NOAA Teacher at Sea
Beth Carter
Onboard NOAA Ship RAINIER
June 25 – July 7, 2007

NOAA Teacher at Sea: Beth Carter
NOAA Ship RAINIER
Mission: Hydrographic Mapping of Gulf of Esquibel
Day 15: Monday, July 9, 2007

Weather Data from Bridge:

Visibility: 6 miles
Wind direction: 135 degrees
Wind speed: 9 knots
Sea wave height: 0-1 feet
Swell wave height: none
Seawater Temperature: 12.2 degrees C
Dry Bulb Temperature: 11.1 degrees C Wet Bulb: 11.1 degrees C
Sea level pressure: 1022.1 mb
Cloud cover: 8/8, fog & drizzle
Depth: 22.6 fathoms

Science and Technology Log:

Bull kelp…just amazing stuff. Today I want to focus upon bull kelp and its role in the Alaskan coastal ecosystem, and its impact on hydrographers and fishermen.

First of all…it is a fast-growing type of brown algae that can grow in strands from 40-65 feet long. It grows close into shore and anchors itself to rock surfaces by a root-like growth called a holdfast. The scientific name is *nereocystis leutkeana.* Bull kelp has leaves called blades that grow outward from the main stem, but its most distinguishing feature is its long (2-3 feet) "bullwhip" stalks that have air bladders on their ends that can be 4" in diameter…rather like a stiff rope with a hollow

This is a view of strands of kelp as seen from the # 6 launch of the RAINIER. Kelp appears as brown lines, or brown masses in thick kelp beds.

onion on the end. Bull kelp can live for eight years, and reproduces via spores.

Rocky substrates just off the coasts and islands of Alaska provide perfect places for the kelps' holdfasts, and large kelp beds form in and around the islands of southeastern Alaska where the RAINIER is sailing.

In a closer view, bull kelp has some very stiff "bullwhip" like strands with air bladders on its ends. The air bladders are hollow, and look like onions or bulbs.

Bull kelp provides food and protective cover for all types of fish, invertebrates, birds and marine mammals. Kelp beds are literally teeming with life. Kelp waves and moves with the currents and tides. Sea otters are the most visible of the animals who depend on kelp. They feed off the sea urchins and other invertebrates that live at the bases of the kelp. Sea urchins feed upon the holdfasts that anchor the kelp, so the sea otters keep the urchins in check in a healthy kelp bed. The otters can be seen bobbing in the kelp, lying on their backs enjoying snacks of sea urchins, clams, etc.

Commander Guy Noll of the RAINIER says that kelp is a natural navigational aid in Alaska and Pacific coastal waters. If you are in a boat of any kind and you see kelp strands on the surface of the water, stay clear.

Small leaves, or blades of bull kelp washed into shore add decorations to the black pebble beaches.

Hydrographers are not particularly fond of kelp. On the one hand, the presence of kelp indicates a rocky bottom, which is one of the features that chartmakers want to indicate on their maps. But.RAINIER's launches try to stay out of kelp beds, as the kelp can become caught on the sonar transducers, which are suspended from the hulls of the boats. Kelp can also be a "heads up" that there may be a hidden rocky feature that is a danger to navigation. The launches are very careful around kelp.

The sound waves that hydrographers use for charting can also be distorted by kelp, as it is very dense in its coverage. Also, the whips and

floating blade "bladders are hollow, so the echoes do not reach the underlying rocky ground. NOAA sometimes has to send divers down to get a least depth in kelpy areas, and diving in kelp is difficult because of entanglement issues.

Fishermen give kelp beds a wide berth to avoid fouling their nets and equipment in the heavy, leafy, stalky bull kelp. However, they will sometimes try to trawl near kelp beds, as the kelp provides excellent cover for salmon and other fish as they hide from orcas and other predators.

Personal Log

I became fascinated by kelp last week as I kayaked through some island passages that were thick with kelp. As you look into the water, you see dozens, hundreds of small snails on the blades of the kelp…I think they were black turban snails. I tasted some of the kelp and found it, predictably…salty! It was also chewy and gummy and difficult to swallow. Perhaps there are wonderful ways to prepare kelp to eat, but out of the water as a snack – not for me.

This sea otter mom and baby are floating near a kelp bed. This photograph is courtesy of Ensign Tim Smith, an excellent officer and photographer on the RAINIER.

From the launches, it is fun to see the sea otters' heads pop up in and near the kelp beds. They manage to get their heads and shoulders out of the water…they must be standing on the kelp to get such a clear look at us! Several of the moms we saw had babies hitching rides on their bellies, or perhaps nursing. They are unbelievably cute and quick, and I am too slow to get good photographs of them.

Correction!

Early in the trip, I wrote about the GPS, Global Positioning Satellites, and stated that there are 11 in geosynchronous orbits above the earth. I looked up GPS on the NOAA website and found that there are 24 satellites, so I stand corrected!

Questions of the Day:

1. What do you think would be the environmental impact of an oil spill on or near the rocky coasts of Alaska?

2. What effects would it have on kelp beds? If you want a real life example of what could and has happened, “Google” the story of the Exxon Valdez, which created a huge oil spill in Prince William Sound, Alaska in 1989.

*** Note**: Commander Guy Noll explained that the RAINIER was one of the responding vessels after the Valdez oil spill. RAINIER did the hydrographic work needed by the Navy ships that did the cleanup. At that time, the world’s focus turned upon Prince William Sound, and as the RAINIER did the surveying, they discovered many chart errors. They spent a great deal of time surveying the area, and provided more accurate charts for the cruise ships and tourists that became interested in the beautiful area in and around Prince William Sound.