The SALMON PROJECT

"At-Sea Oceanographic Research"

http://www.ims.uaf.edu/salmon/movies/web/atsea.htm

Part 1/8: Going to Sea

A linked set of worldwide oceanography research projects, the Global Ocean Ecosystem Dynamics Study, is designed to help understand how climate change and variability translates into changes in the structure and dynamics of marine ecosystems. To characterize the inter-seasonal, inter-annual and long-term variability of these ecosystems, oceanographers are undertaking large-scale observation programs, developing and applying computer models, and analyzing their data within the context of historical data sets. Research cruises on the Gulf of Alaska shelf have focused on the distribution of nutrients, phytoplankton, zooplankton, fish, and seabird populations relative to ocean physical properties.
(Seth Danielson, M.S., Physical Oceanographer)

To find positioning on the boat we use gyrocompasses, and the *Alpha Helix* has 2 gyrocompasses. We have 2 radars. We have a large Raytheon-M34, 10-centimeter radar and in addition to that, we also have an X-band. It works on a much smaller frequency. For navigation equipment, we have three GPS units on here: Global Positioning System. Our main sounder is a Furuno Color Sounder. With this particular unit I can go down to 2000 meters. We do most of all our communications via satellite. We have an Inmarsat. It gives you both a voice communication and also the ability to send faxes and data.
(William Rook, Captain of the Research Vessel (R.V.) Alpha Helix)

Part 2/8: Getting into position

We have stations spaced every 5 miles from the mouth of Resurrection Bay at what we call station GAK 1, to the shelf break, which is about 90 miles offshore. From the shelf break, another 40 miles offshore, we have another 4 stations spaced 10 miles apart. We're going through and making measurements of the whole water column for the physics, the chemistry and the phytoplankton. Ken Coyle runs his acoustics and he can capture the plankton that he can see at those depths. . .
(Seth Danielson)

Part 3/8: Casting the CTD

OK John, let's go down to 172 at 30 per.
(Seth Danielson)

172 at 30 per, Roger.
(John Whisamore, R.V. Alpha Helix Able Seaman)

We're measuring temperature with 2 probes, and conductivity with two probes. We're also measuring the amount of fluorescence and they're being plotted out on the screen and the CTD goes down through the water column at 30 meters per minute. . . . Up to one zero.
(Seth Danielson)

We take water from specific light depths and we put that water into bottles that have screens on them that mimic that same amount of light getting through. So we add nutrients to those bottles and we let the bottles incubate and for 4 to 6 hours. And the plants have been taking the nutrients up, and from that we can get an idea of how fast they're growing.
(Sarah Thompson, M.S., Biological/Chemical Oceanographer)

I run an auto-analyzer and it tells us how much nutrients are in the water: it's basically plant food. And so each 1 of these is a depth. It comes over here and it grabs a sample and then it just adds the chemical, and mixes it. And what happens is that the chemical reaction makes a change in color and depending how much color you get, is how much nutrients are in the water.
(Amy Childers, Ph.D. graduate student of Chemical Oceanography)

This is for chlorophyll, which shows you production in the water. There are usually about 6 to 12 samples at every station. I'm filtering the water we just sampled.
(*Melaine Rohr, M.S., Biological/Chemical Oceanographer)*

Part 4/8: Collecting Zooplankton

John you want to just hold it there for a second, bring it close. . . OK, bring it up.
(Russell Hopcroff, Ph.D., Biological Oceanographer)

We have the smaller mesh. The plankton that can move fast enough see it coming and get out of the way. And then, where if you have a coarser mesh net, then it can go faster and it will grab everything.
(Laura Slater, Ph.D. graduate student of Biological Oceanography)

Judging by a quick look here, there's euphausiids, there's *Pseudocalanus*, *Acartia*, there's *Centropages*, a few *Calanus*, and some *Podon*.
(Russel Hopcroff)

Let's go down at 20 per.
(Ken Coyle, Ph.D., Biological Oceanographer)

OK, pay out at 20
(Pam Blusk, R.V. Alpha Helix Able Seaman)

Ken Coyle: As we move along the acoustic equipment is being pulled through the water and it looks down through the water column so we can see what the net is fishing . . . OK, let's reverse and retrieve at 10 per.
(Ken Coyle)

OK, coming back in at 10.
(Pam Blusk)

Part 5/8: Lauching the Mocness Net

We just fired the net, that was the net signal. So it's starting to get light and the animals have already started their descent. Yep, the ultimate oceanographers; their life depends on it. OK that's it, we tripped the last net, and the last net just has to fish up to the surface and we're done with the tow. . . (OK, this is 5, right). Yep, number 5; OK that can be rinsed . . . that's got some euphausiids in it.
(Ken Coyle)

I'm putting individual female copepods into containers to monitor their production of eggs. The idea is that we will eventually be able to predict the relationship between food and temperature, and production. How are you doing for Acartia, Alexi?
(Russel Hopcroff)

I'm just picking them up. I don't know how many.
(Alexi Pinchuk, Ph.D. graduate student of Biological Oceanography)

I started learning in March with Bob Day. I'm studying the distribution and the abundance of the seabirds in the Gulf. I'm going to try to relate the distribution to the zooplankton data that has been collected at night.
(Leandra DeSousa, M.S. graduate student of Biological Oceanograhy)

Part 6/8: Measuring Physical Properties

Whereas the GLOBEC project samples 6 or 7 times a year on the Gulf of Alaska Shelf, we also deploy 2 moorings about 30 miles offshore. There's about a half a dozen different types of instruments on these 2 moorings.
(Seth Danielson)

Part 7/8: Mooring deployment

Near the surface we have a SEACAT instrument, we have a light sensor, a fluorometer, a transmissometer, a temperature probe and a conductivity probe. Below that we have a nitrate meter, which is using color-metrics to determine the amount of nitrate in the water column. Below the nitrate meter we have a sediment trap, which is measuring the amount of particles that are drifting down through the water column. Once the mooring is all assembled, we pick up the top float and slowly lower it over the stern of the ship, and then pay out each instrument 1 after another until we finally get down to the anchor. And then the mooring is deployed for the next 6 months to a year or so. We come back to pick up the moorings and send an acoustical signal down to the release, which is holding on to the anchor. The acoustic release hears our signal, lets go of the anchor and all the floats on the mooring bring the entire mess of instruments up to the surface. We pull up the acoustic Doppler current profiler, which measures the currents by bouncing sound waves off of zooplankton in the water column.
(Seth Danielson)

Part 8/8: What the Ocean can tell us

The conditions that we pull up our moorings in isn't always ideal. SEACATs and nitrate meters can be covered in growth when we bring them back up onboard, but after careful cleaning, we bring them into the lab so that we can download the data

on to a computer to analyze.
(Seth Danielson)

The data from this project will help us make the links between the physical properties of the Gulf of Alaska and its plants and animals. This baseline data will increase our understanding of how and why the ocean ecosystem is changing.

A couple days of cloudiness and drizzle it's nice to be out here.
(Thomas Kline, Ph.D., Oceanographer)