



# **Response and Recovery of Faunal and Floral Communities to the 2003 and 2007 San Diego Wildfires**

U.S. Department of the Interior  
U.S. Geological Survey

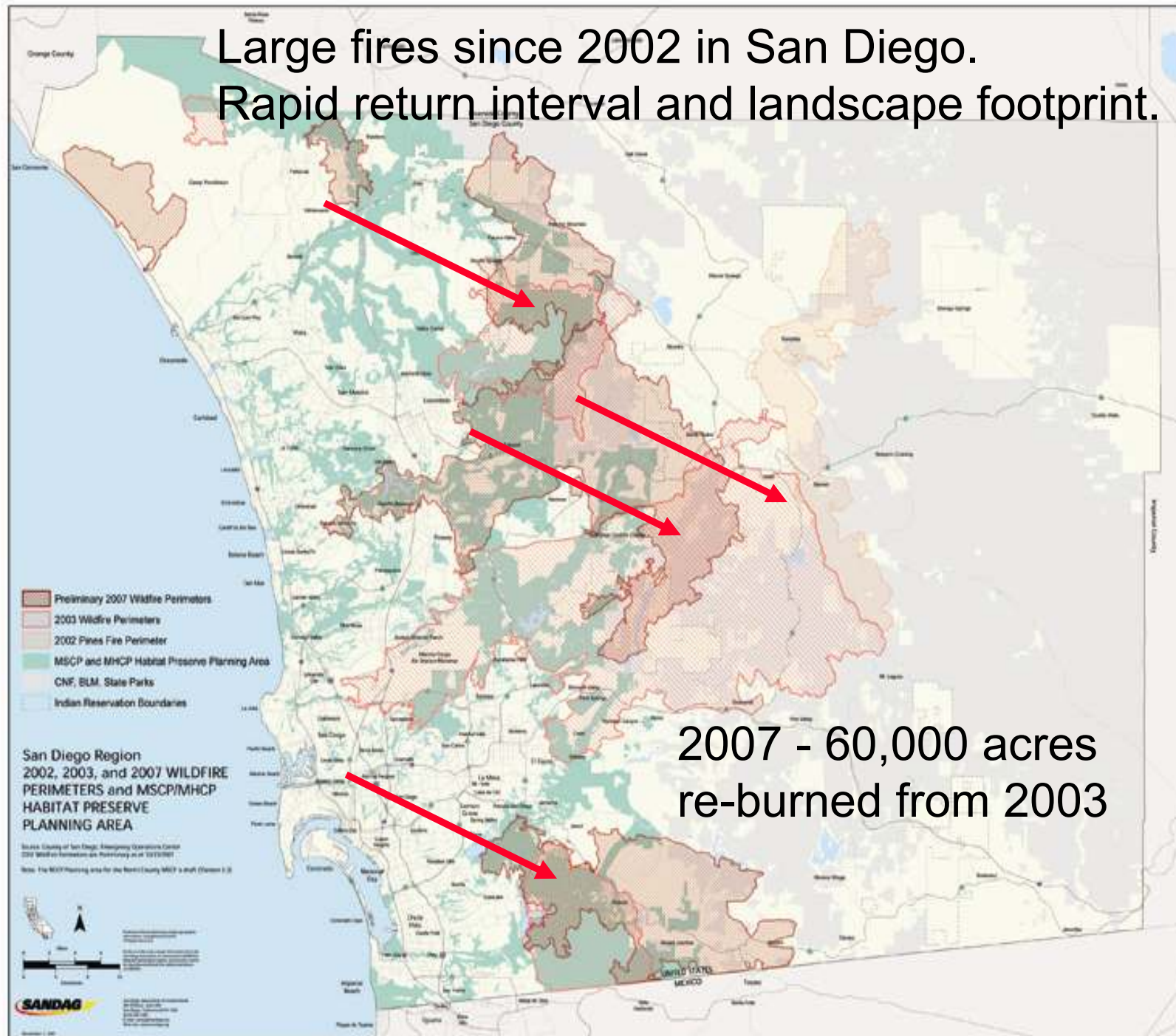
# Introduction

- Wildfire an important ecosystem driver in chaparral systems
- *Historically*- Summer fires caused by lightning-strikes
- Increased urban/wildland edge leads to:
  - Increased ignition sources
  - Increased loss of life and property – fuels management
  - Prescribed burning of scrublands – conversion to alien grasslands, reduction of litter/organic material
- *Currently*- Increased fire frequency, increased risk of large landscape-level Santa Ana-driven fires
- Southern California faunal communities are adapted to fire, but maybe not to the landscape level fires; little known about them

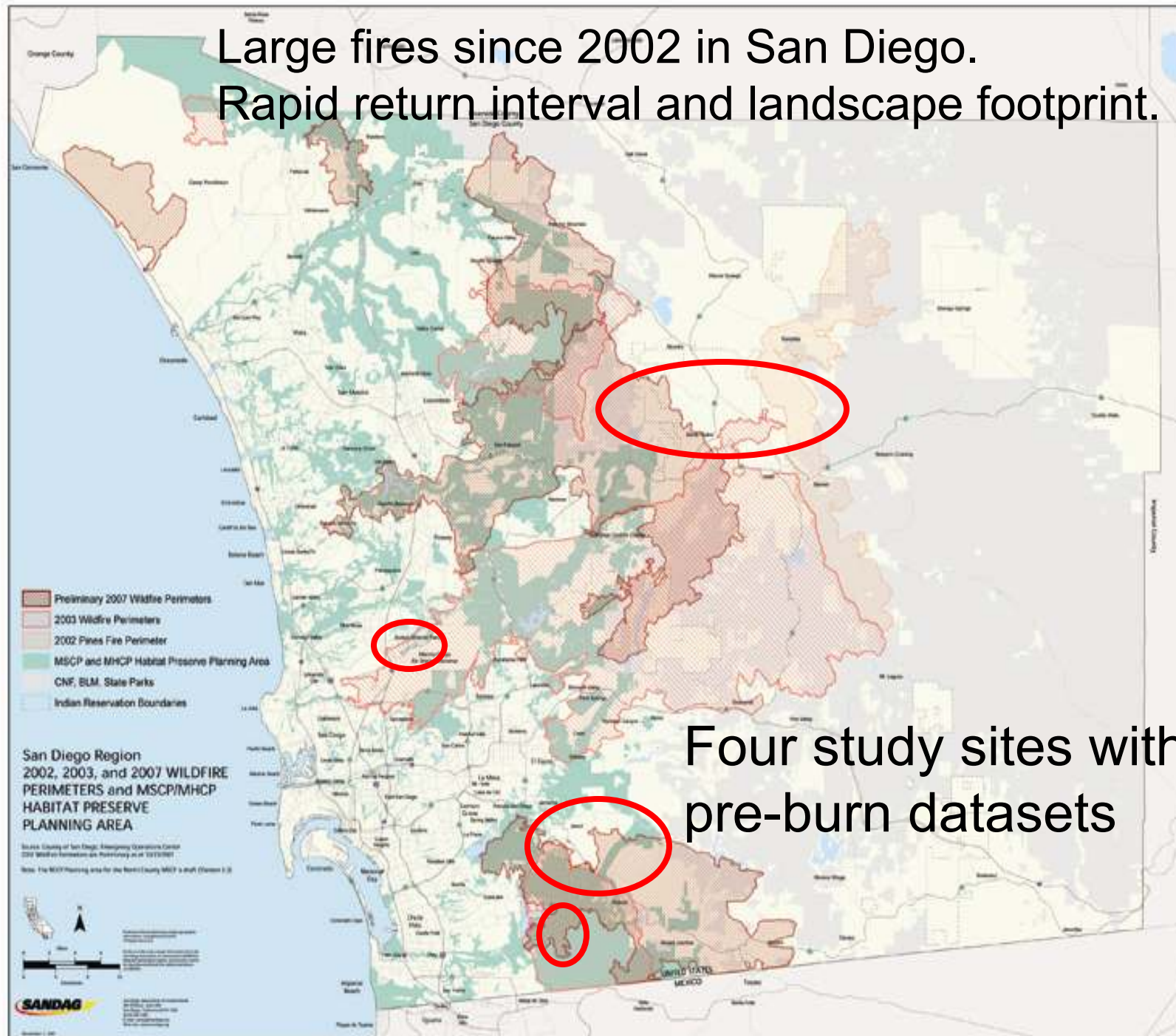
# Background

- **Oct/Nov 2003 - Massive wildfires consumed approx. 750,000 acres in Southern California**
- **Over 50% of San Diego County MSCP area burned in Otay, Cedar Fires**
- **Lack of information about effects of fires on faunal communities**
- **USGS has a rich pre-burn terrestrial multitaxa dataset in fire footprint**

Large fires since 2002 in San Diego.  
Rapid return interval and landscape footprint.



Large fires since 2002 in San Diego.  
Rapid return interval and landscape footprint.



Four study sites with  
pre-burn datasets

# Objectives

- **Understand ecosystem response to landscape-level fire**
  - **Effect of large scale fires on faunal communities**
    - **Post-fire ecosystem successional dynamics**
    - **Trophic interactions and influence of fire**
    - **Habitat conversion effects on fauna**
    - **Indicator species for post-fire recovery**
- **Provide useful information to land managers**
  - **Reserve Design**
  - **Reserve Management**
  - **Focal Species for Monitoring**

# Hypotheses

- Catastrophic fire will alter the community structure (abundance and richness) of terrestrial vertebrates, invertebrates, and vegetation.
- Species responses to fire will group according to shared life history characteristics (dispersal ability, population size, reproductive strategy, dietary specialization, habitat specialization).
- Populations of some species will be negatively impacted by fire (decrease in abundance), while others will show a positive response.
- Fire disturbance will facilitate the invasion of non-native species, especially in areas also disturbed by human impacts.

# Study Design

## ■ Terrestrial Habitats

- 4 vegetation communities (CSS, Chap, Grassland, Woodlands)
- 7 animal communities (invertebrates, reptile, amphibian, small mammals, birds, bats, carnivores)
- Pre/Post-burn Comparisons
- Post-burn Controls

## ■ Riparian Habitats – Arroyo Toad

- Response to 2003 and 2007 fires
- Includes all known sites within MSCP
- Tracking habitat changes over time
- Focused on recruitment
- Same methods as long term monitoring at Camp Pendleton

# Preliminary Results

**Mendelsohn, M.B., Brehme, C.S., Rochester, C.J., Stokes, D.C., Hathaway, S.A., and R.N. Fisher. 2008. Responses in bird communities to wildland fires in southern California. Fire Ecology Special Issue 4:63-82.**

- **Bird Community**
  - **Santa Ysabel and Rancho Jamul**
    - Prefire data: 2001-2003; two years post-fire (2003)
    - Different elevations
    - Long history without fires
    - Some changes in bird communities
    - High mobility in this taxa
    - Recommendation revisit point counts in future if habitat recovers

# Preliminary Results

Rochester, C.J., Brehme, C.S., Clark, D.R., Stokes, D.C., Hathaway, S.A., and R.N. Fisher. In press. Reptile and amphibian responses to large-scale wildfires in southern California. *Journal of Herpetology* *In press*.

- Reptile and Amphibian (Herpetofauna) Community
  - Four study sites
    - Prefire data: 1995-2003
    - Good trends data for orange throated whiptails and coastal horned lizards
    - Generalist species increased; decreases in closed habitat specialists
    - Recommendations are to analyze data collected after 2006 and to continue monitoring until recovery

# Preliminary Results

**Brown, C.W., Mitrovich, M.J., Rochester, C.J., and R.N. Fisher. 2010. Effects of large-scale wildfires on the scorpion and solifugid communities of the San Diego MSCP region. U.S. Geological Survey Data Summary prepared for San Diego Association of Governments.**

- **Scorpion and solifugid Community**
  - **Four study sites**
    - Prefire data: 1998-2003, depending on site
    - Showed increases in diversity post-burn
    - These groups respond to vegetation and not to burn condition
    - Recommendations are to identify additional solifugids collected after 2006 and conduct analysis on both groups

# Preliminary Results

**Turschak, G.M., Rochester, C.J., Hathaway, S.A., Stokes, D.C., Haas, C.D., and R.N. Fisher. 2010. Effects of large-scale wildfire on carnivores in San Diego County, California. U.S. Geological Survey Data Summary prepared for San Diego Association of Governments**

- **Carnivore Community**
  - **Santa Ysabel and Rancho Jamul**
    - Prefire data: 2001 - 2003
    - Showed little effect of wildfires
    - Operate at large scales, connectivity is major concern
    - Recommendation to focus on connectivity research

# Preliminary Results

**Rochester, C.J., Mitrovich, M.J., Clark, D.R., Mendelsohn, M.B., Stokes, D.C., and R.N. Fisher. 2010. Plant community responses to large-scale wildfires in southern California. U.S. Geological Survey Data Summary prepared for San Diego Association of Governments**

- **Vegetation Community (four study sites)**
  - Four habitat types (CSS, Chap, Grass, Woodland)
  - Coastal sage scrub and chaparral vegetation showed greatest changes – became more like grassland
  - California sagebrush and California buckwheat abundance and cover declined drastically
  - Recommend continued monitoring for potential recovery

# Preliminary Results

**Rochester, C.J., Backlin, A.R., Stokes, D.C., Mitrovich, M.J., Brehme, C.S., and R.N. Fisher. 2010. Bat communities of Rancho Jamul Ecological Reserve and Santa Ysabel Open Space Preserve before and after the 2003 wildfires. U.S. Geological Survey Data Summary prepared for San Diego Association of Governments**

- **Bat Community**
  - **Santa Ysabel and Rancho Jamul**
    - Prefire data: 2001 - 2003
    - Showed little effect of 2003 wildfires
    - Operate at large scales, roost sites are major concern
    - Recommendation to focus on landscape level research

# Preliminary Results

**Brehme, C.S., Clark, D.R., Rochester, C.J., and R.N. Fisher. In review. Effects of large-scale wildfires on rodents in southern California. *Submitted Journal of Mammalogy***

- **Small Mammal Community (four study sites)**
  - Generalists and open habitat specialists increased
  - Closed habitat species (specifically brushlands – coastal sage scrub and chaparral) declined dramatically
  - Recommendation is to revisit small mammal sampling in 2010 – 2012 to determine if recovery has occurred

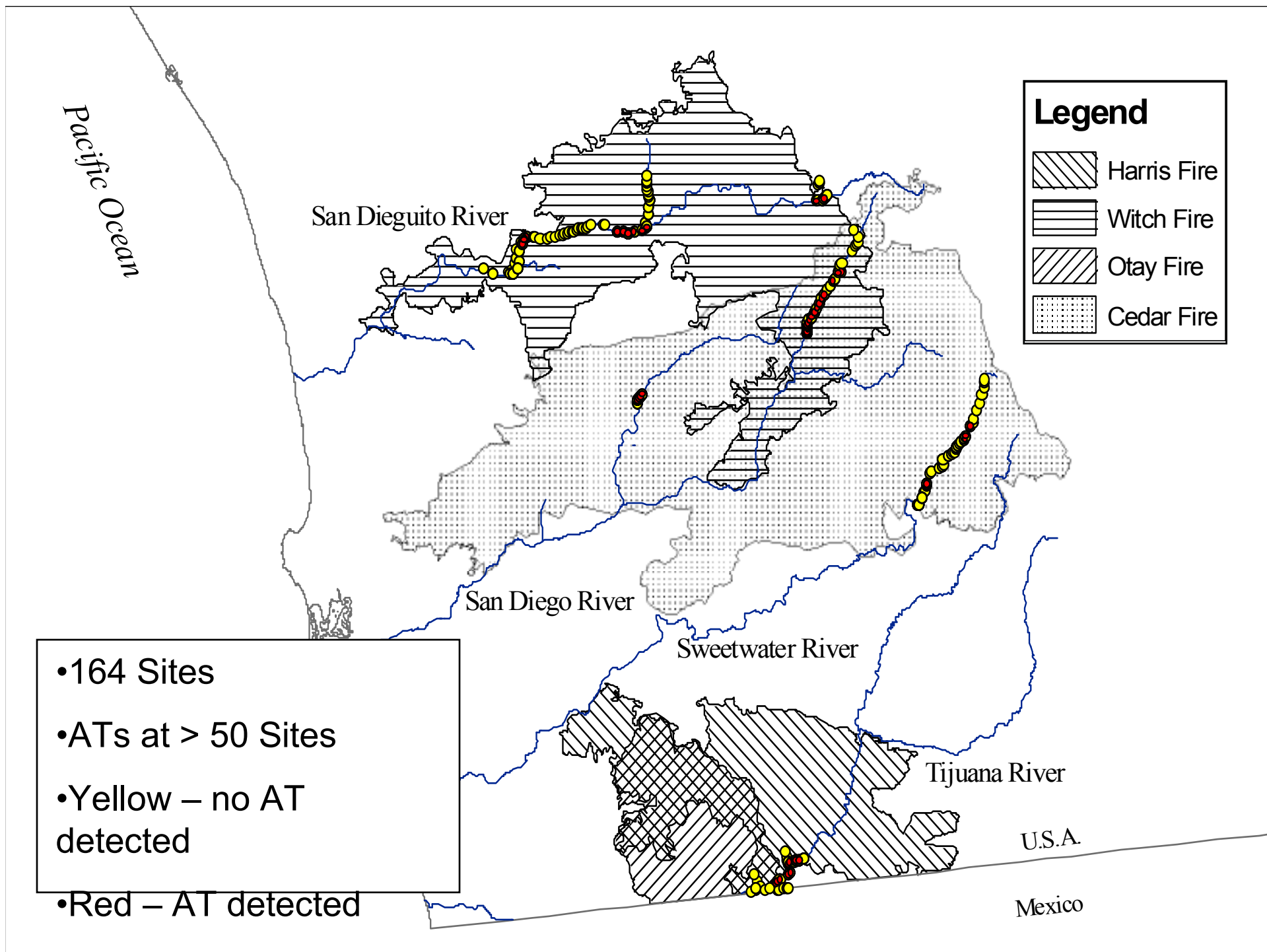
# Preliminary Results

**Matsuda, T., Turschak, G., Brehme, C., Rochester, C., and R. Fisher. In review. Effects of large-scale wildfire on ground foraging ants (Hymenoptera: Formicidae) in southern California. *Submitted Environmental Entomology***

- **Ant Community (four study sites)**
  - Four habitat types
  - Coastal sage scrub showed greatest change in ant diversity
  - All habitats showed post-burn decline in ant diversity
  - Turnover in harvester ant species, due to invasive grasses?
  - Recommendations are to sort and identify additional ants collected after 2006 and conduct analysis

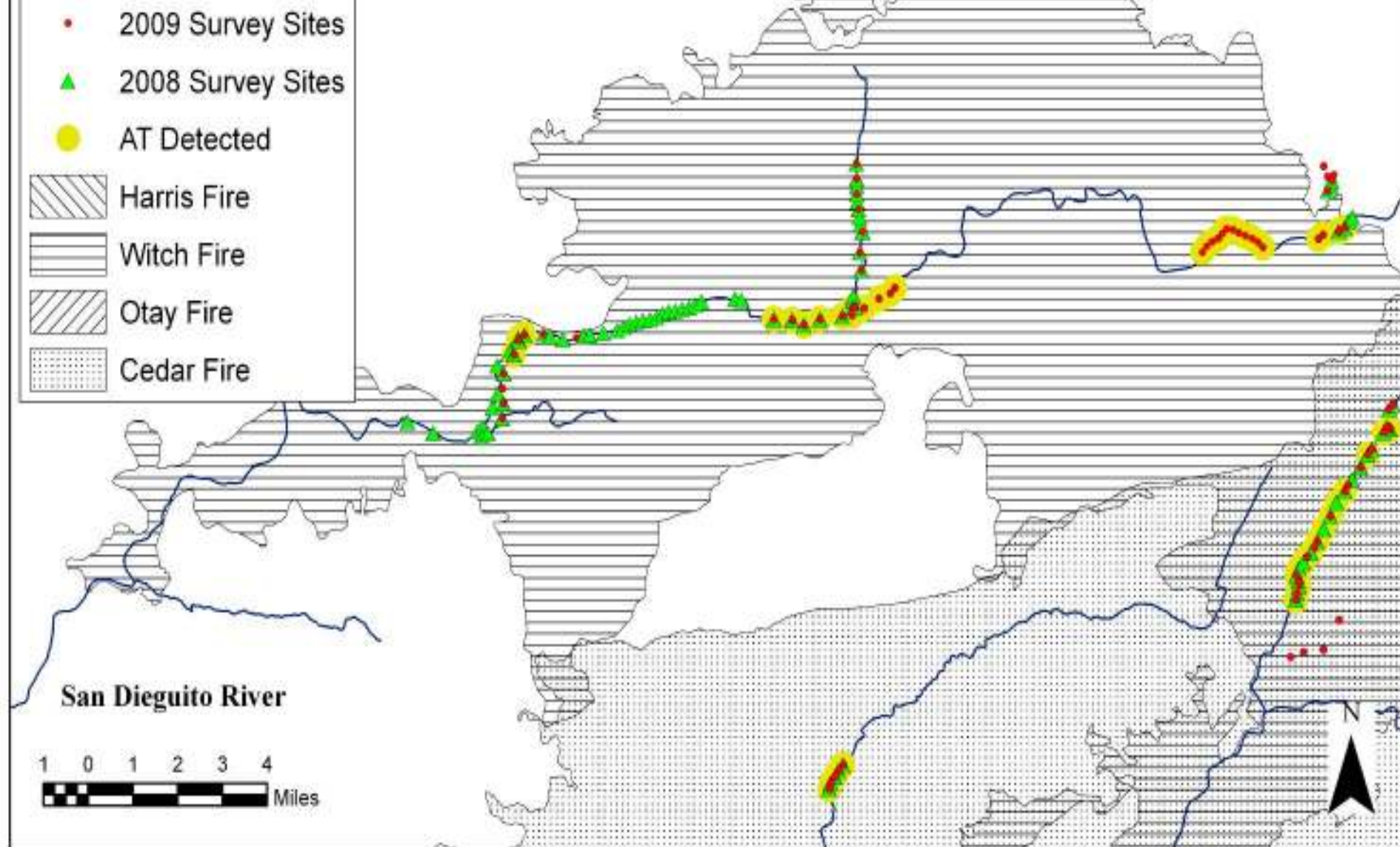
# Preliminary Results

- **Arroyo Toads (2008 - 2009)**
  - **All known occupied sites within MSCP; other sites in county**
    - Prefire data: 2000 – 2002
    - Following protocols developed for robust monitoring at Camp Pendleton
    - Finding short term increases in toad occupancy at some sites
    - Recommendations are to continue monitoring sites to determine if these trends persist over time as riparian habitat recovers



## Arroyo Toad Survey Locations 2008-2009

# San Dieguito and San Diego Watersheds



# Preliminary Conclusions

- Initial response of some wildlife to wildfires was predictable; these studies were discontinued
- Habitat conversion from scrublands (CSS and chaparral) to grasslands appears to be reducing and simplifying faunal diversity for some taxa
- Additional monitoring is needed to determine recovery process and long-term effects for certain declining taxa