

Coastal Environments

Oceanographic and Engineering Expertise

Coastal Environments

La Jolla, CA

www.coastalenvironments.com

EcoSystems Management Associates, Inc.

Carlsbad, CA

www.eco-m.com

14 May 2004
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COASTAL
ENVIRONMENTS

Services and Resources

- Southern California and Worldwide
 - Oceanographic services
 - Coastal processes and beaches
 - Wetlands enhancement and restoration





Coastal Environments

- Oceanographic and coastal engineering services
 - Physical oceanography
 - Coastal processes and engineering
 - Biological monitoring
 - Geology, geophysics, hydrography
 - Cultural resources, marine archaeology
 - Data analysis, numerical modeling
 - Oceanographic equipment, instrumentation





Coastal Environments' Subsidiaries

EcoSystems Management Associates, Inc.

- Oceanographic field measurements
 - Currents, waves, winds, water quality
 - Bathymetry, side-scan, sub-bottom, magnetometer, geophysical surveys, cruises

Delta H Engineers

- Coastal and structural defects, forensic studies
- Expert consultant, witness services



Selected Expertise

- Oceanographic monitoring, impacts
 - San Onofre Nuclear Generating Station
 - Effect of kelp on beaches
 - King Harbor in Redondo Beach
- Lagoon restoration, enhancement
 - San Elijo, San Dieguito, Los Peñasquitos, Tijuana
- Beaches and coastal development
 - Crystal Cove

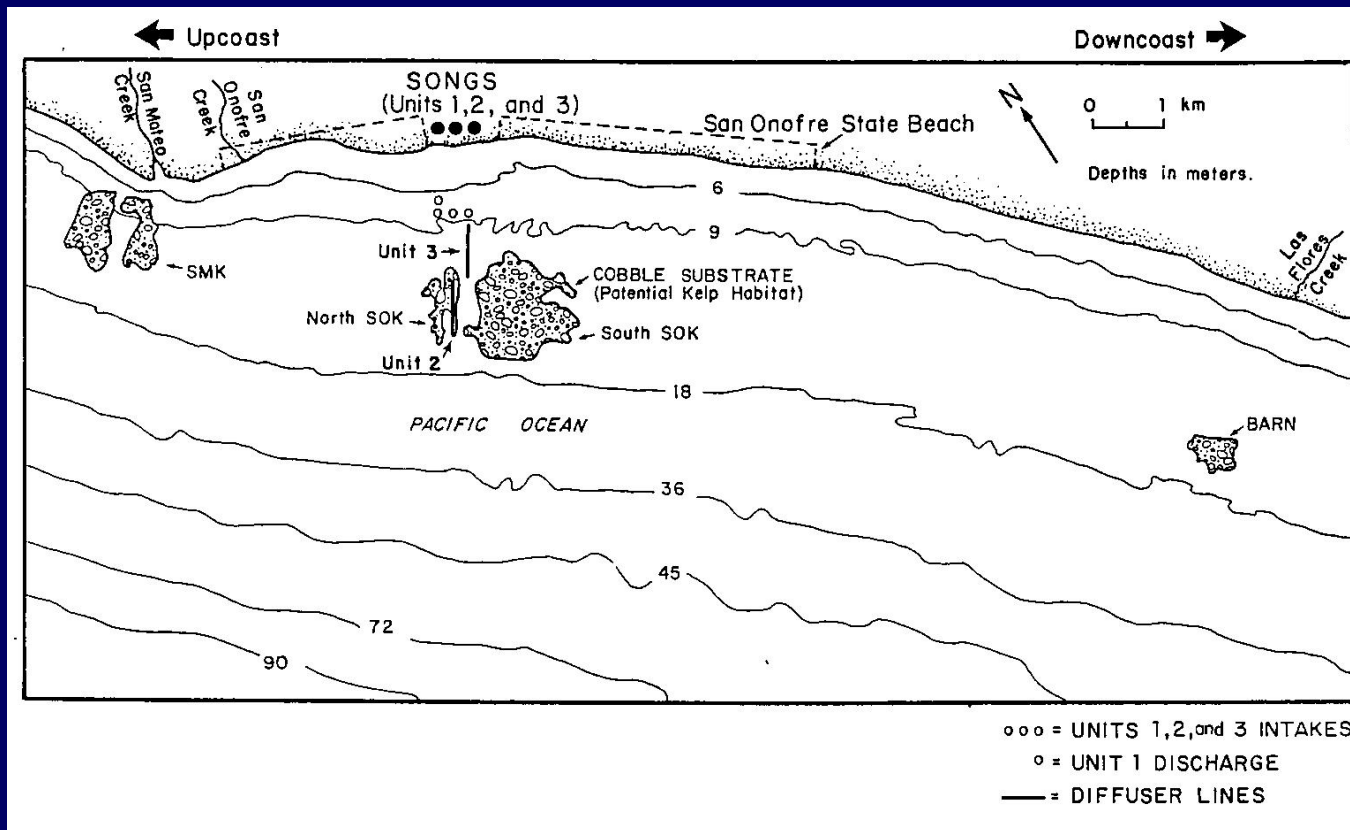


San Onofre Nuclear Generating Station (SONGS)

- Sand pad & beach width changes
- Cooling system
- Plume monitoring
- Ambient currents

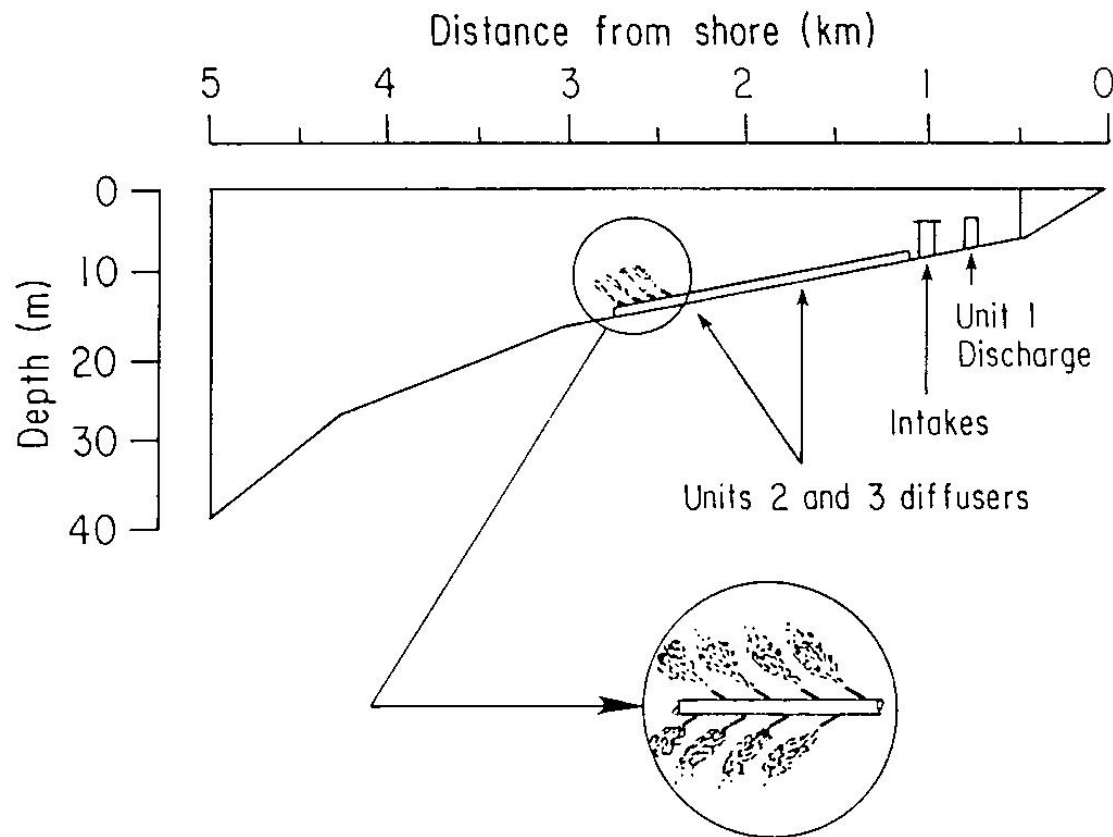


SONGS Cooling System

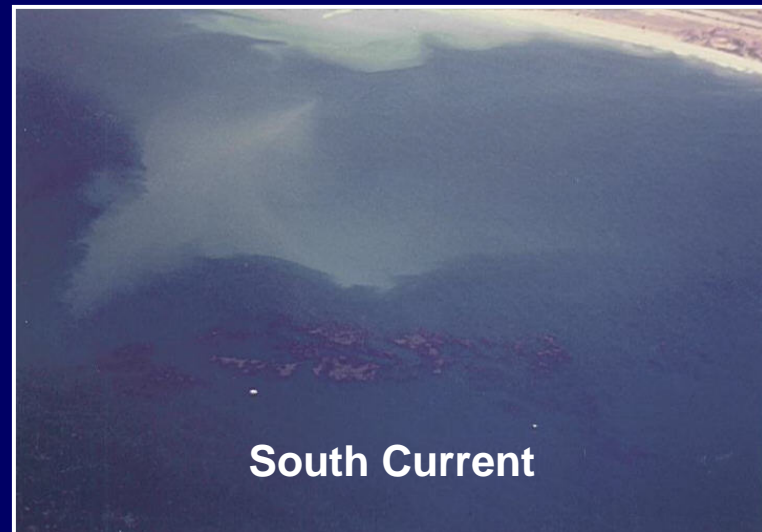
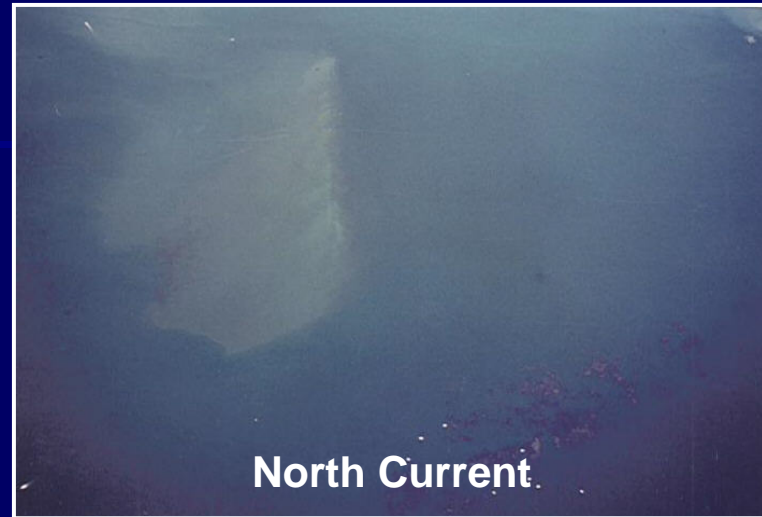
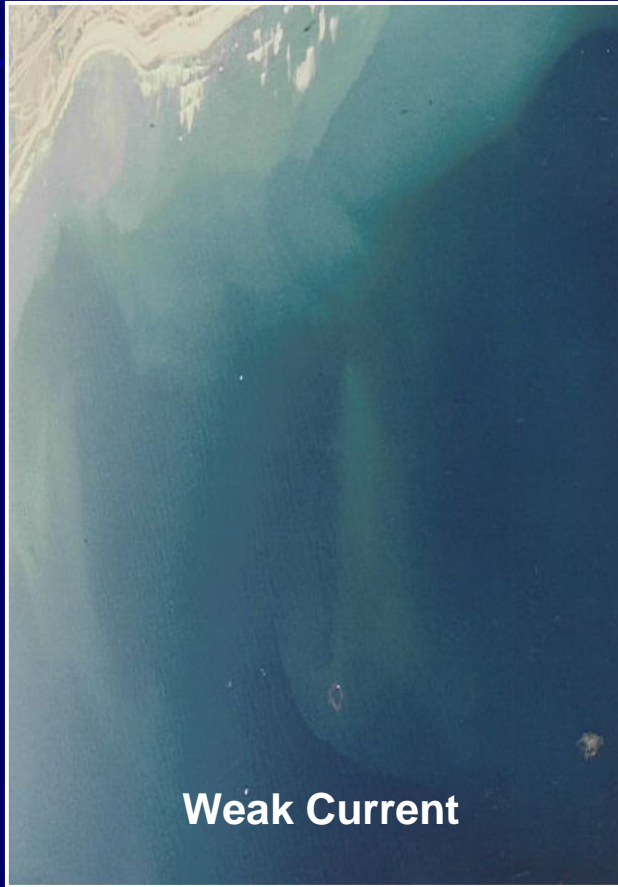
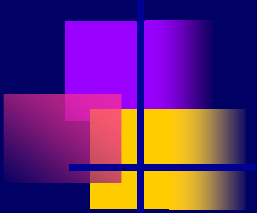


Offshore Circulating Water System

SONGS Cooling System

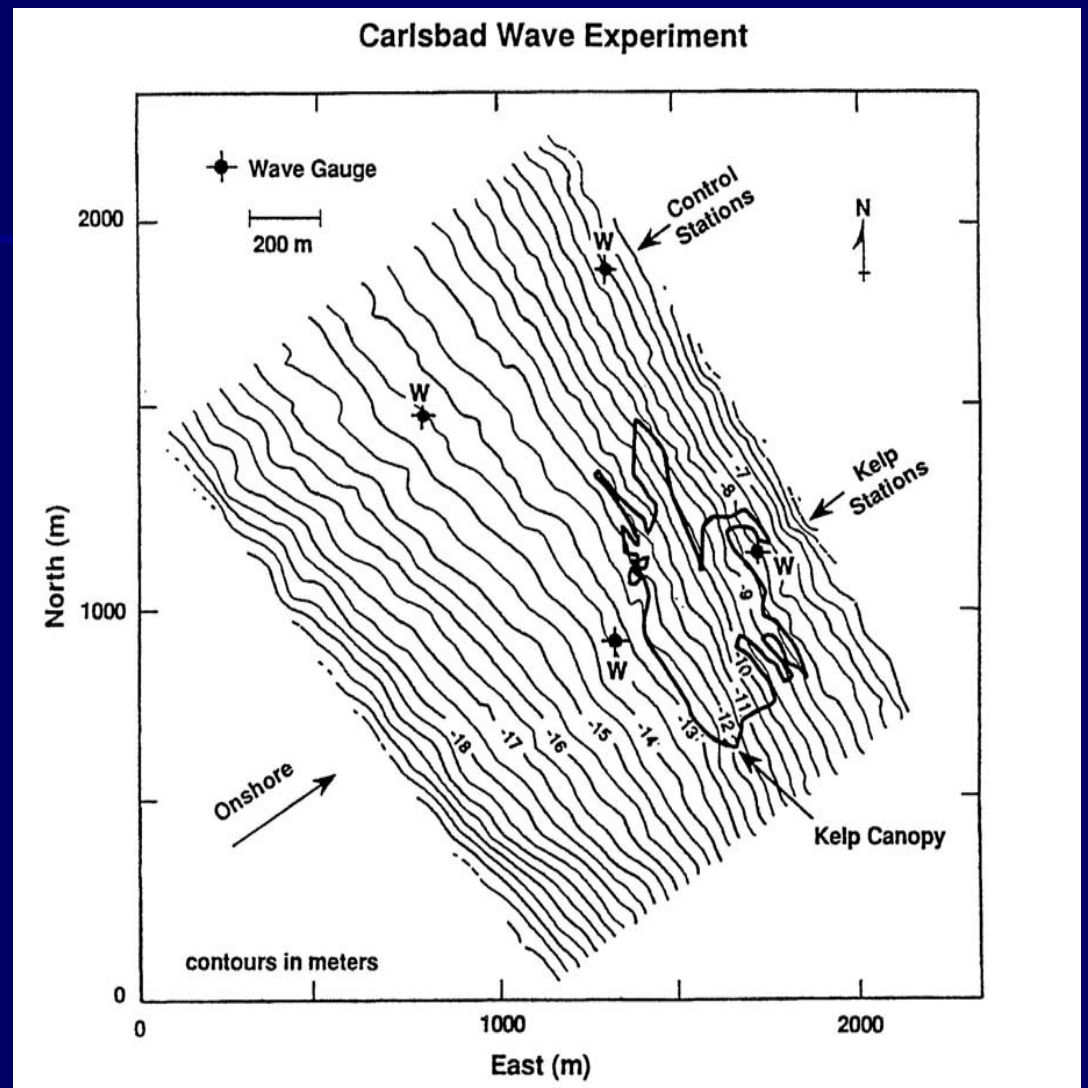


Effect of SONGS on Ambient Current



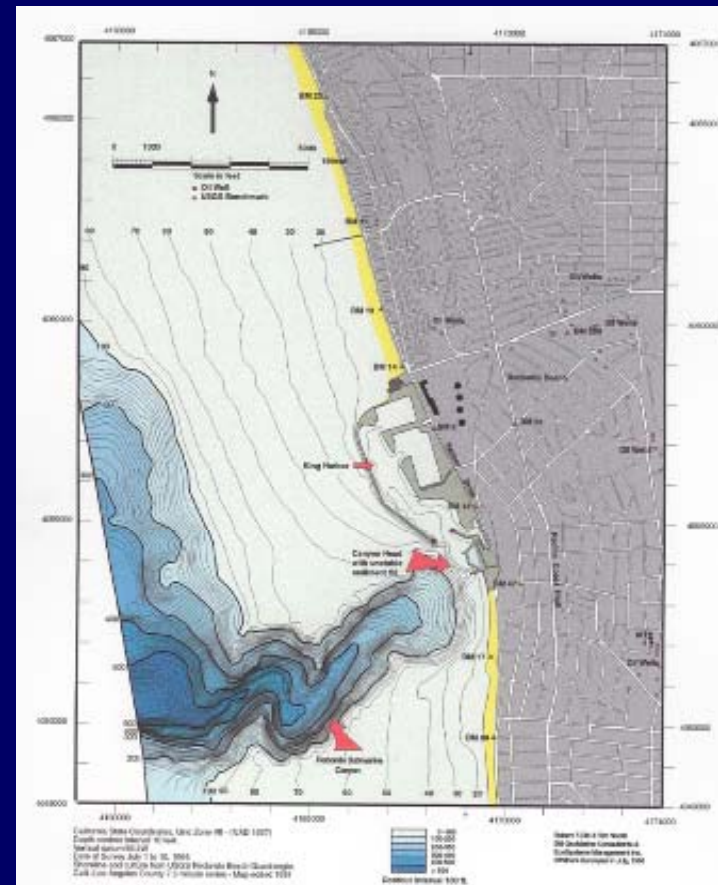
Effect of Kelp on Beaches

- Wave attenuation?
- No measurable effect



King Harbor–Redondo Beach Wave Damage and Subsidence

- Large wave-storm of 17 January 1988
- Redondo Canyon focused waves on breakwater
- Breakwater subsided 2 ft?
- \$80 million damage
- Whose fault?



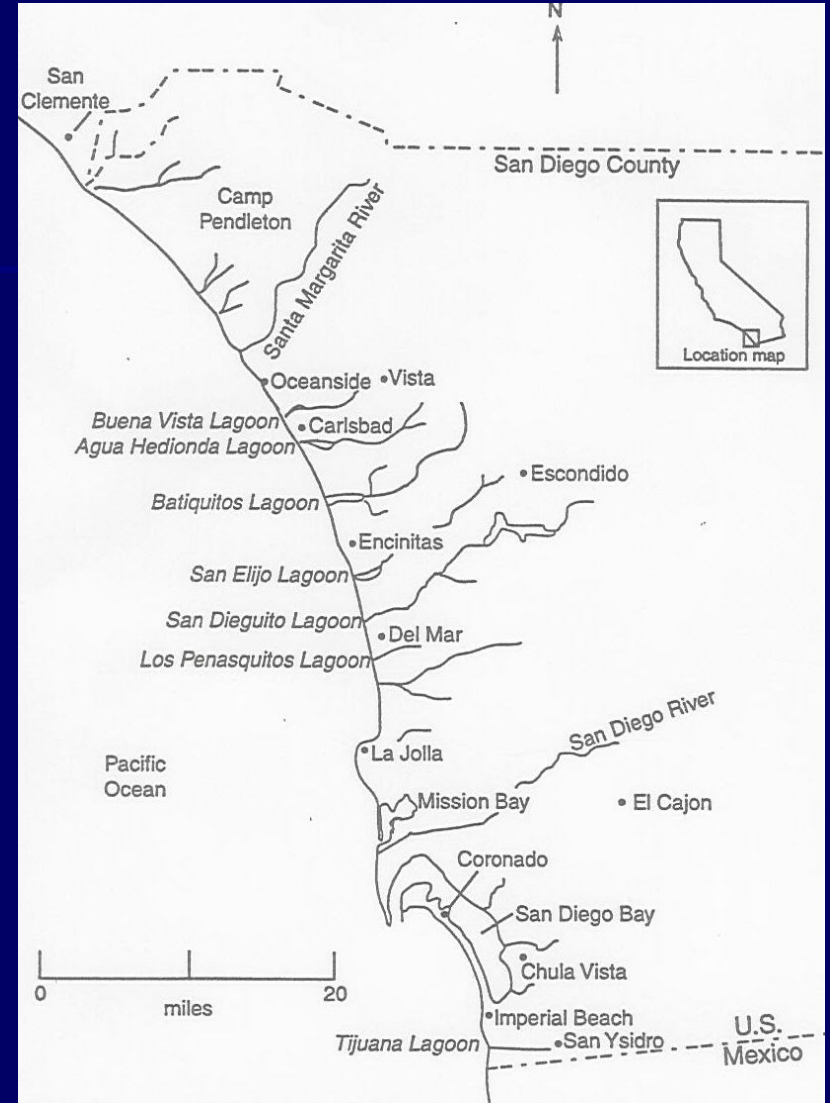
King Harbor–Redondo Beach Wave Damage and Subsidence

- Breakwater had settled
- Overtopping was a freak accident



Southern California Lagoons

- Small
- Estuarine, at lower ends of rivers, creeks
- Narrow, long inlets
- Shallow basins



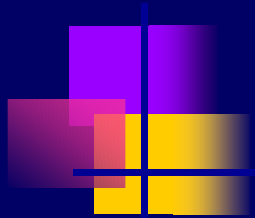


Lagoon Issues

- Too small to maintain open inlet
- Sedimentation
- Summer low flow
- Impacts of artificial inlet openings on the beach
- Lack biological diversity
- Pollutant input: storm drains, runoff, sewage spills
- Invasive species



Southern California Lagoons



Green > 2 ft NGVD



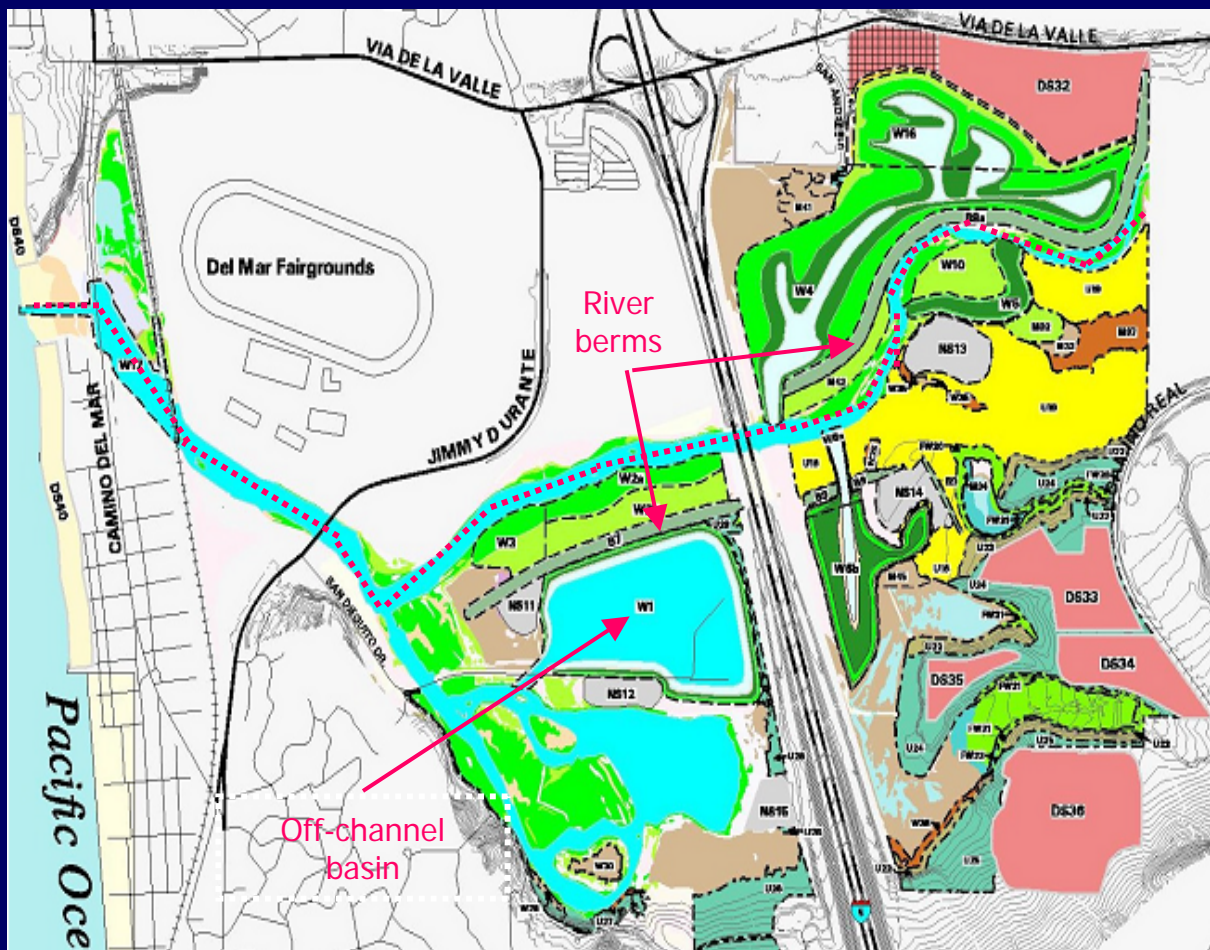
San Dieguito



San Elijo



San Dieguito Lagoon Restored



Restoration:

- Channels
- Basins
- Four Nesting Sites

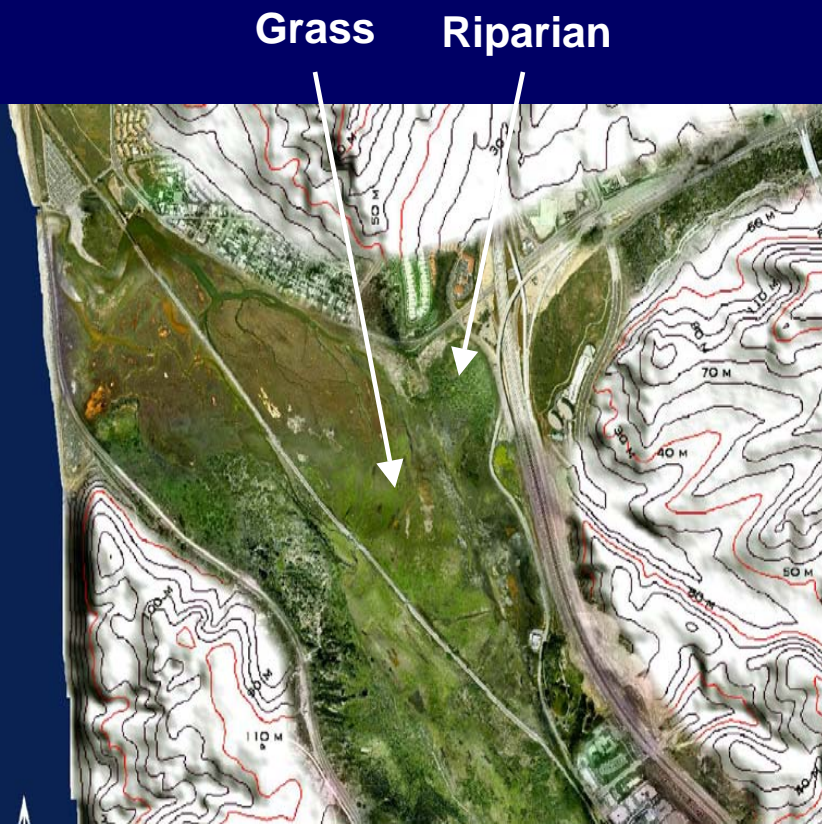
SCE credits:

- 135 acres – restoration
- 15 acres – open inlet



COASTAL
ENVIRONMENTS

Southern California Lagoons



Los Peñasquitos



Tijuana Estuary





Beaches

- Risks, damages from storm waves, flooding, erosion
- Waves, tides, sea level, run-up
- Bathymetry, topography
- Beach changes: profiles, shorelines
- Sediment transport, budgets

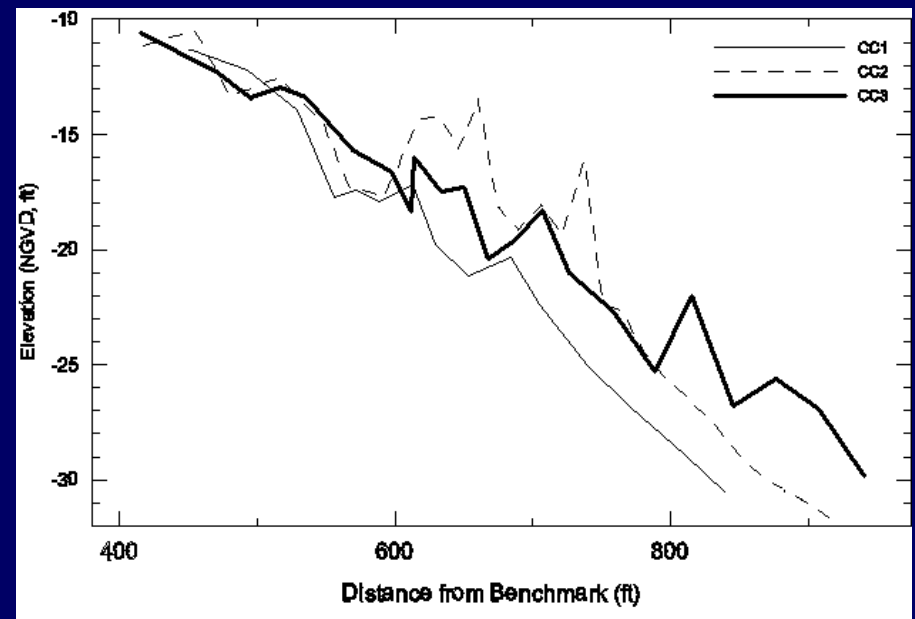
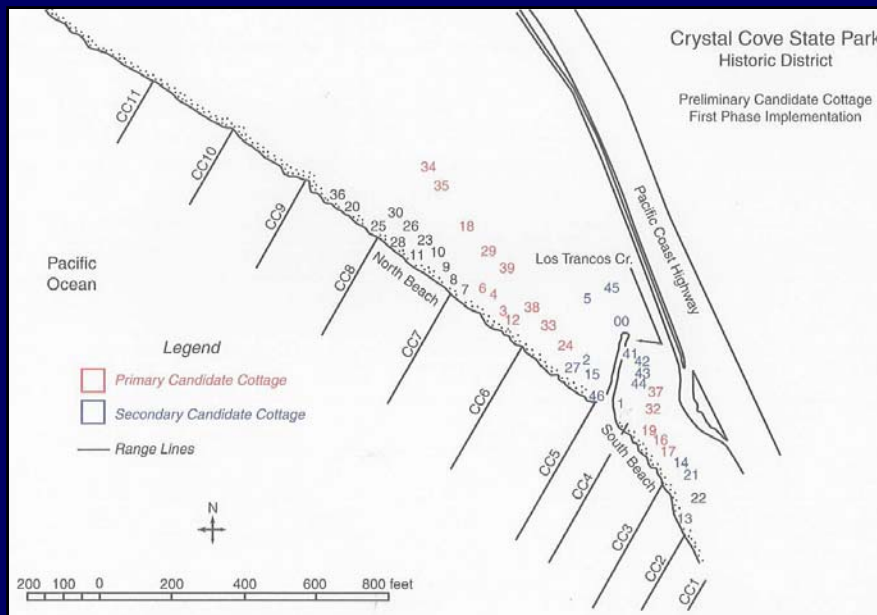


Crystal Cove State Park Historic Rehabilitation

- 46 cottages survived 75 years of Pacific waves!



Crystal Cove State Park Nearshore Topography



Beach Ranges and Details of Outcroppings



International Projects

- Puerto Ameca Harbor, Mexico
- Isla de Margarita Lagoon, Venezuela
- Bardawil Lagoon, Egypt
- Tastiota Lagoon, Mexico
- Laguna Del Mar, Puerto Peñasco, Mexico
- Abu Soma, Egypt

- Venice Lagoon, Italy
- Wave Climate, Sound Channels, Egypt





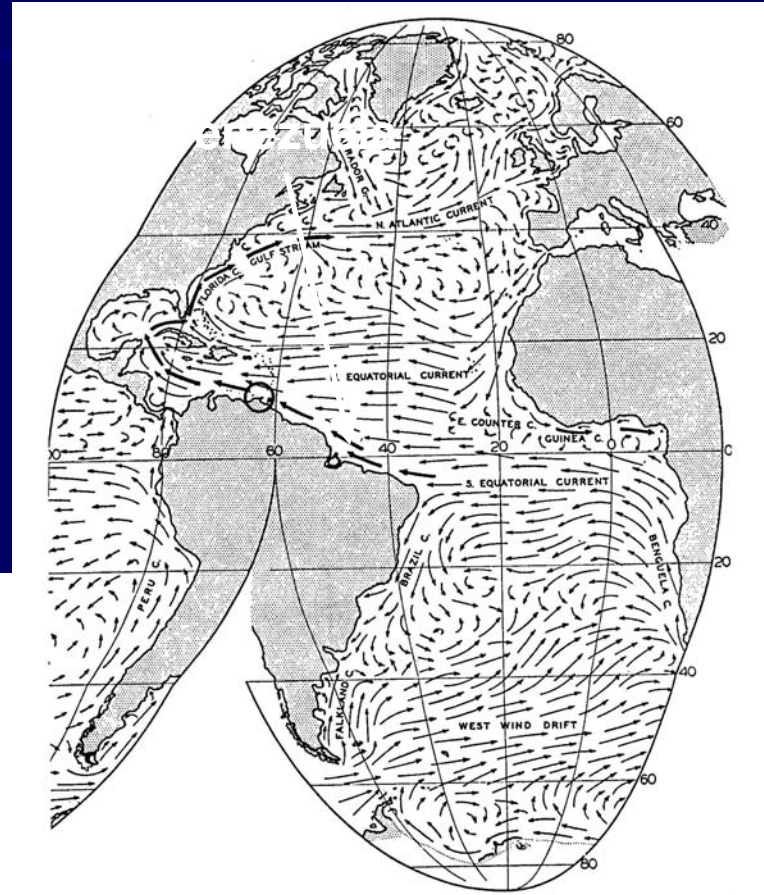
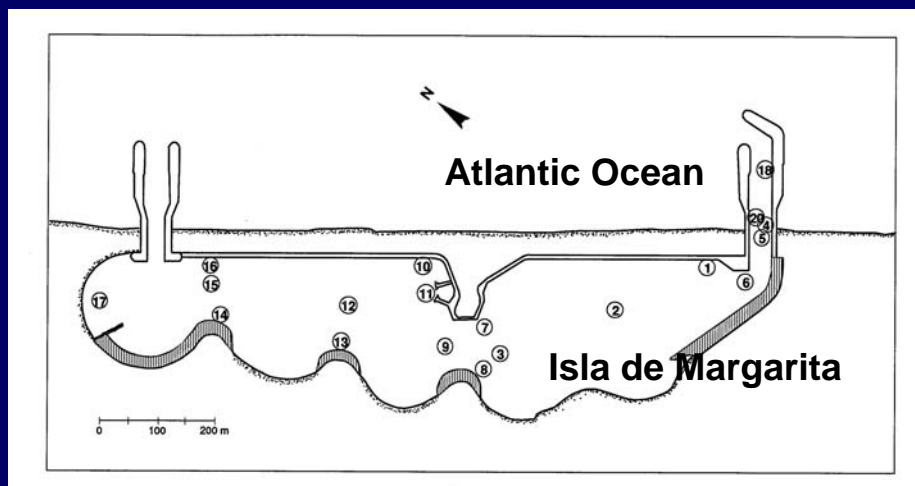
Puerto Ameca Harbor, Mexico

- Feasibility, site selection
- Coastal oceanography
- River diversion, flood plan
- Flow analysis
- Channel configuration



Isla de Margarita, Venezuela Resort Hotel Lagoon

- Water, sediment quality
- Biological inventory
- Channel design
- Maintenance plan
- Monitoring program

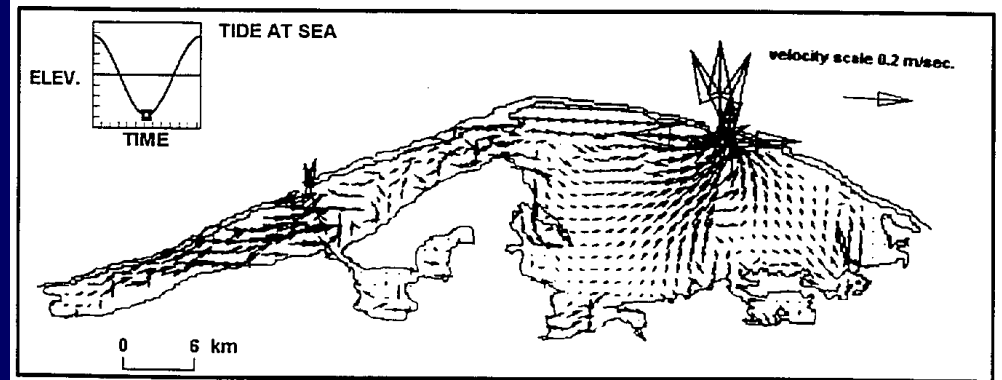
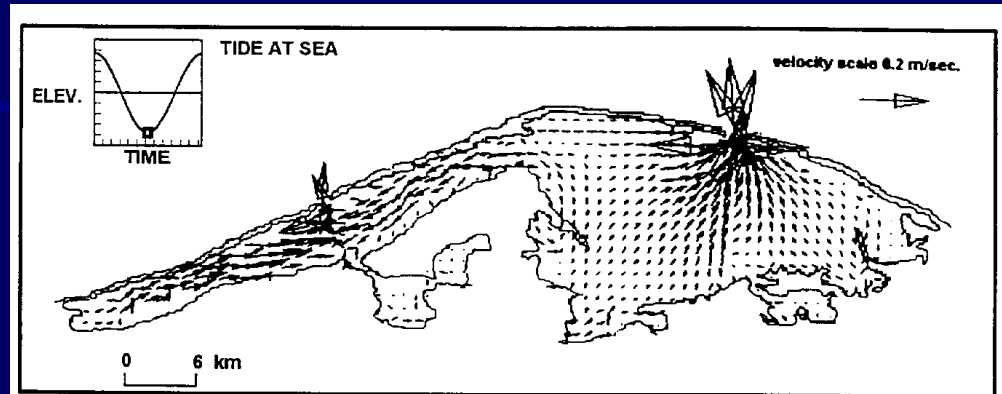


Atlantic Ocean
Equatorial Circulation



Bardawil Lagoon, Egypt

- Hydrodynamics
- Inlet design
- 2-D numerical model



Venice Lagoon, Italy

- Contaminated sediment
- Sediment movement
- Dredge spoil



Waves Are the Biggest Source of Energy on California Coast

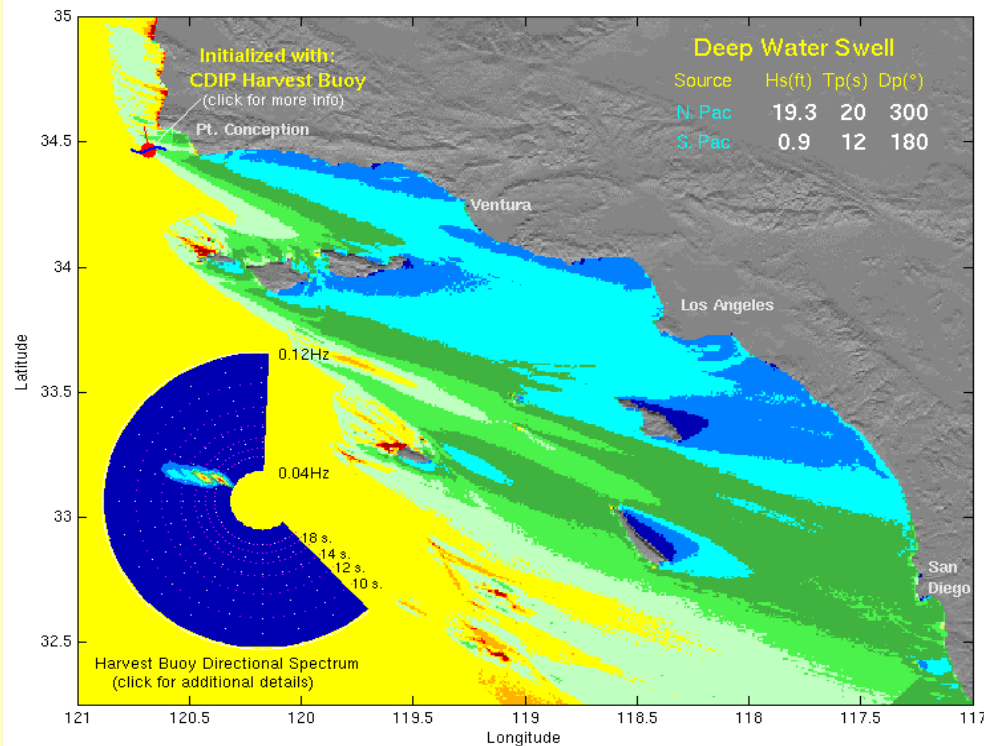
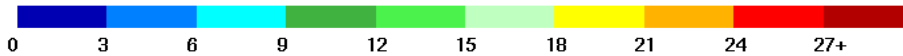


The Coastal Data Information Program
Center for Coastal Studies



Analysis Time – 8 NOV 2002 : 1131 PST

Swell Height (ft) – Southern California Bight



Additional Information @ <http://cdip.ucsd.edu/>



California Department
of Boating and Waterways



U.S. Army Corps
of Engineers
Field Wave Gaging Program



Office of Naval Research
Advanced Wave
Prediction Program

- Flooding
- Sand Motion
- Surfing



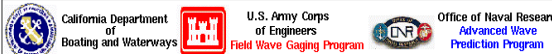
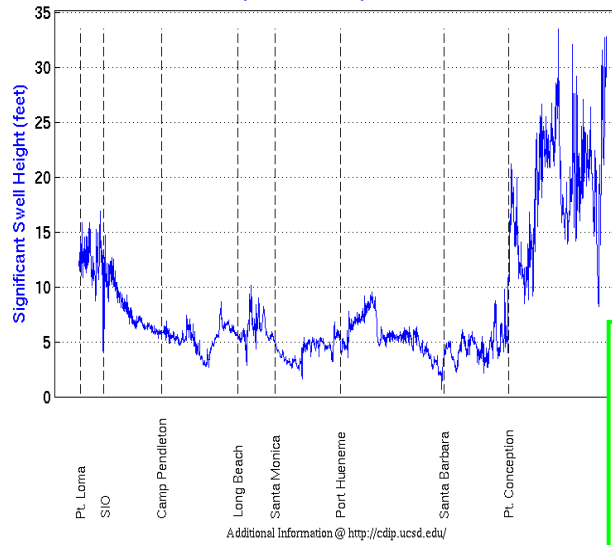
Santa Barbara, Feb 1980

CDIP Real-Time



Analysis Time - 8 NOV 2002 : 1131 PST

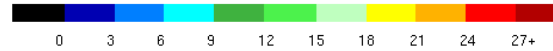
Predicted Alongcoast Swell Height - Southern California



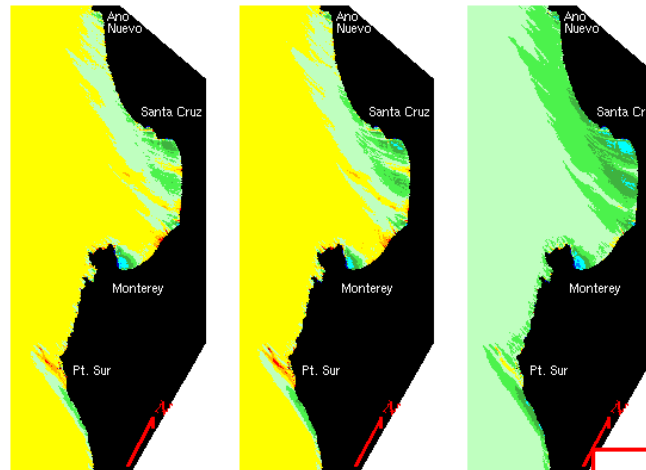
55 Million Served Since 1996

EXPERIMENTAL COASTAL WAVE FORECASTS Monterey Bay Area

Significant Wave Height (ft)

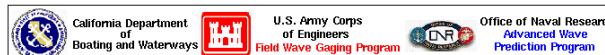
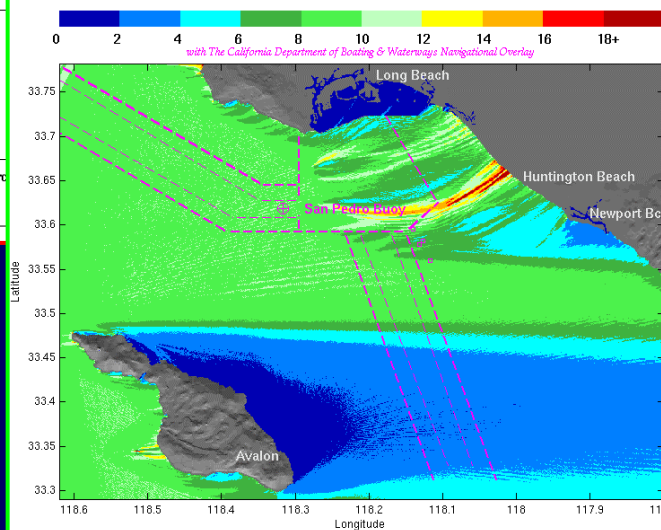


9 NOV 2002 : 10 AM PST 10 NOV 2002 : 10 AM PST 11 NOV 2002 : 10 AM PST



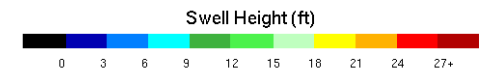
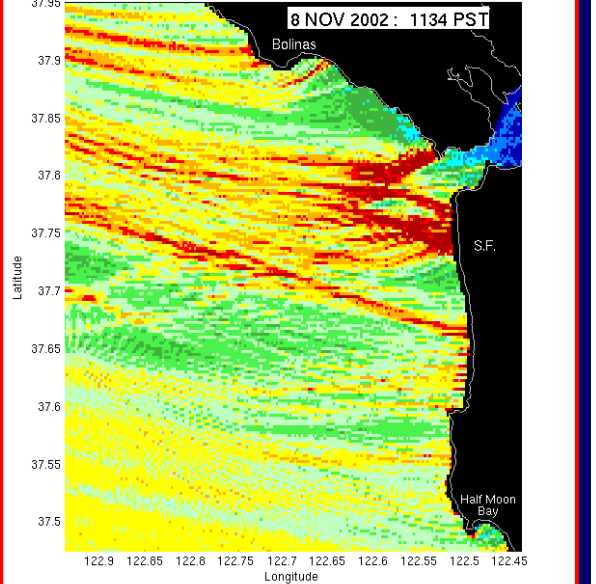
110,000 Hits 8 Nov 2002

Analysis Time - 8 NOV 2002 : 1146 PST



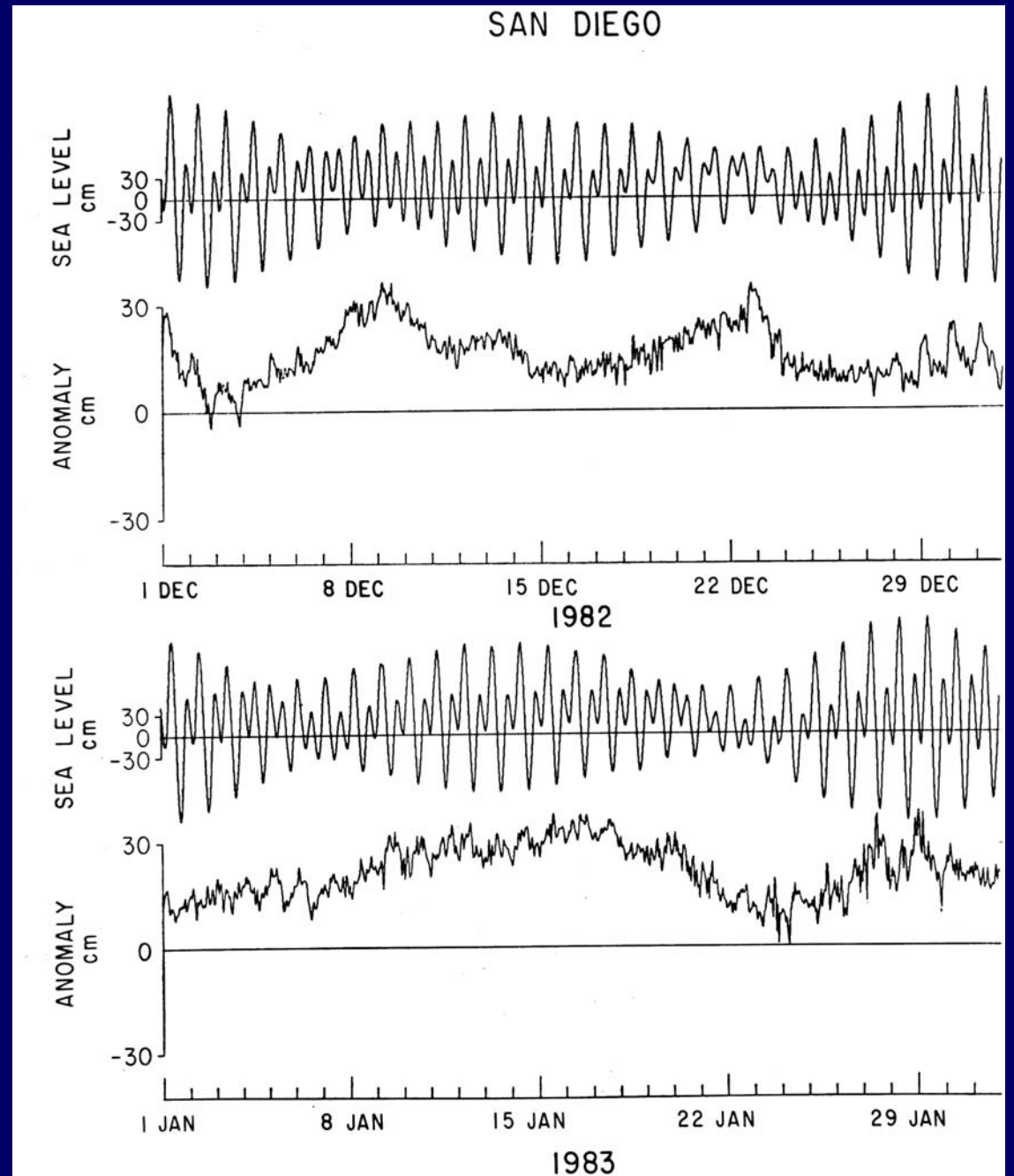
The Coastal Data Information Program

@ Scripps Institution of Oceanography
CA Dept. of Boating and Waterways - U.S. Army Corps of Engineers



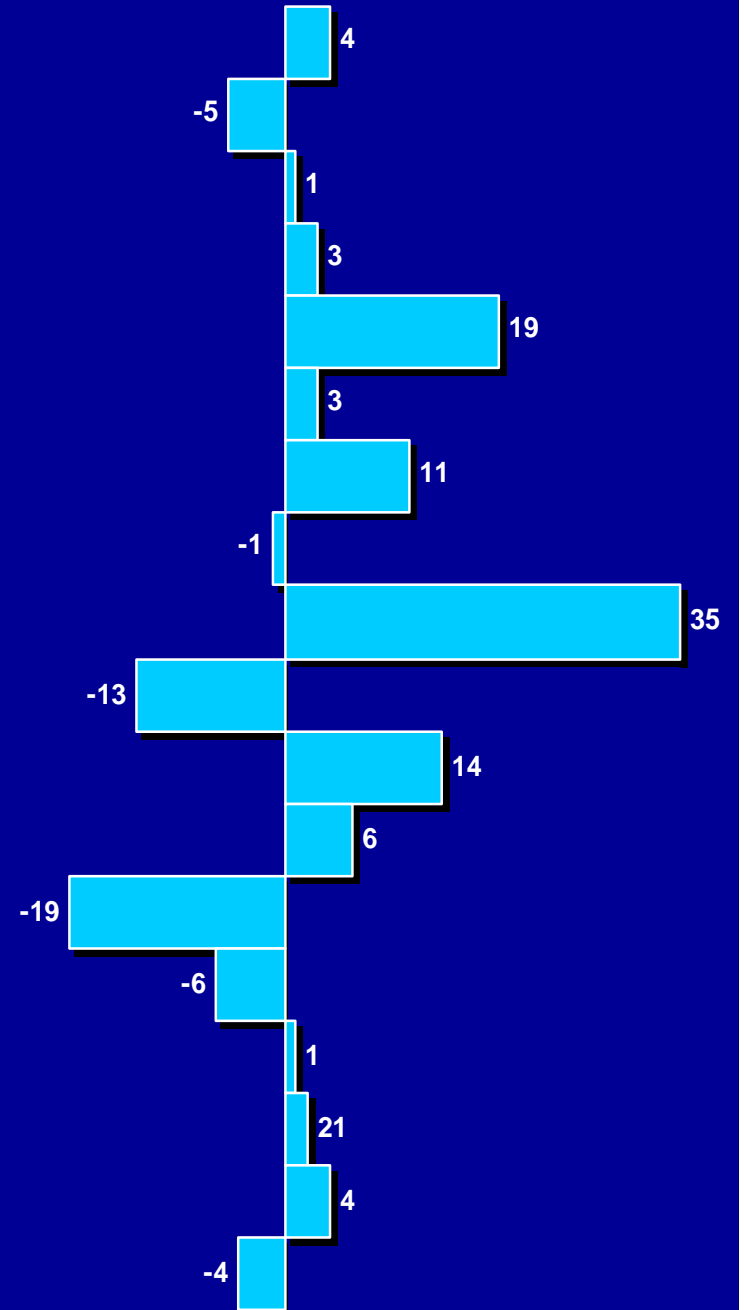
Tide+Storm Surge 1982-83

- High tide, waves coincidence crucial for coastal flooding, damages



West Coast Tide Range cm/century

- Friday Harbor WA
- Cherry Point WA
- Seattle WA
- Neah Bay WA
- Astoria OR
- Yaquina OR
- Coos Bay OR
- Crescent City CA
- Port Chicago CA
- Point Reyes CA
- Alameda CA
- San Francisco CA
- Monterey CA
- Port San Luis CA
- Santa Monica CA
- Los Angeles CA
- La Jolla CA
- San Diego CA





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