

Carmel River – History, Restoration, and Protection

A presentation to the



Thursday, October 23, 2008

by Larry Hampson, Water Resources Engineer

Topics

History

- Local geology
- Native Americans
- Spanish and Mexican Era
- 20th and 21st century water resource development

Ecology

- Anthropomorphic change and resource decline
- Rise of environmental activism

Restoration and Protection

- Carmel River Management Plan
- Current trends and resource status of the river
- What's on the horizon

BASIN MAP

Population

(rounded, year 2000)

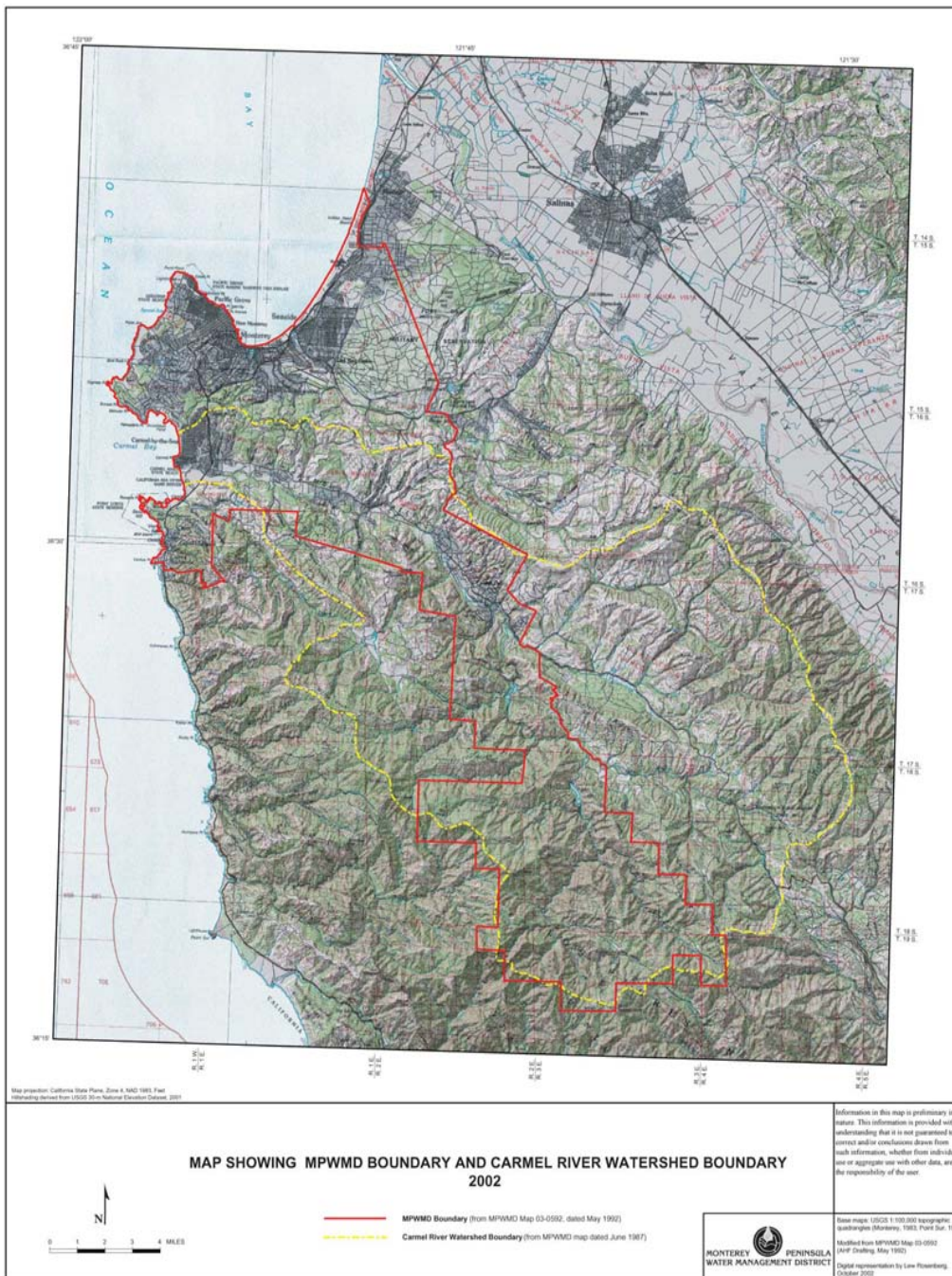
- Cachagua Valley = 2,000
- Carmel-by-the-Sea = 4,000
- Carmel Valley main = 14,000

Carmel Valley = (about) 20,000

• Monterey Peninsula and Carmel Valley total = 115,000

• Watershed area = 255 square miles or about 163,000 acres

• Basin Complex fire area = 255 square miles (2008)



Basin Geology

- Portions of the watershed date from the end of the Cretaceous period (about 65 million years ago)
- A complex quilt of rocks stitched together by faults of varying ages and other kinds of contacts (i.e., differences in horizontal layers)
 - Igneous
 - Metamorphic
 - Sedimentary in part
- Carmel Valley was carved into the Salinian Block, a piece of crust that began its existence near the Mojave desert and moved northward, dragged by the Pacific plate for the past 20 million years.

Rock Basement Layer Along Carmel River State Beach (50-60 MYA)



River Terrace Gravels (2-3 MYA) over
Monterey Shale (20 MYA)
Carmel Valley Road east of mid-Valley



MAJOR FAULTS

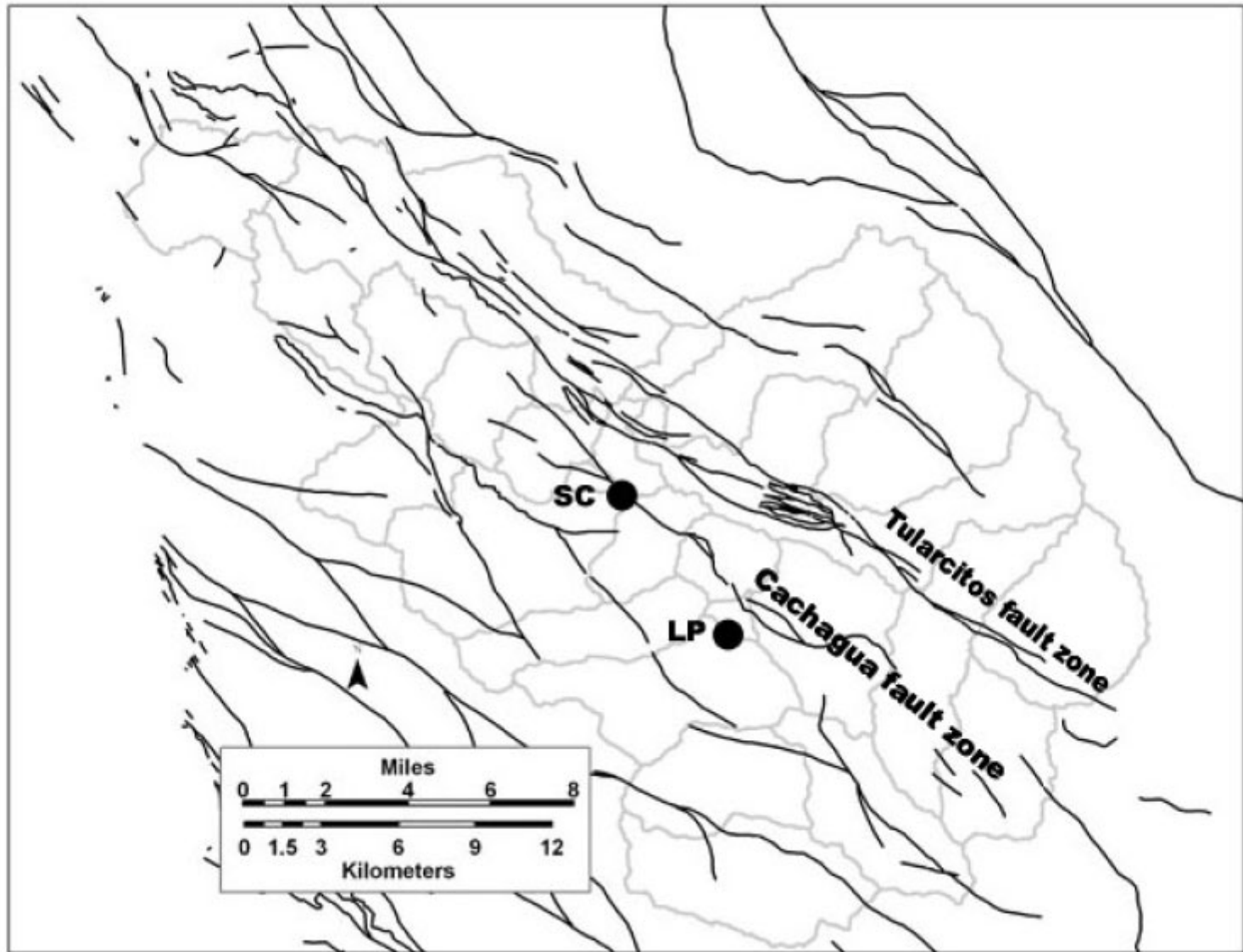


Figure 3: Major faults of the Carmel Watershed. SC is San Clemente Dam. LP is Los Padres Dam.



Uplift and erosion –
primary forces shaping
the river

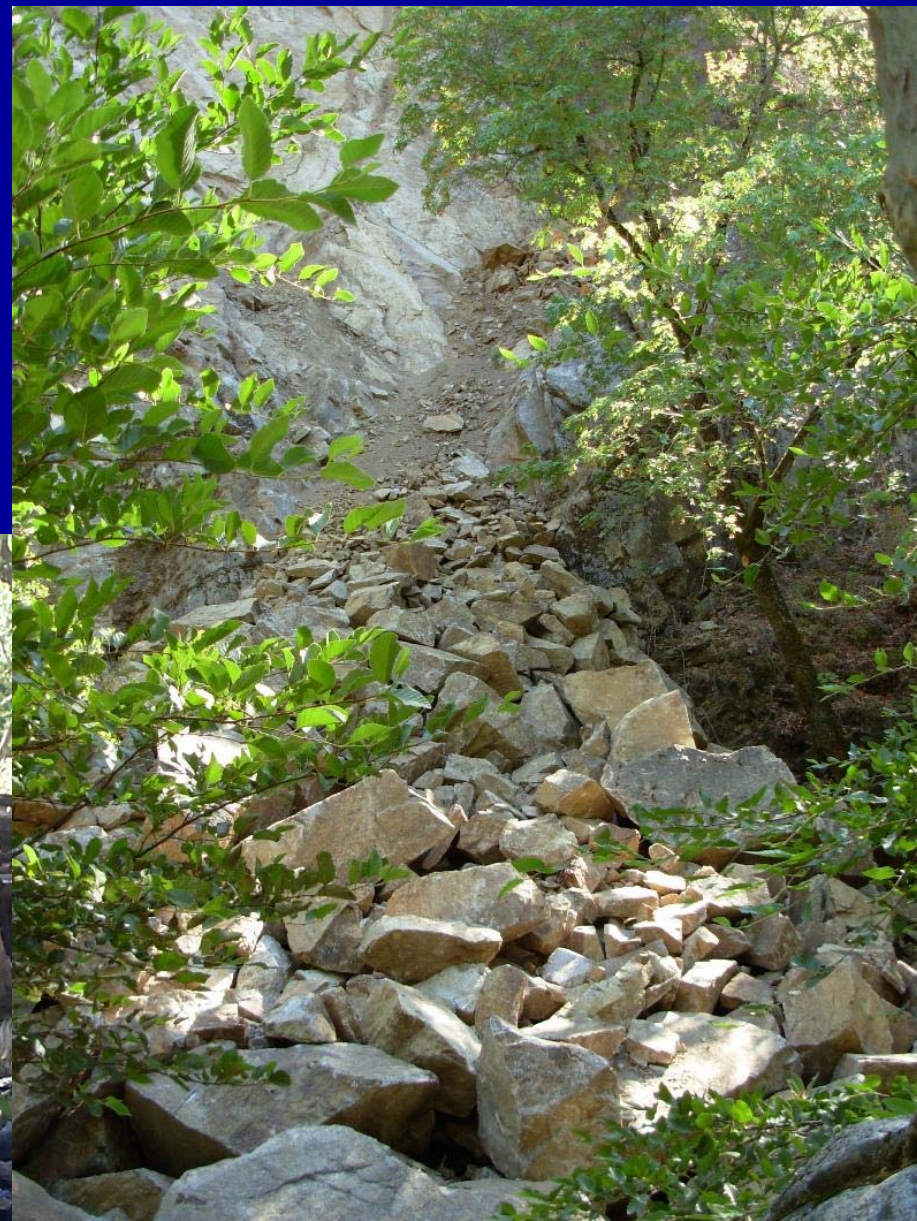
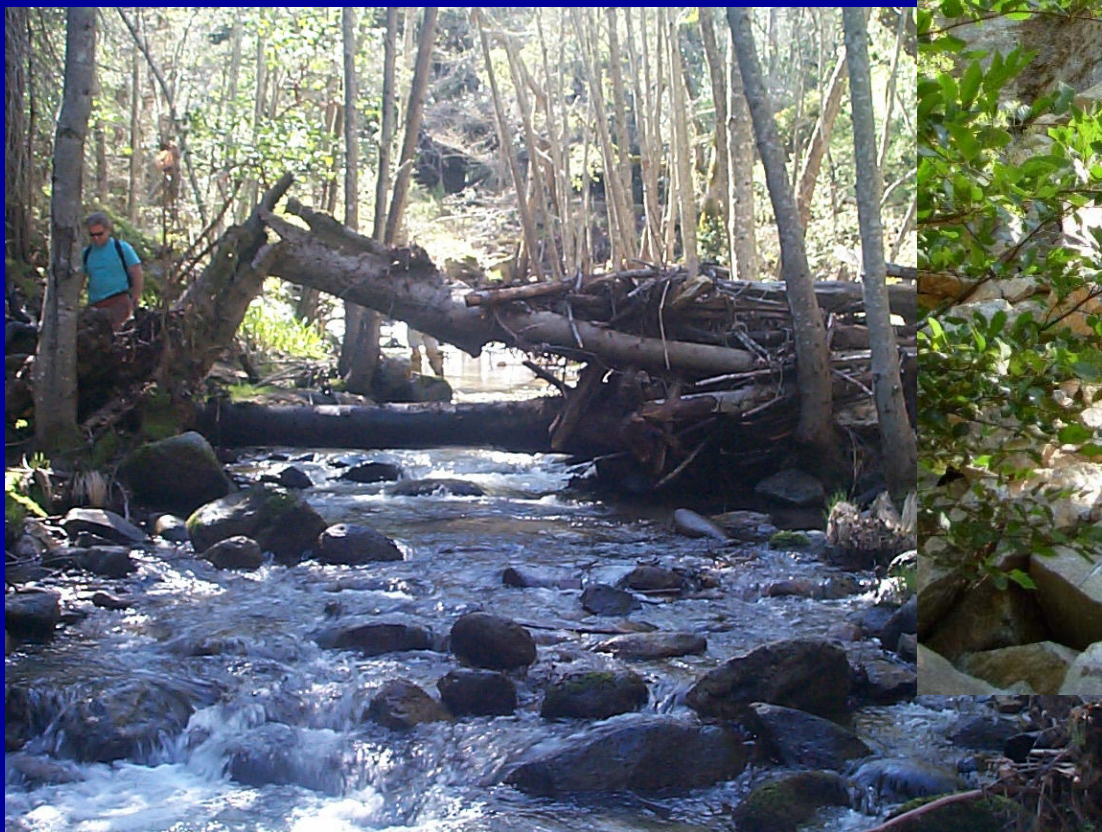
Map of Esselen Territory



Native American Tribal Areas

Use of map courtesy of Gary S. Breschini

Esselen Territory



Coastal Indians



Native American Groups

- Esselen Group
 - occupation began about 3,300 years ago
 - one of least populous groups in State (estimates range from 500 to >1,400)
 - largest village was at Princes Camp
 - subsisted on hunting, fishing (including some ocean fishing), and gathering
 - occupied upper Carmel River drainage in six tribelets near the Church Creek area in Miller Canyon-Tassajara Creek
 - controlled about 750 sq. mi. in Santa Lucia Mountains

Esselen Group

- entire length of Carmel River was used as a traditional plant gathering area for medicinal and ceremonial purposes
- Carmel River is the path spirits of the dead travel to the Western Gate or Door to the Island of the Dead at the headwaters of the river



Native American Groups

- Rumsen Group
 - Ohlone tribelet of about 500
 - five villages along the Carmel River, including one at the Santa Lucia Preserve
 - tradition places Costanoan Rumsen in California for at least 20,000 years
 - CSUMB Master Plan suggests settlement by at least 5,000 B.C. and possibly earlier

Acorn Diet



Above –
mortar from
mid-Valley

Left - acorn
woodpecker
granary



A healthy way of life?

"Old Gabriel"

San Carlos
Mission records
show he was 119
in 1890, so he
was born the year
Fr. Serra moved
the mission to
Carmel Valley

Vizcaíno discovers Monterey Bay and the Carmel River in 1603

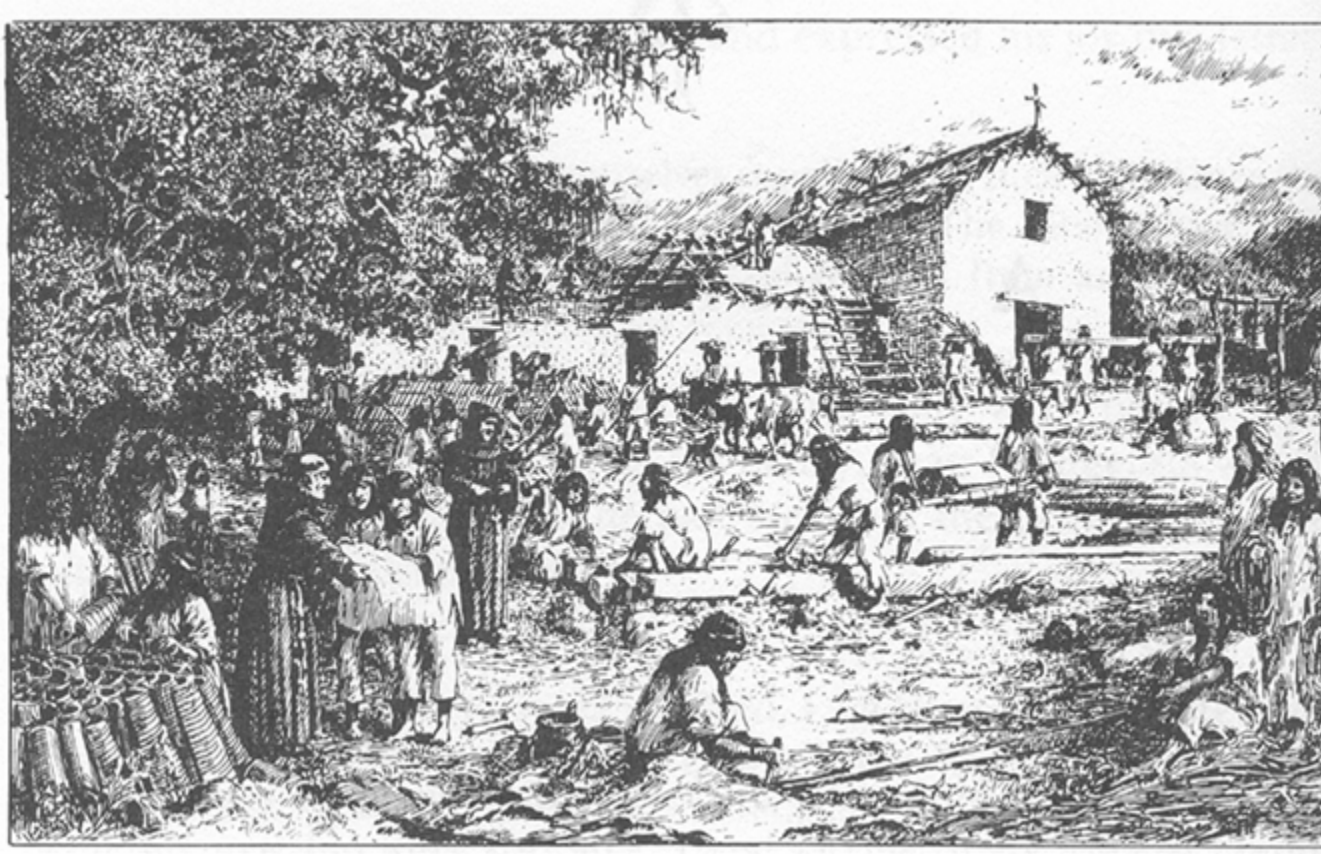
1603 January 3rd
Sebastian Vizcaíno
discovers a stream and names it El Rio del Carmelo, probably because three friars of the Carmelite order were members of his expedition, this in honor of their patroness, Our Lady of Mount Carmel.
(Wagner, p. 379)



Mission Era

1770 - Father Serra arrives at Monterey

- He writes to Father Juan Andres: "Or it may be necessary to leave the presidio here and move the mission with a few soldiers to the banks of the Carmel, two short leagues to the South. It is a truly delightful spot, which, thanks to its plentiful supply of both land and water, gives promise of abundant harvests." 6/12/1770 (Vandevere)



Salty Soil Around the Lagoon

1771: Serra writes to Father Francisco Palou:

"What we did here, we of the mission, in the way of raising crops came to nothing. We made a little garden nearby and enclosed it; the Indians doing the digging. The whole of it became one seeding bed, as Father Fray Juan had all kinds of seeds. Everything came out fine, but nothing grew to maturity. We were all greatly puzzled. Later we found out that the ground, while showing no signs of it, at times is washed over by the salt water of the bay and so is fit for nothing but nettles and reeds." 6/21/1771 (Vandervere)



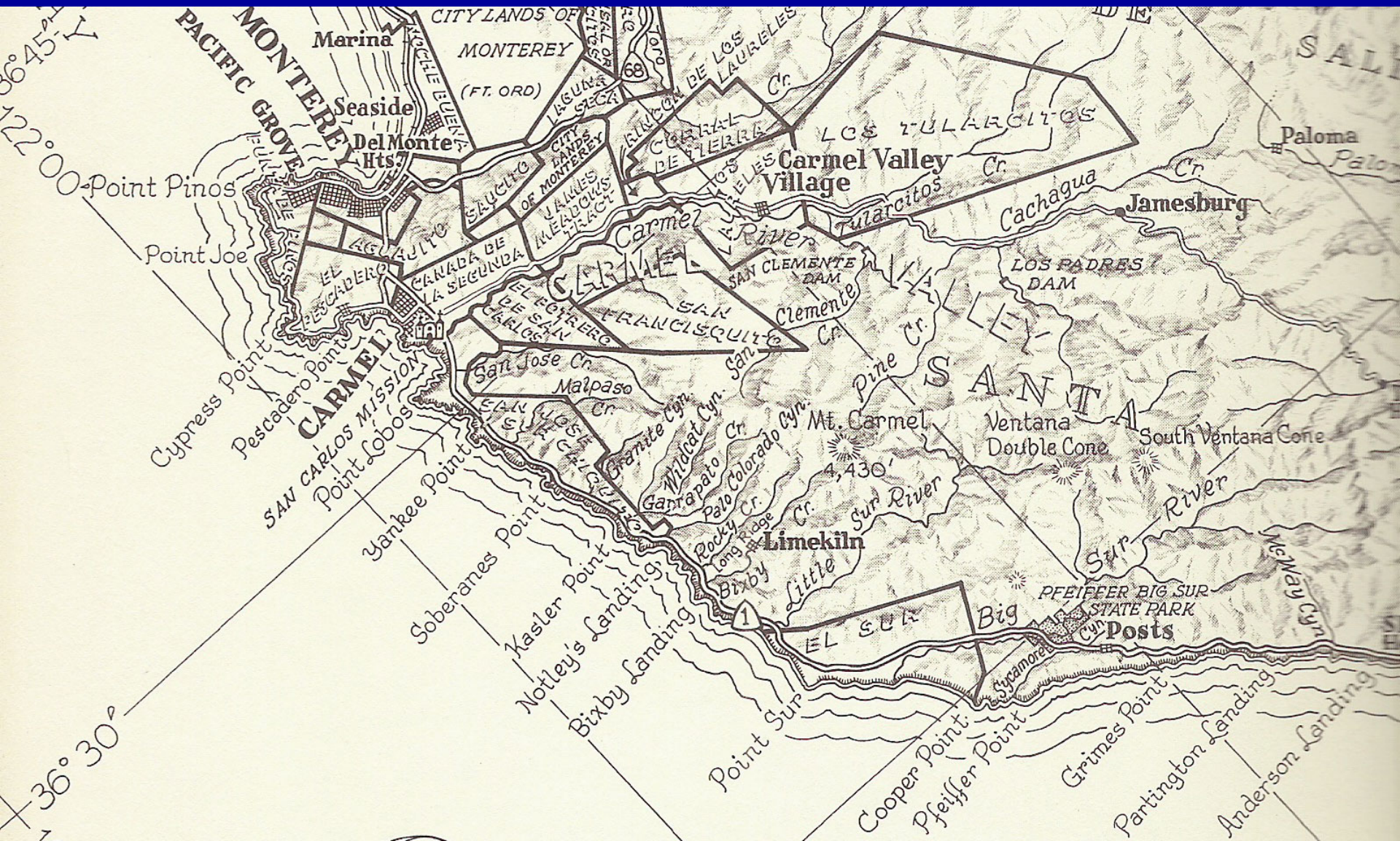
Filling the lagoon with water and salmon (steelhead)

- **1783** In his annual report Serra writes:
"To the 7 months' worth required to take water from the river for irrigation, as mentioned above, we must add the labor of bringing it to the lagoon near the mission residence. In some years, this lagoon used to be dry. Now it is always full, making it a great convenience and a delight to the mission. Some salmon (pescado) have been placed in the pool so we have it handy."

End of the Mission Era

- Mexican citizens in California felt that all California lands should be opened up to settlement
- Governor Echeandia issued decrees in 1826, 1830, and 1831 to secularize mission property
- Stated purpose was to free Native Americans from bondage and give them property
- Immediate effects of secularization throughout California were to deprive a large percentage of the remaining mission Indians of their rightful property and disperse mission property to a few well placed individuals
- By early 1800's, Carmel Valley natives had left their villages for missions or fled into the mountains

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 built to serve Hotel Del Monte



May 6, 1985

- constructed ca 1880
- 700 Chinese laborers
- 25 miles of 12-inch iron pipe
- crossed river in five places
- first Monterey Peninsula water supply
- included five-foot trestle at Robinson Canyon



June 2008



San Clemente Dam • March 29, 1932

Pat Hathaway Collection

1921 cost to
build
\$1-2 million

Finding no water in
Pebble Beach, SFB
Morse buys most of
Carmel Valley from
Crocker family to
obtain water rights
and builds San
Clemente Dam



2007 cost to remove
> \$80 million

San Clemente Reservoir





ca 1900



Breaching
the the
Carmel River
State Beach
– an old
tradition

How much has the beach changed?



Odello Art (O'Dello)
1935
Fields
Feb. 1935
Courtesy of
Bruno O'Dello
By Lewis J. Jesselyn - Carmel

JUN 23 2005



Stewart's Cove

Pat Hathaway Photo Collection (831) 373-3811 www.caviews.com

above – ca spring 1937

left - March 4, 2005



The surge



March 9, 2005



35-FOOT
WAVES
HIT THE
BEACH

JANUARY 5, 2008



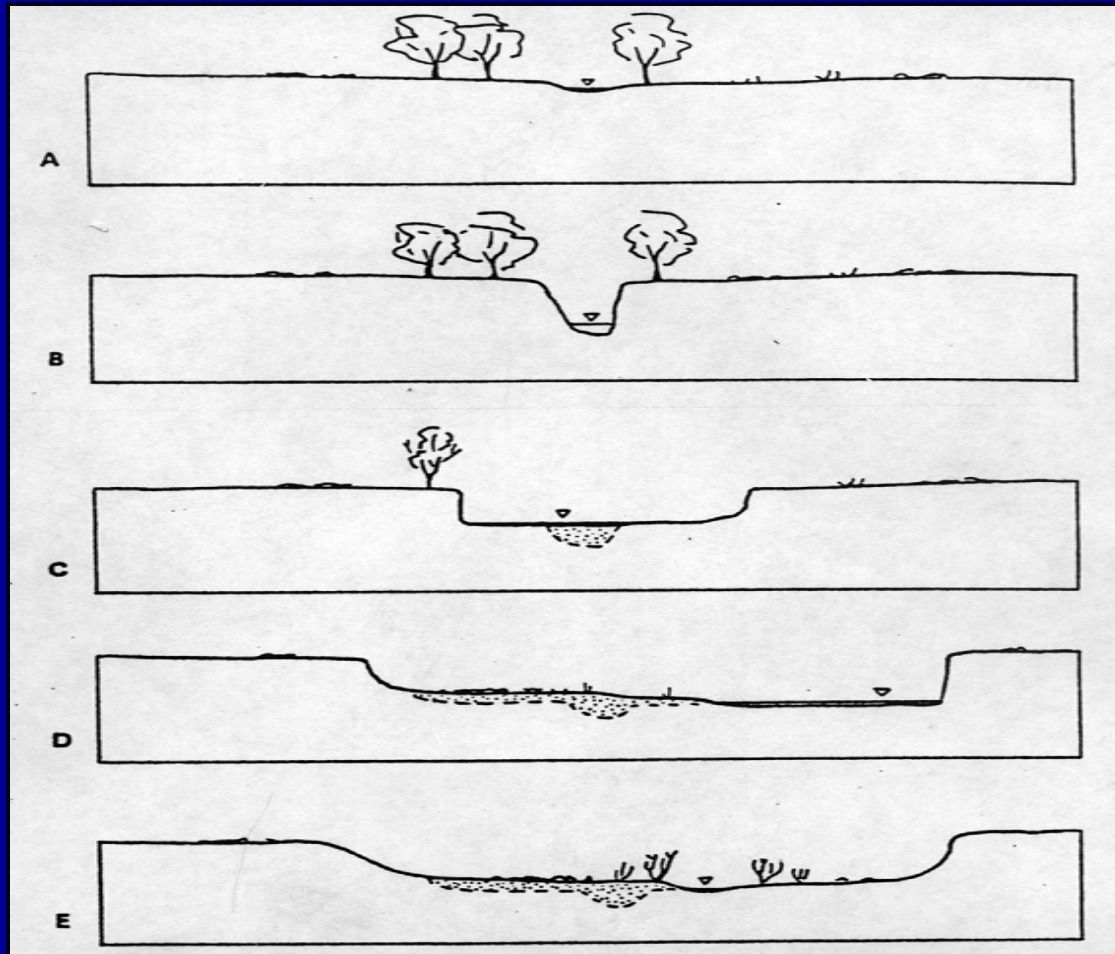
LAGOON CLOSURE

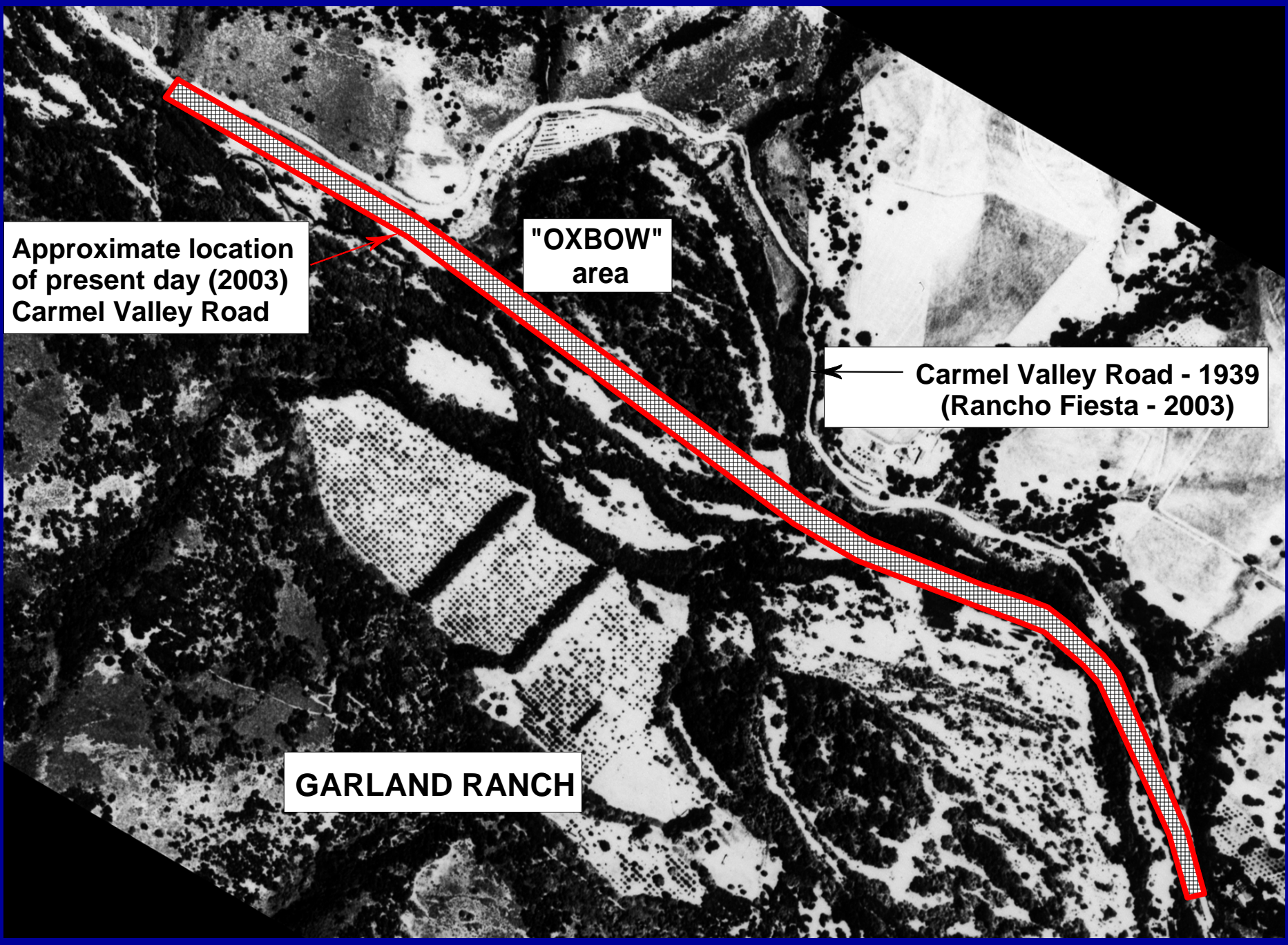


May 5, 2008

Evolution of an Incised Channel

(Schumm, et al., 1984)





Approximate location
of present day (2003)
Carmel Valley Road

"OXBOW"
area

← Carmel Valley Road - 1939
(Rancho Fiesta - 2003)

GARLAND RANCH







Channel
Maintenance
at Farm
Center
ca 1940s

The photographer wrote on the back: "Sand bars can build up in the river channel, divide the flow and divert it on new courses unless a clearance project is maintained from year to year."

SCHULTE ROAD - 1958

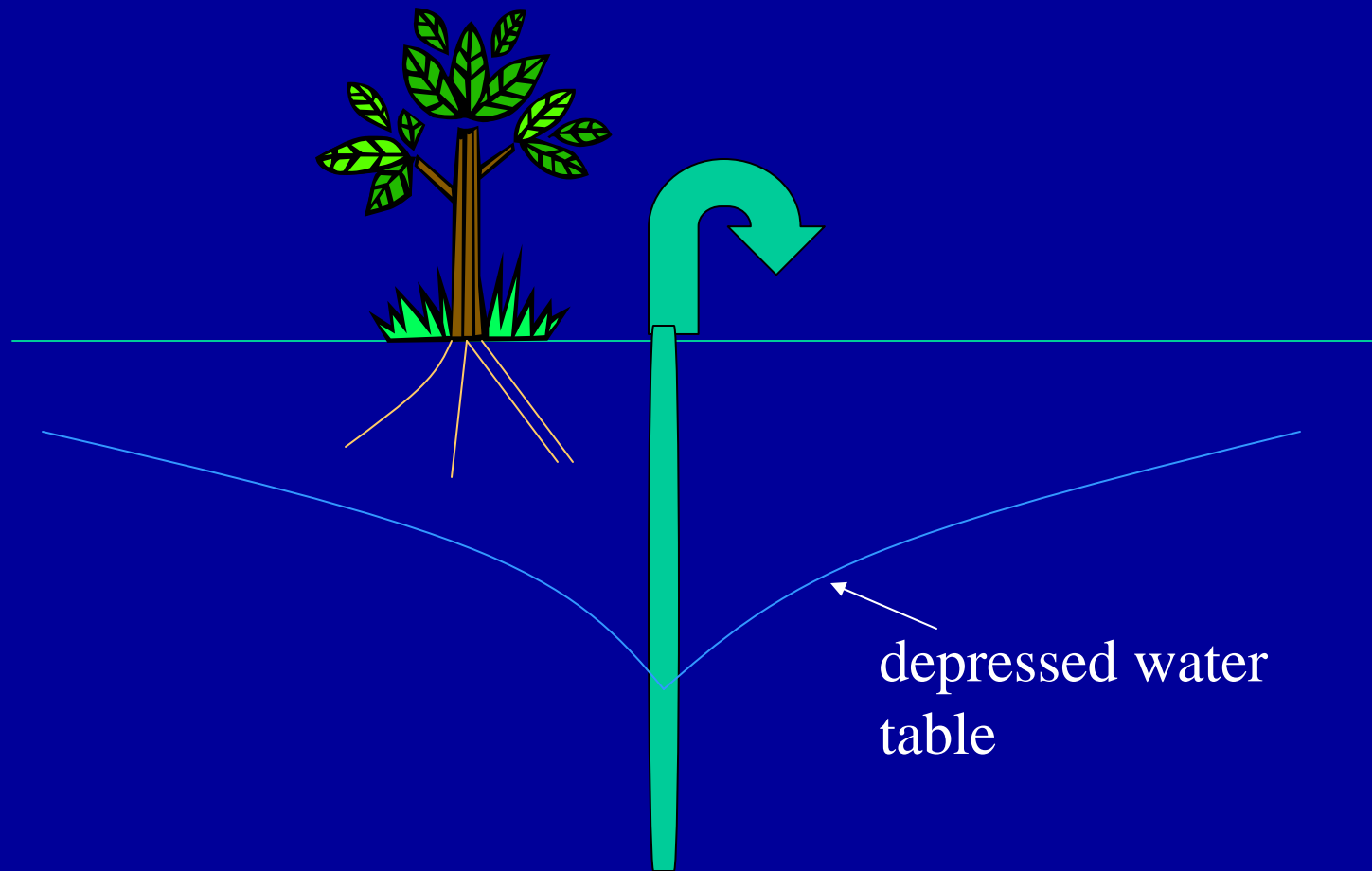


A Region Known to Have Difficulties Getting Unstuck



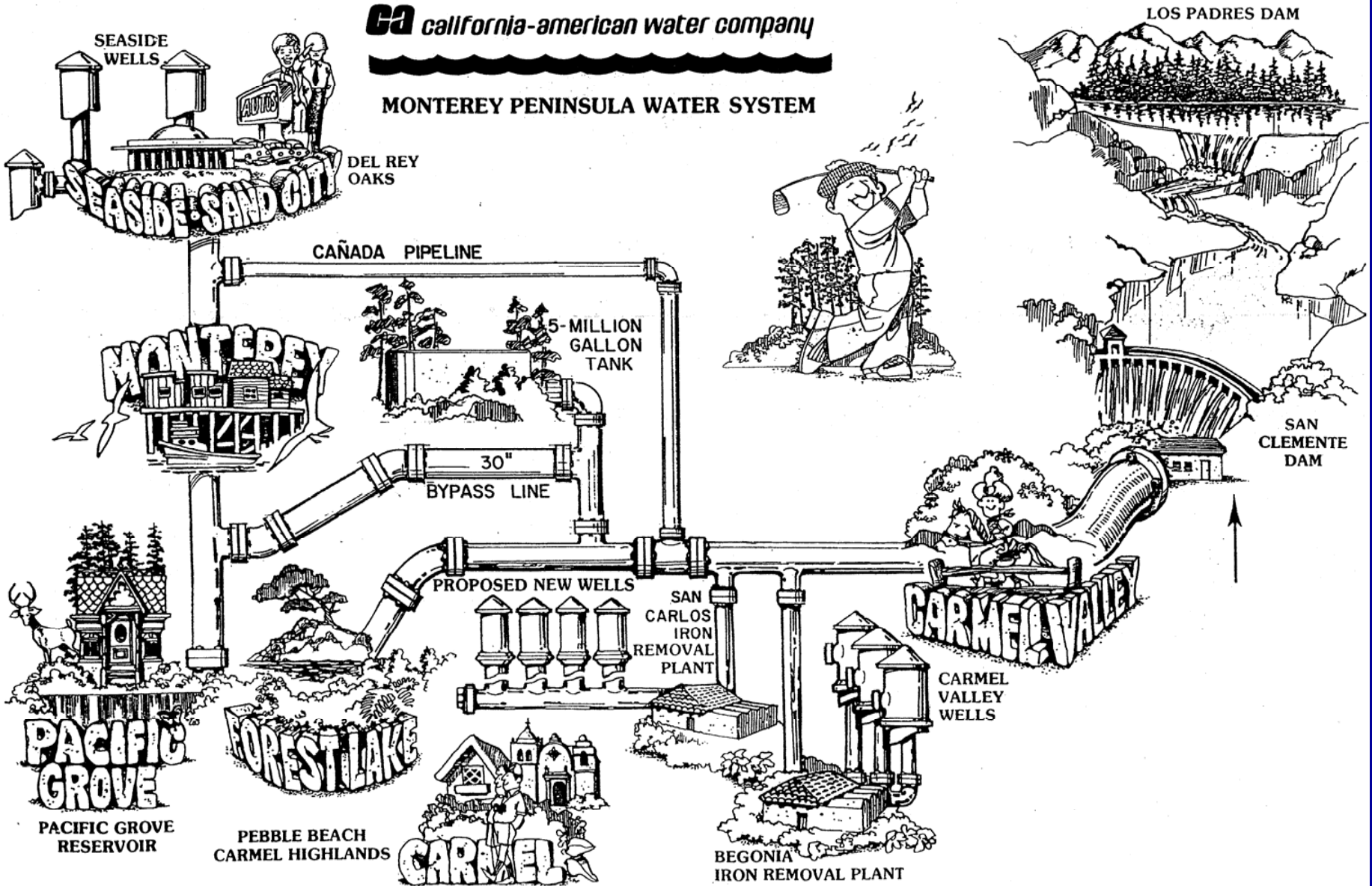
Looking downstream to a 1958 (?)
Volkswagon at the end of
Schulte Road, April 2, 1958.
Photograph by Charles R. Walker

1960's - Groundwater Pumping Increased



ca *california-american water company*

MONTEREY PENINSULA WATER SYSTEM



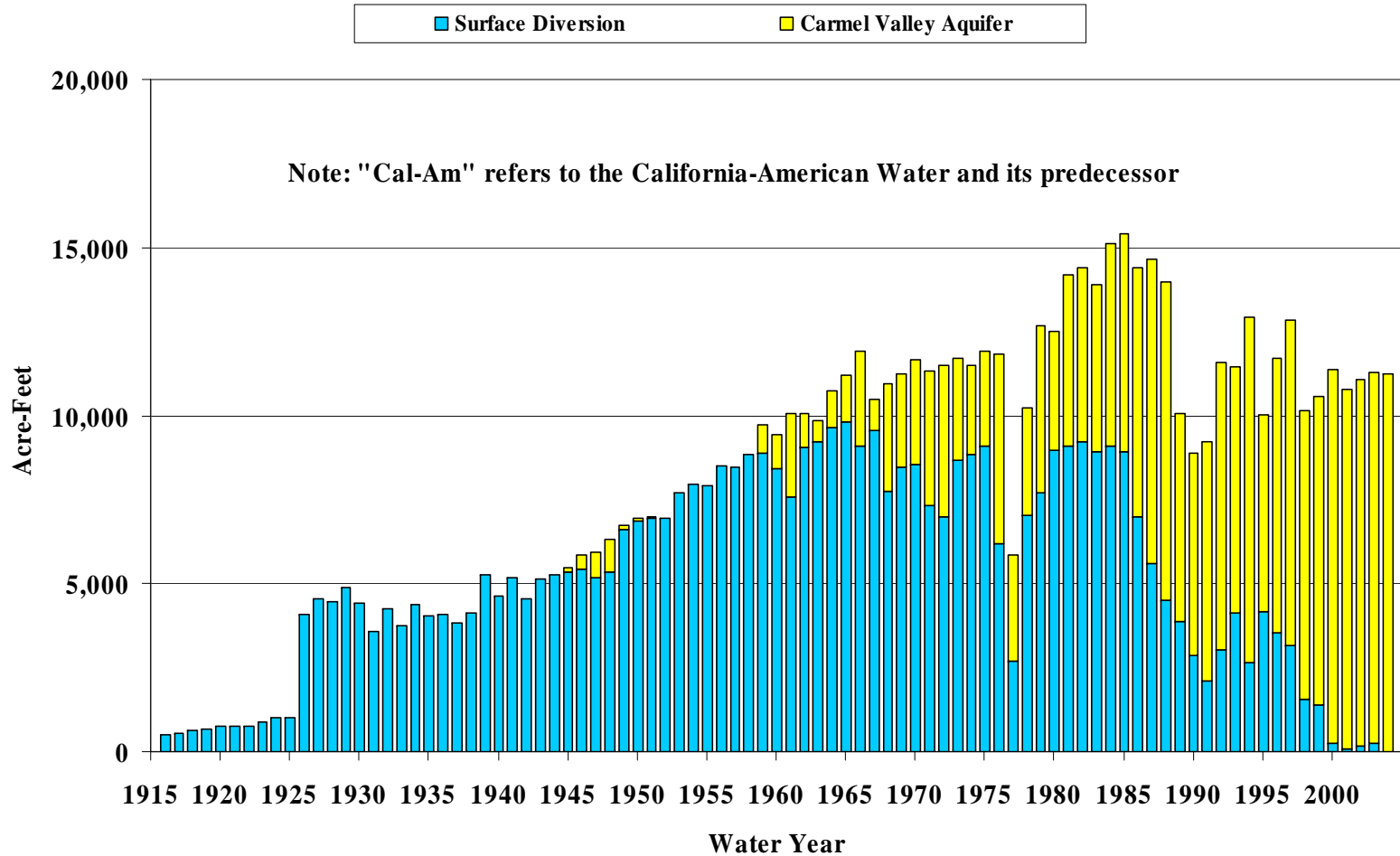
SUMMER PUMPING in the CARMEL VALLEY ALLUVIAL AQUIFER



At Carmel Valley Ranch (1980)

Carmel Valley Water Production 1915-2004

Cal-Am Water Production by Source: 1916-2004



Production values for the 1916-1978 period from Cal-Am Exhibit 90 at the 1992 State Water Resources Control Board hearings regarding Cal-Am's diversions from the Carmel River system. Production for the 1978-2004 period were compiled by the Monterey Peninsula Water Management District from monthly production reports submitted by the Cal-Am's Monterey Division.

January 10, 1982



Upstream of Schulte Bridge

Schulte Road Bridge – May 1982



Schulte Project – 1982 and 2003

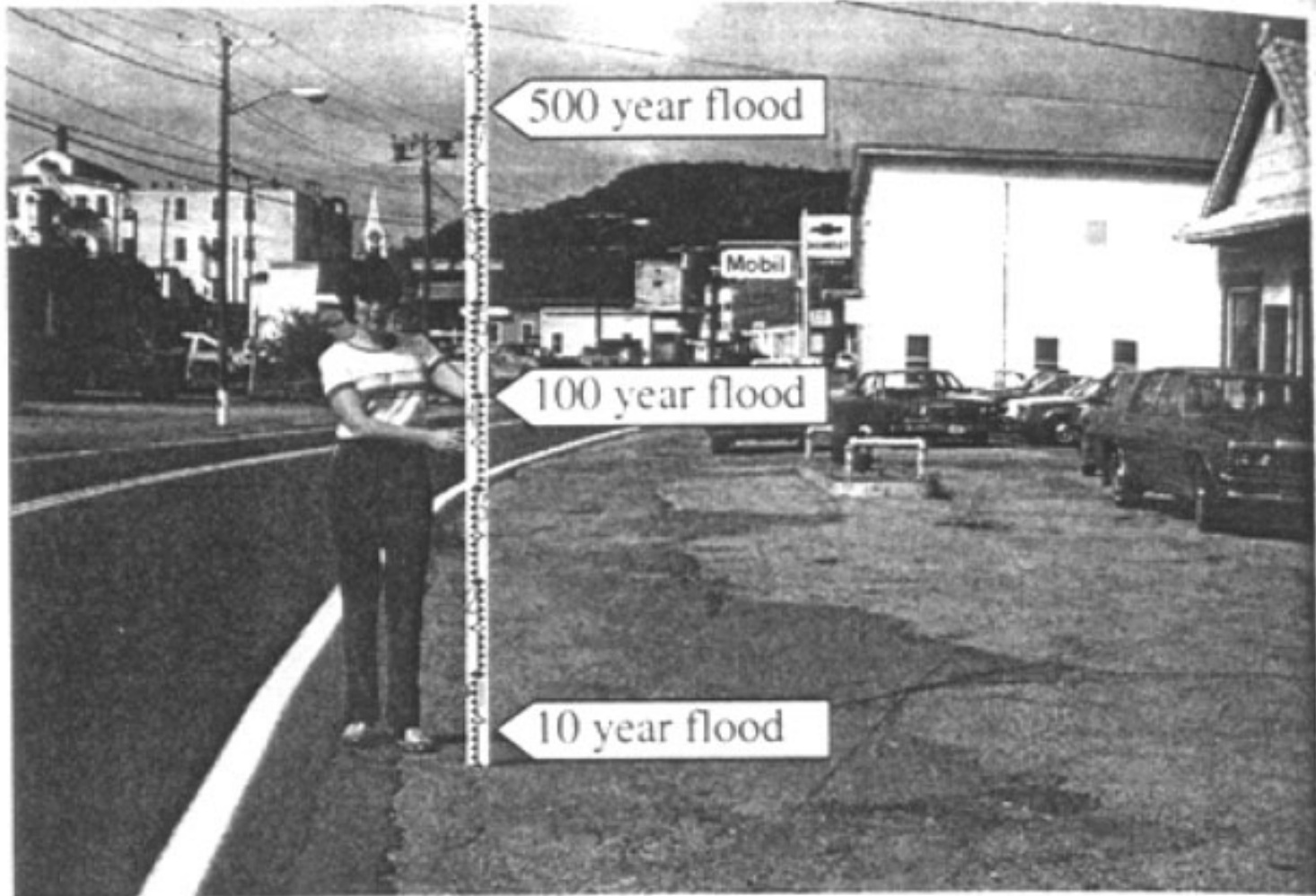
Left - Looking upstream from Schulte Bridge, April 1982. Note tires, wooden jacks, and concrete rubble dumped by the owner on the streambank to slow erosion.



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.



Flood Return Interval = Average Spacing of Events



Early Carmel Valley Residents evacuate during a flood (late Cretaceous – 65 MYA)



FLOODS IN THE 1990'S



**MARCH 10, 1995
BORONDA BRIDGE
(left)**



**MAY 2002
BORONDA BRIDGE
(right)**



Highway 1 Bridge over the Carmel River
Above - March 10, 1995
Below - March 12, 1995



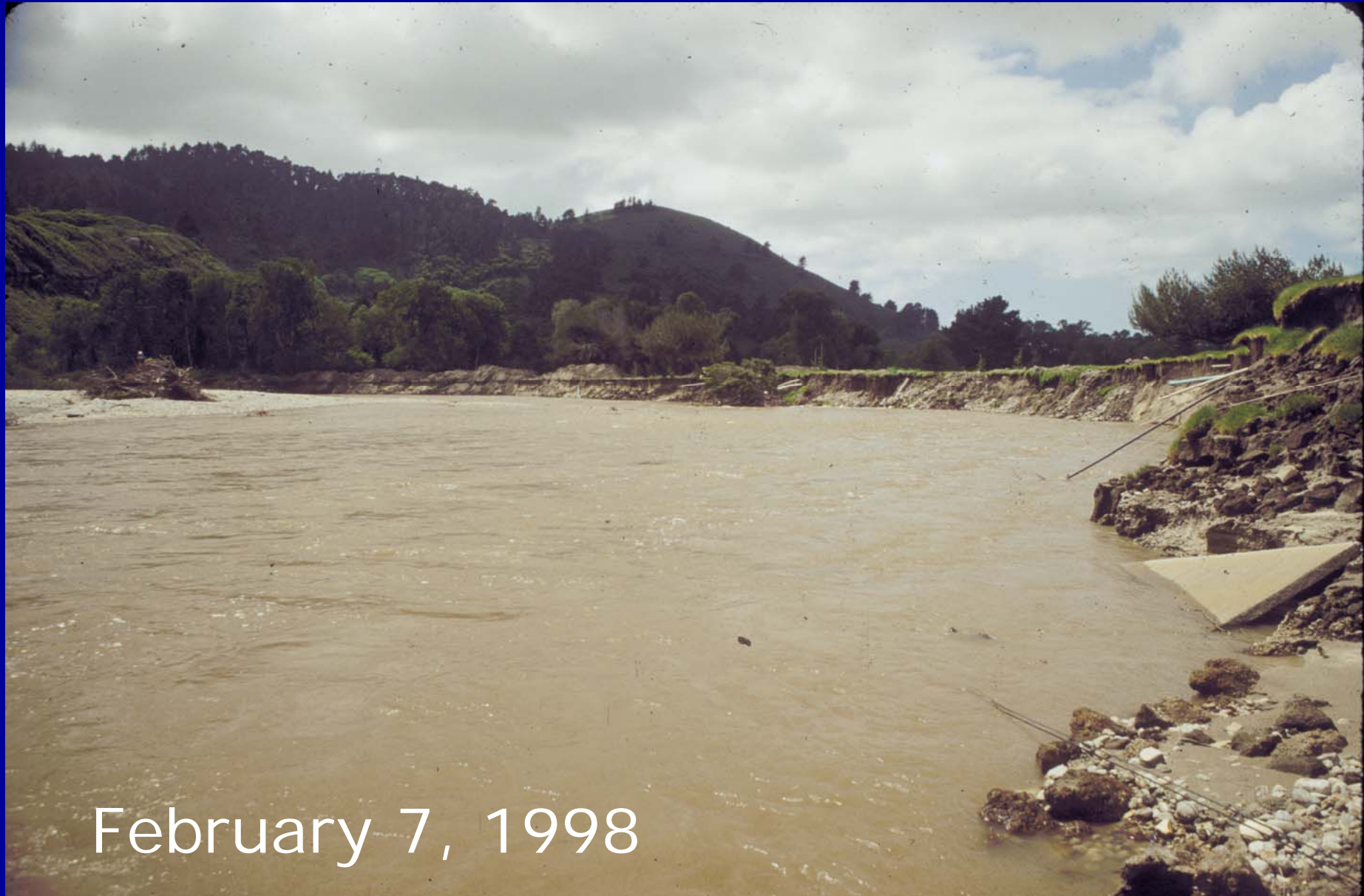
Highway 1
Bridge Hit by
120-foot tree –
likely a
cottonwood
from near the
Crossroads
Center

Hacienda Carmel Levee Fails in 1998



Carmel River at Hacienda Carmel (RM 3.5)
Looking downstream at left levee
February 7, 1998

Rancho Cañada Loses Two Fairways



February 7, 1998

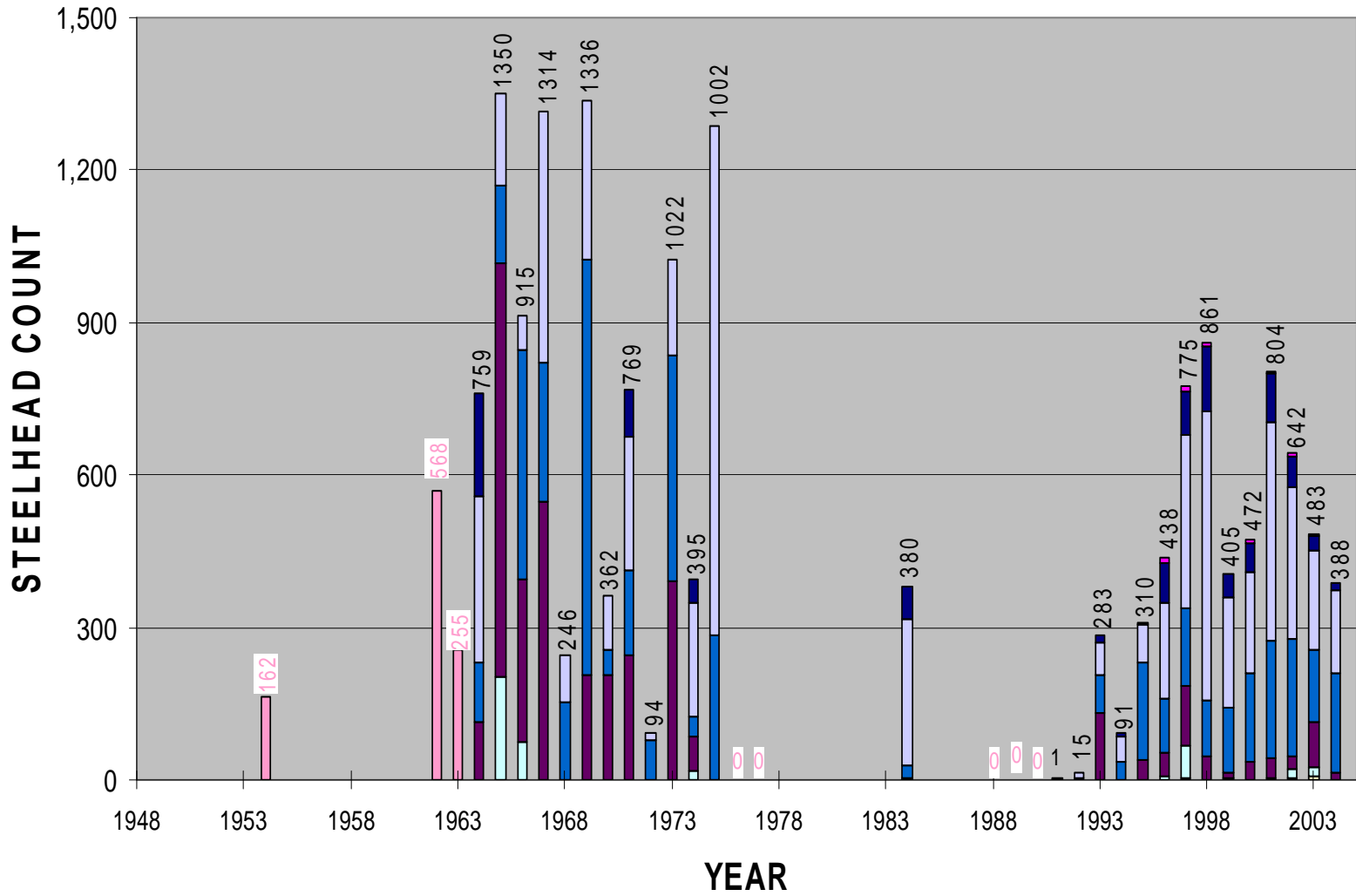
Threatened
Species
Protected in
1996 and
1997

Steelhead



California Red-legged Frog

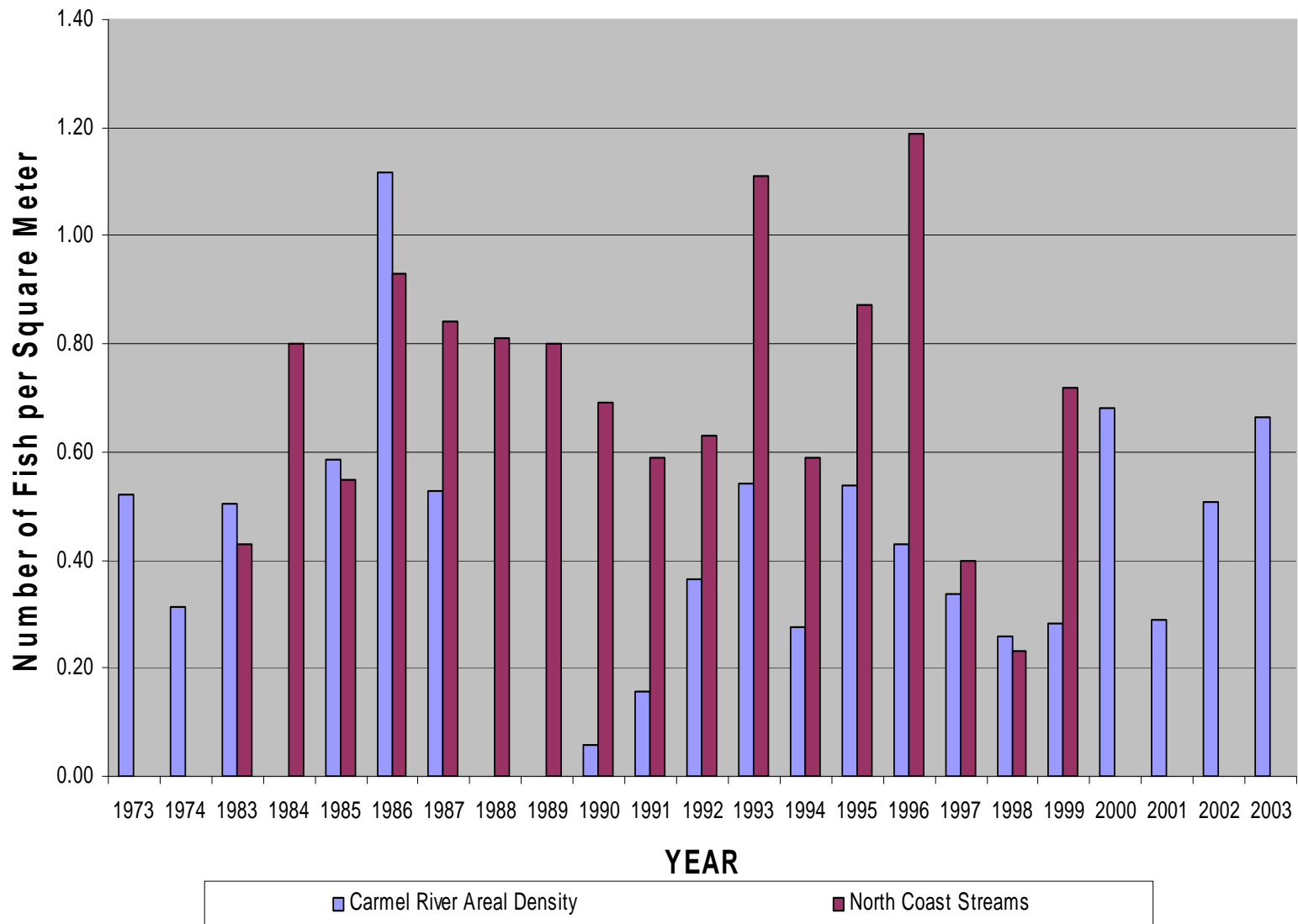
Historical Counts of Adult Steelhead at San Clemente Dam 1954-2004



NOV
 DEC
 JAN
 FEB
 MAR
 APR
 MAY
 Miscellaneous

Juvenile Steelhead Population Density, Carmel River and North Coast Streams

Selected Years, 1973-2003



Source: North Coast Streams 1983-1994, Cramer, et al. 1995 and 1995-1999, CDFG 2003; Carmel River, MPWMD files

Court Battles, Citizen Efforts, Better Management Halt Degradation of River

- 1974 - suit over groundwater extraction in mid-Valley
- 1976-77 - Carmel River Watch (CREW) established
- 1983 - 84% yes vote for river restoration program
- 1984 – MPWMD orders pumping to be shifted downstream
- 1987 – four complaints filed against Cal-Am with SWRCB

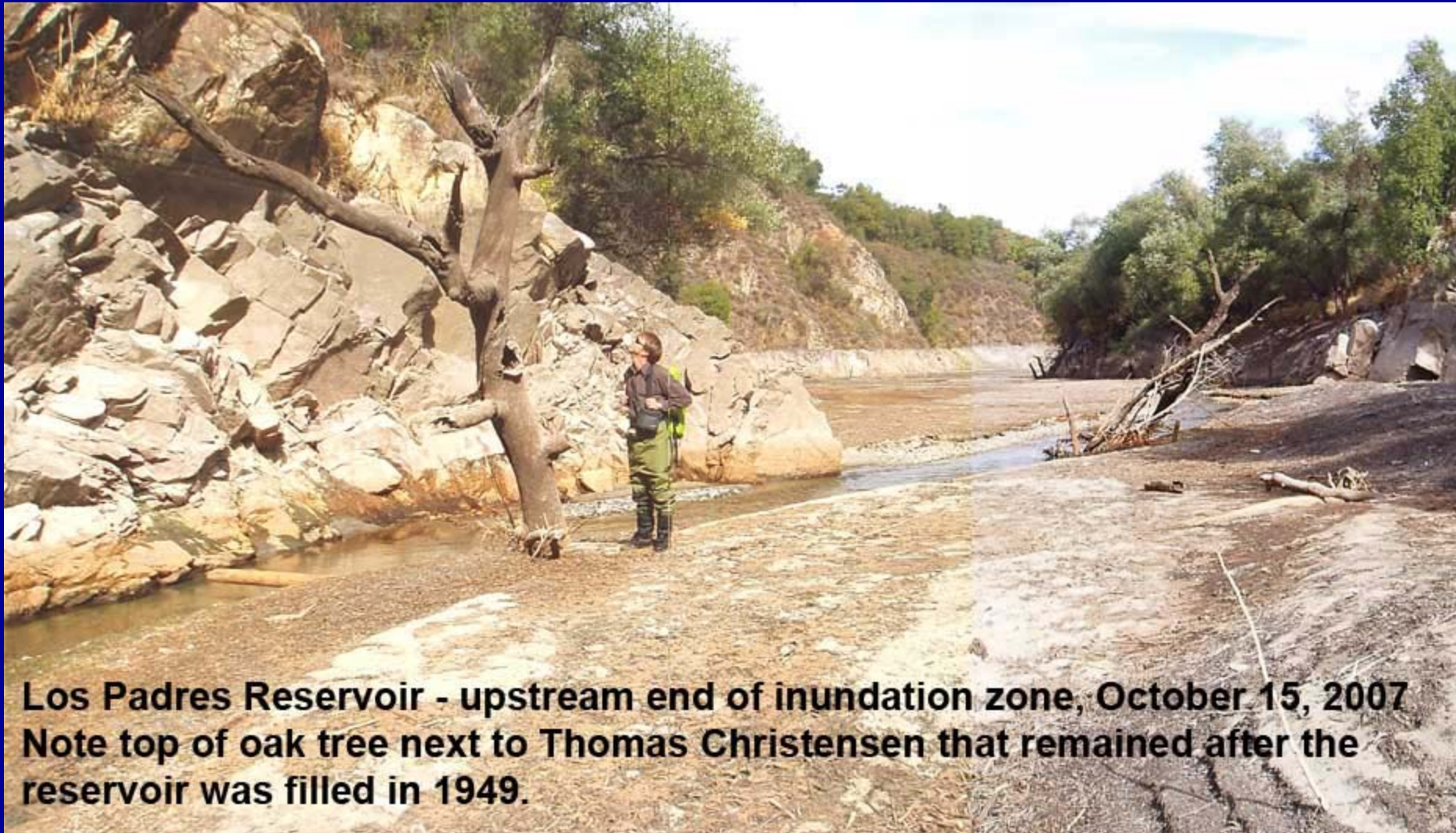
Events (continued)

- 1990 – EIR on water allocation results in expanded Mitigation Program for river
- 1995 – SWRCB issues WR Order 95-10
- 1996-97 – listing of steelhead and California red-legged frogs spurs tighter federal controls of activities along the river
- 2000-2005 Cal-Am surface diversions further curtailed
- 2008 – Coastal Conservancy sponsors Sand Clemente Dam removal and river re-route
- 2007-08-09 (?) - SWRCB revisits Order 95-10

What Are the Threats to Resources of the Carmel River?

- Los Padres Reservoir may continue to impound sediment from the upper watershed
 - Loss of surface storage may result in less flow downstream in the summer
 - Lack of sediment may destabilize streambanks
- Armoring of streambanks is likely to continue after large floods
- Diversions in lower river continue to affect vegetation and aquatic habitat
- Global warming may cause larger swings in temperature and rainfall

Los Padres Reservoir Sedimentation



**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.**

From Los Tulares – July 2, 2008

Fire
Hastens
Mass
Wasting



Below - Danish Creek watershed – July 12, 2008



Basin Complex Fire Will Increase Sediment Load



Incision at Rancho Cañada



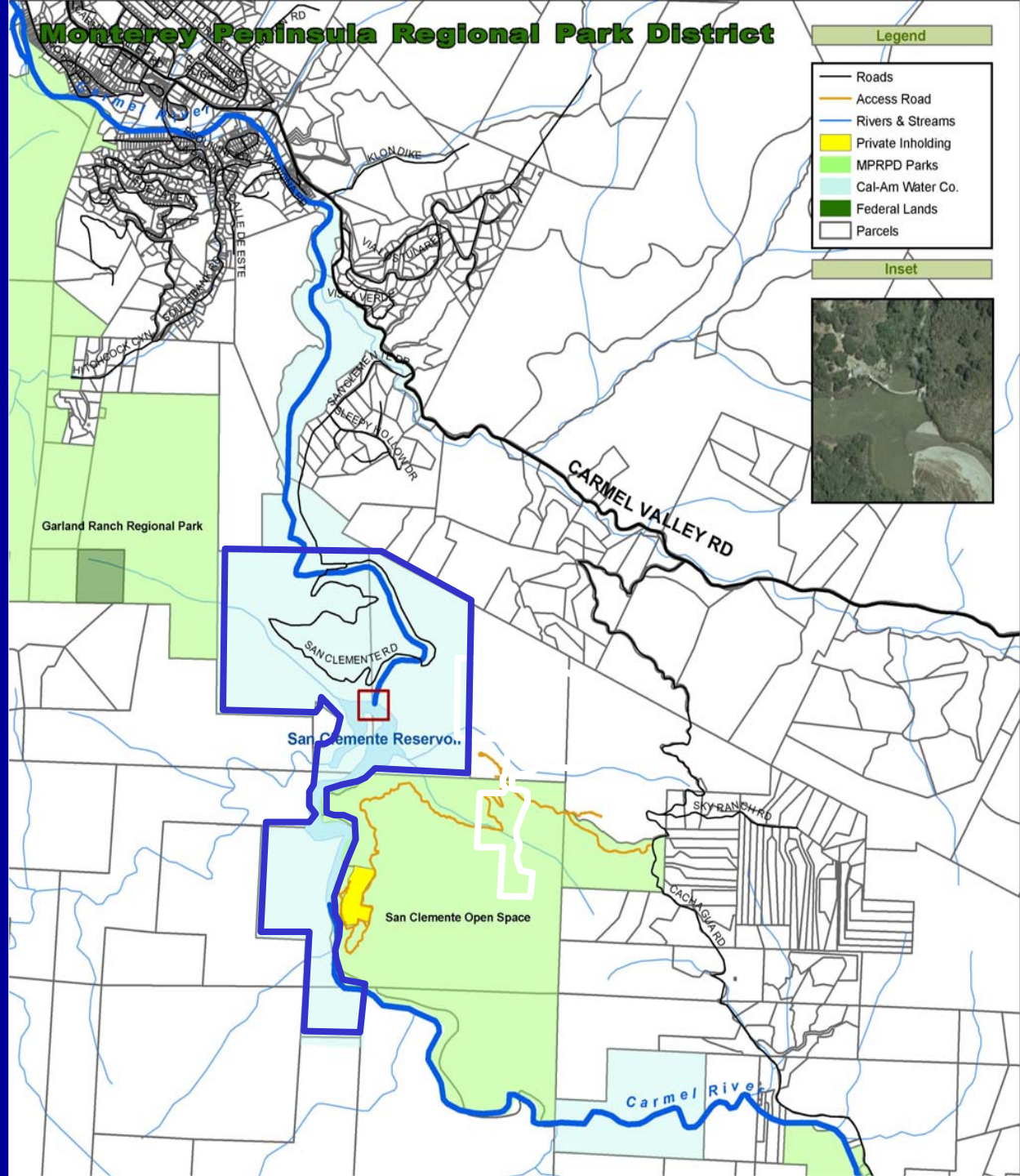
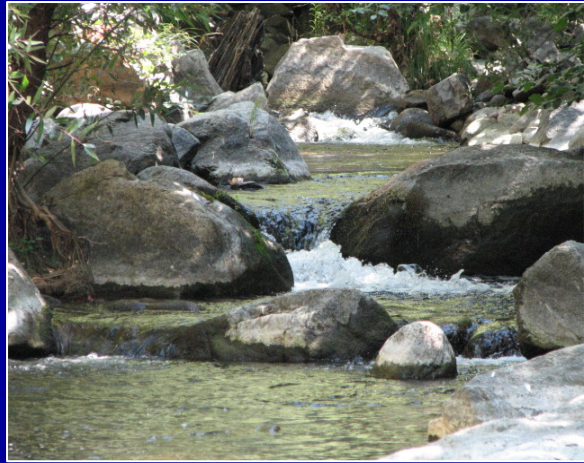
Rusty Bridge Pilings as a Failure Mechanism



Moving Forward

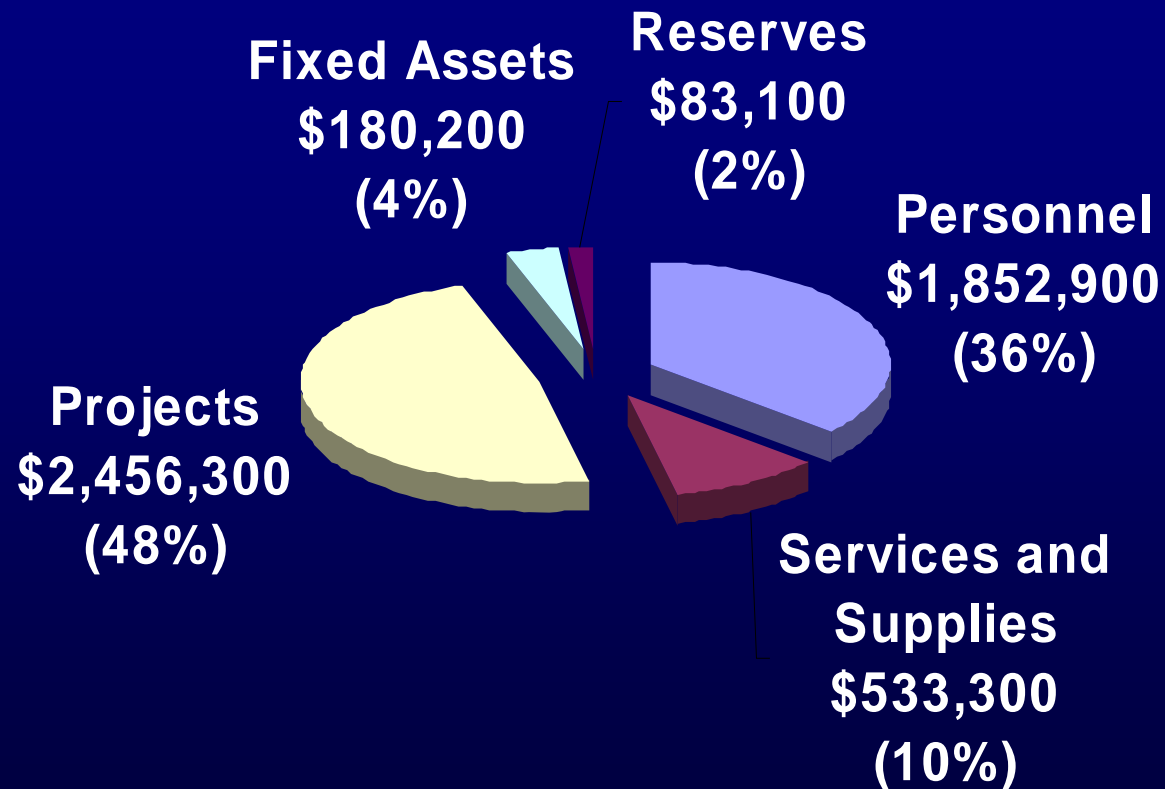
- Significant bond act funding may be available to continue restoration and mitigation efforts
- Private and non-profit groups such as the Big Sur Land Trust and the Planning and Conservation League are interested in restoring and maintaining the watershed
- San Clemente Dam to be removed by State Coastal Conservancy
- New water supplies for the Monterey Peninsula are projected to be completed within eight years - these projects will allow a reduction in diversions from Carmel Valley

River Reroute and Dam Removal Maximize the Public Benefits



2008-09 MPWMD Mitigation Program Expenditures

Total = \$5,105,800



Mitigation Program Direct Measures

- **Seaside basin injection/recovery**
- **Fish rescue, rearing, habitat improvement**
- **Irrigation of Carmel River riparian corridor**
- **Vegetation management/modification and augmentation**
- **Streambank and channel restoration**

Mitigation Program Indirect Measures

- **Conservation - e.g. property inspection/retrofits, studies for Pebble Beach reclamation project**
- **Enforcement of Ordinances/Rules and Regulations for water use and activities along the Carmel River**
- **Management of limited water supplies**
- **Monitoring programs (fishery, wildlife, vegetation, water quality and quantity)**

MPWMD Annual Rescues

- **Community demand** dries up eight miles of river
- **39,500** juvenile fish rescued in 2003
- **80,000+** juvenile fish rescued in 2008
- **Over 300,000** fish rescued in the past 14 years



A backpack electrofisher and dip nets used to catch fish before the river dries up.

MPWMD Fish Rescue Team

Planting Streamside Vegetation



2001
estimate of
riparian area
= 438 acres

☞ An increase
of 139 acres
since 1986

Gravel Injection Program

Mitigation for Habitat Loss

- Injection program replaces gravel retained by main stem reservoirs
- 4,000 tons of material placed since 1993



Placing spawning gravel through the bridge at the Los Padres Dam spillway.



A backhoe pushes spawning gravel into pool near fish ladder.

References

Smith, D.P., Newman, W.B., Watson, F.G.R., and Hameister, J., 2004, Physical and Hydrologic Assessment of the Carmel River Watershed, California. The Watershed Institute, California State University Monterey Bay, Publication No. WI-2004-05/2, 88 pp.

Fink, Augusta, Monterey The Presence of the Past, Chronicle Books, 1972

MPWMD, Monterey Peninsula Water Supply Project, Final Environmental Impact Report/Environmental Impact Statement, March 1994