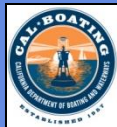


Ocean Observations In Support of Decision-Making for Maritime Operations



**Julie Thomas
Scripps Institution
of Oceanography**

**Transportation
Research Board
Washington DC
June 29, 2014**



IOOS[®] INTEGRATED OCEAN OBSERVING SYSTEM

Coastal Data Information Program



- Based at SIO since 1975
- 58 Wave Stations
LIDAR & In-Situ Beach
Surveys
- 17 People
- Major Funding by:
USACE, DPR
- Partners
(IOOS, NOAA
CA Coastal Conservancy
ONR/NAVY...)

CDIP Mission:

Monitor and predict
nearshore waves and
shoreline change.

CDIP Wave Buoys – NAVIGATION



<http://cdip.ucsd.edu>

4.4 million page views from Jun 2013 – Jun 2014
Data sent to NDBC @ 30 min and distributed to NWS

southern california bight



Buoy



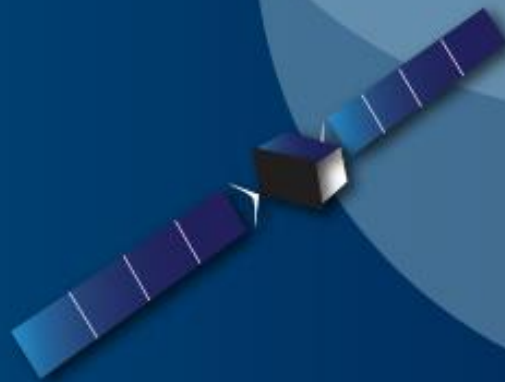
Mooring



Glider Track



SCCOOS Shore Station



Southern California Coastal
Observing System -SCCOOS

SCCOOS Surface Currents



HF Radar, Santa Catalina provides surface currents

Case Examples demonstrating the value of Ocean Observations in PREPARING for a Resilient MTS

Metrics

Safety, Economics, Environment

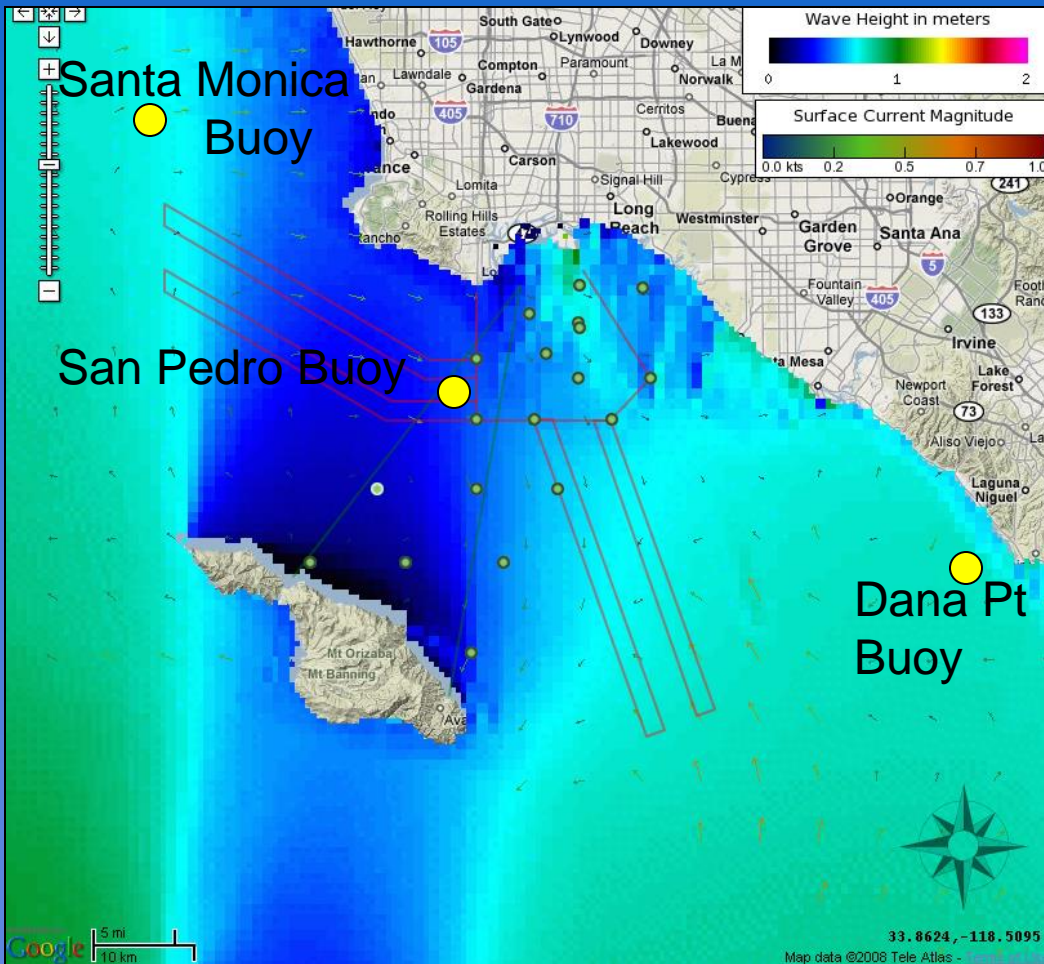
Los Angeles/Long Beach

San Francisco

Mouth of the Columbia

Kaunapali, Lanai

NAVIGATION – Ports of LA/LB



CDIP providing wave observations, nowcasts and forecasts.

SCCOOS providing HF Radar surface currents

USACE – LA District
Catalina Express
Los Angeles Bar Pilots
Long Beach Bar Pilots
NOAA - Navigation
San Pedro Marine Exchange
Sause Brothers
US Coast Guard

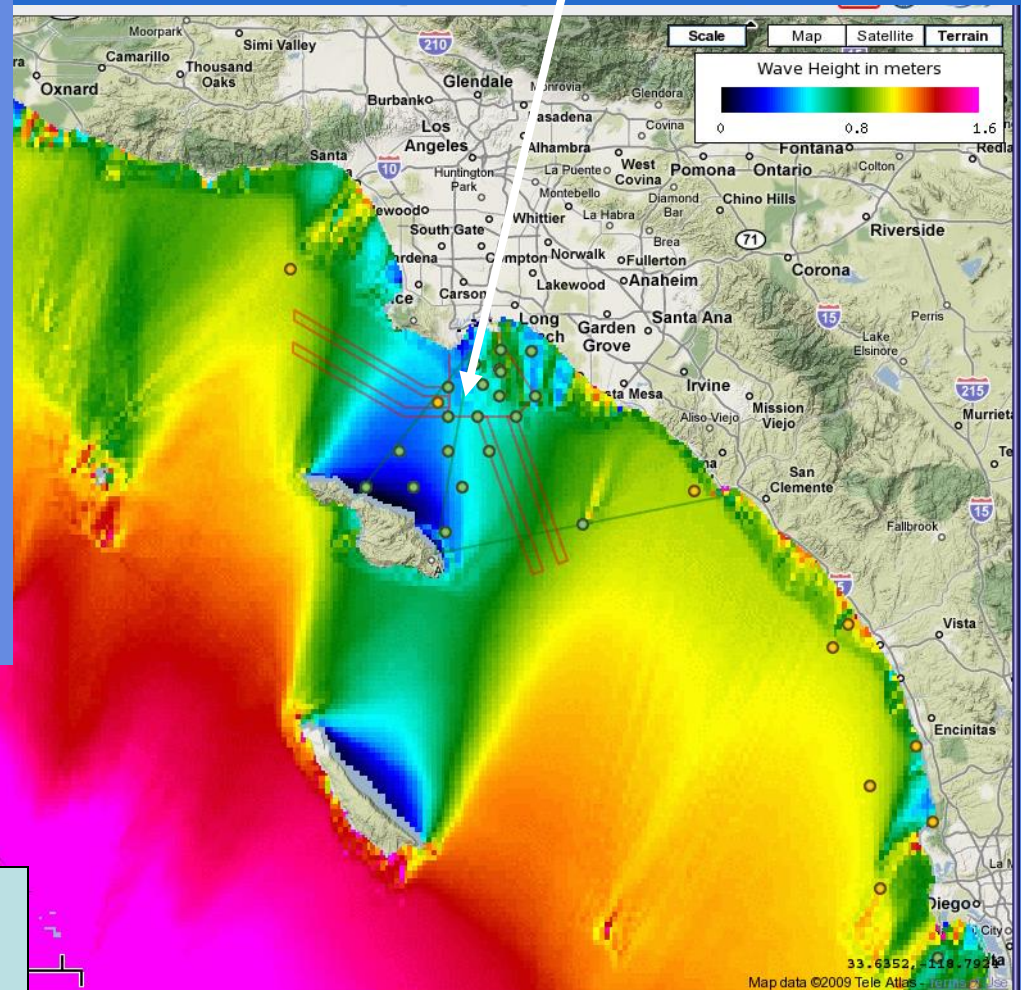
<http://www.sccoos.org/data/harbors/lalb/fullscreen.php>

PORT of Los Angeles and Long Beach

CDIP's high resolution wave models allows for accurate forecasts.

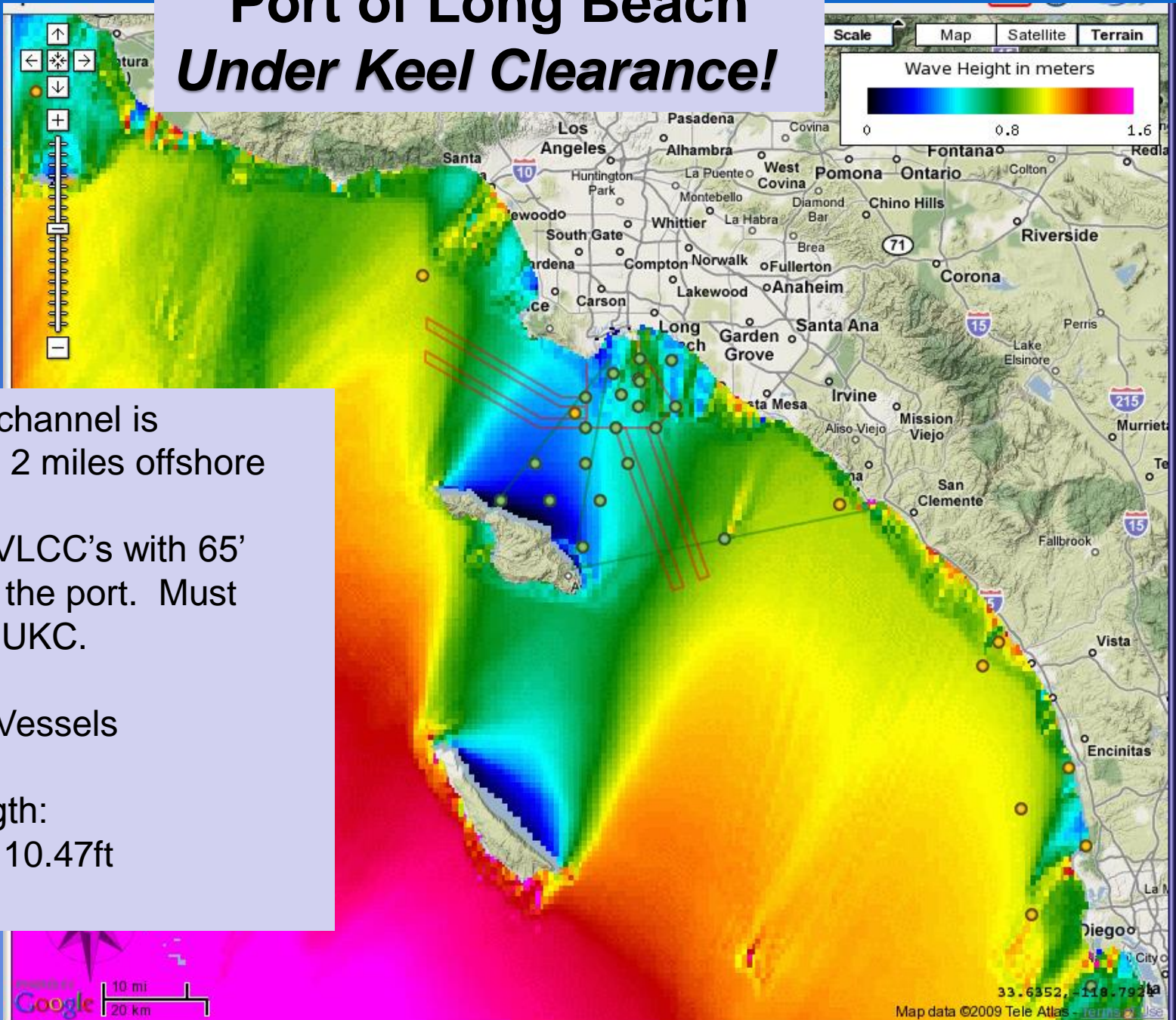
Spatial variation due to island shadowing allows coastal variability. Wave heights differ according to direction of the waves.

Pilots xfer 4 mi out



Big waves, big trouble?
headline in
Occounty.com, Jul 24, 2009

Port of Long Beach *Under Keel Clearance!*



Approach channel is
Dredged ~ 2 miles offshore

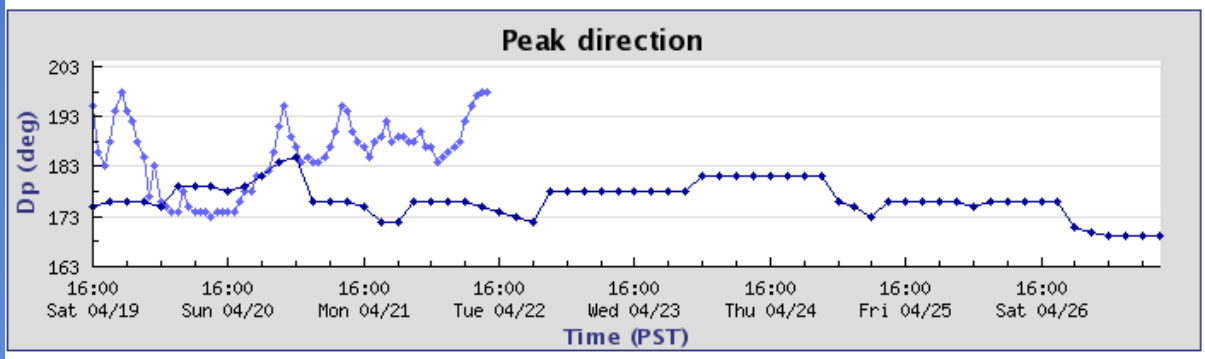
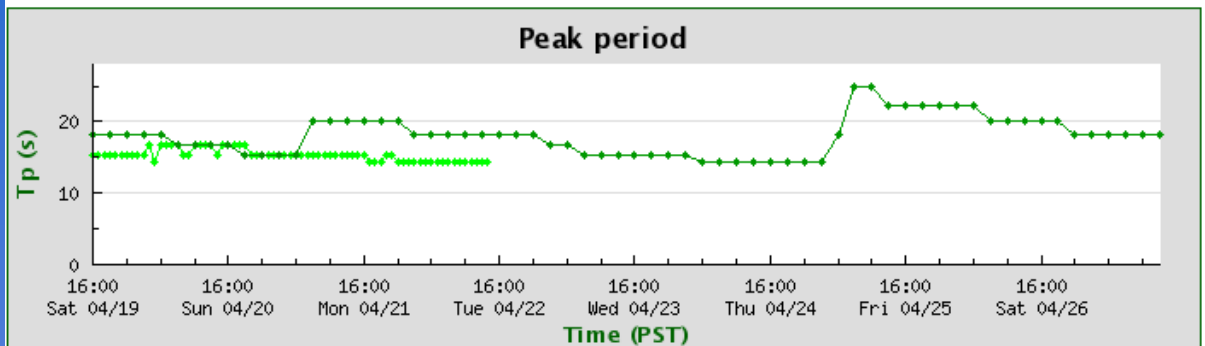
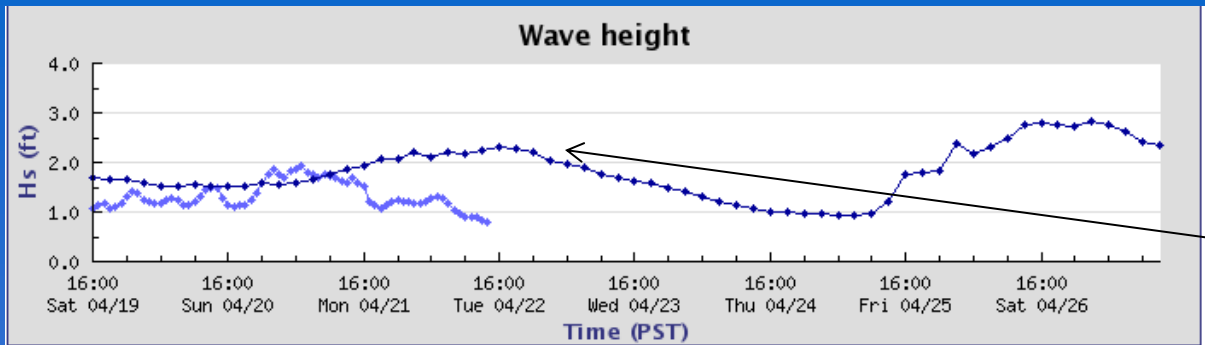
Presently VLCC's with 65'
draft enter the port. Must
have 10% UKC.

Panamax Vessels
69ft draft
1200' Length:
1° pitch = 10.47ft

VLCC – 1200 ft length



June 2014 - San Pedro Wave Buoy measured 21ft peak, at 13-14 sec. An ATC Oil Tanker rolled 10 degrees at the Long Beach Breakwater entrance. The vessel had a 55 ft draft, 160 ft wide. The roll increased the draft to 64 feet. (Channel currently dredged to 69ft)

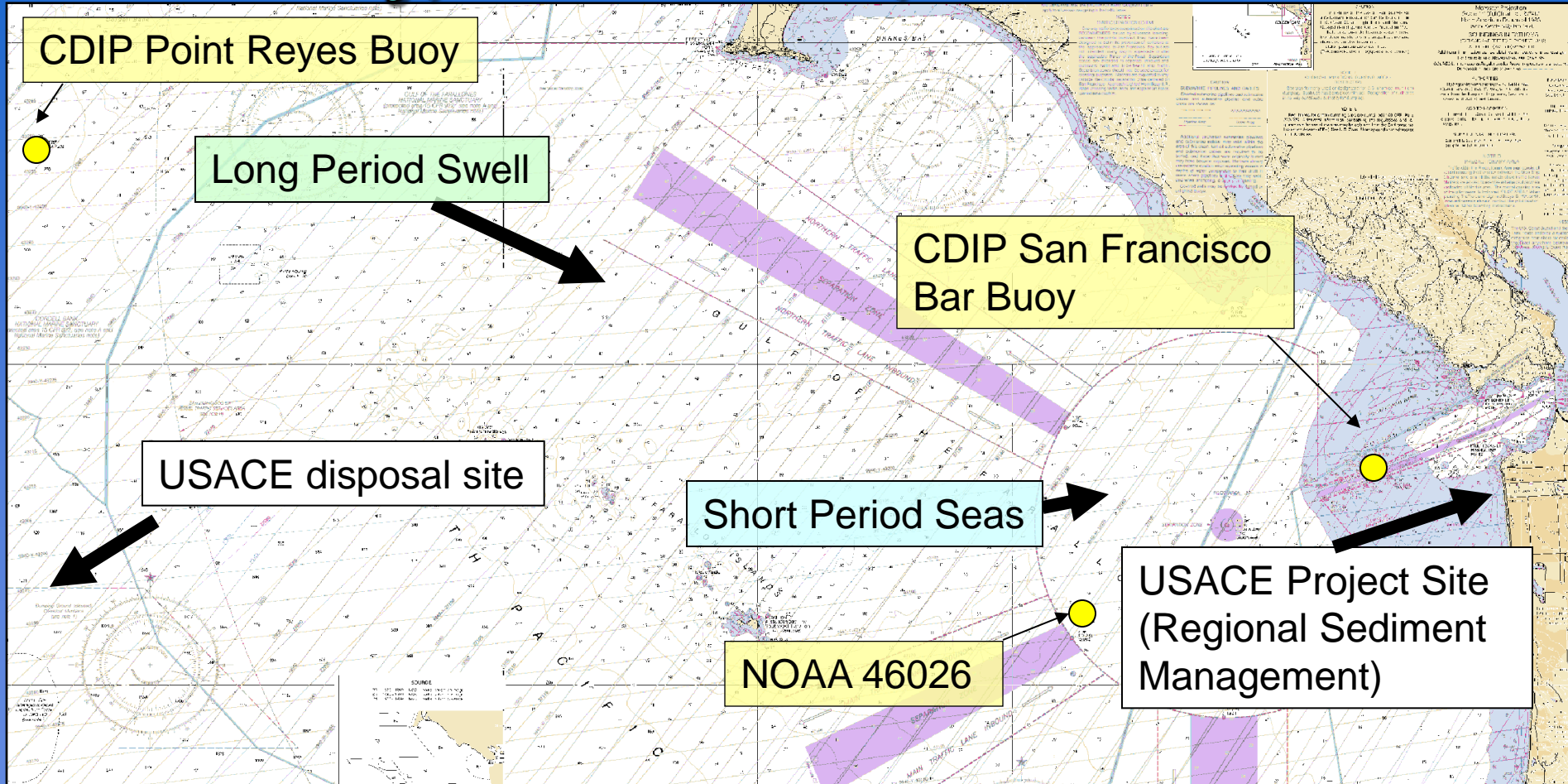


Model is over predicting by >1 ft Significant Wave height.

San Pedro Buoy observation vs WW3 Model Predictions
April 2014

San Francisco

Safety, Economics, Environment

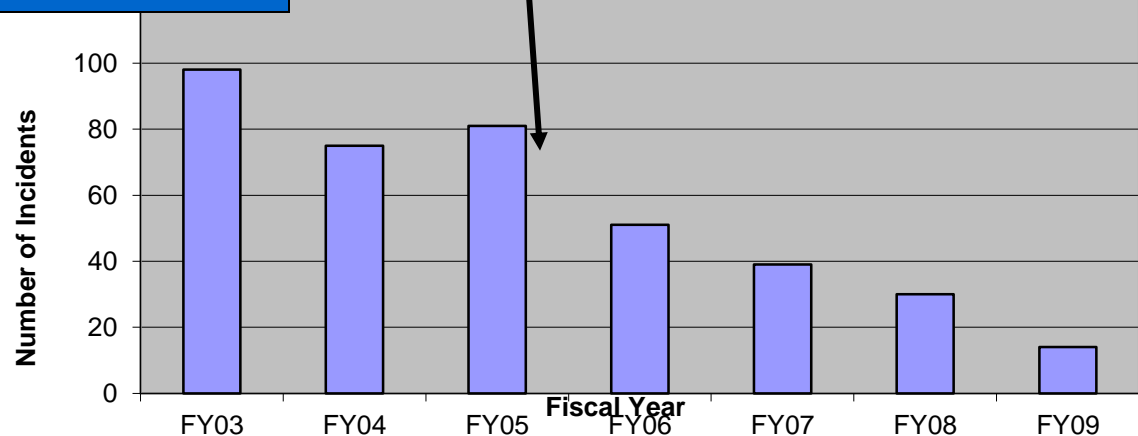


San Francisco - SAFETY

Fiscal Year (FY)	Surf Cases	IVO of SF Bar	Total
FY03	32	98	130
FY04	28	75	103
FY05	29	81	110
FY06	18	51	69
FY07	20	39	59
FY08	19	30	49
FY09	11	14	25
TOTAL:	157	388	545

Marine Incidents (rescues) near SF Bar

Bar Forecast Begun by MTR



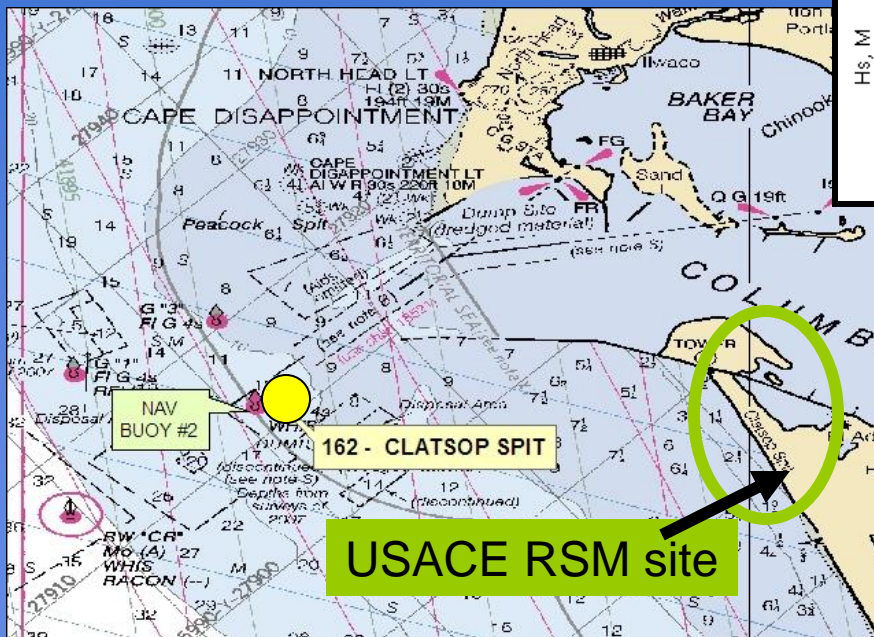
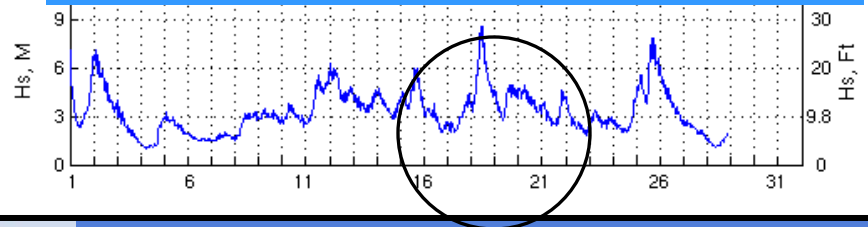
Incidents in the Vicinity of SF Bar (IVO)

Data supplied by the Coast Guard. Assimilated and Disseminated by the SF NWS Office.

Mouth of the Columbia - SAFETY

Mouth of the Columbia River installation supports projects as Regional Sediment Management (RSM) for the USACE Portland District, Bar Pilots and commercial fishing. This buoy is critical for safety and efficiency of maritime transportation.

CDIP buoy measured 9m significant height waves in Jan 2010



Job Corps Vessel Ironwood
Deploys buoy

Mouth of the Columbia River

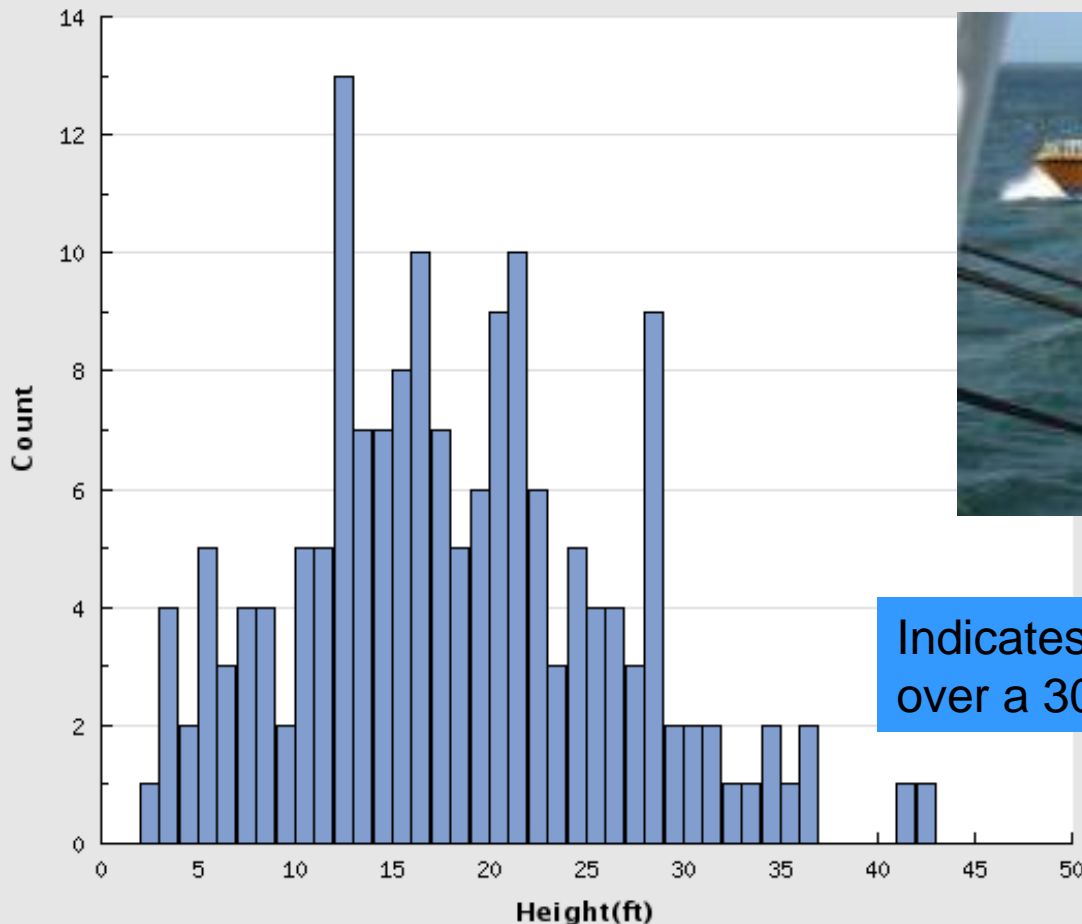
SAFETY

Station 162 trough-to-crest wave heights

Sample start time: 2010-05-20 03:10 UTC

Largest wave: 42.95 ft

H1/10: 35.21 ft



Indicates the highest, single wave over a 30 minute interval.

Kaumalapau, Lanai

Environment & Economics



> 14ft waves at
Entrance to
Harbor.

Young Brothers delivers all the oil
to Lanai.

Kaumalapau, Lanai

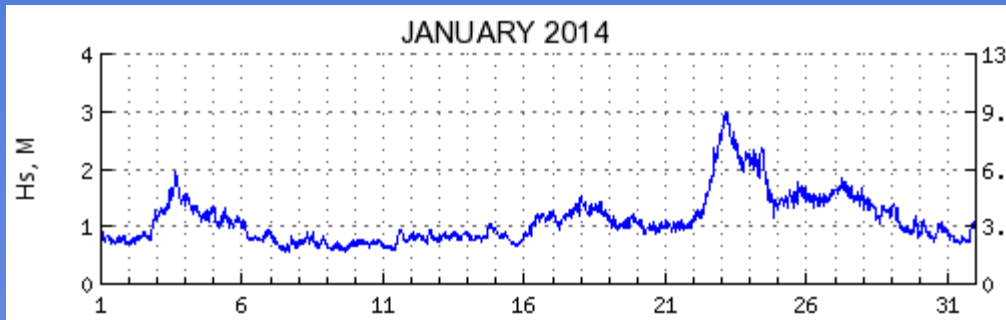
Safety, Environment & Economics



Loading Dock



Kaumalapau Harbor



Before 1997, when the buoy was installed, the barge would have to abort without offloading in Harbor. Costs \$22,000 to divert MauiOil Barge back to Honolulu.

Resiliency (Operations/Climate)

It is critical that the ocean observation infrastructure is in place, providing baseline measurements, to assure the safety of our maritime community, to promote the economic health of maritime transportation and to protect our environment.

