SAN DIEGO REGION
RESOURCES AND
CONSERVATION

Thomas Oberbauer
Formerly County of San Diego
Now AECOM
San Diego County one of the most biologically diverse Counties in US.

For Example Botanically 1573 native 26 endemic many near endemics. New native species ongoing. More than all New England

More bats than any county, 23 species half species in entire country

More land mollusks

Size of Connecticut

More people than 19 states including Iowa
Outline

- Physical features of San Diego County
- Unique vegetation and some associated species
- Fire events from last 12 years
- Multiple Species Conservation Program successes
- General photographs of interesting areas
- Baja California mainland and islands
Geologic History

Cretaceous Andes Style Mountains 15-19,000 feet high

Otay, Black and San Miguel Mountains remnants Metavolcanic metamorphosed by heating from batholith

Coastal terraces composed of Sonoran River rock and sediments that have been uplifted.

Granitic Mountains rose 2 million years ago
Mio-Pleistocene – Woodrat middens and based on current species distribution

- Montane Coniferous forest through the area
- Sierra San Pedro Mártir forest in the higher elevations
  - Quaking Aspen and Douglas tree squirrels
  - Lodgepole Pine at higher elevations
- Piñon Pines down to desert edge
- Closed Cone forest on mesas
Precipitation

- **Cabrillo Monument**
  - Upper 12 in (30cm)
  - Lower 6 in (15.24cm)
- **San Diego** 10.2 in (26 cm)
- **Ramona** 15.8 in (40.1)
- **Cuyamaca Lake** 34 in (86 cm)
- **Palomar Mountain** 40 in (101 cm)
- **Pine Valley** 21 in (53cm)
- **Mount Laguna** 25 in (63 cm),
- **Campo** 17 in (43cm),
- **Jacumba** 9 in (23 cm)
- **Ocotillo** 2.5 in (6.3 cm)
Climatic Variation

- Campo – one day temp can range from below freezing to 100 degrees F.

- Summer thunderstorms can be severe. In 1880’s Campo received 11.5 in (29.2 cm) of rain in 80 minutes one August afternoon.

- Aug 1992 6.5 in (16.5 cm) Palomar Mountain in 90 min.

- 1976 Hurricane Kathleen dropped torrential rains in the area, Desert areas up to 6-7 in (15-17 cm), Mt. Laguna 10 in (25 cm) in 12 hours.
1993 Palomar Mountain 97 in (246 cm)
1880s Cuyamaca 100+ in (254cm) flooded mines
1891 Descanso 33 in (84cm) in 60 hours

August 4, 2011 Oceanside Harbor 66, San Diego 73, Ramona 94, Campo 100 with low of 52, Mt. Laguna 81 and Borrego Springs 114. 48 degree temp range.

August 24, 2011 Oceanside Harbor tied record lowest high for date at 67, but Borrego Springs broke record high for date of 116. 49 degree range

September day in 2011, Lindbergh Field .13 in. and 97 deg.
October 12, 2015 3 PM, Oceanside 81, Campo 88, Lindbergh 94, Brown Field 97, Borrego 95 and Mount Laguna 66.
Sept day 2013 car thermometer Earthquake Valley 99 and raining, Ocotillo 107 and Mount Laguna 65 and raining.
Drought

- 2001-2002 Season San Diego 3.02 inches
  - Cuyamaca 10.8 inches

- Driest in 150 years of recordings

- 2006-2007 also very dry

- Only 2 years above normal rainfall in last 17
Vegetation

- Large number of Holland vegetation communities
  - Coastal sage scrub
  - Coastal dune
  - Coastal salt marsh
  - Vernal Pools

- Various forms of chaparral
  - Southern mixed chaparral
  - Desert transition chaparral
  - Redshank chaparral
  - Chamise chaparral
Vegetation

- Oak Woodland
- Riparian Woodland
- Sierran Coniferous Forest
- Pinyon Juniper Forest
- Montane Meadow
- Grassland
- Great Basin Sagebrush
- Cypress Woodland

Many more under San Diego Manual using CNPS Manual
Coastal sage scrub 75% loss

Artemisia californica-Eriogonum fasciculatum-Opuntia littoralis Association
Bahiopsis laciniata- Artemisia californica- Eriogonum fasciculatum Association
Salvia munzii
Mission Trails CSS and CHP

Baccharis sarothroides Association in foreground
Encelia californica
Point Loma
CSS
Riparian Vegetation
Chaparral slopes
Chaparral and Oaks

Quercus berberidifolia-Adenostoma fasciculatum Alliance and Quercus kelloggii Association
Dense Forest
Deserts: Desert Scrub
Desert Scrub
Gabbros
• Nolina interrata
• Packera ganderi
• Carex obispoensis serpentine disjunct

Metavolcanics
• Fremontodendron mexicana
• Lepechinia ganderi

Gabbros or Metavolcanics
• Calochortus dunnii
• Hesperocyparis forbesii
• Satureja chandleri
• Tetracoccus dioicus
Plant Soil Affinities

Clay Soil
Acanthomintha ilicifolia
Bloomeria clevelandii
Convolvulus simulans

Sandy soils
Chorizanthe orcuttiana
Dudleya blochmanii brevifolia
Acmespon nuttalliana
Pinus torreyana
Chaenactis glabriuscula orcuttiana
Calochortus dunnii
Dunn’s Mariposa Lily Gabbro and Metavolcanic
Lepechinia ganderi
Nolina interrata Gabbro endemic
Coastal Plants: Chaenactis glabriuscula orcuttiana Sandy soils
Coast: *Chloropyron maritima*
Salt Marsh
Pinus torreyana
Torrey Pines State Park
Agave shawii
Point Loma
Came late 1970’s Originally Tidy Tips and Camissoniopsis cheiranthifolia
Linanthus dianthiflorus Torrey Pines, Veldt Grass removal
Dudleya brevifolia
Del Mar
Vernal pool with water
96+% loss of habitat
Vernal Pool Spring
Pogogyne nudiuscula
Brodiaea orcuttii
Otay Mountain

3,500 foot peak with Chaparral and Tecate cypress, metavolcanic rock
Acanthomintha ilicifolia
Arctostaphylos otayensis
Artemisia palmeri
Astragalus deanei
Brodiaea orcuttii
Calandrinia breweri
Calochortus dunnii
Caulanthus stenocarpus
Chamaebatia australis
Chorizanthe leptotheca
Chorizanthe polygonoides longispina
Chorizanthe procumbens
Clarkia delicata
Comarostaphylos diversifolia diversifolia
Hesperocyparis forbesii

Dichondra occidentalis
Dudleya variegata
Ericameria palmeri palmeri
Fremontodendron mexicanum
Galium californicum californicum
Gilia caruifolia
Harpagonella palmeri
Deinandra floribunda
Horkelia truncata
Juglans californica
Juncus acutus leopoldii
Lathyrus splendens
Lepechinia ganderi
Lilium humboldtii ocellatum
Hosackia crassifolia otayensis
San Diego County Mountains

Upper Palomar Mountain
Rare Plants San Diego County Mountains

- Androsace elongata acuta
- Astragalus douglasii perstrictus
- Astragalus oocarpus
- Berberis fremontii
- Berberis nevinii
- Boechera hirshberiae
- Boykinia rotundifolia
- Brodiaea orcuttii
- Calochortus dunnii
- Caulanthus simulans
- Chaenactis parishii
- Chorizanthe leptotheca
- Chorizanthe polygonoides longispina
- Clarkia delicata
- Hesperocyparis forbesii
- Hesperocyparis stephensonii
- Deinandra floribunda
- Deinandra mohavensis
- Delphinium hesperium cuyamacae
- Delphinium parishii subglobosum
- Downingia concolor brevior
- Ericameria cuneata macrocephala
- Eriogonum foliosum
- Galium johnstonii
- Galium angustifolium jacinticum
- Geraea viscida
- Gilia caruifolia
- Grindelia hirsutula hallii
- Heterotheca sessilifolia sanjacintensis
- Heuchera brevistaminea
- Heuchera rubescens versicolor
- Hulsea californica
- Hulsea mexicana
- Hulsea vestita callicarpha
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<thead>
<tr>
<th>Hymenothrix wrightii</th>
<th>Pentachaeta aurea</th>
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<tr>
<td>Lathyrus splendens</td>
<td>Perideridia gairdneri gairdneri uncertain</td>
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<td>Lessingia glandulifera tomentosa</td>
<td>Poa atropurpurea</td>
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<td>Lewisia brachycalyx</td>
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<td>Lilium humboldtii ocellatum</td>
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<td>Lilium parryi</td>
<td>Rubus glaucifolius ganderi</td>
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<td>Limnanthes gracilis parishii</td>
<td>Rupertia rigida</td>
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<td>Linanthis bellus</td>
<td>Scutellaria bolanderi austromontana</td>
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<td>Linanthis orcuttii</td>
<td>Selaginella asprella</td>
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<td>Streptanthus campestris</td>
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<td>Mimulus diffusus</td>
<td>Thermopsis californica semota</td>
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<td>Monardella macrantha hallii</td>
<td>Viola aurea</td>
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<td>Monardella nana leptosiphon</td>
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<td>Navarretia peninsularis</td>
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<tr>
<td>Penstemon clevelandii connatus</td>
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</tbody>
</table>
Mixed Forest

Mendenhall Valley
Conifer and Meadow

French Valley
Lilium humboldtii ssp. ocellatum
Monardella macrantha
Linanthus bellus east edge of mountains
Desert Plants
Mimulus bigelovii
Oenothera deltoides, Abronia villosa, Geraea canescens, Sahara mustard removal
Xylorhiza orcuttiana
Mohavia conferta
Disjuncts from North

*Ceanothus folius*us Holy Jim Canyon 9 2009? SLO

*Salvia sonomensis* LAC possibly ornamental helipad SGabriel mtns. Santa Barbara next records

*Vaccinium ovatum* to Santa Barbara

*Cornus nuttallii* not in Santa Barbara or SLO down the Sierras

*Rhododendron occidentale* skips LA, SLO, SB, OC up the Sierran SB and Riverside county paths

*Lewisia brachycalyx* SB LA Plumas and Arizona and Utah N Baja

Disjunct from South

*Viguiera purisimae* Camp Pendleton 300 miles north of nearest location found in 1997.
Banana slug
Hesperochiron californicum  SB, Ventura mt pinos Sierras and Sierra Juarez with Lewisia brachycalyx
Penstemon californicus  Riverside OC and Sierra Juarez, near San Diego County line
Pinus contorta murrayana  San Jacinto Mtns and Sierra San Pedro Martir
Populus tremuloides  San Bernardino Mtns
Sarcodes sanguinea  San Jacinto and Sierra San Pedro Martir
Southern Limits

Pacific Madrone
Big Leaf Maple
Drought killed trees 2003
Loss of Big trees and loss of nearly 20,000 acres of conifers with 9,000 in Cuyamaca alone. Note density of dead trees.
9 ft. Tree
approx. 1000 years old
World’s Largest Coulter Pine Register Big Trees
Cypress saplings Otay Mountain
2007 Poomacha Fire Backfire in area where dead trees were removed SD Union Tribune
Poomacha Fire fighter working in defensible space
SD UNION TRIBUNE
Dead Dying Diseased Tree removal created Defensible Space for backfires
Cuyamaca Peak Remnant conifers from Cedar Fire
10 foot tall Ceanothus palmeri
Chamise Chaparral I-8 Overlook burned 3 times in last 15 years
Gold spotted oak borer

Photos from Internet
Feral Pigs

- Introduced in 2006
- 200-300 animals
- Working on plans to eradicate them
- Eat acorns

- Turkeys introduced 1990s eat acorns
- Combine with GSOB dim future for oaks
Work with Stakeholders and public officials

- Wildlife Agencies both US Fish and Wildlife Service and California Department of Fish and Game
- Builders
- Environmental groups
- Agricultural groups
- Decision Makers
- Partners nearly 40,000 acres in MSCP plus tens of thousands more outside MSCP spillover
Castilleja densiflora, Lasthenia gracilis, Lupinus bicolor, Layia platyglossa
Limnanthes gracilis var. parishii
Downingia concolor var. brevior
Laguna Meadow winter
Sierra Juarez is Large Area
Erendira Pinus muricata
Picacho Del Diablo
Sierra San Pedro Martir
Vizcaino Desert
Abronia villosa, Pachycereus, Yucca valida
Arroyo San Pablo
Sierra San Francisco
Guadalupe Cypress on Guadalupe Island
Coastal sage scrub 75+% loss of habitat

Artemisia californica-Eriogonum fasciculatum-Malosma laurina Association
Cuyamaca Burning
Cuyamaca Burned
CREATION OF A PLAN IS DEPENDENT ON SOUND BIOLOGICAL AND MODELING PRINCIPLES

• Lack of access to properties to perform surveys
• Need to evaluate relative values of habitat
• Large number of species to be considered together to obtain coverage
This is a complete list of rarelisted plants and animals in San Diego County along with screening criteria for listing.

Verify results with Tom Oberbaur or Maggie Loy before requesting that a site specific species survey be conducted.

To limit the list to plants and animals that meet certain habitat, location, and elevation criteria click on the arrow over the criteria you wish to reset and select "All".

BE CAREFUL! If you use multiple screening criteria be aware that the results will be limited to species that meet all the criteria.

For example if you screen for both Coastal Sage species and Chapparral species you will not see species that meet one but not both criteria. Therefore, it will usually be required to run several different scenarios for each project.

* Species Listed indicates that species has some protection or concern at the Federal State or Local level.

Desert Salamander NE Santa Rosa Mtns. In Anza Borrego per Mark Jorgensen

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Common Name</th>
<th>Ecoregions</th>
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<tbody>
<tr>
<td>Androscage elongata acuta</td>
<td>California rosace</td>
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<td>Astragalus douglasii persticuosus</td>
<td>Jacumba Milkvetch</td>
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<tr>
<td>Berberis fremontii</td>
<td>Fremont barberry</td>
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<td>Caulanthus simulans</td>
<td>Pagson's jewellflower</td>
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<td>Clarkia delicata</td>
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<td>Delphinium panthiil subglobosum</td>
<td>Desert larkspur</td>
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<td>Gilia carafolia</td>
<td>Caraway leaved gilia</td>
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<tr>
<td>Geraea viscosa</td>
<td>Sticky gerea</td>
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</tr>
<tr>
<td>Heterocentra gilbigna</td>
<td>Tecate tarplant</td>
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</tbody>
</table>
Referred to as a Reserve Selection Algorithm
Mechanically evaluate the trade-offs associated with drawing preserve area boundaries
Optimum conservation area boundaries with the least acreage necessary to meet assigned goals
Quantification of how many goals are reached
Objective, repeatable
**Habitat Modeling and Analysis**

- What areas have high biological resource value?
- Where are the most important habitats for endangered species?

**Reserve Selection Algorithm (SITES) Modeling**

"Creating the Preserve"

- Systematic approach to define preserve boundaries and meet biological goals based on sound biological science and planning

**Gap Analysis**

- What areas are already protected?
- Where are the linkages to other surrounding preserve areas?

**Identification of Pre-Approved Mitigation Area (PAMA) Boundaries**

- Coordinated drawing of preserve area boundaries (PAMA) with Wildlife Agencies

**Conservation Analysis**

- Can the preserve configuration meet the project goals (level of conservation, land use planning) and protect the species for which coverage is sought?

**NCCP Plan Development and Implementing Agreements**

- Document production and permit processing
Value of Multiple Species Planning

- Focuses attention on conserving highly sensitive areas
- Partnership with conservation and development. Need to work together to succeed. If not, environment usually loses. Very Difficult. Creating plans is easier than gaining support.
Attracts Federal and State Funds.

Conservation moves more smoothly rather than confrontation for each project.

South County MSCP Permit 1998. More than 40,000 acres conserved that would not have been.

Federal Wildlife Refuge.
Independent Science Advisors

- Provide independent peer review to scientific process
- Provide a basis for identification of important biological areas

The coastline of the Big Bend Region of Florida is the largest undeveloped coastline in the United States outside of Alaska. Successful rewilding is possible because viable core linkages to necessary habitat exist.

Dr. Reed Noss
Conservation Biologist
Conservation Biology Institute
Sidalcea malviflora
Laguna Meadow winter
Mountains: Palomar Mendenhall Valley
2004-2005 Palomar Mountain
Dead tree treatment area before.
Palomar Mountain dead tree removal after. Note V trees left in place.
Tetracoccus dioicus  Gabbro endemic