

Integration of Living Marine Resource and Oceanographic Satellite Data

Dave Foley

Joint Institute for Marine and Atmospheric Research

University of Hawai'i at Manoa

And

Environmental Research Division

Southwest Fisheries Science Center

NOAA Fisheries

Yi Chao and Ben Holt

Oceanography Group

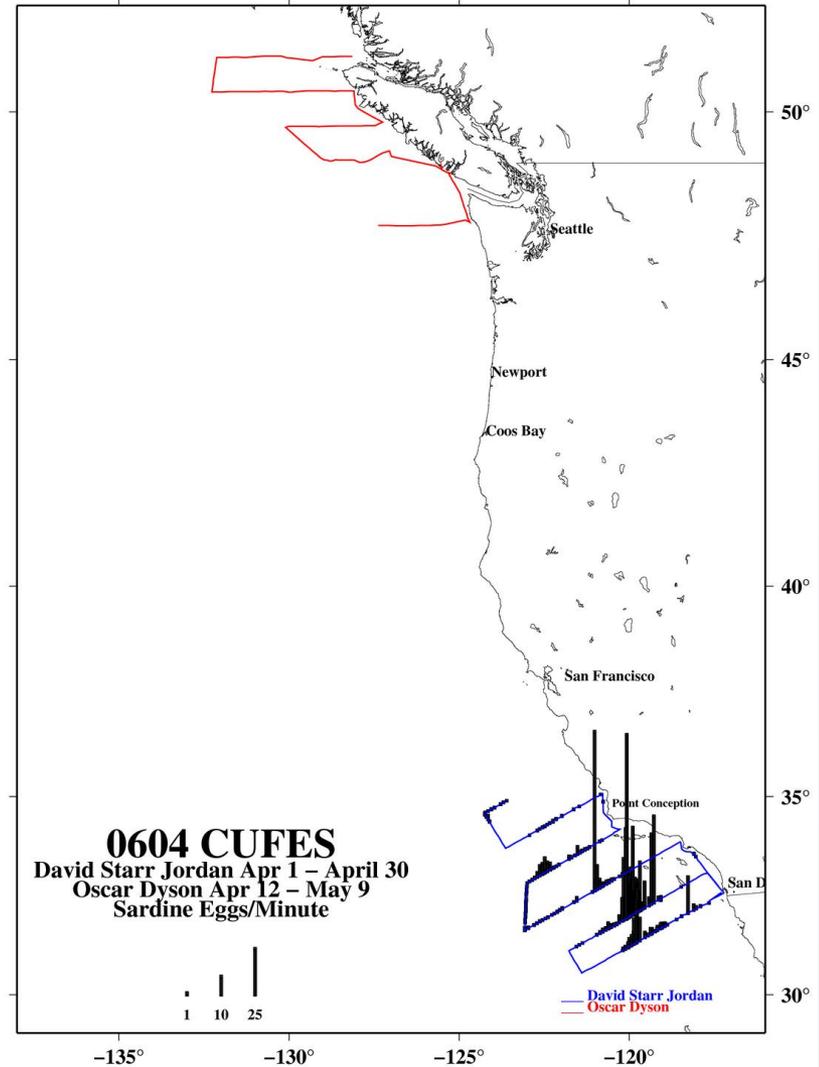
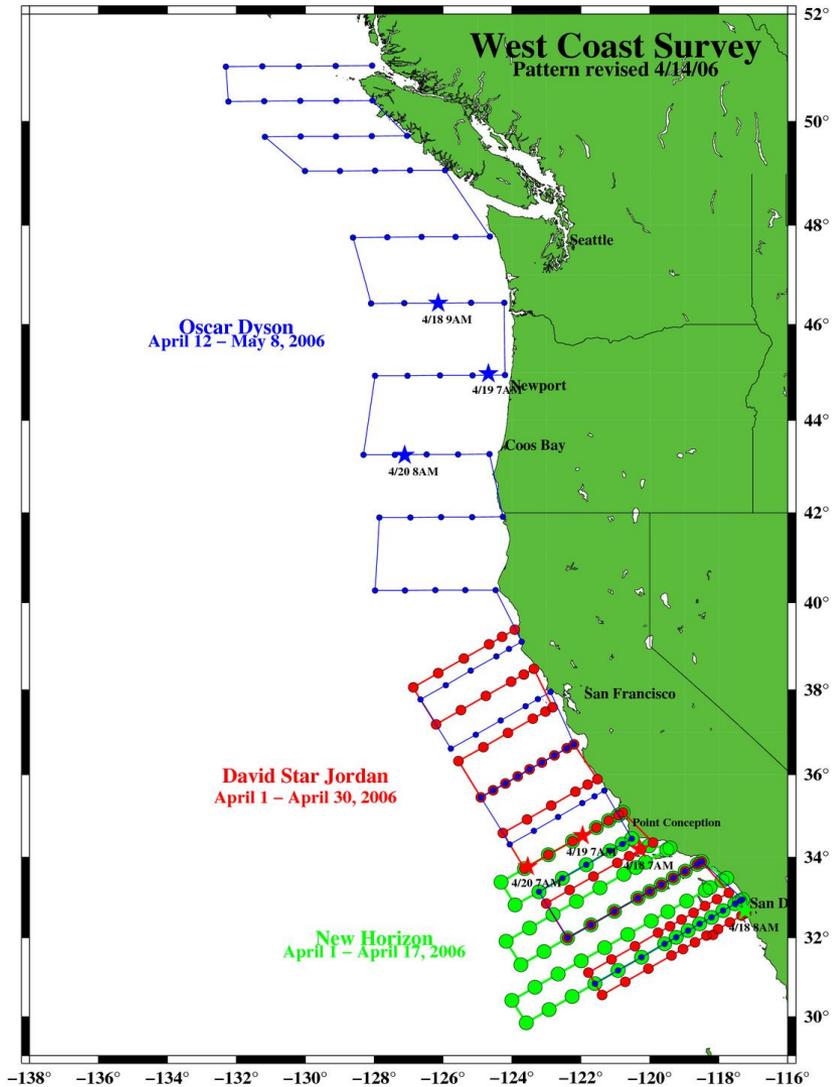
NASA Jet Propulsion Laboratory

California Institute of Technology

Real Data



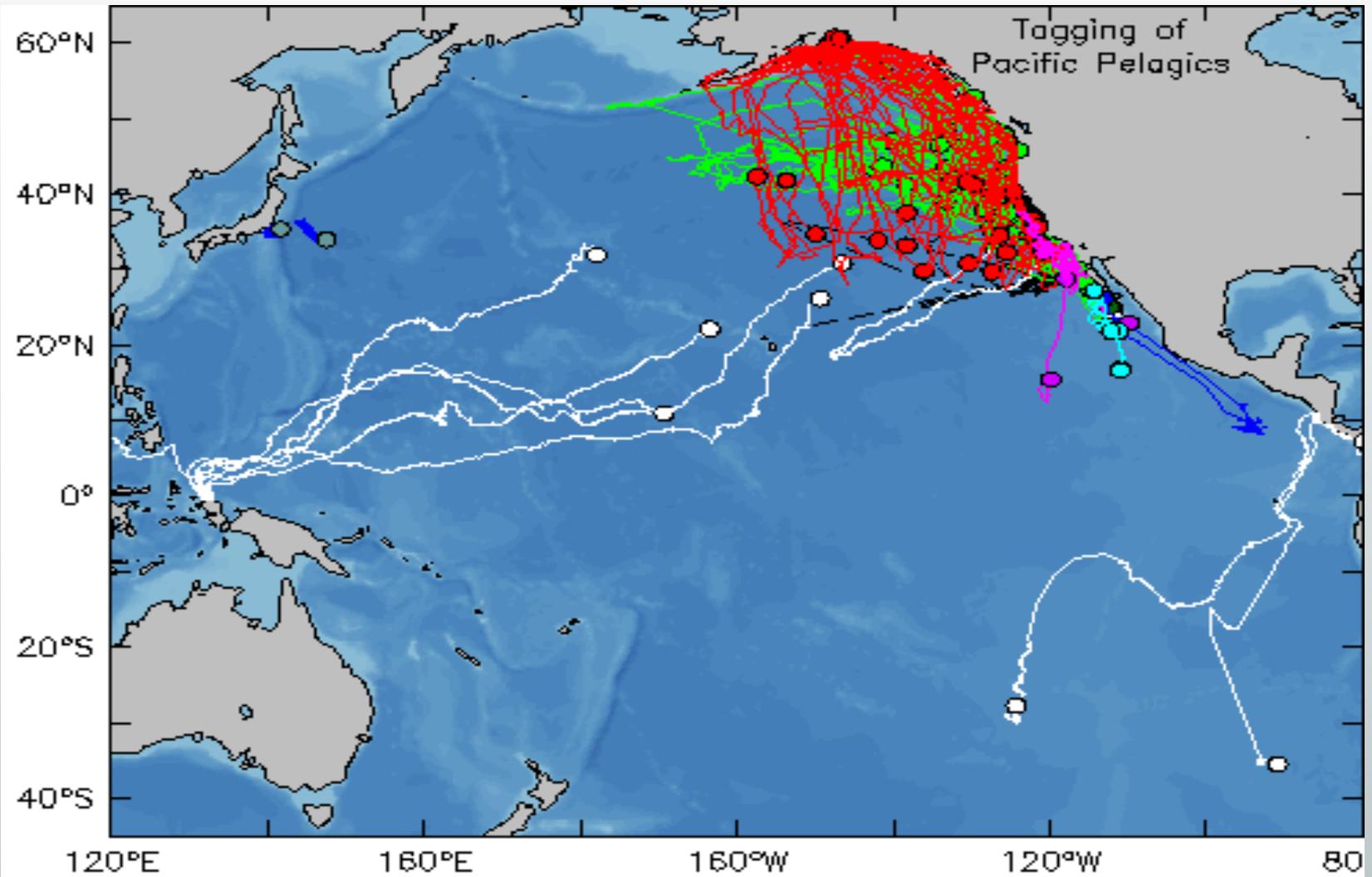
Ongoing Surveys

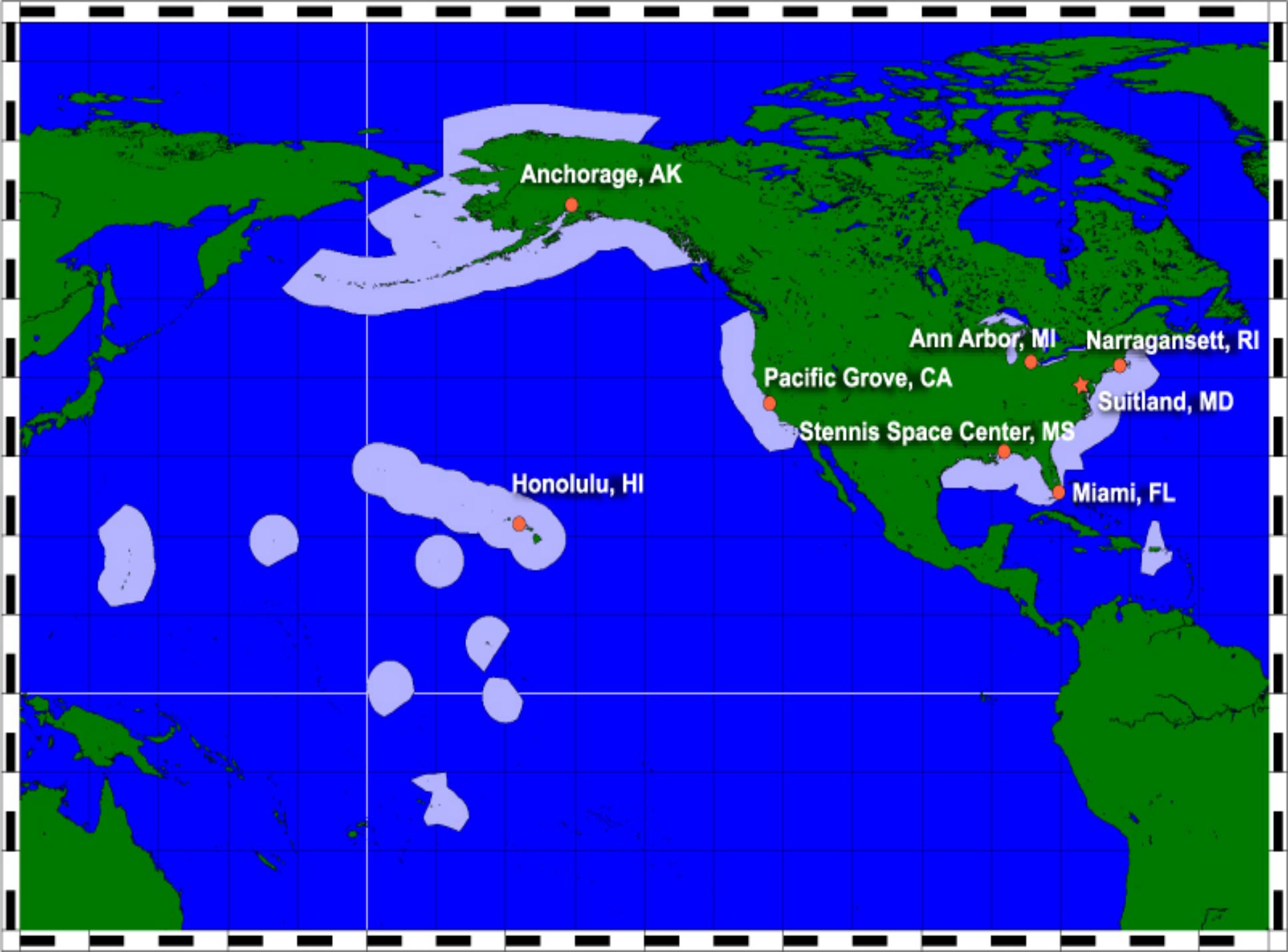


Really Relevant Data



Ongoing Surveys





Anchorage, AK

Honolulu, HI

Ann Arbor, MI

Pacific Grove, CA

Stennis Space Center, MS

Narragansett, RI

Suitland, MD

Miami, FL



Satellite Ocean Data and Data Products

Include those from satellite sensors
that measure

- SST
- Ocean color
- Ocean winds, and
- Sea surface height.

Helping Others to Help Themselves

- ▶ *Digital data must be made available at Regional Level*
 - *WHO?*
 - *IOOS RA's*
 - *National Backbone (CoastWatch, NASA DAACS).*
 - *HOW?*
 - *Live Access Servers*
 - *OpenDAP*
 - *Other as designated by IOOS DMAC*
- ▶ *Tools to apply the data*
 - *Technical workshops to provide “hands-on” training*
- ▶ *Projects to spearhead development*

Regional Data Distribution

▲ *Near Real Time*

- *Live access servers oceanwatch.pfel.noaa.gov/*
- *NEREIDS (nereids.jpl.nasa.gov)*
- *CIMT Wind page (cimt.jpl.nasa.gov)*
- *New and improved CoastWatch browser
coastwatch.pfel.noaa.gov/coastwatch/CWBrowser.jsp*

▲ *Delayed science-quality data*

- *Live access servers (above)*
- *POET (poet.jpl.nasa.gov)*
- *Archive – PODAAC (podaac.jpl.nasa.gov)*

JPL Near-Real Time Interface



Jet Propulsion Laboratory
California Institute of Technology

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SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

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Interactive Mapping Tool

Download Data & Images

>> Search by Overpass & View > Southern California Coast

Southern California Coast
West Coast
Baja California

Past 12 hrs
Past 24 hrs
Past 3 days
Past week
Past month

Key

- JA** Sea surface height (SSHA), SSH anomaly and wave height measured along the Jason-1 satellite track.
- 16** Sea surface temperature (SST) and SST anomaly at 2.2 and 8.8 km resolution measured by AVHRR on the NOAA-16 satellite.
- 17** Sea surface temperature (SST) and SST anomaly at 2.2 and 8.8 km resolution measured by AVHRR on the NOAA-17 satellite.
- Q_S** Ocean vector wind at 25 km resolution measured by the QuikSCAT satellite.
- MA** Ocean Color and SST at 1 km resolution measured by the MODIS AQUA satellite.

Select Sea Surface Variable

Help

Parameter:

Source:

Spatial/Temporal Resolution: Time of Day:

Advanced Processing Options: Minimum Quality: Algorithm:

Select a Time Interval

Help

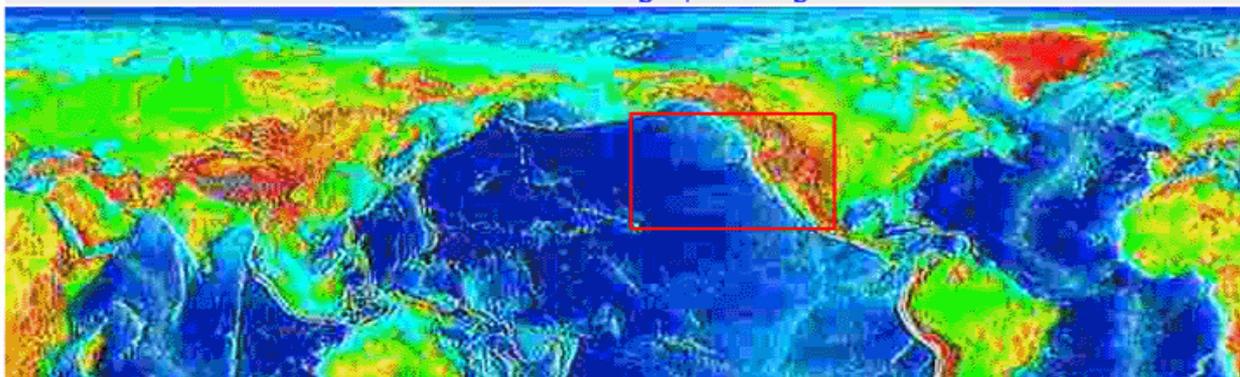
Date Range (MO DAY YR):

Mouse Tools: Select Interval Multi-Year
 Pan Year Season

Zoom Level:

Select a Geographic Region

Help





CoastWatch Browser - Create custom maps and download near-real-time satellite data. [\[Help\]](#)

Edit: The Map Main Data Bathymetry Contour Data Vector Data

1) Select a region: US+Mexico West US N N1 N2 N3 C C1 C2 C3 S S1 S2 M M1 M2

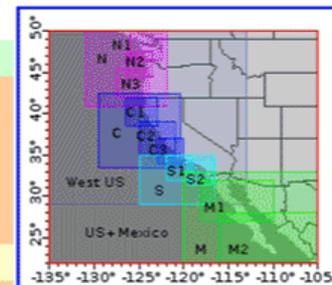
(or specify ...)

Max Y: - +
 Min X: - + Max X: - +
 Min Y: - +

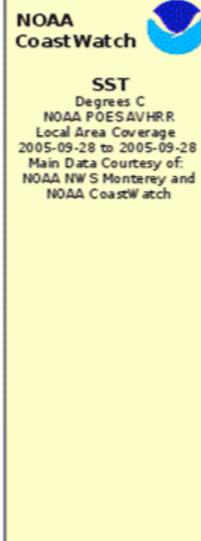
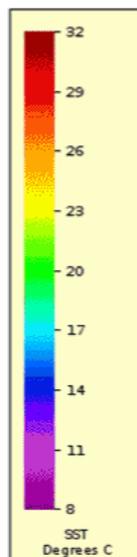
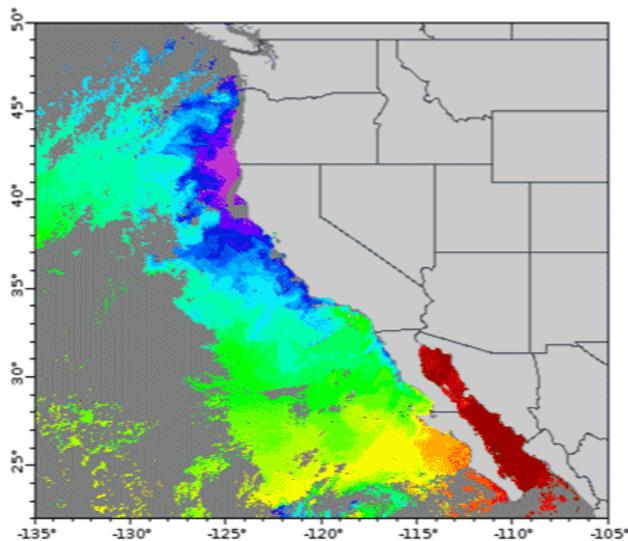
(or ...)

2) Select a size:

3) Download the map: [gif](#) [pdf](#)

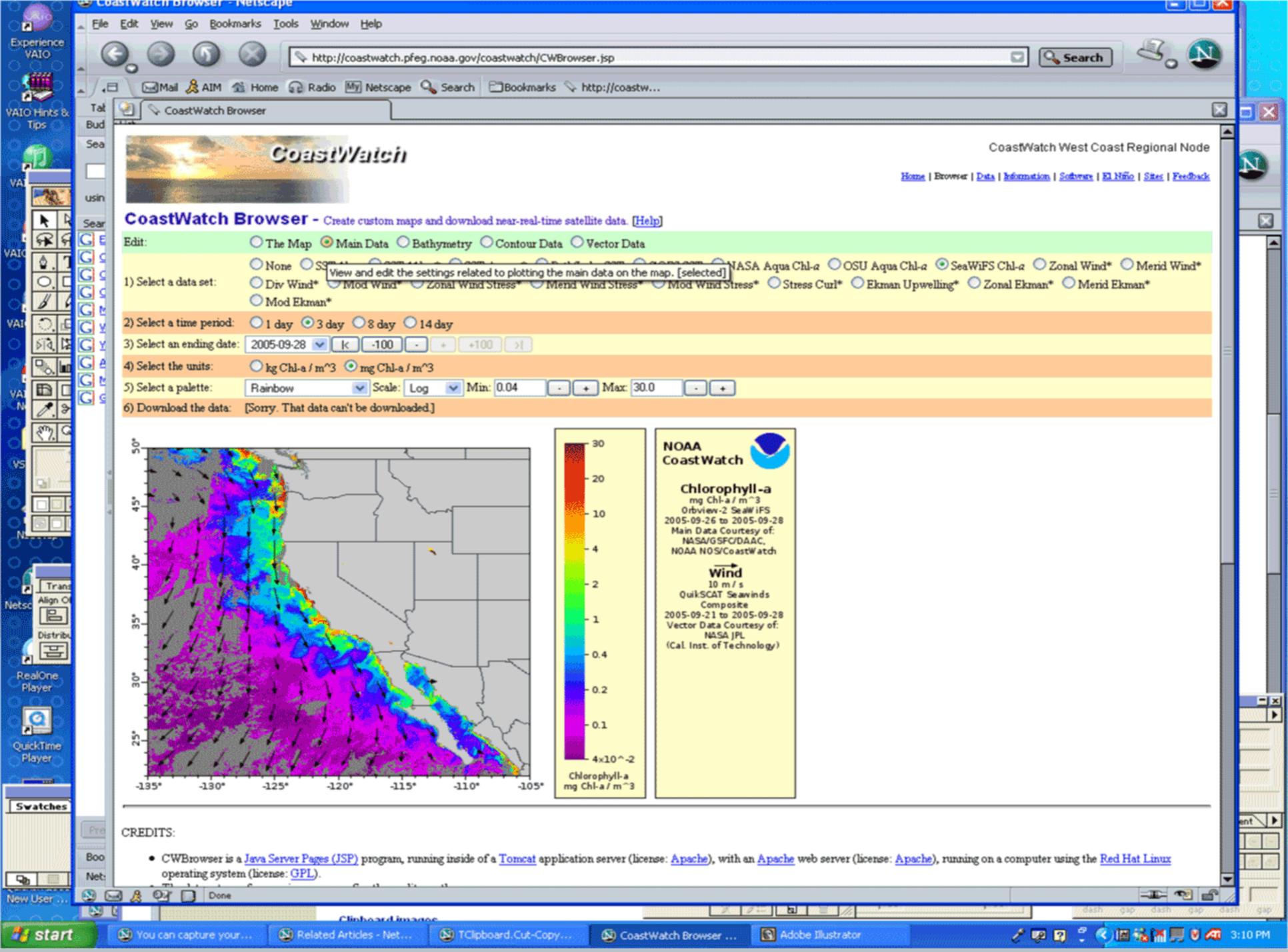


Click to pick a predefined region.



CREDITS:

- CWBrowser is a [Java Server Pages \(JSP\)](#) program, running inside of a [Tomcat](#) application server (license: [Apache](#)), with an [Apache](#) web server (license: [Apache](#)), running on a computer using the [Red Hat Linux](#) operating system (license: [GPL](#)).
- The data came from various sources. See the credits on the maps.



CoastWatch

CoastWatch West Coast Regional Node

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CoastWatch Browser - Create custom maps and download near-real-time satellite data. [\[Help\]](#)

Edit: The Map Main Data Bathymetry Contour Data Vector Data

None SeaWiFS Aqua Chl-a OSU Aqua Chl-a SeaWiFS Chl-a Zonal Wind* Merid Wind*

1) Select a data set: Dir Wind* Mod Wind* Zonal Wind Stress* Merid Wind Stress* Mod Wind Stress* Stress Curl* Ekman Upwelling* Zonal Ekman* Merid Ekman* Mod Ekman*

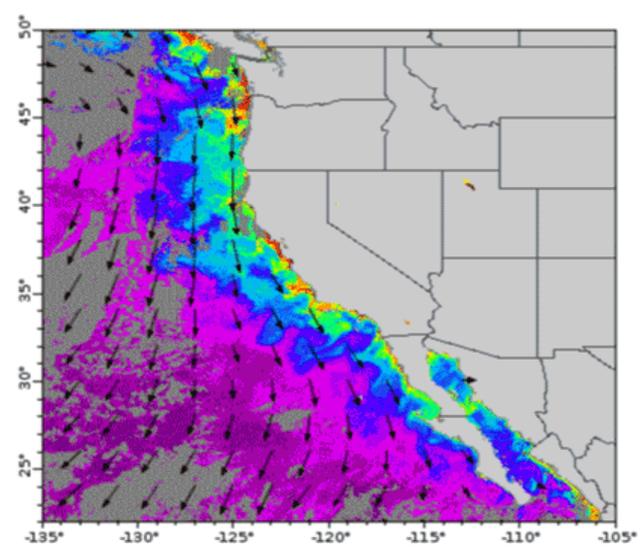
2) Select a time period: 1 day 3 day 8 day 14 day

3) Select an ending date: 2005-09-28 [K] [-100] [-] [+] +100 >|

4) Select the units: kg Chl-a / m³ mg Chl-a / m³

5) Select a palette: Rainbow [v] Scale: Log [v] Min: 0.04 [-] [+] Max: 30.0 [-] +

6) Download the data: [Sorry. That data can't be downloaded.]



NOAA CoastWatch

Chlorophyll-a
mg Chl-a / m³
Orbview-2 SeaWiFS
2005-09-26 to 2005-09-28
Main Data Courtesy of:
NASA/GSFC/DAAC,
NOAA NOS/CoastWatch

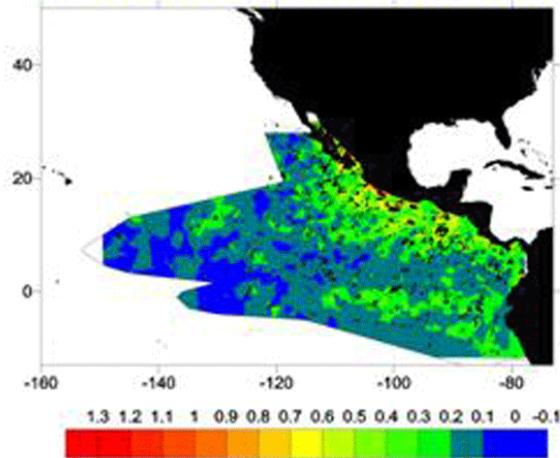
Wind
10 m / s
QuikSCAT SeaWinds
Composite
2005-09-21 to 2005-09-28
Vector Data Courtesy of:
NASA JPL
(Cal. Inst. of Technology)

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Combining Ocean Obs and Sightings – (see Forney et al. in Posters session)

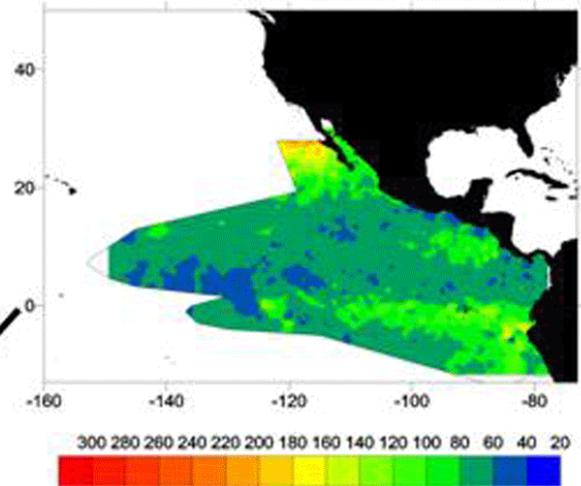
Encounter Rate Model (n/L)



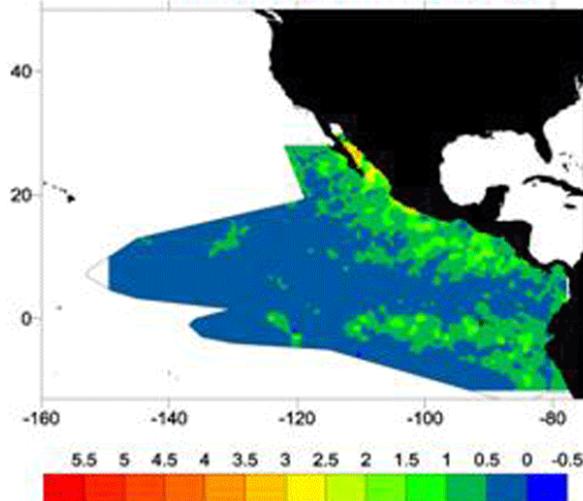
- 1 to 2
- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 10.01



Group Size Model (s)



Density Model (D)



Proof of Concept

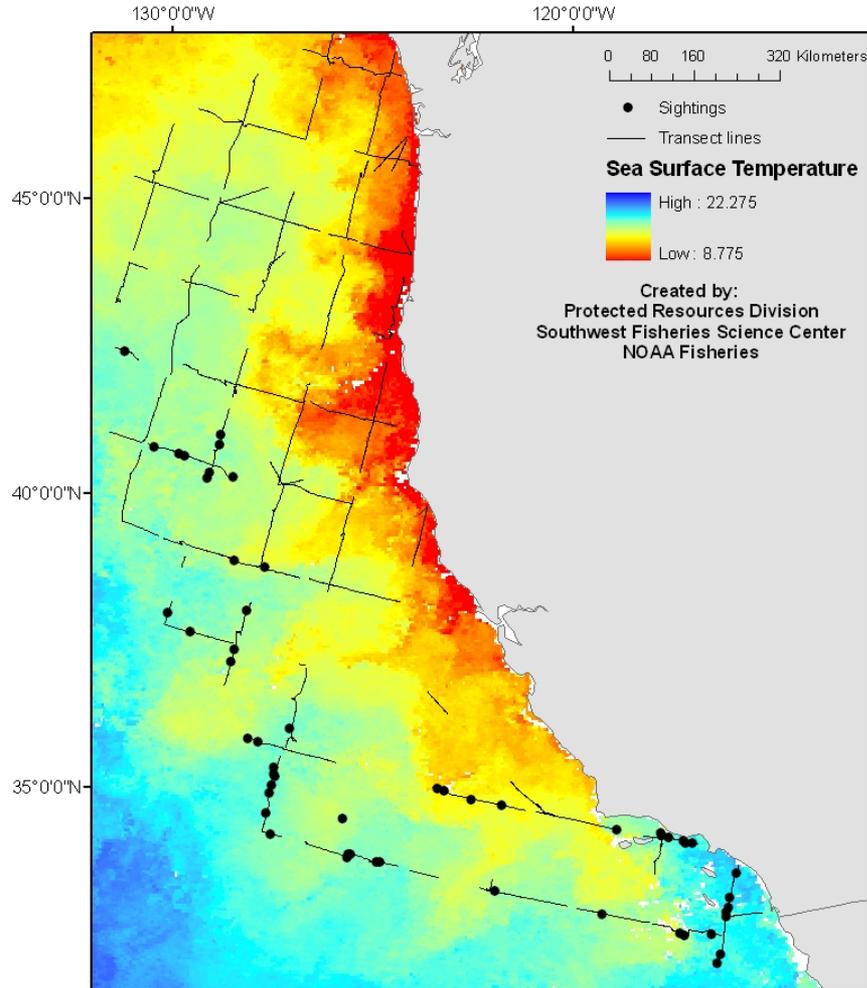
**GAMs for all dolphins
in the ETP in summer/fall**

$$D = [n/L \cdot s] \cdot [f(0) / 2 \cdot g(0)]$$

Where $f(0)$ and $g(0)$ are line-transect parameters related to sightability.

Modeling Cetacean Distribution Redux (Becker et al., in progress)

Short-beaked Common Dolphin (*Delphinus delphis*) 2001



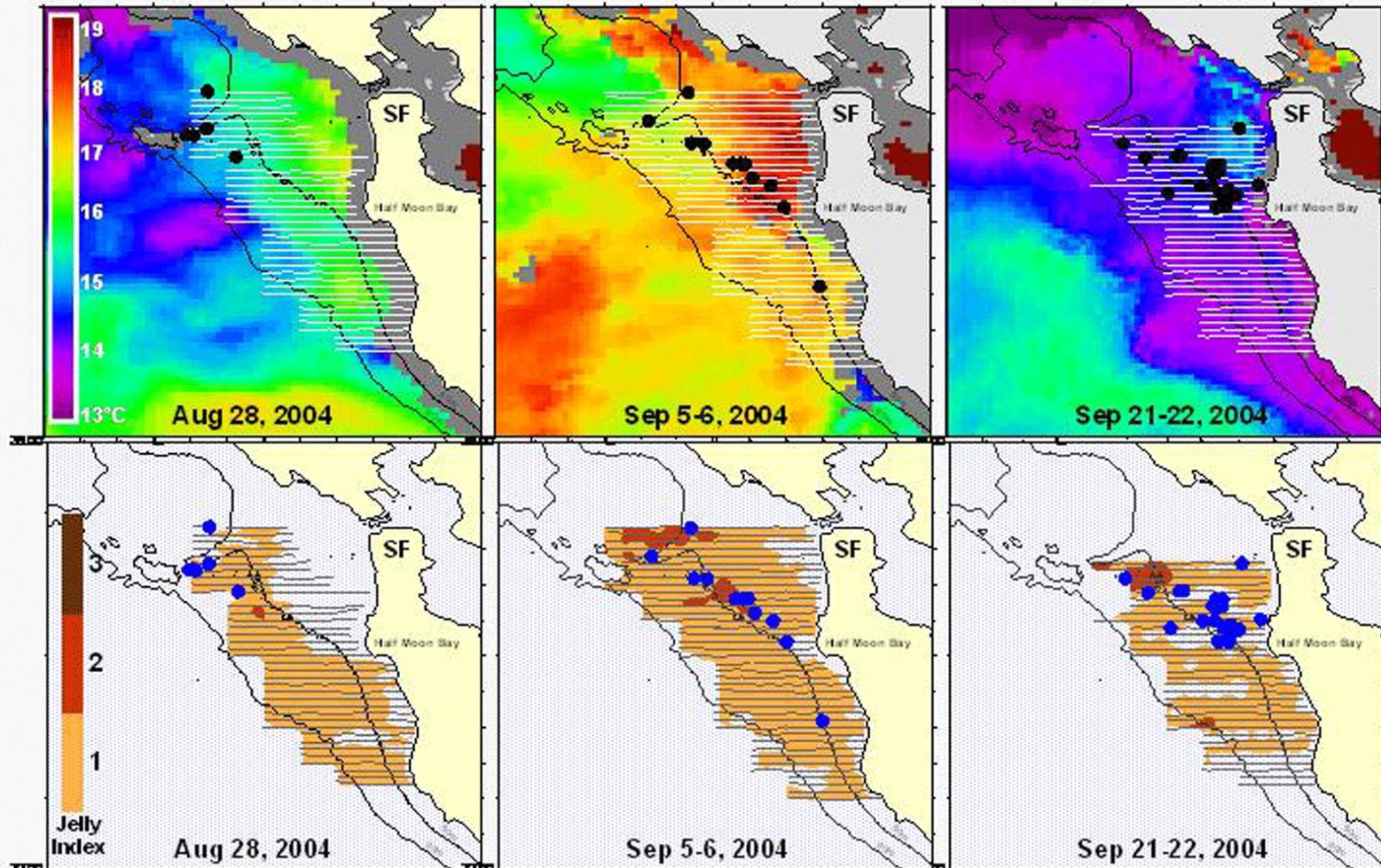
- Easily acquired in GIS-ready format
- Adequately resolves key features of CCS

Predator and Prey Sightings with Satellite Data

– (Benson and Forney)

Within-season habitat development

Response of leatherbacks (•) and jellyfish prey to sea surface temperature during upwelling and relaxation events off central California, Aug 28-Sep 22, 2004.

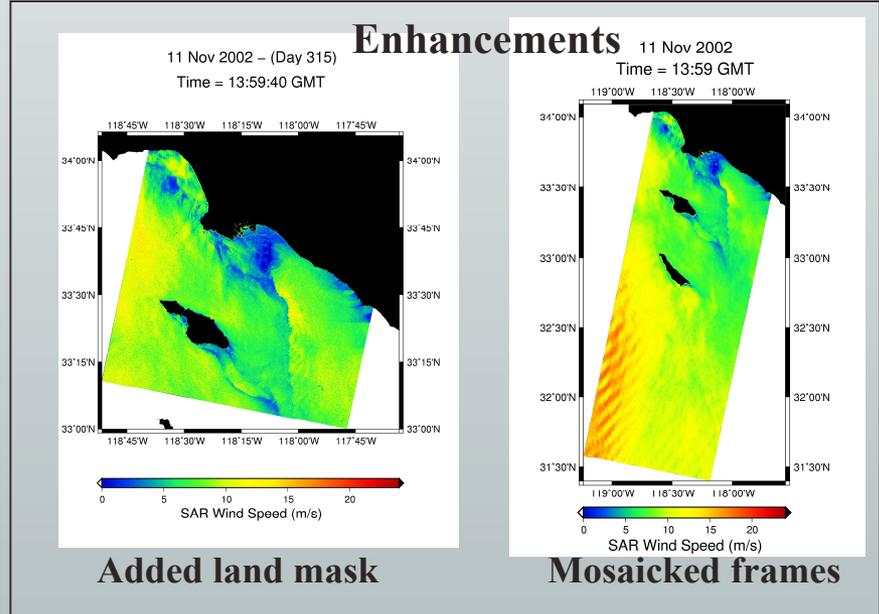
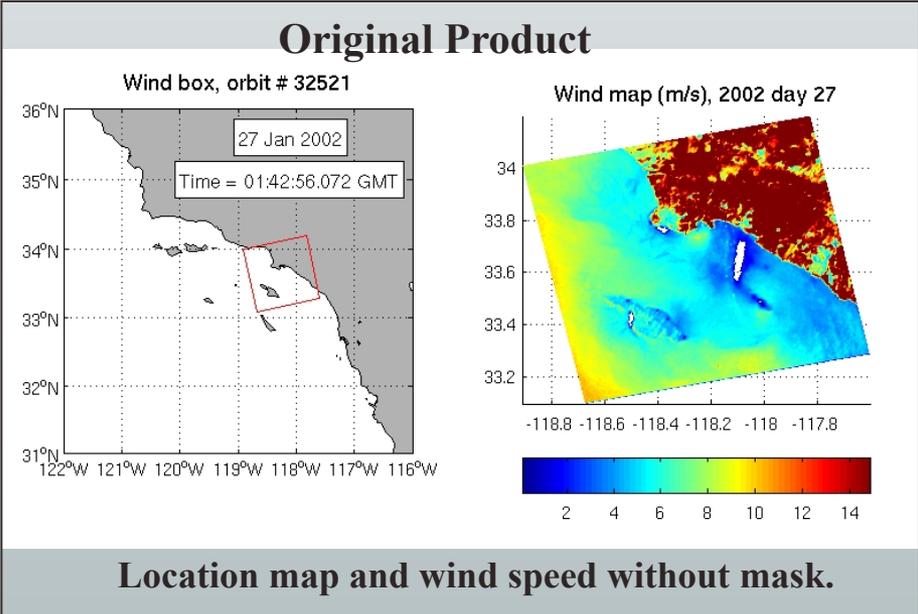


Product Development Model

- ▶ *Target specific applications*
- ▶ *Form partnerships with regional experts*
- ▶ *Identify and acquire necessary data*
- ▶ *Deliver and test experimental products*
- ▶ *Transfer technology to National level*
- ▶ *Adapt for application as appropriate elsewhere*

JPL SAR Wind Speed Data Archive - So. California

- RADARSAT SAR wind speed maps generated and archived for 2002 off California. Algorithm developed by JHUAPL for NOAA. Products operationally in use by NWS in Alaska.
- Algorithm uses NOGAPS model wind direction to correct for variation of backscatter in relation to wind direction and antenna angle. Recently added MM5.
- Developed interface with individual frames selectable and viewable by interactive mouse selection (left).
- Enhancements: Add land mask, mosaic frames into strip.
- Next: Add wide swath data from 2 satellites for 2005, suitable for evaluation for model wind forcing, Central CA.

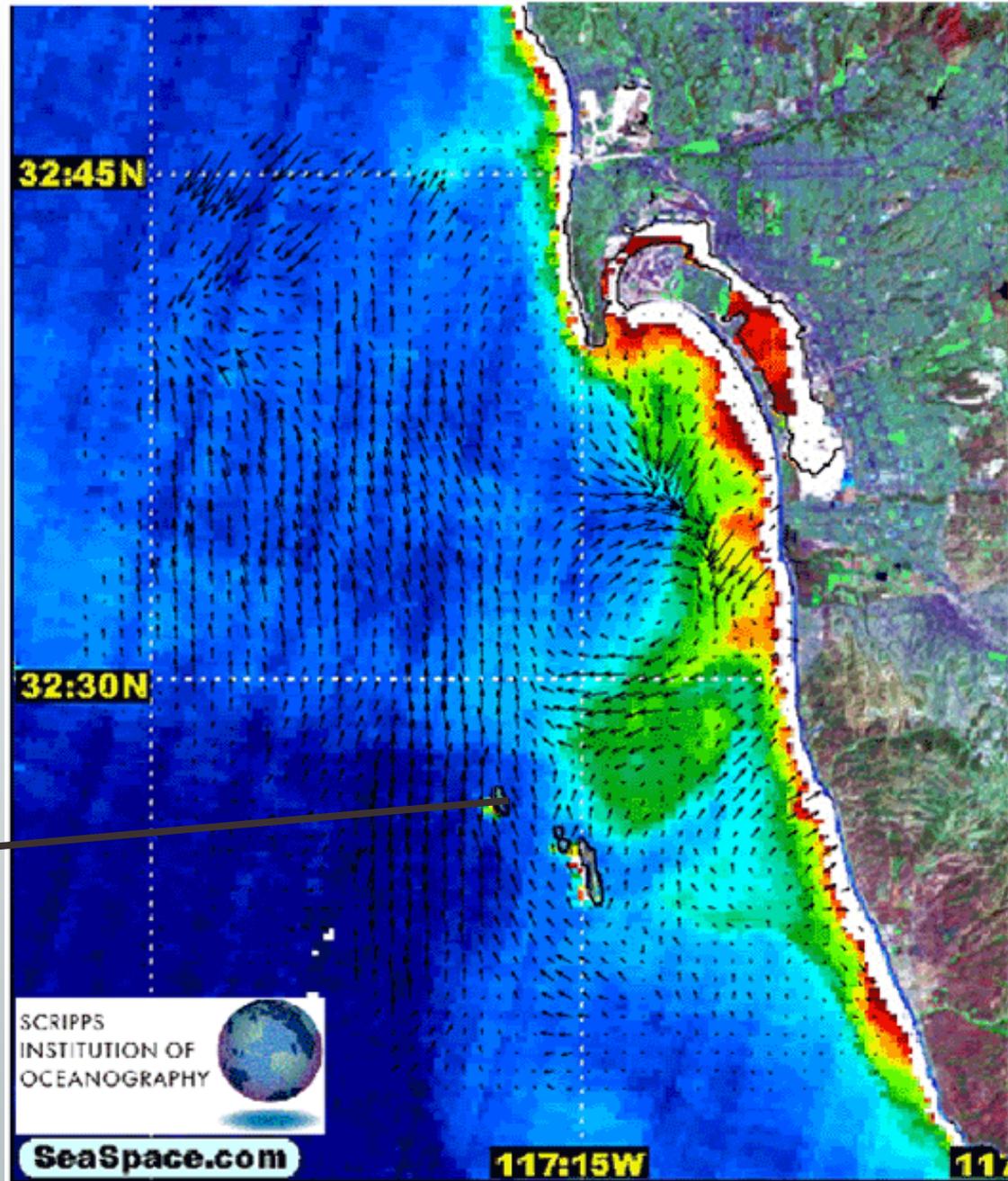
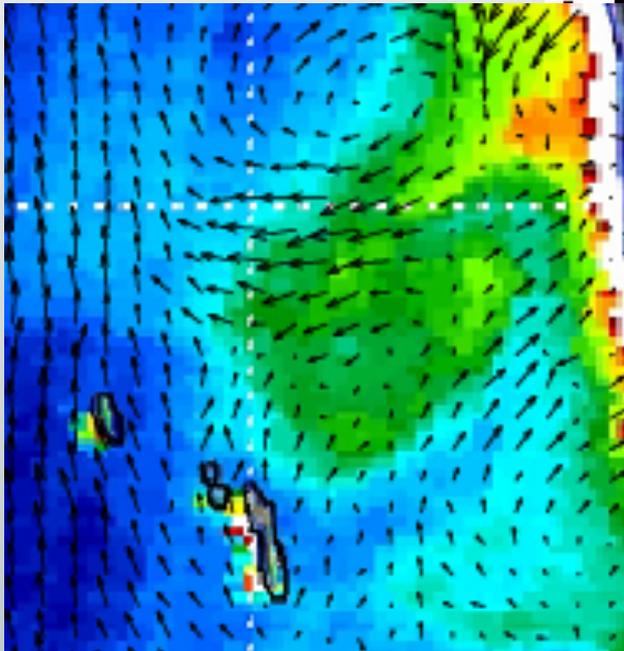


Combination of HF
RADAR
CURRENTS with
OCEAN COLOR
satellite data

2/5/03

oceansat-1
2003/02/05
20:31:05

Total
Suspended
Matter
mg/l



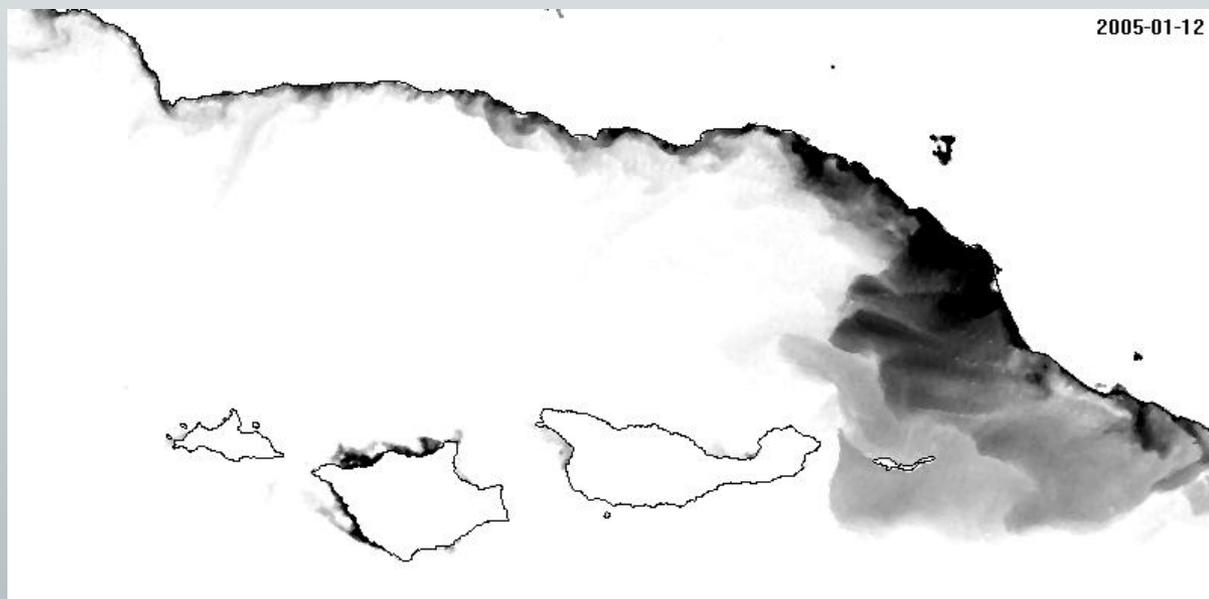
Development of high-resolution turbidity products from 250m resolution channels onboard MODIS satellites. Dr.' s M.Kahru and G. Mitchell

Development of high-resolution turbidity products from 250m resolution channels onboard MODIS satellites. Dr.' s M.Kahru and G. Mitchell

ation



Santa Barbara Channel, Terra-MODIS pass of January 12, 2005; extensive sediment plume from the Santa Clara river:



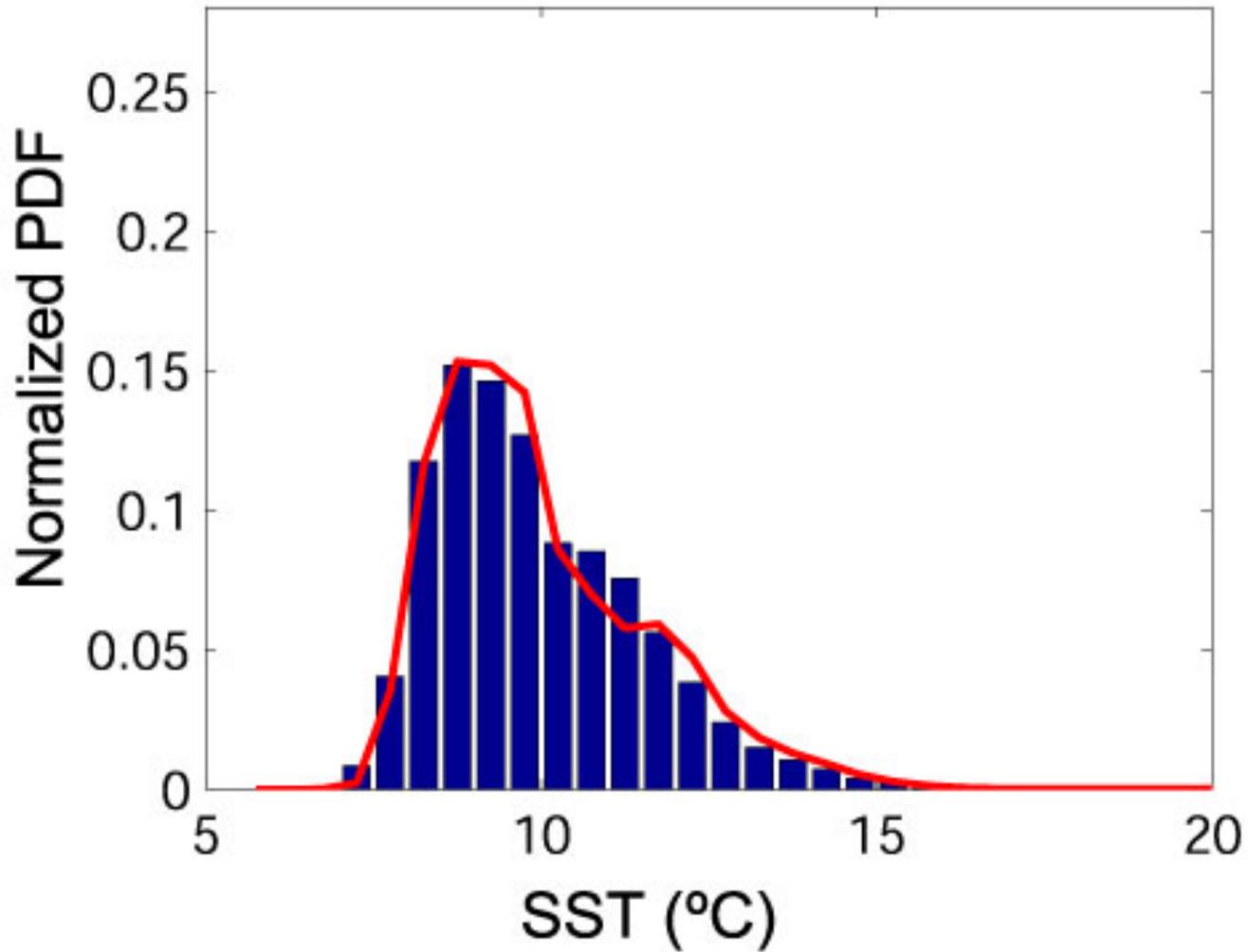
Application I: Refining Definitions of Chinook Salmon Habitat

- ▶ *George Boehlert, George Watters and Cara Wilson (SWFSC)*
- ▶ *Cindy Bessey, Jefferson Hinke, and Melissa Snover (JIMAR)*
- ▶ *Over 100 TDR tags deployed at sea and recovered (Monterey Bay to Ft. Bragg, CA).*
- ▶ *Published as Hinke et al., 2004 MEPS and Hinke et al., in press MEPS.*

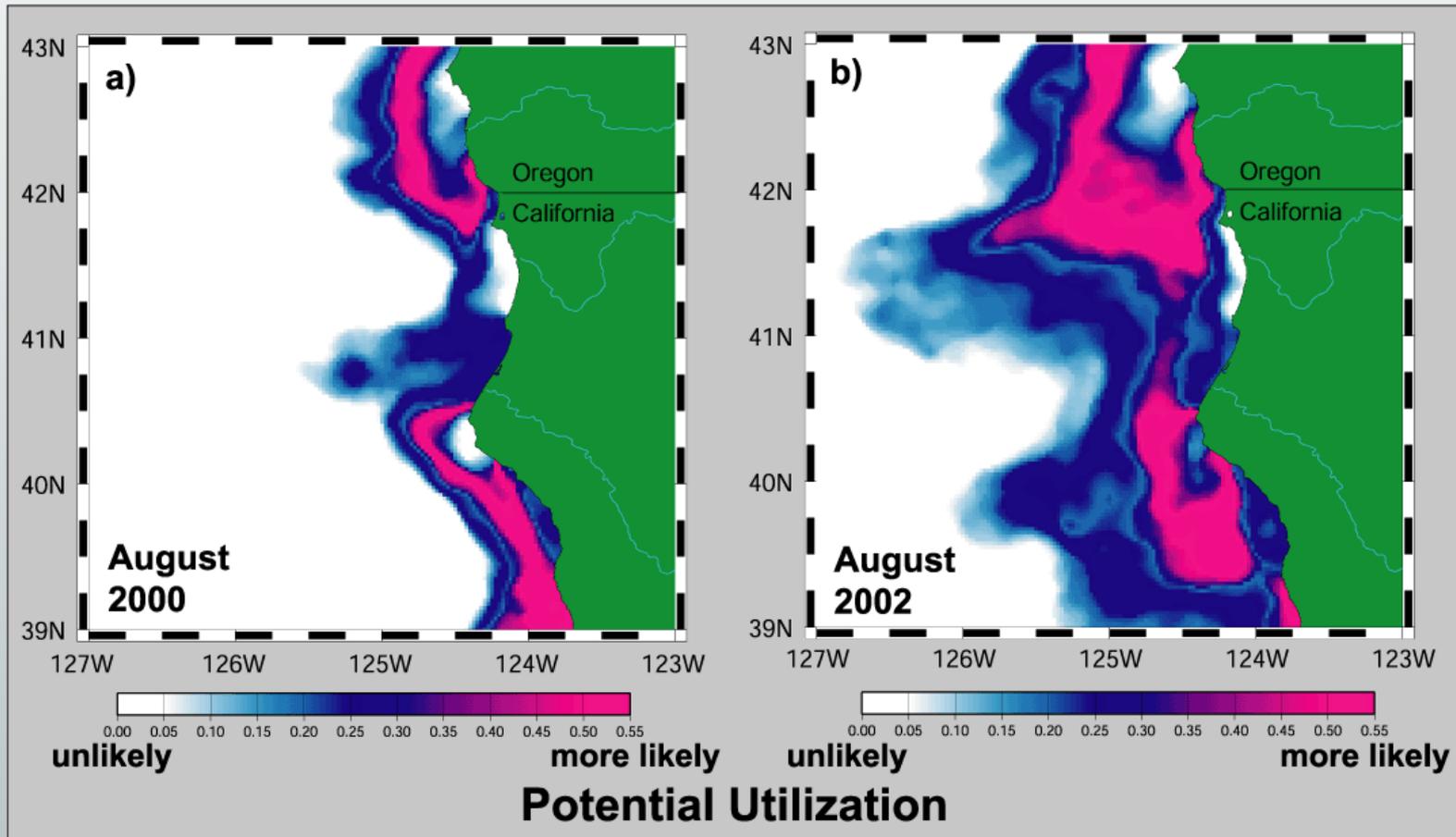
TDR Tag Placed on Chinook



Chinook Temperature PDF



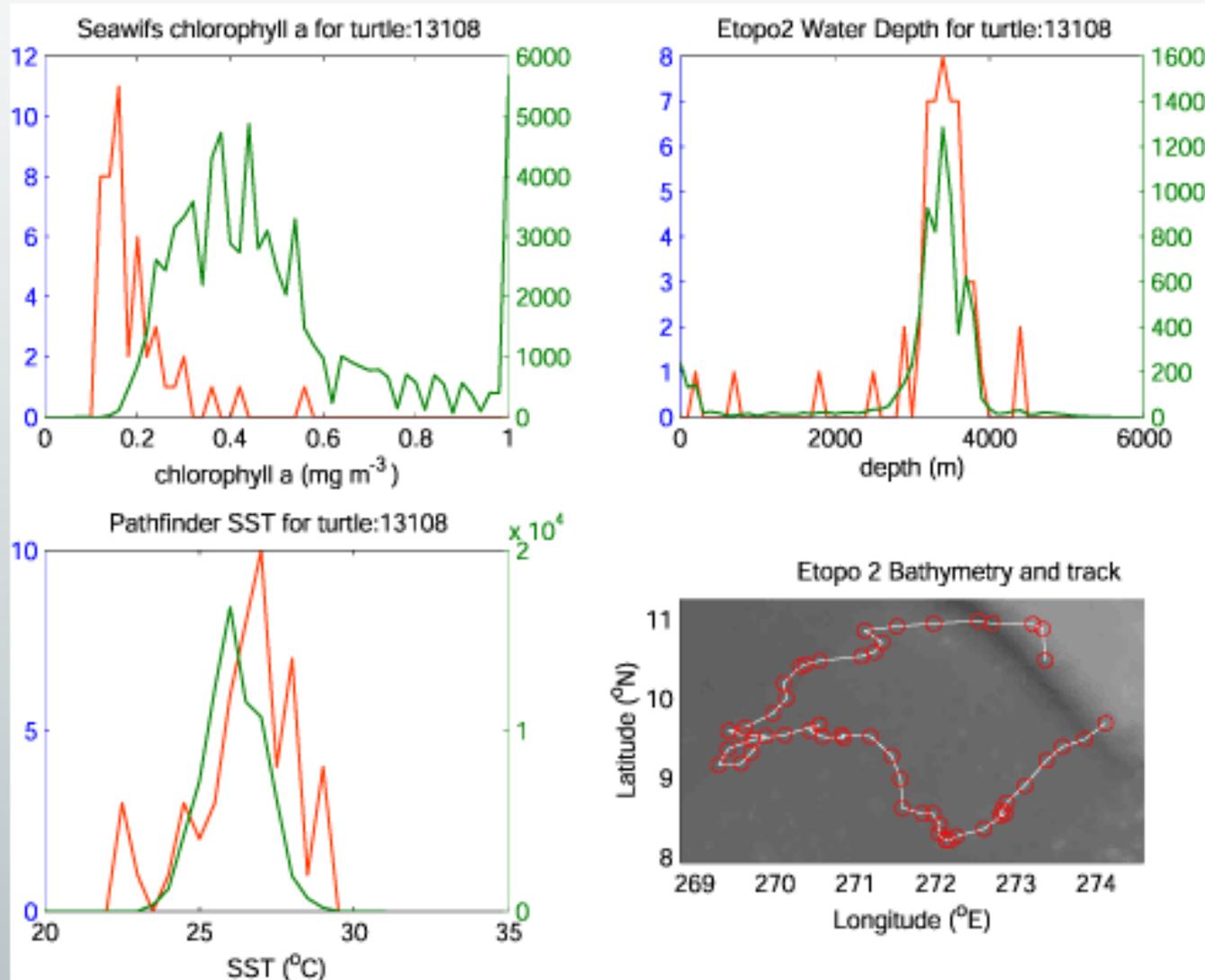
Chinook Potential Habitat (August)



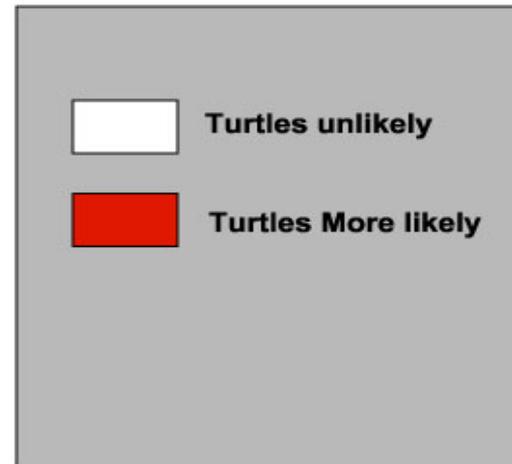
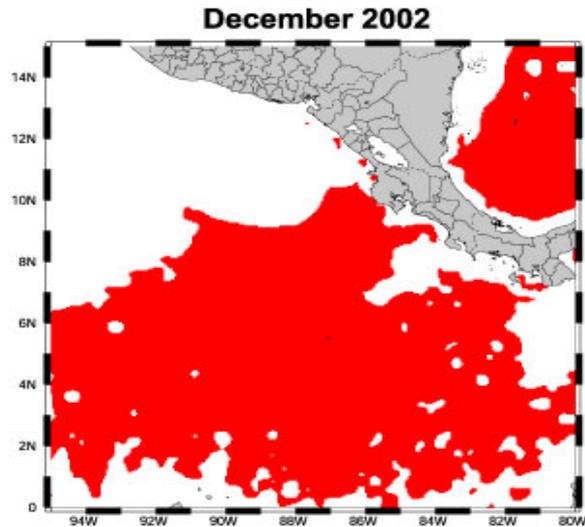
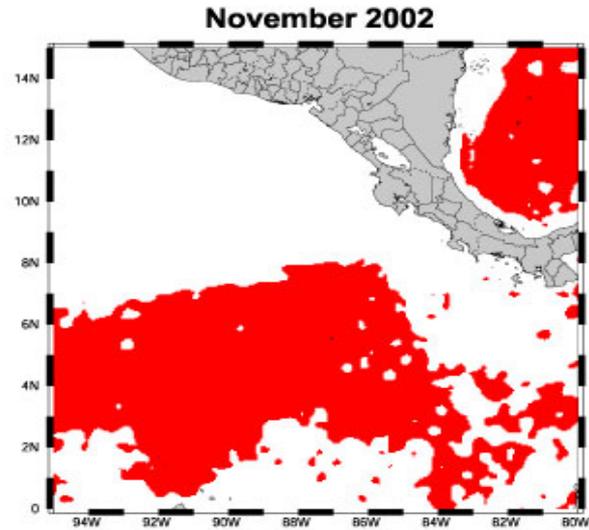
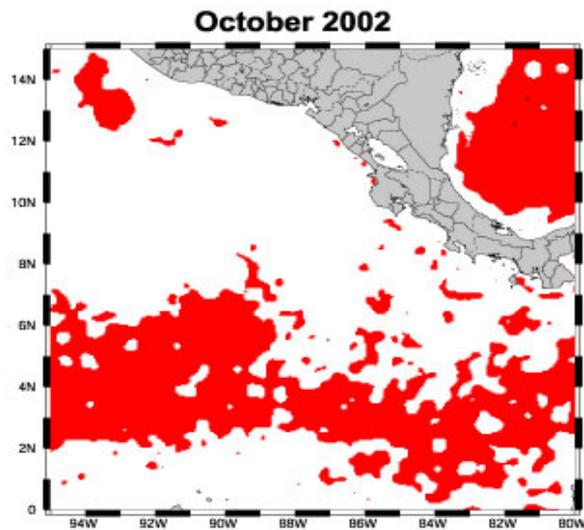
Application II: Olive Ridley Turtles

- ★ *Yonat Swimmer, Lianne McNaughton and others (PIFSC).*
- ★ *Anders Nielson and John Sibert (PFRP).*
- ★ *Mike Laurs (JIMAR)*

Examining Habitat Preferences



Potential Habitat Maps



Looking forward

- ▶ *Piecemeal approach to physics ineffective – ultimate integration tool is the data assimilating model (next talk)*
- ▶ *Similarly, examination of individual pieces of ecosystem will probably not describe well the ecosystem as a whole (following talks)*
- ▶ *VERY IMPORTANT! The Satellite data requests you make today will determine the data available in 10-20 years.*

Contact Information

Dave Foley
NOAA SWFSC - ERD
1352 Lighthouse Ave
Pacific Grove, CA 93950

831.648.0632

dave.foley@noaa.gov

<http://coastwatch.pfel.noaa.gov/>