

GLOBEC Northeast Pacific California Current

Cruise Report, R/V *Roger Revelle* (R0208)

31 July - 19 August, 2002

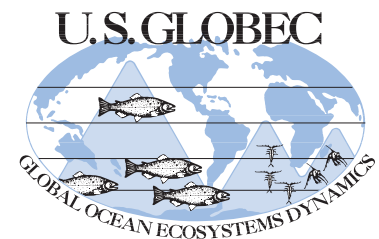


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31 July - 19 August, 2002**

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Port of Departure: Newport, Oregon
Port of Return: Newport, Oregon

Cruise Objectives

- To conduct a mesoscale hydrographic, velocity, bioacoustic and bio-optical survey of coastal waters between Newport, OR, and Crescent City, CA;
- To conduct at least two finescale hydrographic, velocity, bioacoustic and bio-optical surveys over the continental shelf and shallow continental slope: one over Heceta Bank, the other bracketing Cape Blanco;
- To deploy optical drifters within the survey area;
- To obtain high-resolution underway measurements of surface hydrographic, optical (ac-9), and photosynthetic properties, along with frequent discrete samples for nutrients, chlorophyll, HPLC, phytoplankton species, and particulate absorption;
- To obtain profiles of hydrographic, bio-optical and photosynthetic properties near the optical drifters;
- To obtain CTD profiles of hydrographic properties along the mesoscale survey lines as time and conditions permit;
- To obtain marine mammal and seabird distribution estimates in the survey area.

Table 1. GLOBEC Cruise Participants (all OSU unless specified)

Jack Barth	Chief Scientist	Sea Soar
Robert O'Malley	Technician	Sea Soar
Anatoli Erofeev	Scientist	SeaSoar
Renato Castelao	Graduate Student	SeaSoar
Meng Zhou (U Mass)	Scientist	OPC
Di Wu (U Mass)	Graduate Student	OPC
Ricardo Letelier+	Scientist	underway nuts/chl/FRRF/drifters
Amanda Ashe	Technician	underway nuts/chl/FRRF/drifters
Rachael Sanders	Graduate Student	underway nuts/chl/FRRF/drifters
Guido Corno	Graduate Student	underway nuts/chl/FRRF/drifters
Mauricio Andrades	Undergrad Student	underway nuts/chl/FRRF/drifters
Marc Willis	Marine Tech Sup	SeaSoar
Linda Fayler	Marine Tech	SeaSoar
Toby Martin	Marine Tech	SeaSoar
Chad Waluk (Cal State, Monterey)	Technician	SeaSoar
Steve Pierce	Scientist	ADCP/HTI
Kasey Legaard (UMaine)	Graduate Student	HTI/misc
Christopher Wingard	Technician	bio-optics
Amanda Briggs	Graduate Student	bio-optics
Cidney Howard	Graduate Student	bio-optics
David Ainley (^HTH)	Scientist	bird observations
Charles Alexander (^HTH)	Technician	bird observations
Cyndy Tynan (UW)	Scientist	mammal observations
Tom Ryan (^HTH)	Technician	mammal observations
John Hercher (South Salem HS)	High School Teacher	outreach
Tammy Baiz (Scripps)	Resident Technician	operations
Bill French (Scripps)	Computer Technician	operations

+ Disembarked 9 August

^HTH H. T. Harvey and Associates

GLOBEC Research Components Represented:

Barth, Cowles, Pierce: *Mesoscale patterns in physical and bio-optical distributions* (SeaSoar)

Participants: Barth, Pierce, Erofeev, O'Malley, Wingard, Howard, Fayler, Swenson, Martin, Castelao, Waluk, Legaard, Briggs

Abbott and Letelier: *Phytoplankton biomass and physiology*

Participants: Ashe, Letelier, Sanders, Corno, Andrades

Huntley and Zhou: *Zooplankton distributions from optical plankton counter* (OPC)

Participants: Zhou, Wu

Peterson: *Zooplankton distributions from 4-frequency bioacoustical system* (HTI)

Participants: Pierce

Tynan and Ainley: *Distributions of marine mammals and seabirds*

Participants: Tynan, Ainley, Alexander, Ryan

Summaries of each of the GLOBEC projects may be found at the following web site:

<http://globec.coas.oregonstate.edu/groups/nep/projs.html>

Cruise Narrative (Note: All times referred to in cruise narrative are local (PDT: UTC -7).

The R/V *Roger Revelle* was loaded for GLOBEC NEP mesoscale survey activities at the OSU Ship Operation's dock on 28-31 July 2002. The R/V *Revelle* was tied up forward of the R/V *Wecoma* which was being loaded for departure on 1 August for Hawaii. The R/V *New Horizon* arrived on 30 July and tied up outside of the R/V *Revelle*. The R/V *New Horizon* loaded MOCNESS gear in preparation for zooplankton sampling in coordination with the survey work conducted from the R/V *Revelle*.

This was the second of two cruises in 2002 to map out the physical and biological oceanographic distributions and processes that influence juvenile salmonid habitat along the Oregon and northern California coast. The goal is to understand how physical circulation features (for example, upwelling fronts and jets, and recirculation around submarine banks) influence distributions of phytoplankton, zooplankton and larval fish. We used a variety of instruments: a towed, undulating vehicle (SeaSoar) to measure temperature, salinity, phytoplankton fluorescence, colored dissolved organic matter (CDOM) fluorescence, and zooplankton; a shipboard Acoustic Doppler Current Profiler to measure water velocity; and a towed, four-frequency acoustics unit (HTI) to detect large zooplankton and larval fish. Surveys of the bird and mammal populations were also made during daylight hours. A set of three WOCE-standard surface drifters was released on the Newport Hydrographic line at the beginning of the cruise. Two sets of bio-optical drifters were released at the northern ends of our survey grids, with the expectation that they'd drift through the study area as we sampled with SeaSoar. All drifters were tracked via ARGOS. Bio-optical measurements using a Tethered Spectral Radiometer Buoy (TSRB) and the vertically profiling bioacoustics package were made near the surface drifters. We also coordinated closely with the R/V *New Horizon* and the F/V *Frosti*, both conducting net sampling in our study region.

Mesoscale Survey 1 (31 July - 7 August)

31 July. The R/V *Roger Revelle* sailed at 1600 on Wednesday, after the R/V *New Horizon* pulled away from being rafted on the outside of the R/V *Revelle*. We proceeded to the east end of line 1 where there were many crab pots, then continued westward to about the 60m isobath scouting for pots. The HTI was deployed in a crane-in-crutch towing configuration, then was recovered to shorten the tow cable by about 3-4 m so that it would tow well at 7-8 knots. This towing configuration worked well although the HTI was closer to the ship than we've been used to on the R/V *Wecoma* or the R/V *Thompson*. We then found a hole in the crab pots around 1E and deployed the HTI and SeaSoar. The R/V *New Horizon* was near us during deployment. SeaSoaring went well as we headed out line 1. The westward ends of lines 1-4 were moved out to 125 45'W (from 125 15'W as occupied during the May-June 2002 mesoscale survey) in order to capture a cold water feature observed in recent satellite SST imagery. Satellite-tracked surface drifters were deployed at NH-10, NH-15 and NH-25, the historic LTOP drifter release locations. There was still a great deal of cold water on the shelf and a subsurface temperature minimum extended all the way across line 1. The ADCP section showed a nice shelf upwelling jet, a more depth-independent northward flow over the shelf, and then another "shelf-like" equatorward flow centered near 125.6. This was the strong flow coming off the shelf that we thought might be there given the SST imagery. Chlorophyll fluorescence was high in the upper 20m to out well beyond the shelf break.

While heading out past the shelf break on line 1, we observed that the new plastic, zip-on fairing made the SeaSoar performance worse than towing with bare cable. We only got down to about 80 m (see Mesoscale Survey 1, line 1) with about 400 m of zip-faired cable out. It was decided to remove all the fairing and this was accomplished by the OSU MarTechs during the late morning of 1 August. We then towed SeaSoar on bare cable with about a 110 m depth capability. The data set from this cruise will be comparable to what we collected during COAST 2001 and GLOBEC 2000.

After removing the zip fairing, we towed east on line 2 and transited the shallow end and back out before nightfall. We saw the drilling ship *Joides Resolution* and the R/V *Ewing* working over the methane hydrates on the slope between our lines 1 and 2. All bio-optical instruments were online and working well from the beginning of the first mesoscale grid. The 4-person bird and mammal team established their sampling protocol and began surveys during daylight.

2 August. We completed lines 3 and 4 by 1730. SeaSoar and its instruments continued to work well, sampling to about 110 m on bare cable. Just about 24 hours earlier (8/1) we snagged a crabpot at the shallow end of line 2. In the process of pushing it off SeaSoar, the vehicle rebounded into the transom and the upper rear tail fin was broken. There was no damage to the bio-optics instruments located there; the stainless steel PAR cage did its job. The OSU Martechs replaced the tail fin and we were back in the water 2 hours later. Around 1300, at HH-3, we towed the SeaSoar and HTI behind R/V *New Horizon* as they MOCNESSED.

Initial maps of surface properties from lines 1-4 showed that the low temperature, high chlorophyll water was restricted to Heceta Bank, north of 44N and east of 124.8W. This is the zone of low O₂ that ODFW, OSU and PISCO investigators have reported. After the Mesoscale 1 survey, we planned to return to the Heceta Bank region and to do some CTD/rosette casts in this region with an O₂ sensor on the package.

3 August. Winds and seas were calm as we proceeded down the coast near Coos Bay (see Figure 2). Lots of whale sightings this morning near the middle of line 6 (43.5N). We did a near flyby of R/V *New Horizon* along line 6 at 125 10'W (1/2 hour between occupations of that spot). There were several groups (4-12 individuals) of sea lions off the Coos Bay entrance, along with numerous salmon trollers that the R/V *Revelle* wound its way through.

In the 5-m SST maps from SeaSoar data, there was cold water near the coast and a streamer of cold water extending offshore near 44N out to at least 126W. 5-m chlorophyll was highest over the Bank, but elevated values were also found in that cold water feature far offshore. There are lots of downward excursions of high chl water (down to ~50 m), likely associated with the "egg beater" motion of the meanders, filaments and eddies in this well-developed upwelling system.

At approximately 2000, the ship's Knudsen echosounder failed just as we were about to turn offshore near 7E. We flew the SeaSoar conservatively based on the ADCP and HTI depth outputs. We didn't get great depth coverage over the shelf, but we chose to err on the side of caution. The SIO computer tech and OSU Marine Technician, Linda Faylor, swapped in the ship's ODEC Bathy2000 12.5 kHz echosounder and had it done in about an hour and a half. Meanwhile, we did a very close and coordinated flyby of R/V *New Horizon* on the FM line at 124 36'W. The winds were weak and seas calm.

4 August. We conducted a safety meeting to go over the procedures for deploying the CTD/rosette, the bio-optics profiling package and the TSRB in anticipation of switching to those activities after the first Mesoscale survey.

During the early evening, the bird and mammal observers saw many (~25) humpback whales around Coquille Bank just north of Cape Blanco. This was an area of strong upwelling and high chlorophyll. We expect to cover this region again during our south fine-scale survey later in the cruise. We could also see the smoke from the Illinois Valley forest fires to the south.

5 August. By approximately 0800, we completed lines 7-9 on the mesoscale survey and turned eastbound onto line 10 (Rogue River line, 42 30'N) with an ETA at the east end of about 1800. The winds and seas continued to be calm, making for easy operations. We planned to complete the mesoscale survey and get back north to the Newport area before winds picked up as forecast for the end of the week. We plan to do another *New Horizon* flyby this afternoon, closer inshore on line 10, comparing HTI bioacoustics measurements of zooplankton from *Revelle* with zooplankton net tows from the *New Horizon*.

The bio-optics group (Wingard, Howard, Briggs) flow-through systems continue to work well. The phytoplankton physiology group (Letelier, Ashe, Sanders, Corno, Andrades) have operated the Fast Repetition Rate Fluorometer (FRRF) and MicroSAS continuously since we sailed. They take discrete samples every 1-2 hours for chlorophyll, nutrients (frozen for analysis back at OSU), HPLC pigments, absorption, flow cytometry and particle size distributions. They have conducted two C¹⁴ productivity experiments using surface offshore waters and will complete a third today using inshore, upwelled water. All these measurements are intended to assess the phytoplankton assemblages and their physiological state.

The physical and biological measurements have shown some amazing structure associated with an offshore cyclone (counterclockwise eddy) located at 42 45'N, 125 45'W. This is a piece of coastal water spinning off from the along-shore coastal upwelling jet. The strong counterclockwise circulation appears to be forcing cold water, phytoplankton and zooplankton down from near the surface to over 100 m depth. Given this striking feature, we hope to return to

the eddy region for a day of intense sampling (SeaSoar/HTI and deep CTD/rosette casts) after we complete the mesoscale survey tomorrow night (8/6). The R/V *New Horizon* will join us to tow the zooplankton nets through the feature. The goal is to map the physical structure of this eddy and to determine the contents and physiological state of the phyto- and zooplankton communities which it contains.

6 August. We successfully completed lines 10 (Rogue River) and 11 of the Mesoscale grid and are eastbound on line 12 (Crescent City). We expect to complete the survey inshore at 12E at around 2000 this evening.

The SeaSoar and HTI bioacoustics sampling on line 11 delineated the southern end of the cyclonic circulation feature that is centered at 125°35'W, 42°40'N. This eddy has lots of surface chlorophyll with values as high as observed over Heceta Bank. The presence of warm water, phytoplankton and zooplankton at depth (in excess of 100 m) on the westward edge of the cyclonic-turning jet occurs most strongly on lines 8-10, with just a hint of it on line 11. This feature is very intriguing and we will investigate it further on Wednesday.

We completed a flyby of R/V *New Horizon* on the inshore end of line 10 and may do another somewhere on line 12 when we go by the R/V *New Horizon* working its way westbound. The inshore end of line 10 had enormous numbers of jellyfish. Over the outer shelf, they were a white or pale blue color without tentacles and the R/V *New Horizon* scientists told us they were "*Aurelia labiata*." Farther inshore, these were joined by another species of jellyfish, brown or yellow in color with tentacles.

The topside upper trophics group (Cyndy Tynan, David Ainley, Tom Ryan and Chuck Alexander) continue to do line-transect surveys of mammals and strip-transect surveys of birds for 12-14 hours each day. They're doing continuous monitoring during daylight hours, except for short breaks for meals. On line 10 yesterday, they observed the following mammals (# in parentheses): Dall's Porpoise (18), Humpback whales (6), Harbor porpoise (11), Elephant seals (10), Fur seals (2), Steller Sea Lions (2), California Sea Lion (10) and Harbor seals (5). As far as birds, in waters of the slope and deeper (warm water), they observed Leach's storm petrels and a major southward migration of Red Phalaropes, Arctic Terns, and Long-tailed and Parasitic Jaegers. In waters within 10 miles of the coast associated with the cold alongshore upwelling front, they observed Common Murres, Pink-footed and Sooty Shearwaters, Cassin's Auklets, and Red-necked and Red Phalaropes.

One challenge that the Scripps computer tech, Bill French, is working on is intermittent failure of the Knudsen echosounder. We cannot fly SeaSoar safely in shallow water without good bottom depth information. The failure seems to be temperature dependent and Bill is in contact with engineers back at Scripps about how to solve the problem. As a backup, we ran the Simrad multi-beam echosounder system this morning and it did not appear to interfere with the HTI bioacoustics package. So we can use depth information from the Simrad to fly the SeaSoar. Bill is working on coding up a piece of software that will make the Simrad output available to our SeaSoar flight controller. The detailed bottom characteristics from the Simrad can later be shared with geologists at OSU and HMSC to improve their characterization of the bottom habitat off Oregon.

Eddy Study (7-8 August)

7 August. After completing the Mesoscale 1 survey, the R/V *Roger Revelle* turned northwest, still towing the SeaSoar and HTI bioacoustics instrument, to resurvey the cyclone offshore flow feature that we'd measured offshore of Cape Blanco. This morning we found the counterclockwise eddy and the deep subsurface chlorophyll feature on its offshore side. We used the SeaSoar to refine our choice of sampling stations and radioed those locations to the R/V *New Horizon*. We spent the remainder of the day completing five deep stations across the eddy from west to east (see Figure 3). Our first station on the western edge of the eddy sampled through the 90 m deep subsurface chlorophyll feature. We did a traditional CTD/rosette cast to 1000 m to investigate the deep physical structure of this feature. Water was obtained from various depths for chlorophyll and nutrient analysis. Ricardo Letelier and Amanda Ashe collected water from the subsurface chlorophyll maximum in order to run a C¹⁴ growth rate experiment. This will tell us about the viability of this deep phytoplankton population, especially since at those depths there is very little to no light. Getting this biological information about the subsurface feature will add to what we learned about deep chlorophyll features during the 1993 EBC experiment. The bio-optics package was deployed at this same station, and the R/V *New Horizon* was alongside doing vertical net and MOCNESS tows. The bio-optics package was also deployed after the 1000 meter CTD casts at the center and eastern edge of the "eddy". We are in the process of

analyzing the deep CTD data in an effort to see how deep these coastal features penetrate once they leave the continental shelf. We also released a bio-optical drifter near the center of the cyclonic feature.

8 August. We finished our eddy study just after 0200, steamed north at 12 knots, and arrived on the Newport hydrographic line at about 1200 on 8 August. We headed inshore, measuring the subsurface currents using the shipboard ADCP and mapping the crab pots. An upwelling jet core was found near NH-5, about 5 miles offshore of Newport. Three bio-optics drifters were deployed in this feature and we are presently conducting station operations near the drifters. This includes deployment of the TSRB and multiple vertical profiles with the bio-optics package. Also planned is an intercalibration test between the HTI bioacoustics instrument and the TAPS bioacoustics instrument deployed from the bio-optics package.

It's absolutely amazing the number of research vessels that are in this region. In addition to our GLOBEC project using the R/V *Roger Revelle*, the R/V *New Horizon* and the F/V *Frosti*, the drill ship *Joides Resolution* is working off Newport. Further, the German research vessel, R/V *Sonne*, may have been seen working near it today. When calling the R/V *Elakha* today to arrange for a possible meeting, the R/V *Thomas G. Thompson* called in. It is believed that earlier the R/V *Atlantis* and the R/V *Ewing* were in the area, too.

At midnight tonight, we'll deploy the SeaSoar and HTI off Newport and tow to the south on the Fine-Scale North grid over Heceta Bank. We have a quick meeting with the R/V *Elakha* planned later in the morning, at 0900 off Newport. If the weather holds and the seas aren't too rough, we'll receive some science and ship supplies from shore and transfer one of the scientists to shore. After this, we'll continue south on the Fine-Scale North grid. We'll be SeaSoaring for two days, and will be down on the Heceta Head (44N) line when the R/V *New Horizon* (and hopefully F/V *Frosti*) joins us down there on August 10. When we complete the North survey, we plan to find the bio-optics drifters and work by them for a few hours. Then we'll proceed to the Fine-Scale South survey around Cape Blanco. The top trophic observers are excited to resample that area where they saw large numbers of birds and whales.

North Survey (9-11 August)

9 August. We deployed the HTI bioacoustics instrument and the SeaSoar inshore on the Newport Hydrographic Line (line 1) at 0000 on 9 August. Lots of boat traffic near Newport, but it was a crystal clear night. We surveyed on lines 1 and 1A of the Fine-Resolution North survey region before recovering the HTI and SeaSoar at 0800 today. The R/V *Revelle*'s zodiac was used to transfer Ricardo Letelier to the R/V *Elakha* and to pick up some filters for the flow-through bio-optics group and refrigerant for the Chief Engineer. The seas were calm and the transfer went smoothly. We were back SeaSoaring on line 2 at 1000. There was a hotspot of activity on the offshore side of line 2A, at 44 22.8N, 124 42'W. This was the western edge of a very high chlorophyll feature. HTI echoes were solid to the bottom inshore of this point. There were many humpbacks and large numbers of birds. This could be the continuation of a chlorophyll front running along the isobaths, but it is not very strong on the NH line (Line 1).

We had heavy fog most of the day, most likely the result of warmer, moisture laden air meeting the cold upwelled water on the Heceta Bank. This shutdown the daytime bird and mammal observations and necessitated the regular sounding of the R/V *Revelle*'s fog horn. High values of chlorophyll remain over the Bank and the flow-through system filters need to be changed frequently.

11 August. After completing the North Fine-Scale survey at 2300 last night, we transited north to 44 15.0'N. This is just offshore of the PISCO Strawberry Hill measurement site. We conducted 5 CTD stations from 45 to 100 m depth during the night from 0200-0600. We were especially interested in measuring dissolved oxygen through the water column given the previously reported findings of low oxygen waters in this area. We found freshly upwelled, quite salty water (33.914 psu) near the bottom. Each CTD station included samples for nutrients and various phytoplankton properties (chlorophyll content, pigment composition).

As we pulled onto our final station in 100 m of water, one of the bright orange bio-optical drifters was only 50 m off the bow of the R/V *Revelle*! We had tried to finish near where we expected the drifters to be, but it was pure luck that they were that close to our CTD station. The other two drifters were close by, within about several hundred meters of each other. After the CTD, we proceeded with our station work near the drifters, including a TSRB session, and 1.5 hours of bio-optical profiling.

Meanwhile, Chris Wingard, Marc Willis and Chad Waluk worked hard to repair the SeaSoar from the two minor problems we had encountered toward the end of the North Fine-Scale sampling. Chris made a new cable for the PAR sensor and, with assistance from Chad, also made a new cable for the ac-9 we're flying on top of SeaSoar. The light absorption channel had gone out on ac-9 #152 (Barth's ac-9), so we swapped in ac-9 #141 from the Cowles group once we had the cable we needed. Marc and Chad reattached all the instruments to SeaSoar and buttoned it up in record time as we transited to the offshore end of line 4.

Middle Survey (11-12 August)

We needed to reassemble the SeaSoar quickly because of the opportunity to work with both the R/V *New Horizon* and the F/V *Frosti* along the 44°0'N (Heceta Head) line this afternoon. We decided to take a closer look at the region near 124°42'W on the inshore side of Heceta Bank, where the top trophic group reported sightings of about 50 humpbacks along this line the previous day.

The SeaSoar was deployed at 1500 today (August 11) and we began towing inshore on line 4 (HH). We did another intercalibration flyby of the R/V *New Horizon* starting at 2115 as we were heading eastbound; the F/V *Frosti* was trawling for salmon nearby.

On the inshore part of line 4, the water was the color of root beer, a deep brown from high phytoplankton concentrations. It appears that the whales and birds are on the outside, western edge of this high chlorophyll feature. We should have the data in hand, from physics (temperature, salinity, circulation, water clarity), chemistry (nutrients) and biology (phytoplankton, zooplankton, birds and mammals) to sort out the spatial structure of this community.

Next up is towing the SeaSoar and HTI to line 7 off Bandon, deploying another set of bio-optical drifters, and then conducting a 2-2.5 day survey of the southern region around Cape Blanco.

12 August. Unfortunately, at about 0900, the SeaSoar vehicle hit the bottom on the shallow end of line 7 off Bandon. Upon recovery, the Optical Plankton Counter (OPC) had been sheared off the bottom and the nose of SeaSoar was dented. There were rocks, mud and a piece of benthic sponge in the nose opening of SeaSoar. The temperature and conductivity sensors mounted in the nose of SeaSoar were jarred, but may be okay as further tests will tell. The vehicle and the other instruments are okay. We have a second OPC and backup temperature and conductivity sensors on board. We also have a spare SeaSoar nose. We are now working to replace all the damaged parts and hope to have SeaSoar back in operation tomorrow afternoon (August 13). The bottom collision was caused by an incorrect setting on the ship's echosounder: the minimum depth was set too deep as we came into shallow water.

While the SeaSoar is under repair, we deployed 3 bio-optical drifters in the upwelling jet along line 7 off Bandon. We completed TSRB, bio-optics and CTD/rosette profiling near the drifters.

South Survey (13-15 August)

13 August. As of 1700 today, we were back SeaSoaring on the Fine-Resolution South grid. Thanks to the OSU Marine Technicians (Marc Willis, Linda Fayler, Chad Waluk and Toby Martin) for their hard work rebuilding the SeaSoar nose and bringing the vehicle back to 100% functionality. During the time it took to do the repair, we surveyed lines 7, 7A and 8 with the HTI in the water, along with the complete flow-thru instrumentation and the bird and mammal observers on the O3 deck. Last night, between surveying lines 7 and 7A, we completed CTD profiles along the FM line (FM-6,7,8,9 and 10). Combining these with R/V *New Horizon*'s CTD stations along the FM line earlier in the day gives us a complete LTOP-quality FM line.

We found freshly upwelled, low chlorophyll water along these first three lines of the South grid, consistent with the strong upwelling favorable (southward) winds over the last couple of days. The HTI bioacoustics instrument showed strong returns in the low frequencies (euphausiids?) over and inshore of Coquille Bank. The bird and mammal observers reported very few whales in this region, in contrast with their count of about 25 individuals along line 8 about nine days ago. Scientists aboard the F/V *Frosti* report catching many adult salmon on three stations they occupied over the Bank. Although there weren't large numbers of mammals along these lines, the top trophic observers logged their 300th cetacean sighting.

The SeaSoar rebuilding effort involved stripping all the instruments out of the vehicle and pulling off the smashed nose. Then a spare SeaSoar nose was reinstalled, with a little cosmetic surgery, and a new OPC frame was attached to the bottom of the vehicle. The OPC instrument was reattached and newly constructed ballast weights (thanks Chief Engineer John Downey and crew!) were hung beneath SeaSoar. The spare OPC does not have serial communications as did the lost OPC, so we ran the OPC via copper conductors rather than over the fiber optic link. All communications up and down the cable are working fine. The OSU MarTechs also took the opportunity to replace the hydraulic unit which drives the wings up and down, while the other repairs were going on.

14 August. We completed lines 8 through 10 on the Fine-Resolution South grid. Heavy fog inshore near Port Orford put the bird and mammal observers out of work for a few hours. There is a great deal of freshly upwelled, cold, salty water inshore on each of these lines. We went far enough offshore on lines 8 and 8A to find the temperature and salinity front near 125 25'W. Lines 9 and 10 contained mostly freshly upwelled water, but there was a pool of chlorophyll in the upper 20 m centered on the middle of each line. There was very little phytoplankton in either the freshly upwelled water right near the coast or the water offshore of the front.

Amanda Ashe took a sample for C¹⁴ analysis this morning inshore near Cape Blanco. The flow-through system continues to work well. Winds picked up to 30 knots as we came in toward the coast on line 9. We could clearly see the huge plumes of smoke coming off the mountain ridges in this area from the forest fires.

Mesoscale Survey 2 (15-19 August)

15 August. We completed the Fine-Resolution south grid through line 11, then skipped line 11a and instead dropped down to do line 12 (Crescent City Line) and the start of the next survey. The South survey had shown freshly upwelled water inshore of about 125 10'W. The only significant surface layer chlorophyll was restricted to 42.5-43 N and 124 36' to 125 10'W.

We ran into gale force winds around Cape Blanco. As we headed inshore on line 10, winds were out of the north at 25 knots increasing to 35 knots as we passed the longitude of the Cape. Inshore of that, the winds weakened and even reversed as we moved into the protective lee south of the Cape.

We designed a "Mesoscale 2" survey from south to north to hit some of the important features we discovered on our previous Mesoscale 1 grid, as well as to occupy some of the main GLOBEC cross-shelf lines. We extended line 12 out to warm water at 126 30' and then will angle back through the center of the cyclonic eddy we had sampled earlier.

16 August. As we sampled through the eddy early this morning, we found that it still had some chlorophyll in a subsurface maximum around 30 m, but it had reduced greatly since the previous week. Further analysis will allow us to estimate the fate of shelf material (cold water, nutrients, phyto- and zooplankton) sent offshore in this feature.

We then angled offshore to the western end of line 10, and then turned shoreward. We turned north at 125 30' in the early afternoon, intending to intersect the drifters on line 8 before dusk. After only diverting about a mile from our track line, we found the bio-optical drifters in the middle of line 8 off Cape Blanco. The drifters finally got caught up in a strong southward jet (45 cm/s or about 1 knot of current) and shot down to our track line. Again, a bit of luck getting the place and time about right. Line 8 is the Coquille Bank line. We did 1.5 - 2 hours of station work near the drifters before redeploying SeaSoar and finishing a tow on line 8 to the east. The one sacrifice was loss of bird and mammal observations from 125 5'W to the beach, since darkness set in as we resumed our tow. We passed by R/V *New Horizon* at 124 50' as they concluded a MOCNESS tow.

Each of our SeaSoar/ADCP/HTI sections across the equatorward jet continues to show lots of vertical structure, including alternating layers of cold and warm water. High chlorophyll is found in the warm lenses extending down the isopycnals (lines of constant density) just offshore of the front and jet. This is all consistent with a vigorous mesoscale circulation consisting of jets, meanders and eddies.

17 August. We are about to turn west for a long, ~15-hour tow along line 4 (Heceta Head) during which we'll lose satellite communications. The satellite dish is on the starboard side of the ship's mast so is blocked from the satellite which is located on the dateline (180W) above the equator.

We came out of the coastal fog and headed west on line 4 along 44 0.0'N. There was high chlorophyll over Heceta Bank out to 125 18' W. As we passed over "Humpback Hollow", the top trophic observers reported seeing some humpback whales. We did an HTI bio-acoustics flyby of the R/V *New Horizon* as they MOCNESSED at HH-5 (125 0'W). We then continued west, looking for the equatorward jet that had transported one of our drifters in a large counter-clockwise loop around Heceta Bank. We found evidence of a strong (> 60 cm/s) southwestward jet at 126 30'W, offshore of which we finally reached warm (17+ degrees C) oceanic water, albeit influenced by Columbia River outflow (salinity < 32.5). Elevated chlorophyll was found at 30-50 m on the western side of the sloping isopycnals which support the jet.

18 August. At 0240 this morning, we turned back east along and into the jet waters. We towed up to line 1 (NH line) and started sampling up the shelf on that line starting at 1300. The top trophic observers reported seeing many (~50) fin whales near ~126, 44 15'N.

19 August. We performed the R/V *New Horizon* flyby between midnight and 0100; the SeaSoar and HTI bioacoustics instrument were later recovered at about 0330. We then headed for the whistle buoy outside the Newport jetty to meet the pilot at 0645. R/V *Roger Revelle* was alongside the OSU ShipOps dock at 0730.

Preliminary Cruise Statistics:

18	CTDs
410	Discrete chlorophyll samples
209	Discrete HPLC (pigment) samples
214	Discrete samples for absorbance spectra
409	Nutrient samples
217	Discrete sample for flow cytometry
83	Coulter counter samples
9	C ¹⁴ stations for P vs I curves
3	Surface drifters deployed
7	Bio-optics drifters deployed
38	Bio-optics casts
3	Tethered Spectral Radiometer Buoy deployments
> 370	Cetacean sightings
> 3000	Bird sightings
7	HTI bioacoustics flybys with R/V <i>New Horizon</i>
7	Gigabytes of HTI bioacoustics data
0.7	Gigabytes ADCP velocity data
10550	SeaSoar profiles CTD/bio-optics/OPC

Data Collection During R0208

SeaSoar CTD and Bio-Optics (Barth and Cowles)

Temperature and conductivity data were collected during all SeaSoar operations with dual Seabird temperature and conductivity sensors that were mounted in the nosecone of the SeaSoar vehicle. We monitored real-time displays of temperature and conductivity data to detect clogging of the sensors.

During the cruise we damaged the tail while disengaging a crab from the vehicle. Later in the cruise we also damaged the nosecone when we struck the bottom while towing. The MarTechs were able to repair the SeaSoar body in both cases.

Bio-optical sensors (ac-9 and two fluorometers) were mounted on the SeaSoar and sampled water via an intake port in the nosecone of the SeaSoar vehicle. Real-time display of ac-9 data was used to reveal spatial patterns of phytoplankton abundance (based on light absorption at 676 nm) in relation to hydrographic features. Two fluorometers were in-line with the ac-9: a WET Labs (WL) Chlorophyll WETStar with an excitation wavelength of 470 nm, recording pigment fluorescence at 685 nm; and a WL-CDOM WETStar with an excitation wavelength of 370 nm and recording colored dissolved organic matter fluorescence at 460 nm.

A complete set of SeaSoar CTD and chlorophyll maps and vertical sections can be found at

<http://damp.coas.oregonstate.edu/globec/nep/seasoar/index.html>.

Three WOCE Surface Velocity Program-style surface drifters (satellite-tracked, 15-m drogued, surface T) were deployed along the Newport Hydrographic line at the start of the cruise.

Bio-optics Group (Cowles)

The Plankton/Bio-Optical Oceanography group, represented by Amanda Briggs, Cidney Howard and Christopher Wingard, were responsible for the bio-optical instrumentation mounted inline with the ship's uncontaminated seawater system. Measurements from the optical instruments included:

- phytoplankton physiology (FRRF, Chelsea, Inc.);
- chlorophyll (CHL) and colored dissolved organic matter (CDOM) fluorescence (both from WET Labs, Inc. WETStars);
- particulate (due to phytoplankton and detritus) and dissolved absorption (a) and attenuation (c) spectra from a nine wavelength spectrophotometer (ac-9, WET Labs, Inc.);
- fluorescence from CDOM, CHL and accessory light harvesting pigments with a multispectral fluorometer (SAFire, WET Labs, Inc.);
- dissolved absorption spectra with an ac-9 after filtering the seawater through a 0.2 μ m filter, and conductivity and temperature (SBE25, SeaBird Electronics, Inc.); and
- additional measurements of spectral backscattering at 6 wavelengths were collected with a HydroScat6 from Hobi Labs, Inc.

The CDOM WETStar ceased to function midway through the first mesoscale map, but all of the other instruments performed according to expectations. With the exception of brief downtimes for plumbing repairs, calibrations and when the instruments were moved in and out of the bio-optical profiler, the system was continuously running.

Measurements of the surface bio-optical properties were collected along all of the SeaSoar track lines except for the middle survey (11-12 August).

Shipboard Acoustic Doppler Current Profiler (Pierce)

Acoustic Doppler current profiler data were collected nearly continuously throughout the cruise using a 153 kHz RD Instruments narrow-band model. The instrument was configured with a pulse length of 8 m, bin width of 8 m, and blanking interval of 4 m. The depth range of good quality data was usually 17 to about 350 m. Bottom-tracking was enabled when the bottom depth was less than about 400 m. P-code GPS was integrated into the ADCP data at the end of each ensemble. Ship's heading was by a combination of Sperry gyro compass and Ashtech attitude GPS, both recorded at 1 Hz. The ensemble averaging time for velocity data was 1 minute. Estimated inherent short-term random uncertainty was 2.1 cm/s for each 1 minute velocity at every depth bin. If the current 1 minute ensembles are averaged in post-processing into 2.5 minute ensembles, however, the short-term uncertainty drops down to 1.4 cm/s. The instrument was also configured to collect raw backscatter amplitude data with every ping, using a special option of the UE4 user-exit program. These data will be used to create 12 s averages, to match with the HTI data ensembles. The ADCP usually operated continuously except for planned brief interruptions to change system parameters. A preliminary analysis suggests overall ADCP data quality for the cruise was excellent.

Bioacoustical system (Peterson and Pierce)

A four-frequency bioacoustics instrument was towed on a short cable off the starboard quarter from a crane during most of the cruise. This was a Hydroacoustic Technology, Inc. Model 244 instrument (HTI), mounted on a towed sled at 4-13 m depth, depending on ship speed. The four frequencies were 38, 120, 200, and 420 kHz (the ADCP backscatter will be used to provide a less-accurate but still useful fifth frequency at 153 kHz). The instrument was always deployed while the SeaSoar was in use and was available at other times as well. It was removed from the water for most of the station work and during transit times when a ship speed of more than 8 knots was required. We configured the HTI to collect echo integration data and to use a raw ping rate of 2.7 pings/s or 0.7 pings/s for each frequency. Depth bins were 1 m in width, and nominal depth ranges were 300 m (38 and 120 kHz), 200 m (200 kHz),

and 100 m (420 kHz). The ensemble averaging time was 12 s. Data were collected nearly continuously while the HTI was deployed, with occasional software or ethernet glitches requiring Windows reboots and the loss of a few minutes of data. Preliminary analysis suggests overall HTI data quality for the cruise was excellent.

Optical Plankton Counter (Huntley and Zhou)

US GLOBEC NEP Program: Zooplankton distribution and size structure

R0208 NEP Survey 4 (July 31 - August 19, 2002)

Meng Zhou and Di Wu

University of Massachusetts Boston

OBJECTIVES

Our overall objective is to understand the abundance and population processes of mesozooplankton within mesoscale physical features of the northern California Current. Our approach includes 1) using an Optical Plankton Counter (OPC) mounted on a vertically undulating SeaSoar for measuring the spatial distribution and the size structure of mesozooplankton along with other physical and biological variables such as temperature, salinity and fluorescence; 2) comparing OPC data of size structures with net tow samples for the size and species relationships; 3) analyzing OPC data based on the size-structure theories for understanding the population dynamics parameters such as individual growth and population mortality rates; and 4) validating our results of population dynamics parameters with results from shipboard experiments conducted on the process-study vessel.

INSTRUMENTS

Optical Plankton Counter (OPC; Focal Technologies Inc.): The Optical Plankton Counter is a real-time underwater system used to sample plankton. It detects particles in 3431 digital sizes within a range of 0.25-14 mm equivalent spherical diameter (ESD). The towed version (OPC-1T) requires a flow rate of 0.5-4 m/s through the sampling aperture. The OPC is mounted at the bottom of a SeaSoar. The communication between the OPC underwater unit and the deck unit through the fiber optical cable or regular conductive wires was flawless during this cruise.

DATA AND PRELIMINARY RESULTS

OPC data were acquired during the Mesoscale-1 survey, eddy study, North fine scale survey and a portion of the South fine scale survey. Data quality is very high. There is no interference with any other instruments, and no interruption of data acquisition. After the SeaSoar hit the bottom and the OPC owned by Oregon State University was lost, a spare OPC together with a pair of brackets and a stand brought from the University of Massachusetts was installed onto the SeaSoar. OPC data were acquired during the south fine scale survey and a portion of the Mesoscale-2 survey. The spare OPC stopped transmitting data on the second to last line of the Mesoscale-2 survey because the electronic case was flooded.

The mesoscale survey shows the correlation between the mesoscale physical fields of the California Current system and the zooplankton distributions. In general, the coastal regions have more zooplankton in both abundance and biomass. The highest abundance and biomass were found over the Heceta Bank and the near shore area south of Cape Blanco where the upwelling was strong during our survey period. Maxima of zooplankton abundance and biomass were found in offshore regions where cold mesoscale eddies were spinning off the California Current, and translating southwestward together with trapped biota. Minima of zooplankton abundance and biomass were also found in areas of eddies. The spatial scale of the zooplankton distribution varies and reflects the scale of upwelling in near shore areas, and the scale of mesoscale eddies in offshore areas.

The vertical transects show complicated features in the zooplankton spatial and temporal distribution. At Heceta Bank, large zooplankton in the size range of juvenile and adult euphausiids were found near surface in near shore regions, and subsurface maxima were found in offshore areas. As moving towards the south, large zooplankton remained in the surface layer within eddies which might spin off from coastal regions. In some areas near jets, these large zooplankton also penetrated deeper than 100m. Small zooplankton in the size range of copepods were found in both surface and deep layers. They tend to be segregated from those large ones. They seem to be transported by currents and downwelling towards the offshore region, and penetrate to a great depth. There is no obvious diel vertical migration pattern in our abundance and biomass transects. Detailed size-dependent features will be analyzed in the future.

Optical drifters (Abbott and Letelier)

Letelier Lab Group GLOBEC 2002: Ricardo Letelier (disembarked August 9), Amanda Ashe, Guido Corno, Rachel Sanders, and Mauricio Andraes.

Discrete Sampling during SeaSoar/ADCP survey: hourly chlorophyll and nutrient samples; bi-hourly HPLC, absorbance spectra, and flow cytometry; and supplemental particle counts/size distribution analysis with a Z2 Coulter Counter, as of 8/17/02 at 7:10 p.m. local time:

410	Chl
209	HPLC
214	absorbance spectra
409	nutrient samples
217	flow cytometry samples
83	coulter counter samples
9	C ¹⁴ stations-to generate P vs I curves (compare w/FRRF data)

Continuous Sampling: Fast Repetition Rate Fluorometer (FRRF-Chelsea Inst) to measure phytoplankton physiological parameters, SAMPLING RATE=1 acquisition per every 3.5sec; and MicroSAS = upwelled and downwelled light at 7 wavelengths (correlate with those used for MODIS sensors) sampled once per second.

Instrument Deployment: HyperTSRB (Satlantic) to obtain hyperspectral radiance data (radiance & irradiance measurements at 256 wavelengths, with a sampling interval of 15s for a total deployment time of 25 minutes).

Optical Drifter deployments (multiwavelength radiance & irradiance measurements): 3 in north, 1 in eddy, 3 in south.

Stationwork near drifters: TSRB (3 deployments); Optical Profiling (see Cowles); and CTD casts for discrete sampling (18 CTD casts).

Seabird and Marine Mammals (Tynan and Ainley)

Seabirds seen on GLOBEC 2002 August Mesoscale Survey 300 m-wide transect strip (David Ainley, August 9, 2002)

	Number	Habitat
Black-footed Albatross	32	Slope
Sooty Shearwater	634	Inshore, upwelling front
Pink-footed Shearwater	166	Inshore, upwelling front
Northern Fulmar	27	Shelf
Hawaiian Petrel	1	Warm, off shelf
Cook's Petrel	3	Warm, off shelf
Leach's Storm-Petrel	614	Warm, off shelf
Fork-tailed Storm-Petrel	354	Shelf, slope
White-winged Scoter	1	Inshore
Red Phalarope	1055	Warm, off shelf
Red-necked Phalarope	433	Inshore, upwelling front
South Polar Skua	2	Warm, off shelf
Pomarine Jaeger	5	Warm, off shelf
Parasitic Jaeger	31	Warm, off shelf
Long-tailed Jaeger	71	Warm, off shelf
Western Gull	65	Inshore, upwelling front
Herring Gull	1	Shelf
Sabine's Gull	22	Warm, off shelf
Arctic Tern	27	Warm, off shelf
Common Murre	893	Inshore, upwelling front
Cassin's Auklet	5168	Inshore, upwelling front, South
Rhinoceros Auklet	60	Slope, shelf
Tufted Puffin	3	Slope, shelf
Marbled Murrelet	4	Inshore
Xantus/Craveri Murrelet	1	Warm, offshore

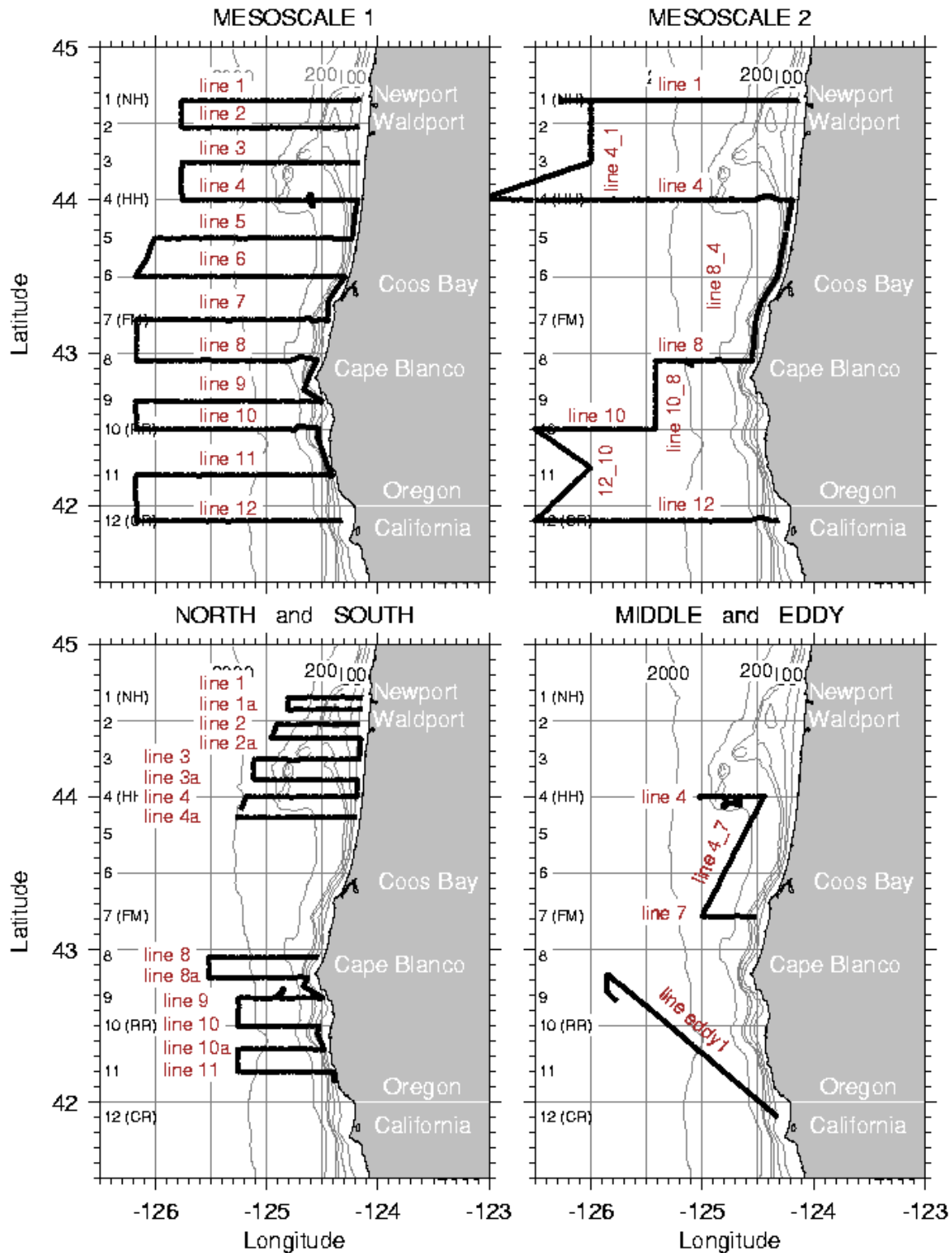


Figure 1. Mapping grids with line numbers

R0208: GLOBEC NEP R/V Roger Revelle winds

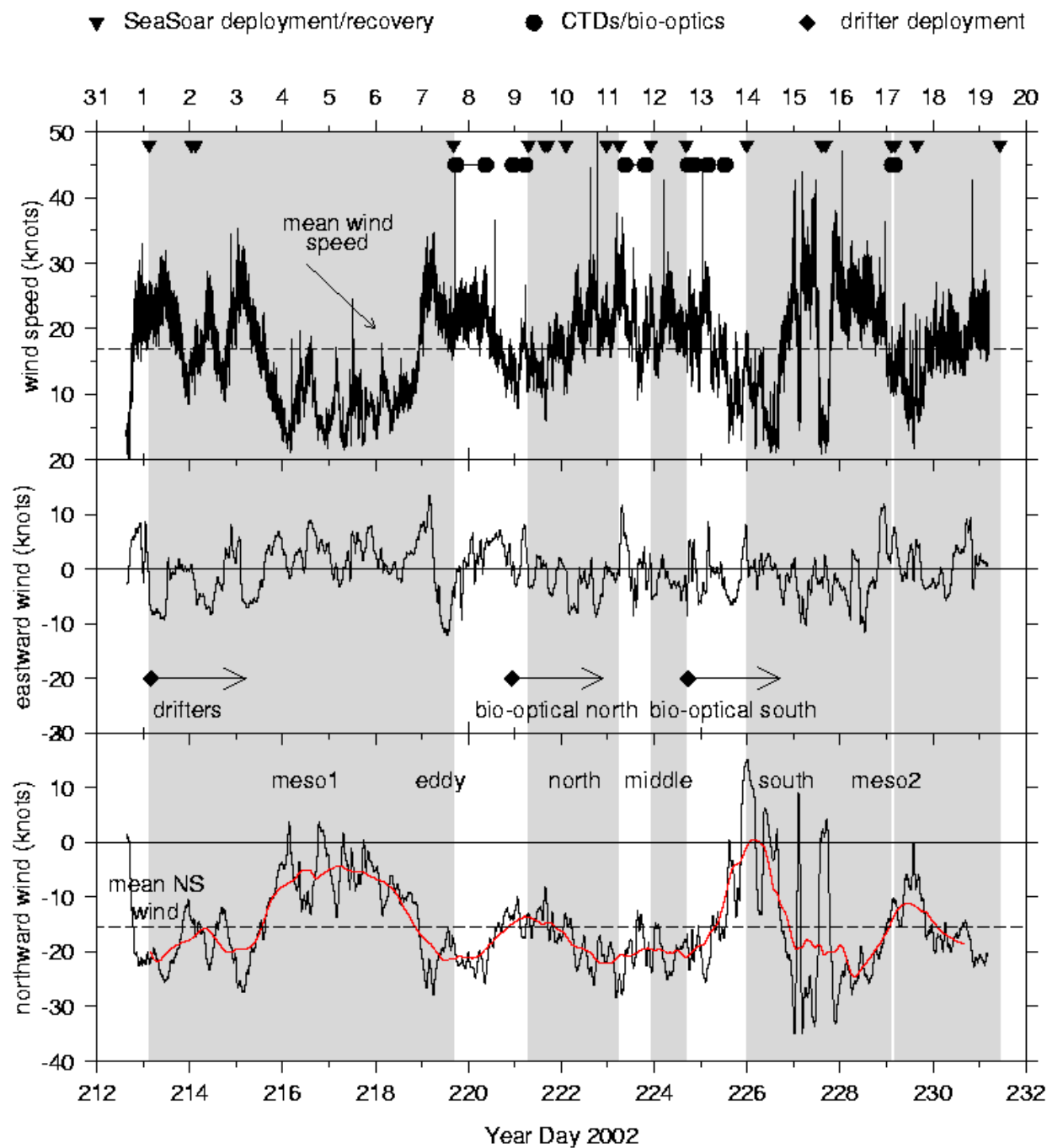


Figure 2. Wind as measured from the R/V *Roger Revelle*, and cruise activities. Time is UTC.

GLOBEC Roger Revelle cruise (R0208) 31-July to 19-August 2002

CTD Locations

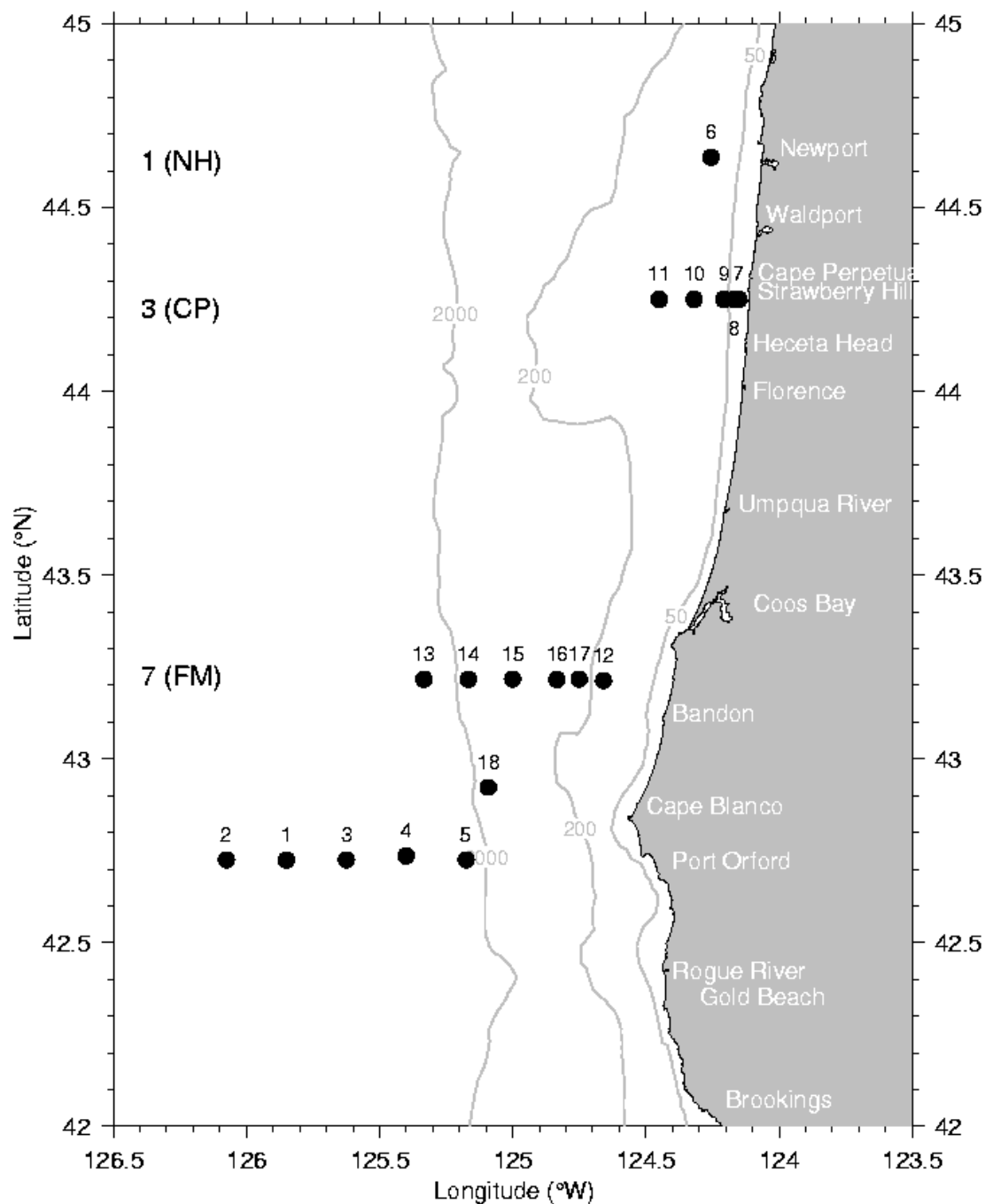


Figure 3. CTD station locations during R0208. Bottom tomography in meters.

Table 2: CTD Casts

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21902.13	CTD	1	1	Eddy2	S	42.7250	-125.8500	3000	1000	Barth	nd	7	8	1735	
RR21902.14	CTD	1	1	nd	E	42.7250	-125.8500	3000	1000	nd	nd	7	8	1838	
RR21902.21	CTD	2	2	Eddy1	S	42.7250	-126.0750	2357	1000	Barth	nd	7	8	2115	
RR21902.22	CTD	2	2	nd	E	42.7250	-126.0750	2357	1000	nd	nd	7	8	2225	
RR22002.03	CTD	3	3	Eddy3	S	42.7250	-125.6250	3075	1000	Barth	nd	8	8	0042	Deployed in eddy.
RR22002.04	CTD	3	3	nd	E	42.7250	-125.6250	3075	1000	nd	nd	8	8	0137	
RR22002.14	CTD	4	4	Eddy4	S	42.7358	-125.4005	3077	1000	Barth	nd	8	8	0421	
RR22002.15	CTD	4	4	nd	E	42.7358	-125.4005	3077	1000	nd	nd	8	8	0540	
RR22002.18	CTD	5	5	Eddy5	S	42.7250	-125.1750	2944	1000	Barth	nd	8	8	0802	
RR22002.19	CTD	5	5	nd	E	42.7250	-125.1750	2944	1000	nd	nd	8	8	0854	
RR22102.02	CTD	6	6	nd	S	44.6368	-124.2555	74	70	Barth	nd	9	8	0320	Line 1.
RR22102.03	CTD	6	6	nd	E	44.6368	-124.2555	74	70	nd	nd	9	8	0338	
RR22302.07	CTD	7	7	Oxy1	S	44.2500	-124.1500	45	40	Barth	nd	11	8	0904	Off Strawberry Hill.
RR22302.08	CTD	7	7	nd	E	44.2500	-124.1500	nd	nd	nd	nd	11	8	0935	PISCO site.
RR22302.09	CTD	8	8	Oxy2	S	44.2500	-124.1702	54	48	Barth	nd	11	8	1051	
RR22302.10	CTD	8	8	nd	E	44.2500	-124.1700	nd	nd	nd	nd	11	8	1126	
RR22302.11	CTD	9	9	Oxy3	S	44.2500	-124.1667	64	57	Barth	nd	11	8	1222	
RR22302.12	CTD	9	9	nd	E	44.2500	-124.1667	nd	nd	nd	nd	11	8	1247	
RR22302.13	CTD	10	10	Oxy4	S	44.2497	-124.3185	79	78	Barth	nd	11	8	1347	
RR22302.14	CTD	10	10	nd	E	44.2497	-124.3185	nd	nd	nd	nd	11	8	1422	
RR22302.15	CTD	11	11	Oxy5	S	44.2493	-124.4500	97	95	Barth	nd	11	8	1537	
RR22302.16	CTD	11	11	nd	E	44.2493	-124.4500	nd	nd	nd	nd	11	8	1605	
RR22402.14	CTD	12	12	nd	S	43.2130	-124.6592	145	143	Barth	nd	12	8	2018	Near drifter 27###.
RR22402.15	CTD	12	12	nd	E	43.2130	-124.6592	74	70	nd	nd	12	8	2052	
RR22502.06	CTD	13	13	FM-10	S	43.2167	-125.3335	3022	1005	Barth	nd	13	8	0335	
RR22502.07	CTD	13	13	nd	E	43.2167	-125.3335	nd	nd	nd	nd	13	8	0427	
RR22502.10	CTD	14	14	FM-9	S	43.2167	-125.1667	1670	1012	Barth	nd	13	8	0537	
RR22502.11	CTD	14	14	nd	E	43.2167	-125.1667	nd	nd	nd	nd	13	8	0642	
RR22502.12	CTD	15	15	FM-8	S	43.2167	-125.0000	1085	990	Barth	nd	13	8	0750	
RR22502.13	CTD	15	15	nd	E	43.2167	-125.0000	nd	nd	nd	nd	13	8	0852	
RR22502.14	CTD	16	16	FM-7	S	43.2163	-124.8337	343	342	Barth	nd	13	8	1010	
RR22502.15	CTD	16	16	nd	E	43.2163	-124.8337	nd	nd	nd	nd	13	8	1048	
RR22502.16	CTD	17	17	FM-6	S	43.2165	-124.7500	313	308	Barth	nd	13	8	1145	
RR22502.17	CTD	17	17	nd	E	43.2165	-124.7500	nd	nd	nd	nd	13	8	1236	
RR22902.10	CTD	18	18	nd	S	42.9220	-125.0918	1646	200	Barth	nd	17	8	0343	Near drifter 27534.
RR22902.11	CTD	18	18	nd	E	42.9220	-125.0918	nd	nd	nd	nd	17	8	0400	

Table 3: Biooptical Profiler Deployments

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21902.15	BioopticProf	1	1	Eddy	S	42.7250	-125.8500	2950	150	Cowles/Wingard	nd	7	8	1915	nd
RR21902.16	BioopticProf	1	1	nd	E	42.7250	-125.8500	2950	150	nd	nd	7	8	1953	
RR22002.05	BioopticProf	2	3	Eddy3	S	42.7250	-125.6250	3075	150	Cowles/Wingard	nd	8	8	0153	For New Horizon.
RR22002.06	BioopticProf	2	3	nd	E	42.7250	-125.6250	3075	150	nd	nd	8	8	0225	MOCNESS depths
RR22002.16	BioopticProf	3	4	Eddy4	S	42.7357	-125.4000	3103	150	Cowles/Wingard	nd	8	8	0554	
RR22002.17	BioopticProf	3	4	nd	E	42.7357	-125.4000	3103	150	nd	nd	8	8	0645	
RR22002.31	BioopticProf	4	6	nd	S	44.6443	-124.2593	78	65	Cowles/Wingard	nd	8	8	2341	15 casts.
RR22102.01	BioopticProf	4	6	nd	E	44.6380	-124.2578	78	65	nd	nd	9	8	0311	
RR22302.19	BioopticProf	5	11	nd	S	44.2430	-124.4483	97	80	Cowles/Wingard	nd	11	8	1713	Near drifters 2691#.
RR22302.20	BioopticProf	5	11	nd	E	44.2382	-124.4537	nd	nd	nd	nd	11	8	1905	
RR22402.12	BioopticProf	6	12	nd	S	43.2128	-124.6592	144	90	Cowles/Wingard	nd	12	8	1825	Near drifters 27###.
RR22402.13	BioopticProf	6	12	nd	E	43.2130	-124.6592	nd	nd	nd	nd	12	8	2012	
RR22902.07	BioopticProf	7	18	nd	S	42.9270	-125.0780	1646	100	Cowles/Wingard	nd	17	8	0300	Near drifter 27534.
RR22902.09	BioopticProf	7	18	nd	E	42.9270	-125.0780	nd	nd	nd	nd	17	8	0330	2 casts.

Table 4: Drifter Deployments

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21302.06	Drifter	1	nd	NH-10	S	44.6520	-124.2965	nd	nd	Barth	nd	1	8	0355	WOCE SVP; Drifter 35910; not recovered.
RR21302.08	Drifter	2	nd	NH-15	S	44.6522	-124.4203	nd	nd	Barth	nd	1	8	0436	WOCE SVP; Drifter 35911; not recovered.
RR21302.09	Drifter	3	nd	NH-25	S	44.6518	-124.6548	nd	nd	Barth	nd	1	8	0556	WOCE SVP; Drifter 35912; not recovered.
RR22002.07	Drifter	4	nd	nd	S	42.7278	-125.6268	3075	nd	Abbott/Letelier	nd	8	8	0234	Deployed in eddy; Drifter 26914.
RR22002.26	Drifter	5	nd	nd	S	44.6523	-124.2408	78	nd	Abbott/Letelier	NFS	8	8	2225	Line 1; Drifter 26910.
RR22002.27	Drifter	6	nd	nd	S	44.6522	-124.2412	78	nd	Abbott/Letelier	NFS	8	8	2226	Line 1; Drifter 26911.
RR22002.28	Drifter	7	nd	nd	S	44.6520	-124.2417	78	nd	Abbott/Letelier	NFS	8	8	2227	Line 1; Drifter 26912.
RR22402.07	Drifter	8	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27954; not recovered.
RR22402.08	Drifter	9	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27534.
RR22402.09	Drifter	10	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27953; not recovered.

Table 5: HTI Multi-frequency Acoustics Observations

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21302.01	HTI	1	nd	1E	S	44.6657	-124.1465	52	v	Pierce	MS1	1	8	0238	Start MS1.
RR21902.12	HTI	1	nd	Eddy2	E	42.6787	-124.7922	2800	nd	nd	nd	7	8	1627	
RR22002.12	HTI	2	nd	Eddy4	S	42.7250	-125.4000	3103	2	Pierce	nd	8	8	0350	
RR22002.13	HTI	2	nd	nd	E	42.7358	-125.4002	3103	nd	nd	nd	8	8	0414	
RR22102.04	HTI	3	nd	nd	S	44.6365	-124.2557	74	5	Pierce	Line1	9	8	0406	TAPS comparison.
RR22102.13	HTI	3	nd	1AE	E	44.5638	-124.1458	45	nd	nd	nd	9	8	1529	
RR22102.16	HTI	4	nd	2E	S	44.4748	-124.1532	50	5	Pierce	NFS	9	8	1658	Line 2.
RR22302.06	HTI	4	nd	nd	E	43.8728	-124.2160	60	nd	nd	nd	11	8	0608	
RR22302.25	HTI	5	nd	nd	S	43.9973	-124.4410	130	5	Pierce	NFS	11	8	2158	
RR22402.06	HTI	5	nd	nd	E	43.2242	-124.4820	60	nd	nd	nd	12	8	1640	No SeaSoar.
RR22402.16	HTI	6	nd	7E	S	43.2200	-124.4483	50	5	Pierce	Line7	12	8	2210	
RR22502.05	HTI	6	nd	nd	E	43.2150	-125.3250	3022	nd	nd	nd	13	8	0319	
RR22502.18	HTI	7	nd	7AE	S	43.0835	-124.4750	44	5	Pierce	SFS	13	8	1414	
RR22902.06	HTI	7	nd	nd	E	42.9233	-125.0617	nd	nd	nd	nd	17	8	0236	
RR22902.12	HTI	8	nd	nd	S	42.9215	-125.1085	1573	5	Pierce	nd	17	8	0413	
RR23102.13	HTI	8	nd	nd	E	44.6630	-124.1357	50	nd	nd	nd	19	8	1049	

Table 6: SeaSoar Deployments

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21302.02	SeaSoar	1	nd	1E	S	44.6657	-124.1465	52	v	Barth	MS1	1	8	0257	Start MS1, Tow1.
RR21402.03	SeaSoar	1	nd	nd	E	44.4652	-124.1617	50	nd	Barth	nd	2	8	0059	End Tow1.
RR21402.04	SeaSoar	2	nd	3E	S	44.2450	-124.1645	50	v	Barth	MS1	2	8	0310	Start Tow2.
RR21902.11	SeaSoar	2	nd	Eddy2	E	42.6748	-124.7922	2800	nd	nd	nd	7	8	1616	End Tow2.
RR22102.07	SeaSoar	3	nd	1E	S	44.6500	-124.1317	45	v	Barth	NFS	9	8	0704	Start Tow3.
RR22102.12	SeaSoar	3	nd	1AE	E	44.5638	-124.1458	45	nd	nd	Line1a	9	8	1524	End Tow3.
RR22102.17	SeaSoar	4	nd	2E	S	44.4740	-124.1580	50	v	Barth	NFS	9	8	1702	Start Tow4.
RR22202.15	SeaSoar	4	nd	nd	E	43.9133	-125.2317	1740	nd	nd	nd	10	8	2226	Near 4AW.
RR22202.16	SeaSoar	5	nd	nd	S	43.8785	-125.2433	1740	v	Barth	NFS	10	8	2319	Start Tow5.
RR22302.05	SeaSoar	5	nd	nd	E	43.8700	-124.2088	60	nd	nd	nd	11	8	0554	
RR22302.26	SeaSoar	6	nd	nd	S	43.9987	-124.4433	130	v	Barth	NFS	11	8	2204	Start Tow6.
RR22402.05	SeaSoar	6	nd	nd	E	43.2242	-124.4820	60	nd	nd	nd	12	8	1630	Near 7E.
RR22502.34	SeaSoar	7	nd	8E	S	42.9507	-124.5280	50	v	Barth	SFS	13	8	2344	Start Tow7.
RR22702.02	SeaSoar	7	nd	nd	E	42.1283	-124.3887	60	nd	nd	nd	15	8	1425	
RR22702.03	SeaSoar	8	nd	12E	S	41.9023	-124.3097	45	v	Barth	SFS	15	8	1626	Also start Meso2.
RR22902.05	SeaSoar	8	nd	nd	E	42.9233	-125.0722	1475	nd	nd	nd	17	8	0223	
RR22902.13	SeaSoar	9	nd	nd	S	42.9247	-125.1113	1573	v	Barth	nd	17	8	0420	Line 8, Meso 2.
RR22902.14	SeaSoar	9	nd	nd	E	43.7892	-124.2460	80	nd	nd	nd	17	8	1525	
RR22902.15	SeaSoar	10	nd	nd	S	43.7987	-124.2430	76	v	Barth	nd	17	8	1540	After cleaning.
RR23102.12	SeaSoar	10	nd	nd	E	44.6543	-124.1333	50	nd	nd	nd	19	8	1036	

Table 7: Tethered Spectral Radiometer Buoy Measurements

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22002.29	TSRB	1	6	nd	S	44.6427	-124.2500	78	0	Letelier/Abbott	nd	8	8	2255	Near drifters 269##.
RR22002.30	TSRB	1	6	nd	E	44.6427	-124.2500	78	nd	nd	nd	8	8	2320	
RR22302.17	TSRB	2	11	nd	S	44.2435	-124.4477	97	0	Letelier/Abbott	nd	11	8	1626	Near drifters 2691#.
RR22302.18	TSRB	2	11	nd	E	44.2435	-124.4477	nd	nd	nd	nd	11	8	1651	
RR22402.10	TSRB	3	12	nd	S	43.2170	-124.6590	144	0	Letelier/Abbott	nd	12	8	1742	Near drifters 27###.
RR22402.11	TSRB	3	12	nd	E	43.2170	-124.6590	nd	nd	nd	nd	12	8	1813	

Table 8: Expendible Bathythermograph Drops

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21802.09	XBT	1	nd	nd	S	41.8997	-126.0907	nd	1000	Barth	nd	6	8	1634	
RR21802.10	XBT	1	nd	nd	E	41.8997	-126.0907	nd	1000	Barth	nd	6	8	1644	
RR22202.11	XBT	2	nd	nd	S	43.9995	-125.1402	nd	1000	Barth	nd	10	8	2120	
RR22202.12	XBT	2	nd	nd	E	43.9995	-125.1402	nd	1000	Barth	nd	10	8	2130	
RR22402.03	XBT	3	nd	nd	S	43.9998	-124.9543	nd	1000	Barth	nd	12	8	0200	
RR22402.04	XBT	3	nd	nd	E	43.9998	-124.9543	nd	1000	Barth	nd	12	8	0210	
RR22502.08	XBT	4	nd	nd	S	43.2165	-125.3255	nd	1000	Barth	nd	13	8	0435	
RR22502.09	XBT	4	nd	nd	E	43.2165	-125.3255	nd	1000	Barth	nd	13	8	0445	
RR22702.11	XBT	5	nd	nd	S	41.8998	-125.4807	nd	1000	Barth	nd	15	8	2338	
RR22702.12	XBT	5	nd	nd	E	41.8998	-125.4807	nd	1000	Barth	nd	15	8	2348	
RR23002.15	XBT	6	nd	nd	S	44.6510	-126.2352	nd	1000	Barth	nd	18	8	2127	
RR23002.16	XBT	6	nd	nd	E	44.6510	-126.2352	nd	1000	Barth	nd	18	8	2137	
RR23002.19	XBT	7	nd	nd	S	44.6513	-125.9063	nd	1000	Barth	nd	18	8	2353	
RR23102.01	XBT	8	nd	nd	S	44.6515	-125.8878	nd	1000	Barth	nd	19	8	0000	
RR23102.02	XBT	7	nd	nd	E	44.6513	-125.9063	nd	1000	Barth	nd	19	8	0003	
RR23102.03	XBT	8	nd	nd	E	44.6515	-125.8878	nd	1000	Barth	nd	19	8	0010	
RR23102.06	XBT	9	nd	nd	S	44.6522	-125.5853	nd	1000	Barth	nd	19	8	0153	
RR23102.07	XBT	9	nd	nd	E	44.6522	-125.5853	nd	1000	Barth	nd	19	8	0203	
RR23102.10	XBT	10	nd	nd	S	44.6510	-125.3422	nd	1000	Barth	nd	19	8	0325	
RR23102.11	XBT	10	nd	nd	E	44.6510	-125.3422	nd	1000	Barth	nd	19	8	0335	

APPENDIX I

R0208 EVENT LOG

EVENTLOG CONTENTS

Column Label

Event#

Instrument (Instr)

Cast

Station (Sta)

Station Standard (Sta std)

Start/End (S/E) flag

Latitude (Lat)

Longitude (Long)

Water Depth

Cast Depth

SI

Region

Day

Month (Mos)

Time

Comments

Description

Unique identifier for each line of event log.

CTD: SeaBird 911 with SBE oxygen sensor, PAR sensor, Seapoint Fluorometer and CStar transmissometer.

BiopticProf: Bioptical Profiler Deployments; generally deployed to 150 m depth or 10 m above bottom if shallower.

Drifter: Drifter Deployments

HTI: HTI Multifrequency Acoustics Observations

SeaSoar: Sea Soar Deployments

TSRB: Tethered Spectral Radiometer Buoy Measurements

XBT: Expendible Bathythermograph Drops

Big Eyes: Big eye binoculars (25x; mammals)

H.Binocs: Handheld binoculars (birds, sometimes mammals)

Sequence # for a particular instrument

S=Start of event; E=End of event

Decimal degrees; north is positive

Decimal degrees; east is positive

Depth of bottom

Maximum depth of deployment

Scientific Investigator

Transect line number

GMT basis

GMT basis

GMT time

Appendix I: Event Log

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21202.01	Depart	nd	nd	nd	S	nd	nd	nd	nd	Barth	nd	31	7	2300	Depart Newport.
RR21202.02	ADCP	nd	nd	nd	S	nd	nd	nd	nd	Pierce	nd	31	7	2300	150kHz shipboard ADCP.
RR21202.03	MET	nd	nd	nd	S	nd	nd	nd	nd	Barth	nd	31	7	2300	Shipboard MET pkg.
RR21202.04	U/W T/S/fl	nd	nd	nd	S	nd	nd	nd	nd	Barth	nd	31	7	2300	Underway 5-m.
RR21202.05	U/W ac-9	nd	nd	nd	S	nd	nd	nd	nd	Cowles/Wingard	nd	31	7	2300	Underway 5-m.
RR21202.06	U/W FRRF	nd	nd	nd	S	nd	nd	nd	nd	Letelier/Ashe	nd	31	7	2300	Underway 5-m.
RR21302.01	HTI	1	nd	1E	S	44.6657	-124.1465	52	v	Pierce	MS1	1	8	0238	Start MS1.
RR21302.02	SeaSoar	1	nd	1E	S	44.6657	-124.1465	52	v	Barth	MS1	1	8	0257	Start MS1, Tow1.
RR21302.03	H.Binocs	nd	birds	nd	S	44.6583	-124.1783	50	nd	Ainley/Tynan	Line1	1	8	0315	Newport line.
RR21302.04	BigEyes	nd	mams	nd	S	44.6582	-124.1772	49	nd	Tynan/Ainley	Line1	1	8	0317	Newport line.
RR21302.05	BigEyes	nd	mams	nd	E	44.6517	-124.2620	nd	nd	nd	nd	1	8	0347	Lost light.
RR21302.06	Drifter	1	nd	NH-10	S	44.6520	-124.2965	nd	nd	Barth	nd	1	8	0355	WOCE SVP; Drifter 35910; not recovered.
RR21302.07	H.Binocs	nd	birds	nd	E	44.6517	-124.2833	75	nd	nd	nd	1	8	0400	Lost light.
RR21302.08	Drifter	2	nd	NH-15	S	44.6522	-124.4203	nd	nd	Barth	nd	1	8	0436	WOCE SVP; Drifter 35911; not recovered.
RR21302.09	Drifter	3	nd	NH-25	S	44.6518	-124.6548	nd	nd	Barth	nd	1	8	0556	WOCE SVP; Drifter 35912; not recovered.
RR21302.10	BigEyes	nd	mams	nd	S	44.4740	-125.7528	nd	nd	Tynan/Ainley	Line2	1	8	1330	MS1.
RR21302.11	H.Binocs	nd	birds	nd	S	44.4833	-125.7633	3000	nd	Ainley/Tynan	Line2	1	8	1330	
RR21302.12	BigEyes	nd	mams	nd	E	44.4745	-125.5742	nd	nd	nd	nd	1	8	1430	
RR21302.13	BigEyes	nd	mams	nd	S	44.4757	-125.4933	nd	nd	Tynan/Ainley	Line2	1	8	1502	MS1.
RR21302.14	H.Binocs	nd	birds	nd	E	44.4750	-125.1483	1440	nd	nd	nd	1	8	1645	
RR21302.15	BigEyes	nd	mams	nd	E	44.4742	-125.1398	nd	nd	nd	nd	1	8	1653	Stop to strip fairing.
RR21302.16	H.Binocs	nd	birds	nd	S	44.4750	-124.9017	480	nd	Ainley/Tynan	Line2	1	8	2040	
RR21302.17	BigEyes	nd	mams	nd	S	44.4752	-124.8982	480	nd	Tynan/Ainley	Line2	1	8	2045	MS1.
RR21402.01	H.Binocs	nd	birds	nd	E	44.4750	-124.1617	50	nd	nd	nd	2	8	0045	
RR21402.02	BigEyes	nd	mams	nd	E	44.4773	-124.1618	nd	nd	nd	nd	2	8	0049	
RR21402.03	SeaSoar	1	nd	nd	E	44.4652	-124.1617	50	nd	Barth	nd	2	8	0059	End Tow1.
RR21402.04	SeaSoar	2	nd	3E	S	44.2450	-124.1645	50	v	Barth	MS1	2	8	0310	Start Tow2.
RR21402.05	H.Binocs	nd	birds	nd	S	44.2450	-124.1633	43	nd	Ainley/Tynan	Line3	2	8	0315	
RR21402.06	BigEyes	nd	mams	nd	S	44.2458	-124.1775	43	nd	Tynan/Ainley	Line3	2	8	0325	MS1.
RR21402.07	BigEyes	nd	mams	nd	E	44.2472	-124.2515	nd	nd	nd	nd	2	8	0352	
RR21402.08	H.Binocs	nd	birds	nd	E	44.2467	-124.2250	80	nd	nd	nd	2	8	0400	
RR21402.09	H.Binocs	nd	birds	nd	S	44.0012	-125.7250	3000	nd	Ainley/Tynan	Line4	2	8	1430	
RR21402.10	BigEyes	nd	mams	nd	S	44.0013	-125.6682	3063	nd	Tynan/Ainley	Line4	2	8	1430	MS1.
RR21402.11	H.Binocs	nd	birds	nd	E	44.0002	-125.2388	2084	nd	nd	nd	2	8	1700	
RR21402.12	BigEyes	nd	mams	nd	E	44.0002	-125.2388	2084	nd	nd	nd	2	8	1700	
RR21402.13	BigEyes	nd	mams	nd	S	44.0000	-125.1928	1711	nd	Tynan/Ainley	Line4	2	8	1715	MS1.
RR21402.14	H.Binocs	nd	birds	nd	S	44.0000	-125.1983	1711	nd	Ainley/Tynan	Line4	2	8	1715	
RR21402.15	BigEyes	nd	mams	nd	E	44.0002	-124.9705	840	nd	nd	nd	2	8	1830	
RR21402.16	BigEyes	nd	mams	nd	S	43.9997	-124.9072	169	nd	Tynan/Ainley	Line4	2	8	1853	MS1.
RR21402.17	H.Binocs	nd	birds	nd	E	44.0000	-124.6050	152	nd	nd	nd	2	8	2038	HTI cal w/ <i>New Horizon</i> .

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21402.18	BigEyes	nd	mams	nd	E	43.9933	-124.5838	152	nd	nd	nd	2	8	2041	HTI cal w/ <i>New Horizon</i> .
RR21402.19	H.Binocs	nd	birds	nd	S	44.0025	-124.5900	148	nd	Ainley/Tynan	Line4	2	8	2200	
RR21402.20	BigEyes	nd	mams	nd	S	44.0025	-124.5900	148	nd	Tynan/Ainley	Line4	2	8	2200	
RR21502.01	BigEyes	nd	mams	nd	E	44.0000	-124.1812	40	nd	nd	nd	3	8	0025	End line 4, Beaufort 6.
RR21502.02	H.Binocs	nd	birds	nd	E	44.0000	-124.1812	40	nd	nd	nd	3	8	0025	End line 4.
RR21502.03	BigEyes	nd	mams	nd	S	43.7442	-124.2380	56	nd	Tynan/Ainley	Line5	3	8	0230	Begin line 5 westbound.
RR21502.04	H.Binocs	nd	birds	nd	S	43.7450	-124.2317	56	nd	Ainley/Tynan	Line5	3	8	0230	Start line 5.
RR21502.05	BigEyes	nd	mams	nd	E	43.7517	-124.4460	123	nd	nd	nd	3	8	0340	Losing light, Beaufort 7.
RR21502.06	H.Binocs	nd	birds	nd	E	43.7417	-124.4667	130	nd	nd	nd	3	8	0400	
RR21502.07	H.Binocs	nd	birds	nd	S	43.5017	-126.1750	3062	nd	Ainley/Tynan	Line6	3	8	1415	
RR21502.08	BigEyes	nd	mams	nd	S	43.4993	-126.1745	3062	nd	Tynan/Ainley	Line6	3	8	1418	MS1.
RR21502.09	BigEyes	nd	mams	nd	E	43.4992	-126.0865	3065	nd	nd	nd	3	8	1446	
RR21502.10	BigEyes	nd	mams	nd	S	43.4993	-126.0400	3062	nd	Tynan/Ainley	Line6	3	8	1502	MS1.
RR21502.11	BigEyes	nd	mams	nd	E	43.5002	-125.3798	3056	nd	nd	nd	3	8	1830	
RR21502.12	H.Binocs	nd	birds	nd	E	43.5017	-125.3798	3056	nd	nd	nd	3	8	1830	
RR21502.13	BigEyes	nd	mams	nd	S	43.5000	-125.3250	nd	nd	Tynan/Ainley	Line6	3	8	1845	
RR21502.14	H.Binocs	nd	birds	nd	S	43.5002	-125.3053	2226	nd	Ainley/Tynan	Line6	3	8	1855	
RR21602.01	BigEyes	nd	mams	nd	E	43.5000	-124.3025	72	nd	nd	nd	4	8	0030	End line 6.
RR21602.02	H.Binocs	nd	birds	nd	E	43.5000	-124.3033	72	nd	nd	nd	4	8	0030	
RR21602.03	BigEyes	nd	mams	nd	S	43.2120	-124.4515	49	nd	Tynan/Ainley	Line7	4	8	0300	Start line 7.
RR21602.04	BigEyes	nd	mams	nd	E	43.2128	-124.6002	105	nd	nd	nd	4	8	0355	HTI cal w/ <i>New Horizon</i> .
RR21602.05	H.Binocs	nd	birds	nd	S	43.2120	-124.4515	49	nd	Ainley/Tynan	Line7	4	8	0400	Line 7 begins.
RR21602.06	H.Binocs	nd	birds	nd	E	43.2128	-124.6002	105	nd	nd	nd	4	8	0456	Look at <i>New Horizon</i> .
RR21602.07	H.Binocs	nd	birds	nd	S	42.9478	-126.1530	2227	nd	Ainley/Tynan	Line8	4	8	1530	
RR21602.08	BigEyes	nd	mams	nd	S	42.9478	-126.1530	2777	nd	Tynan/Ainley	Line8	4	8	1530	Begin line 8 ? East.
RR21602.09	BigEyes	nd	mams	nd	E	42.9498	-125.6357	3015	nd	nd	nd	4	8	1830	
RR21602.10	BigEyes	nd	mams	nd	S	42.9525	-125.5568	3019	nd	Tynan/Ainley	Line8	4	8	1857	
RR21602.11	BigEyes	nd	mams	nd	E	42.9502	-125.1330	1864	nd	nd	nd	4	8	2115	
RR21602.12	BigEyes	nd	mams	nd	S	42.9502	-125.0875	1462	nd	Tynan/Ainley	Line8	4	8	2130	
RR21702.01	BigEyes	nd	mams	nd	E	42.9538	-124.5513	64	nd	nd	Line8	5	8	0036	End of line 8.
RR21702.02	H.Binocs	nd	birds	nd	E	42.9538	-124.5513	64	nd	nd	nd	5	8	0037	End of line 8.
RR21702.03	BigEyes	nd	mams	nd	S	42.7575	-124.6677	96	nd	Tynan/Ainley	L8—>L9t	5	8	0232	Transit to line 9.
RR21702.04	BigEyes	nd	mams	nd	E	42.7020	-124.5402	73	nd	nd	L8—>L9t	5	8	0330	Smoke in air from fires.
RR21702.05	BigEyes	nd	mams	nd	S	42.4977	-126.1640	2851	nd	Tynan/Ainley	Line10	5	8	1513	Begin line 10 w.
RR21702.06	H.Binocs	nd	birds	nd	S	42.4983	-126.1617	2851	nd	Ainley/Tynan	Line10	5	8	1515	
RR21702.07	BigEyes	nd	mams	nd	E	42.5008	-125.5758	3108	nd	nd	Line10	5	8	1830	
RR21702.08	BigEyes	nd	mams	nd	S	42.4997	-125.3360	3108	nd	Tynan/Ainley	Line10	5	8	1945	
RR21702.09	BigEyes	nd	mams	nd	E	42.4948	-124.7422	223	nd	nd	Line10	5	8	2310	C/C <i>New Horizon</i> pass.
RR21702.10	BigEyes	nd	mams	nd	S	42.5202	-124.7125	168	nd	Tynan/Ainley	Line10	5	8	2326	
RR21802.01	BigEyes	nd	mams	nd	E	42.5050	-124.5322	53	nd	nd	Line10	6	8	0028	End line 10 E.

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR21802.02	H.Binocs	nd	birds	nd	E	42.5050	-124.5322	53	nd	nd	Line10	6	8	0028	End of line 10 RR.
RR21802.03	BigEyes	nd	mams	nd	S	42.1983	-124.4050	41	nd	Tynan/Ainley	Line11	6	8	0322	Start line 11 E.
RR21802.04	BigEyes	nd	mams	nd	E	42.1987	-124.4682	121	nd	nd	Line11	6	8	0346	Losing light.
RR21802.05	H.Binocs	nd	birds	nd	S	42.1997	-124.4050	41	nd	Ainley/Tynan	Line11	6	8	0422	Begin line 11.
RR21802.06	H.Binocs	nd	birds	nd	E	42.1993	-124.4968	124	nd	nd	Line11	6	8	0456	Losing light.
RR21802.07	BigEyes	nd	mams	nd	S	41.8975	-126.1687	3100	nd	Tynan/Ainley	Line12	6	8	1605	Crescent City line 16.90.
RR21802.08	H.Binocs	nd	birds	nd	S	41.8967	-126.1667	3100	nd	Ainley/Tynan	Line12	6	8	1605	
RR21802.09	XBT	1	nd	nd	S	41.8997	-126.0907	nd	1000	Barth	nd	6	8	1634	
RR21802.10	XBT	1	nd	nd	E	41.8997	-126.0907	nd	1000	Barth	nd	6	8	1644	
RR21802.11	BigEyes	nd	mams	nd	E	41.9003	-125.7328	2900	nd	nd	nd	6	8	1845	
RR21802.12	BigEyes	nd	mams	nd	S	41.8992	-125.6818	2879	nd	Tynan/Ainley	Line12	6	8	1905	
RR21802.13	BigEyes	nd	mams	nd	E	41.8997	-125.2752	3102	nd	nd	nd	6	8	2130	
RR21802.14	BigEyes	nd	mams	nd	S	41.9022	-125.2222	3091	nd	Tynan/Ainley	nd	6	8	2150	
RR21902.01	BigEyes	nd	mams	nd	E	41.9012	-124.8533	677	nd	nd	Line12	7	8	0000	
RR21902.02	BigEyes	nd	mams	nd	S	41.8990	-124.7652	673	nd	Tynan/Ainley	Line12	7	8	0030	
RR21902.03	H.Binocs	nd	birds	nd	E	41.9000	-124.3550	59	nd	nd	Line12	7	8	0315	
RR21902.04	BigEyes	nd	mams	nd	E	41.8997	-124.3245	59	nd	nd	Line12	7	8	0315	End 12 Crescent City.
RR21902.05	H.Binocs	nd	birds	nd	S	41.8967	-126.1667	3100	nd	Ainley/Tynan	Eddy	7	8	1330	
RR21902.06	BigEyes	nd	mams	nd	S	42.7685	-125.7322	2700	nd	Tynan/Ainley	Eddy	7	8	1337	Transect through eddy.
RR21902.07	BigEyes	nd	mams	nd	E	42.8345	-125.8435	2700	nd	nd	Eddy	7	8	1430	On turn c/c NW edge.
RR21902.08	BigEyes	nd	mams	nd	S	42.7782	-125.8580	2930	nd	Tynan/Ainley	Eddy	7	8	1456	Leady S on eddy pattern.
RR21902.09	H.Binocs	nd	birds	nd	E	42.6717	-125.7833	2948	nd	nd	nd	7	8	1555	
RR21902.10	BigEyes	nd	mams	nd	E	42.6723	-125.7807	2930	nd	nd	Eddy	7	8	1600	Stop - pull in SeaSoar.
RR21902.11	SeaSoar	2	nd	Eddy2	E	42.6748	-124.7922	2800	nd	nd	nd	7	8	1616	End Tow2.
RR21902.12	HTI	1	nd	Eddy2	E	42.6787	-124.7922	2800	nd	nd	nd	7	8	1627	
RR21902.13	CTD	1	1	Eddy2	S	42.7250	-125.8500	3000	1000	Barth	nd	7	8	1735	
RR21902.14	CTD	1	1	nd	E	42.7250	-125.8500	3000	1000	nd	nd	7	8	1838	
RR21902.15	BioopticProf	1	1	Eddy	S	42.7250	-125.8500	2950	150	Cowles/Wingard	nd	7	8	1915	nd.
RR21902.16	BioopticProf	1	1	nd	E	42.7250	-125.8500	2950	150	nd	nd	7	8	1953	
RR21902.17	H.Binocs	nd	birds	nd	S	42.7267	-125.0867	2918	nd	Ainley/Tynan	nd	7	8	2005	
RR21902.18	BigEyes	nd	mams	nd	S	42.7267	-125.8700	2918	nd	Tynan/Ainley	Eddy	7	8	2005	Leady 255 transit bet. (71) stations.
RR21902.19	BigEyes	nd	mams	nd	E	42.7240	-126.0755	2191	nd	nd	nd	7	8	2055	CTD bioptics #2.
RR21902.20	H.Binocs	nd	birds	nd	E	42.7233	-126.0750	2191	nd	nd	nd	7	8	2055	
RR21902.21	CTD	2	2	Eddy1	S	42.7250	-126.0750	2357	1000	Barth	nd	7	8	2115	
RR21902.22	CTD	2	2	nd	E	42.7250	-126.0750	2357	1000	nd	nd	7	8	2225	
RR21902.23	H.Binocs	nd	birds	nd	S	42.7233	-126.0717	2341	nd	Ainley/Tynan	nd	7	8	2230	
RR21902.24	BigEyes	nd	mams	nd	S	42.7240	-126.0712	2341	nd	Tynan/Ainley	Eddy	7	8	2234	Leave CTD #2 eddy.
RR22002.01	BigEyes	nd	mams	nd	E	42.7230	-125.6290	3072	nd	nd	nd	8	8	0027	On CTD #3 station.
RR22002.02	H.Binocs	nd	birds	nd	E	42.7233	-125.5183	3072	nd	nd	nd	8	8	0027	
RR22002.03	CTD	3	3	Eddy3	S	42.7250	-125.6250	3075	1000	Barth	nd	8	8	0042	Deployed in eddy.
RR22002.04	CTD	3	3	nd	E	42.7250	-125.6250	3075	1000	nd	nd	8	8	0137	
RR22002.05	BioopticProf	2	3	Eddy3	S	42.7250	-125.6250	3075	150	Cowles/Wingard	nd	8	8	0153	For <i>New Horizon</i> .
RR22002.06	BioopticProf	2	3	nd	E	42.7250	-125.6250	3075	150	nd	nd	8	8	0225	MOCNESS depths.

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22002.07	Drifter	4	nd	nd	S	42.7278	-125.6268	3075	nd	Abbott/Letelier	nd	8	8	0234	Deployed in eddy; Drifter 26914.
RR22002.08	BigEyes	nd	mams	nd	S	42.7333	-125.6260	3072	nd	Tynan/Ainley	Eddy	8	8	0244	Leave CTD #3 station.
RR22002.09	H.Binocs	nd	birds	nd	S	42.7333	-125.6267	3072	nd	Ainley/Tynan	nd	8	8	0245	On station CTD #4 to <i>New Horizon</i> .
RR22002.10	BigEyes	nd	mams	nd	E	42.7250	-125.4177	3091	nd	nd	Eddy	8	8	0335	
RR22002.11	H.Binocs	nd	birds	nd	E	42.7250	-125.4183	3091	nd	nd	nd	8	8	0335	Transit to NFS. Transit over line 3. Fine scale. NFS Leading east, ADCP survey. End Line 1 NFS. Line 1; Drifter 26910. Line 1; Drifter 26911. Line 1; Drifter 26912. Near drifters 269##.
RR22002.12	HTI	2	nd	Eddy4	S	42.7250	-125.4000	3103	2	Pierce	nd	8	8	0350	
RR22002.13	HTI	2	nd	nd	E	42.7358	-125.4002	3103	nd	nd	nd	8	8	0414	
RR22002.14	CTD	4	4	Eddy4	S	42.7358	-125.4005	3077	1000	Barth	nd	8	8	0421	
RR22002.15	CTD	4	4	nd	E	42.7358	-125.4005	3077	1000	nd	nd	8	8	0540	
RR22002.16	BioopticProf	3	4	Eddy4	S	42.7357	-125.4000	3103	150	Cowles/Wingard	nd	8	8	0554	
RR22002.17	BioopticProf	3	4	nd	E	42.7357	-125.4000	3103	150	nd	nd	8	8	0645	
RR22002.18	CTD	5	5	Eddy5	S	42.7250	-125.1750	2944	1000	Barth	nd	8	8	0802	
RR22002.19	CTD	5	5	nd	E	42.7250	-125.1750	2944	1000	nd	nd	8	8	0854	
RR22002.20	BigEyes	nd	mams	nd	S	43.8868	-124.9998	650	nd	Tynan/Ainley	L5-L4t	8	8	1502	
RR22002.21	BigEyes	nd	mams	nd	E	44.2692	-124.9407	393	nd	nd	nd	8	8	1700	
RR22002.22	H.Binocs	nd	birds	nd	S	44.6517	-124.8800	423	nd	Ainley/Tynan	nd	8	8	1900	
RR22002.23	BigEyes	nd	mams	nd	S	44.6497	-124.8827	423	nd	Tynan/Ainley	Line1	8	8	1902	
RR22002.24	BigEyes	nd	mams	nd	E	44.6517	-124.1360	50	nd	nd	Line1	8	8	2145	
RR22002.25	H.Binocs	nd	birds	nd	E	44.6517	-124.1360	50	nd	nd	nd	8	8	2145	
RR22002.26	Drifter	5	nd	nd	S	44.6523	-124.2408	78	nd	Abbott/Letelier	NFS	8	8	2225	
RR22002.27	Drifter	6	nd	nd	S	44.6522	-124.2412	78	nd	Abbott/Letelier	NFS	8	8	2226	
RR22002.28	Drifter	7	nd	nd	S	44.6520	-124.2417	78	nd	Abbott/Letelier	NFS	8	8	2227	
RR22002.29	TSRB	1	6	nd	S	44.6427	-124.2500	78	0	Letelier/Abbott	nd	8	8	2255	Line 1.
RR22002.30	TSRB	1	6	nd	E	44.6427	-124.2500	78	nd	nd	nd	8	8	2320	
RR22002.31	BioopticProf	4	6	nd	S	44.6443	-124.2593	78	65	Cowles/Wingard	nd	8	8	2341	15 casts.
RR22102.01	BioopticProf	4	6	nd	E	44.6380	-124.2578	78	65	nd	nd	9	8	0311	Line 1.
RR22102.02	CTD	6	6	nd	S	44.6368	-124.2555	74	70	Barth	nd	9	8	0320	
RR22102.03	CTD	6	6	nd	E	44.6368	-124.2555	74	70	nd	nd	9	8	0338	TAPS comparison. HTI comparison.
RR22102.04	HTI	3	nd	nd	S	44.6365	-124.2557	74	5	Pierce	Line1	9	8	0406	
RR22102.05	TAPS	1	6	nd	S	44.6365	-124.2557	74	v	Cowles/Wingard	nd	9	8	0415	Start Tow3.
RR22102.06	TAPS	1	6	nd	E	44.6532	-124.2557	nd	nd	nd	nd	9	8	0523	
RR22102.07	SeaSoar	3	nd	1E	S	44.6500	-124.1317	45	v	Barth	NFS	9	8	0704	NFS.
RR22102.08	H.Binocs	nd	birds	nd	S	44.5717	-124.5217	186	nd	Ainley/Tynan	Line1a	9	8	1300	
RR22102.09	BigEyes	nd	mams	nd	S	44.5732	-124.4933	94	nd	Tynan/Ainley	Line1a	9	8	1312	End line 1a.
RR22102.10	BigEyes	nd	mams	nd	E	44.5715	-124.1425	46	nd	nd	Line1aE	9	8	1513	
RR22102.11	H.Binocs	nd	birds	nd	E	44.5683	-124.1383	46	nd	nd	Line1a	9	8	1513	End Tow3.
RR22102.12	SeaSoar	3	nd	1AE	E	44.5638	-124.1458	45	nd	nd	Line1a	9	8	1524	
RR22102.13	HTI	3	nd	1AE	E	44.5638	-124.1458	45	nd	nd	nd	9	8	1529	1a -> 2 NFS.
RR22102.14	BigEyes	nd	mams	nd	S	44.5550	-124.1362	46	nd	Tynan/Ainley	L1a-L2t	9	8	1628	
RR22102.15	BigEyes	nd	mams	nd	E	44.4808	-124.1430	40	nd	nd	2E	9	8	1650	Waypt 2E.
RR22102.16	HTI	4	nd	2E	S	44.4748	-124.1532	50	5	Pierce	NFS	9	8	1658	Line 2.

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22102.17	SeaSoar	4	nd	2E	S	44.4740	-124.1580	50	v	Barth	NFS	9	8	1702	Start Tow4.
RR22102.18	BigEyes	nd	mams	nd	S	44.4742	-124.1857	50	nd	Tynan/Ainley	Line2	9	8	1717	17:28 on hand-held.
RR22102.19	H.Binocs	nd	birds	nd	S	44.4733	-124.1683	50	nd	Ainley/Tynan	nd	9	8	1720	
RR22102.20	BigEyes	nd	mams	nd	E	44.4753	-124.2267	nd	nd	nd	Line2	9	8	1732	Fog.
RR22102.21	H.Binocs	nd	birds	nd	E	44.4750	-124.2217	60	nd	nd	nd	9	8	1735	
RR22102.22	H.Binocs	nd	birds	nd	S	44.4750	-124.7267	153	nd	Ainley/Tynan	nd	9	8	2020	
RR22102.23	H.Binocs	nd	mams	nd	S	44.4560	-124.9172	514	nd	Tynan/Ainley	transit	9	8	2126	Bet. Lines 2 and 2a cown 200.
RR22102.24	H.Binocs	nd	birds	nd	S	44.4133	-124.9383	566	nd	Ainley/Tynan	transit	9	8	2145	
RR22102.25	H.Binocs	nd	birds	nd	E	44.4750	-124.9217	514	nd	nd	nd	9	8	2145	
RR22102.26	H.Binocs	nd	birds	nd	E	44.4217	-124.9583	599	nd	nd	transit	9	8	2153	
RR22102.27	H.Binocs	nd	mams	nd	nd	44.3987	-124.9460	nd	nd	nd	transit	9	8	2153	c/c 215.
RR22102.28	H.Binocs	nd	birds	nd	S	44.4217	-124.9583	599	nd	Ainley/Tynan	Line2a	9	8	2200	
RR22102.29	H.Binocs	nd	mams	nd	nd	44.3835	-124.9558	533	nd	Tynan/Ainley	Line2a	9	8	2203	c/c 090.
RR22102.30	BigEyes	nd	mams	nd	nd	44.3817	-124.8242	372	nd	Tynan/Ainley	nd	9	8	2245	
RR22202.01	BigEyes	nd	mams	nd	E	44.3813	-124.5288	93	nd	Tynan/Ainley	Line2a	10	8	0025	Intense fog.
RR22202.02	H.Binocs	nd	birds	nd	E	44.4200	-124.4833	85	nd	nd	Line2a	10	8	0100	
RR22202.03	BigEyes	nd	mams	nd	S	44.1107	-124.5325	119	nd	Tynan/Ainley	Line3a	10	8	1312	NFS.
RR22202.04	H.Binocs	nd	birds	nd	S	44.1100	-124.5267	119	nd	Ainley/Tynan	Line3a	10	8	1315	Fine scale north.
RR22202.05	H.Binocs	nd	birds	nd	E	44.1067	-124.1800	45	nd	nd	Line3a	10	8	1510	
RR22202.06	BigEyes	nd	mams	nd	E	44.1107	-124.1840	45	nd	nd	Line3a	10	8	1512	End line 3a E.
RR22202.07	BigEyes	nd	mams	nd	S	44.0027	-124.1882	44	nd	Tynan/Ainley	Line4	10	8	1603	Begin line 4 E, 7.95°0C.
RR22202.08	H.Binocs	nd	birds	nd	S	44.0017	-124.1883	44	nd	Ainley/Tynan	Line4	10	8	1605	
RR22202.09	BigEyes	nd	mams	nd	E	43.9993	-124.7280	14	nd	nd	Line4	10	8	1908	
RR22202.10	BigEyes	nd	mams	nd	S	43.9983	-124.7798	121	nd	Tynan/Ainley	Line4	10	8	1924	
RR22202.11	XBT	2	nd	nd	S	43.9995	-125.1402	nd	1000	Barth	nd	10	8	2120	
RR22202.12	XBT	2	nd	nd	E	43.9995	-125.1402	nd	1000	Barth	nd	10	8	2130	
RR22202.13	BigEyes	nd	mams	nd	E	44.0003	-125.1832	1724	nd	nd	Line4	10	8	2138	End of line 4.
RR22202.14	H.Binocs	nd	birds	nd	E	44.0000	-125.1868	1724	nd	nd	Line4	10	8	2139	
RR22202.15	SeaSoar	4	nd	nd	E	43.9133	-125.2317	1740	nd	nd	nd	10	8	2226	Near 4AW.
RR22202.16	SeaSoar	5	nd	nd	S	43.8785	-125.2433	1740	v	Barth	NFS	10	8	2319	Start Tow5.
RR22202.17	BigEyes	nd	mams	nd	S	43.8705	-125.2595	1844	nd	Tynan/Ainley	Line4a	10	8	2339	Begin line 4a leading east.
RR22202.18	H.Binocs	nd	birds	nd	S	43.8717	-125.2600	1844	nd	Ainley/Tynan	Line4a	10	8	2340	
RR22302.01	BigEyes	nd	mams	nd	E	43.8662	-125.2067	1788	nd	nd	nd	11	8	0000	
RR22302.02	BigEyes	nd	mams	nd	S	43.8670	-125.1382	1557	nd	Tynan/Ainley	Line4a	11	8	0024	
RR22302.03	BigEyes	nd	mams	nd	E	43.8668	-124.5700	185	nd	nd	Line4a	11	8	0335	Losing light for survey.
RR22302.04	H.Binocs	nd	birds	nd	E	43.8667	-124.5383	159	nd	nd	Line4a	11	8	0346	
RR22302.05	SeaSoar	5	nd	nd	E	43.8700	-124.2088	60	nd	nd	nd	11	8	0554	
RR22302.06	HTI	4	nd	nd	E	43.8728	-124.2160	60	nd	nd	nd	11	8	0608	
RR22302.07	CTD	7	7	Oxy1	S	44.2500	-124.1500	45	40	Barth	nd	11	8	0904	Off Strawberry Hill.
RR22302.08	CTD	7	7	nd	E	44.2500	-124.1500	nd	nd	nd	nd	11	8	0935	PISCO site.
RR22302.09	CTD	8	8	Oxy2	S	44.2500	-124.1702	54	48	Barth	nd	11	8	1051	
RR22302.10	CTD	8	8	nd	E	44.2500	-124.1700	nd	nd	nd	nd	11	8	1126	
RR22302.11	CTD	9	9	Oxy3	S	44.2500	-124.1667	64	57	Barth	nd	11	8	1222	
RR22302.12	CTD	9	9	nd	E	44.2500	-124.1667	nd	nd	nd	nd	11	8	1247	

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22302.13	CTD	10	10	Oxy4	S	44.2497	-124.3185	79	78	Barth	nd	11	8	1347	
RR22302.14	CTD	10	10	nd	E	44.2497	-124.3185	nd	nd	nd	nd	11	8	1422	
RR22302.15	CTD	11	11	Oxy5	S	44.2493	-124.4500	97	95	Barth	nd	11	8	1537	
RR22302.16	CTD	11	11	nd	E	44.2493	-124.4500	nd	nd	nd	nd	11	8	1605	
RR22302.17	TSRB	2	11	nd	S	44.2435	-124.4477	97	0	Letelier/Abbott	nd	11	8	1626	Near drifters 2691#.
RR22302.18	TSRB	2	11	nd	E	44.2435	-124.4477	nd	nd	nd	nd	11	8	1651	
RR22302.19	BioopticProf	5	11	nd	S	44.2430	-124.4483	97	80	Cowles/Wingard	nd	11	8	1713	Near drifters 2691#.
RR22302.20	BioopticProf	5	11	nd	E	44.2382	-124.4537	nd	nd	nd	nd	11	8	1905	
RR22302.21	H.Binocs	nd	birds	nd	S	44.2400	-124.4400	102	nd	Ainley/Tynan	transit	11	8	1935	
RR22302.22	BigEyes	nd	mams	nd	S	44.2367	-124.4600	102	nd	Tynan/Ainley	3	11	8	1935	Leave sta Oxy5 for transit.
RR22302.23	BigEyes	nd	mams	nd	nd	44.1132	-124.6940	110	nd	nd	Line3a	11	8	2039	C/c dogleg to 125N.
RR22302.24	BigEyes	nd	mams	nd	E	44.0037	-124.4640	129	nd	nd	4	11	8	2137	At waypoint line 4, deploy SeaSoar, HTI
RR22302.25	HTI	5	nd	nd	S	43.9973	-124.4410	130	5	Pierce	NFS	11	8	2158	
RR22302.26	SeaSoar	6	nd	nd	S	43.9987	-124.4433	130	v	Barth	NFS	11	8	2204	Start Tow6.
RR22302.27	H.Binocs	nd	birds	nd	E	44.0000	-124.4533	131	nd	nd	nd	11	8	2225	
RR22302.28	H.Binocs	nd	birds	nd	S	44.0000	-124.4533	131	nd	Ainley/Tynan	Line4	11	8	2225	
RR22302.29	BigEyes	nd	mams	nd	S	43.9992	-124.4497	131	nd	Tynan/Ainley	Line4	11	8	2226	Repeat line 4 across humpbacks.
RR22402.01	H.Binocs	nd	birds	nd	E	44.0000	-125.0233	1069	nd	nd	Line4	12	8	0135	
RR22402.02	BigEyes	nd	mams	nd	E	43.9952	-125.0163	1069	nd	nd	Line4	12	8	0136	End line 4.
RR22402.03	XBT	3	nd	nd	S	43.9998	-124.9543	nd	1000	Barth	nd	12	8	0200	
RR22402.04	XBT	3	nd	nd	E	43.9998	-124.9543	nd	1000	Barth	nd	12	8	0210	
RR22402.05	SeaSoar	6	nd	nd	E	43.2242	-124.4820	60	nd	nd	nd	12	8	1630	Near 7E.
RR22402.06	HTI	5	nd	nd	E	43.2242	-124.4820	60	nd	nd	nd	12	8	1640	
RR22402.07	Drifter	8	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27954; not recovered.
RR22402.08	Drifter	9	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27534
RR22402.09	Drifter	10	nd	nd	S	43.2170	-124.6590	144	nd	Abbott/Letelier	NFS	12	8	1733	Line 7; Drifter 27953; not recovered.
RR22402.10	TSRB	3	12	nd	S	43.2170	-124.6590	144	0	Letelier/Abbott	nd	12	8	1742	Near drifters 27###.
RR22402.11	TSRB	3	12	nd	E	43.2170	-124.6590	nd	nd	nd	nd	12	8	1813	
RR22402.12	BioopticProf	6	12	nd	S	43.2128	-124.6592	144	90	Cowles/Wingard	nd	12	8	1825	Near drifters 27###.
RR22402.13	BioopticProf	6	12	nd	E	43.2130	-124.6592	nd	nd	nd	nd	12	8	2012	
RR22402.14	CTD	12	12	nd	S	43.2130	-124.6592	145	143	Barth	nd	12	8	2018	Near drifter 27###.
RR22402.15	CTD	12	12	nd	E	43.2130	-124.6592	74	70	nd	nd	12	8	2052	
RR22402.16	HTI	6	nd	7E	S	43.2200	-124.4483	50	5	Pierce	Line7	12	8	2210	No SeaSoar.
RR22402.17	H.Binocs	nd	birds	nd	S	43.2233	-124.4467	44	nd	Ainley/Tynan	Line7	12	8	2215	
RR22402.18	BigEyes	nd	mams	nd	S	43.2170	-124.4477	45	nd	Tynan/Ainley	Line7	12	8	2217	No SeaSoar/OPC.
RR22502.01	BigEyes	nd	mams	nd	E	43.2168	-124.7992	342	nd	nd	Line7	13	8	0016	
RR22502.02	BigEyes	nd	mams	nd	S	43.2163	-124.9078	482	nd	Tynan/Ainley	Line7	13	8	0052	
RR22502.03	BigEyes	nd	mams	nd	E	43.2162	-125.2447	2080	nd	nd	Line7	13	8	0247	
RR22502.04	H.Binocs	nd	birds	nd	E	43.2167	-125.2583	2080	nd	nd	Line7	13	8	0300	
RR22502.05	HTI	6	nd	nd	E	43.2150	-125.3250	3022	nd	nd	nd	13	8	0319	
RR22502.06	CTD	13	13	FM-10	S	43.2167	-125.3335	3022	1005	Barth	nd	13	8	0335	

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22502.07	CTD	13	13	nd	E	43.2167	-125.3335	nd	nd	nd	nd	13	8	0427	
RR22502.08	XBT	4	nd	nd	S	43.2165	-125.3255	nd	1000	Barth	nd	13	8	0435	
RR22502.09	XBT	4	nd	nd	E	43.2165	-125.3255	nd	1000	Barth	nd	13	8	0445	
RR22502.10	CTD	14	14	FM-9	S	43.2167	-125.1667	1670	1012	Barth	nd	13	8	0537	
RR22502.11	CTD	14	14	nd	E	43.2167	-125.1667	nd	nd	nd	nd	13	8	0642	
RR22502.12	CTD	15	15	FM-8	S	43.2167	-125.0000	1085	990	Barth	nd	13	8	0750	
RR22502.13	CTD	15	15	nd	E	43.2167	-125.0000	nd	nd	nd	nd	13	8	0852	
RR22502.14	CTD	16	16	FM-7	S	43.2163	-124.8337	343	342	Barth	nd	13	8	1010	
RR22502.15	CTD	16	16	nd	E	43.2163	-124.8337	nd	nd	nd	nd	13	8	1048	
RR22502.16	CTD	17	17	FM-6	S	43.2165	-124.7500	313	308	Barth	nd	13	8	1145	
RR22502.17	CTD	17	17	nd	E	43.2165	-124.7500	nd	nd	nd	nd	13	8	1236	
RR22502.18	HTI	7	nd	7AE	S	43.0835	-124.4750	44	5	Pierce	SFS	13	8	1414	
RR22502.19	H.Binocs	nd	birds	nd	S	43.0833	-124.5033	44	nd	Ainley/Tynan	Line7a	13	8	1420	
RR22502.20	BigEyes	nd	mams	nd	S	43.0827	-124.4982	48	nd	Tynan/Ainley	Line7a	13	8	1424	No SeaSoar/OPC.
RR22502.21	BigEyes	nd	mams	nd	nd	43.0845	-124.5588	90	nd	nd	Line7a	13	8	1445	C/c vessel traffic 320.
RR22502.22	BigEyes	nd	mams	nd	nd	43.1033	-124.5858	110	nd	Tynan/Ainley	Line7a	13	8	1458	C/c back to 270.
RR22502.23	BigEyes	nd	mams	nd	E	43.1020	-124.6072	nd	nd	nd	Line7a	13	8	1506	
RR22502.24	BigEyes	nd	mams	nd	S	43.0963	-124.6482	145	nd	Tynan/Ainley	Line7a	13	8	1519	
RR22502.25	BigEyes	nd	mams	nd	nd	43.0833	-124.9955	1123	nd	nd	Line7a	13	8	1710	Strong front, many phalaropes.
RR22502.26	BigEyes	nd	mams	nd	E	43.0833	-125.2287	2741	nd	Tynan/Ainley	Line7a	13	8	1825	End of line 7a.
RR22502.27	H.Binocs	nd	birds	nd	E	43.0833	-125.2017	2741	nd	nd	Line7a	13	8	1830	
RR22502.28	H.Binocs	nd	birds	nd	S	42.9500	-125.2333	2991	nd	Ainley/Tynan	Line8	13	8	1932	
RR22502.29	BigEyes	nd	mams	nd	S	42.9498	-125.2417	2991	nd	nd	Line8	13	8	1932	
RR22502.30	BigEyes	nd	mams	nd	E	42.9530	-125.0532	1374	nd	nd	Line8	13	8	2038	Ship stops to let vessel pass.
RR22502.31	BigEyes	nd	mams	nd	S	42.9520	-125.0387	1187	nd	Tynan/Ainley	Line8	13	8	2052	Underway.
RR22502.32	H.Binocs	nd	birds	nd	E	42.9500	-124.5317	40	nd	nd	Line8	13	8	2338	
RR22502.33	BigEyes	nd	mams	nd	E	42.9510	-124.5257	<50	nd	nd	Line8	13	8	2339	End of line 8.
RR22502.34	SeaSoar	7	nd	8E	S	42.9507	-124.5280	50	v	Barth	SFS	13	8	2344	Start Tow7
RR22602.01	H.Binocs	nd	birds	nd	S	42.6833	-124.8317	662	nd	Ainley/Tynan	Line9	14	8	1550	Fog until now.
RR22602.02	BigEyes	nd	mams	nd	S	42.6830	-124.8645	615	nd	Tynan/Ainley	Line9	14	8	1603	SFS fog this morning.
RR22602.03	BigEyes	nd	mams	nd	E	42.6862	-124.9067	nd	nd	nd	Line9	14	8	1618	End effort to id buoy #46015.
RR22602.04	H.Binocs	nd	birds	nd	E	42.6833	-124.9000	650	nd	nd	Line9	14	8	1624	
RR22602.05	H.Binocs	nd	birds	nd	S	42.6833	-124.9117	745	nd	Ainley/Tynan	Line9	14	8	1630	
RR22602.06	BigEyes	nd	mams	nd	nd	42.7403	-124.8545	nd	nd	nd	Line9	14	8	1651	Position NOAA buoy #46015.
RR22602.07	BigEyes	nd	mams	nd	S	42.6868	-124.9073	745	nd	nd	Line9	14	8	1728	Resume line after buoy id.
RR22602.08	H.Binocs	nd	mams	nd	nd	42.6828	-125.0565	1491	nd	nd	Line9	14	8	1819	Fog.
RR22602.09	H.Binocs	nd	mams	nd	E	42.6830	-125.0730	1491	nd	nd	Line9	14	8	1824	Fog.
RR22602.10	H.Binocs	nd	birds	nd	E	42.6833	-125.1383	2300	nd	nd	Line9	14	8	1845	
RR22602.11	BigEyes	nd	mams	nd	S	42.4997	-125.2495	3003	nd	nd	Line9a	14	8	2108	
RR22602.12	H.Binocs	nd	birds	nd	S	42.5000	-125.2517	3118	nd	Ainley/Tynan	Line9a	14	8	2110	
RR22602.13	H.Binocs	nd	mams	nd	nd	42.4997	-125.1212	1980	nd	nd	Line9a	14	8	2153	Fog.
RR22602.14	H.Binocs	nd	mams	nd	E	42.5010	-125.0938	1980	nd	nd	Line9a	14	8	2203	Fog - foghorn on.
RR22702.01	H.Binocs	nd	birds	nd	E	42.5000	-124.5367	58	nd	nd	Line9a	15	8	0110	

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22702.02	SeaSoar	7	nd	nd	E	42.1283	-124.3887	60	nd	nd	nd	15	8	1425	
RR22702.03	SeaSoar	8	nd	12E	S	41.9023	-124.3097	45	v	Barth	SFS	15	8	1626	Also start Meso2.
RR22702.04	H.Binocs	nd	birds	nd	S	41.9217	-124.4898	135	nd	Ainley/Tynan	Line12	15	8	1740	
RR22702.05	BigEyes	nd	mams	nd	S	41.9102	-124.5375	285	nd	Tynan/Ainley	Line12	15	8	1801	Line 12 SFS heading west.
RR22702.06	BigEyes	nd	mams	nd	E	41.9005	-124.7257	670	nd	nd	Line12	15	8	1914	Fire boat drill.
RR22702.07	BigEyes	nd	mams	nd	S	41.8995	-124.7625	nd	nd	nd	Line12	15	8	1927	
RR22702.08	H.Binocs	nd	mams	nd	nd	41.8985	-124.9387	915	nd	nd	Line12	15	8	2033	Beaufort 7.
RR22702.09	H.Binocs	nd	mams	nd	E	41.9007	-125.0698	1120	nd	nd	Line12	15	8	2120	Beaufort 7, Near gale, 32 kts wind.
RR22702.10	H.Binocs	nd	mams	nd	S	41.9005	-125.2805	3153	nd	nd	Line12	15	8	2230	Beaufort 7, near gale, 30 kts wind.
RR22702.11	XBT	5	nd	nd	S	41.8998	-125.4807	nd	1000	Barth	nd	15	8	2338	
RR22702.12	XBT	5	nd	nd	E	41.8998	-125.4807	nd	1000	Barth	nd	15	8	2348	
RR22802.01	H.Binocs	nd	birds	nd	E	41.9017	-126.0950	3074	nd	nd	Line12	16	8	0315	
RR22802.02	H.Binocs	nd	mams	nd	E	41.9003	-126.0893	3247	nd	nd	Line12	16	8	0316	
RR22802.03	H.Binocs	nd	birds	nd	S	42.5000	-126.4983	2760	nd	Ainley/Tynan	Line10	16	8	1340	
RR22802.04	H.Binocs	nd	mams	nd	S	42.4980	-126.3443	2987	nd	nd	Line10	16	8	1434	Study feature - large meander/eddy.
RR22802.05	BigEyes	nd	mams	nd	nd	42.4992	-126.1838	2800	nd	nd	Line10	16	8	1533	Beaufort 6, large swell.
RR22802.06	H.Binocs	nd	mams	nd	nd	42.5005	-126.0402	2586	nd	nd	Line10	16	8	1628	Swell too large for 25x binocs (BigEyes).
RR22802.07	BigEyes	nd	mams	nd	nd	42.5008	-125.9180	2517	nd	nd	Line10	16	8	1723	
RR22802.08	BigEyes	nd	mams	nd	E	42.4997	-125.7370	3000	nd	nd	nd	16	8	1833	
RR22802.09	BigEyes	nd	mams	nd	S	42.5015	-125.6030	3056	nd	nd	Line10	16	8	1920	East of line 10.
RR22802.10	BigEyes	nd	mams	nd	E	42.5002	-125.4243	3106	nd	nd	Line10	16	8	2023	C/c to north meander study.
RR22802.11	BigEyes	nd	mams	nd	S	42.8207	-125.4188	3095	nd	nd	transit	16	8	2254	Northward bet lines 10 & 8.
RR22802.12	H.Binocs	nd	birds	nd	E	42.9311	-125.4167	3056	nd	nd	Line8	16	8	2345	
RR22802.13	BigEyes	nd	mams	nd	E	42.9467	-125.4173	nd	nd	nd	Line8	16	8	2353	Begin line 8 eastward
RR22902.01	H.Binocs	nd	birds	nd	S	42.9350	-125.4167	3056	nd	Ainley/Tynan	Line8	17	8	0020	
RR22902.02	BigEyes	nd	mams	nd	S	42.9508	-125.3208	3109	nd	nd	Line8	17	8	0029	
RR22902.03	BigEyes	nd	mams	nd	nd	42.9483	-125.1503	1997	nd	nd	Line8	17	8	0139	C/c to approach drifter search.
RR22902.04	BigEyes	nd	mams	nd	E	42.9210	-125.0902	nd	nd	nd	Line8	17	8	0208	At drifter location.
RR22902.05	SeaSoar	8	nd	nd	E	42.9233	-125.0722	1475	nd	nd	nd	17	8	0223	
RR22902.06	HTI	7	nd	nd	E	42.9233	-125.0617	nd	nd	nd	nd	17	8	0236	
RR22902.07	BioopticProf	7	18	nd	S	42.9270	-125.0780	1646	100	Cowles/Wingard	nd	17	8	0300	Near drifter 27534.
RR22902.08	H.Binocs	nd	birds	nd	E	42.9500	-125.1017	1638	nd	nd	6	17	8	0300	
RR22902.09	BioopticProf	7	18	nd	E	42.9270	-125.0780	nd	nd	nd	nd	17	8	0330	2 casts.
RR22902.10	CTD	18	18	nd	S	42.9220	-125.0918	1646	200	Barth	nd	17	8	0343	Near drifter 27534.
RR22902.11	CTD	18	18	nd	E	42.9220	-125.0918	nd	nd	nd	nd	17	8	0400	
RR22902.12	HTI	8	nd	nd	S	42.9215	-125.1085	1573	5	Pierce	nd	17	8	0413	
RR22902.13	SeaSoar	9	nd	nd	S	42.9247	-125.1113	1573	v	Barth	nd	17	8	0420	Line 8, Meso 2.
RR22902.14	SeaSoar	9	nd	nd	E	43.7892	-124.2460	80	nd	nd	nd	17	8	1525	
RR22902.15	SeaSoar	10	nd	nd	S	43.7987	-124.2430	76	v	Barth	nd	17	8	1540	After cleaning.

Appendix I: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Day	Mos	Time	Comments
RR22902.16	H.Binocs	nd	birds	nd	S	43.9667	-124.2733	95	nd	Ainley/Tynan	4	17	8	1800	Mesoscale 2.
RR22902.17	BigEyes	nd	mams	nd	S	44.0067	-124.4962	125	nd	Tynan/Ainley	Line4	17	8	1910	
RR23002.01	BigEyes	nd	mams	nd	E	44.0005	-125.3308	2924	nd	nd	4	18	8	0000	
RR23002.02	BigEyes	nd	mams	nd	S	44.0010	-125.4382	2917	nd	nd	4	18	8	0036	
RR23002.03	H.Binocs	nd	birds	nd	E	44.0000	-125.9150	3022	nd	nd	4	18	8	0315	
RR23002.04	BigEyes	nd	mams	nd	E	44.0002	-125.9455	3022	nd	nd	4	18	8	0327	Losing light. Leading 065 Meander /Jet study. Transit.
RR23002.05	BigEyes	nd	mams	nd	S	44.1312	-126.4665	2991	nd	nd	L4-L1t	18	8	1334	
RR23002.06	H.Binocs	nd	birds	nd	S	44.1317	-126.4633	2991	nd	Ainley/Tynan	nd	18	8	1335	
RR23002.07	BigEyes	nd	mams	nd	E	44.1848	-126.2537	2977	nd	nd	nd	18	8	1500	
RR23002.08	BigEyes	nd	mams	nd	S	44.1993	-126.1992	2976	nd	nd	L4-L1t	18	8	1522	
RR23002.09	H.Binocs	nd	birds	nd	E	44.2433	-126.0133	2976	nd	nd	nd	18	8	1630	Diagonal transit 070 across jet. Transit.
RR23002.10	H.Binocs	nd	birds	nd	S	44.2617	-126.0000	2988	nd	Ainley/Tynan	nd	18	8	1645	Transit.
RR23002.11	H.Binocs	nd	birds	nd	E	44.4022	-126.0000	2939	nd	nd	nd	18	8	1800	Transit.
RR23002.12	BigEyes	nd	mams	nd	E	44.4605	-126.0008	2944	nd	nd	L4→L1t	18	8	1831	Transit north to line 1. Turn west ~1 hour.
RR23002.13	BigEyes	nd	mams	nd	S	44.5243	-125.9985	2958	nd	nd	L4→L1t	18	8	1903	
RR23002.14	BigEyes	nd	mams	nd	E	44.6435	-126.0005	2923	nd	nd	Line1	18	8	2007	
RR23002.15	XBT	6	nd	nd	S	44.6510	-126.2352	nd	1000	Barth	nd	18	8	2127	
RR23002.16	XBT	6	nd	nd	E	44.6510	-126.2352	nd	1000	Barth	nd	18	8	2137	
RR23002.17	BigEyes	nd	mams	nd	S	44.6447	-126.2525	2879	nd	nd	Line1	18	8	2148	Often XBT launch; Jet study.
RR23002.18	H.Binocs	nd	birds	nd	S	44.6500	-126.2467	2879	nd	Ainley/Tynan	nd	18	8	2150	
RR23002.19	XBT	7	nd	nd	S	44.6513	-125.9063	nd	1000	Barth	nd	18	8	2353	
RR23102.01	XBT	8	nd	nd	S	44.6515	-125.8878	nd	1000	Barth	nd	19	8	0000	
RR23102.02	XBT	7	nd	nd	E	44.6513	-125.9063	nd	1000	Barth	nd	19	8	0003	
RR23102.03	XBT	8	nd	nd	E	44.6515	-125.8878	nd	1000	Barth	nd	19	8	0010	
RR23102.04	BigEyes	nd	mams	nd	E	44.6520	-125.8077	2888	nd	nd	nd	19	8	0033	
RR23102.05	BigEyes	nd	mams	nd	S	44.6507	-125.7368	2886	nd	nd	Line1	19	8	0059	
RR23102.06	XBT	9	nd	nd	S	44.6522	-125.5853	nd	1000	Barth	nd	19	8	0153	
RR23102.07	XBT	9	nd	nd	E	44.6522	-125.5853	nd	1000	Barth	nd	19	8	0203	
RR23102.08	H.Binocs	nd	birds	nd	E	44.6500	-125.4367	2880	nd	nd	nd	19	8	0300	
RR23102.09	BigEyes	nd	mams	nd	E	44.6512	-125.4117	2885	nd	nd	nd	19	8	0303	
RR23102.10	XBT	10	nd	nd	S	44.6510	-125.3422	nd	1000	Barth	nd	19	8	0325	
RR23102.11	XBT	10	nd	nd	E	44.6510	-125.3422	nd	1000	Barth	nd	19	8	0335	
RR23102.12	SeaSoar	10	nd	nd	E	44.6543	-124.1333	50	nd	nd	nd	19	8	1036	
RR23102.13	HTI	8	nd	nd	E	44.6630	-124.1357	50	nd	nd	nd	19	8	1049	
RR23102.14	U/W FRRF	nd	nd	nd	E	44.5955	-124.1347	45	nd	Letelier/Ashe	nd	19	8	1430	
RR23102.15	U/W ac-9	nd	nd	nd	E	44.5955	-124.1347	45	nd	Cowles/Wingard	nd	19	8	1430	
RR23102.16	U/W T/S/fl	nd	nd	nd	E	44.5955	-124.1347	45	nd	Barth	nd	19	8	1430	
RR23102.17	MET	nd	nd	nd	E	44.5955	-124.1347	45	nd	Barth	nd	19	8	1430	
RR23102.18	ADCP	nd	nd	nd	E	44.6187	-124.0618	10	nd	Pierce	nd	19	8	1430	
RR23102.19	arrive	nd	nd	nd	E	nd	nd	nd	nd	Barth	nd	19	8	1430	