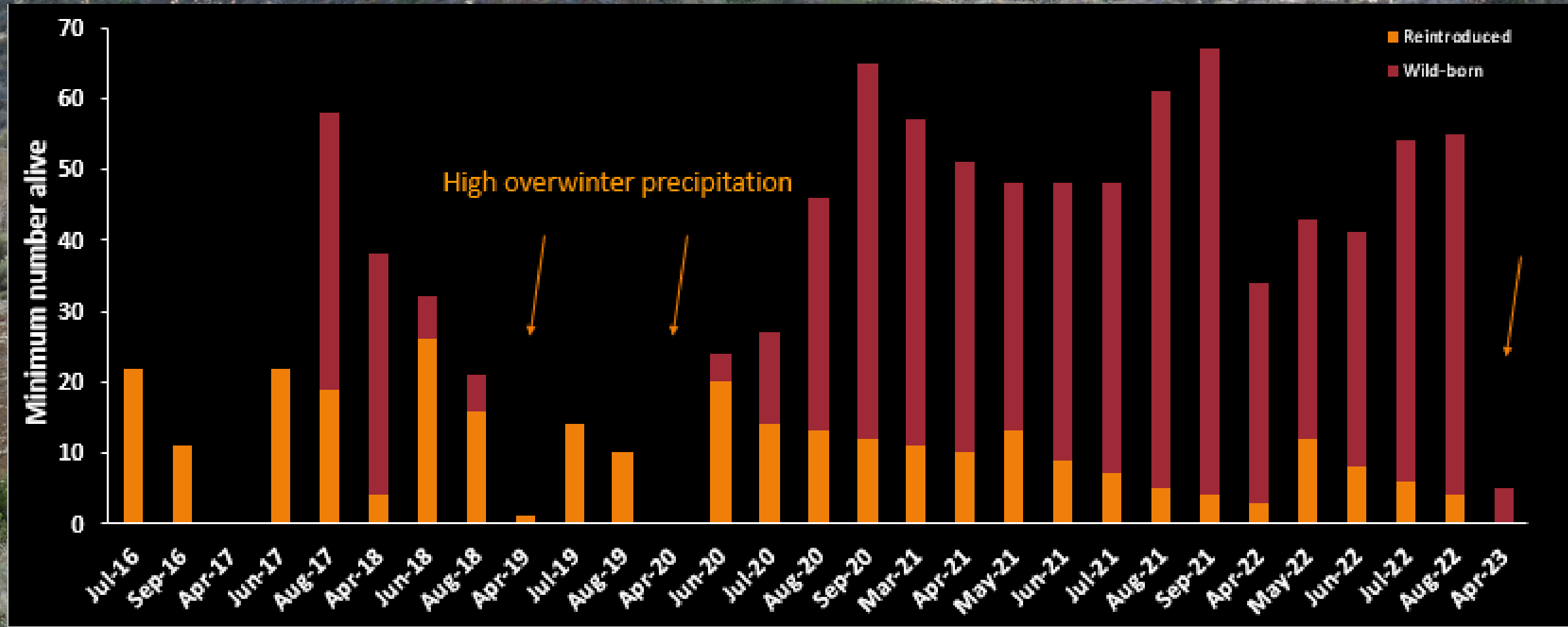
- Within historic range
- Sandy soils
- Open vegetation
- Compatible with other land uses
- Ability to monitor and manage
- Willing landowner



# LAGUNA COAST- WATER TANK 2016



# OVERWINTER SURVIVAL & REPRODUCTION



# WHERE TO REINTRODUCE? – TAKE 2



Contents lists available at [ScienceDirect](#)

Journal for Nature Conservation

journal homepage: [www.elsevier.com/locate/jnc](http://www.elsevier.com/locate/jnc)



Quantitative SWOT analysis: A structured and collaborative approach to reintroduction site selection for the endangered Pacific pocket mouse

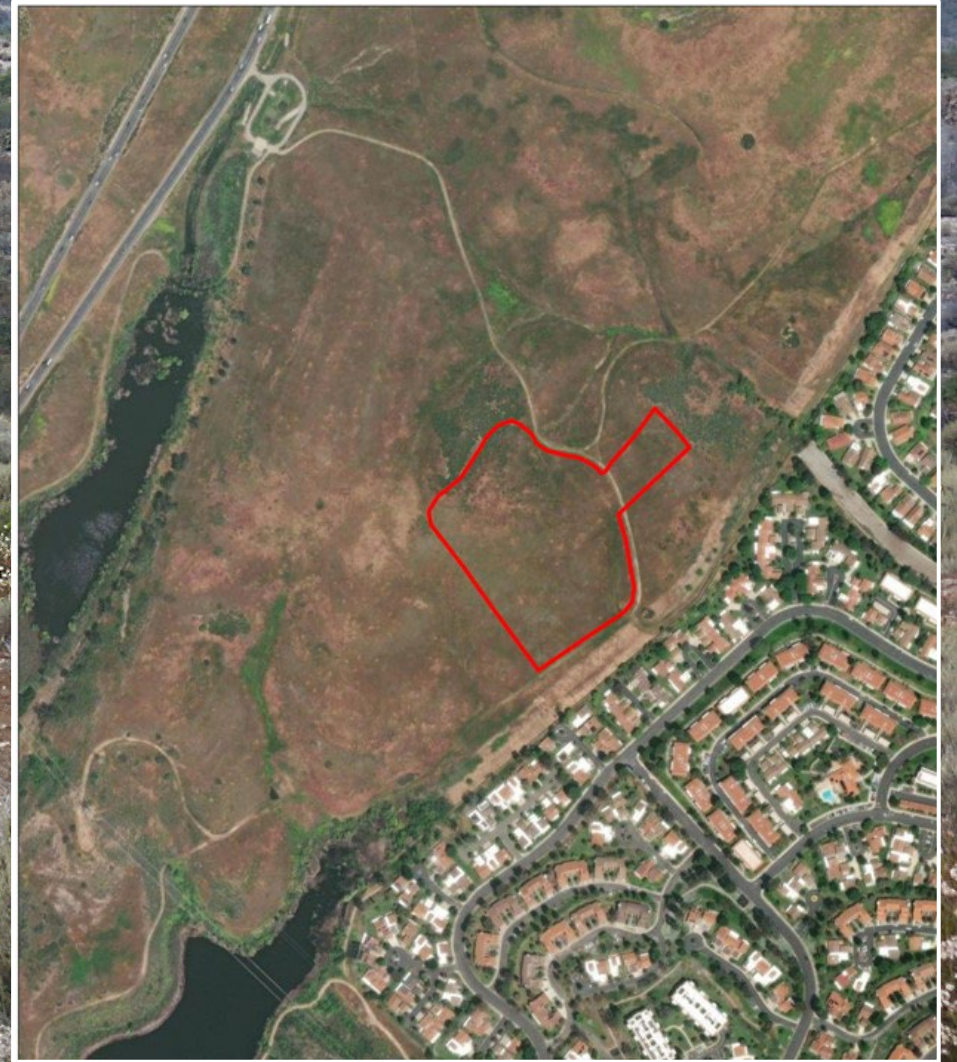
Rachel Y. Chock<sup>a,\*</sup>, William B. Miller<sup>b</sup>, Shauna N.D. King<sup>a</sup>, Cheryl S. Brehme<sup>c</sup>,  
Robert N. Fisher<sup>c</sup>, Hans Sin<sup>d</sup>, Peggy Wilcox<sup>e</sup>, Jill Terp<sup>f</sup>, Scott Tremor<sup>g</sup>, Matthew R. Major<sup>h</sup>,  
Korie Merrill<sup>i</sup>, Wayne D. Spencer<sup>j</sup>, Sherri Sullivan<sup>e</sup>, Debra M. Shier<sup>a,k</sup>



**DILLEY**

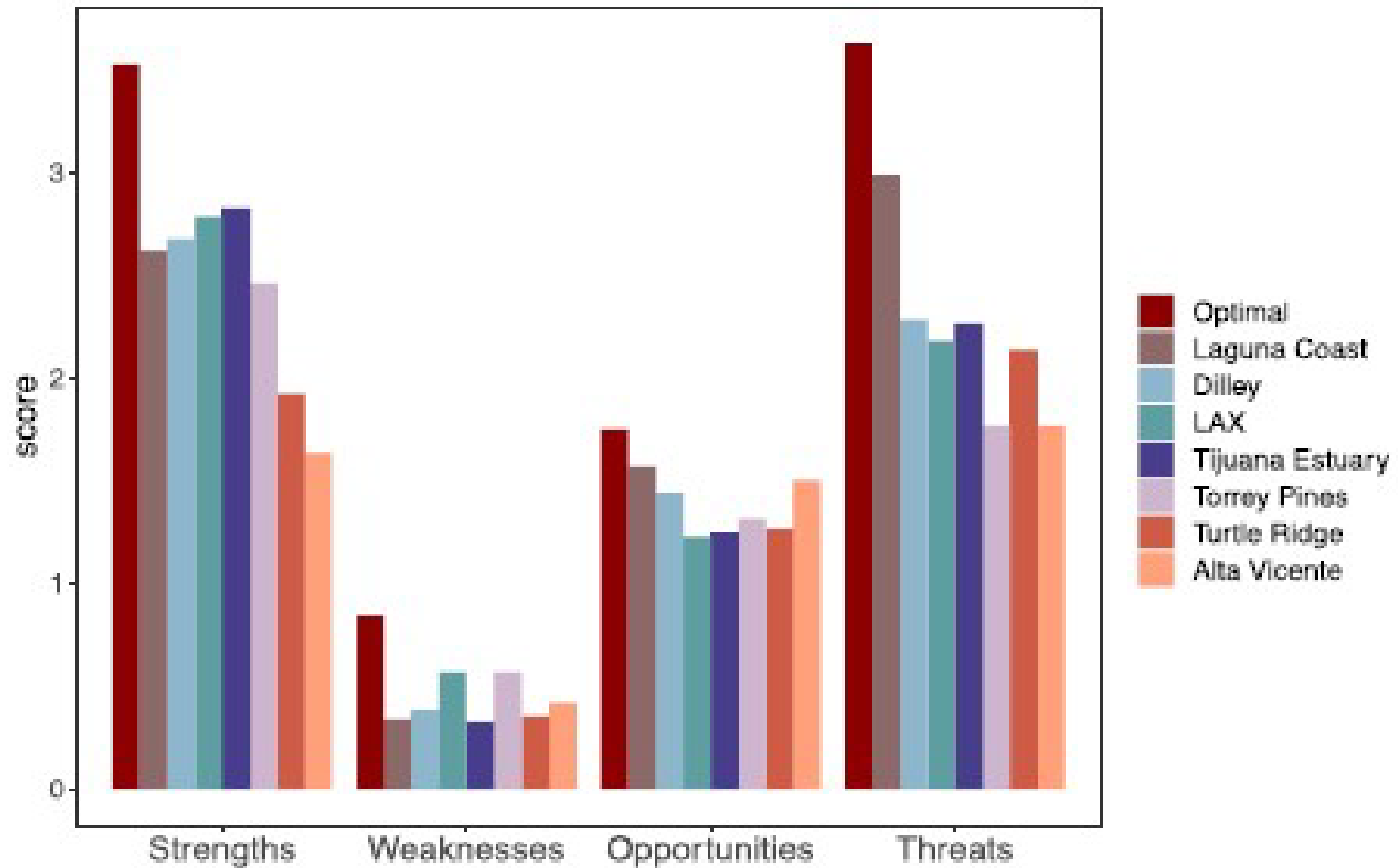


**L. L. PARCEL 5**





# DILLEY/PARCEL 5 RANKS HIGHLY



# POTENTIAL FOR COMPLEMENTARY HABITAT ENHANCEMENT

Laguna Coast Wilderness Park - Laguna Laurel Conservation Easement Property  
Habitat Enhancement Plan for "Vegetation Management Zones"

*- An Experimental Pilot Project -*

Matthew Major, Orange County Parks

September 2022

## DRAFT LAGUNA COAST WILDERNESS PARK PARCEL 5 RESTORATION PLAN

Prepared by William Miller, USFWS Biomonitor, Carlsbad Fish and Wildlife Office  
with input from the San Diego Zoo Wildlife Alliance. November 15, 2024



# PROSPECTIVE TIMELINE

2025- Initiate annual grass, thatch and weed removal

2026- Continue site preparation

2027- Use seeds to restore habitat to sage scrub mixed forbland

2027/2028- Install fencing, burrows and translocate mice

2028/2029- Monitor and adaptively  
manage vegetation and PPM

# CONSERVATION PARTNERS



San Diego Zoo  
Wildlife Alliance

## NNC Addendum Outline as of our Fall 2024 Team meeting

- NNC Dedication
- Funding
- Building Specifics
- Building Awards
- Exhibit Design
- Exhibit Awards
- NNC Overview – Theme - Full Views through the lenses of culture, art and science scientists
- Portals
- Historical Themes
- Entryway to the NNC
- Inside the NNC
- Entry Corridor
- A Full View
- Gallery
- Portal One – The Peaks of Saddleback
- Portal Two – The Little Sycamores
- Full Circle Mural
- Portal Three – Of Buckwheat and Sage
- Portal Four Stories in Stone – need to create a writeup on the new Geology exhibit
- Portal Five – Onward – The Vision to Save the Land

Need to update all the elements in the Portals now – what is working or needs repairs or replacement