

# Monitoring California Gnatcatchers in Southern California 2004 / 2007 / 2009



# Agenda

- Study Design Overview
- Data QA/QC
- Recovery from Fire
- Population Estimates
- Habitat Requirements
- Management Recommendations
- Future Work





# Design



- Population Closure
  - What is it?
    - No births/deaths    Immigration/Emigration
    - Fixed number during sample period
  - How did we deal with it?
    - Sample during breeding season
    - Count adult pairs



# Design



- Detectability (Probability of Detection)
  - What is it?
    - Chance of observing a gnatcatcher at a point - given the survey point is occupied
  - How did we deal with it?
    - Repeat visits to set points



# Design



- Detectability (Probability of Detection)
  - What does it look like?
  - Why is it SO important?

Estimate  
of  
Population

Count: what you saw

$$\hat{N} = \frac{C}{\hat{p}}$$

Probability of  
Detection

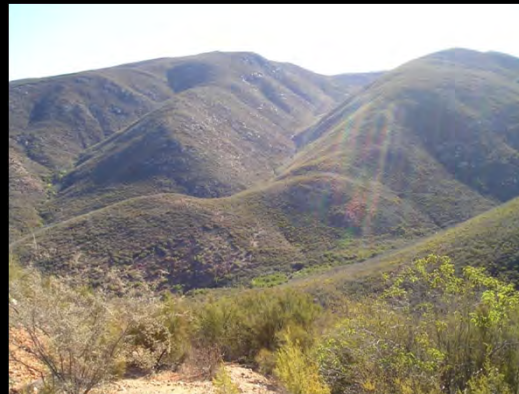
100001  
010101  
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# Design

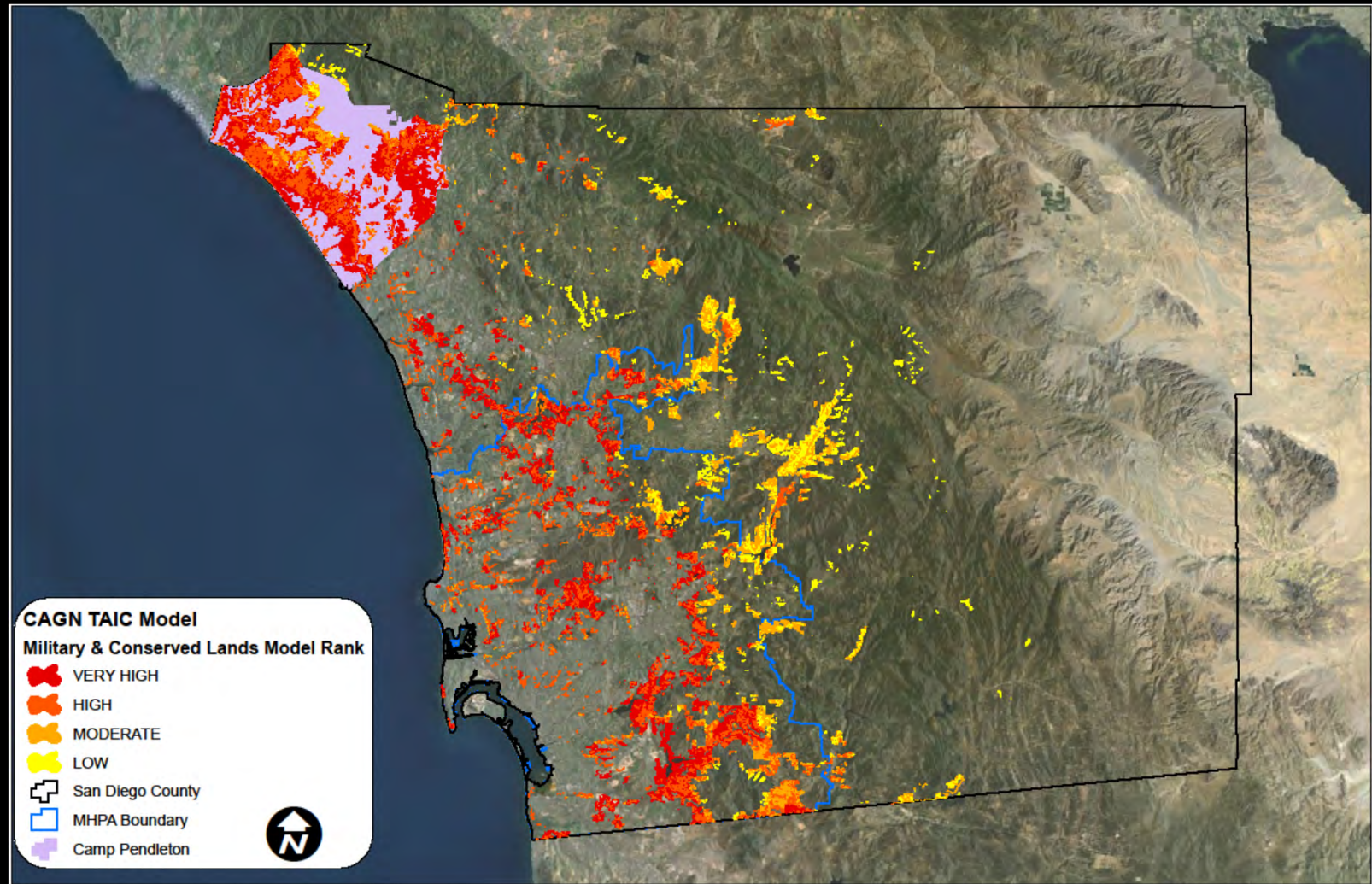


- Spatial Sampling
  - What is it?
    - Establishing the study area or sample frame
    - Creates the area to which results can be inferred
  - How did we deal with it?
    - Probabilistic Sampling Scheme
    - Random Sample on 600 m X 600 m grid





# Sample Frame



# 2007 Project

## What was measured?



- CAGN:
  - Present / Absent
  - Distance/Angle
  - Time of Observations (tracking)
- Site Environmental Factors
- GIS:
  - Slope
  - Elevation
  - Habitat Patch Size
  - Aspect
  - Distance to Coast



- Field:
  - Plant Community
  - Percent Closed Canopy
  - Shrub Diversity
  - Shrub Abundance
  - Shrub Coverage
  - ARCA Present / Absent
  - Percent Bare Ground
  - Burned (Fire History)
  - Shrub Height
  - Grasses Coverage





# Design



- Spatial Sampling
  - Methodology
    - Point Counts
    - Focused Surveys



# Data QA/QC

- CAGN Presence/Absence Records
  - 18,243
- GIS Site Records
  - 4672
- Habitat Evaluation Records
  - 704
- Soil Data Records
  - 698
- Vegetation Transects Records
  - 14,330



# Data QA/QC

## Photographic Documentation

- Years
  - 2007 & 2009
- 409 Plots
  - Burn & No Burn
- Cataloged in PowerPoint files and printed notebooks
- Systematically taken
  - On Point: North/East/South/West



# Data QA/QC

- Stored in Access
  - Relational Database
  - Managed Records
    - 38,647

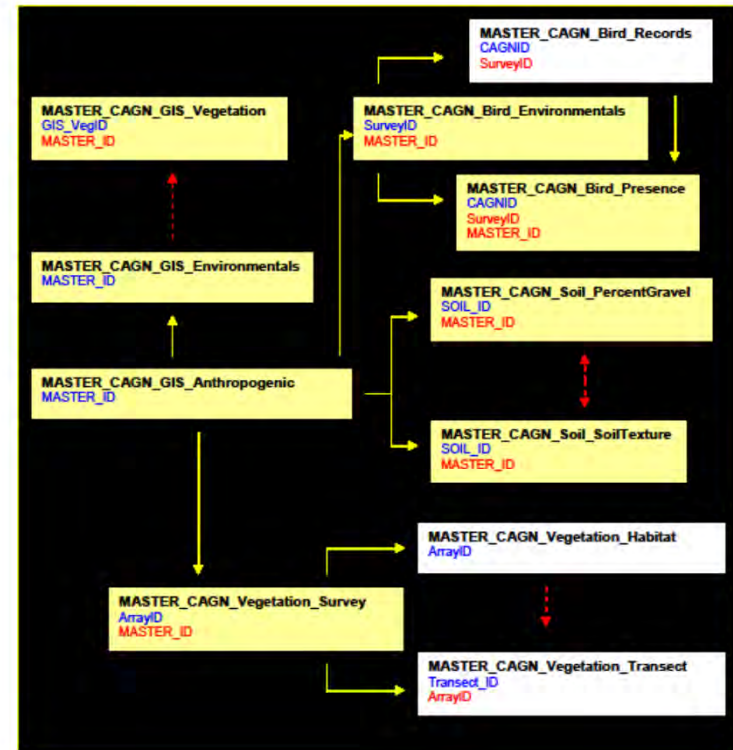
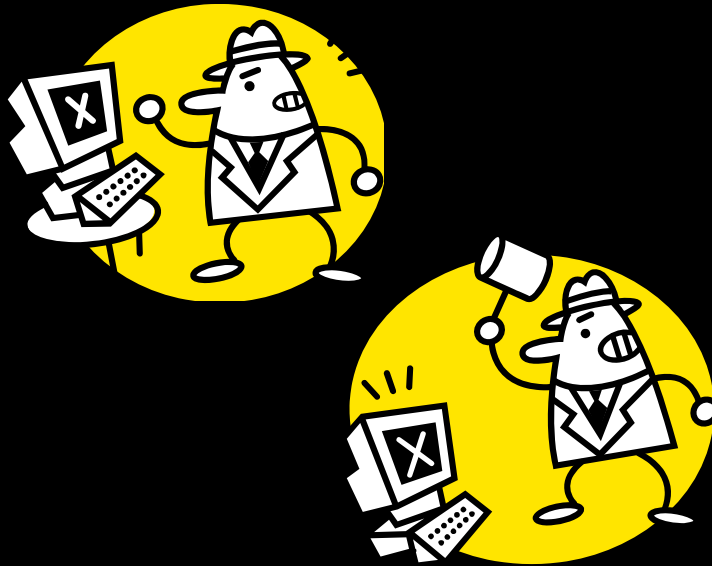
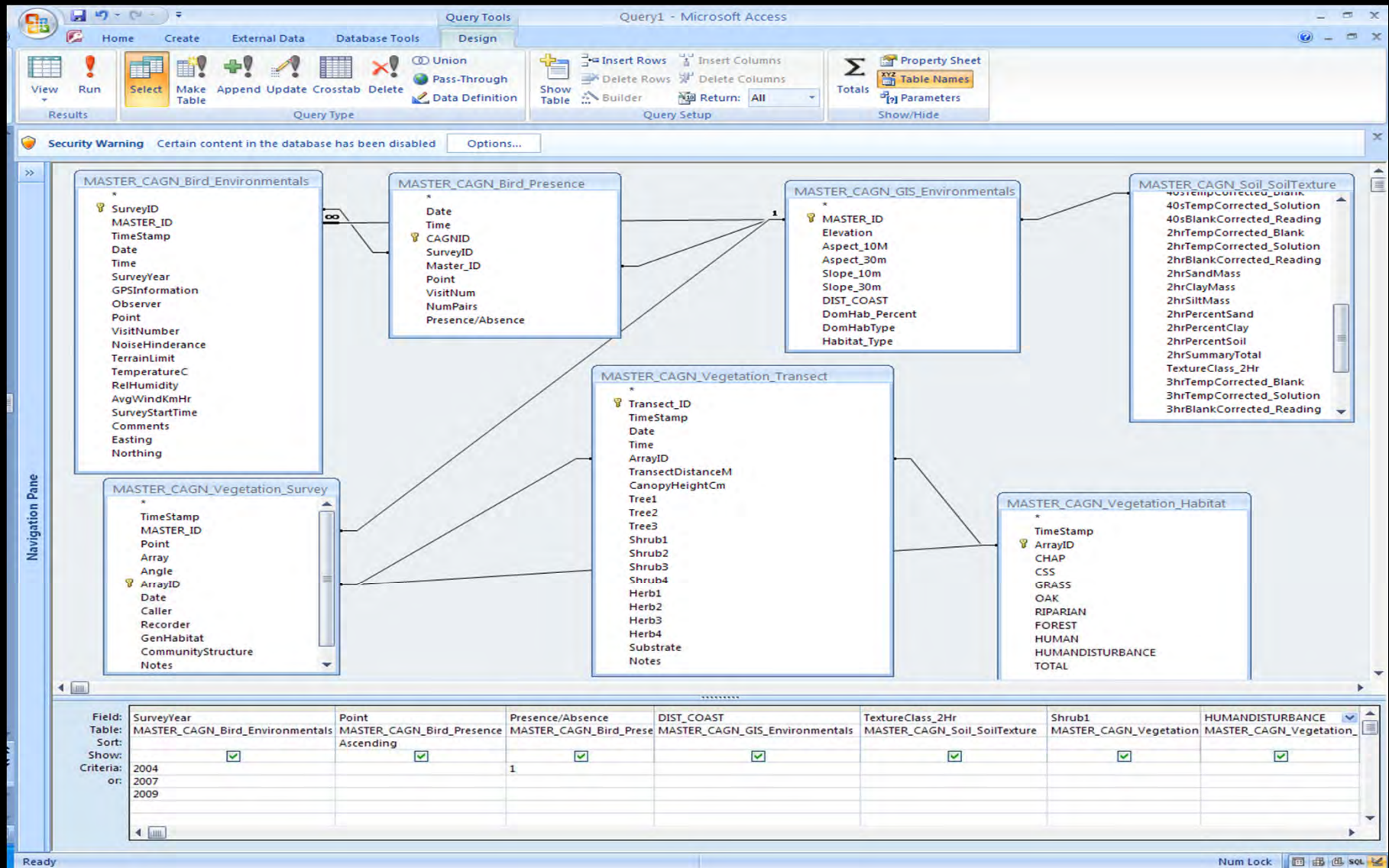
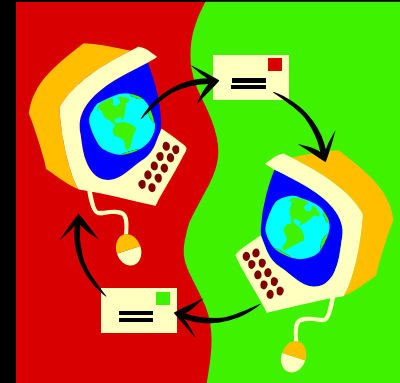


Photo Plots are not integrated into the database.  
Separate files outside of the database.

# Data QA/QC



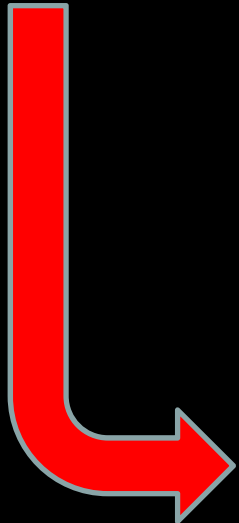
# Data QA/QC



- Meta Data Files
  - Bird survey Records
  - GIS Information and Sample Selection
  - Vegetation
  - Soil Data
- Describes Methods of Data Collection
- Tracks Changes or Updates
- Navigate through the Data

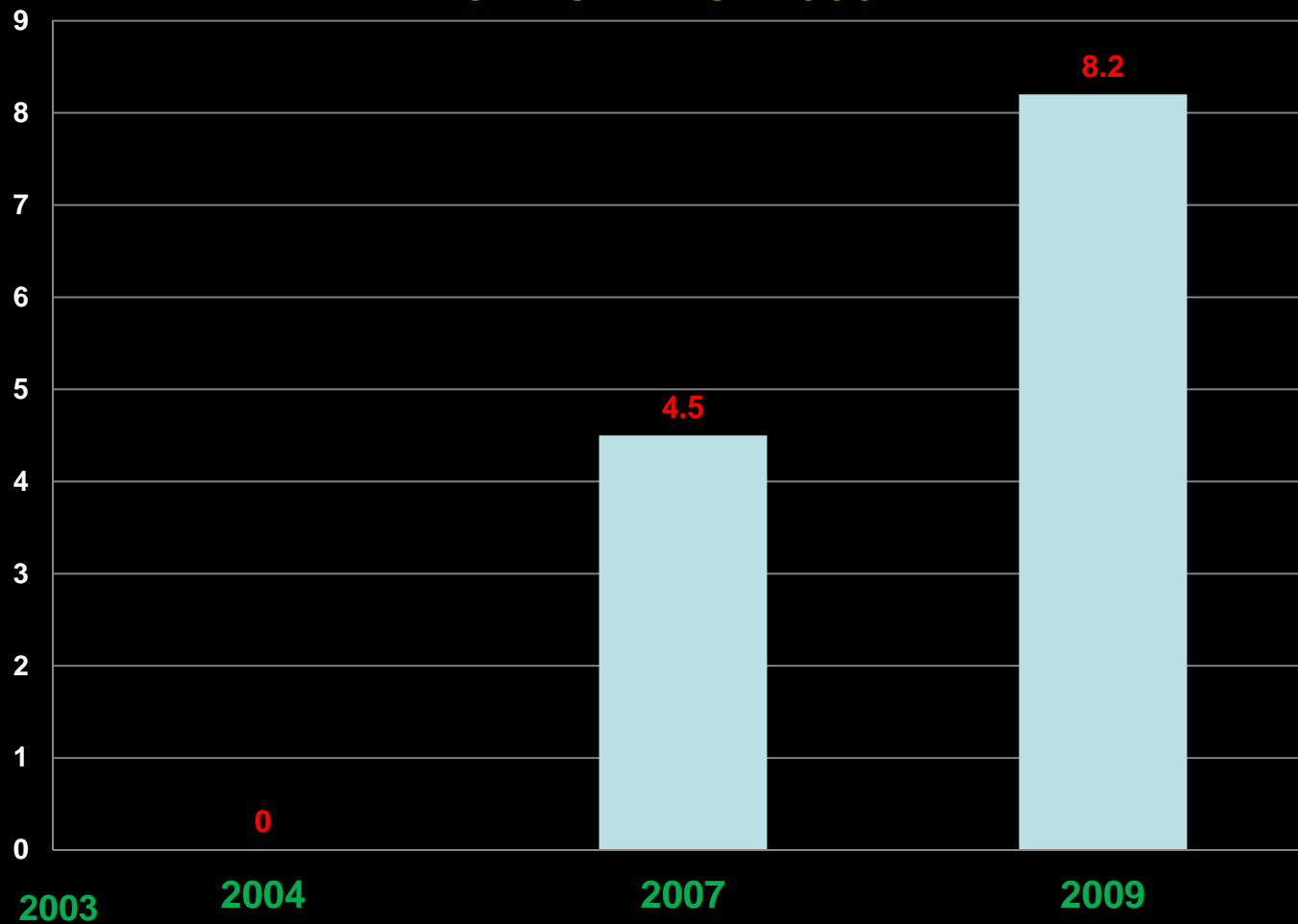


# Recovery from Fire

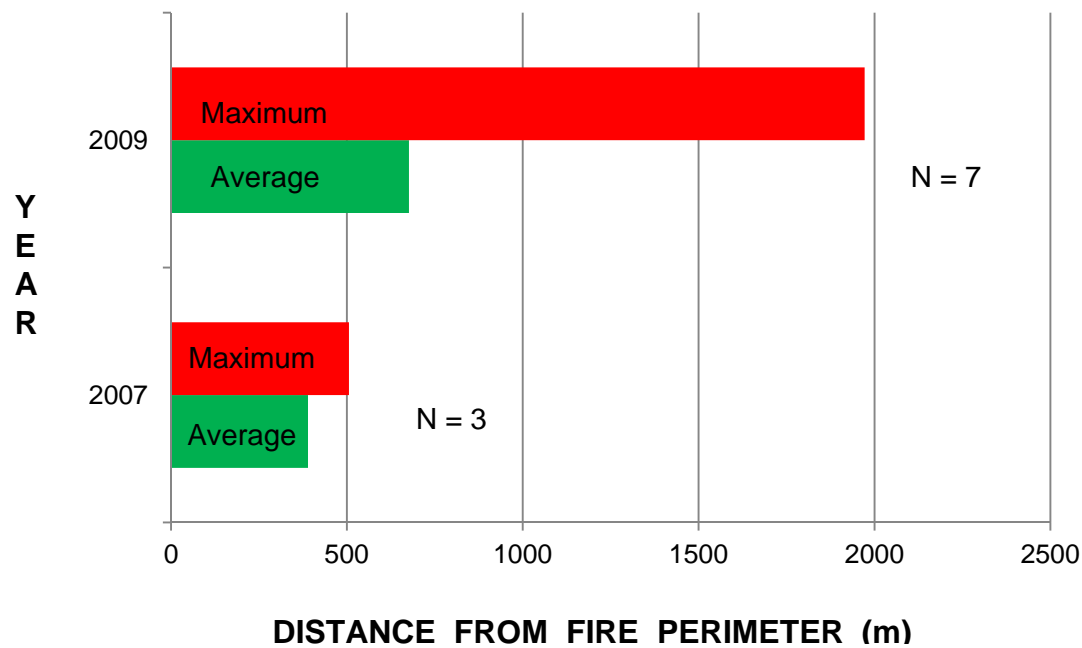


# Recovery from Fire

## PERCENTAGE OF POINTS RECOLONIZED FOLLOWING 2003 FIRE



# Recovery from Fire

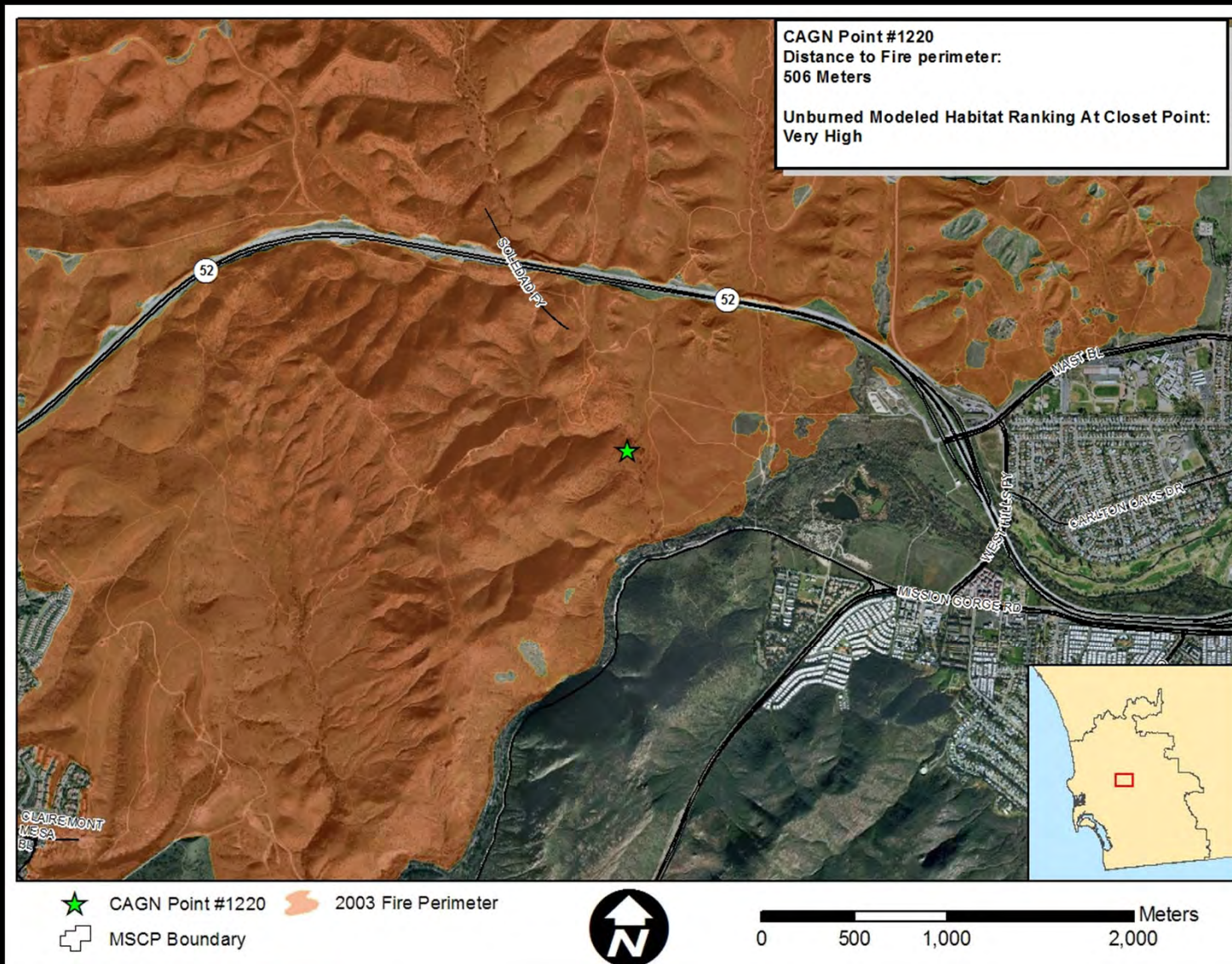


# Recovery from Fire

- The nearest unburned habitat to the point is modeled as Very High (7) or High (1) quality habitat.



# Recovery from Fire



# What Burned?

<u>ACCESS</u>	<u>MODEL RANK</u>	<u>PERCENT BURNED 2003</u>	<u>PERCENT BURNED 2007</u>	<u>TOTAL PERCENT BURENED</u>	<u>PERCENT BURNED TWICE</u>
YES	VERY HIGH	18	27	45	16
No	VERY HIGH	8	14	22	3
YES	HIGH	19	29	48	25
No	HIGH	4	11	15	2
YES	MODERATE	31	44	75	49
No	MODERATE	8	13	21	7
YES	LOW	37	30	67	68
No	LOW	9	14	23	5



# What Burned?

<u>ACCESS</u>	<u>MODEL_RANK</u>	<u>PERCENT BURNED 2003</u>	<u>PERCENT BURNED 2007</u>	<u>TOTAL PERCENT BURENED</u>	<u>PERCENT BURNED TWICE</u>
YES	VERY HIGH	18	27	1.5 X	
YES	HIGH	19	29		
YES	MODERATE	31	44	2 X	
YES	LOW	37	30		

# What Burned?

<u>ACCESS</u>	<u>MODEL_RANK</u>	<u>PERCENT BURNED 2003</u>	<u>PERCENT BURNED 2007</u>	<u>TOTAL PERCENT BURENED</u>	<u>PERCENT BURNED TWICE</u>
YES	VERY HIGH			45	
YES	HIGH			48	
YES	MODERATE			75	
YES	LOW			67	



# What Burned?

<u>ACCESS</u>	<u>MODEL_RANK</u>	<u>PERCENT BURNED 2003</u>	<u>PERCENT BURNED 2007</u>	<u>TOTAL PERCENT BURENED</u>	<u>PERCENT BURNED TWICE</u>
YES	VERY HIGH				16
No	VERY HIGH				3
YES	HIGH				25
No	HIGH				2
YES	MODERATE				49
No	MODERATE				7
YES	LOW				68
No	LOW				5

Difference  
between fire  
affecting  
preserve and  
non-preserve  
lands.

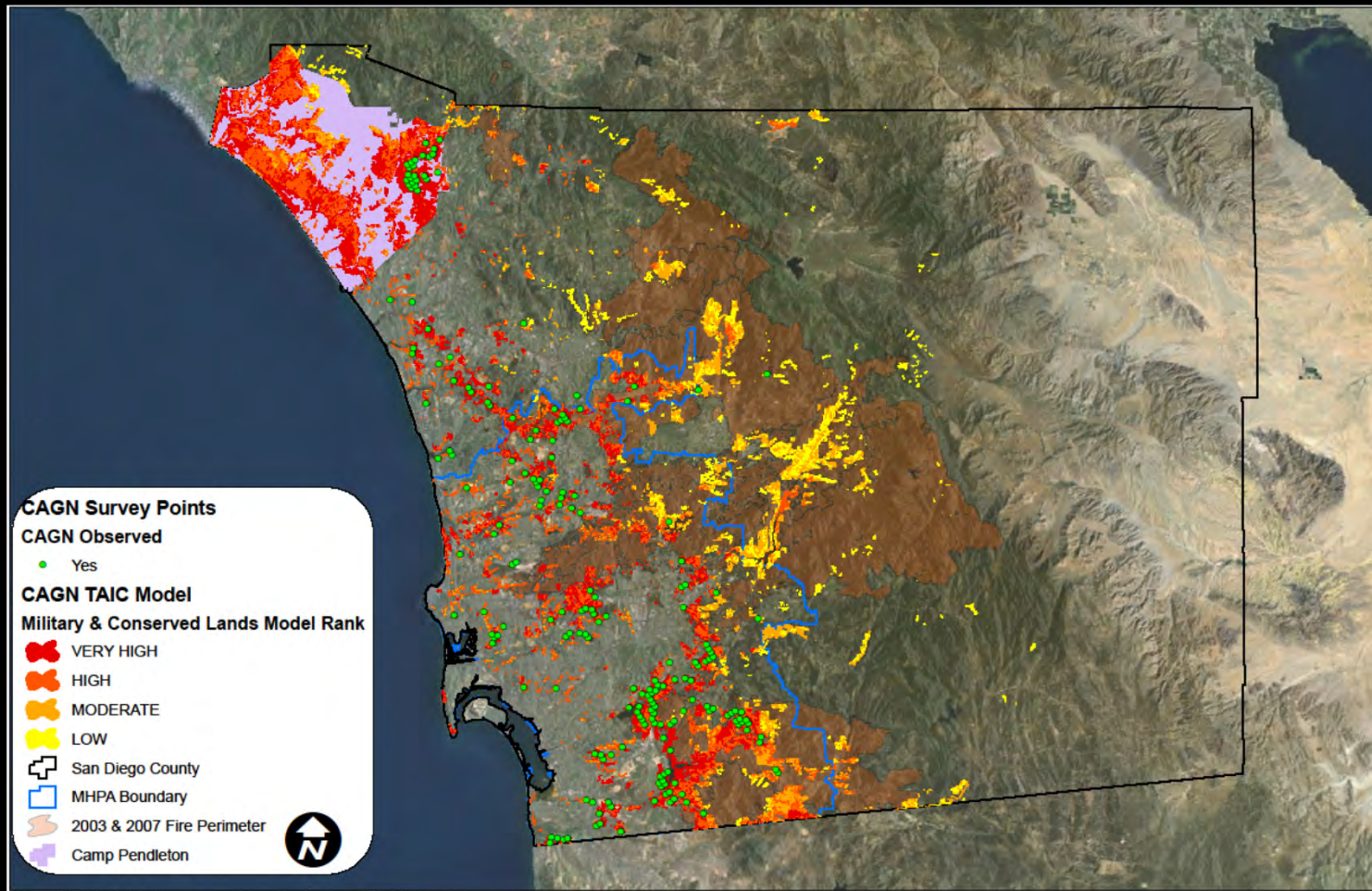


# Future Concern





# Fire and Fragmentation



Roughly 80% of CAGN observations are trapped by SAN and the remainder of the county.

# Population Estimates

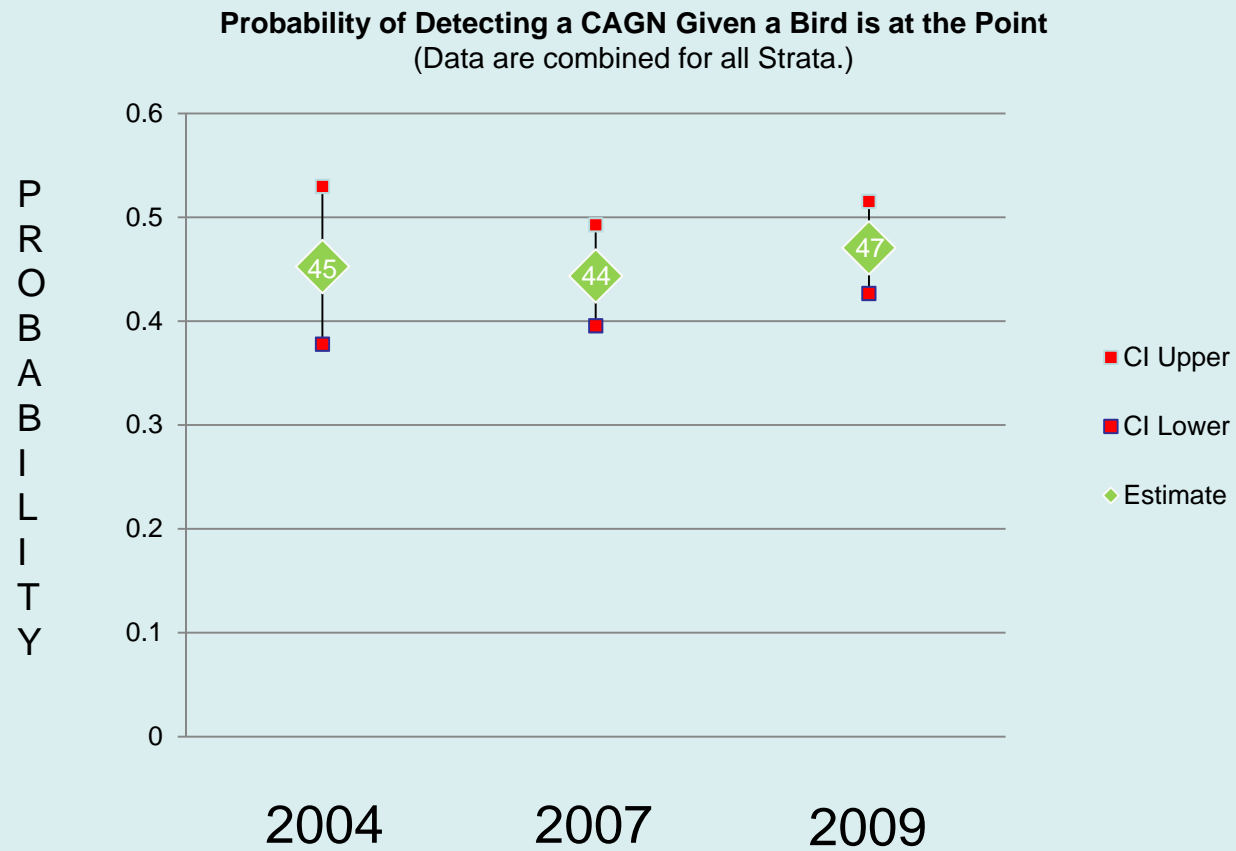
$$\hat{N} = \frac{C}{\hat{p}}$$



# Occupancy Estimation Model

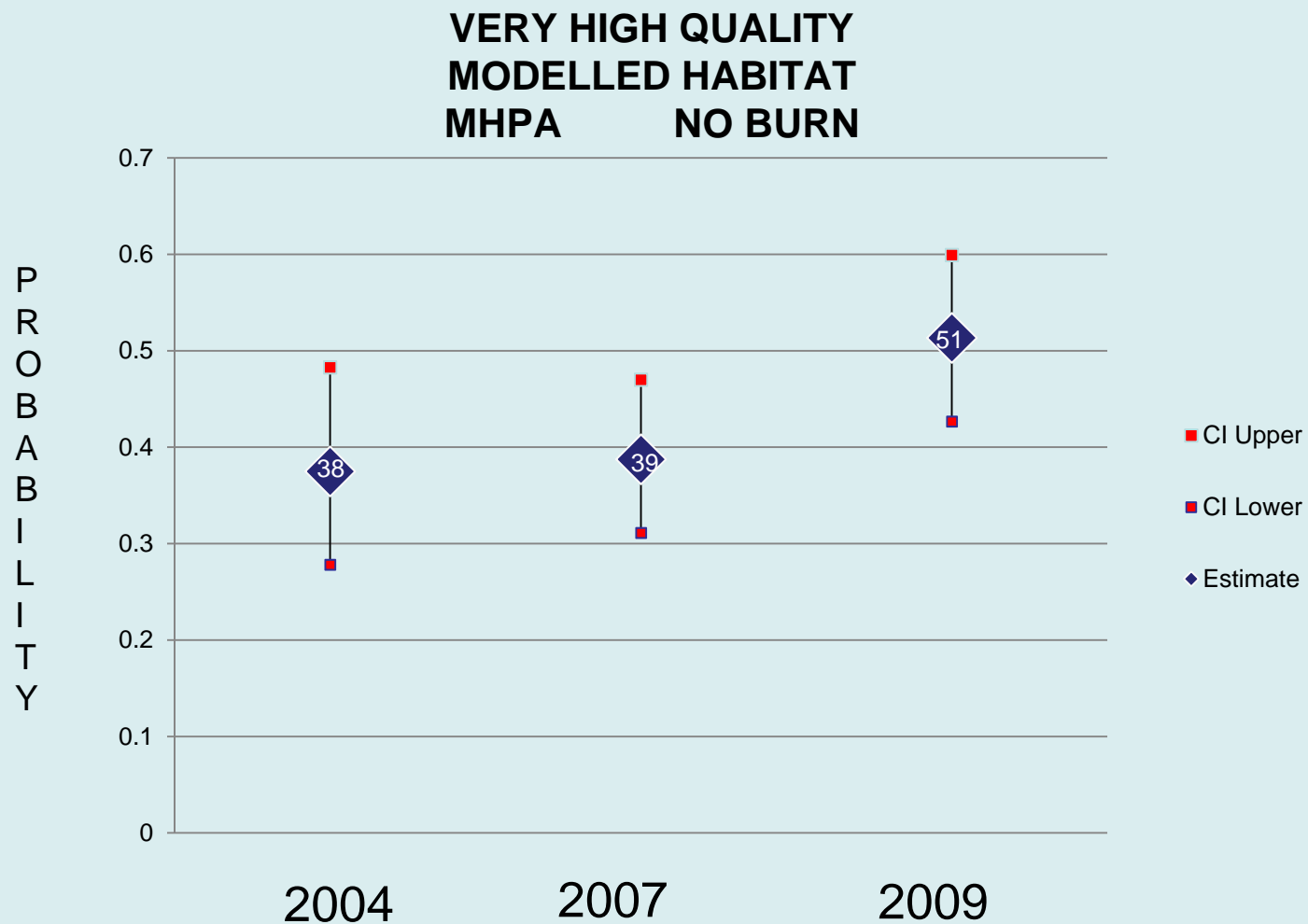
$$\{\hat{\rho}(\cdot)\hat{\psi}(g)\}$$

# Probability of Detection

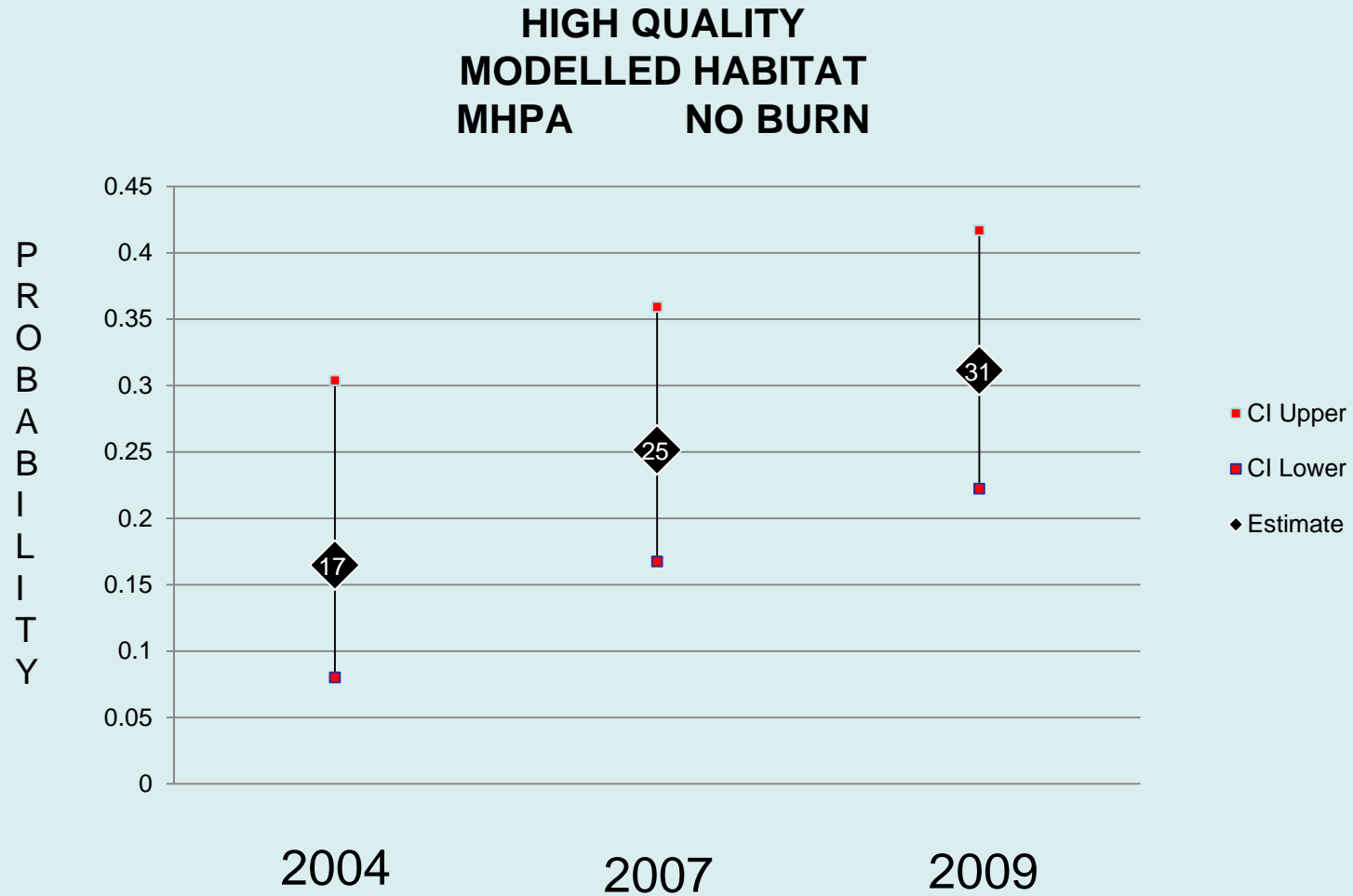


# Percent Area Occupied

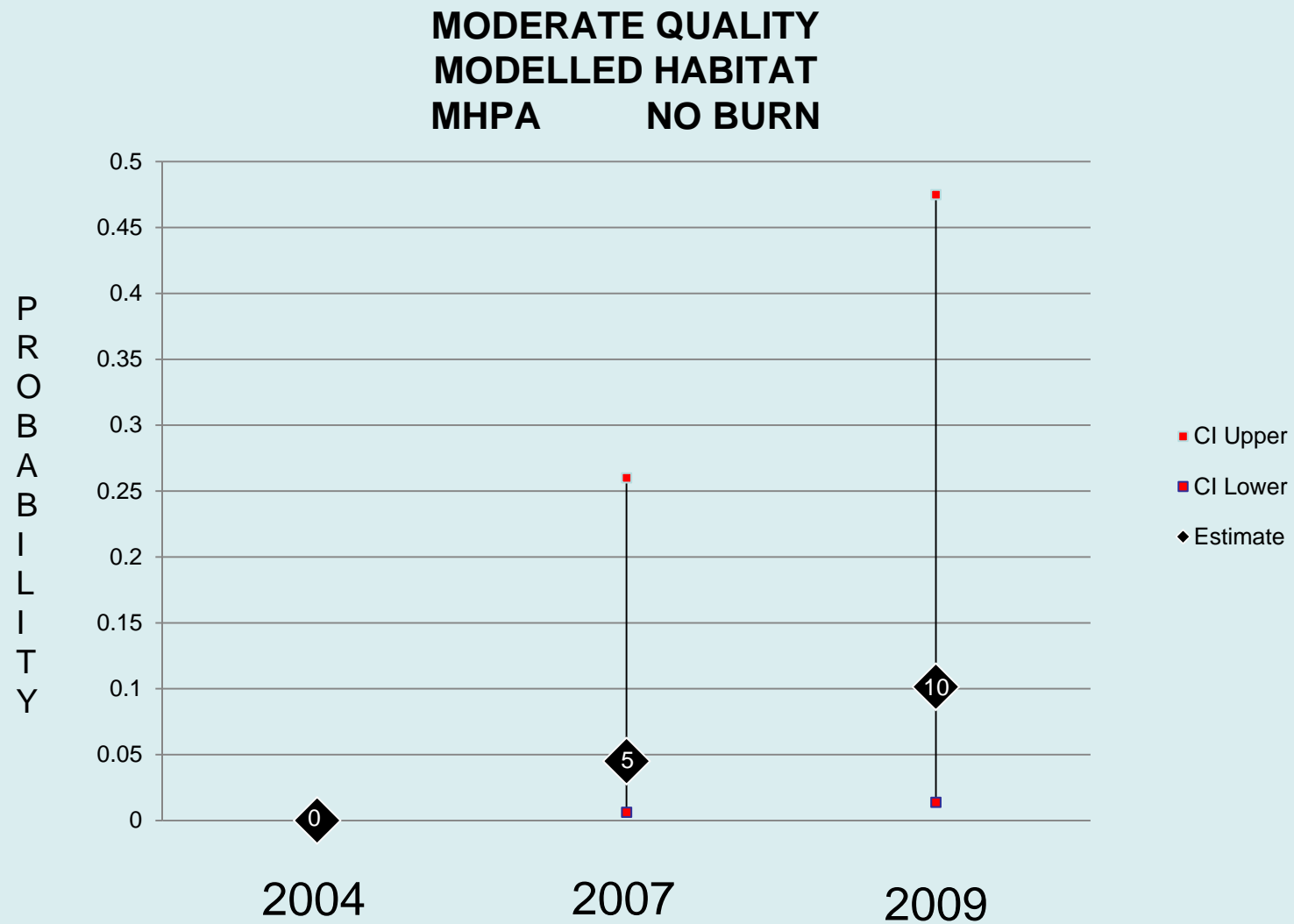
38



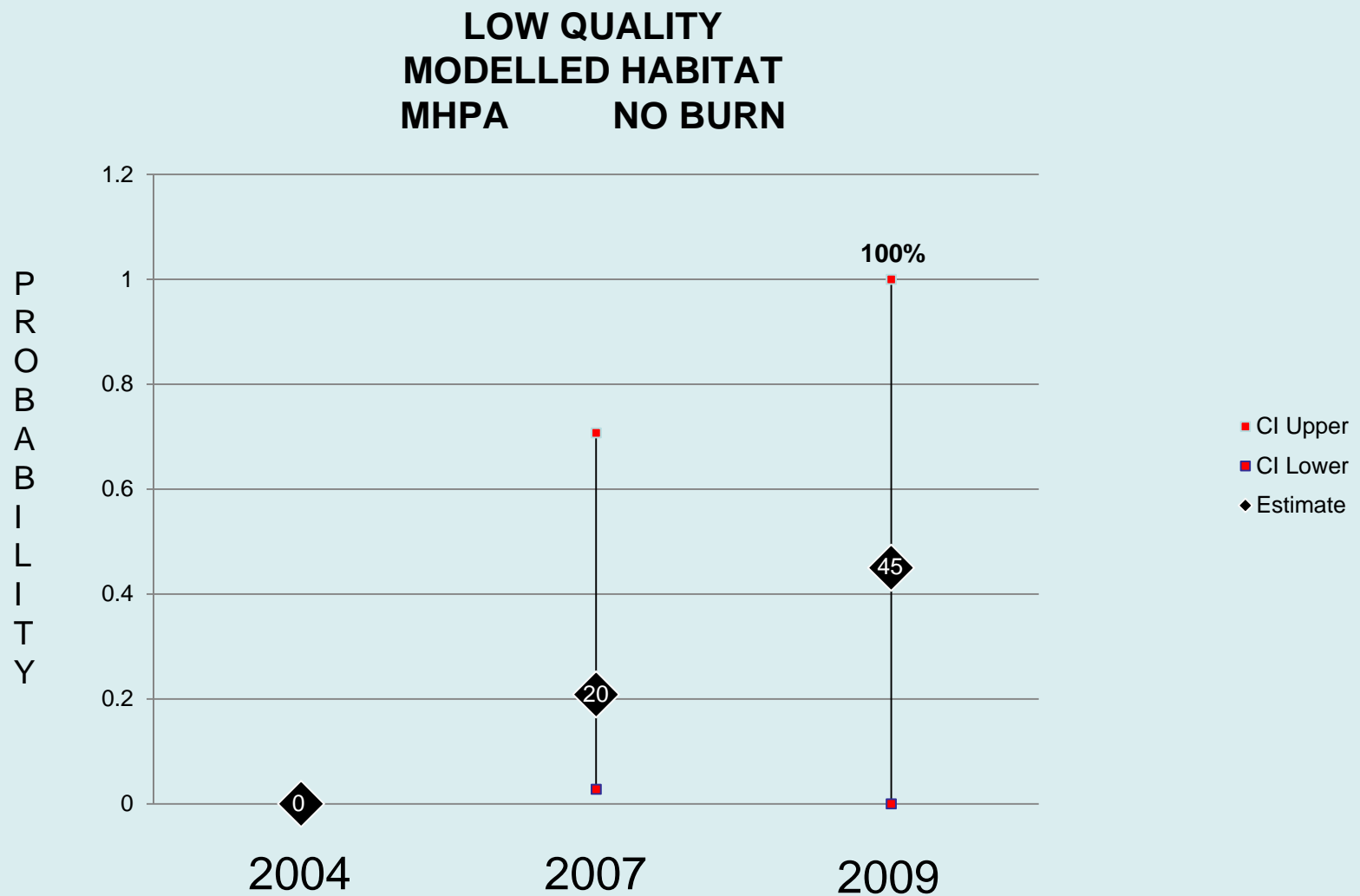
# Percent Area Occupied



# Percent Area Occupied



# Percent Area Occupied







# Remember



- Confidence Intervals
  - Indicate the reliability of an estimate
  - Increase as sample size decrease
    - Moderate and Low Quality Habitat Stratified towards less effort
  - Increase in program MARK as  $psi$ , or occupancy, decreases




# Remember



- Areas modeled as Moderate or Low Quality
  - Sampled at a lower intensity.
    - Less of the total percentage is sampled
  - This is done because the bulk (> 95%) of the population occupies Very High and High Quality Habitat
    - Put effort here to gain reliability in these results
  - Moderate and Low Quality Habitat is sampled simply to confirm CAGN are using these areas
    - Areas can serve as important dispersal corridors/linkages
    - Areas can serve as refugia, for example after a fire

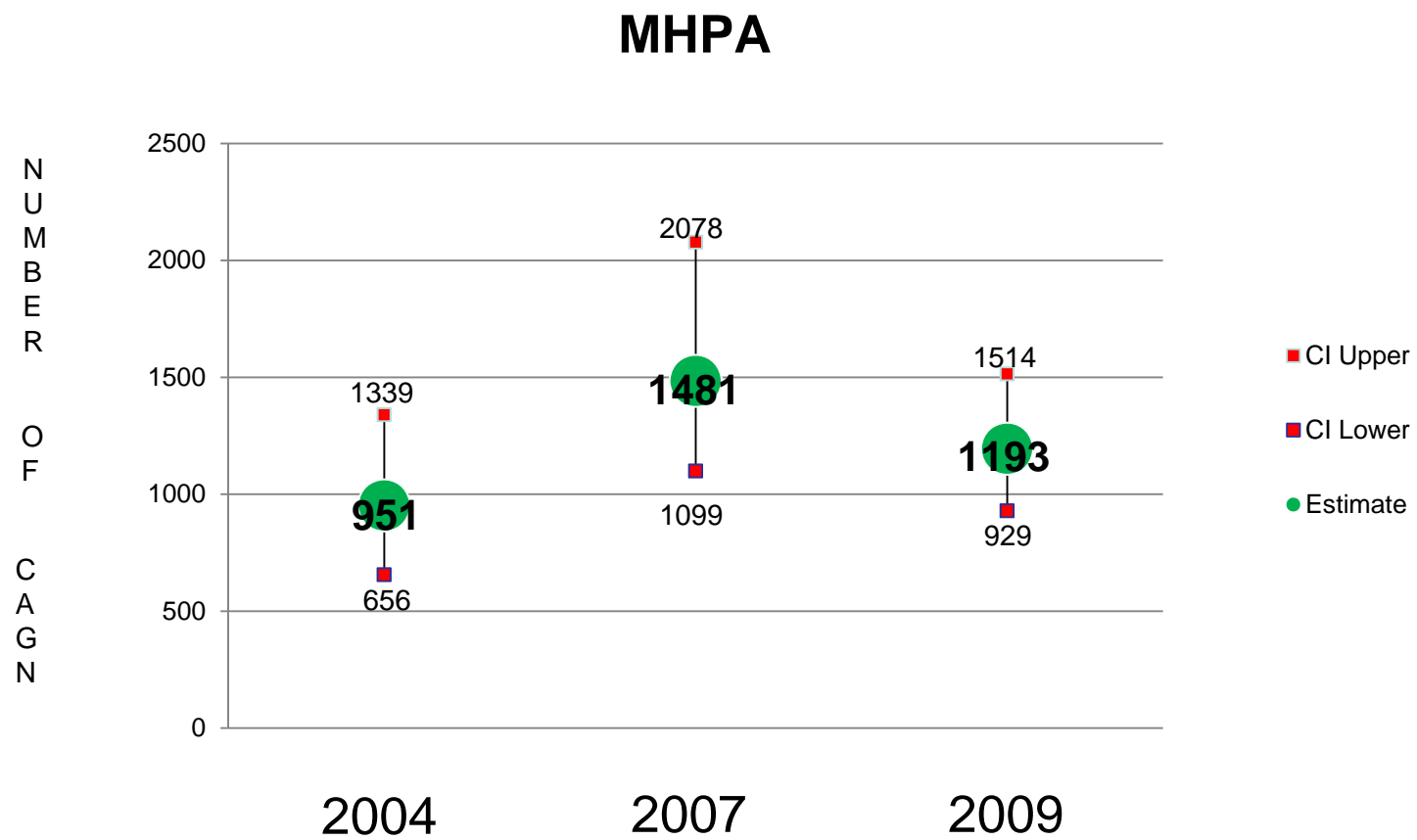
# MHPA Land Area of Unburned Habitat



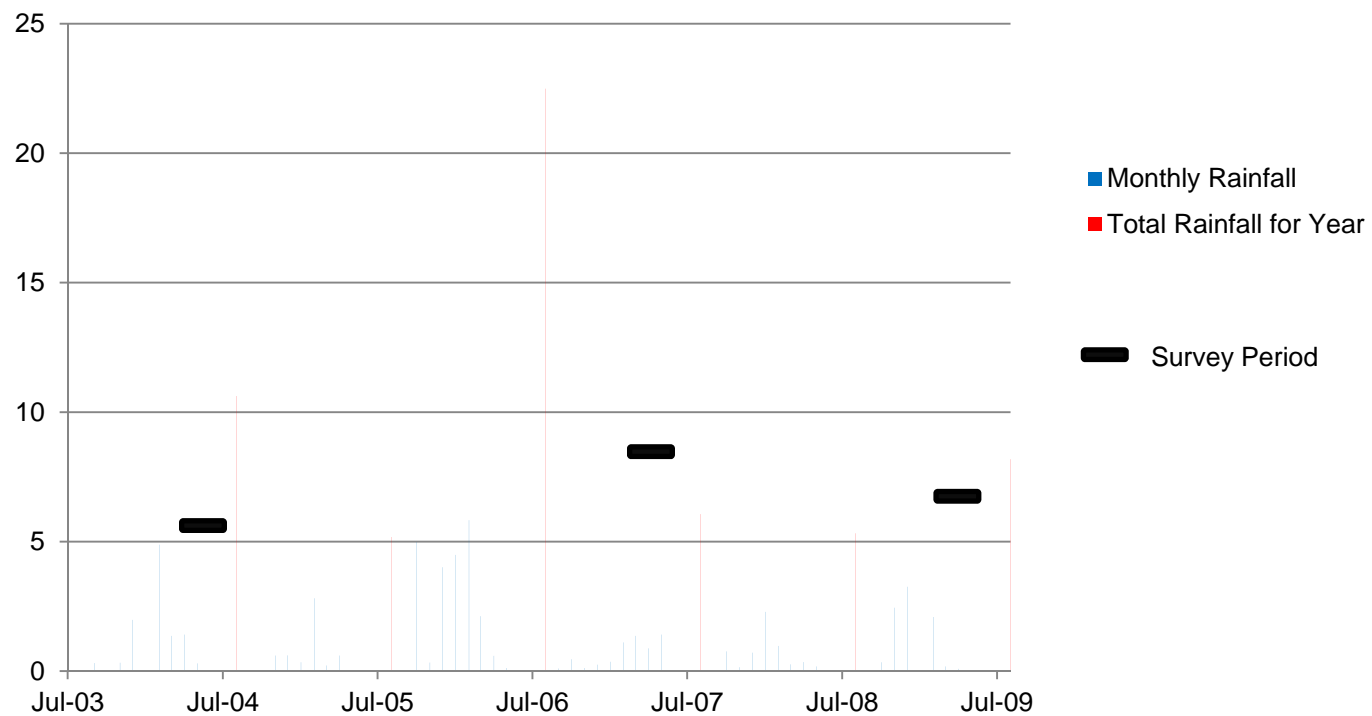
Model Ranking	2004	2007	2009
Very High		8465	14
High	10	5116	
Moderate	1477	1980	39
Low	429	451	166

Hectares

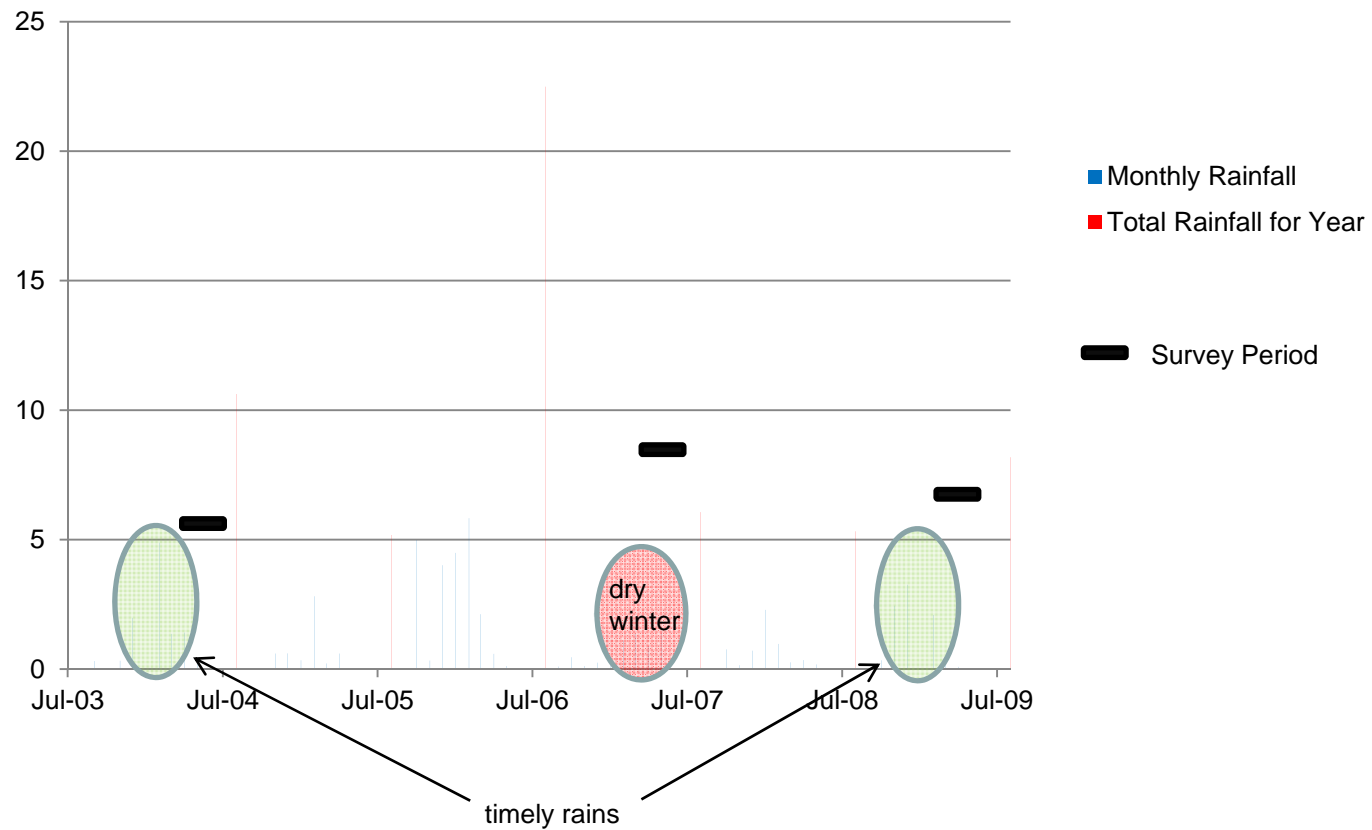
# Trend



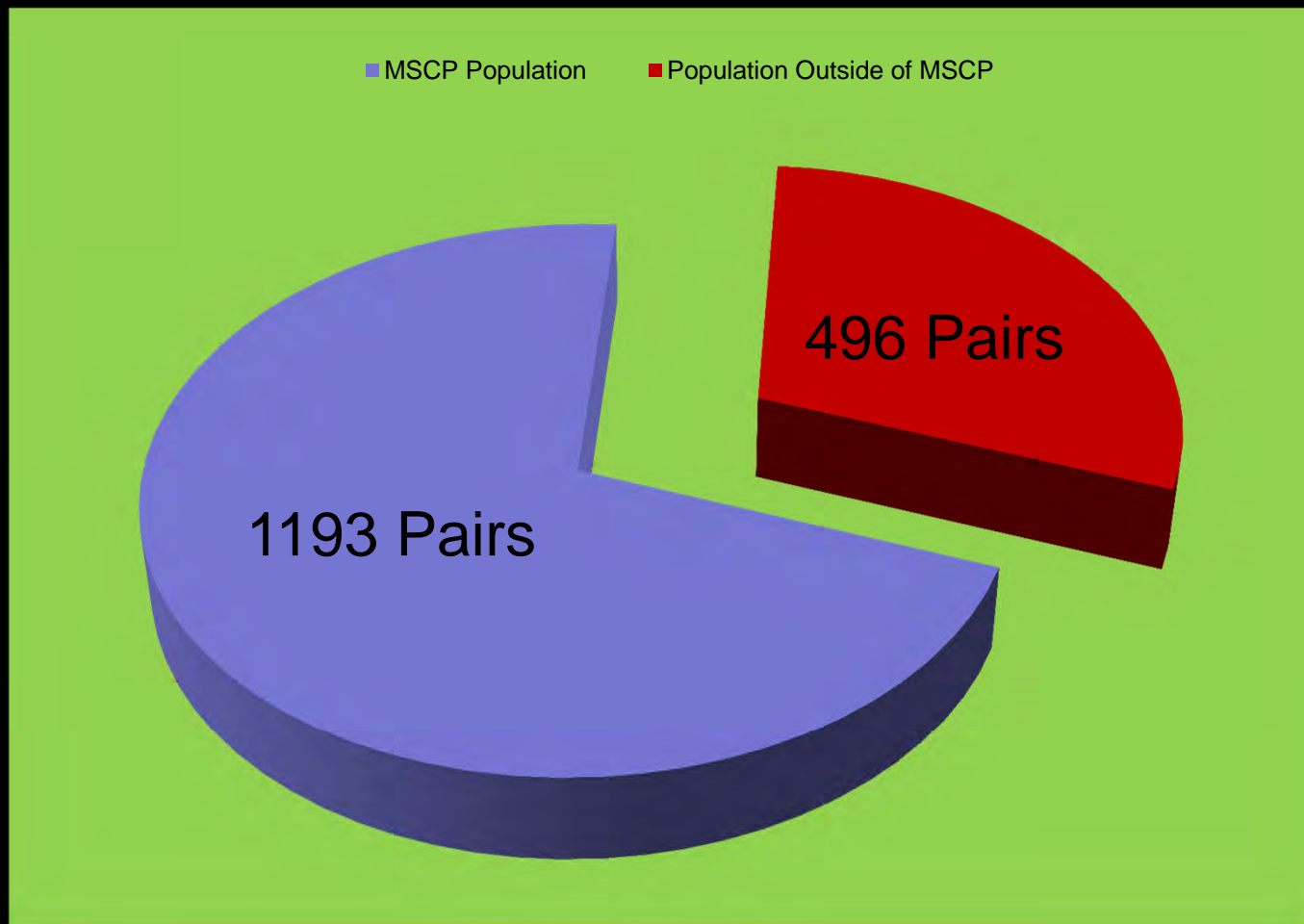
# Effect of Rainfall



# Effect of Rainfall



# MSCP & Other Areas 2009



1689 Pairs within Sample Frame

IS IT  
WORKING?



IS IT  
FAILING?

NO

# Habitat Requirements



# Plant Transects

Number of Transects	Number of Years CAGN Observed	Sample
10	3 of 3 Survey Years	All Sites Sampled
17	2 of 3 Survey Years	All Sites Sampled
14	1 of 3 Survey Years	All Sites Sampled
30	0 of 3 Survey Years	Random Sample

**All transects were at sites ranked as Very High or High Quality**

**Sites were not impacted by fire during the course of the study.**

# Honey Hole





# Common Characteristics

- Percent of Vegetation Classified as Tree (>3.0 m)
  - 1 %
- Percent of Site Bare Soil with no canopy cover
  - 25%
- Plant characteristics (Diversity)
  - 9 out of 10 sites had ARCA11 (*Artemisia californica*)
    - Chamise / Black Sage / Mission Manzanita: Chaparral
  - 27% cover was ARCA11 (*Artemisia californica*)
  - 15% cover was ERFA2 (*Eriogonum crassifolium*)
  - 9% cover was MALA6 (*Malosma laurina*)\*
  - 4% cover was SAME3 (*Salvia mellifera*)
- Invasive Plants
  - 6 out of 10 sites had BRNI (*Brassica nigra*) Black Mustard
    - At those sites mustard <<< 10% of cover
  - 5 out of 5 sites had Non Native Grasses
    - At those sites NNG <<< 4%

# Management Recommendations

- Do not conduct preserve level monitoring for CAGN unless monitoring the effects of a specific management action.
- Take administrative or management actions to increase preserve lands outside the MHPA.
  - Increase the proportion of the CAGN population outside the MHPA
  - Concentrate on lands ranked as Very High or High Quality
- Direct restoration efforts after a fire in areas adjacent to Very High quality habitat – previously modeled as Very High quality habitat – and not extend out more than several hundred meters.



# Management Recommendations

- Selecting sites for acquisition or restoration
  - Look for Laurel Sumac in vicinity
  - Limit sites where CSS is senescent
    - Area of experimentation
  - Manage for shrub diversity
    - Artemisa is important
  - Minimize non-native grasses and black mustard
    - Important to manage after fire



# Future Work





- One more year (2012) of surveys scheduled
- Continue surveys in fire impacted areas after 2012
- Link site covariates and plant transect data with colonization/extinction data
- Consider corridor/linkage work



# Partners

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Sweetwater Authority

City of Carlsbad

US Geological Survey

City of Santee

City of San Diego

California Dept Fish & Game

City of Chula Vista

City of Encinitas

San Diego Zoological Society

County of San Diego

Nature Reserve Orange County

Bureau Land Management

US Navy

US Forest Service

US National Park Service

City of Escondido

Helix Water District

Naval Weapons Station Fallbrook

California Dept Transportation

California Dept State Parks

Center Natural Lands Management

Colorado State University

City of Poway

MCAS Miramar

U.S. Fish & Wildlife Service



Thank you:

**EMP Working Group**

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