

# **Carmel River Watershed: Water Supply Perspective**

**A presentation for the**

**Western States Source Water and  
Ground Water Protection Forum**

**Tuesday, May 5, 2009**

**Joseph Oliver, Water Resources Manager**



## *Preamble*

### *Ground Water vs. Groundwater*

- That is not an earthquake you felt, it was the USGS changing its longstanding policy on the two-word vs. one-word spelling.
- On March 26, 2009, USGS Tech Memo 2009.03 issued, reversing Tech Memo 75.03, and the 35-year old policy on the two-word spelling.
- Change becomes effective on August 1, 2009
- Additional information at <http://water.usgs.gov/admin/memo/GW/gw09.03.html>

# *Topics*

## *Overview*

- Monterey Peninsula setting
- Water supply sources
- Historical water supply development

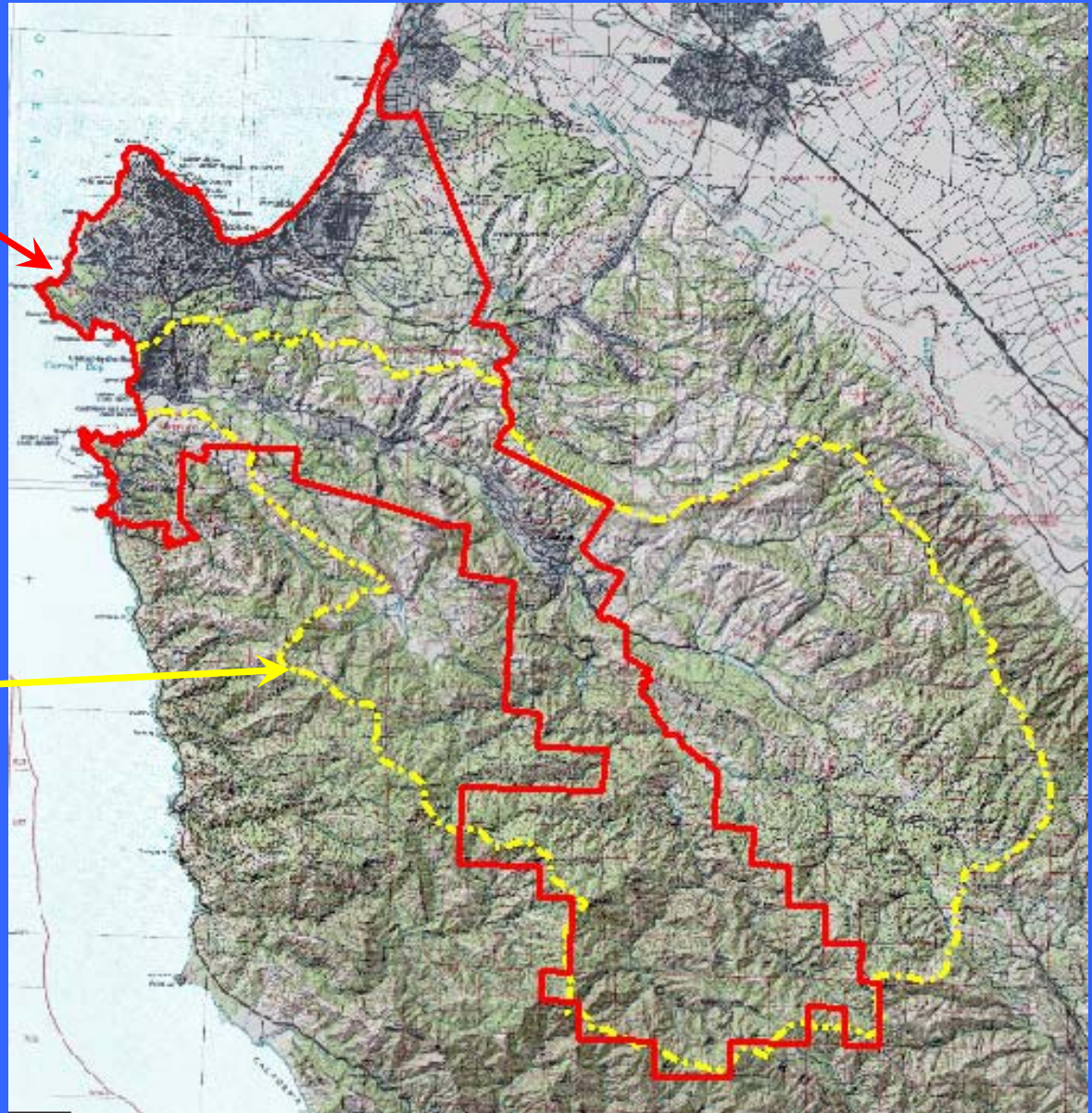
## *Issues, Constraints, Opportunities*

- Water extractions
- Riparian vegetation, channel-bank stability
- Endangered Species Act
- Carmel River Dams: sedimentation, safety
- 2008 watershed fire
- Lagoon / wetland protection and enhancement
- Water supply planning

**MPWMD  
Boundary**



**Carmel  
River  
Watershed  
Boundary**





# Monterey Peninsula Water Resource System



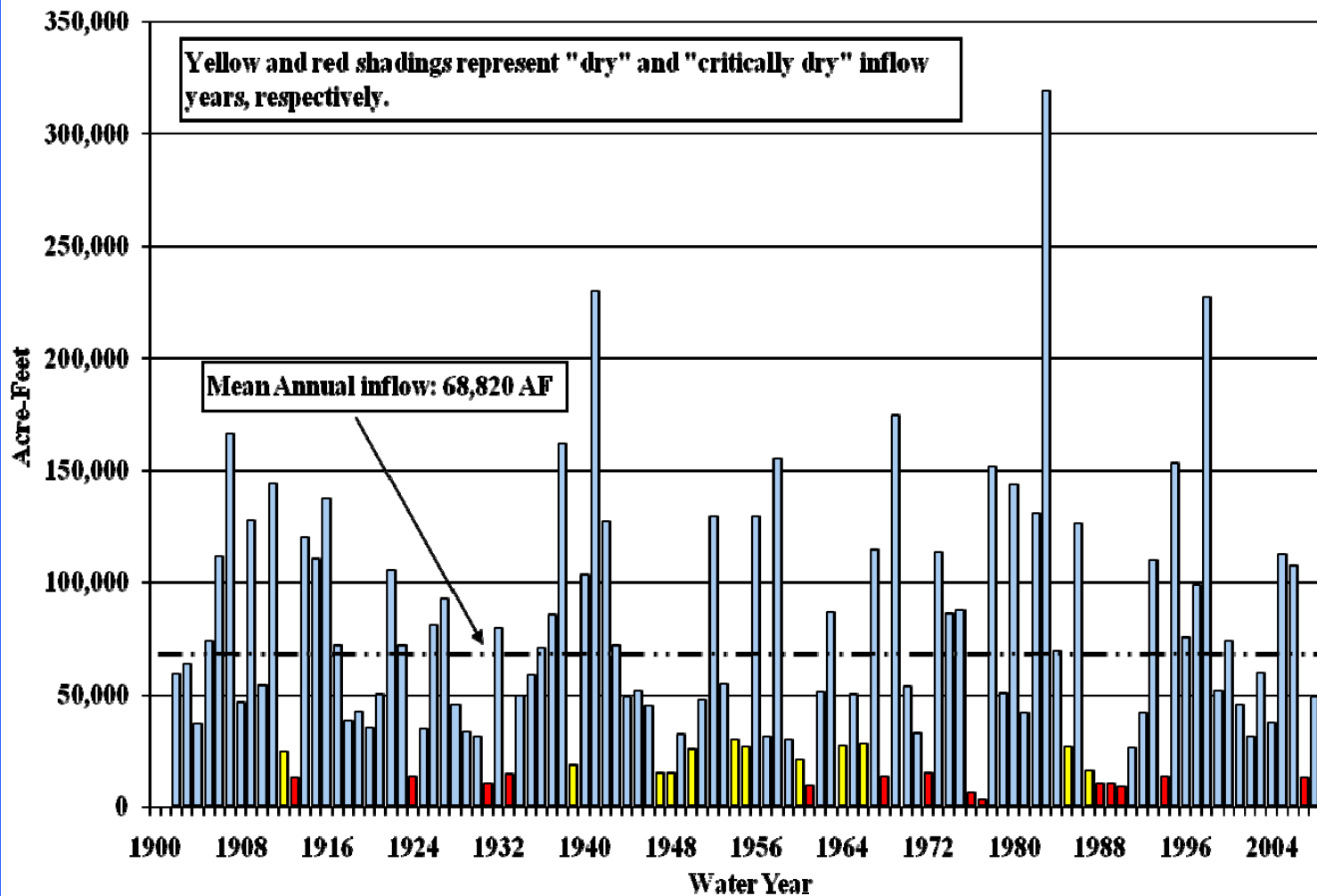
# Carmel River Watershed - Physical Features

- **Area:** 255 square miles (163,000 acres)
- **River length:** 36 miles of main stem
- **Upper 20 river miles:** steep canyons, relatively undeveloped, headwaters in Ventana Wilderness Area
- **Lower 16 river miles:** alluvial valley floor, moderately to densely developed
- **River mouth:** Large lagoon and wetland (100 acres)

# Rainfall in the basin

- Rainfall amounts vary significantly geographically and seasonally
  - annual rainfall at San Clemente Dam ranges from <3 inches to >46 inches
  - annual rainfall in the basin ranges from <15 inches at the coast to more than 40 inches in the headwaters
  - 10-inch overnight accumulations are rare, but occurred in 1995 and 1998

# Unimpaired Carmel River Flow at San Clemente Dam Site: 1902- 2008





# Mediterranean Climate



Above - Carmel River  
steelhead, June 1988  
(photo: MPWMD).



Left - San Clemente  
Dam, March 10, 1995  
(photo: California American  
Water).



Highly Variable  
Landscape from  
the ocean to  
headwaters

Above - river flow through  
the "slot" at the Carmel River  
mouth, April 25, 2008

Right - Upper Carmel  
River, 2007

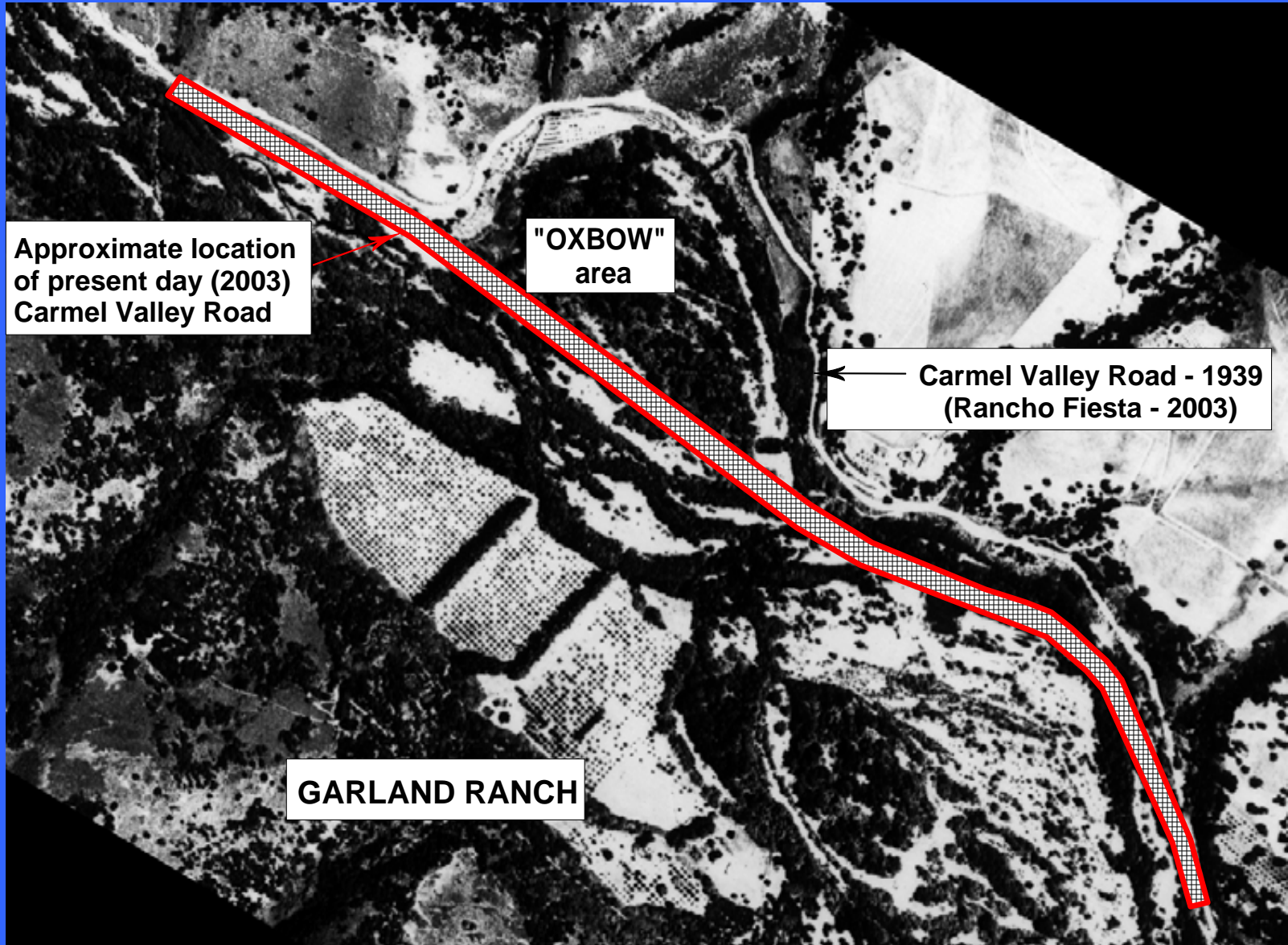




# Lower Carmel River - Cultural Features

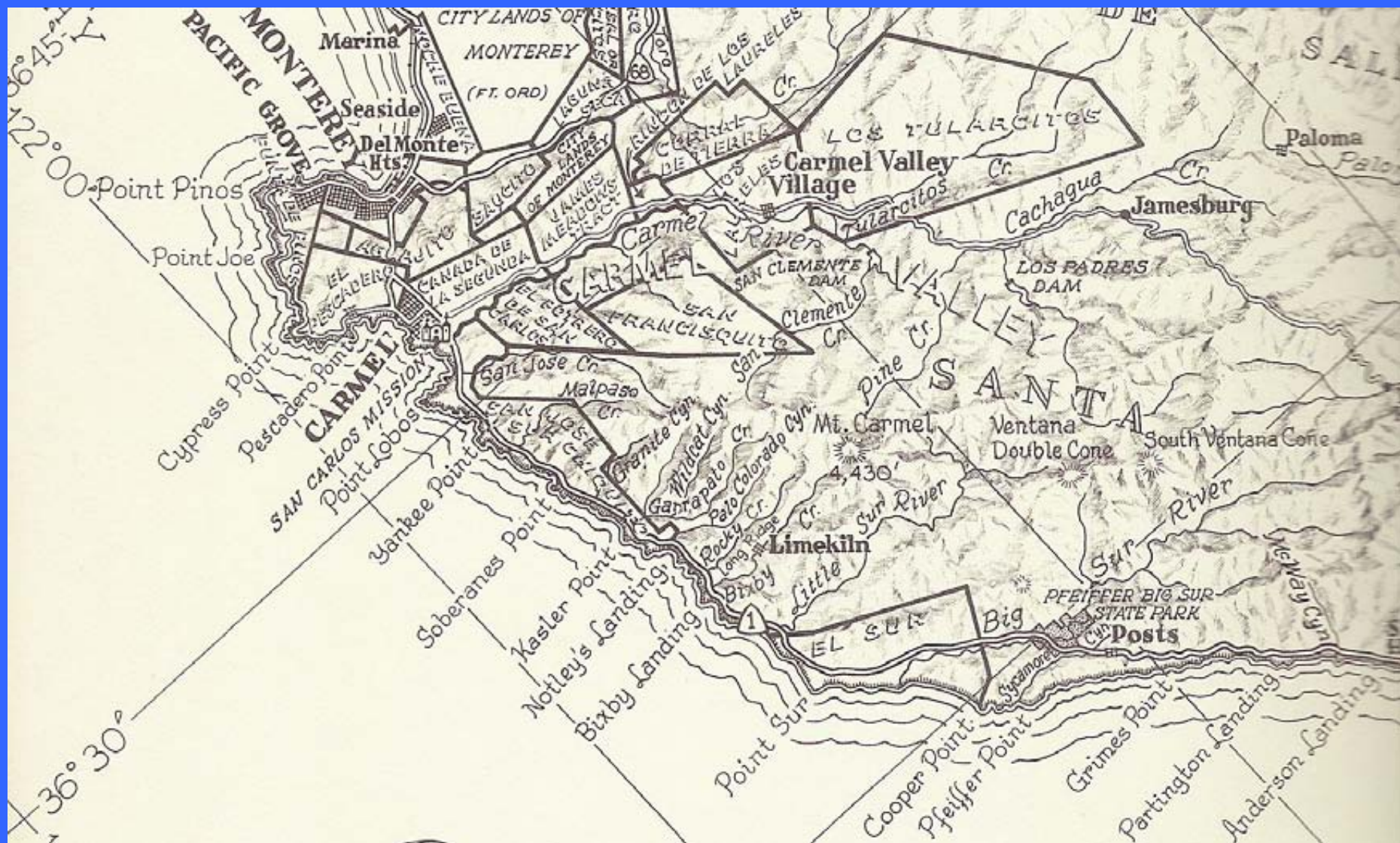
- Highly erodible channel banks
- 19 bridges, 3 dams
- >420 riverfront properties
- >1,500 parcels in 100-year floodplain
- Alluvial portion of the river has been straightened and narrowed since the early 1900's
- About 438 acres of riparian area along the lower 18.6 miles of the river

# River Straightening





# Early Carmel River Water Supply Development: Ranchos (granted 1820's-1840's)





# Joining of Carmel Valley to the Monterey Peninsula



Hotel Del Monte opened June 10, 1880 by Charles Crocker (Pacific Improvement Company)

# Old Carmel Dam



May 6, 1985

Constructed circa 1880

- 700 Chinese laborers
- 25 miles of 12-inch iron pipe crossed river in five places
- first Monterey Peninsula municipal water supply



June 2008



# San Clemente Dam



San Clemente Dam • March 29, 1932

Pat Hathaway Collection

Constructed  
in 1921:  
\$1-2 million



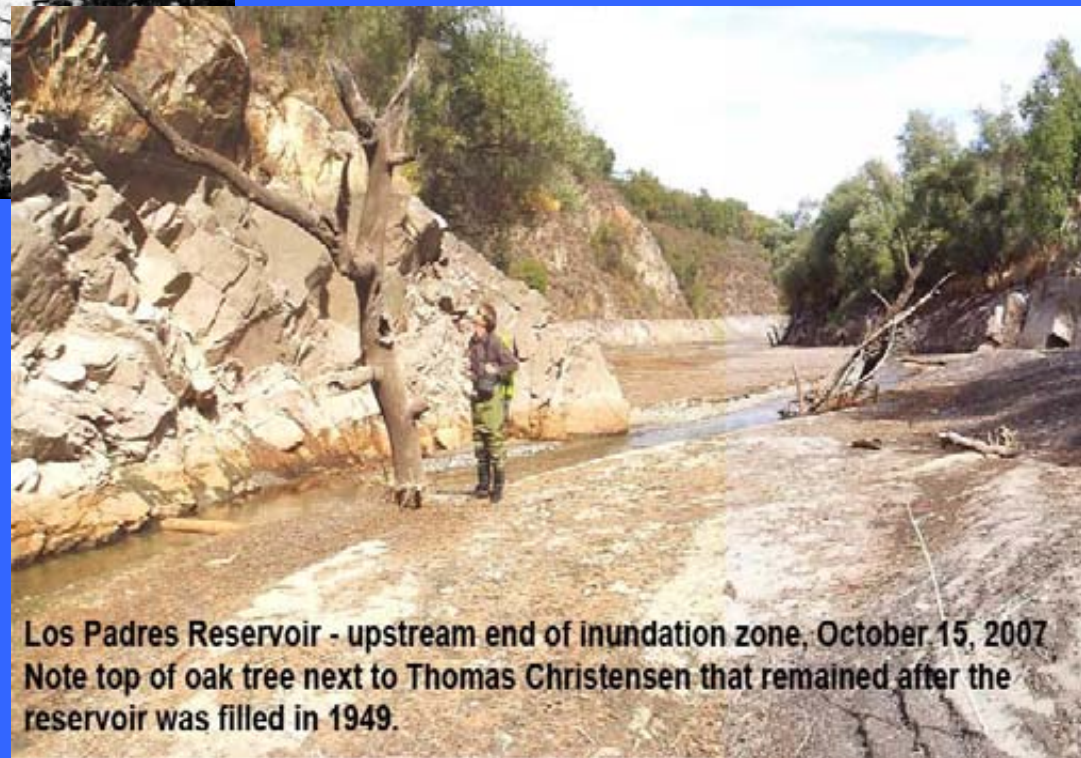
2007 cost to remove  
> \$80 million



# Los Padres Dam



Constructed  
in 1949:  
\$1.5 million



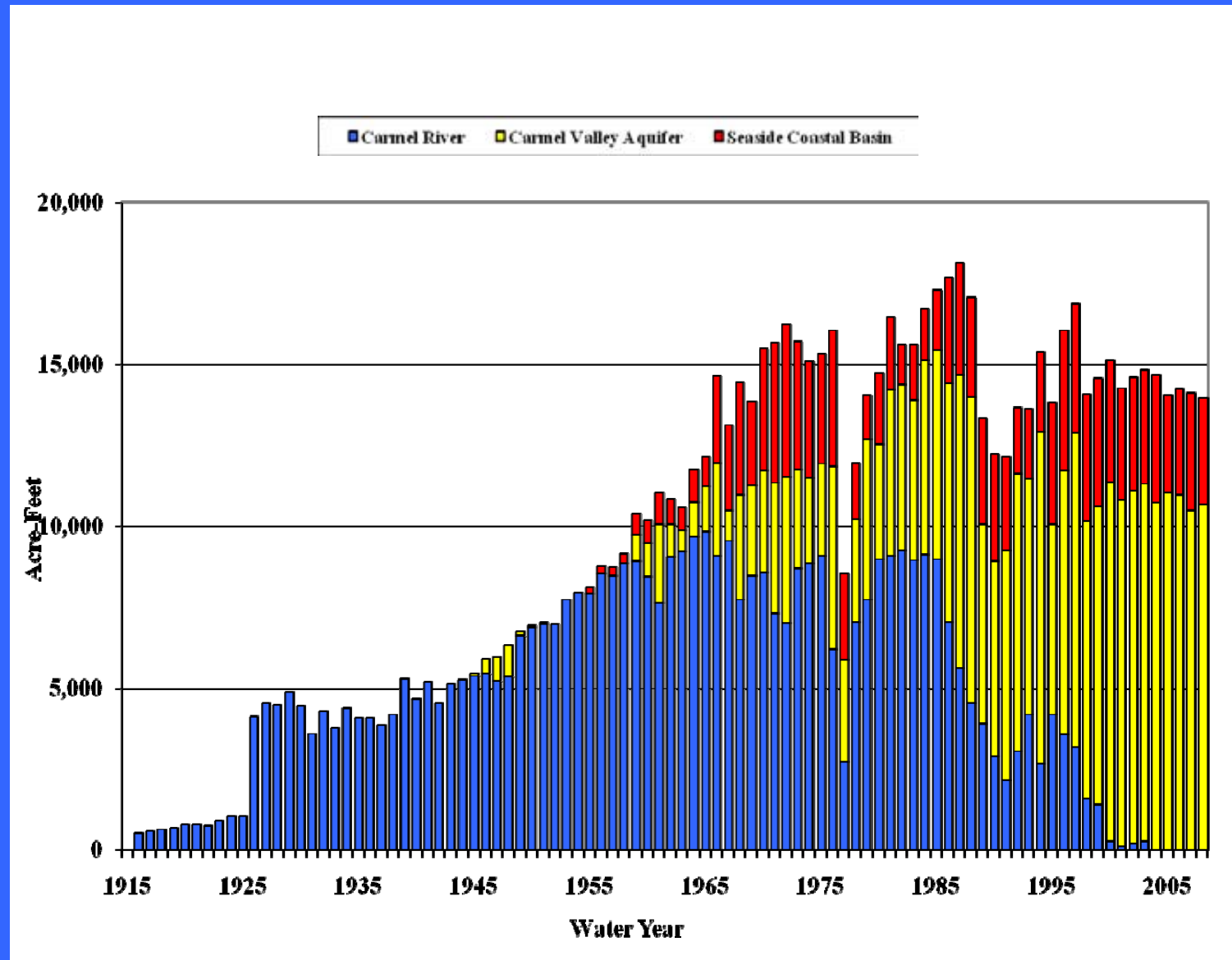
Los Padres Reservoir - upstream end of inundation zone, October 15, 2007  
Note top of oak tree next to Thomas Christensen that remained after the reservoir was filled in 1949.

# Monterey Peninsula Water Supply at a Glance

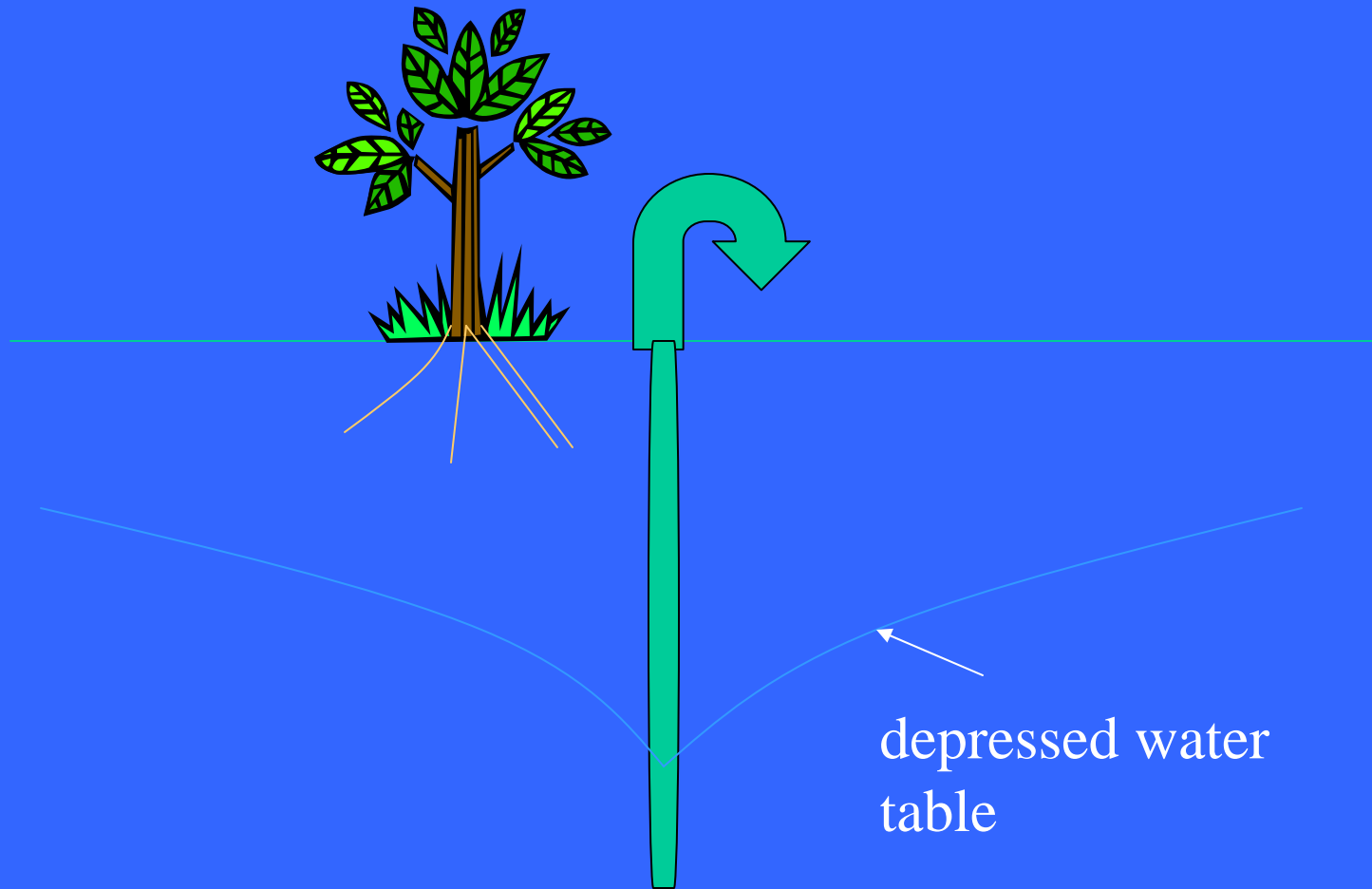
- Largest municipal water purveyor – California American Water – 15,000 AFY
- Cal-Am water supply from two source areas:
  1. Carmel River alluvial aquifer system – 75%
  2. Seaside Groundwater Basin – 25%



# California American Water Production By Source: 1916 through 2008



# Issue: Groundwater pumping impacts riparian vegetation and channel-bank stability



# Schulte Project Area 1988



# Schulte Project Area 2001





# Schulte Project – 1982 and 2003

Left - Looking upstream from Schulte Bridge, April 1982. Note tires, wooden jacks, and concrete rubble dumped by the owner on the streambank to slow erosion.

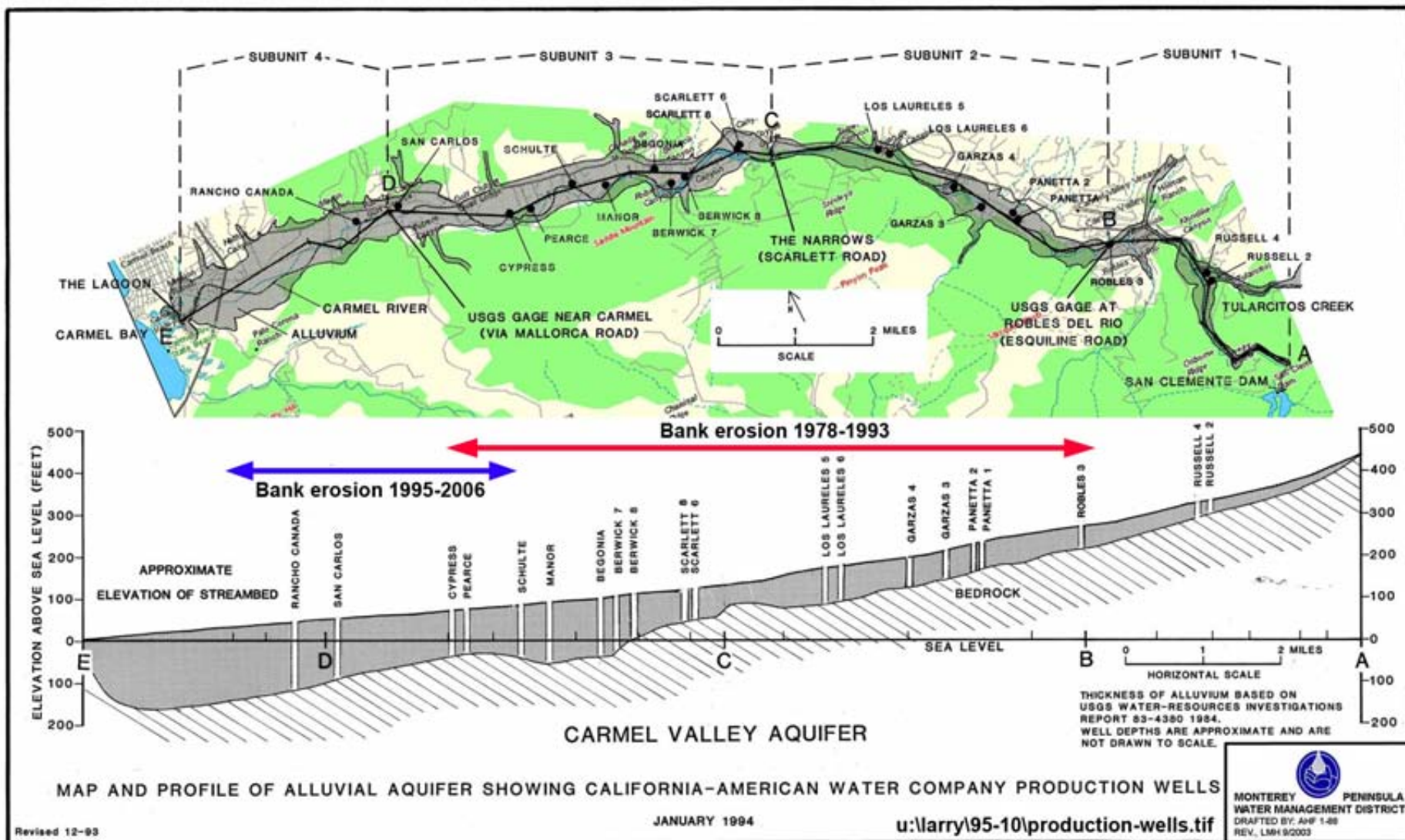


Right - May 2003 - after MPWMD-sponsored restoration work. The arrow shows where the brown well pump building was at the upper left of the 1982 photo. MPWMD continues to maintain and monitor this project area.





# Bank Erosion Problem Areas



# Issue: ESA listings

- Red-Legged Frog, Steelhead listed as threatened species





# Issue: Reservoir sedimentation and seismic safety

## San Clemente Dam and Reservoir

Storage loss

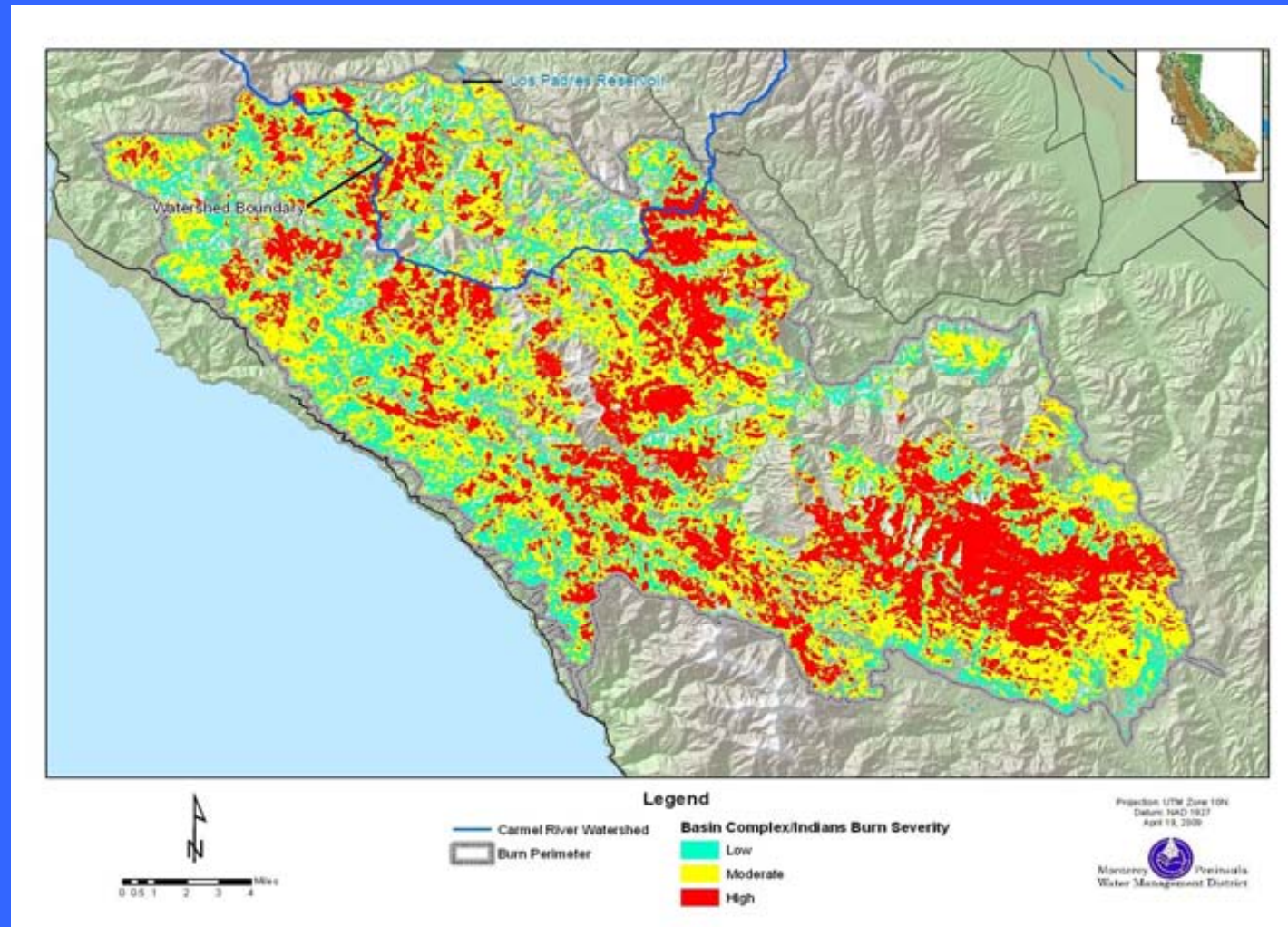
1921: 1,425 acre-feet  
2008: < 100 acre-feet

Proposals:

- Strengthen dam
- Remove dam and re-route river



# Issue: 2008 Basin Complex Fire burned approximately 20% of Carmel River Watershed





From Los Tulares – July 2, 2008



Fire  
Hastens  
Mass  
Wasting

Below - Danish Creek watershed – July 12, 2008



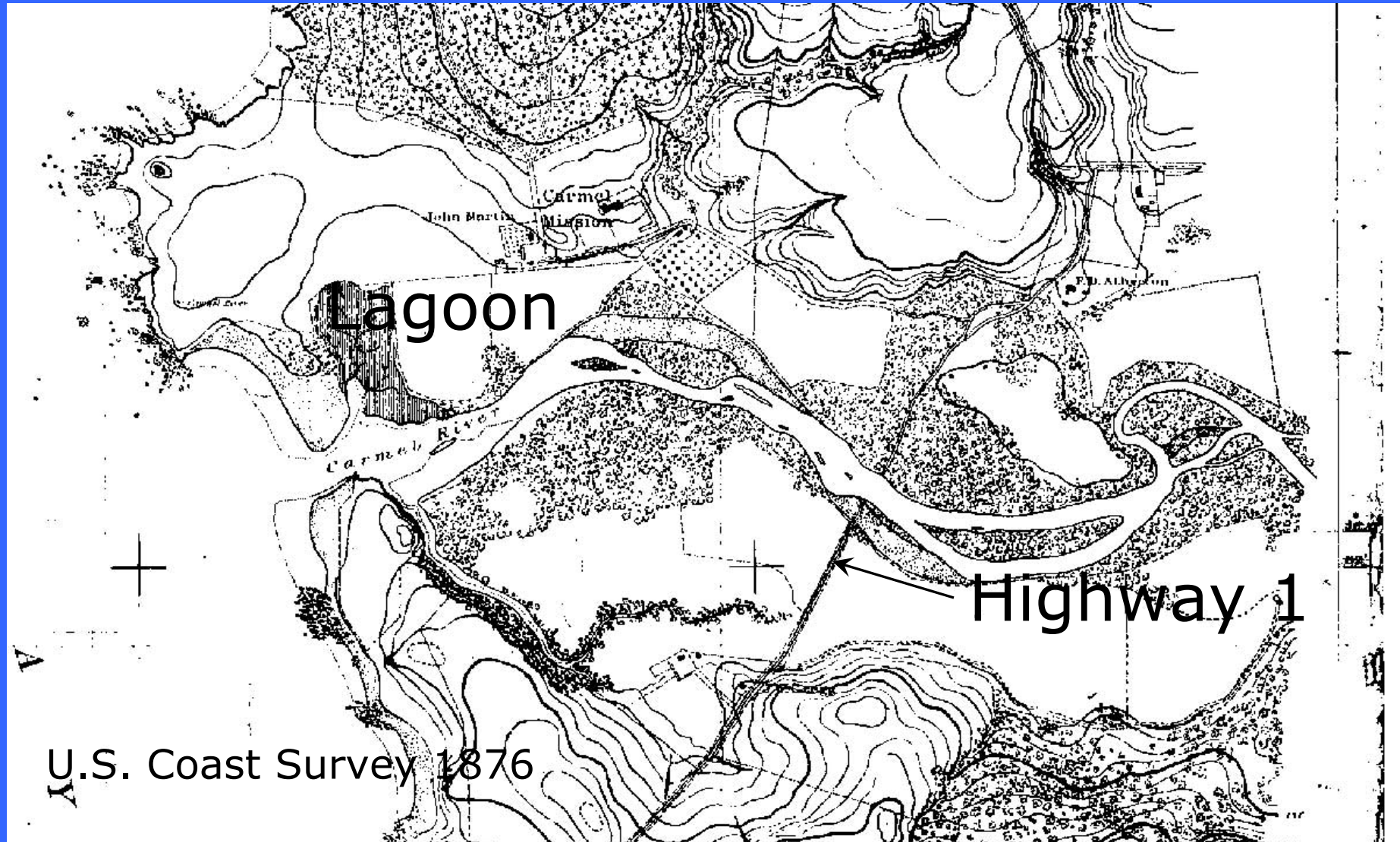


# Basin Complex Fire Will Increase Sediment Load into Los Padres Reservoir





# Issue: Lagoon and Wetlands Management





ca 1900



2005

JUN 23 2005

Breaching  
the the  
Carmel River  
State Beach  
– an old  
tradition



# How much has the beach changed?



1935 (photo:  
Bruno Odello)



2005 (photo:  
MPWMD)

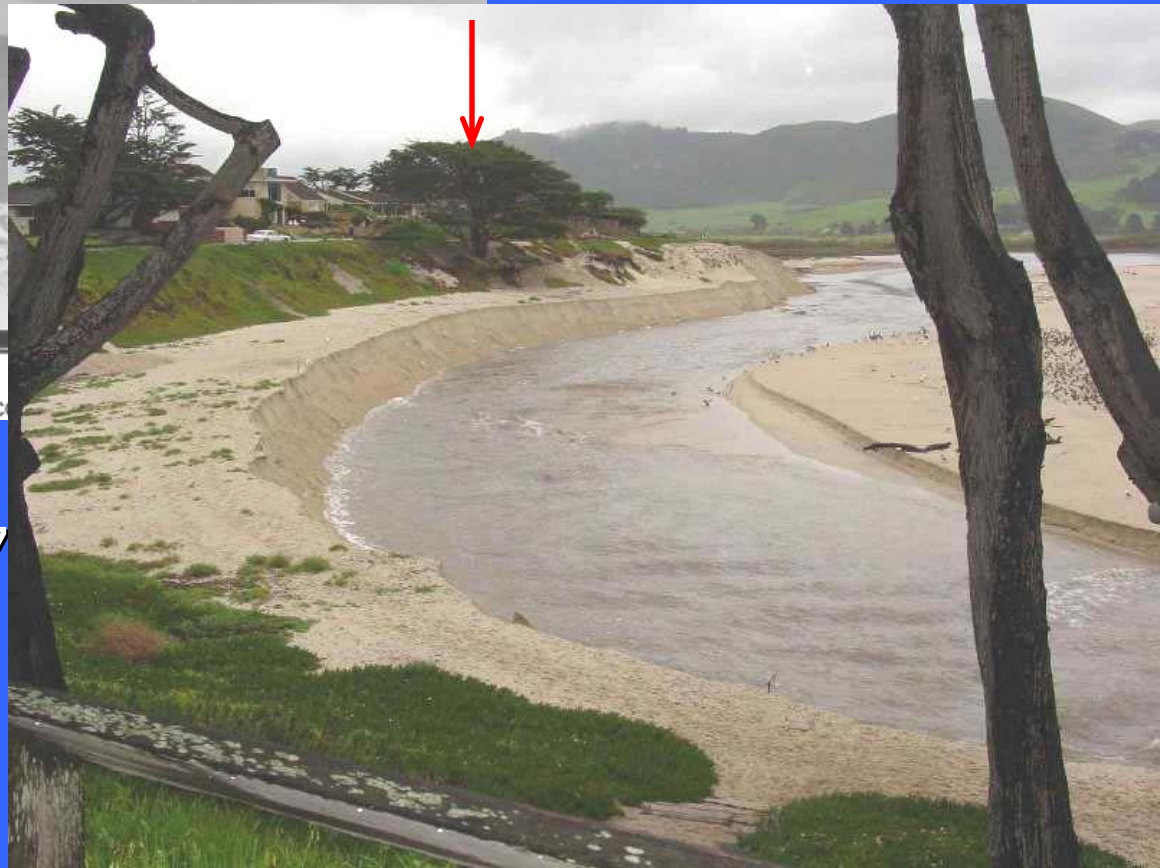
JUN 23 2005

*Odello Artichoke  
Fields  
Feb. 1935*

*By Lewis J. Gosselyn - Carmel*



# Stewart's Cove



Pat Hathaway Photo Collection (831) 373-3811 [www.caviews.com](http://www.caviews.com)

above – ca spring 1937

right - March 4, 2005



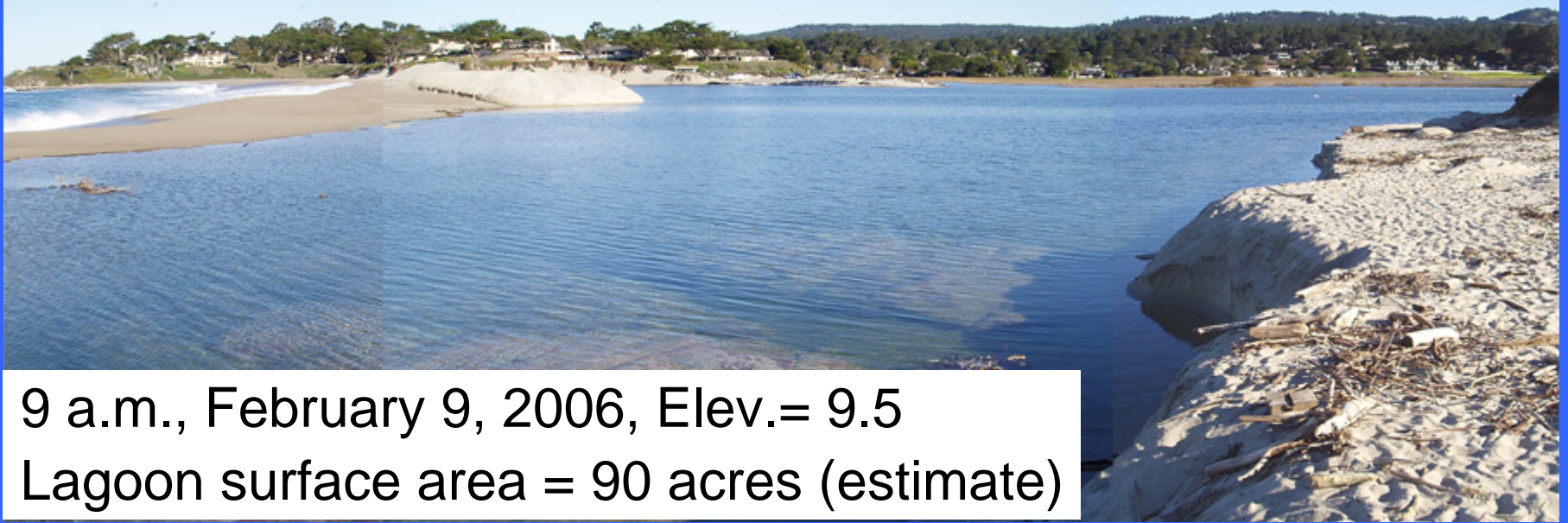
**35-FOOT  
WAVES  
HIT THE  
BEACH**



**STORM SURGE  
JANUARY 5, 2008**



# High and low water comparison





# Constraints: Water Supply Regulations

- State Water Resources Control Board Order (1995): Orders reduction in Cal-Am Carmel River extractions by 70 %
- Seaside Basin Groundwater Adjudication (2006): Orders reduction by Cal-Am and other pumpers by 46 %



# Opportunities:

- Coastal Water Project
- Regional Project



**Thank you for your  
attention.**

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