



**NOAA Teacher at Sea
Beth Lancaster
Onboard NOAA Ship McARTHUR II
April 6 – 14, 2008**

**NOAA Teacher at Sea: Beth A. Lancaster
NOAA Ship McARTHUR II**

Mission: Examine the spatial and temporal relationships between zooplankton, top predators, and oceanographic processes in the Gulf of the Farallones and Cordell Bank.

Project Collaborators: This mission is the result of a collaboration between PRBO Conservation Science and Cordell Bank and Gulf of the Farallones National Marine Sanctuaries. The primary investigator for this cruise is Dr. Jaime Jahncke (PRBO) collaborating with Chief Scientist, Dr. Lisa Etherington (NOAA.)

Geographical Area: Pacific Ocean, Cordell Bank National Marine Sanctuary and Farallones Escarpment.

Date: April 7, 2008

Science and Technology Log

Today was the first full daytime operations. We began shortly after 7:00 a.m., and covered a 90 kilometer transect throughout the course of the day ending at 6:00 p.m. At each sampling point along the transect a series of measurements and observations were made to look at relationships between the physical ocean environment, and abundance of living organisms that are observed and collected to gain a better understanding of the physical and biological features of the area, and how they interact. The daytime crew was divided into two groups: the marine mammal and bird observers, and a second group that was responsible for collecting water and plankton samples as well as other various physical measurements of the water. I worked with the second group, and will share what sampling I assisted with.

At each sampling point we used the CTD, which is a piece of equipment that has several probes on it, to collect a vertical sample of the water column. When the CTD is deployed into the water it is sent down 200 meters below the surface and collects water conductivity (used to calculate salinity), temperature, depth, and turbidity. There is also a fluorometer attached to the CTD that measures the fluorescence of chlorophyll-a, which approximates the abundance of phytoplankton. The CTD collects all this data, and can then be downloaded onto a computer. Surface water samples were also collected at each sampling point, and will be tested for the presence of nutrients which would also have a direct impact on the abundance of organisms in the area.



NOAA Teacher at Sea Beth Lancaster bottles a surface water sample that will be tested for the presence of nutrients.

To gather information on the living organisms present at each site, a hoop net was used to collect samples of plankton. The net was sent down approximately 50 meters, and collected all of the



Beth Lancaster (right) preserves a plankton sample collected using a hoop net.

tiny living organisms (zooplankton) on a screen as the net was pulled through the water column. When the hoop net was brought back onboard, the cod end of the net (where the sample is collected) was transferred to a sample bottle, and preserved for further investigations in the laboratory.

In addition to the living organisms collected in the hoop net, marine mammal and bird observations are being made from the flying bridge of the ship. That would be the highest point on the boat, and not the location for people who are afraid of heights. Due to rough sea conditions (10-12 foot swells), sightings were few and far between today.

Springtime within Cordell Bank National Marine Sanctuary is a time where strong winds cause upwelling of deeper waters towards the surface near the coast. This upwelled water is colder and has higher nutrient concentrations. This influx in nutrients means the ecosystem becomes very productive. Given this high influx of nutrients, prey items for birds and mammals are readily available. The food of choice for a lot of these organisms is krill (a shrimplike zooplankton.) We did collect some krill in the hoop net during the day, but the abundance of krill in shallower water is much greater in the evening, when krill migrate from deep depths towards the surface. The night crew is collecting krill using a tucker trawl, which has three separate nets that are opened and closed at different depths.

Krill play a vital role in the ecosystem scientists are currently studying. They provide nourishment for resident and migratory birds as well as marine mammals. There is sufficient nutrient availability for primary producers which are then food for primary consumers such as krill, and therefore food availability for secondary consumers such as fish and tertiary consumers such as whales and dolphins.

Throughout the week the same measurements will be taken at different sights along the continental shelf and continental slope in the region of Cordell Bank National Marine Sanctuary and the Farallones Escarpment (within Gulf of the Farallones National Marine Sanctuary). This information will allow scientists to better understand the dynamic relationship



Sample of krill caught in the daytime with a hoop net.

between zooplankton, top predators, and oceanographic processes. Data gathered will also be used in conservation planning of the marine sanctuaries.



Black-footed Albatross (Picture taken by Sophie Webb off the stern of the McARTHUR II.

Some Animal Sightings

Black-footed Albatross

Ancient Murrelet

Northern Fulmar

Laysan Albatross

Pacific White-sided Dolphin