

# Restoration of Western Pond Turtles in the MSCP Region of San Diego, California



**Christopher W. Brown, Thomas C.  
Owens and Robert N. Fisher**

# San Diego Multi-Species Conservation Plan (MSCP)

- Adopted March 18, 1997
- Includes western pond turtle (*Emys marmorata*) (WPT)
- USGS began monitoring MSCP turtles in 2002



## Distribution and Status of the Arroyo Toad (*Bufo californicus*) and Western Pond Turtle (*Emys marmorata*) in the San Diego MSCP and Surrounding Areas

Final Report 10/11/05



Prepared for:

California Department of Fish and Game  
County of San Diego



U.S. DEPARTMENT OF THE INTERIOR  
U.S. GEOLOGICAL SURVEY  
WESTERN ECOLOGICAL RESEARCH CENTER



## Data Summary for the 2007 and 2008 Pacific Pond Turtle (*Actinemys marmorata*) Surveys Conducted in the County of San Diego; Boulder Oaks, Lusardi Creek and Los Penasquitos Canyon

Data Summary



Prepared for:

County of San Diego

U. S. DEPARTMENT OF THE INTERIOR  
U. S. GEOLOGICAL SURVEY  
WESTERN ECOLOGICAL RESEARCH CENTER



USGS Western Ecological Research Center

Home Who We Are Where We Are What We Do Products Search Director's Message Outreach Jobs Contacts

### Assessment of Western Pond Turtle population genetic structure and diversity in southern California

The western pond turtle (*Emys marmorata* (syn. *Actinemys marmorata*) is the only turtle species which is native to southern California. Western pond turtles are listed as "vulnerable" by the IUCN, and the species is included (or proposed to be included) in multi-species conservation plans throughout southern California. Ongoing threats to western pond turtle populations include habitat loss and the introduction of non-native turtle species, bass, and bullfrogs.



#### Project Details

We are using state of the art genetic and analytical methods to measure both the extent of genetic connectivity among extant populations and the levels of within population genetic diversity among western pond turtles in southern California in collaboration with the California Department of Fish and Game and researchers at the University of California, Davis.

#### Objectives

Data obtained through this project will be used to inform decisions about population augmentation or relocation within southern California watersheds. These data will enable the identification of genetically unique populations, provide baseline data about the level of genetic diversity within and among populations, and will be used to identify populations that may be especially vulnerable or that have greatly reduced levels of genetic diversity.



# WPT in the MSCP region

- No detectable recruitment at any study sites
- One gravid female at only one site: Sycuan Peak Ecological Reserve

Potential deterrents to recruitment...

-Exotics -Roads -Fishing/Hunting -Public Access (dogs, traffic, etc.)



# MSCP

Area  
~900mi<sup>2</sup>

## Turtle Records

● Historic

● Recent  
Females

x Recent  
Exotic  
Turtles

Conserved  
MSCP  
Lands



U.S.A.

Mexico

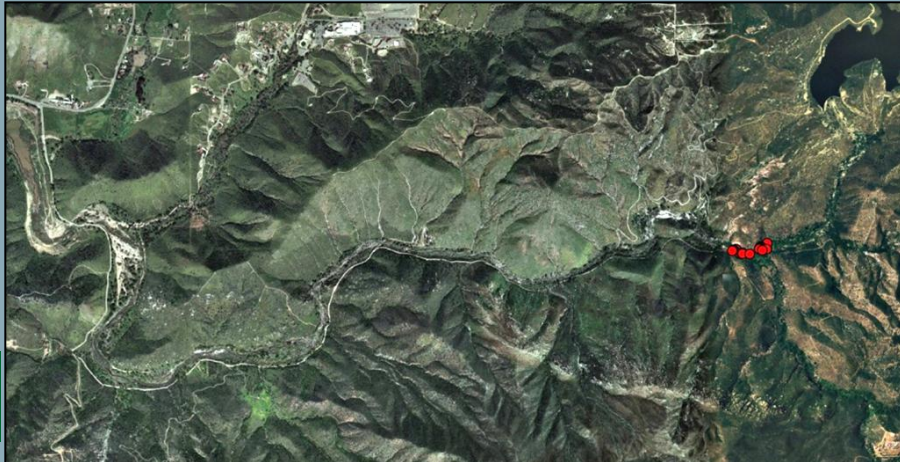


# Can We Restore WPT in Urban San Diego?

## --Sycuan Peak Ecological Reserve--

- Can harvest eggs from females for head starting
- CDFG Reserve—Restricted access and multi-agency collaboration
- Discrete ponds—Easier for trapping and exotics control
- Can use as starter population for Otay watershed (now protected)

--As good as it gets in MSCP--



# Trapping Methods

- 1.5' single-fingered hoop trap (15-20)
  - Baited (mackerel or sardines) in morning on day 1
  - Checked daily in mornings, refreshing bait as needed
  - Closed on morning of day 5
- Galvanized 16.5" minnow traps (3-9)
- Seines and dip nets

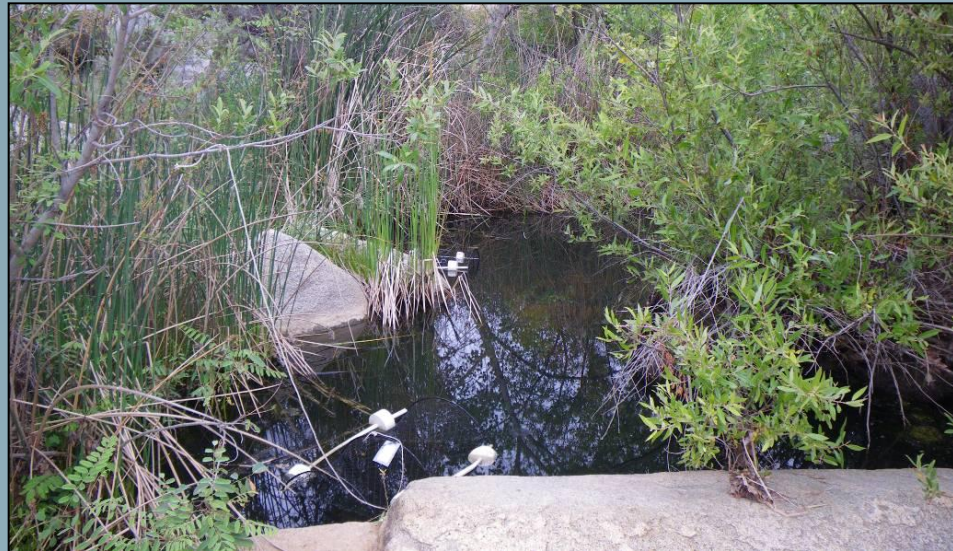


## Turtle Processing

- Weigh and measure, count annuli
- Examine for general health, injuries, damage
- Check for previous markings/IDs
- Implant PIT tags and take tissue from new captures

# 2009 Western Pond Turtle Trapping

- 4 main pools
- 15-20 hoop traps (water level driven)
- 6 Surveys (5 day trapping sessions)
- 41 WPT captures of 24 individuals
- All adults, 10:14 females : males
- Only 8 new WPT  
(16 from 2002-3)
- 2 gravid females  
(only 1 fertile)



SAN DIEGO  
**ZOO**

**USGS**  
science for a changing world

# Invasive Removal and Maintenance

- 2009: removed crayfish, sunfish, bullfrogs and African clawed frogs until none were detected
  - 2010:Early spring-no detections of exotic species at primary turtle ponds
- Late spring-2 adult bullfrogs detected and removed from site
- No invasives detected during most recent survey



# Spring 2010 Western Pond Turtle Trapping

- 2 surveys at same pools (post invasives removal)
- 3 gravid females detected and taken to SD Zoo (all fertile)
- 2 New WPT
  - One young adult WPT (105mm) detected in first Spring survey
  - One juvenile WPT (68mm) detected during last survey
  - Youngest 2 WPT detected in MSCP region in 8 yrs

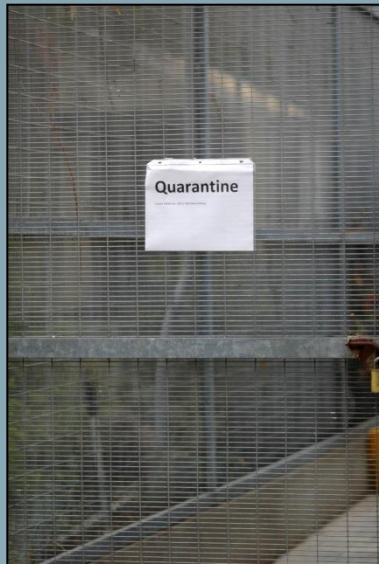


↑  
**WPT  
Activity**



# Collecting Gravid Females

- Captured females were examined to determine reproductive status
  - Radiograph/Physical Examination (Palp)
- Gravid females were kept in **quarantine** at San Diego Zoo for egg harvesting



# Nesting/Egg Laying

- One clutch laid naturally
- Others induced with Oxytocin
- Given supportive fluids and Ca
- Females returned to site after recovery



# Egg Incubation

## •5:1 Vermiculite:Water

- Very dry by most standards
- Typically 1:1 or 2:1
- Chosen based on early data from study
  - Geist et al, in prep

## •Incubated at 28° C for 105 to 126 days

## •Mean egg mass- 11g

## •Mean egg length- 37.6mm

## •Mean egg width- 20.5mm



# Egg Incubation

2009

- 2 Gravid females
  - 1 clutch of 5 fertile eggs
  - 1 clutch of 3 infertile eggs
- All 5 fertile eggs produced juveniles

2010 (so far...)

- 3 Gravid females
  - 1 clutch of 5 eggs (at least 4 appear fertile)
  - 1 clutch of 3 eggs (1 fertile, 2 lost during nesting)
  - 1 clutch of 3 eggs (1 fertile, 2 lost during laying)
- Total of 6 fertile eggs incubating

UPDATE:

5 hatchlings  
from 2 clutches  
from 2010  
doing well, One  
egg still healthy

# Hatchlings (2009)

- Mean weight- 6g
- Mean carapace length- 28.6mm
- Mean carapace width- 26.8mm



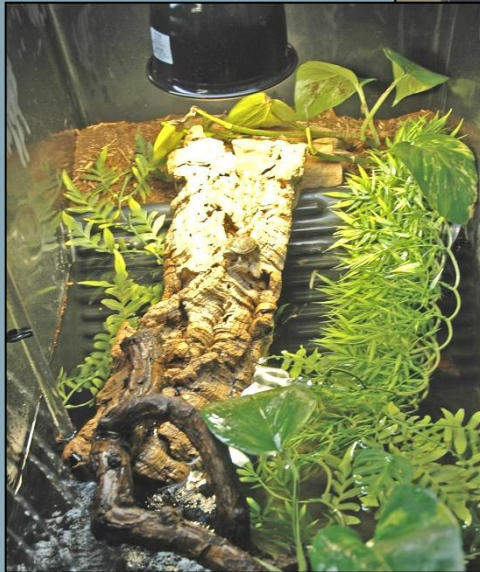
# Feeding

- Crickets, earthworms, Phoenix Worms
- Turtle brittle
- Turtle gel
  - (blended carrots, greens, turtle brittle, omnivore primate biscuits)
- Fish (infrequently)



# Juvenile Care

- New facility for raising juvenile turtles
- Currently 5 healthy juvenile turtles hatched Oct-Nov, 2009
- Mass: 24-32g (~5x hatchling wt)
- Length: 24-28mm
- Width: 22-26mm



# Discussion

- Reduction of invasive species at best WPT site in MSCP
- Successful egg harvesting and incubation from wild population
- Initial positive response in WPT activity potentially to invasives reduction
- Long term commitment for restoration of WPT in MSCP



# Future Activities

- Plan to monitor population to determine if increased activity continues with invasives control
- Continue to develop captive population for breeding and eventual release (4-8 yrs)
- Investigate other potential populations in SD County.
- Examine potential restoration sites in MSCP



# Acknowledgements

**USGS SDFS:** Carlton Rochester,  
Cheryl Brehme, Stacie Hathaway,  
Jeffrey Markert, Richard Cochran,  
Sara Shuster, Kathie Meyer, Melanie  
Madden-Smith...

**San Diego Zoo:** Entire Staff of the  
Herpetology Dept. and Veterinary  
Services

**DFG:** Tim Dillingham, Daniel  
Schrimsher, Biologists of the Viewridge  
Office

**SANDAG:** Keith Greer, Marla Burke,  
Ron Saenz

**Sonoma State University:** Nick Geist

