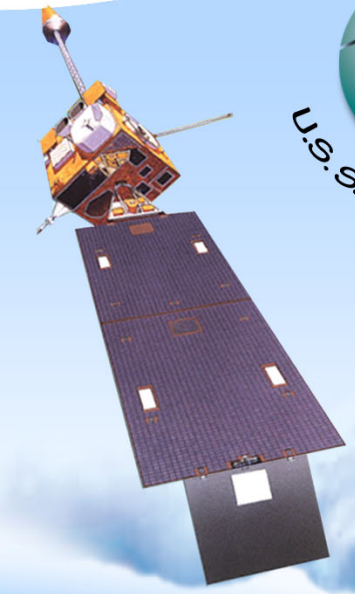
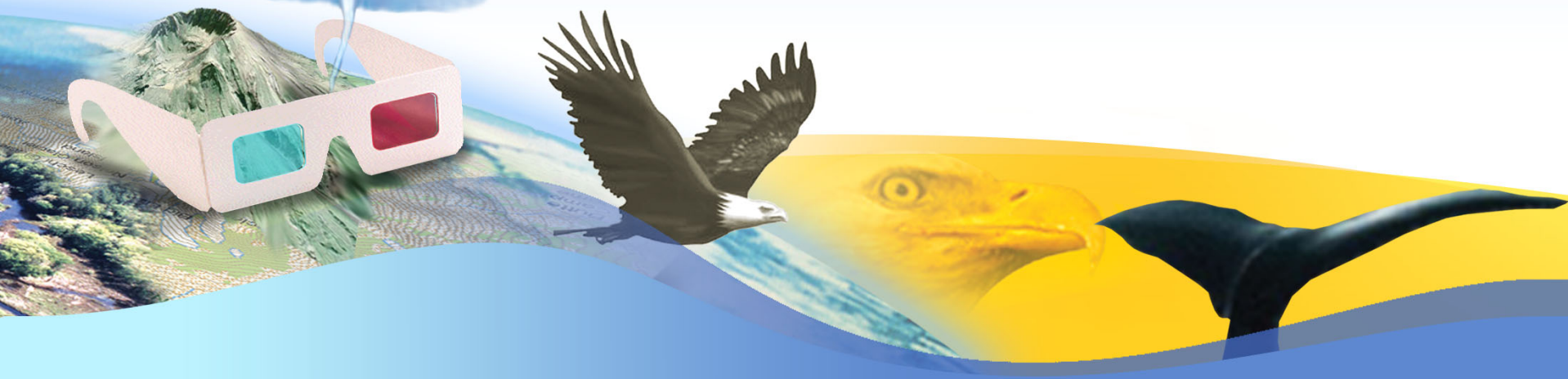


U.S. Satellite Laboratory

Welcome to Session V!

Meghan Marrero, Ed.D.



ACES Program Structure

I. Classroom Lessons

II. Student Expert Research

III. Student Expert Analysis

IV. Investigations

Credit: Office of NOAA Corps Operations

Research Lessons

- **Lesson 15: Learning to Research**
- **Lesson 16: Internet Treasure Hunt**
- **Lesson 17: Student Expert Research**
  - 17a: Species
  - 17b: Bathymetry
  - 17c: Phytoplankton
  - 17d: Sea Surface

Lesson 15: Learning to Research

Overview

Before students begin their "Expert Team" research, this lesson introduces them to performing research on the Internet, perhaps in the school's computer lab. Students will become acquainted with the Signals of Spring -ACES website and learn how to use search engines most effectively. They use the Signals of Spring—ACES website to collect information about some of the animals they will track later and to master Earth data imagery interpretation.

After spending a session in the computer lab, students will work in groups to synthesize their findings in order to be introduced to the widespread issues facing marine animals. Understanding these issues will become important as they do their Expert team analysis and final projects.

Objectives

- ✓ To familiarize students with using the Signals of Spring--ACES website.
- ✓ To introduce students to the process of doing research on the Internet.
- ✓ To identify issues affecting marine animals and discuss why the issues are so widespread.

Working with the Website

Animal Worksheet

Animal Name:

Description:

1.

2.

3.

National Marine Sanctuaries:

1.

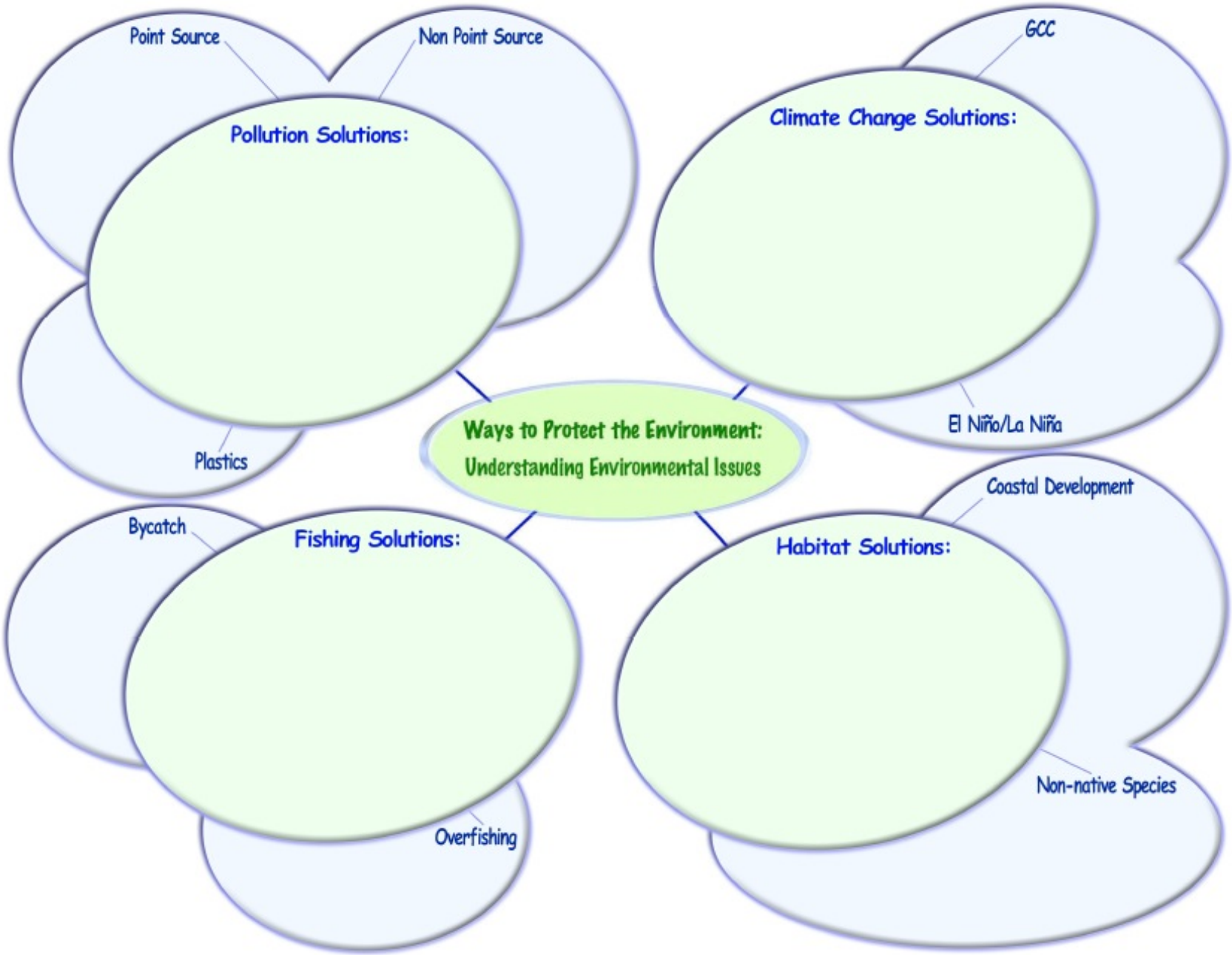
2.

3.

Environmental Issue 1:

Environmental Issue 2:

Environmental Issue 3:


Ways to Protect the Environment:
Understanding Environmental Issues
Pollution Solutions:
Point Source
Non Point Source
Plastics
Climate Change Solutions:
GCC
El Niño/La Niña
Fishing Solutions:
Bycatch
Overfishing
Habitat Solutions:
Coastal Development
Non-native Species

Lesson 16: Internet Treasure Hunt

Objectives

- ✓ To develop Internet research skills by using the Signals of Spring—ACES website and a search engine.
- ✓ To demonstrate the ability to glean pertinent information from a webpage.

Teacher Tip: *In order to encourage students to use time efficiently, turn this activity into a contest and reward the teams that finish first or within a certain period of time while still answering the questions accurately.*

Introducing the ACES Website

- **Scientist Partners**
- **Teacher Resources**
  - Rubrics
  - Standards Grids
  - Transparencies
  - Recorded Webcasts

Lesson 17 – Student Expert Research

Overview

Students are split up into the following "Expert" teams (groups):

- Species (Marine) Experts
- Bathymetry Experts
- Phytoplankton Experts
- Sea Surface Temperature Experts

Each student group will become "Experts" by performing research and studying Earth data. At the conclusion of this Student Research phase, students will be ready to analyze marine animal movements with respect to Earth data.

Students will work for approximately three weeks on answering the questions in the specific research lesson (a through d) for each team.

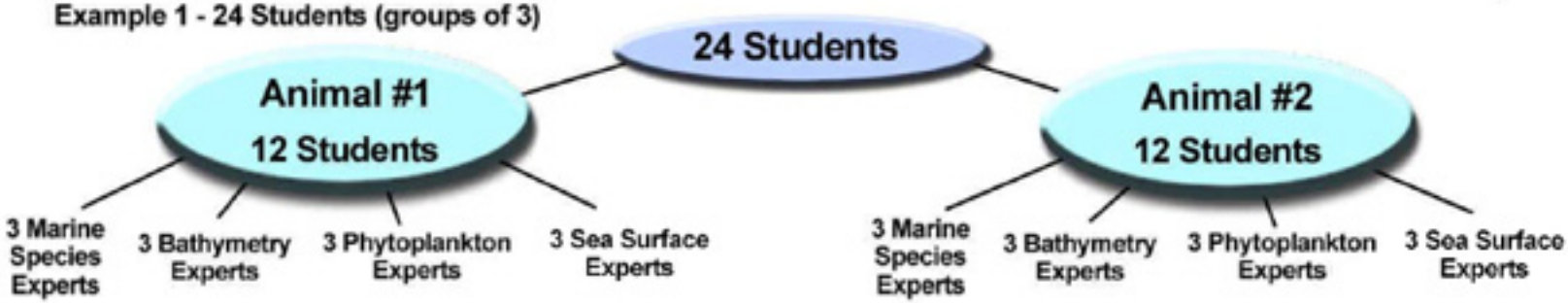
Decide how many questions are appropriate for student groups to answer in your class. This is an appropriate way to scaffold their learning. Students can work on these activities during class and at home. Check in with groups at least twice a week during the period.

After three weeks groups present their findings to the class.

Breaking Classes into Student Expert Teams

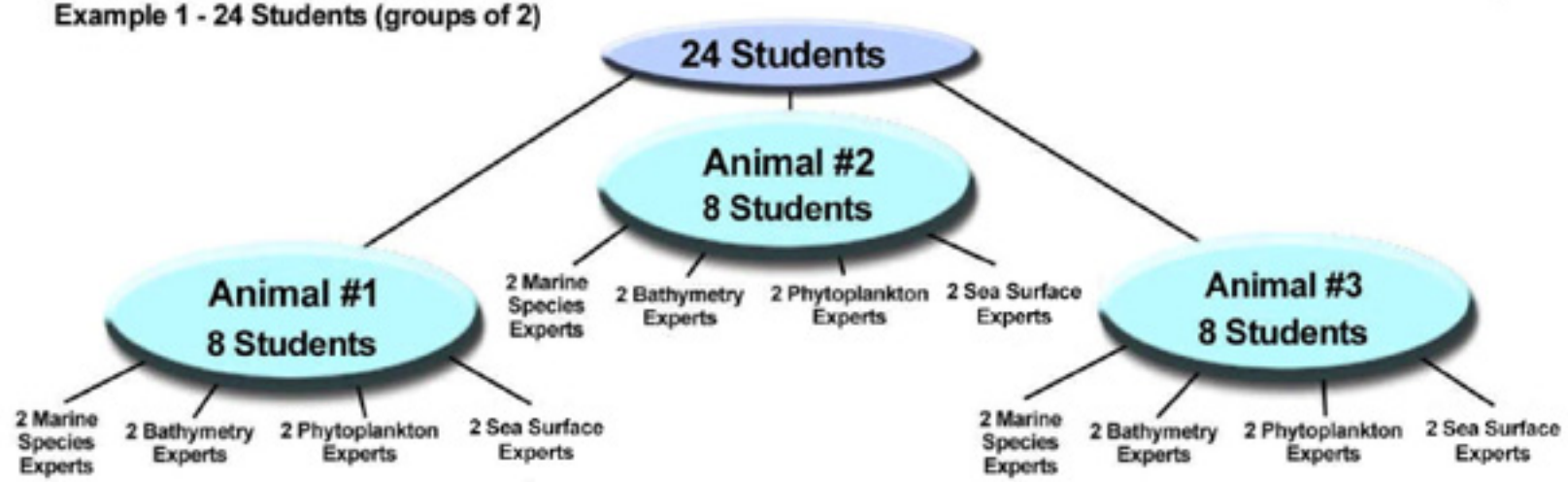
Groups of 3 are optimal.

Example 1 - 24 Students (groups of 3)



This class tracks and studies <u>two</u> total animals; they can be different species.

Example 1 - 24 Students (groups of 2)



This class tracks and studies <u>three</u> total animals; they can be different species.

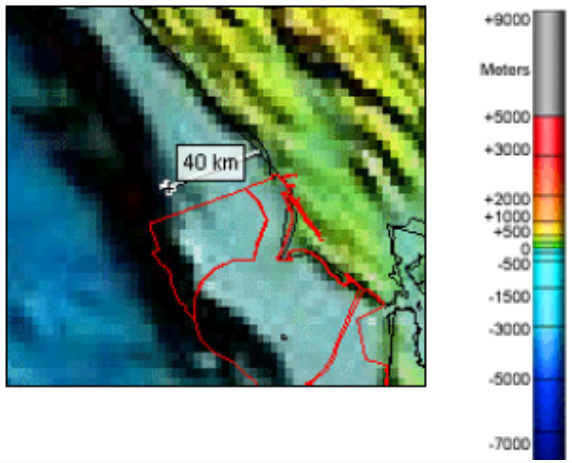
Sample Research Task- Bathymetry

In the Bathymetry Research Links, click this icon to find the information to answer Question 1.

1. **Using Bathymetric imagery online in Research Links, describe and compare the width (use the map ruler tool to help you) and depth (use the color bar to help you) of the <u>continental shelf</u> near/in the:**

   a. **Cordell Bank National Marine Sanctuary**
   b. **Stellwagen Bank National Marine Sanctuary**
   c. **Flower Garden Bank National Marine Sanctuary**

	Width (km)	Depth (m)
Cordell Bank National Marine Sanctuary		
Stellwagen Bank National Marine Sanctuary		
Flower Garden Bank National Marine Sanctuary		



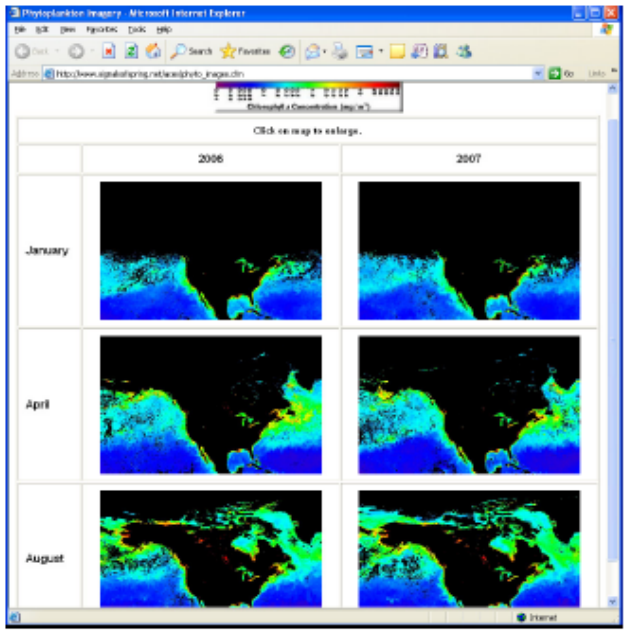
Sample Research Task- Phytoplankton

In the Phytoplankton Research Links, click this icon to find the information to answer Question 2.

2. **Compare and contrast the chlorophyll imagery for the East and West coasts of the United States from January, April and August for two different years. If possible, print out the images and post them on the Wall Display.**

Then answer the following:

a. **Describe in words how the phytoplankton concentration changes in the Atlantic Ocean over the course of the year. When and where do the biggest changes happen (use an atlas to help you)?**
b. **Describe in words how the phytoplankton concentration changes along the coast of California. When do the biggest changes happen? Why?**
c. **Where are the areas with the highest concentration of phytoplankton (use an atlas to help you)? Why?**
d. **Explain any differences from year to year.**

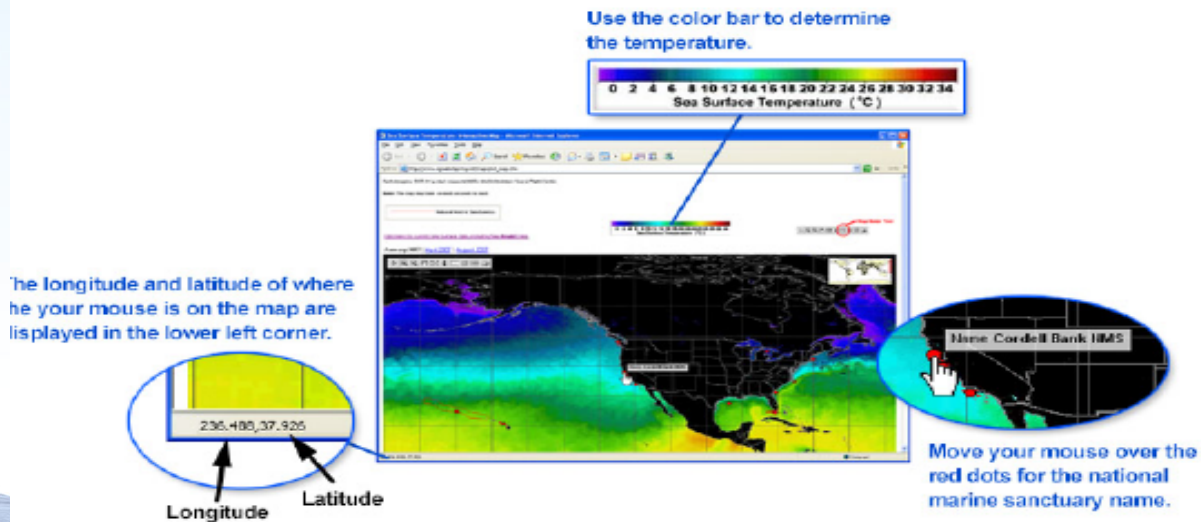


Sample Research Task - Sea Surface

In the Sea Surface Research Links, click this icon to find the information to answer Questions 1 and 2.

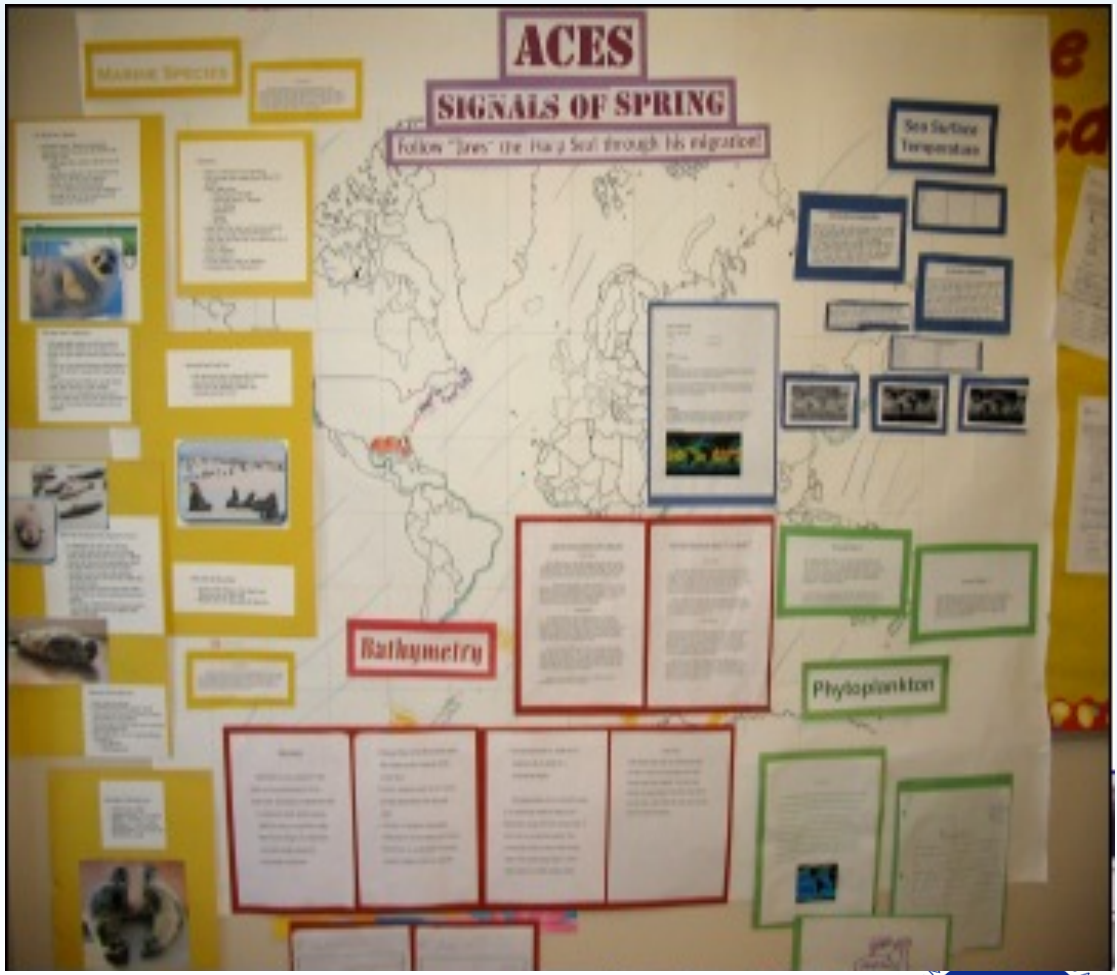
1. **Print the mean SST images for January, April, and August available in the Research Links. Create a table and fill in the 1) latitude and longitude and 2) the average temperature for each of these months for the following locations:**

Name of National Marine Sanctuary	Latitude	Longitude	January Average SST	April Average SST	August Average SST
Fagatele Bay National Marine Sanctuary					
Florida Keys National Marine Sanctuary					
Cordell Bank National Marine Sanctuary					
The Monitor National Marine Sanctuary					
Olympic Coast National Marine Sanctuary					
Stellwagen Bank National Marine Sanctuary					
Channel Islands National Marine Sanctuary					
Hawaiian Islands Humpback Whale National Marine Sanctuary					



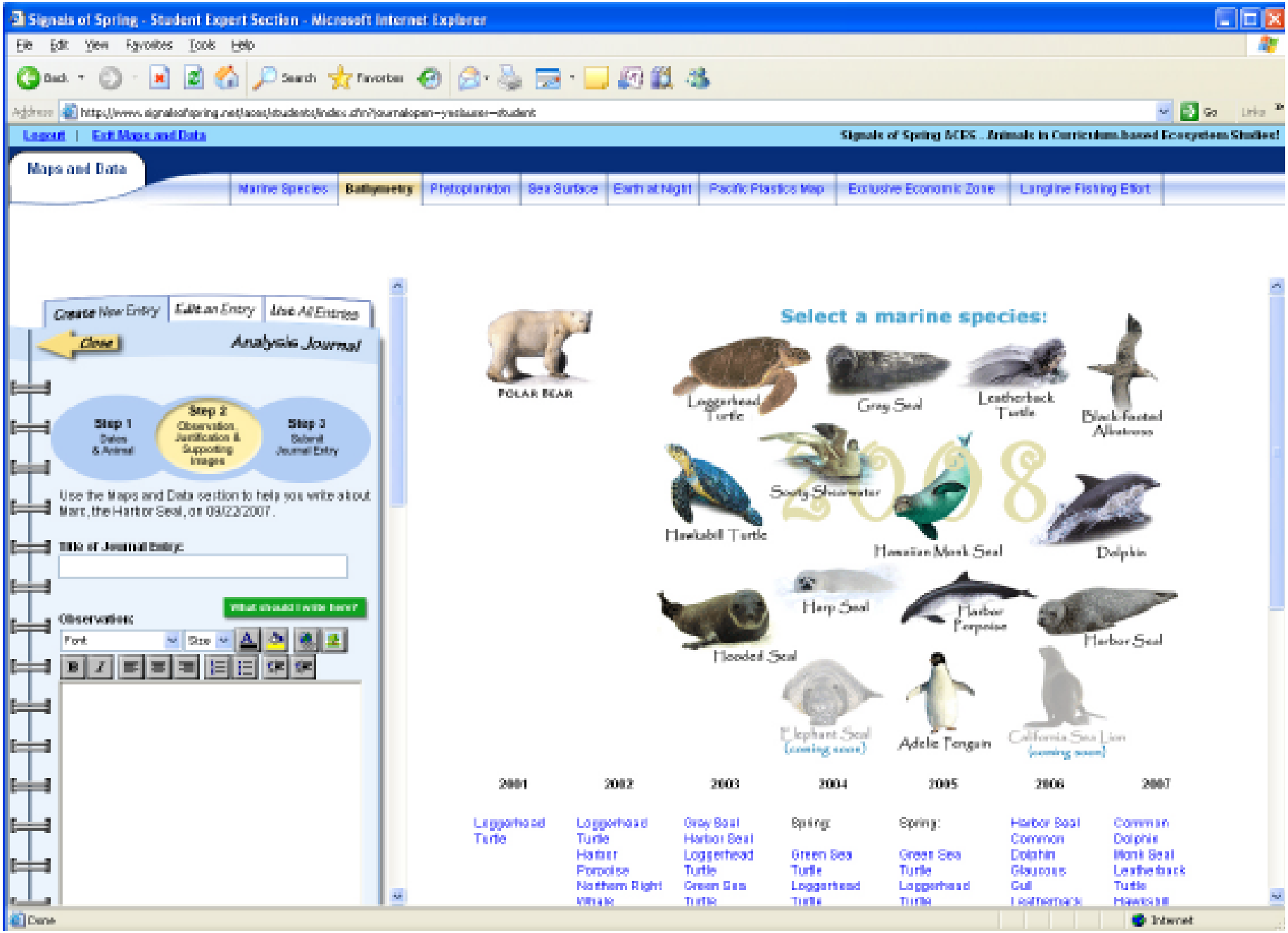
ACES Wall Display

- Visual ‘story’ of Expert Research and Analysis
- Super-sized Paper



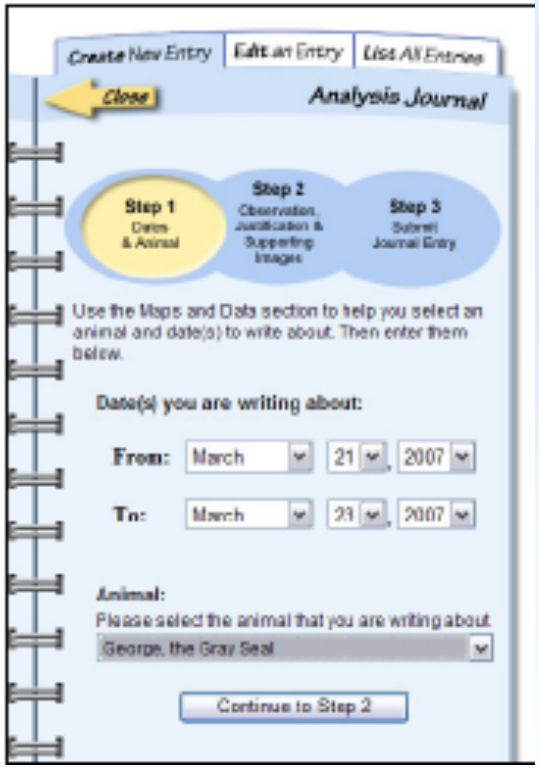
Lesson 18: Student Expert Analysis

- **Make connections between animals and parameters**
- **Explain movements of animals using parameters**
- **Wall Displays**
- **Online Journals**
  - Scientist comments


Signals of Spring - Student Expert Section - Microsoft Internet Explorer
Logout | Exit Maps and Data
Signals of Spring MCRE - Animals in Curriculum-based Ecosystem Studies!
Maps and Data
Marine Species
Bathymetry
Phytoplankton
Sea Surface
Earth at Night
Pacific Plastics Map
Exclusive Economic Zone
Longline Fishing Effort
Create New Entry
Edit an Entry
View All Entries
Close
Analysis Journal
Step 1
Dates & Animal
Step 2
Observation, Justification & Supporting Images
Step 3
Submit Journal Entry
Use the Maps and Data section to help you write about Marc, the Harbor Seal, on 03/22/2007.
Title of Journal Entry:
What should I write here?
Observation:
POLAR BEAR
Select a marine species:
Loggerhead Turtle
Grey Seal
Leatherback Turtle
Black-footed Albatross
Sooty Shearwater
Hawksbill Turtle
Hawaiian Monk Seal
Dolphin
Harp Seal
Harbor Porpoise
Harbor Seal
Hooded Seal
Elephant Seal (coming soon)
Adelie Penguin
California Sea Lion (coming soon)
2001
2002
2003
2004
2005
2006
2007
Loggerhead Turtle
Loggerhead Turtle
Harbor Porpoise
Northern Right Whale
Grey Seal
Harbor Seal
Loggerhead Turtle
Green Sea Turtle
Spring:
Green Sea Turtle
Loggerhead Turtle
Spring:
Green Sea Turtle
Loggerhead Turtle
Harbor Seal
Common Dolphin
Dolphin
Glaucous Gull
Leatherback
Common
Dolphin
Mark Seal
Leatherback
Turtle
Hawksbill
Done
Internet

How do I CREATE an Analysis Journal Entry?

1. From the Signals of Spring – ACES Home Page, login with the Student Expert Team Username and Password provided by your teacher.
2. Click on **Open Analysis Journal**.
3. Click on the **Create New Entry** tab.
4. Select your animal and the dates about which you would like to write, and then click **Continue to Step 2**.



Creating Student Teams

- **Login as a teacher**
- **Go to ‘my students’ and ‘create teams’**
- **Enter the number of teams you need**
- **Record usernames and passwords**
- **(in this case CHANGE the one team you need)**

Create your ACES account

- **Login with the username/password (guest account) you are given.**
- **Complete the registration form, including CHANGING YOUR USERNAME AND PASSWORD**

Homework Task 1

Write an Analysis Journal

a. Create student teams
b. Login as a student for the appropriate Expert Team
c. Choose a short amount of time to write about
d. Remember to keep observations & justifications separate
e. Use Hints in the lesson to help you with what to write
f. Maybe a scientist will visit you! ☺

Observation Section: Bathymetry Example

What do I put in the OBSERVATION section for each journal entry?

What is an OBSERVATION?

An observation is something you see, something you can talk about. You are not drawing conclusions when you observe. Use maps and images from the Signals of Spring -ACES website as well as other resources to discuss the bathymetry of the area of the animal's location for different times. Include specific depths and names of basins, canyons, islands, and other locations including coastal areas. Use atlases in addition to the internet. Discuss changes from one period of time to another.

Justification Section: Bathymetry Example

What do I put in the JUSTIFICATION section for each journal entry?

Write about whether the bathymetry and habitat are affecting the animal movement. Suggest whether there is or is not an influence from the ocean floor. If no changes in location are apparent, discuss why the area is seemingly meeting the needs of the animal. Discuss your conclusions.

Justification Hints (things to consider):

- Is the animal staying on the continental shelf? How does this area help the animal to
- meet its needs?
- Is the animal along the continental slope? How might this affect upwelling and meeting
- the animal's needs?
- Is the animal in deep water? Is it expected to be? Why or why not?
- Did the animal come into very shallow coastal areas like harbors or bays? If so, why?
- How might these areas positively or negatively affect the animal?
- Did the animal travel through any National Marine Sanctuaries? If so, why is that
- Important?

Signals of Spring - Maps and Data - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.signalsofspring.net/aces/maps_data_2008.cfm?user=visitor

AIM Search

Exit Maps and Data

Signals of Spring ACES - Animals in Curriculum-based Ecosystem Studies!

Maps and Data

Marine Species | Bathymetry | Phytoplankton | Sea Surface

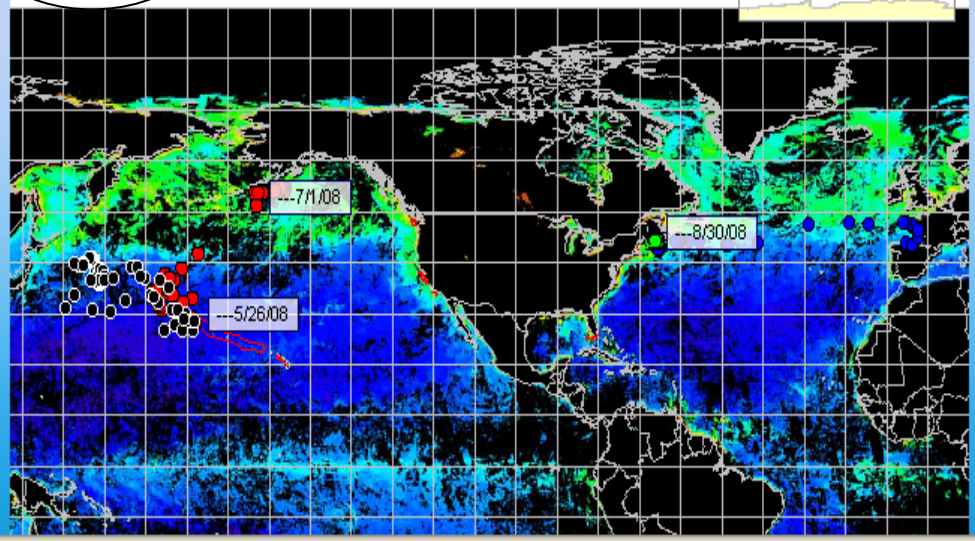
Select Different Species | Data Table | Interactive Map | Google Map | Imagery Archive | Research Links | Wall Displays and Flyways

Sooty Shearwater (2008)

Note: Blinking dots represent approximately where the animal was at the time of the map.

Chlorophyll *a* Concentration (mg / m³)

Block



Open in New Window

Location Data provided by:

- Dalhousie University and the Grand Manan Whale and Seabird Research Station
- U.S. Geological Survey - Western Ecological Research Center, Josh Adams

Animals:

- 66534**
- 67645
- Keisha
- Roxie (66529)**

** We have not received data for this animal in 7 days or more. This does not necessarily mean the tag is inactive.

Map Date:

Week ending 09/20/2008

Update Map

Animal News:

There is currently no news for these animals.

Transferring data from www.signalsofspring.net...

- [x] 66534**
- [ ] 67645
- [ ] Keisha
- [ ] Roxie (66529)**

** We have not received data for this animal in 7 days or more. This does not necessarily mean the tag is inactive.

Map Date:

Week ending 09/20/2008

Update Map

Animal News:

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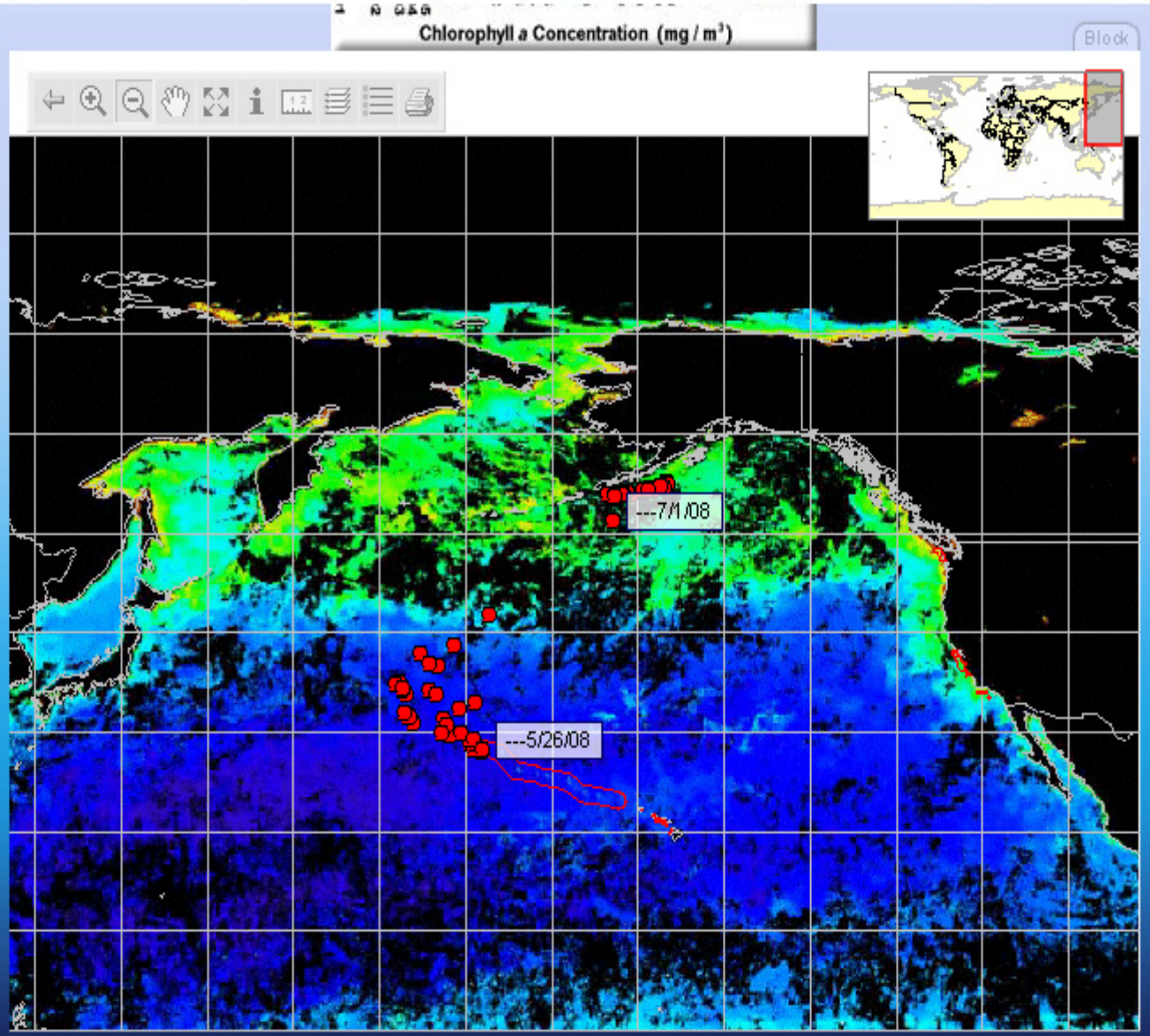


Maps and Data

Marine Species | Bathymetry | Phytoplankton | Sea Surfac

Select Different Species | Data Table | Interactive Map | Google Map | Imagery Archive | Research Links | Wall Displ and Flyw

Sooty Shearwater (2008)

Note: Blinking dots represent approximately where the animal was at the time of the map.

Chlorophyll *a* Concentration (mg / m³)

0.01 0.02 0.03 0.04 0.05 0.1 0.2 0.3 0.4 0.5 1.0 2.0 3.0 4.0 5.0 10 20 30 40 50 60

Block

Animals:

- [x] 66534**
- [ ] 67645
- [ ] Keisha
- [ ] Roxie (66529)**

** We have not received data for this animal in 7 days or more. This does not necessarily mean the tag is inactive.

Map Date:

Week ending 07/02/2008

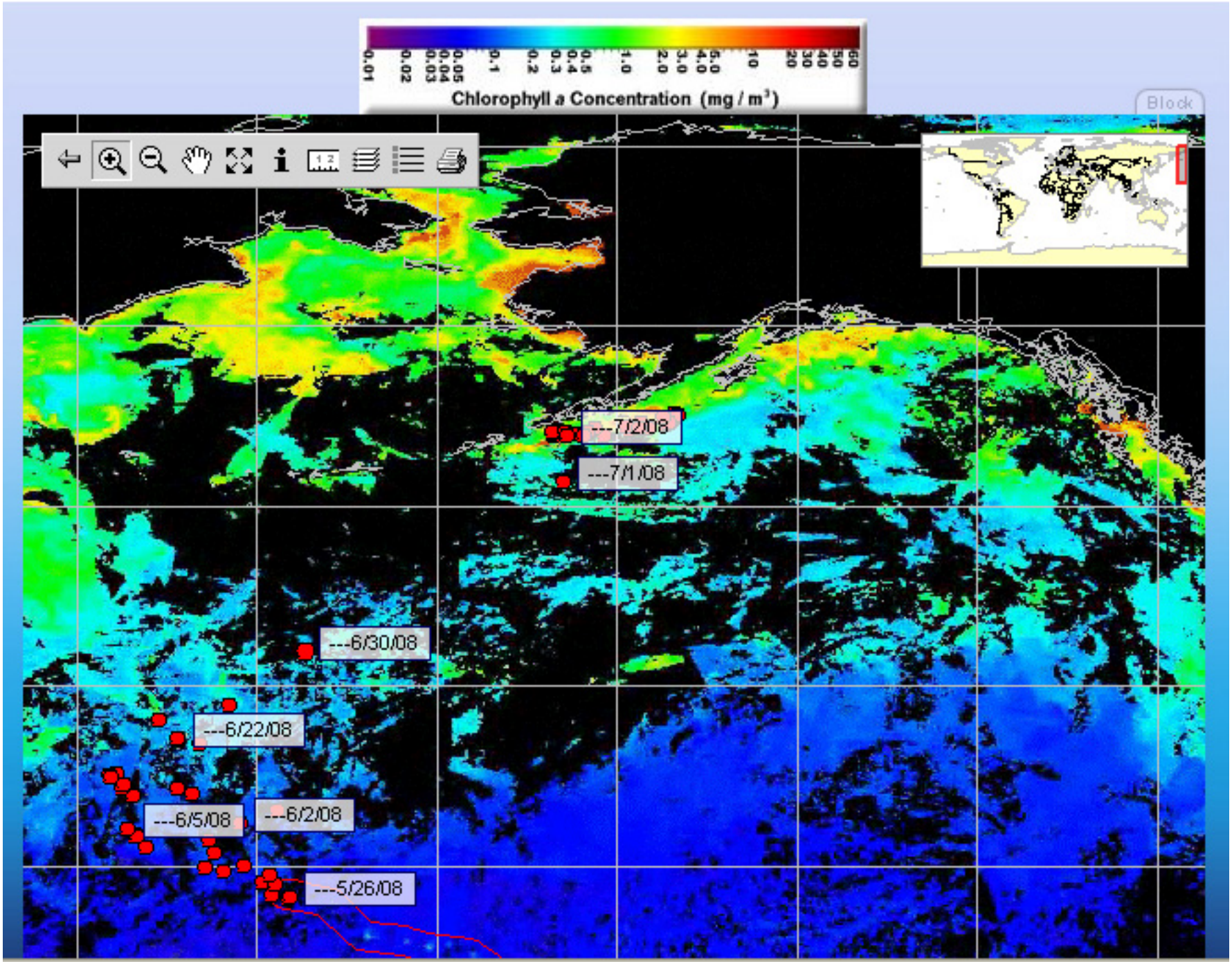
Week ending 09/20/2008
Week ending 09/12/2008
Week ending 09/04/2008
Monthly Mean - Aug 2008
Week ending 08/27/2008
Week ending 08/19/2008
Week ending 08/11/2008
Week ending 08/03/2008
Monthly Mean - Jul 2008
Week ending 07/26/2008
Week ending 07/18/2008
Week ending 07/10/2008
Week ending 07/02/2008
Monthly Mean - Jun 2008
Week ending 06/24/2008
Week ending 06/16/2008
Week ending 06/08/2008
Week ending 05/31/2008
Monthly Mean - May 2008
Week ending 05/23/2008

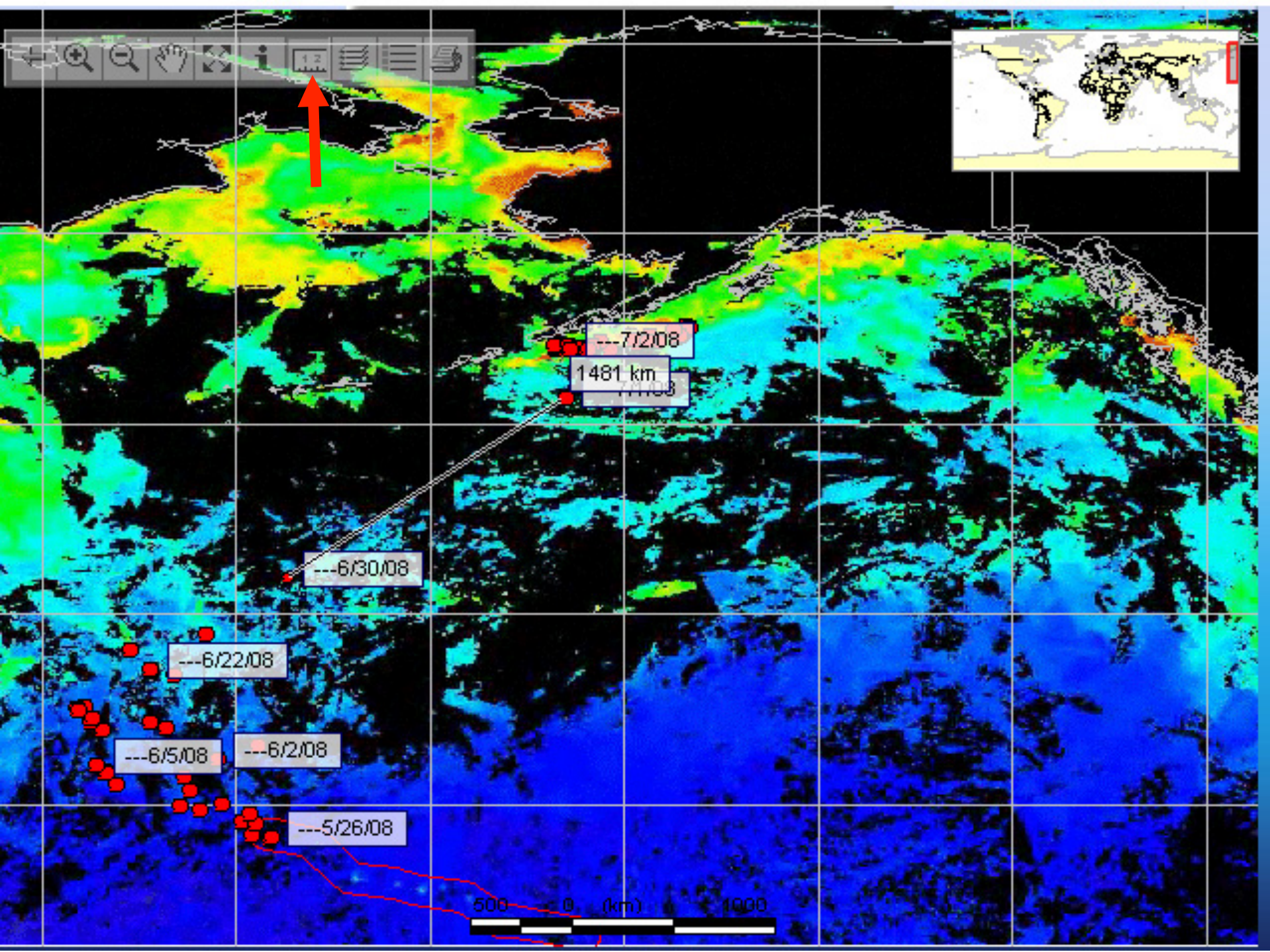
Map

for these animals.

---7/1/08

---5/26/08

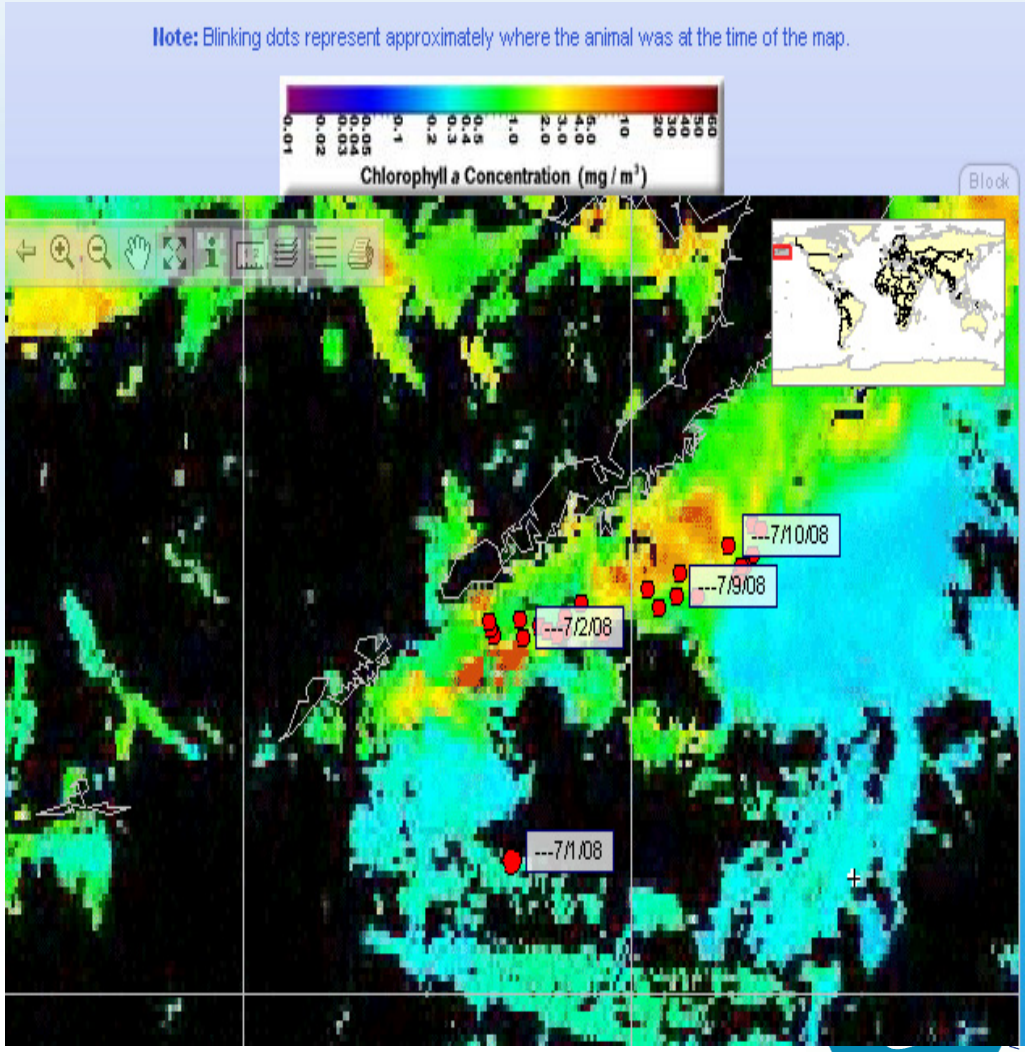

0.01
0.02
0.03
0.04
0.05
0.1
0.2
0.3
0.4
0.5
1.0
2.0
3.0
4.0
5.0
10
20
30
40
50
60
Chlorophyll a Concentration (mg / m3)
Block
---7/2/08
---7/1/08
---6/30/08
---6/22/08
---6/5/08
---6/2/08
---5/26/08


---7/2/08
1481 km
---6/30/08
---6/22/08
---6/5/08
---6/2/08
---5/26/08
500
0
(km)
1000

Sample Observation

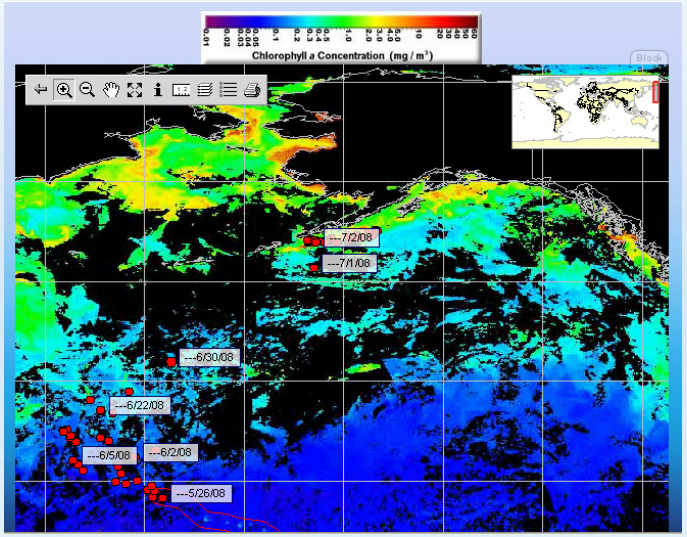
At the end of June (between June 22nd and June 30th), Animal 66534 was in the central North Pacific, located in an area with very low chlorophyll levels, approximately .3 mg/m³. On June 30th, he took off on a long flight, traveling 1481 kilometers in just one day! Between July 1st and 2nd, he traveled another 266 kilometers.

At the June 2nd location, the chlorophyll level near 10 mg/m³.



Sample Justification

This bird flew quite far, most likely in search of food. It left an area of low chlorophyll, meaning few phytoplankton, to travel to an area off the coast of Alaska that had a much higher chlorophyll concentration. Phytoplankton are the base of the marine food chain. In the case of the sooty shearwater, the phytoplankton support a food web that includes the bird's favorite foods, which include jellyfish and squid. Jellyfish and squid eat phytoplankton and zooplankton directly.



As seen in the images, coastlines are often an important feeding ground for seabirds because upwelling and nutrient runoff mean that phytoplankton can reproduce quickly and support the food web. The southern coast of Alaska is an expected feeding ground for sooty shearwaters in June and July.

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE