Western Pond Turtle Monitoring and Management in San Diego

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The Western Pond Turtle

- San Diego's native freshwater turtle
- About an inch long at birth (27-30mm)
- Adults ~ 6 inches (140-150mm)
- 5 yrs or more to mature, live > 20 yrs
- Pacific coast from Washington to Baja California

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The Western Pond Turtle

"**The decline of the western pond turtle in southern California has been recent and rapid**. In 1960 there were 87 known localities for the species from Ventura County to the Mexican border. As of 1970, these were reduced to 57. In 1987, 255 sites were inspected of which 53 possessed turtles, and 25 of these were in Ventura County…

South of the Santa Clara River, sites with western pond turtle populations become increasingly rare: Los Angeles County - 10, **San Diego County - 8**, Orange County - 4, western Riverside County - 3, and southwestern San Bernardino County - 3. **Only five of the populations** south of the Santa Clara River were thought to be **reproductively viable** (Brattstrom, 1988; Brattstrom and Messer, 1988)."

--Lovich, 1998. Western pond turtle species account for BLM.

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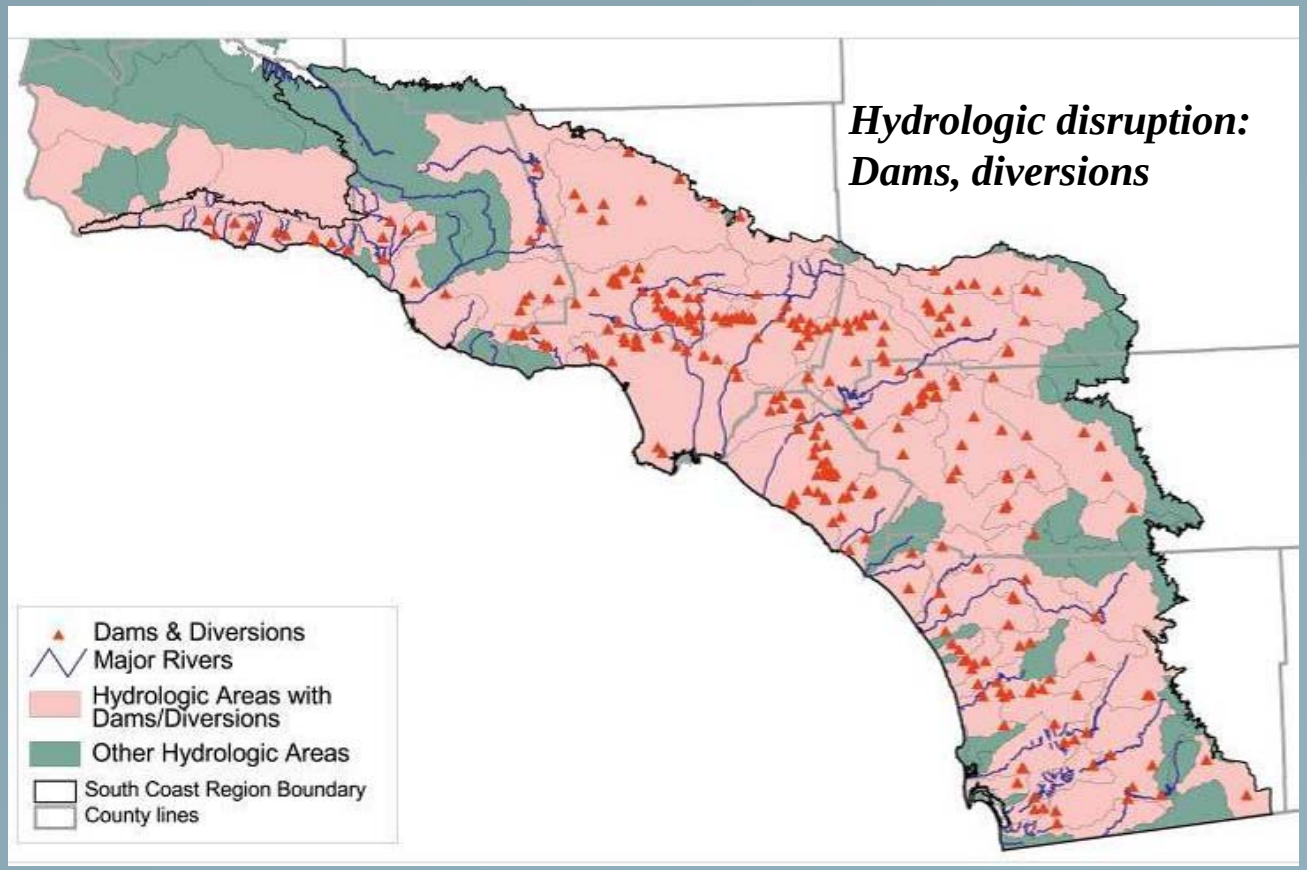
Regional Impacts on the Western Pond Turtle



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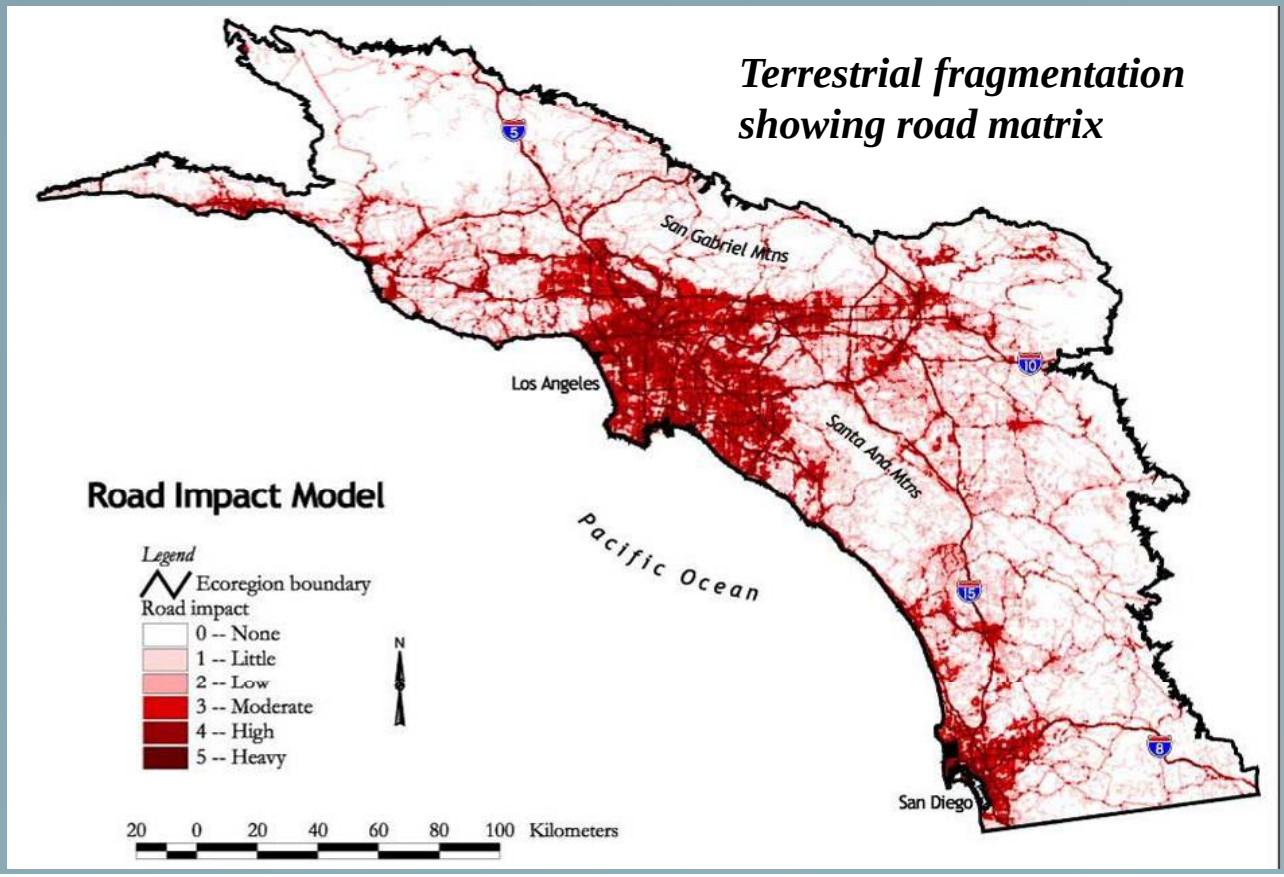

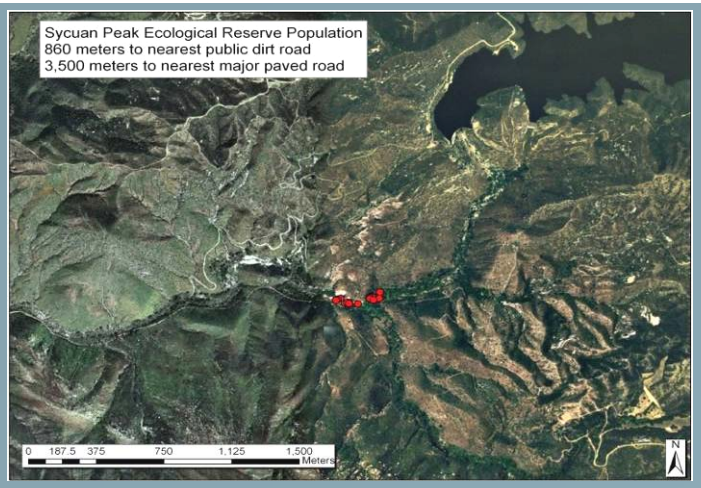

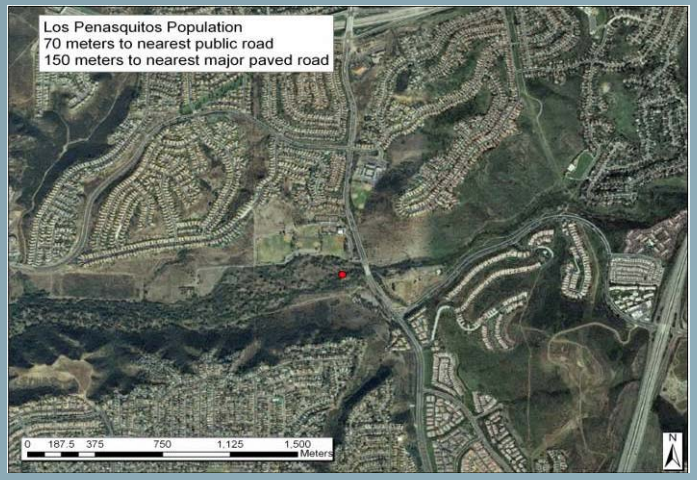

Males vs. females detected at each site and the distance of the population to the nearest major road (two or more lanes in each direction).

Los Penasquitos (150m): 6 males, 0 females

Lusardi Creek (250m): 11 males, 1 female

Sycuan Peak (3,500m): 10 males, 9 females

Local Impacts on the Western Pond Turtle

-Nonnative aquatic species
-Fishing/hunting
-Public access (dogs, traffic, etc.)
-“Good Samaritans”

This OTHER - ID#A1419001

I am a brown and green Turtle.

My age is unknown.

I have been at the shelter since Jun 25, 2011.

This information is 5 hours old.

For more information about this animal, call:
San Diego County Department of Animal Services - San Diego at (619

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Summary of Impacts on the Western Pond Turtle

Human Access \ Naturalness of Site	Natural	Modified Natural	Artificial
High	Pond Turtle ↓↓ Nonnative ↑↑	Pond Turtle ↓↓ Nonnative ↑↑	Pond Turtle 0 Nonnative ↑↑
Medium	Pond Turtle ↓ Nonnative ↑	Pond Turtle ↓ Nonnative ↑	Pond Turtle 0 Nonnative ↑
Low	Pond Turtle ↑ Nonnative 0	Pond Turtle ↑ Nonnative 0	Pond Turtle 0 Nonnative 0

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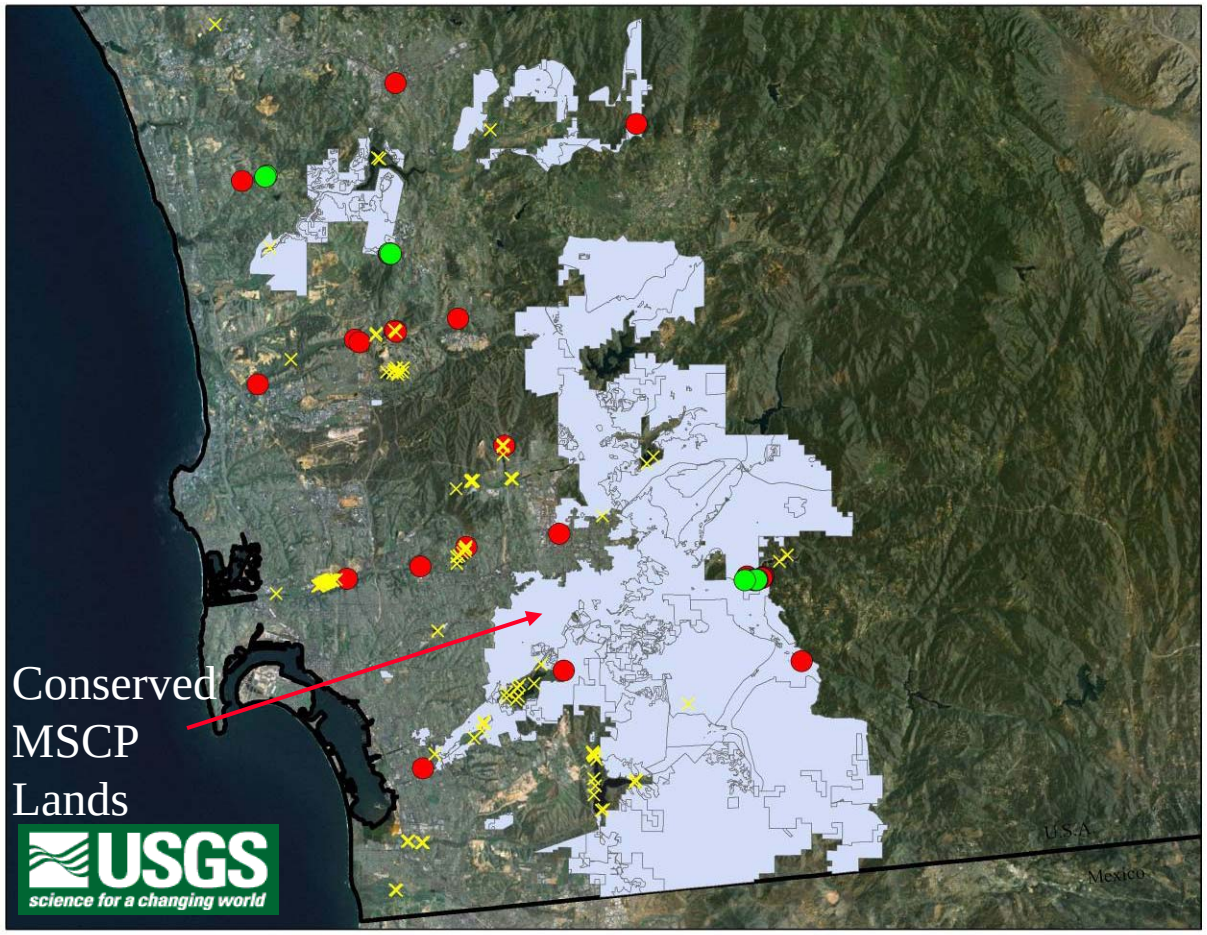
From Madden-Smith, et al., 2005



MSCP Area
~900mi²

Turtle Records

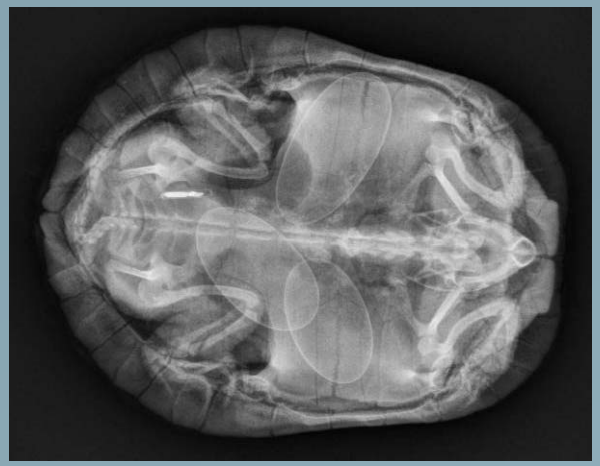
● Historic

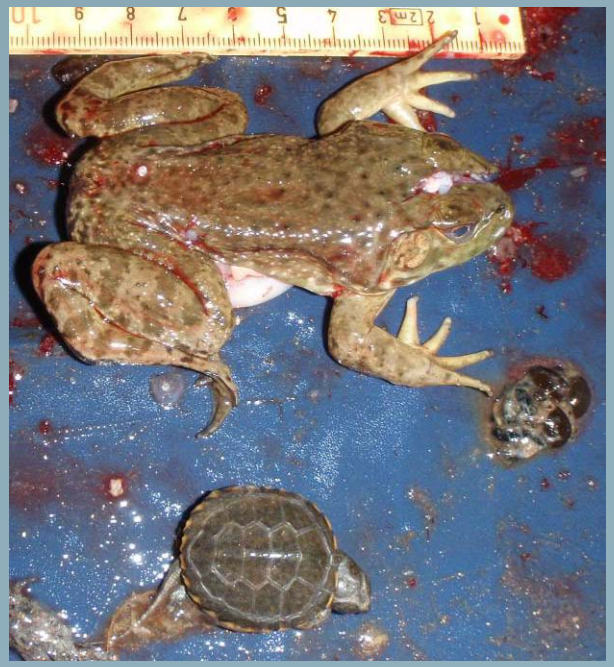
● Recent Females

x Recent Nonnative Turtles

Local Impacts on the Western Pond Turtle

- No detectable recruitment at any MSCP sites 2002-2010
- One gravid female at only one site: Sycuan Peak Ecological Reserve
- Observed predation by nonnative species





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Remove and Restore…

- Remove stressors
  - Nonnatives removal
  - Outreach/signage
  - Trails/roads management

- Restore populations
  - Headstarting
  - Translocations

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Establishing Management Priorities…

- Assess extant populations
  - Many locations outside MSCP poorly surveyed
  - Must also assess impacts to individual populations
    - Nonnatives, access, etc.

- Assess history of the Western Pond Turtle
  - Genetic structure across the range of the species
  - Genetic structure across and within watersheds

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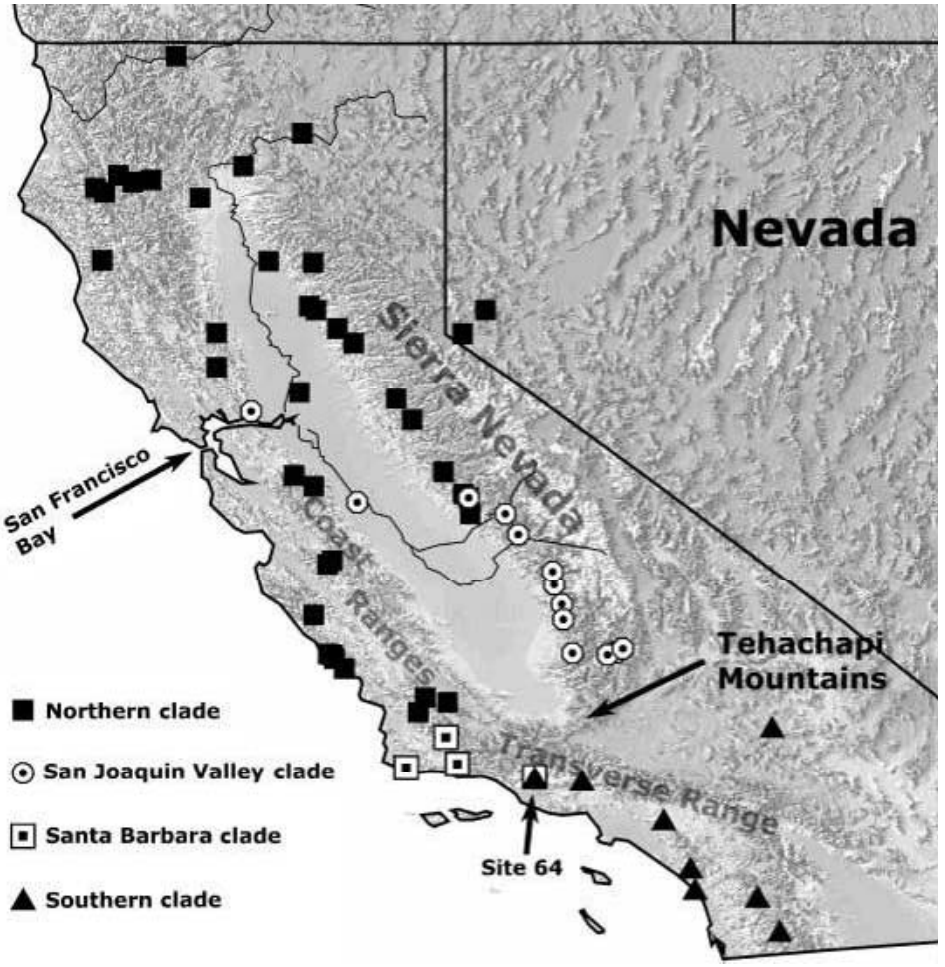
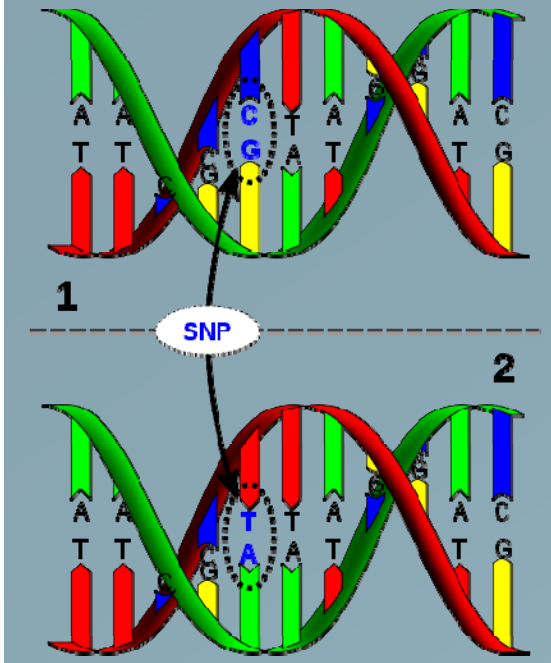
Spinks and Shaffer, 2005

- Populations south of San Francisco highly subdivided
- Southern drainages are generally distinct
- Southern pops. have more variation
- Southern pops. should receive increased conservation attention



Can we use a better genetic tool?



SNP--Single-nucleotide Polymorphism

- The tool – A set of 77 SNP loci developed by Phil Spinks - UCD
- Power of 20 microsats
- Unambiguous Scoring
- “Genome Scale”

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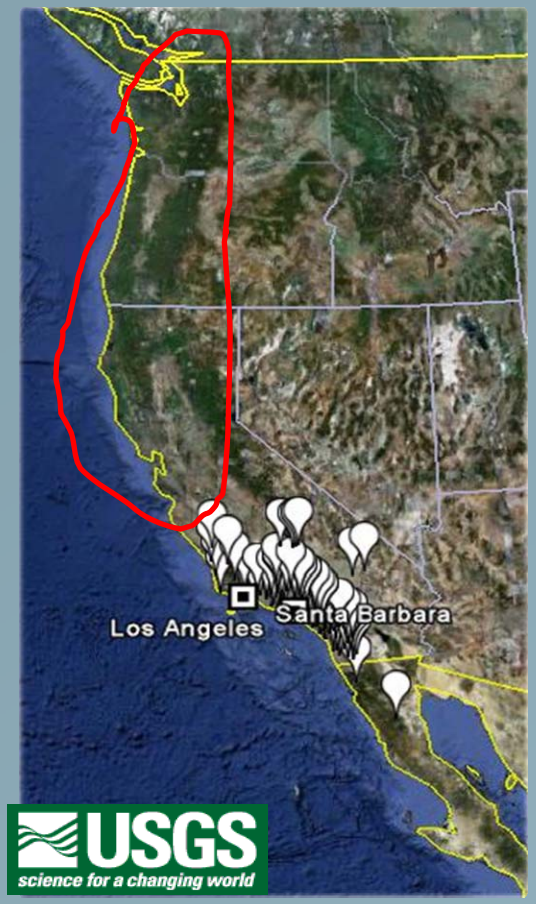
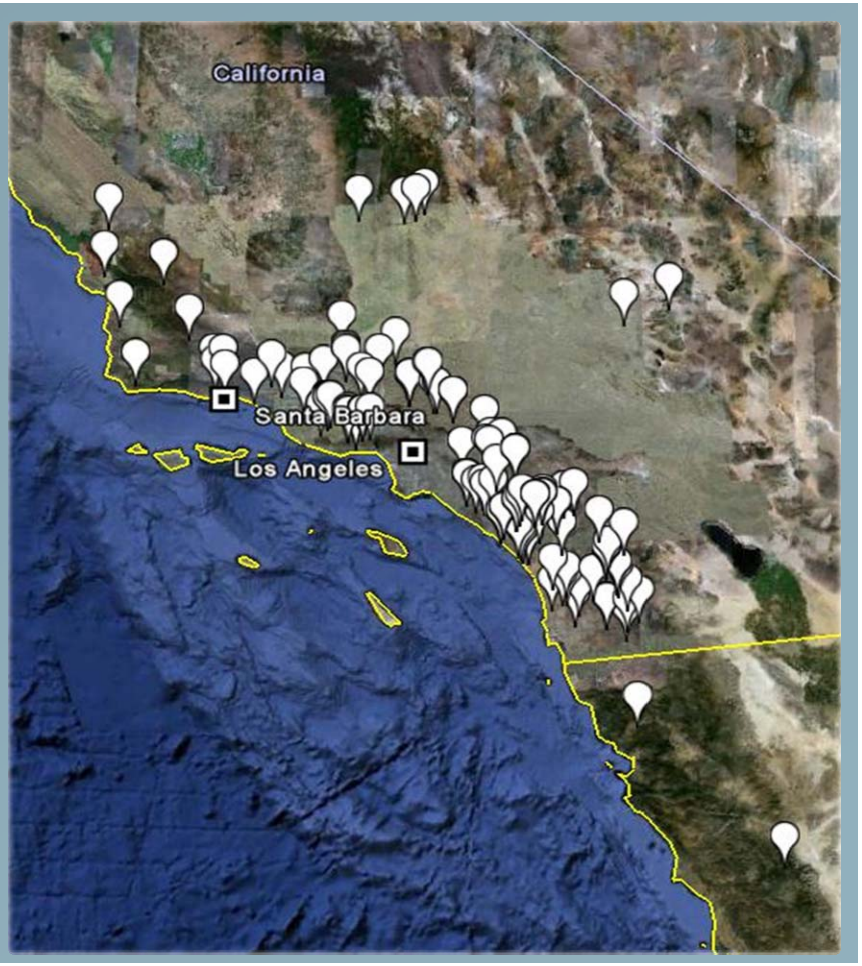


Part of a larger collaboration with Brad Shaffer and Phil Spinks at U. C. Davis

~1500 samples range wide

Our focus: hundreds of individuals, dozens of southern California sites

-many of which are historic



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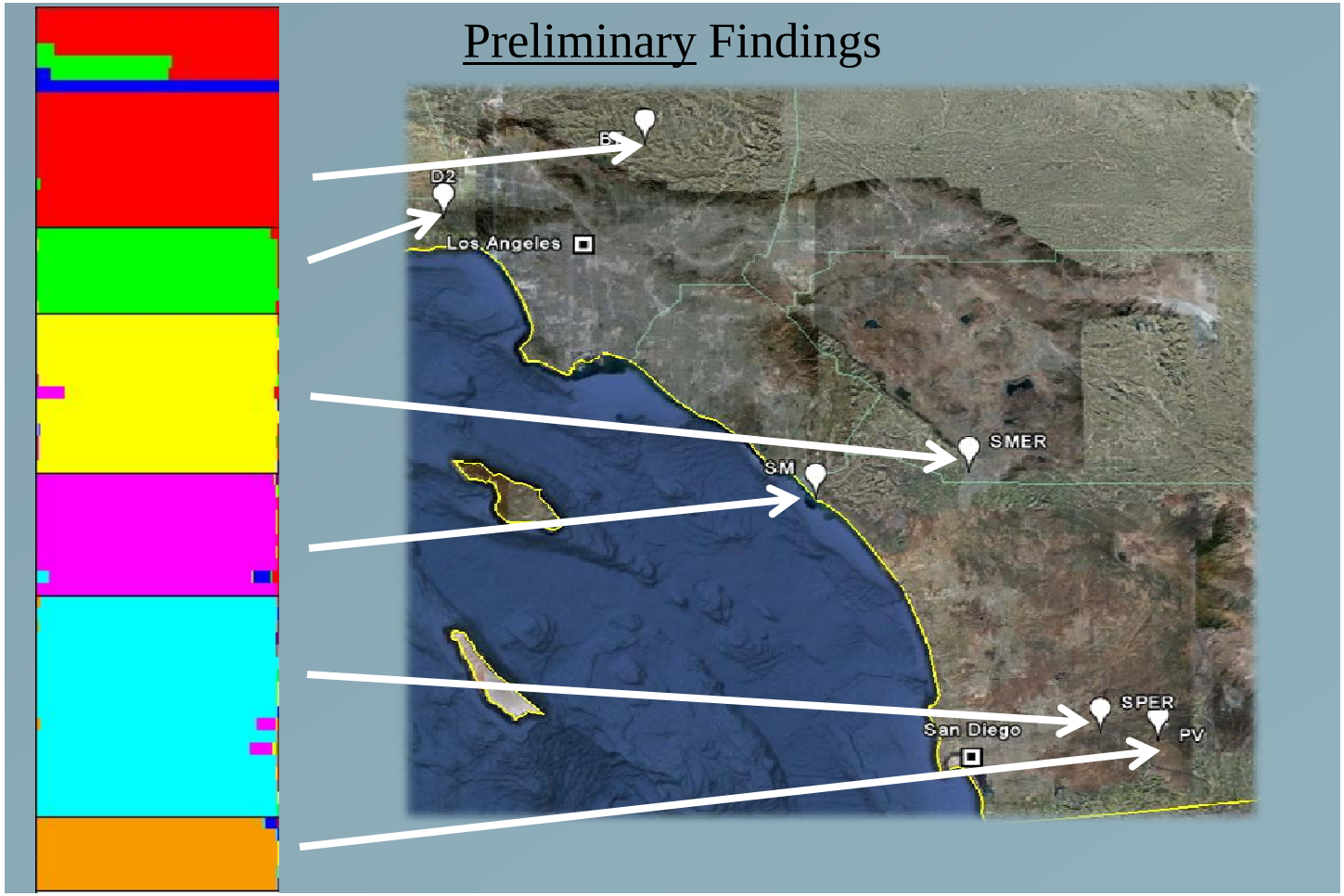
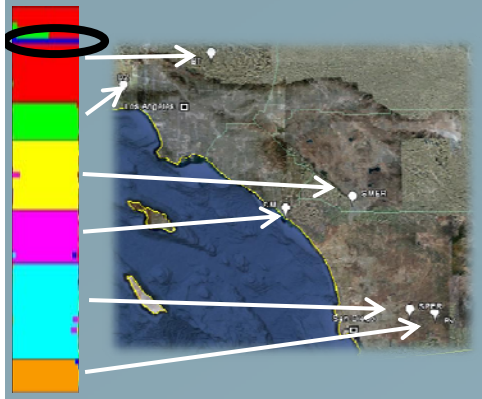
Preliminary Findings



Preliminary Findings Across Watersheds



- Utilizing data from the southern watersheds, 10-13 different groupings…

- Tijuana forms a tight group
- Sweetwater and San Diego cluster
- Penasquitos, Escondido Creek, San Dieguito cluster
- Santa Margarita and two adjacent watersheds cluster

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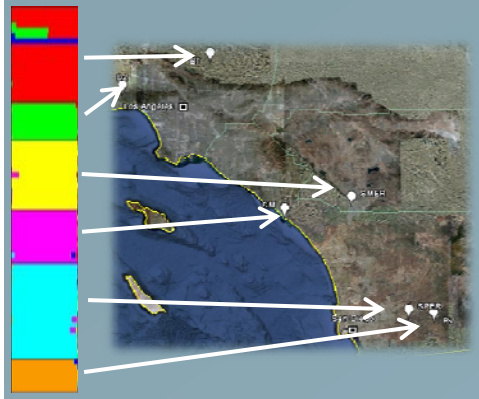
From Markert et al., 2011

Management Implications

- **Need to keep clusters intact:**



- Utilize Tijuana turtles for Otay
- Use current SPER hatchlings to enhance Sweetwater populations
- Keep restored populations pure, do not mix and match

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Can We Restore WPT in Urban San Diego?

--Sycuan Peak Ecological Reserve--

- Headstarting and nonnatives removal
- CDFG Reserve—Restricted access and multi-agency collaboration
- Discrete ponds—Easier for trapping and exotics control

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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

Initial Western Pond Turtle Surveys

- 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)

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New turtles were not young turtles…

Nonnative 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 removed)

•2011:After overtopping, crayfish, sunfish, bullfrogs, African clawed frogs and largemouth bass all detected (but at lower densities).

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Western Pond Turtle Monitoring

- More gravid females with higher fertility
- 3 subadult WPT captured
  - One young adult WPT-2010 (105mm)
  - Two juvenile WPT-2010 & 2011 (68mm & 66mm)
  - Youngest 3 WPT detected in MSCP region in 10 years

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Headstarting

- Females lay naturally or are induced with Oxytocin
- Given supportive fluids and Ca
- Females returned to site after recovery

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Headstarting

- 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 28º C for 105 to 126 days
- Mean egg mass- 11g
- Mean egg length- 37.6mm
- Mean egg width- 20.5mm

Headstarting

2009

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

2010

- 3 Gravid females
  - 1 clutch of 5 eggs (4 fertile)
  - 1 clutch of 3 eggs (1 fertile, 2 lost during nesting)
  - 1 clutch of 3 eggs (1 fertile, 2 lost during laying)
- 5 juveniles hatched

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Headstarting

2009 Hatchlings

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

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Headstarting

Varied diet

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

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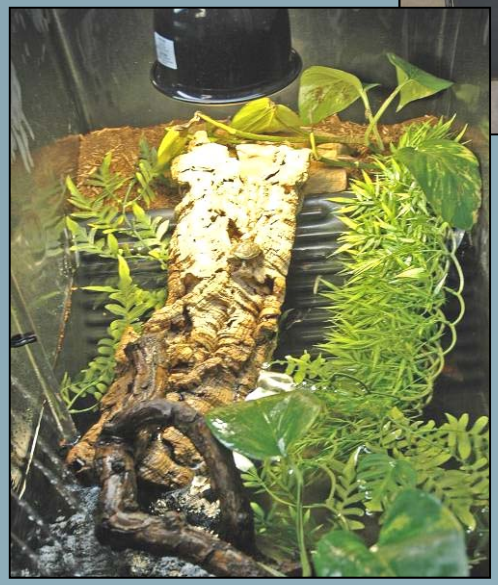
Headstarting

- New facility for raising juvenile turtles
- First 5 healthy juvenile turtles hatched Oct-Nov, 2009
- First 6 month growth
- Mass: 24-32g (~5x hatchling wt)
- Length: 24-28mm
- Width: 22-26mm



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Discussion

- Reduction of nonnative species at best WPT site in MSCP
- Successful egg harvesting and incubation from wild population
- Initial positive response in WPT activity to nonnatives reduction
- Long term commitment for restoration of WPT in MSCP
- Preliminary genetic results illustrate importance of watershed level management

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Discussion

•Nonnatives removal strategies must meet the situation and need

Western pond turtle population at SPER is unique and important to San Diego even though it is impacted

- •Where are there others?
- •Lusardi Creek? Escondido Creek?

Future Activities

- Monitor SPER population for continued recruitment
- Continue to develop captive population for breeding and eventual release (4-8 yrs)
- Complete analysis of south coast pond turtle genetics
- Investigate other potential populations in SD County.
- Examine potential restoration sites in SD County
- Examine potential donor populations based on watershed genetics

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Otay Watershed

Potential reintroduction sites

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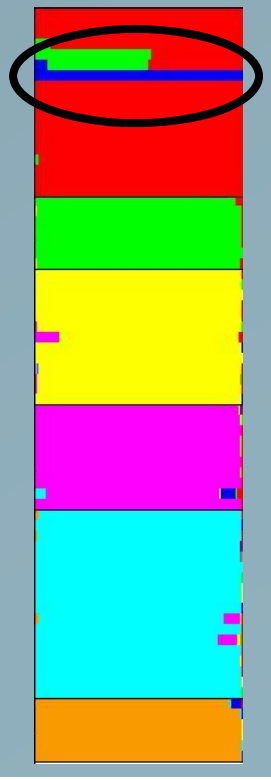
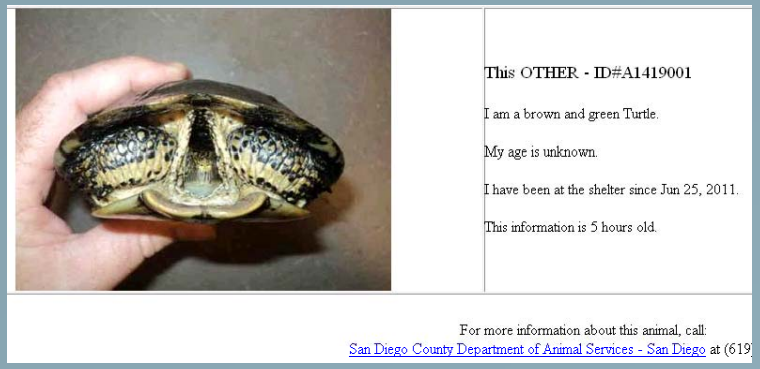
Challenges

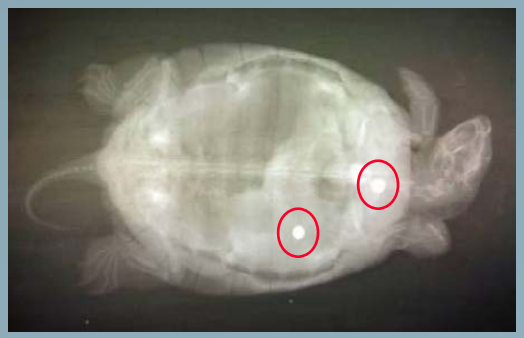
- Misidentifications
- Turtles being moved around



Challenges

- Outreach to the right places/people
- Lack of signage





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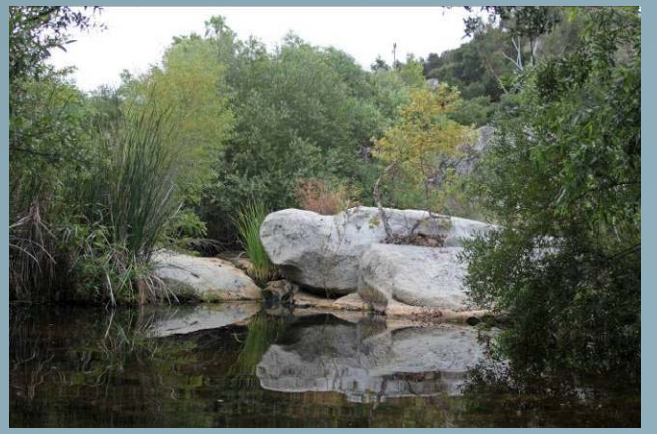
Challenges

•Different habitats require different strategies…



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