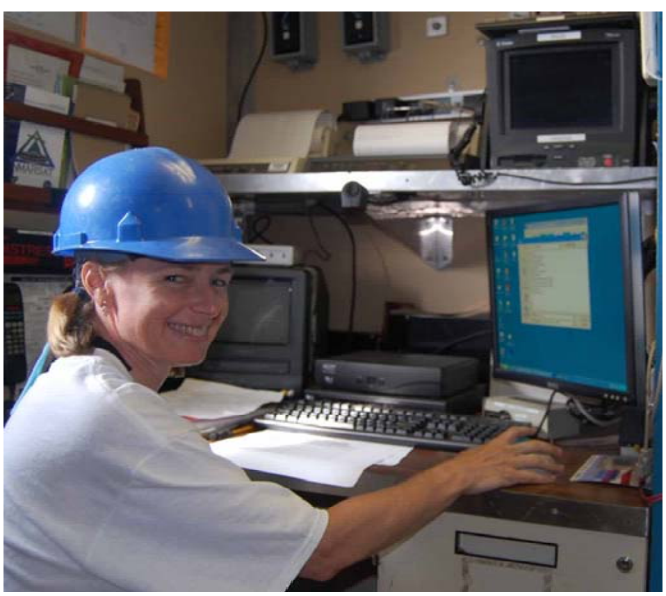
NOAA Teacher at Sea
Lisbeth Uribe
Onboard NOAA Ship DELAWARE II
July 28 – August 8, 2008

NOAA Teacher at Sea: Lisbeth Uribe
NOAA Ship: Delaware II
Mission: 2008 Surf Clam and Ocean Quahog Survey III
Geographical Area: Southern New England and Georges Bank
Date: Tuesday, August 5, 2008

Chief Scientist Vic Nordahl, Chief Boatswain Jon Forgione and Chief Engineer Patrick Murphy discussing the best way to reattach the pump power cable to the dredge.

Ship Log
In the last 48 hours the engineers, crew and scientists have had to re-attach the power cable to the dredge (see photograph), fix the cracked face plate of the pump, replace the blade and blade assembly, change the pipe nozzles that direct the flow of water into the cage, and work on the dredge survey sensor package (SSP). Dredging is hard on the equipment, so some mechanical problems are to be expected. The main concern is for lost time and running out of critical spare parts. So far we have had great success with making the repairs quickly and safely.



Lisbeth is working on the bridge logging the events of each tow into the computer system.

Science and Technology Log

Collecting Tow Event and Sensor Information for the Clam Survey
Over the weekend I was moved up to the bridge during the towing of the dredge. I was responsible for logging the events of each tow and recording information about the ship and weather in a computerized system called SCS (Scientific Computer System). I listened carefully to the radio as the lab, bridge (captain) and crane operator worked together to maneuver the dredge off the deck and into the water, turn on the pumps, tow the dredge on the seafloor

bottom, haul the dredge up, turn off the pump and bring the clam-filled dredge back on deck. It is important that each step of the tow is carefully timed and recorded in order to check that the tows are as identical as possible. The recording of the events is then matched to the sensor data that is collected during dredge deployment. As soon as the dredge is on deck I come downstairs to help clean out the cage and sort and shuck the clams.

Two small black tubes (~3 inches long), called miniloggers, are attached to the dredge. The miniloggers measure the manifold (inside) and ambient (outside) pressure and temperature during the tow.

My next job assignment was to initialize and attach to both the inside and outside of the dredge the two mini-logger sensors before each tow. Once the dredge was back on deck I removed both mini-loggers and downloaded the sensor data into the computers.

NOAA Scientist Amy Nau hauls the plankton net out of the water using the A-frame. (Upper insert: flow meter; lower insert: plankton in the collection bottle after the tow).

Both sensors collect pressure and temperature readings every 10 seconds during each tow. Other sensors are held in the Survey Sensor Package (SSP), a unit that communicates with onboard computers wirelessly. Housed on the dredge, the SSP collects information about the dredge tilt, roll, both manifold and ambient pressure & temperature and power voltage every second. The manifold holds the six-inch pipe nozzles that direct the jets of water into the dredge. Ideally the same pump pressure is provided at all depths of dredge operation.

In addition to the clam survey, NOAA scientists are collecting other specimens and data during this cruise.

NOAA Plankton Diversity Study

FDA and University of Maryland Student Intern Ben Broder-Oldasch is collecting **plankton** from daily tows. The plankton tows take place at noon, when single-celled plants called **phytoplankton** are higher in the water column. Plankton rise and fall according to the light. Plankton is collected in a long funnel-shaped net towed slowly by the ship for 5 minutes at a depth of 20 meters.

Information is collected from a flow meter suspended within the center of the top of the net to get a sense of how much water flowed through the net during the tow. Plankton is caught in the net and then falls into the collecting jar at the bottom of the net. In the most recent tow, the bottle was filled with a large mass of clear jellied organisms called **salps**. Ben then filters the sample to sort the plankton by size. The samples will be brought back to the lab for study under the microscope to get a sense of plankton species diversity on the Georges Bank.

An easy way to collect plankton at home or school is to make a net out of one leg of a pair of nylons. Attach the larger end of the leg to a circular loop made from a metal clothes hanger. Cut a small hole at the toe of the nylon and attach a plastic jar to the nylon by wrapping a rubber band tightly around the nylon and neck of the jar. Drag the net through water and then view your sample under a microscope as soon as possible.

Biological Toxin Studies

Scientists from NOAA and the Food & Drug Administration (FDA) are working together to monitor clams for **biological toxins**. Clams and other bi-valves such as oysters and mussels, feed on phytoplankton. Some species of phytoplankton make biological toxins that, when ingested, are stored in the clam's neck, gills, digestive systems, muscles and gonadal tissues. If non-aquatic animals consume the contaminated clams, the stored toxin can be very harmful, even fatal. The toxin affects the gastrointestinal and neurological systems. The rate at which the toxins leave the clams, also known as **depuration rate**, varies depending on the toxin type, level of contamination, time of year, species, and age of the bivalve. Unfortunately, freezing or cooking shellfish has no effect on the toxicity of the clam. The scientists on the Delaware II are collecting and testing specimens for the two biological toxins that cause Amnesia Shellfish Poisoning (ASP) and Paralytic Shellfish Poisoning (PSP).

Scientist Amy Nau filters seawater for ASP causing dinoflagellates.

NOAA Amnesia Shellfish Poisoning (ASP) Study

A group of naturally occurring **diatoms,** called *Pseudo-nitzschia*, manufacture a biological toxin called Domoic Acid (DA) that causes Amnesia Shellfish Poisoning (ASP) in humans. Diatoms, among the most common organisms found in the ocean, are single-celled plankton that usually float and drift near the ocean surface. NOAA scientist Amy Nau collects samples of ocean water from the surface each day at noon. By taking water samples and counting the numbers of plankton cells, in particular the *Pseudo-nitzschia* diatoms, scientists can better determine if a "**bloom**" (period of rapid growth of algae) is in progress. She filters the sample to separate the cells, places the filter paper in a test tube with water, adds a fixative to the tube and sets it aside for further study in her lab in Beaufort, NC.

FDA Paralytic Shellfish Poisoning (PSP) Study

Scientists aboard the Delaware II are also collecting meat samples from clams for an FDA study on the toxin that causes paralytic shellfish poisoning. When clams ingest the naturally occurring **dinoflagellate** called *Alexandrium catenella*, they accumulate the toxin in their internal organs. When ingested by humans, the toxin blocks sodium channels and causes paralysis. In the lab, testing for the toxin causing PSP is a lengthy process that involves injecting a mouse with extracts from shellfish tissue. If the mouse dies, scientists know the toxin is present. The FDA is testing the accuracy of a new quick test for the toxin called the Jellet Test Kit. After measuring and weighing a dozen clams from each station on the Georges Bank, Ben and Amy remove and freeze the meat (internal organs and flesh) from the clams to save for further testing by scientists back on land. At the same time, they also puree a portion of the sample and test it using the Jellet strips for a quicker positive or negative PSP result.

Personal Log

The problems that we have experienced with regard to the dredge over the past few days are an important reminder of the need for the scientists and crew to not only be well prepared but also flexible when engaged in fieldwork. All manner of events, including poor weather and mechanical difficulties, can and do delay the gathering of data. The Chief Scientist, Vic Nordahl, is constantly checking for inconsistencies or unusual patterns, particularly from the dredge sensor readings, that might need to be addressed in order to ensure that the survey data is consistent and accurate.

The time required to repair the dredge meant I was able to do a load of laundry. Dredging is very dirty work! Good thing I am using old shirts and shorts. I also caught up on a few emails using the onboard computers. Though the Internet service can be slow at times it is such a luxury to be able to stay in touch with friends and family on land.

Pilot whales sighted off the bow!

I still have two very special experiences that I wish to share before ending my log. Late in the evening a couple of days ago, as we steamed toward our next tow station, I was invited to peer over the bow. The turbulence in the water was causing a dinoflagellate called

Noctiluca to sparkle and glow with a greenish-blue light in the ocean spray. The ability of *Noctiluca* and a few other species of plankton and some deep-sea fish to emit light is called **bioluminesense**. A few days later we had the great fortune to see five pilot whales about 100 meters away, gliding together, their black dorsal fins slicing through the water, occasional plumes of air bursting upward through their **blowholes** (nostrils located on the tops of their heads).

Answers to the previous log's questions:
<u>1. What is the depth and name of the deepest part of the ocean?</u>
The Mariana Trench in the Pacific Ocean is 10,852 meters deep, (deeper than Mount Everest is tall – 8,850 meters). Speaking of tall mountains, the tallest mountain in the world is not Mount Everest, but the volcano Mauna Kea (Hawaii). It reaches 4,200 meters above sea level, but its base on the sea floor is 5,800 meters below sea level. Its total height (above base) is therefore 10, 000 meters!

<u>2.What is the longest-lived animal on record?</u>
In 2007, an ocean quahog was dredged off the Icelandic coast. By drilling through and counting the growth rings on its shell, scientists determined it was between 405 and 410 years old. Unfortunately it did not survive the examination, so we do not know how much longer it would have lived if left undisturbed. This ancient clam was slightly less than 6 inches in width.