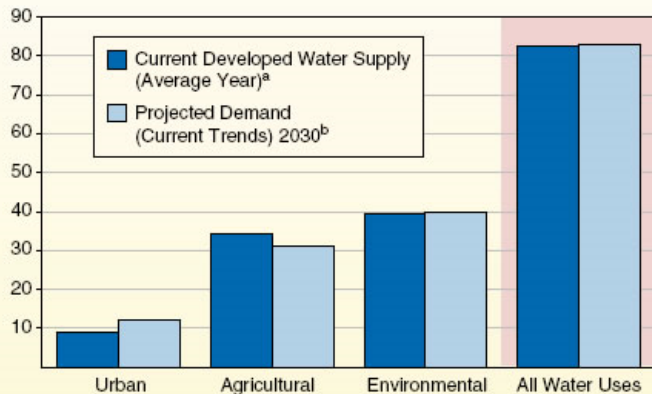


# CA Water Supply Also Disappearing...

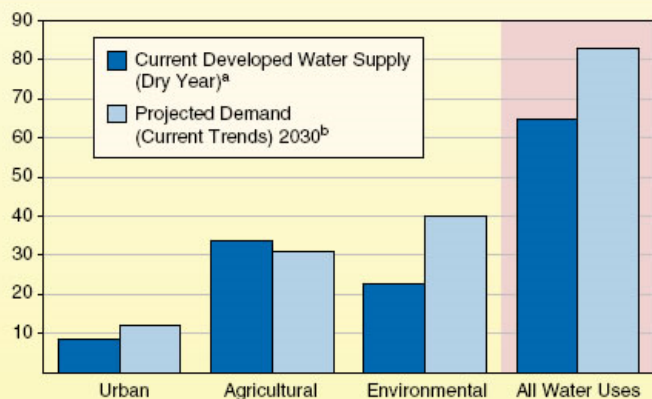
Figure 1

Supply and Demand Projected to Be Nearly Equal Under Average-Year Conditions in 2030...

(Million Acre-Feet)



...But Dry-Year Demand Projected to Exceed Supply



- During average precipitation years, supply projected to equal demand
- However, in dry years, supply projected to fall short of demand

<sup>a</sup>Developed water supply is the amount of precipitation, surface water, or groundwater made available for use, generally through construction of storage or delivery systems.

<sup>b</sup>Demand projections from Department of Water Resources, 2005 California Water Plan.

# Examples of Endangered and Threatened Species



Tidewater Goby



CA Least Tern



Steelhead Trout

Lyon's Pentachaeta



Belding's Sparrow



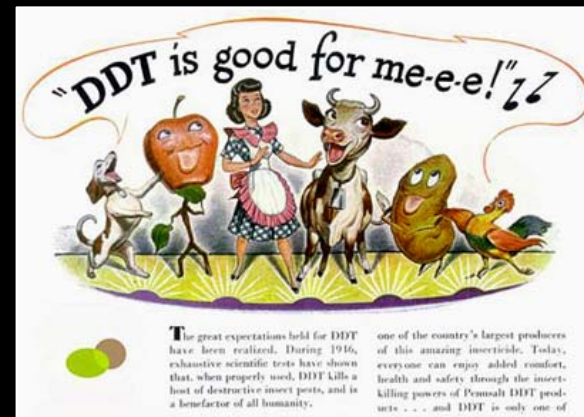
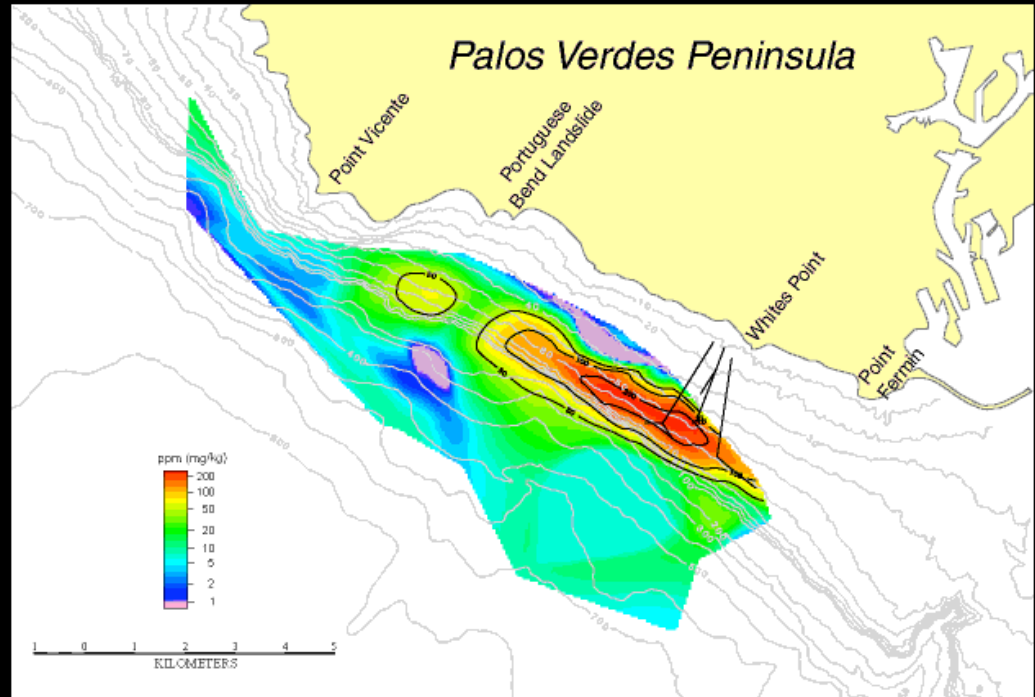
Braunton's Milkvetch

# Examples of Endangered and

## USC Campus on Catalina Island



# DDT Contamination



# Brown Pelicans Removed From ESA List...

A century-long effort to protect the bird is no longer necessary, federal officials say.

The population, once imperiled by hunters and DDT, has reached more than 650,000 in North and Central America.

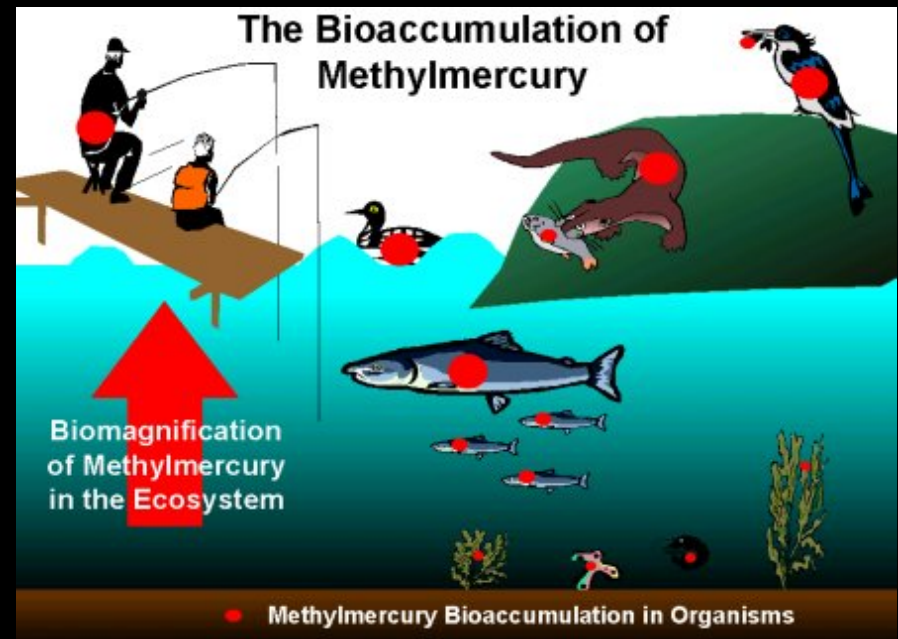
*LA Times*, Nov 12, 2009



# Environmental & Public Health Concerns



- Pollution unregulated for decades
  - Contaminants in river sediment
- Many contaminants absorbed in fatty animal tissues
  - Bioaccumulation over time



# Pacific Northwest Dead Zones

## Dead zones

The plunge in oxygen levels in waters off Washington and Oregon has occurred every summer since 2002, killing bottom-dwelling sea life.



Sources: National Oceanic and Atmospheric Administration, Oregon State University, Partnership for Interdisciplinary Studies of Coastal Oceans, ESRI, TeleAtlas

LESLIE CARLSON Los Angeles Times

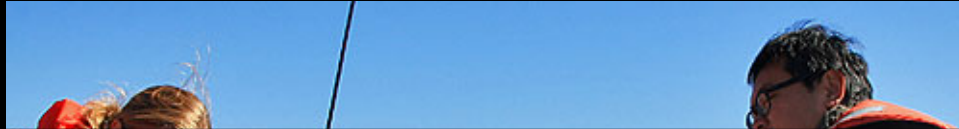


Feb 2008  
LA Times

# Pacific Northwest Dead Zones

## Dead zones

The plunge in oxygen



- Coastal upwelling drives high productivity
- However, prolonged surplus O<sub>2</sub> resources
- Conditions exacerbated by climate change\*
- Such coastal areas account for 1% of world's oceans; BUT provide 20% of global fisheries!



Sources: National Oceanic and Atmospheric Administration, Oregon State University, Partnership for Interdisciplinary Studies of Coastal Oceans, ESRI, TeleAtlas

LESLIE CARLSON Los Angeles Times



Feb 2008  
LA Times

# Bacteria

## Current pathogen indicators

Type	Health standard (AB411 in CA*)
Fecal Coliforms ( <i>Escherichia coli</i> )	400 cells 100 ml <sup>-1</sup> (4 cells ml <sup>-1</sup> )
Enterococci ( <i>E. faecalis</i> , <i>E. faecium</i> )	104 cells 100 ml <sup>-1</sup> (~1 cell ml <sup>-1</sup> )
Total Coliforms	10,000 cells 100 ml <sup>-1</sup> (~100 cells ml <sup>-1</sup> )

**\*AB 411:** Established in 1997 uniform requirements for regular state and local monitoring of coastal waters and for informing the public when the waters pose a health hazard.

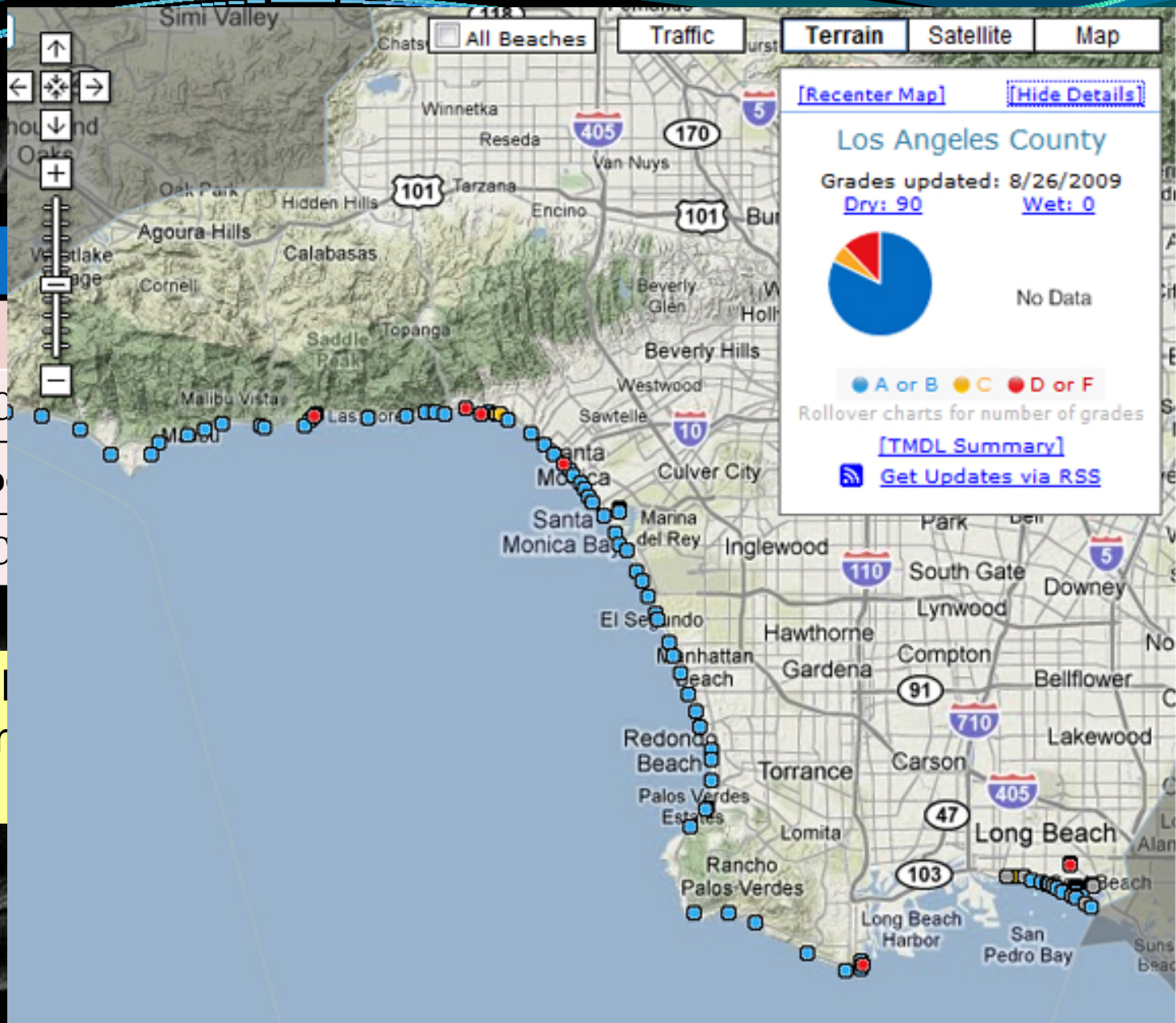
Type

Fecal C

Enteroc

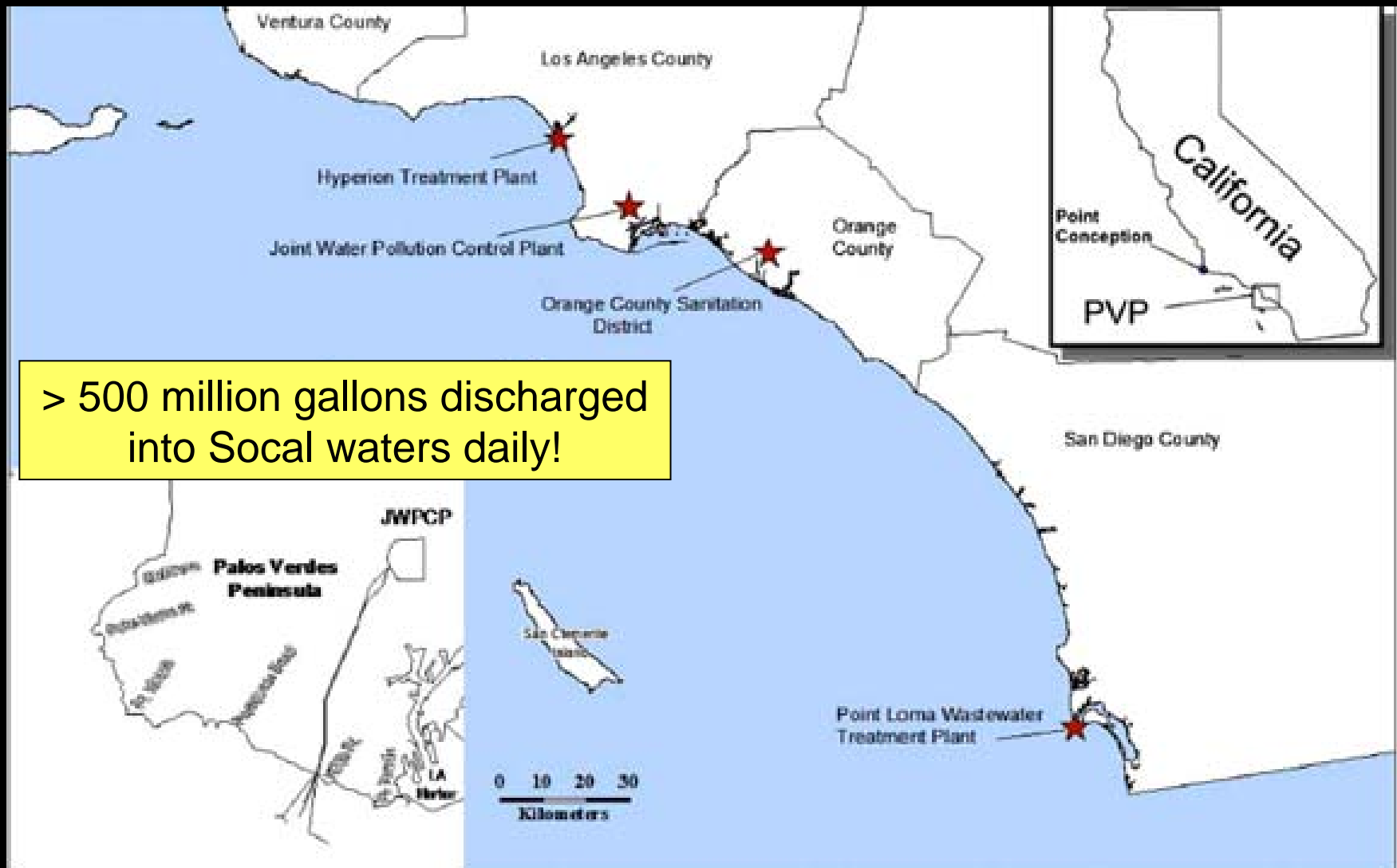
Total C

\*All  
are

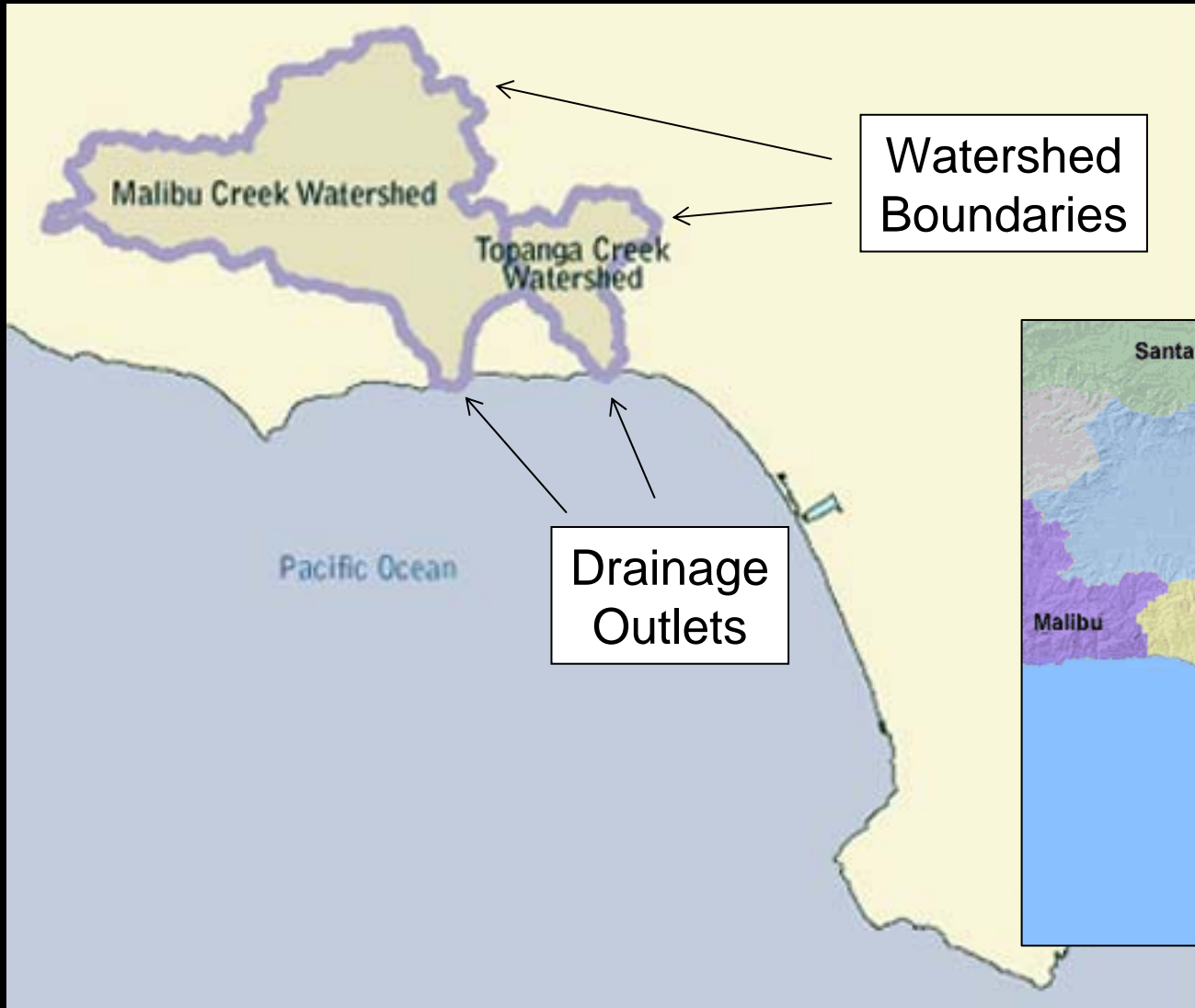


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# Water Supply Management



# Local Watersheds



# Watersheds: Important Characteristics

## Physical Characteristics

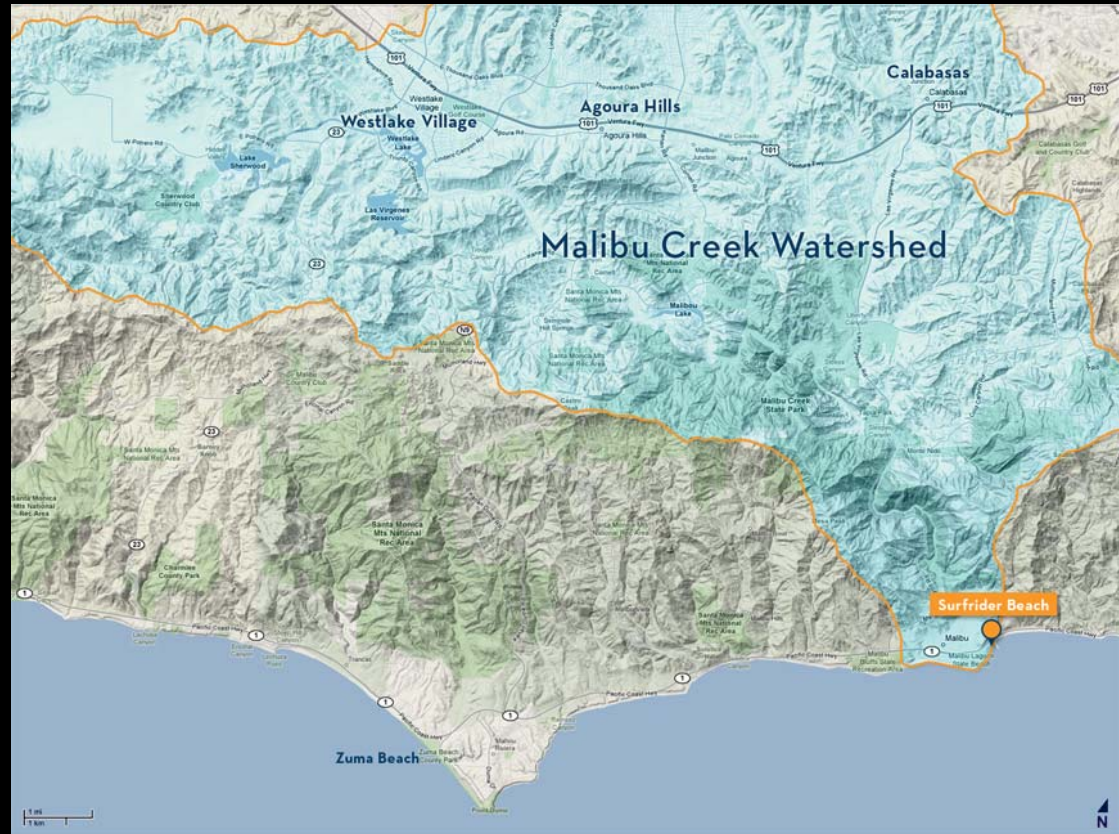
- Extent of area covered
- Boundaries, terrain, geology
- Hydrogeographic information
- Local climate conditions

## Chemical Characteristics

- DO, pH, TSS, nutrients
- Toxics and contaminants
- mineralogy of soils/bedrock

## Biological Characteristics

- inventory of plant/animal biota
- Threatened or endangered spp



# Brown Pelicans Removed From ESA List...

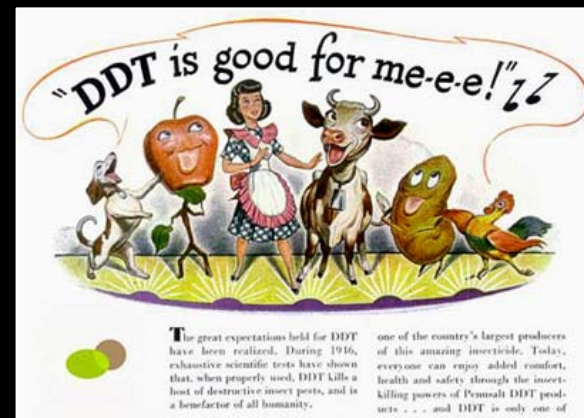
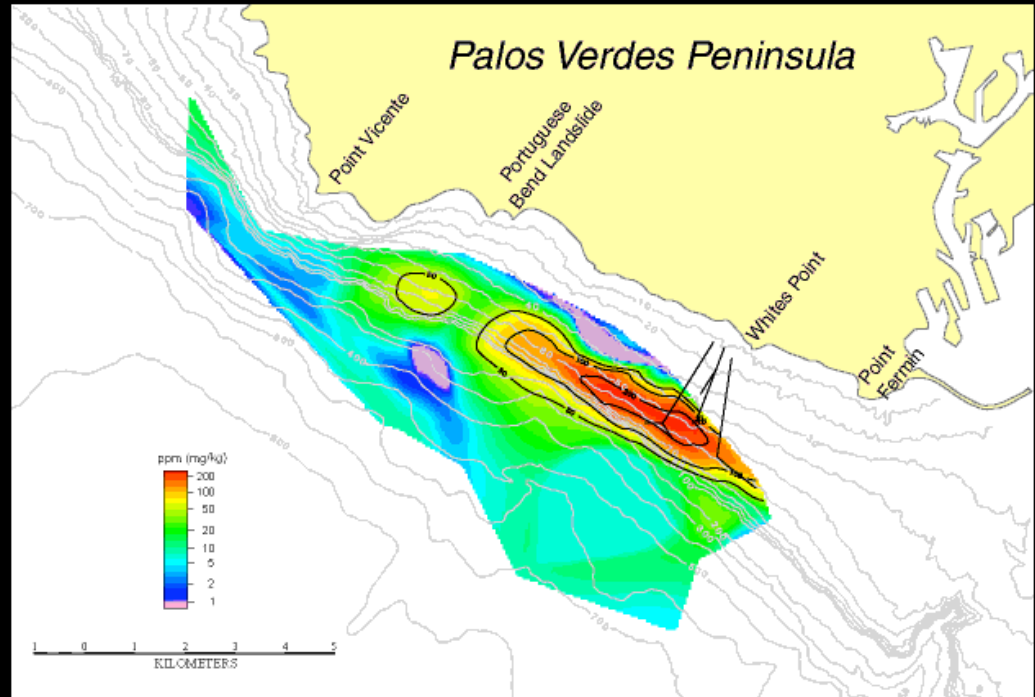
A century-long effort to protect the bird is no longer necessary, federal officials say.

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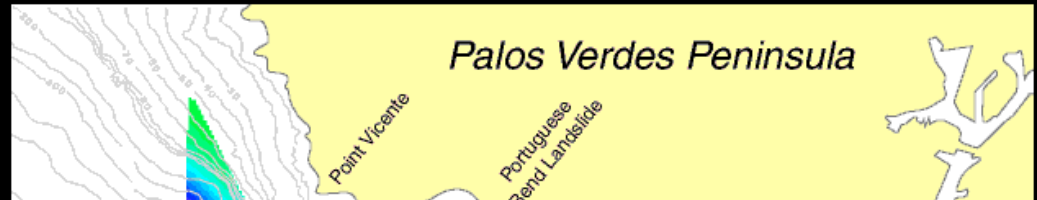
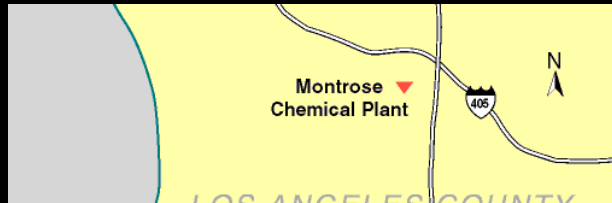
*LA Times*, Nov 12, 2009



# DDT Contamination PV Peninsula



# DDT Contamination PV Peninsula: Recent SCCWRP Study Documenting Status...



## *The extent and magnitude of sediment contamination in the Southern California Bight*

Keith A. Maruya\*  
Kenneth Schiff

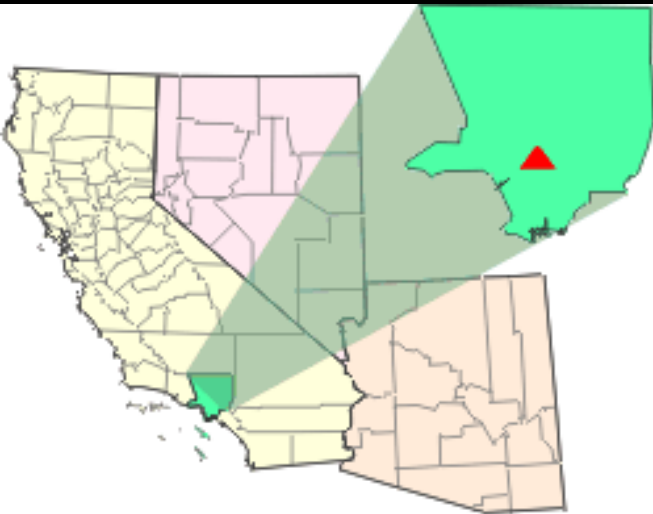
*Southern California Coastal Water Research Project, 3535 Harbor Boulevard, Costa Mesa, California 92626, USA*

2009 Marine Pollution Bulletin



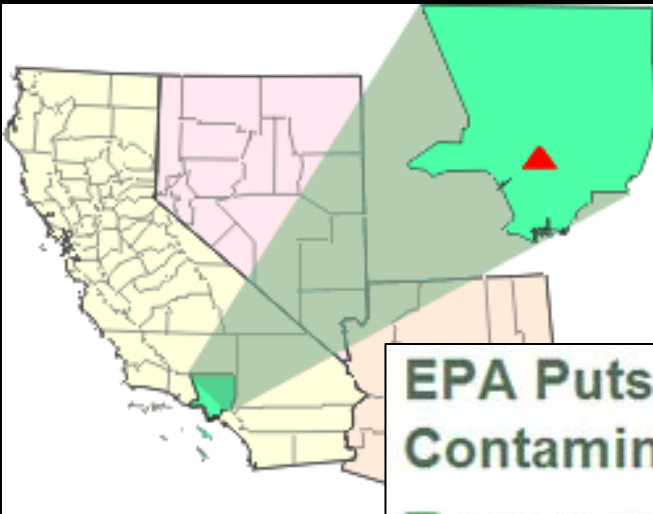
# LA Groundwater Treatment

- **LA Department of Water and Power**
  - San Fernando Valley Basin
  - Los Angeles Basin



# LA Groundwater Treatment

- **LA Department of Water and Power**
  - San Fernando Valley Basin
  - Los Angeles Basin



## EPA Puts its Foot Down: Clean San Fernando Valley's Contaminated Groundwater Site

 Email,  Twitter,  Facebook

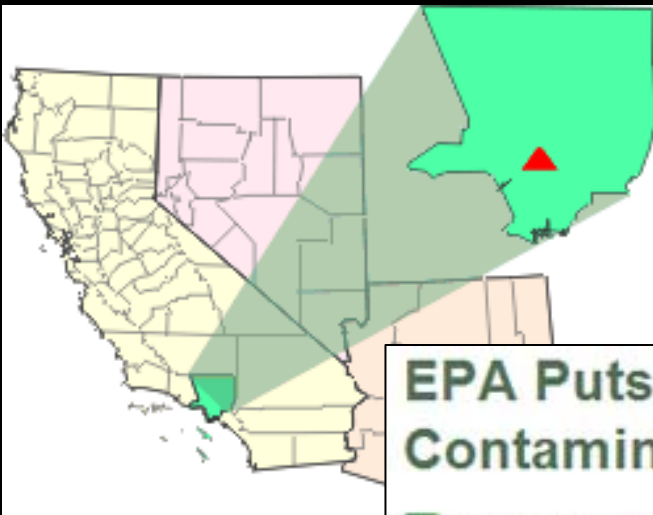
September 24, 2008

The U.S. Environmental Protection Agency is ordering seven businesses to pay approximately \$500,000 towards clean up at one of the San Fernando Valley Superfund sites, located outside Los Angeles, Calif., or come up with an equally effective system to keep contaminated groundwater from affecting local drinking water wells.

# LA Groundwater Treatment

- **LA Department of Water and Power**

- San Fernando Valley Basin
- Los Angeles Basin



## EPA Puts its Foot Down on Contaminated Groundwater

[Email](#), [Twitter](#), [Facebook](#)

**September 24, 2008**

The U.S. Environmental Protection Agency is moving forward with clean up at one of the San Fernando Valley Basins. The agency will come up with an equally effective system to treat groundwater from water wells.

- Contamination from aerospace and defense manufacturing

- machinery degreasing, dry-cleaning, metal plating, etc.

- contaminants include:

- tetrachloroethylene (TCE)
- perchloroethylene (PCE)
- hexavalent chromium
- perchlorate, nitrates, etc.

- MCL below state/federal limits

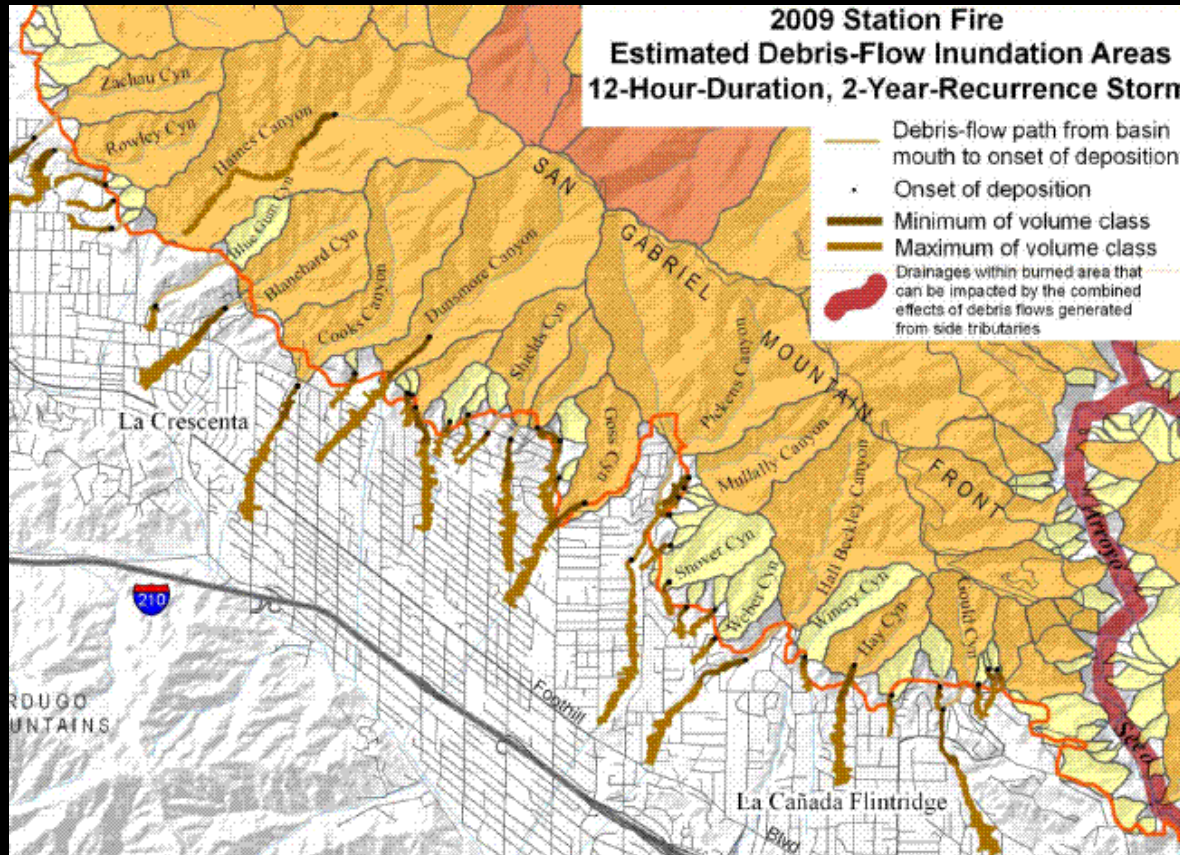
- maintained by blending water from different wells/sources!

- Comprehensive groundwater treatment plan underway...

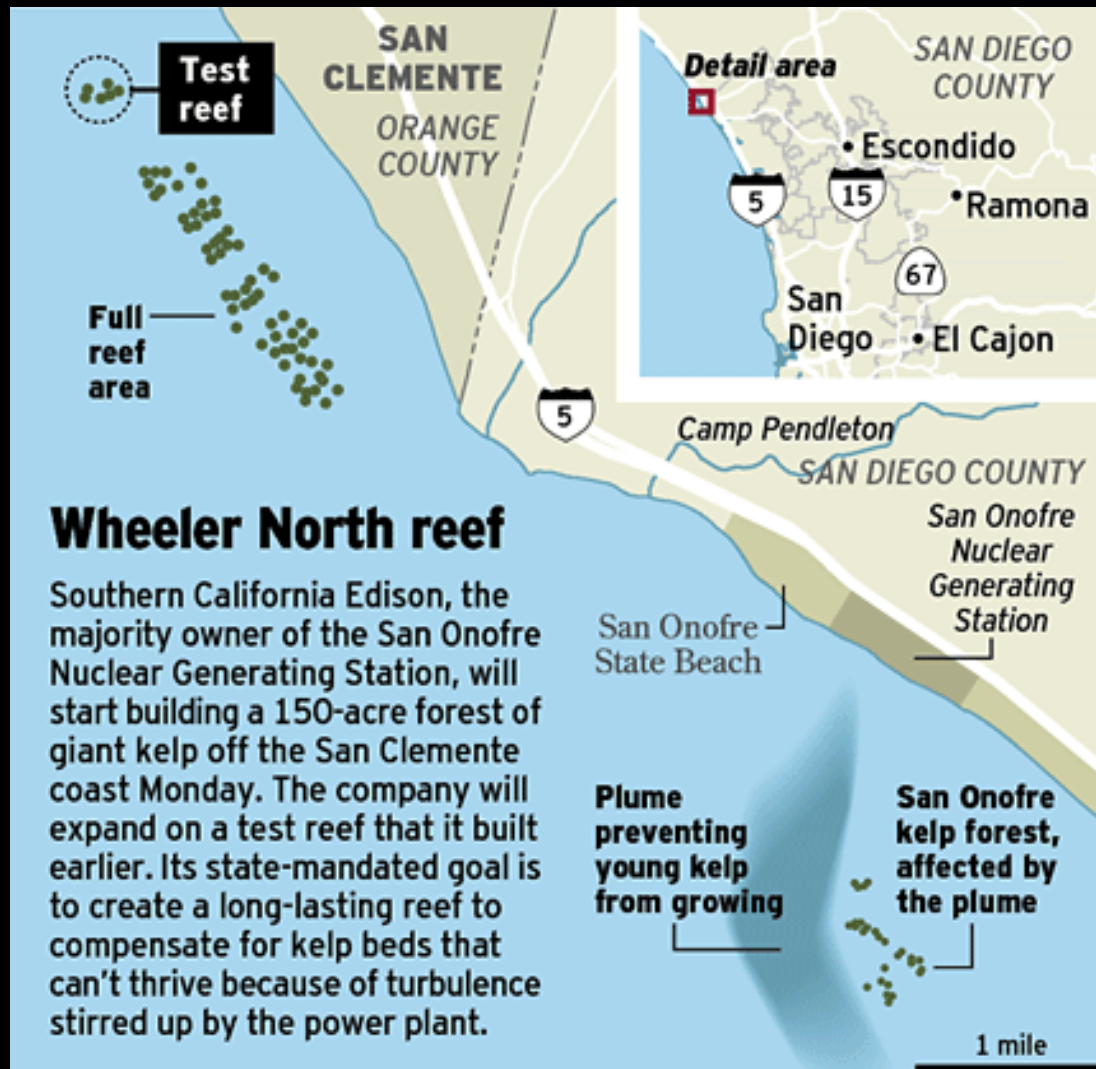
# Federal scientists say risk of mudslides from Station fire extremely high

October 6, 2009 | 12:29 pm

The U.S. Geological Survey today issued a grim forecast for foothill communities hit by the Station fire, saying huge mudslides and debris flows are highly likely during the winter rainy season.



# Thermal Pollution



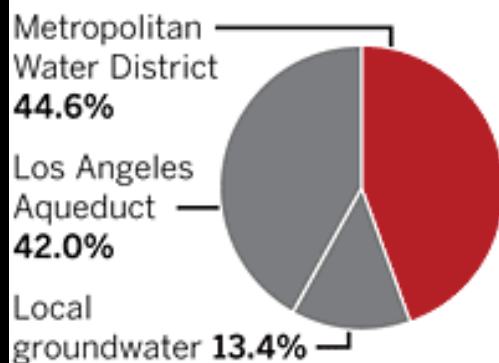
# Water Supply: LA's Future

## The city's supplies

The Metropolitan Water District is now the leading supplier of the city's water.

### L.A. water sources, 2006-07\*

Of total 662,450 acre-feet



\* Fiscal year July 1 to June 30

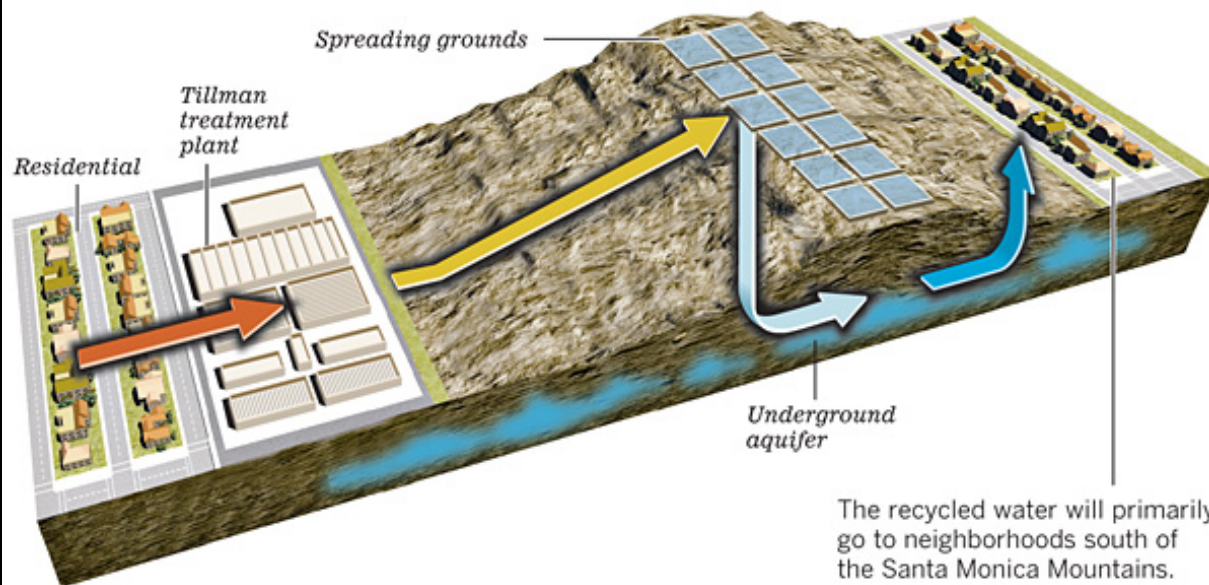
Source: Los Angeles Department of Water and Power. Graphics reporting by RICH CONNELL

Los Angeles Times

## Recharging the water supply

Mayor Antonio Villaraigosa's water conservation plan calls for recycling part of Los Angeles' wastewater into underground drinking water supplies.

- 1 Wastewater enters the Tillman treatment plant in the San Fernando Valley.
- 2 Water purified to drinkable quality is pumped to spreading grounds near Hansen Dam.
- 3 Water seeps through layers of soil into the underground aquifer.
- 4 It reaches wells in three to five years where it is extracted and mixed with water from other sources.



The recycled water will primarily go to neighborhoods south of the Santa Monica Mountains.

### How long it takes

Homes to treatment plant:	Treatment plant:	Pipeline to spreading grounds	Underground percolation	Mixing with aquifer	Pumping water to surface, distribution
A couple of hours	10 hours	3 to 4 hours	1 to 1½ years	1 to 3 years	20 minutes

Source: Los Angeles Department of Water and Power. Graphics reporting by RICH CONNELL

# Plastic in the Ocean

- Much of the plastic in the ocean cannot be seen, its below the surface or on the bottom.
- Much of the concern regarding ocean plastics is what they will leech out over time.
- It has been found that animals who ingest plastics can have contaminants concentrated in their bodies 100 times over the amount in the plastics themselves.



# Pacific Garbage Patch

Actual name is the North Pacific Subtropical Gyre.

Estimated as a Texas-sized span of ocean between Hawaii and California where the currents create a slowly rotating vortex.

Although it has been estimated as being as big as two Texas'.



# Pacific Garbage Patch

This vortex pulls anything floating to this central location.



During crossing of the garbage patch people have calculated half a pound of plastic for every 100 square meters. That would be a total of 3 million tons of plastic in: in just this one spot of ocean.

# Offshore Oil and Gas

## **Federal scientists: Limit offshore drilling plans**

**Citing danger to marine life, the National Oceanic and Atmospheric Administration opposes opening large tracts of coast to drilling and recommends buffer zones off Santa Barbara.**

**By Jim Tankersley and Josh Meyer  
October 12, 2009, LA Times**

## **Coastal oil drilling backers aim to sidestep state's barrier**

**Supporters want to get around a state commission's opposition to new drilling off California's coast by passing a bill that would create a governor-appointed panel that could then approve the project.**

**By Marc Lifsher  
October 5, 2009, LA Times**

# Offshore Oil and Gas

## Can old oil rigs sustain marine life?

Sea expert gives ups, downs of converting oil platforms into habitats.

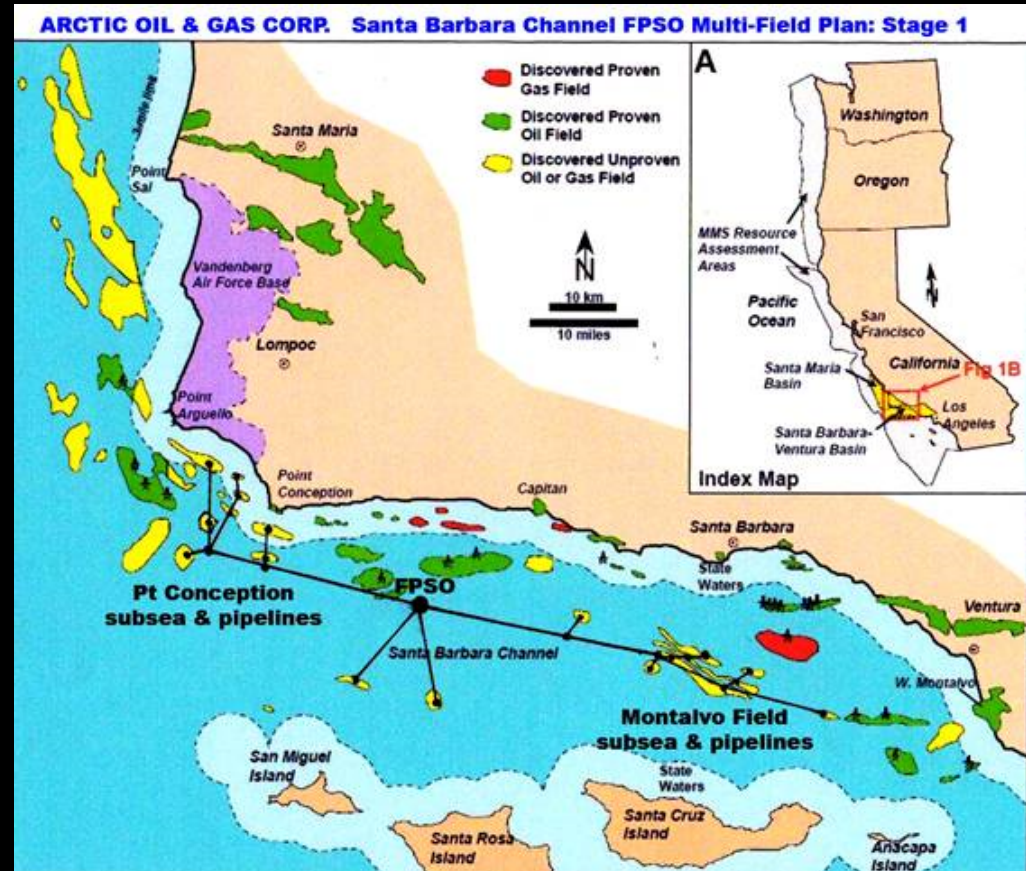
BY CATHY TRAN

The Orange County Register

Should the oil drilling platforms off California be left in place as habitat for marine life when they're decommissioned? Or should the steel structures be dismantled?



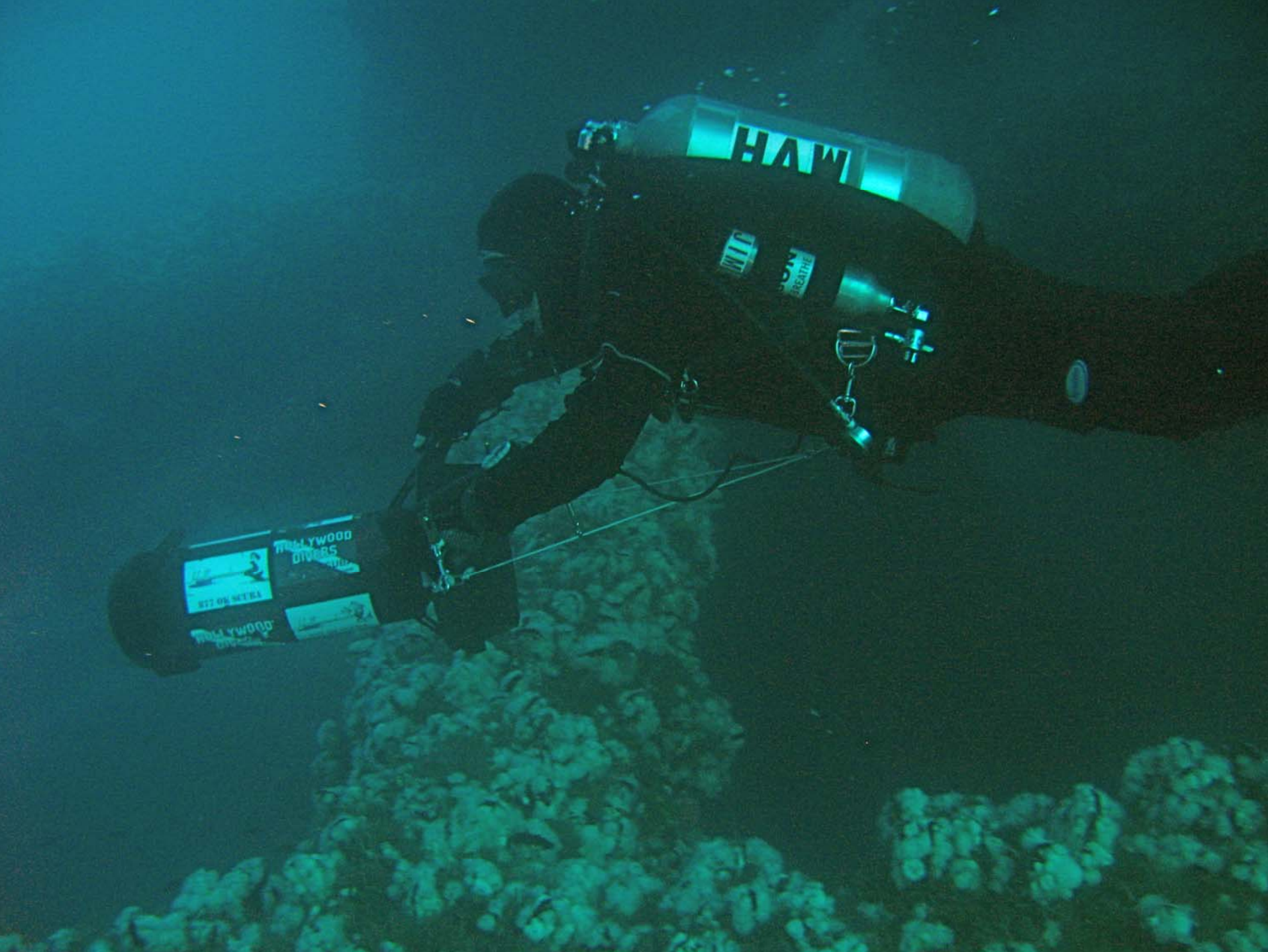
# Offshore Oil and Gas





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# Environmental Risk: Local Case Studies

## Caulerpa Taxifolia Eradication – Officials Proclaim Victory Over “Killer Algae” But Remain Vigilant to New Sightings

CARLSBAD, Calif. – Governmental agencies and community-based environmental organizations came together today to celebrate the successful eradication of the invasive seaweed, *Caulerpa taxifolia*, from the two locations where it was detected nearly six years ago. The algae, first detected in Agua Hedionda Lagoon (near San Diego) and Huntington Harbour (near Los Angeles) in 2000, is one of only a few known eradications of an invasive marine alga species.

## Destructive Seaweed Threatens California

*Caulerpa taxifolia*



If you see it,  
immediately report it,  
but DO NOT disturb it!



# Environmental Risk: Local Case Studies



## Impacts of Biodiversity Loss on Ocean Ecosystem Services

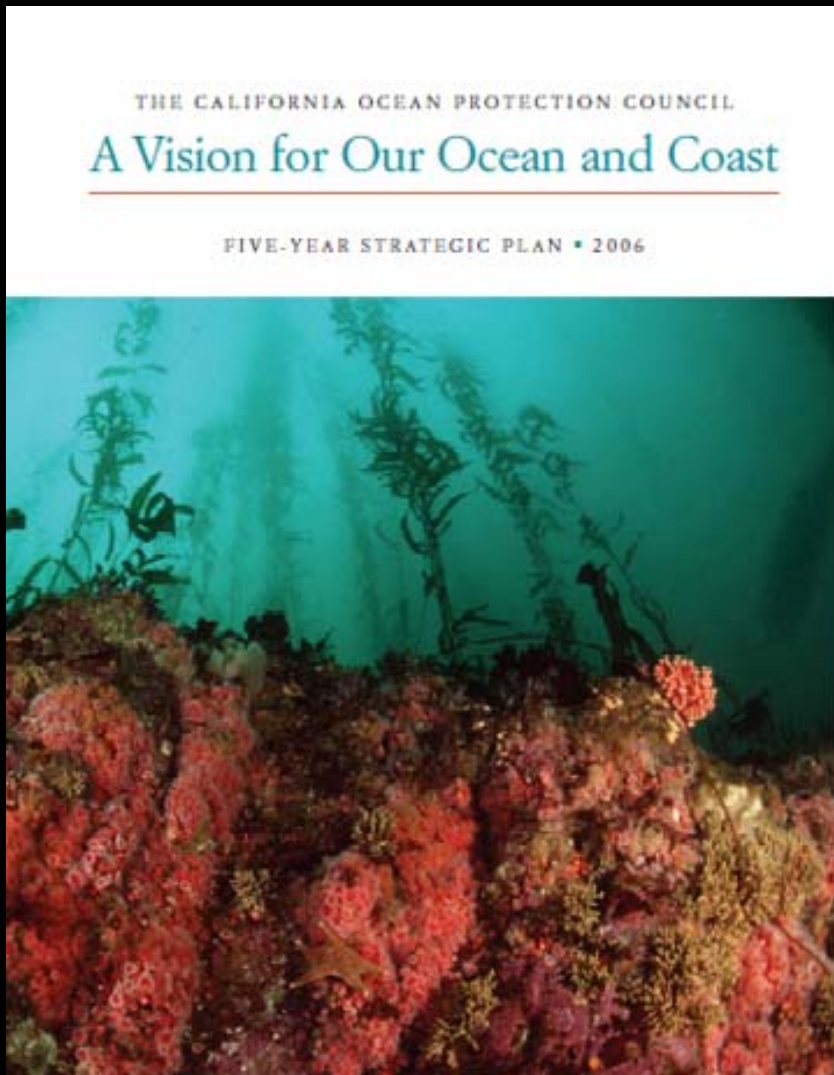
Boris Worm,<sup>1\*</sup> Edward B. Barbier,<sup>2</sup> Nicola Beaumont,<sup>3</sup> J. Emmett Duffy,<sup>4</sup> Carl Folke,<sup>5,6</sup> Benjamin S. Halpern,<sup>7</sup> Jeremy B. C. Jackson,<sup>8,9</sup> Heike K. Lotze,<sup>1</sup> Fiorenza Micheli,<sup>10</sup> Stephen R. Palumbi,<sup>10</sup> Enric Sala,<sup>8</sup> Kimberley A. Selkoe,<sup>7</sup> John J. Stachowicz,<sup>11</sup> Reg Watson<sup>12</sup>

Human-dominated marine ecosystems are experiencing accelerating loss of populations and species, with largely unknown consequences. We analyzed local experiments, long-term regional time series, and global fisheries data to test how biodiversity loss affects marine ecosystem services across temporal and spatial scales. Overall, rates of resource collapse increased and recovery potential, stability, and water quality decreased exponentially with declining diversity. Restoration of biodiversity, in contrast, increased productivity fourfold and decreased variability by 21%, on average. We conclude that marine biodiversity loss is increasingly impairing the ocean's capacity to provide food, maintain water quality, and recover from perturbations. Yet available data suggest that at this point, these trends are still reversible.

Science 2006



# California Ocean Protection Act



- Enacted 2004
- Six focus areas:
  - governance
  - research and monitoring
  - coastal water quality
  - physical processes
  - coastal ecosystems
  - education and outreach
- Regional collaboration between CA, OR, WA\*

# Marine Habitat and Fisheries

## Channel Islands Marine Protected Areas

First 5 Years of Monitoring: 2003–2008



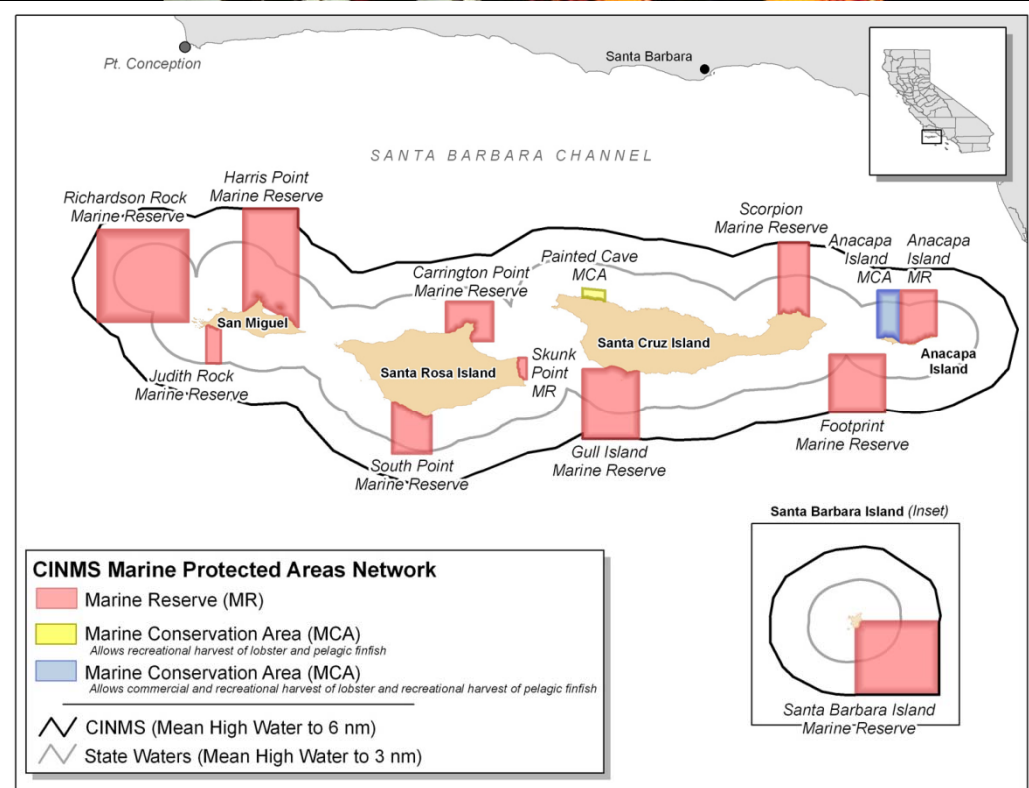
California Department of  
Fish and Game

Partnership for Interdisciplinary  
Studies of Coastal Oceans

Channel Islands  
National Marine Sanctuary

Channel Islands  
National Park

## Marine Life Protection Act (1999)



# **Marine Habitat and Fisheries**

## **A rocky point indeed for California coastal task force**

**Opposing factions will be watching as a state panel proposes fishing restrictions off the Palos Verdes Peninsula. The Fish and Game Commission tends to accept such recommendations with few changes.**

**By Jeff Gottlieb**

**October 22, 2009, LA Times**

## **Turning the tide in Southern California waters**

**In an effort to restore diminishing ocean life, a state task force will be deciding on marine preserves for the region. Maximum protections would be benefit everyone.**

**October 22, 2009, LA Times**

# Landmark Decision for MPA's!

## Panel backs no-fishing zones off Southern California coast

By Louis Sahagun

A state blue-ribbon panel unanimously approved landmark fishing restrictions Tuesday for Southern California, creating a patchwork of havens for marine life designed to replenish the seas while leaving some waters open for anglers.

*LA Times*, Nov 11, 2009

