

# Declining Cactus Wren Populations: What We are Learning from Monitoring Reproduction, Dispersal and Survival

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NATURE RESERVE  
of  
ORANGE COUNTY



Photo Karly Moore

# The Cactus Wren is a high conservation priority in coastal Southern California



# Conserving Cactus Wrens in Central & Coastal Orange County



Photo Kris Preston

# Nature Reserve of Orange County (NROC):

- Orange County's Central & Coastal NCCP/HCP
- Established 1996
- >37,000 acres conserved





- Non-profit organization responsible for implementing NCCP/HCP
- Multiple land owners & managers
- Three target species:  
Orange-throated Whiptail  
California Gnatcatcher  
Coastal Cactus Wren
- Coverage/conditional coverage for 36 other species





Photo Christine Beck

**NROC conserves ~4,100 acres of cactus scrub**

**With all the conserved habitat, why are we still concerned about Cactus Wrens?**





Santiago Fire – 10-07, CBS News Photo

1993 Laguna  
Fire burned  
75% of Coastal  
Reserve

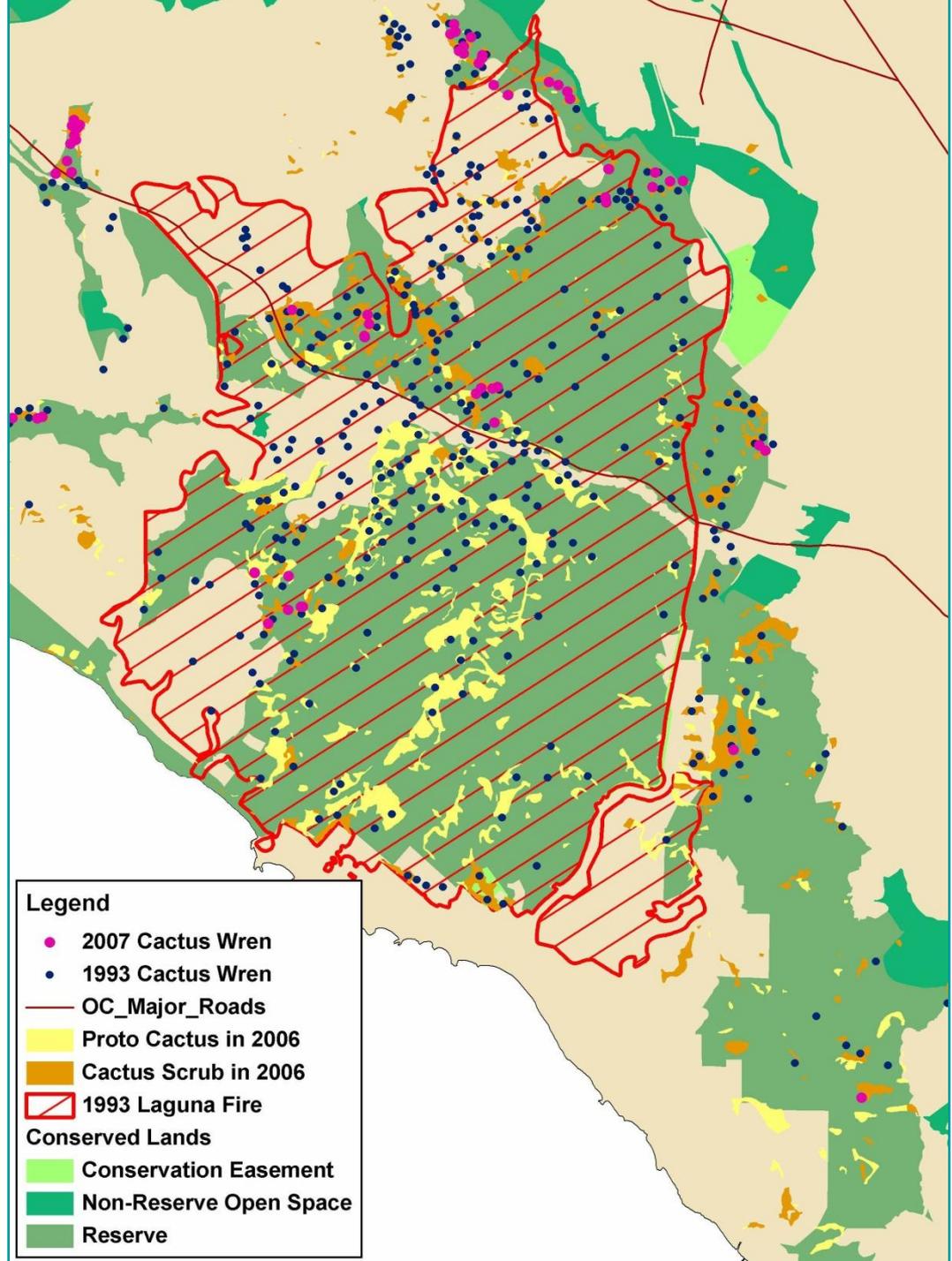
2007 Santiago  
Fire burned  
75% of Central  
Reserve



Santiago Fire – 10-07, CBS News Photo

# Coastal Reserve NROC mapped cactus & wrens 13 years after the Laguna Fire (2006-2007)

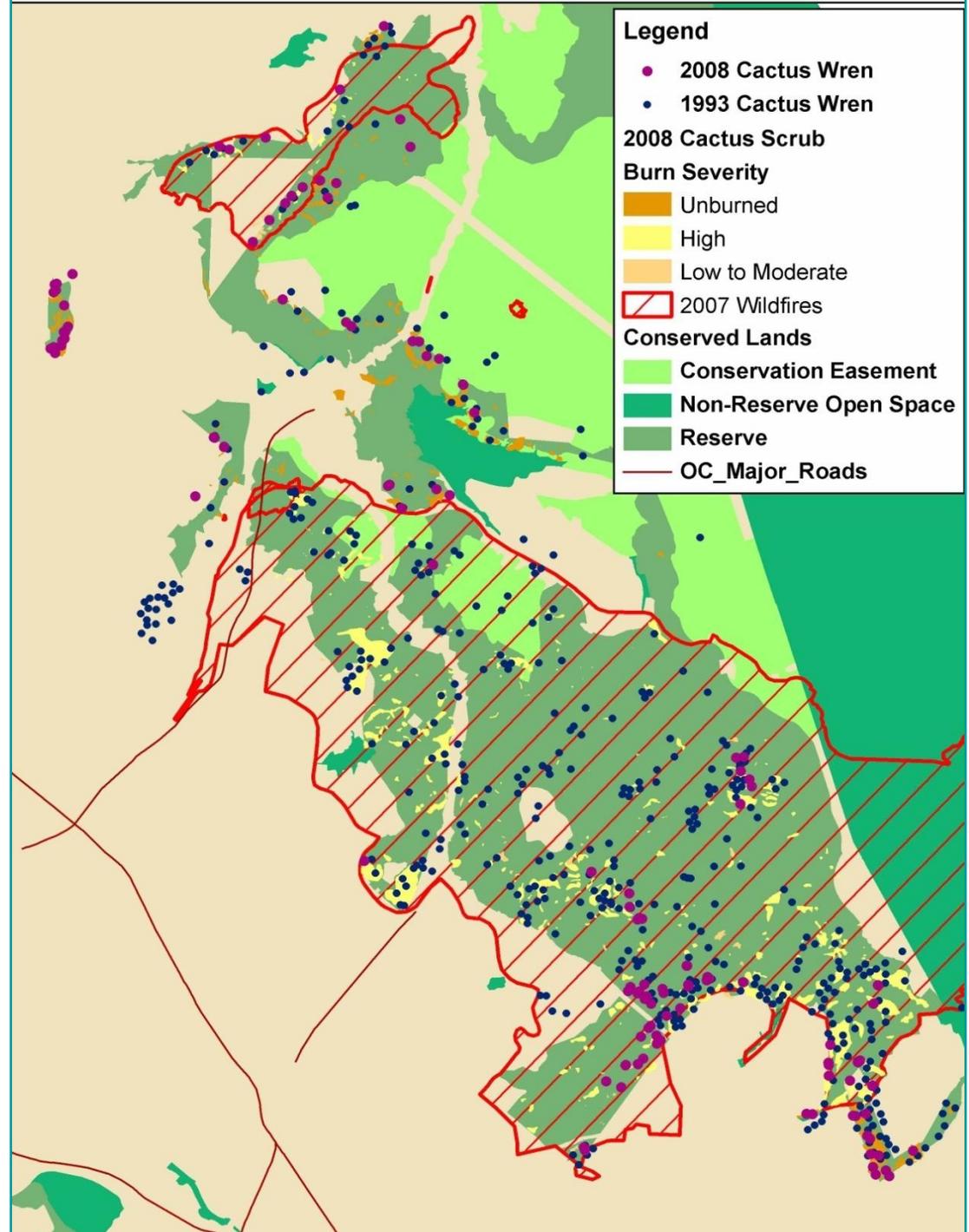
- 2,323 acres cactus scrub, 58% unsuitable for wrens
- 187 acres occupied in 2006 vs. estimated 1,470 in 1992 (87% ↓)  
(Mitrovich & Hamilton 2007)



# Central Reserve NROC mapped cactus & wrens first year after Santiago Fire (2008)

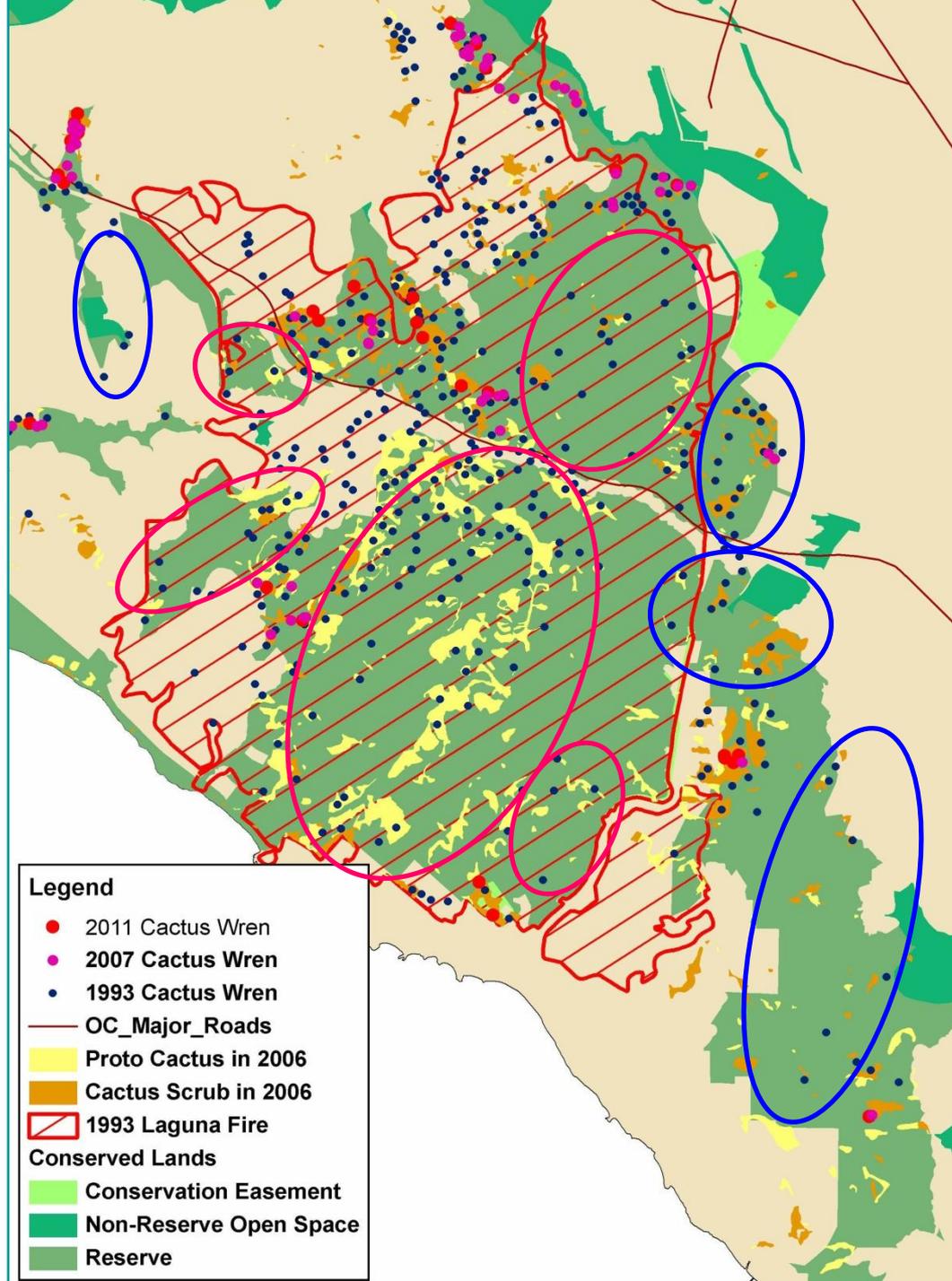
- 1,855 acres cactus scrub, 77% burned
- 683 acres suitable for wrens
- ~67 territories  
(est. 82%↓)

(Leatherman BioConsulting 2009)



# Cactus Wren have disappeared from burned & unburned areas of the Coastal Reserve

- Missing from  
burned areas
- Missing from  
unburned areas  
(not shown is  
Newport Back Bay)



# Why are Cactus Wren populations declining & disappearing?



Photo Christine Beck

# Possible Factors Contributing to the Cactus Wren's Decline

- Low productivity  
food limitation, nest predation
- Low survivorship  
predation, disease
- Isolated small populations  
vulnerable to local extinction with limited dispersal & recolonization
- Insufficient suitable habitat  
habitat has not recovered since fires or has changed in composition and structure

# NROC Monitoring Study

## Objectives:

- Monitor individual productivity & annual survival
- Monitor dispersal & recruitment of individuals into local populations
- Identify threats to the persistence of Cactus Wren
- Collect genetic material for connectivity & taxonomic analyses



Photo Maria Carillo



Photo Karly Moore

# NROC Monitoring Team

Dana Kamada, Karly Moore, Scott Thomas & Kris Preston





Photo Trish Smith



Photo Kris Preston



Photo Kris Preston



Photo Kris Preston



Photo Elisabeth Brown

**Volunteers have been a BIG help surveying for Cactus Wrens**

# Measuring Cactus Wren Productivity

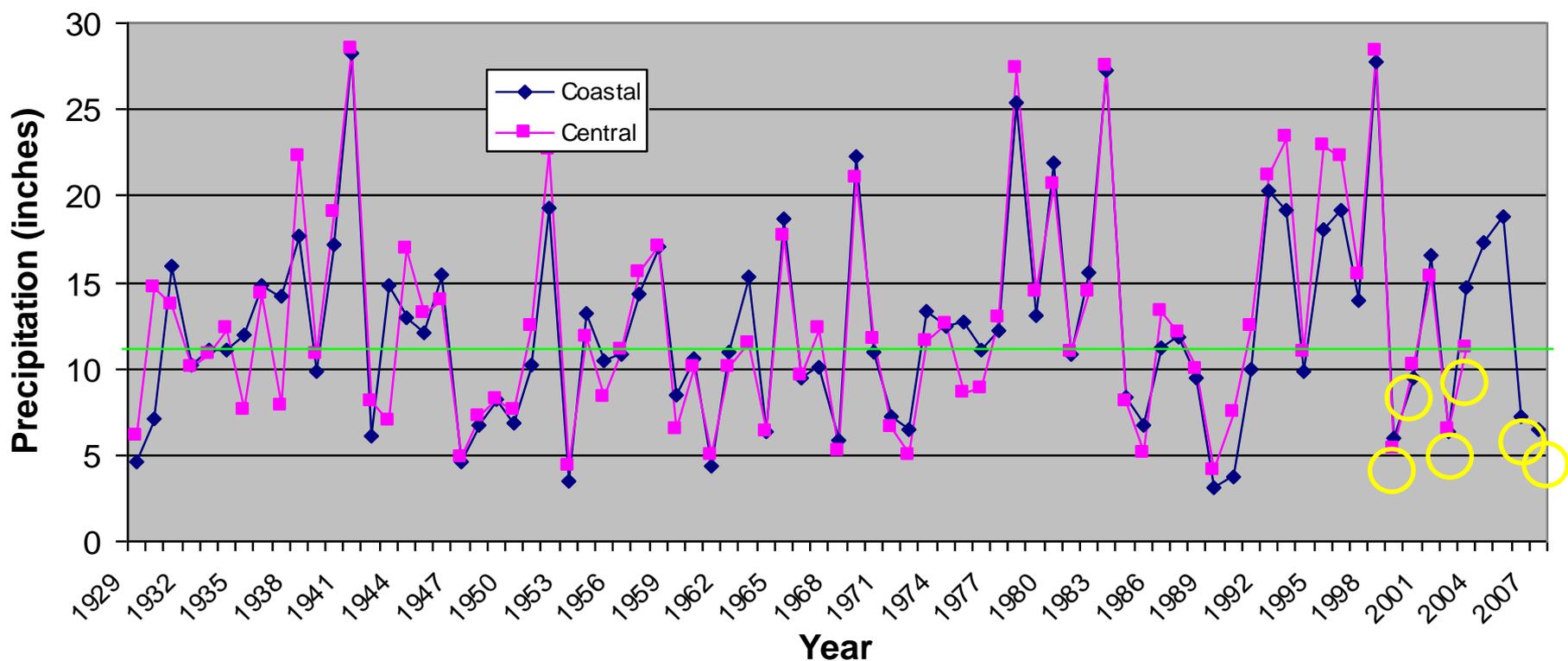


Photo Karly Moore

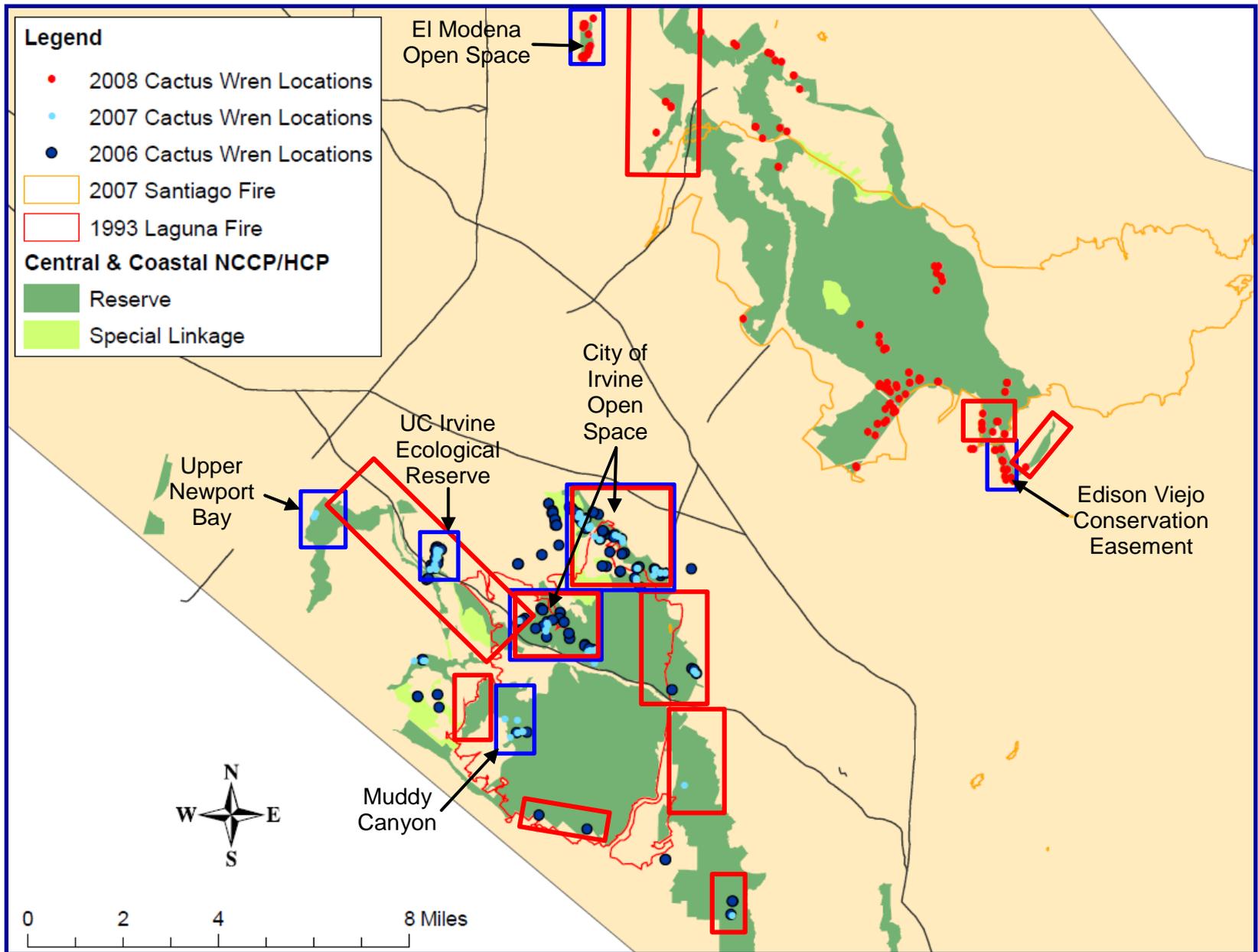
# How important are nest predation and food limitation in Cactus Wren productivity?

- Population decline during recent droughts
- Role of predation unknown

Annual Precipitation in the Central and Coastal Subregions from 1929 to 2007



# NROC Monitoring Study



# Reproductive Monitoring

- 2009 - 34 territories at 5 sites
- 2010 - 47 territories at 9 sites
- 2011 – 60 territories at 9 sites

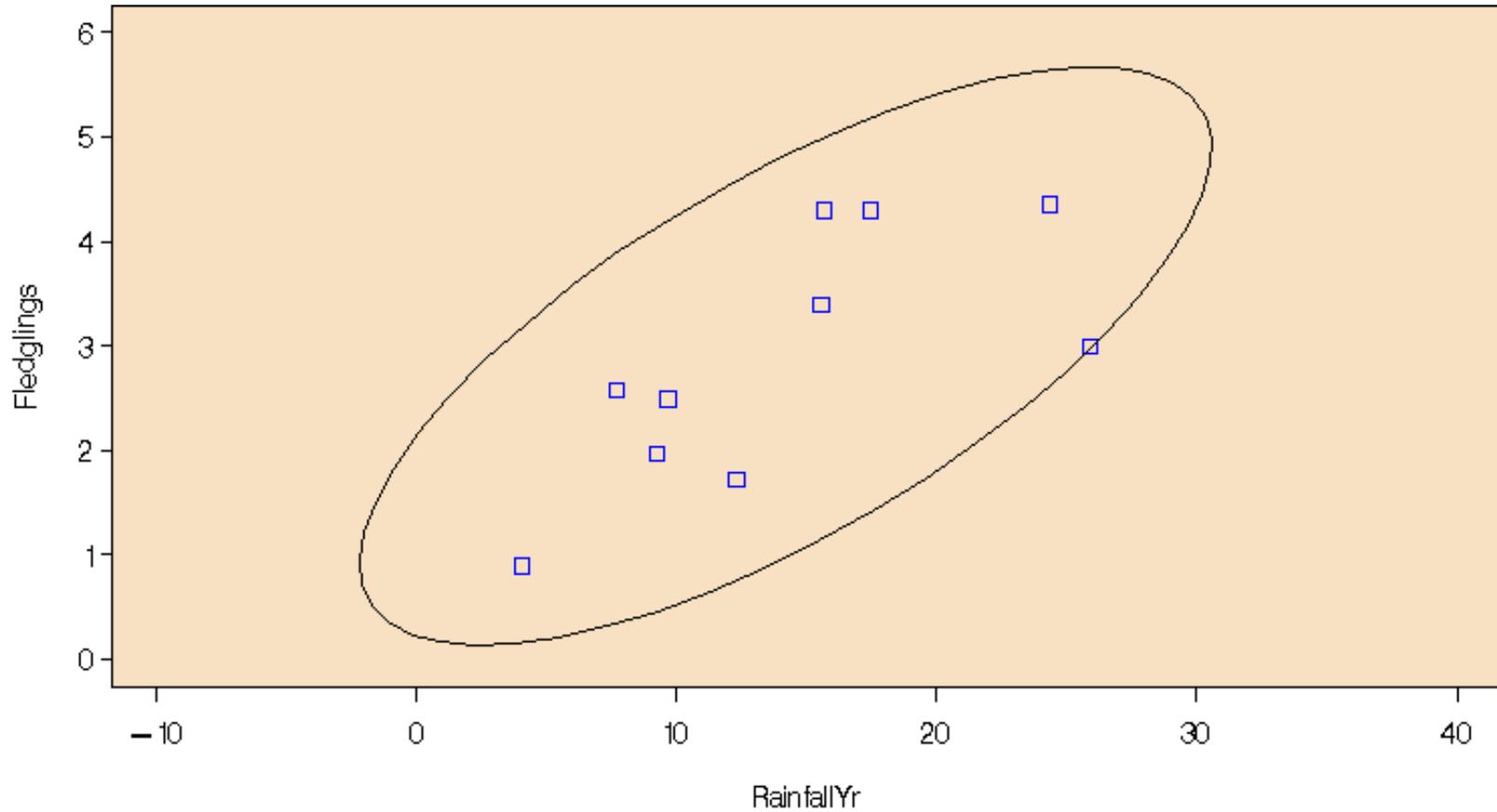


# Cactus Wren Productivity in Southern California

Reproductive Parameter	NROC This Study		NROC Telemetry	Harmsworth OC	Atwood et al PV Peninsula
	2009	2010	2007	1997 & 1998	1993-1997
# Pairs Monitored	32	46	12	10 prs/yr	3-9 prs/yr
% Pairs Successful	74%	92%	50%	100%	
Average # Fledglings/ Pair	2.5	3.3	0.9	4.3	3.0-3.6
Average # Fledglings/ Successful Pair	3.2	3.4	1.6	4.3	



# Positive Correlation: Rainfall & Productivity



Confidence Ellipse: 0.95

$r = 0.72$ ,  $p = 0.02$ ,  $n = 10$

# Causes of Nest Failure

- 2009: primarily nest predation, other factors include loss of adults, late season pairing, nest destroyed by other wrens
- 2010: primarily predation, other factors include infertility, nest destroyed by other wrens. Some nestlings delayed in development and may have died from starvation.



Photo Karly Moore

# 2011 Started Out Slow

Cold wet spring & nesting delayed

- small clutches
- nests abandoned with eggs
- incremental loss of eggs & nestlings
- delayed development
- small clutches
- high nest predation (corvids)



Photo Kris Preston

# Habitat Quality & Food Limitation?



# Habitat Quality & Food Limitation?



# Population Increases 2009-2011

In 2010, pairs recolonized Buck Gully & Boat Canyon

Site	Number of Territories			
	2009	2010	2011	Change
Bommer Canyon	ND	5	7	+ 2
Crystal Cove State Park	1	2	2	+ 1
Mule Deer	ND	1	1	0
Quail Hill	0	0	1	+ 1
Sand Canyon Reservoir	ND	4	3	- 1
Turtle Ridge	ND	4	1?	?
UCI Ecological Preserve	5	6	9	+ 3
Upper Newport Bay	3	2	2	- 1
El Modena	13	13	19?	+ 6
Southern California Edison	11	12	16	+ 5

# Measuring Cactus Wren Survival & Dispersal



Photo Karly Moore

# Color Banding

2009-2011: banded 437 birds to date  
(73 AHYs, 364 HYs)



Photo Maria Carillo



03.17.2009

Photo Kris Preston

# Adult Survival

- 19 of 49 (39%) of banded adults with established territories disappeared from 3-09 to 6-10
- Most individuals disappeared between breeding seasons
- Cooper's Hawk predator of adults & young



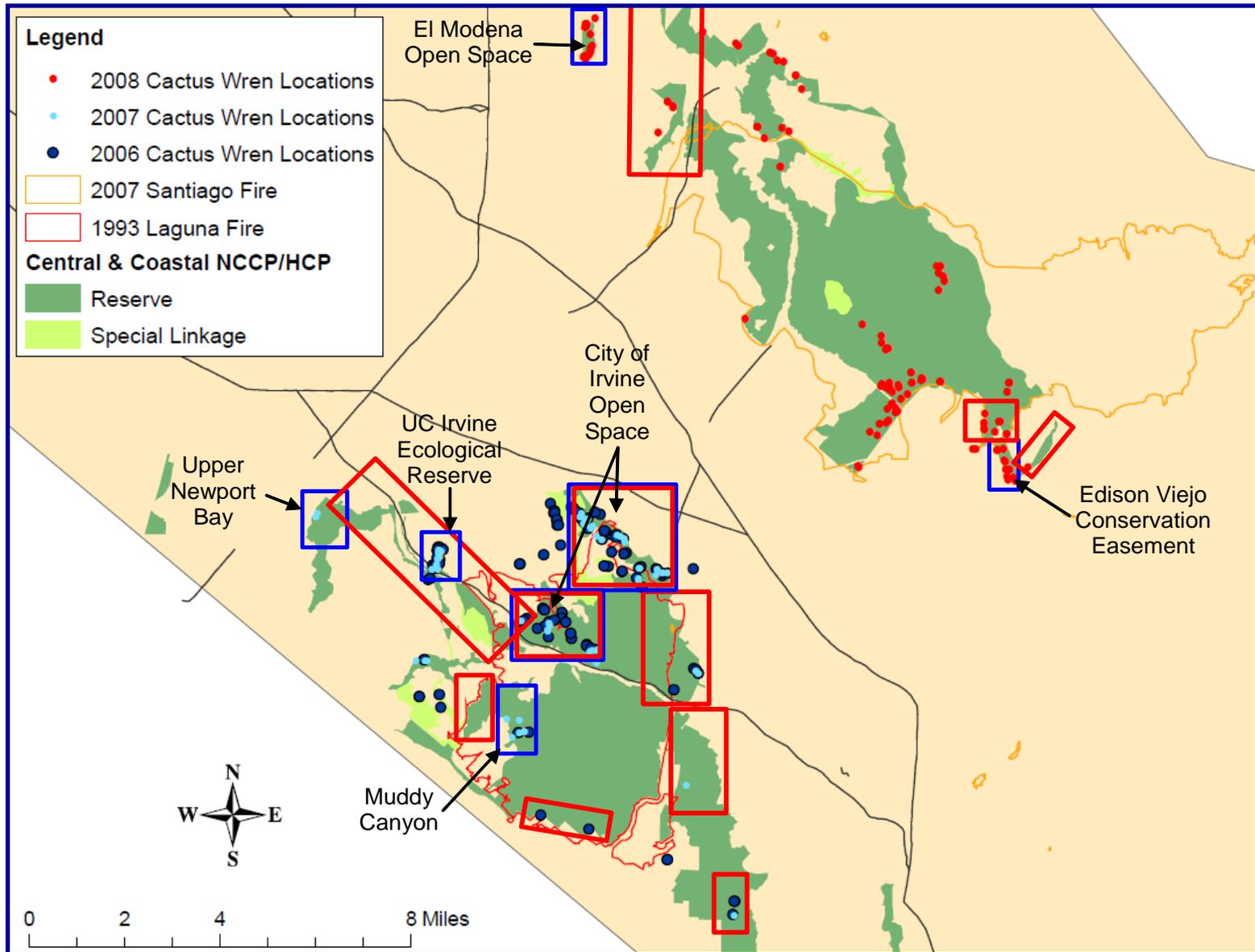
# Changes in Pair Composition

Cactus Wren pair composition changes between 2009 & 2010 (both members of pair banded in 2009)

Pair bond status 2009 to 2010	Number of pairs	% of pairs
F leaves M mid-breeding season after 1st brood & breeds with another M	1	6.3%
F forced out of territory by another F in 2010	3	18.8%
Pair dissolves after 1st breeding season, become floaters	1	6.3%
Pair dissolves after 1st breeding season, obtain new territories & mates	1	6.3%
F disappears mid-breeding, suspect alive with Fls, M gets 2nd F & breeds	1	6.3%
Mate disappears between breeding & remaining bird gets new mate	2	12.5%
Both birds disappear (die?) between breeding season	1	6.3%
Pair remains together 2009 & 2010 breeding seasons	6	37.5%
Total	16	

For pairs changing mates: 67% “divorced”  
& 33% had partner disappear (dead?)

# Monitored dispersal of banded birds (2010) at 18 sites (including 9 monitoring sites)



# Juvenile Dispersal

- Documented dispersal of 16 juveniles in 2010 (7 F, 9 M)
- Juveniles dispersed average 0.4 miles (straight) or 0.6 miles (through natural habitats)
- 9 young established breeding territory at natal site
- Juvenile dispersal distance less than other studies

Atwood 2002 ave = 1.0 mile, outlier - 6.2

Bontrager & Gorospe 1995, ave = 0.8 mile, outlier = 3.5



Photo Karly Moore

# Adult Dispersal

- 10 adults dispersed from 2009 territories to new 2010 territories
- Adult average dispersal 0.6 mile (straight line) and 1 mile (natural habitat)
- 80% of adult dispersals were by females



Photo Karly Moore

# Dispersal Milestones

- Three long distance dispersals so far
- Dispersing birds are crossing SR 73 Toll Road (8 lanes)



Photo Karly Moore

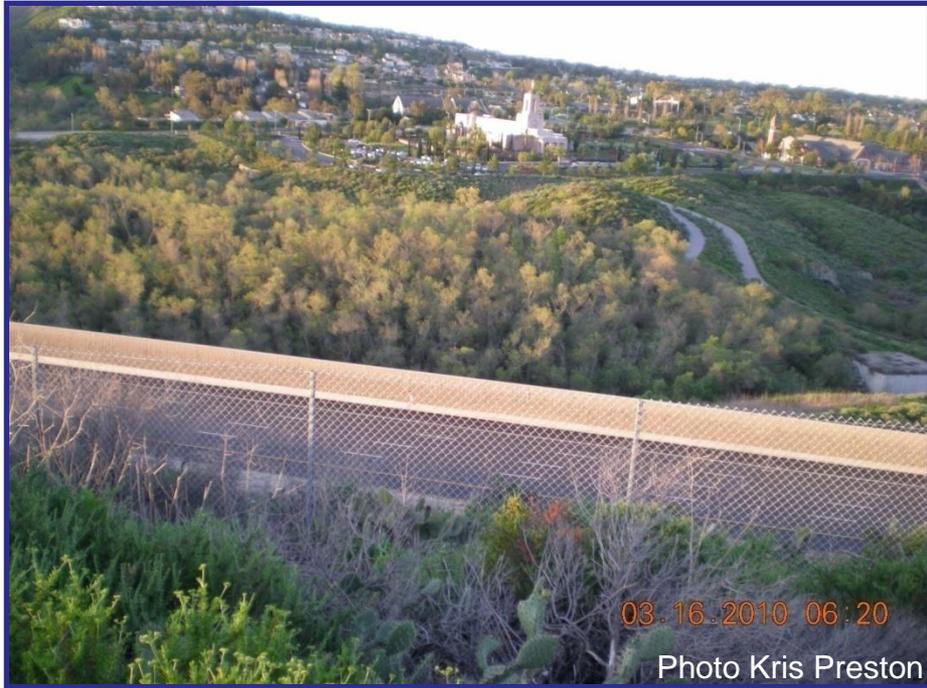


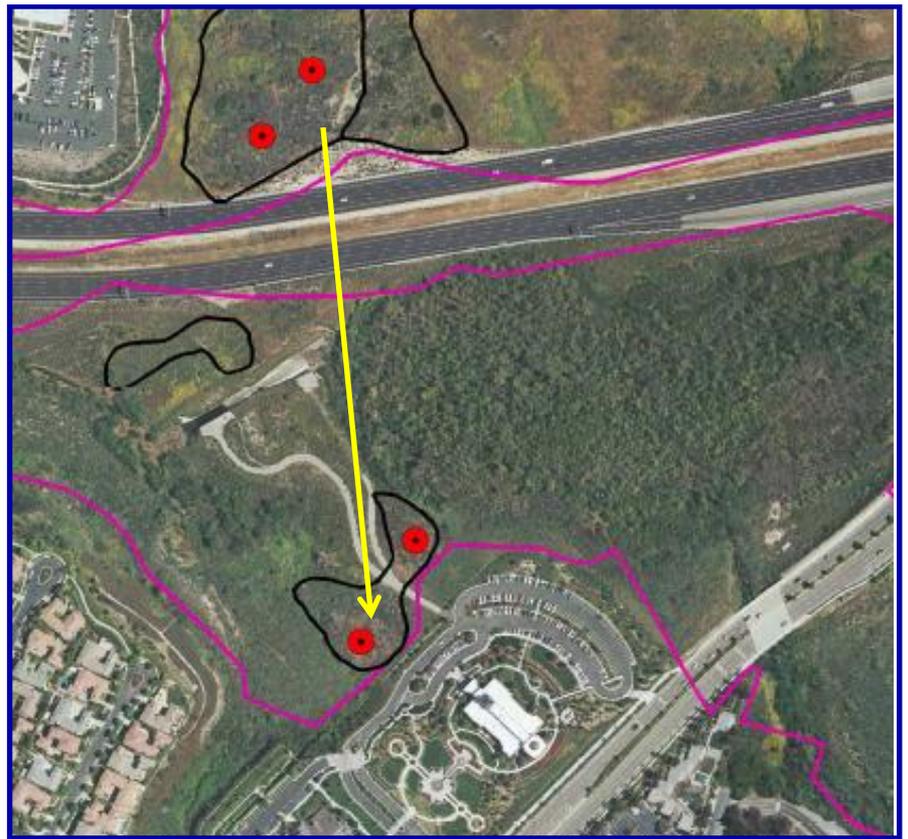
Photo Kris Preston



Photo Karly Moore

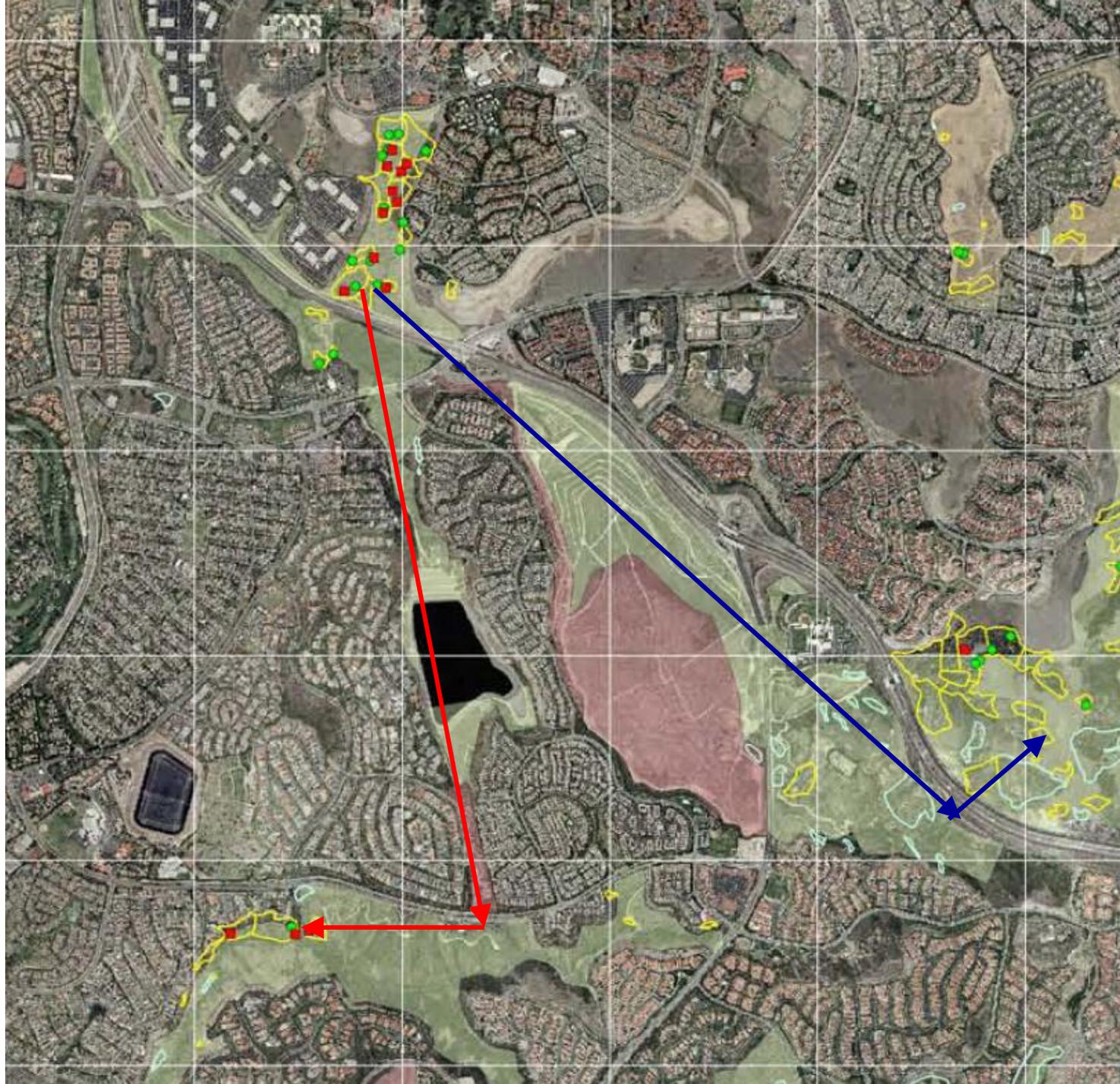


Photo Karly Moore



Pair of  
banded  
juveniles  
disperse  
2.7 miles

Banded  
adult  
female &  
unbanded  
male  
disperse  
3.1 miles



# Why Cactus Wren Have Declined in NROC

- Catastrophic wildfires  
destroyed habitat & killed wrens
- Low productivity  
food limitation & nest predation both important; positive correlation - productivity & rainfall
- Low survivorship?  
it will take several more years of surveys to estimate survival
- Isolated small populations  
vulnerable to local extinction - limited dispersal & recolonization (some sites still not recolonized)
- Insufficient habitat  
all sites at or above capacity
- Poor quality habitat?  
too much shrub & invasive plant cover could affect foraging

# Acknowledgements

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- Dana Kamada
- Karly Moore
- Scott Thomas
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- Trish Smith, The Nature Conservancy
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Susie Anon	Dana Lee
Portia Arutunian	Lana Meade
Dr. Elisabeth Brown	Sally Menzel
Maria Carillo	David Pryor
Deana Collins	Shirley Reynolds
Mayra Garcia	Susan Sheakley
Bethany Glaeser	Paul Strauss
Gail Gutierrez	Peter Wetzel
Janette Havens	Kathy Young
Robert Holcomb	



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