

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

- 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





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

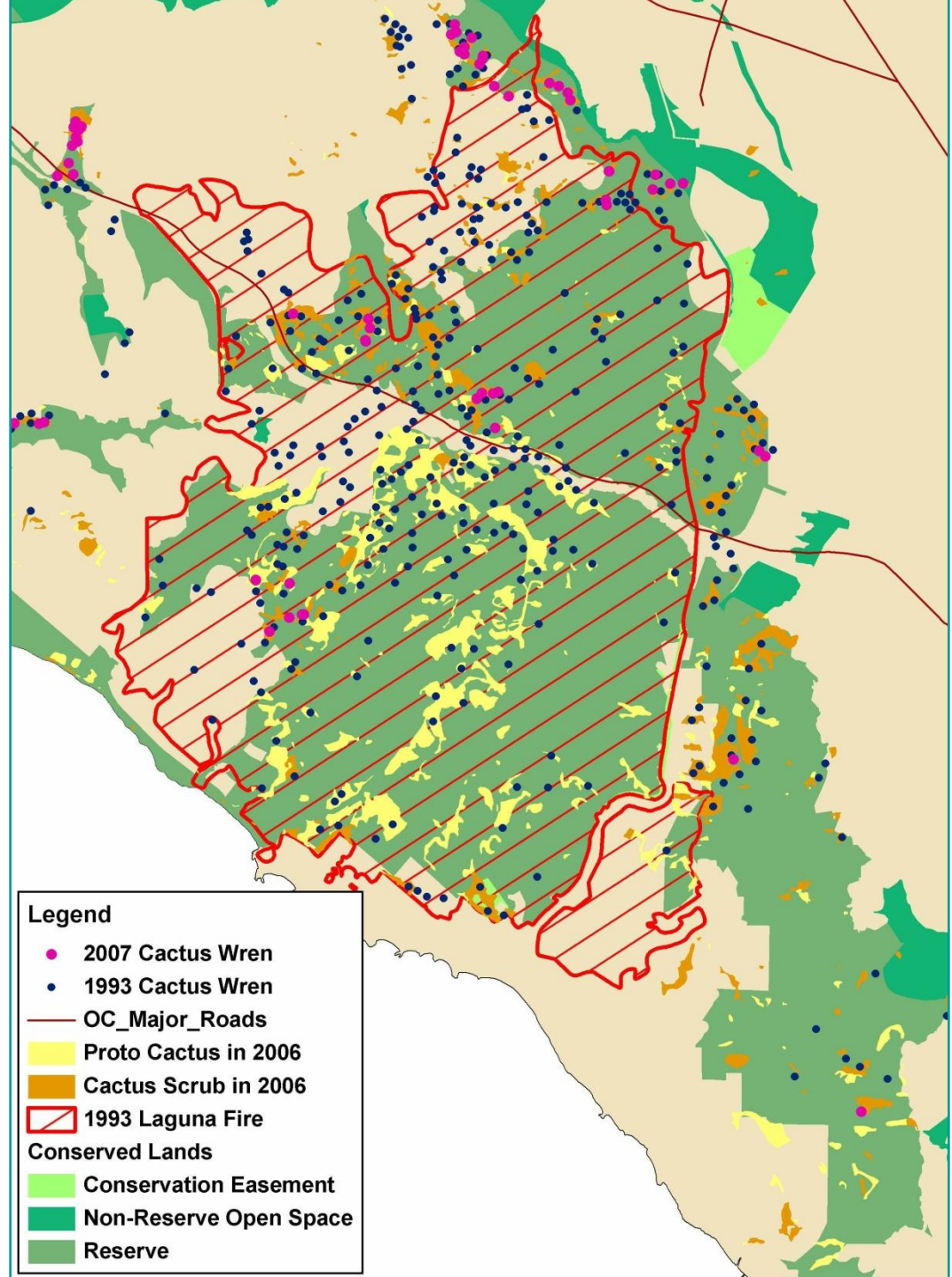
2007 Santiago
Fire burned
75% of Central
Reserve



Santiago Fire – 10-07, CBS News Photo

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

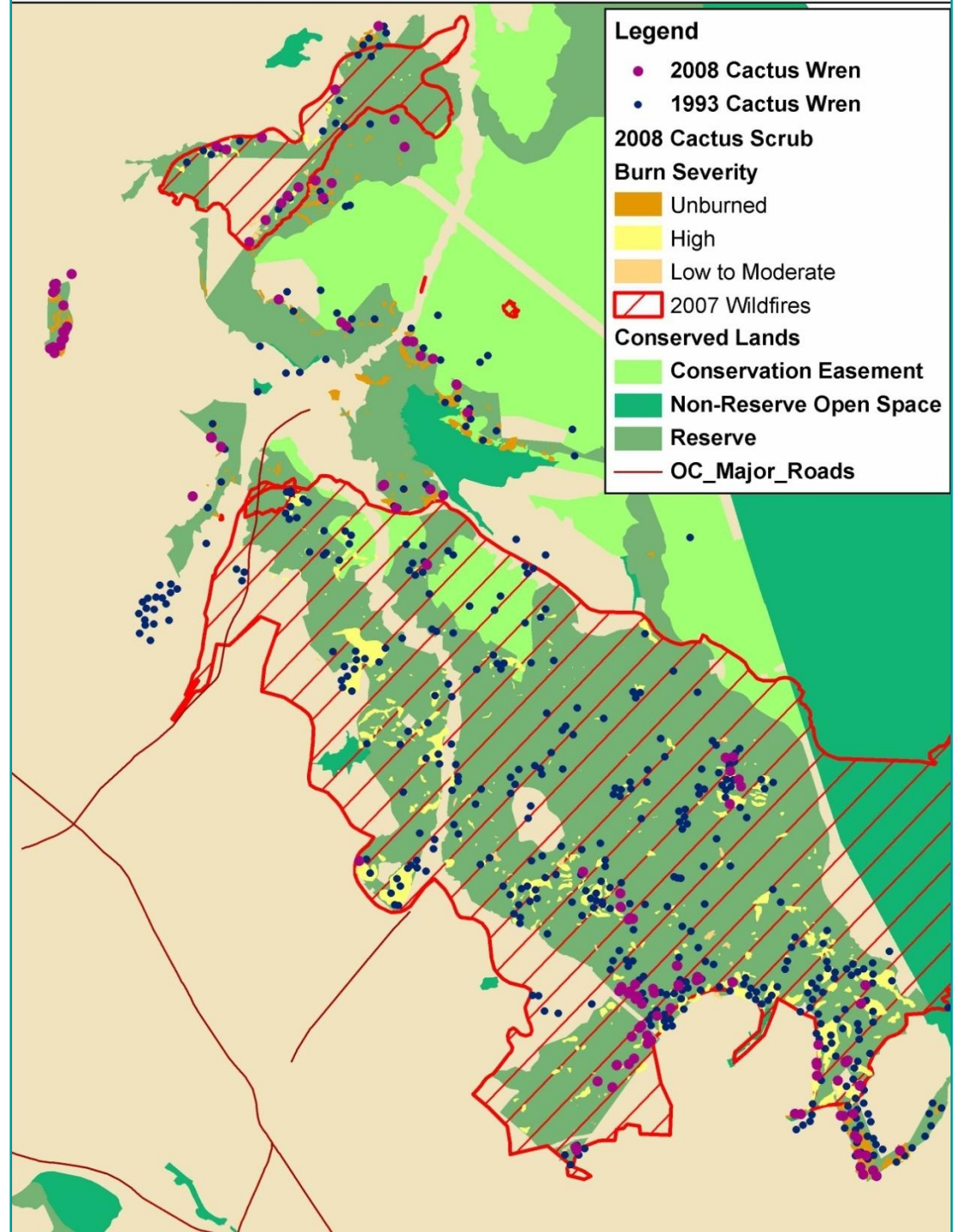
- 2,323 acres cactus scrub, 58% unsuitable for wrens
- 187 acres occupied in 2006 vs. estimated 1,470 in 1992 (87% ↓)
(Mitrovich & Hamilton 2007)



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

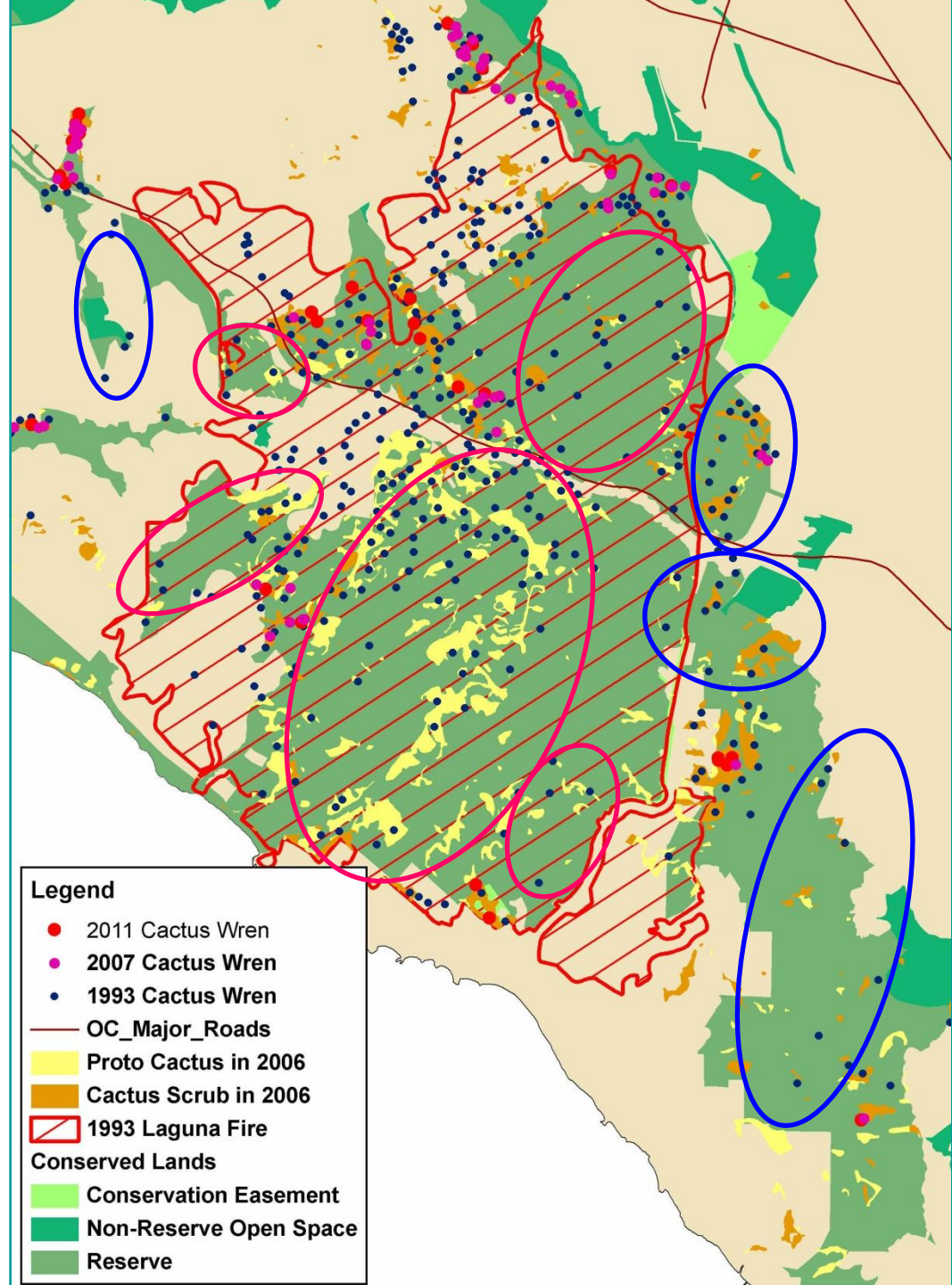
- 1,855 acres cactus scrub, 77% burned
- 683 acres suitable for wrens
- ~67 territories
(est. 82%↓)

(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?



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



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

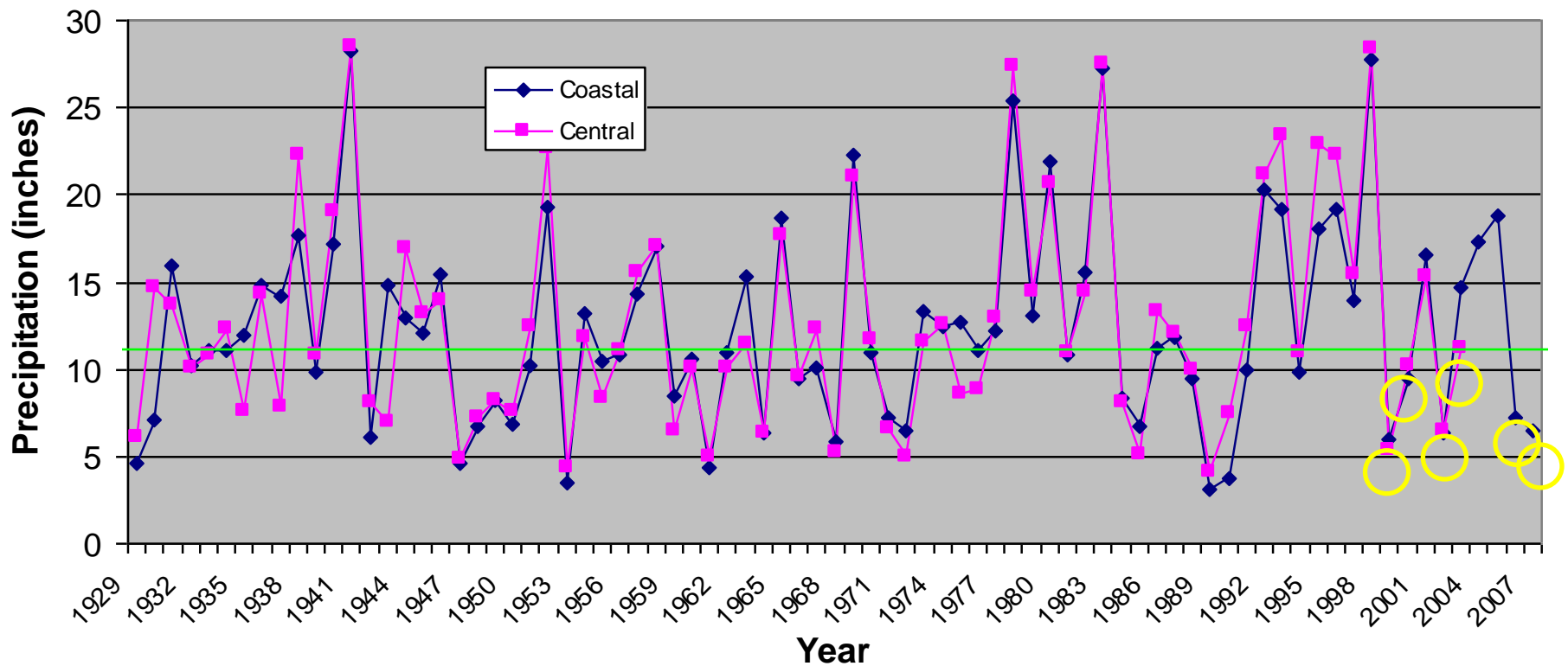


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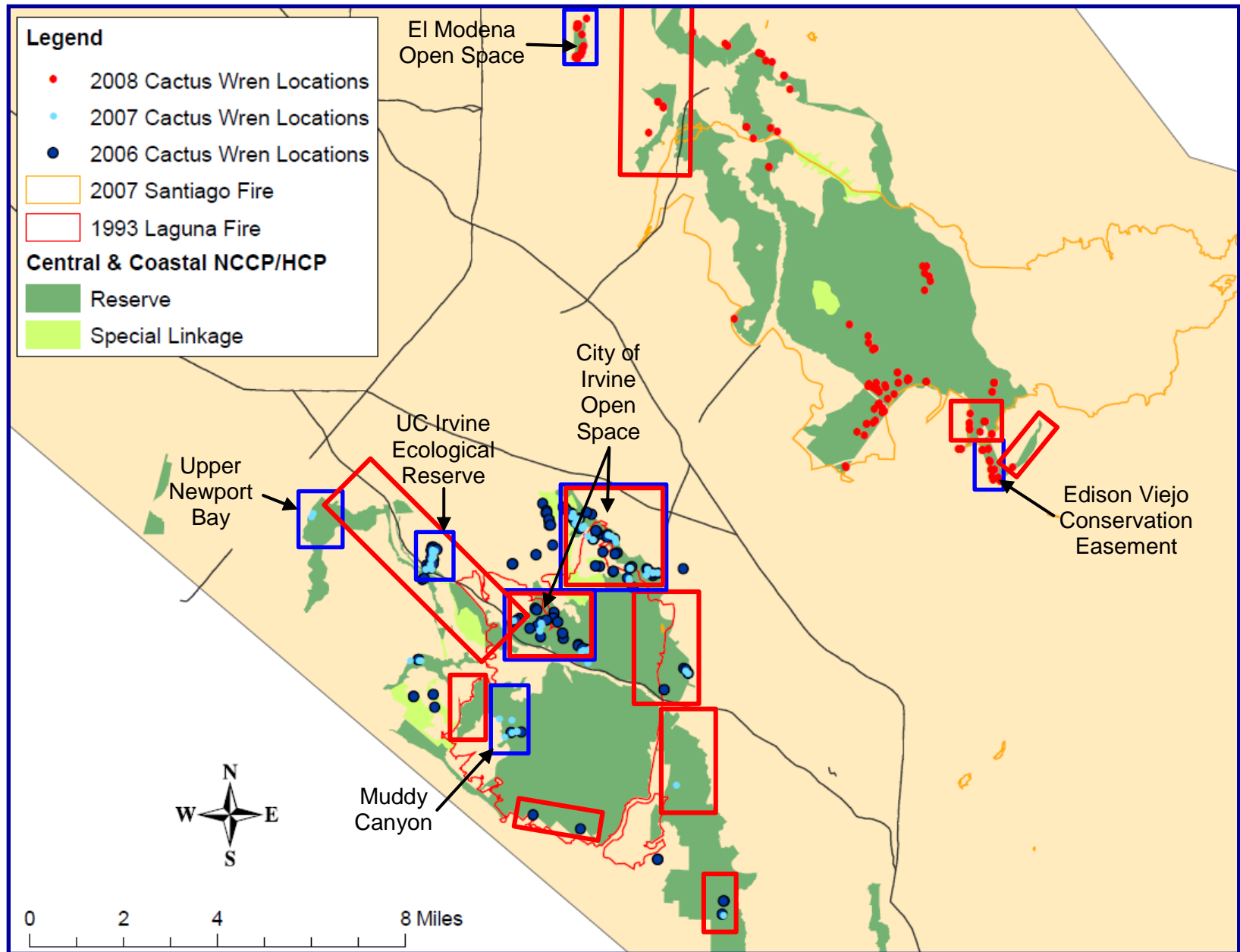
How important are nest predation and food limitation in Cactus Wren productivity?

- 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

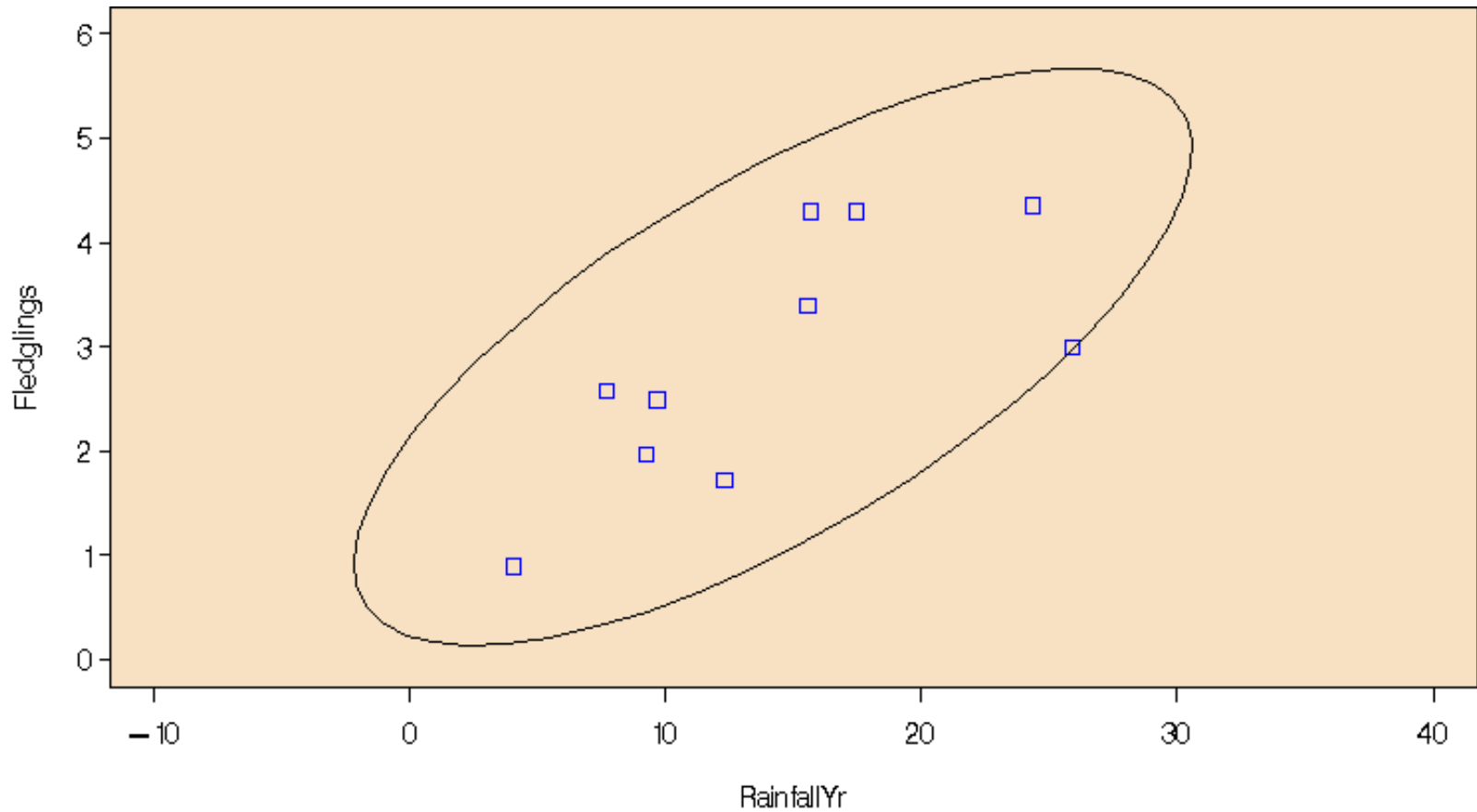


Cactus Wren Productivity in Southern California

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			Change
	2009	2010	2011	
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)



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



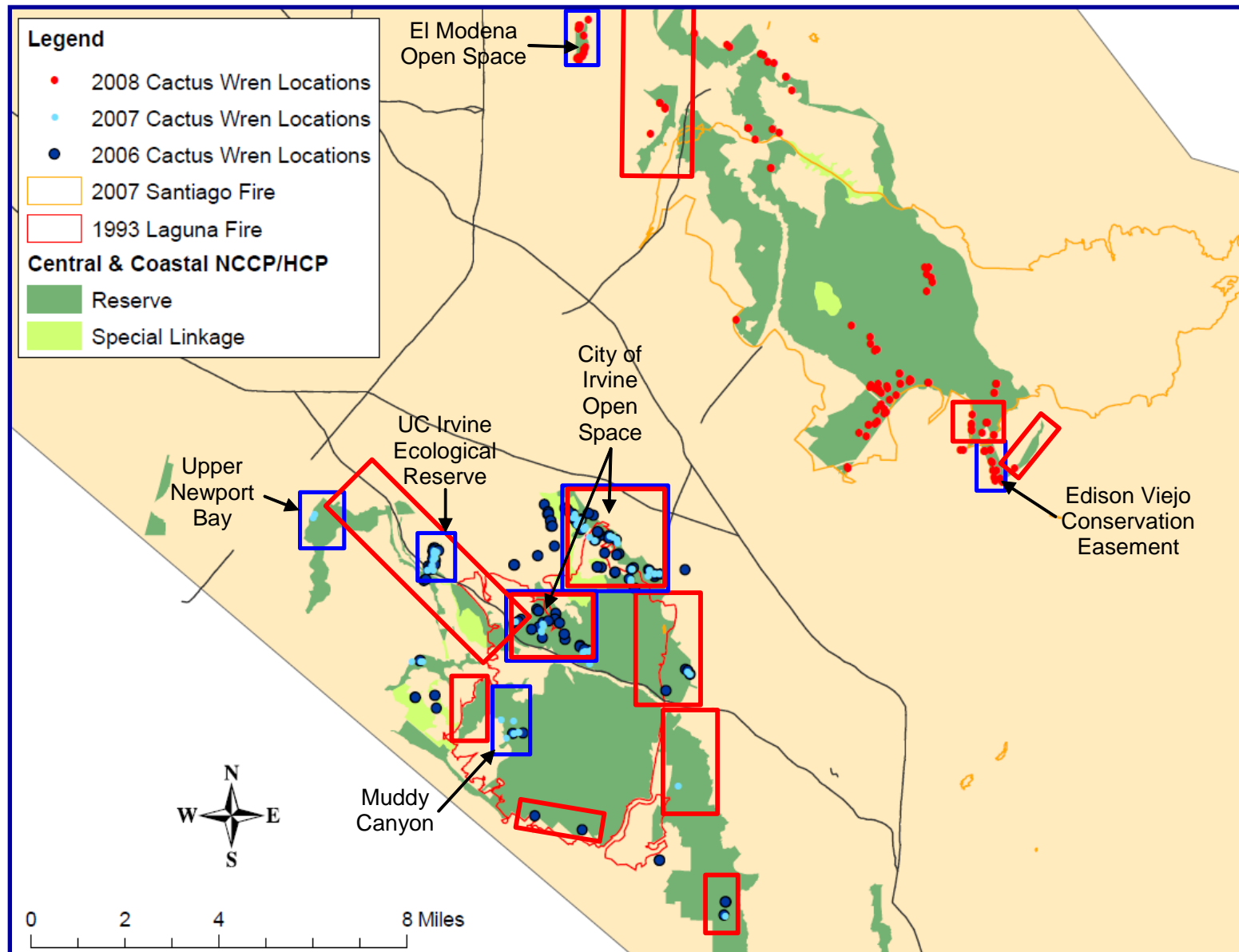
Changes in Pair Composition

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



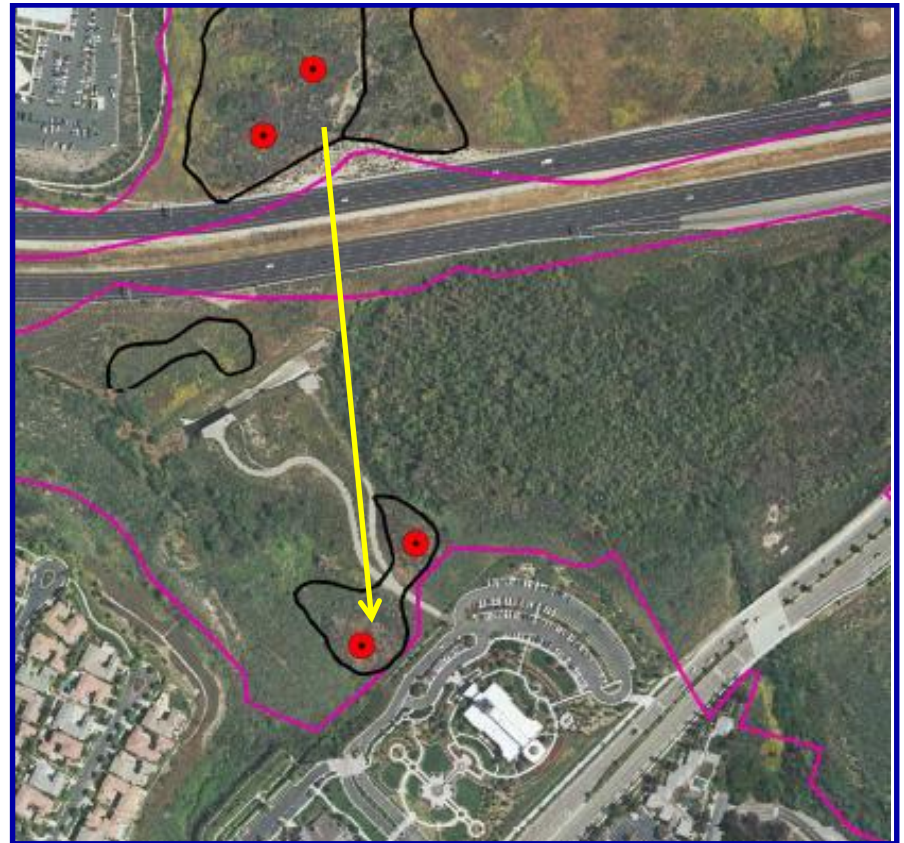
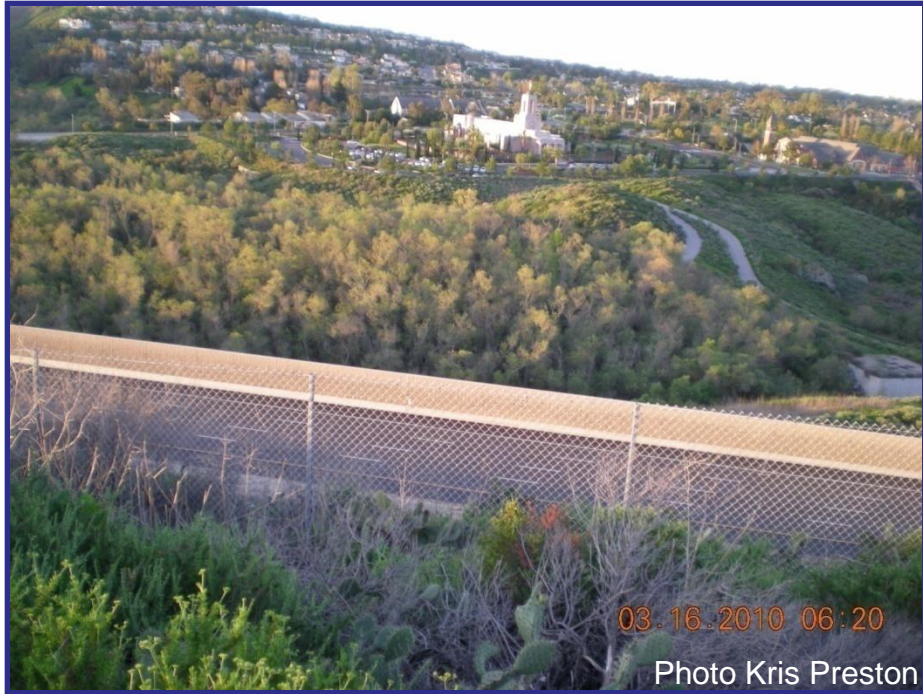
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Dispersal Milestones

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

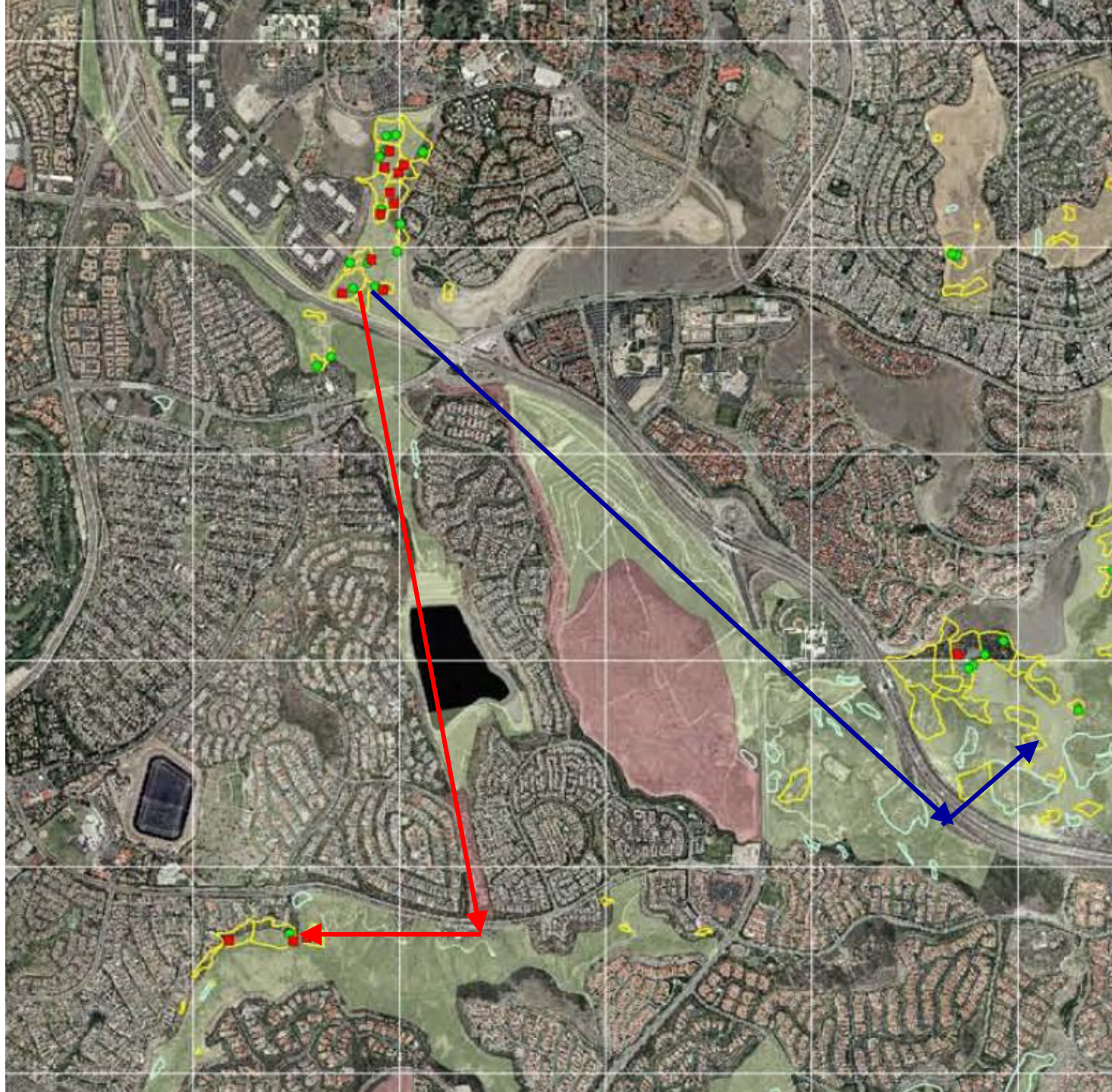


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Pair of
banded
juveniles
disperse
2.7 miles

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

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- Karly Moore
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- Trish Smith, The Nature Conservancy
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Volunteers:

Marian & Steve Alter	Dilip Kumar
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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