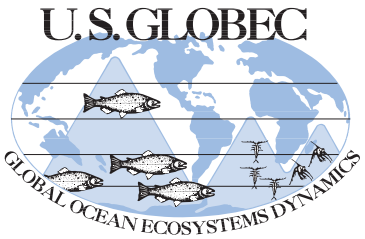
GLOBEC Northeast Pacific California Current

Cruise Report, R/V *Thomas G. Thompson* (T0205)

Alternative Cruise ID: Mesoscale Survey TN147

31 May - 17 June, 2002



This cruise was
sponsored by the

National Science Foundation

and the

National Oceanic and
Atmospheric Administration

GLOBEC Northeast Pacific California Current
Cruise Report, R/V *Thomas G. Thompson* (T0205)
Alternative Cruise ID: Mesoscale Survey TN147
31 May - 17 June, 2002

Chief Scientist:

Tim Cowles
College of Oceanic and Atmospheric Sciences
Oregon State University
104 COAS Administration Building
Corvallis, OR 97331-5503
541-737-3966
tjc@coas.oregonstate.edu

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.

Overview of the Cruise Plan

The mesoscale survey for the California Current System (CCS) region spanned from Newport, OR to Crescent City, CA. U.S. GLOBEC research within this region in summer 2002 occurred on two cruises: 1) late-May to mid-June, and 2) late-July to mid-August. The R/V *Thomas G. Thompson* was the survey vessel for the May-June cruise. The R/V *Thomas G. Thompson* conducted an initial mesoscale survey of the region (requiring about 6 days; see Figure 1) and a shorter, less complete survey of the same region during the final 4-5 days of the cruise (see timeline in next paragraph). The initial survey was sampled from north to south, starting near Newport, Oregon and concluding on the Crescent City line. After this initial mesoscale SeaSoar survey, there were North and South fine-scale SeaSoar surveys (Figure 2). Each of these fine-scale surveys took approximately 2 days, although we experienced some delays due to equipment repairs. Argos-tracked drifters were deployed along the northern line of each fine-scale survey. Fine-scale surveys were done from North to South (following the drifter trajectories).

Pre-cruise Time Line of Cruise Activities (days numbered from Newport, Oregon)

May 31 (day 1) - Depart Newport (afternoon); Instrument tests
June 1 (day 2) - Begin first mesoscale SeaSoar survey (Figure 1)
June 6 (day 7) - Complete first mesoscale SeaSoar survey, steam to northern fine-scale
June 7 (day 8) - Begin SeaSoar of N finescale grid (Figure 2); deploy first set of drifters
June 9 (day 10) - Complete N finescale grid; conduct station work with Wecoma
June 10 (day 11) - Complete station work; move to S finescale grid area
June 11 (day 12) - Conduct SeaSoar survey of S finescale grid; deploy drifters
June 12 (day 13) - Complete S finescale grid; conduct station work
June 13 (day 14) - Steam to southern end of mesoscale grid; begin final SeaSoar ops
June 17 (day 19) - Complete final mesoscale grid and station work; arrive Newport OR

Information about Cruise Activities and Instrument Systems:

The main activity involved towing SeaSoar off the A-frame (undulating from 0-300 m) along with an acoustics package towed just below the surface (HTI, see details below) on a series of E-W lines across the continental margin from around 40 m depth out to deep (>2000 m) water. The E-W lines were between 41.9ºN and 44.6ºN. While underway, measurements of surface water properties (T, S, chlorophyll fluorescence, light absorption and attenuation, and Fast Repetition Rate fluorometry) and standard meteorological properties (IMETpackage, in particular PAR) were made. During daylight hours, underway observations of marine mammals were done from outside on the O3 level, and observations of birds were made from the bridge. Details of measurements made are listed below.

SeaSoar: Towed using an OSU winch mounted on the fantail midship. SeaSoar carried a CTD system, three bio-optical sensors for phytoplankton, and an optical plankton counter for zooplankton. Real-time GPS and bottom depth was integrated into the SeaSoar data stream.

HTI: (Hydroacoustics Technology, Inc) bio-acoustics towed package. It was towed at 3 m depth off the port side to avoid interference with CTD/rosette operations, and provided 1m vertical resolution of acoustic backscatter at 38, 120, 200, 420 kHz every 14 seconds.

Mammal observations: Operations were made outside on the O3 level, with 25x BigEye binocular stations and windscreen in place.

Bird observations: Bird observations were conducted from the ship's bridge during daylight hours.

ADCP: We used a RDI 150-kHz unit set for 8m vertical depth intervals.

CTD/Rosette: CTD/rosette casts were made at specific stations along the survey lines when the SeaSoar system was out of the water. The CTD had dual T/C sensors, fluorometer, transmissometer, and oxygen sensor in addition to the rosette. Water samples were collected from the 10-l Niskin bottles for primary productivity, nutrients, salinity calibration and for chlorophyll extractions.

Bio-optics profiling package: A bio-optics package was deployed near the optical drifters to characterize the finescale vertical structure in optical properties.

Flow-through systems using near-surface seawater: We integrated T, S and chlorophyll fluorescence from the ship's flow-through system with GPS and bottom depth from the echosounder. We installed two ac-9s, a Fast Repetition Rate Fluorometer (FRRF), chlorophyll fluorometers and CDOM fluorometers into the underway flow-through seawater system in the main lab. A vortex debubbler was connected in the seawater line. We used discrete samples from this system for analysis of particle size, nutrient concentration, and primary productivity.

Meteorological package: We recorded data from the standard IMET sensors, including PAR.

Surface drifters with thermistors and radiometers: We deployed Argos-tracked surface drifters equipped with bio-optical sensors. The surface floats were painted bright orange. We did not recover these drifters, but conducted station work near them a few days following deployment.

Table 1. GLOBEC Cruise Participants

Dr. Tim Cowles	OSU	Chief Scientist
Dr. Stephen Pierce	OSU	S
Dr. Cyndy Tynan	NOAA	S
Dr. David Ainley	H.T. Harvey & Associates	S
Dr. Michael Ott	OSU	S
Dr. Patrick Ressler	NOAA	S
Dr. Russell Desiderio	OSU	T
Mr. Robert O'Malley	OSU	T
Mr. Marc Willis	OSU	T
Mr. Toby Martin	OSU	T
Mr. Chad Waluk	Cal State, Monterey	T (MATE Intern)
Mr. Roberto Venegas	OSU	GS
Ms. Linda Fayler	OSU	T
Ms. Amanda Ashe	OSU	T
Ms. Angel White	OSU	GS
Ms. Megan Carney	OSU	GS
Ms. Rachel Sanders	OSU	GS
Ms. Amanda Briggs	OSU	GS
Ms. Di Wu	Univ of Massachusetts	GS
Mr. Jay Peterson	Univ of Massachusetts	GS
Mr. Michael Newcomer	NOAA	T
Mr. Todd Pusser	NOAA	T
Mr. Tom Ryan	NOAA	T
Mr. Charles Alexander	NOAA	T
Mr. Ed Ullrich	Linn-Benton Comm College	UG
Mr. Aaron Kaiser	US Naval Academy	UG

(S=scientist; T=technician, G S=graduate student, U G=undergraduate student)

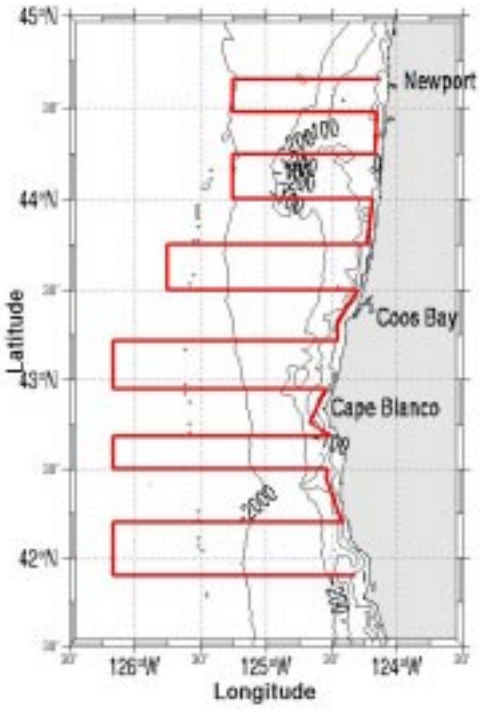


Figure 1. Proposed survey grid for the Mesoscale Survey (Lines 1-12 are numbered from north to south).

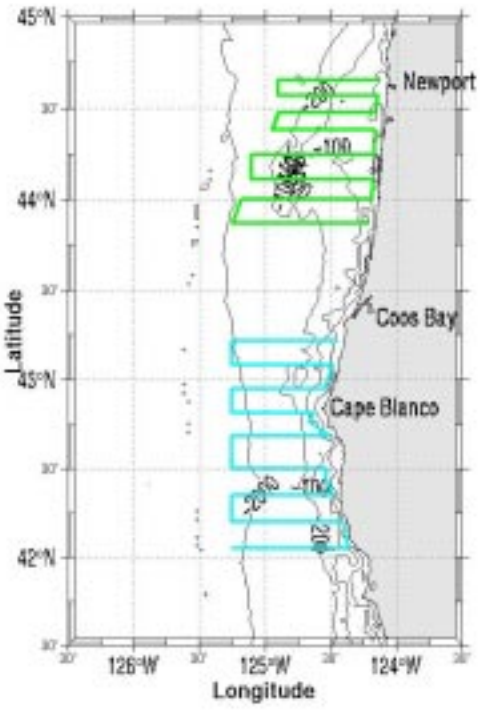


Figure 2. Proposed Northern and Southern finescale grids used during the cruise.

Cruise Narrative

As indicated in the overview, our objective for this cruise was to survey mesoscale physical and biological properties over the study domain, extending from Newport, Oregon in the north to just north of Crescent City, California in the south. We approached this objective by towing an undulating vehicle (SeaSoar) that carried a CTD, an ac-9, an Optical Plankton Counter (OPC), a fluorometer for detecting chlorophyll, a fluorometer for detecting CDOM, and a PAR sensor. Bio-acoustical targets were detected using a towed 4-frequency system (38, 120, 200, 420 kHz, from Hydroacoutics Technology, Inc.). In addition, multiple bio-optical surface properties were monitored continuously via the flow-through seawater system on the R/V *Thompson*, including phytoplankton physiological parameters (Fast Repetition Rate Fluorometry). We coordinated our bio-acoustic surveys with occasional 'fly-bys' of the R/V *Wecoma* and the chartered fishing vessel F/V *Frosti*. Zooplankton and fish sampling was being done on those two vessels. Our cruise included an initial mesoscale survey over the entire study domain, followed by two finescale surveys, one over Heceta Bank (N finescale), the other south of Cape Blanco (S finescale). We finished the cruise with an abbreviated repeat of the initial mesoscale survey.

We were fortunate to have reliable contact with shore via Iridium satellite telephone. This link permitted daily downloads of relevant imagery obtained shoreside, and permitted us to transmit property plots of recently-obtained SeaSoar and ADCP sections for distribution to scientists on the other vessels and elsewhere in the program.

June 1-2 (beginning of Mesoscale Survey 1, MS1). We departed Newport at 1930 GMT (1230 local). We then conducted a brief survey for crab pots at the eastern end of line 1 of the mesoscale grid, then deployed the HTI bioacoustics system and SeaSoar. We began towing along Line 1 about 2330 GMT on June 1. Table 2 summarizes all SeaSoar deployments.

Winds were moderate and upwelling favorable during this first day of work. We had strong SW flow over the shelf on Line 1, extending from the inshore end of Line 1 to 124.7° W longitude, about 40 km offshore. A thin lens of low salinity water (less than 32 psu) extended across the entire line (Figure 3). We observed moderately high chlorophyll concentrations in the upper 15 m over the shelf, with a slightly deeper chlorophyll maximum at 25-25 m depth beyond the shelf break (west of 124.9° W) (Figure 4).

The bioacoustics and Optical Plankton Counter data (Figure 5) revealed apparent zooplankton concentrations in the upper 20 m over the shelf, along with some indication of increased biomass within 20 m of the bottom.

June 3. We observed strong SW flow (40 cm/sec) across Line 3, with a clear expression of a jet centered over the shelf break. There was a broad lens of Columbia River plume water (15 m thick, less than 32 psu) that extended from the offshore end of each line to within 10-15 km of the beach. ADCP data from Line 3 revealed a classic upwelling velocity pattern, with 20-30 cm/sec offshore flow in the upper 20 m (Figure 6).

Fluorometer data from the SeaSoar revealed that phytoplankton biomass was concentrated within the upper 20-25 m over the shelf, deepening slightly to 25-35 m offshore. Bioacoustics and OPC data suggested that zooplankton biomass was associated with the phytoplankton in the upper 30 m, with additional zooplankton biomass located within 20-30 m of the bottom over the continental shelf.

June 4. We continued our SeaSoar mapping work across Lines 5 and 6 within the mesoscale grid, and completed Line 6 about 1600 GMT. We then turned west on Line 7, just south of Cape Arago. Weather conditions remained calm, with light winds and afternoon sunshine following morning fog near the coast.

The boundaries in the ocean color imagery from June 3 (Figure 7) matched well with what we saw in the flow fields derived from the shipboard ADCP. The upwelling jet tracked the bottom topography from Line 1 through Line 4, with an offshore boundary of higher velocities near 125° W. A meander was evident south of Heceta Bank and west of 124.7° W, with a cyclonic feature centered about 124.4° W. The ADCP revealed southerly flow close to the coast south of 44° N (Figure 8).

Consistent with our observations of the more northern lines, Lines 5 and 6 showed thin lenses of low salinity water in the upper 15-20 m, extending to within 10-15 km of the inshore ends of each E-W line. We found higher chlorophyll concentrations (based on fluorescence) inshore and at the base of the low salinity water over the shelf. That

biomass deepened to 30-40 m and became less concentrated west of the shelf break. Mammal sightings increased on Line 5 near 125° W, close to the higher velocity region of the upwelling jet, and near the offshore edge of higher ocean color values seen in the SeaWiFS imagery.

June 5 - 6. We continued our SeaSoar survey of the southern sections of the mesoscale grid. We completed lines 1-10 by 0100 June 6 (GMT). Weather conditions remained calm for the first five days of the cruise, although some moderate increase in wind speed was experienced late on June 5.

We observed strong SW flow over the shelf along line 8, with evidence of a northward undercurrent hugging the continental slope (Figure 9). There was also strong WNW flow extending from 125.3° W to 125.6° W. Surface salinities along Line 8 were less than 32 psu across the entire line, with surface temperatures 12-13° C inshore, 13-14° C offshore. Considerable phytoplankton biomass was concentrated in the upper 20 m over the inshore section of the shelf, deepening to 25-35 m at the shelf break and further offshore (Figure 10).

Recent upwelling had brought cooler water to the surface at the inshore end of line 9 (10° C, salinity of 32.8 psu), nearly 2° C cooler than observed on Line 8. The influence of the Columbia River plume was apparent west of 124.9°W. Higher phytoplankton biomass was shifted westward relative to Line 8, with moderate surface concentrations extending from 124.7° W to 125.1° W along line 9.

Estimates of zooplankton concentrations from bio-acoustics and Optical Plankton Counter continued to indicate that the shelf break is the position of local maxima in signal.

We had to replace the hydraulic unit in the SeaSoar vehicle after line 9, so we conducted CTD operations along Line 10 on June 6 during the repairs (Table 3).

June 7 (end of MS1). The repaired SeaSoar performed well, permitting completion of the two most southerly lines (Lines 12 and 11, in that order) of the mesoscale grid. We experienced 36 hours of strong winds from the north, reinforcing the upwelling conditions along the coast south of Cape Blanco. Steeply upward-sloping isopycnals showed that upwelling was well established, with the 26.0 isopycnal at the surface near 124.6° W, and with 8° C water within 15 km of the coast (Figure 11).

The strong winds of the past two days pushed the upwelling jet from an earlier upwelling event further offshore. Two distinct biological fronts (local increases in fluorescence) along Line 12 (at 124.7° W and 125.0° W) supported this observation of the shifting position of the upwelling jet. The influence of the Columbia River plume was seen west of 124.9° W (Figure 12).

The stronger winds and higher sea state of June 6 and 7 limited the mammal and bird observations along Lines 12 and 11. Marine mammal and seabird observation periods are detailed in Tables 4 and 5, respectively. The cumulative bird and mammal observations over the mesoscale grid suggested that hotspots of top trophic activity were concentrated along the inshore edge of the upwelling jet along lines 4, 5 and 10 (Figures 13 and 14). (See a summary of mammal observations in Appendix I).

Following discussions with Bill Peterson, Chief Scientist on the R/V *Wecoma*, we agreed to shift the northern fine-scale survey one line to the south--we, therefore, began on Line 1A instead of Line 1 (NH). We coordinated our positions with the R/V *Wecoma* and the F/V *Frosti* so that we could pass by them with the HTI bio-acoustics system while they were towing for zooplankton and fish.

June 8 - 9 (beginning of Northern FineScale Survey, NFS). Although the density of crab pots was high near Newport, we found a gap that allowed clear passage just north of Line 1A. We enjoyed the spectacle of all three research vessels clustered at the inshore ends of lines 1 and 1A as we began the finescale survey.

We deployed four optical drifters (Table 6) in rapid succession at the 150 m isobath during our SeaSoar survey of line 1A, then monitored the drifter tracks via Argos over the course of the next 2 days.

We met the R/V *Wecoma* and F/V *Frosti* at the 80 m isobath along Line 2a, and conducted a bio-acoustics fly-by while F/V *Frosti* was trawling and R/V *Wecoma* was towing MOCNESS. We did a loop around the R/V *Wecoma* as she was

towing--a beautiful sight 1 hour before sunset. We then met R/V *Wecoma* again at 0900 GMT for another calibration fly-by at the shelf break on Line 3.

We found extremely high phytoplankton concentrations between Lines 3-3A. The WetStar fluorometer saturated at 5 volts, indicating that chlorophyll concentrations were in excess of 20 $\mu g\ l^{-1}$.

June 10. The Seasoar and cable were recovered to repair damage to the cable. During the repairs and retermination, we completed a survey of Line 3A with ADCP, HTI, and underway systems, and conducted an acoustics rendezvous with R/V *Wecoma* and F/V *Frosti* at HH5, just east of the offshore end of Line 4. We conducted bio-acoustic fly-bys of each vessel as they were towing (daylight, 1000 m water depth). We provided target depths for MOCNESS sampling based on real-time assessment of the HTI data. We repeated this operation with R/V *Wecoma* and F/V *Frosti* at midnight (0000 local, June 10) over the shelf break on Line 4 at station HH4.

June 10 - 11 (end of NFS). After some delays for repairs to the SeaSoar cable, we completed the northern finescale grid by towing offshore on Line 4 and inshore on Line 5. We completed another nighttime acoustics fly-by around R/V *Wecoma* and F/V *Frosti* near station HH4 (Line 4), then steamed past them while they were towing.

We conducted an ADCP and HTI survey enroute to our rendezvous point with the optical drifters near the offshore end of line 5. This survey provided nighttime HTI data to match the daytime data obtained earlier today over the same track.

Phytoplankton concentrations within the NFS box were extremely high from mid-shelf to inshore along each of the lines (Figure 15). There was a visible surface manifestation of Columbia River water at the offshore end of Line 4, with a distinct difference in surface roughness and a change in water color. This matched a sharp gradient in surface salinity and temperature.

Dr. Steve Pierce predicted the location of the drifters with considerable accuracy. Tom Ryan and Todd Pusser of the mammal observation team spotted all four drifters and provided visual confirmation of all four ID#s, in spite of overcast skies and many whitecaps. All the drifters were spotted and identified within 1 hour, within 2 nautical miles of each other, near 44° 01.4'N and 124° 59'W, in about 700 m of water (western end of Line 4). Following identification of the drifters, we conducted CTD casts, optical profiles, and TSRB deployments near the drifters.

June 12 (begin SFS). We spent most of the day within a few hundred meters of one of the four optical drifters deployed on June 8. We deployed the TSRB under a thin overcast to obtain measurements of the bulk absorption properties of the upper water column. We did two CTD casts adjacent to the drifter--one in late morning, and one in late afternoon. The two CTD profiles were quite distinct, with a 10-fold increase in fluorescence (0.4 volts to 4.0 volts) at the chl max between morning and evening.

During our work near the optical drifters, Jay Peterson isolated the signal problem that had been plaguing the OPC during the previous SeaSoar sections. We were subsequently able to obtain reliable OPC data for the remainder of the cruise.

We launched SeaSoar and HTI to begin the Southern Finescale Survey (SFS). We completed Lines 7 and 7A under foggy conditions with winds of 15 knots. We observed high concentrations of phytoplankton in the upper 20 m over the shelf, and strong southerly flow close inshore on Line 7. Beyond the shelf break, we encountered a band of northerly flow that appeared to be bounded on the west by the extension of the jet observed at the western ends of Lines 4 and 5.

We conducted another bioacoustics calibration with the R/V *Wecoma* last night as they were doing a MOCNESS tow, using the HTI signal pattern as a guide for the sampling intervals of the MOCNESS.

We deployed two more optical drifters in strong southerly flow as we crossed the shelf on Line 7.

June 13. We completed line 8, south of Cape Blanco, under moderate downwelling favorable winds. Even with downwelling winds, we observed strong southerly flow over the shelf along this line, with extremely low surface temperatures of 7.5° C, and salinity of 34.1 psu at the inshore end of line 9.

June 14. Winds were light to moderate from the south during the surveys of lines 7-10, and conditions around Cape Blanco were quite calm. In spite of the relaxed wind state, we continued to observe strong upwelling signatures over the shelf along each line. The northward undercurrent was present over the entire shelf along Line 7A. We also found surface temperatures <8° C and surface salinities > 34 psu at the inshore end of these lines. Phytoplankton concentrations remained high, but lower than was observed north of Cape Blanco.

The R/V *Wecoma* and F/V *Frosti* towed adjacent to us along segments of lines 7, 8, and 10 for additional bioacoustic / zooplankton / fish calibration work.

There was considerable bird and mammal activity along Line 10 during the late afternoon, beginning on the inshore side of the shelf break, with bird concentrations highest within a narrow band over a temperature gradient near the shelf break. Numerous humpback whales were spotted inshore of the 200 m isobath.

Our observations along line 11 confirm the significant surface layer concentrations of phytoplankton indicated in the SeaWiFS image obtained on June 11 (Figure 16). The sections from Lines 7-10a, especially the ADCP, illustrated a complex interaction between the upwelling jet and the vertical extent of the undercurrent over the shelf. There was very strong horizontal shear over the shelf in this region, with the indication of significant transport of surface phytoplankton to depth along sloping isopycnals.

June 15 (end of SFS). We increased the western extent of line 11a and 12 to capture the full expression of the coastal jet, as suggested to us via email from Dr. Jack Barth, based on his interpretation of recent AVHRR imagery. We extended the western end of line 11a past 125.5° W, and found that the temperature, salinity, and chlorophyll signals all showed that we had moved west of the jet boundary along line 11a, so we turned east on Line 12 at that point. We observed significant phytoplankton biomass within the upper 30 m out to 40 nautical miles in this offshore region.

June 16. Following completion of the SFS, we shifted operations to the optical drifters that had been deployed on line 7 on June 12. Steve Pierce incorporated ADCP data with recent satellite fixes to provide good predicted positions, but a western turn by the upwelling jet near line 10 carried the drifters a bit further west than predicted. This pair of drifters had been moving at speeds of 60 cm s^{-1}. CTD and optical profiles showed high phtyoplankton biomass between 20-40 m beneath the optical drifters.

We conducted additional bioacoustic calibrations with the R/V *Wecoma* along line 12 under perfectly calm conditions.

June 17. Following our work near the optical drifters on June 16, we developed a plan for an abbreviated mesoscale survey during the final day of the cruise. This short survey includes line 7, line 4, and the NH line on our way into Newport.

During this abbreviated survey, we passed through a dramatic surface expression of the Columbia River plume about 15 nautical miles offshore along Line 4, with extensive bands of slicks and swirling water. Several humpback whales were observed within a few hundred meters of the front--on the cooler, saltier side. We observed surface salinities less than 29 psu within this feature.

We recovered SeaSoar and the HTI system over the mid-shelf just west of Newport during the mid-morning hours of June 17, satisfied that we had obtained a remarkable data set.

The SeaSoar operation successfully completed three major surveys, mapping physical and bio-optical properties, along with OPC zooplankton counts, along 32 cross-shelf sections. The coincident ADCP and HTI datasets provide an unprecedented coupling of the physical and biological patterns of this region. The mammal and seabird observation teams logged hundreds of hours, and found distinct patterns of distribution. Over 300 sightings of cetaceans and 10 sightings of pinnipeds were obtained during the cruise, representing 11 species of cetaceans and 5 species of pinnipeds. The underway sampling team mapped surface bio-optical properties continuously, obtaining a unique collection of phytoplankton physiological indices using the Fast Repetition Rate Fluorometer (FRRF) and absorption meters.

The cruise officially ended with our arrival at the dock in Newport on June 17 at 1200 local time (1900 GMT).

Data Summaries

Several of the extensive data sets obtained during this cruise are now available on-line. Please refer to the following web sites for more details:

SeaSoar: sections and maps of physical properties and chlorophyll concentrations
http://damp.coas.oregonstate.edu/globec/nep/seasoar/index.html

ADCP: sections and maps of velocities
http://damp.coas.oregonstate.edu/globec/nep/adcp/index.html

HTI bioacoustics: sections of acoustic backscatter
http://damp.coas.oregonstate.edu/globec/nep/hti/index.html

Drifter tracks:
http://diana.oce.orst.edu/drift/

TSRB and radiometer data:
http://picasso.oce.orst.edu/ORSOO/data.html

Optical Plankton Counter: sections and maps of estimated zooplankton concentrations
http://www.es.umb.edu/faculty/mzh/files/nep/nep.htm

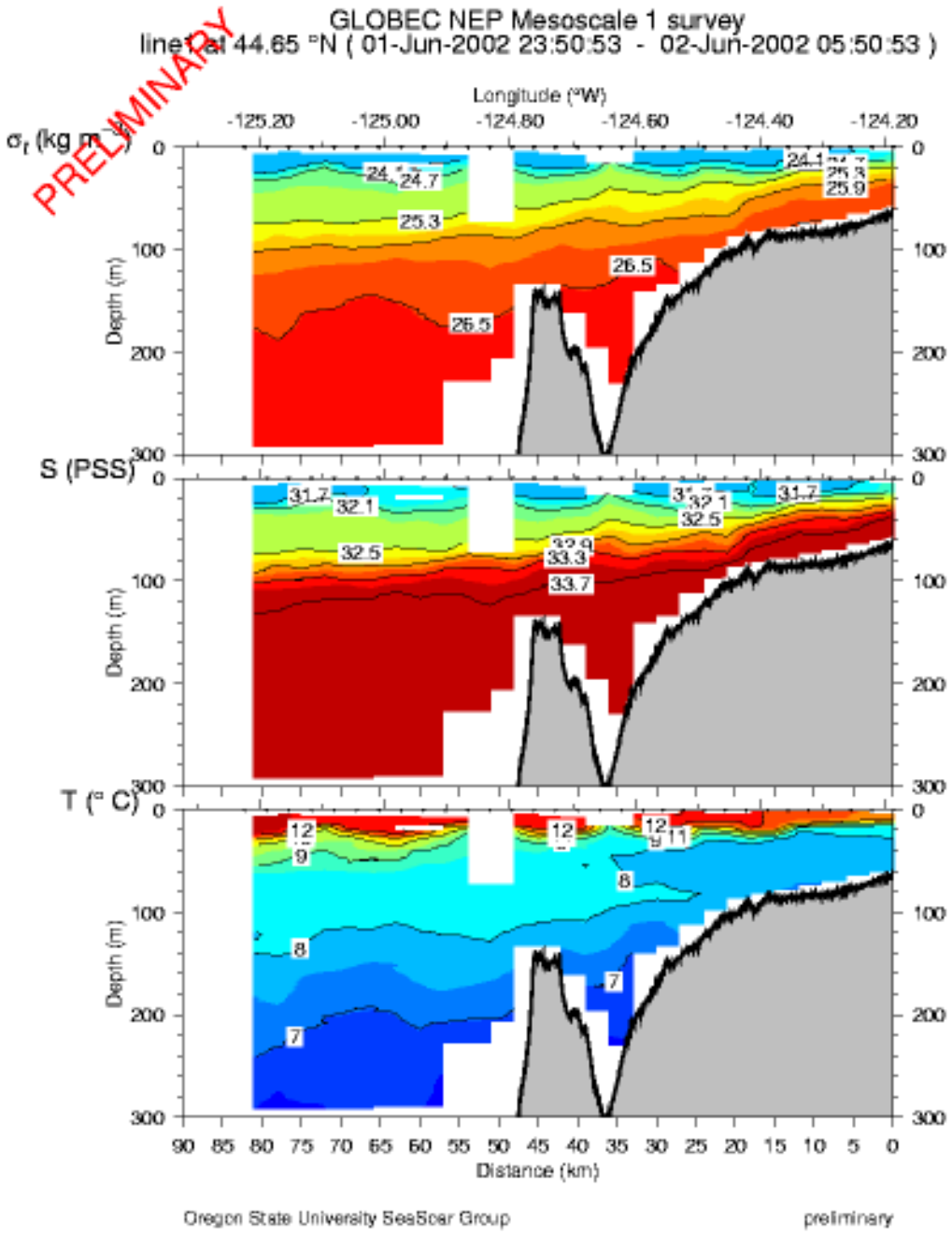


Figure 3. Density (top), Salinity (middle), and Temperature (bottom) on Mesoscale Survey, Line 1.

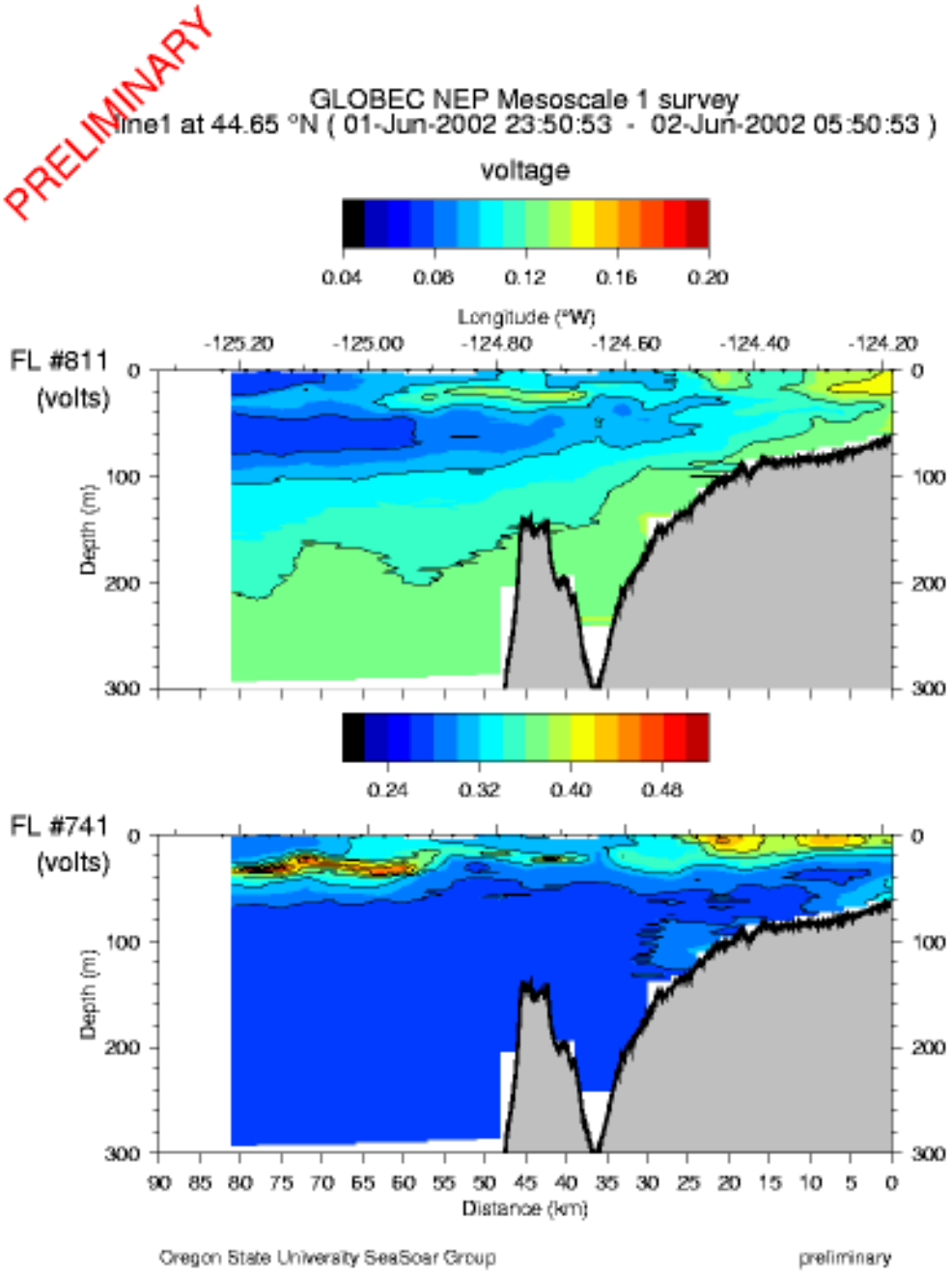


Figure 4. CDOM (top) and Chlorophyll (bottom) Fluorescence on Line 1.

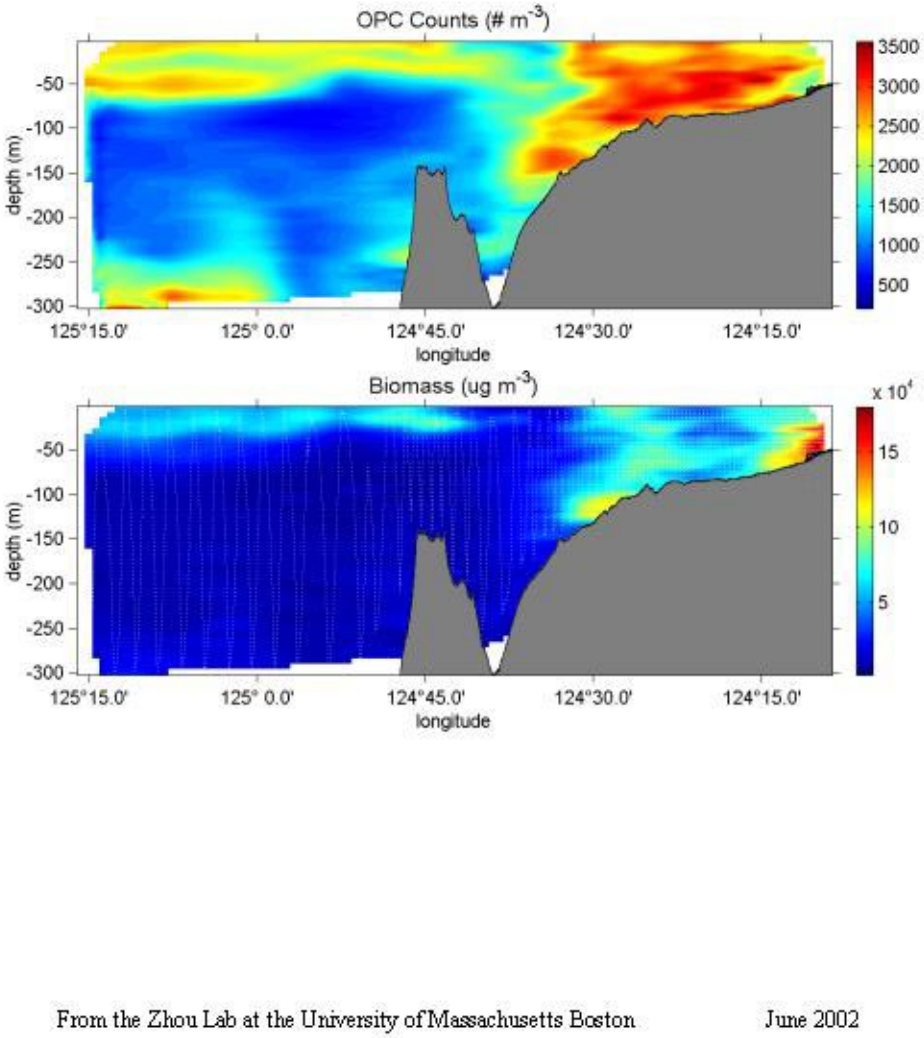


Figure 5. Counts (top) and Estimated Biomass (bottom) from OPC, Line 1.

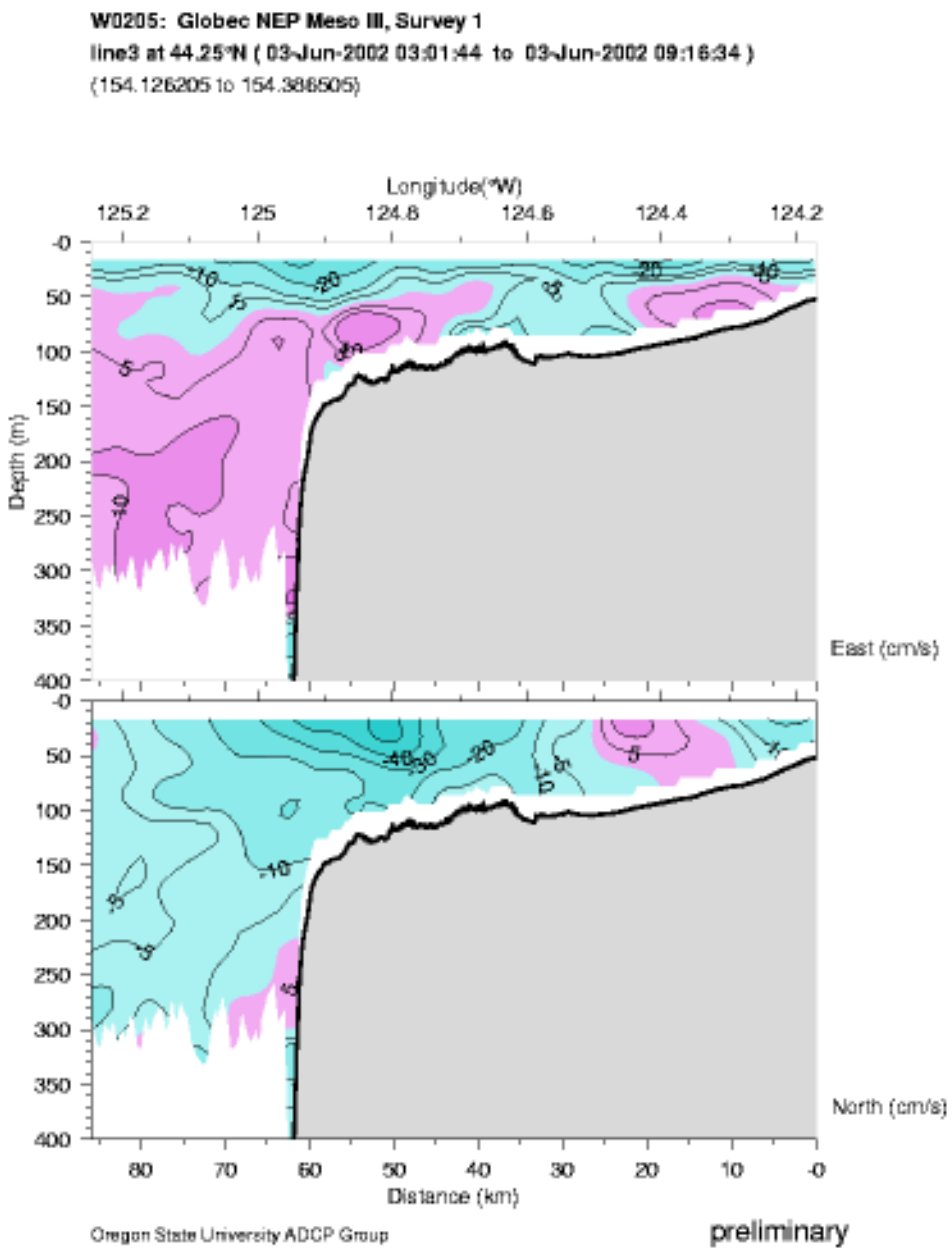


Figure 6. Eastward Velocity (top) and Northward Velocity (bottom) from 150 kHz ADCP, Line 3.

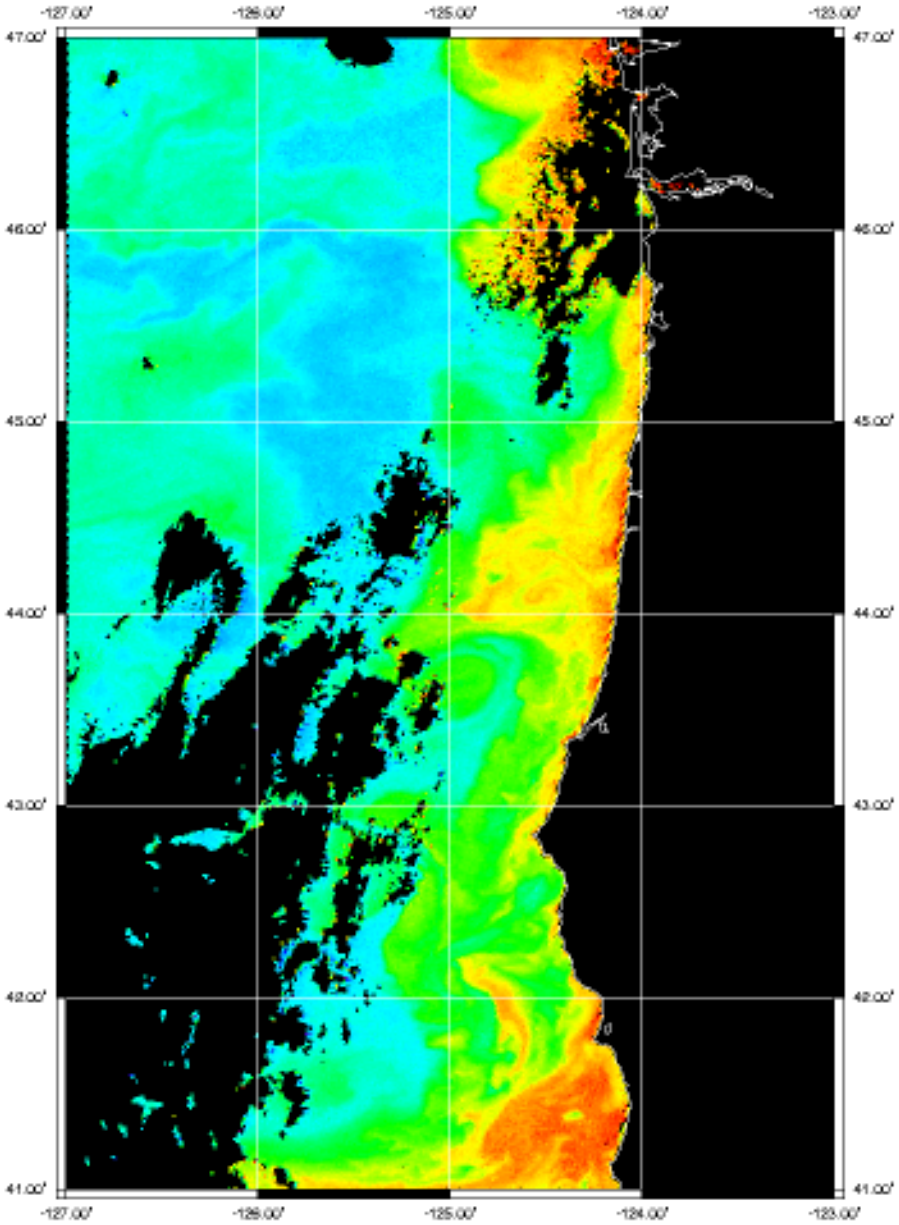


Figure 7. SeaWiFS Ocean Color Image from 3 June 2002.

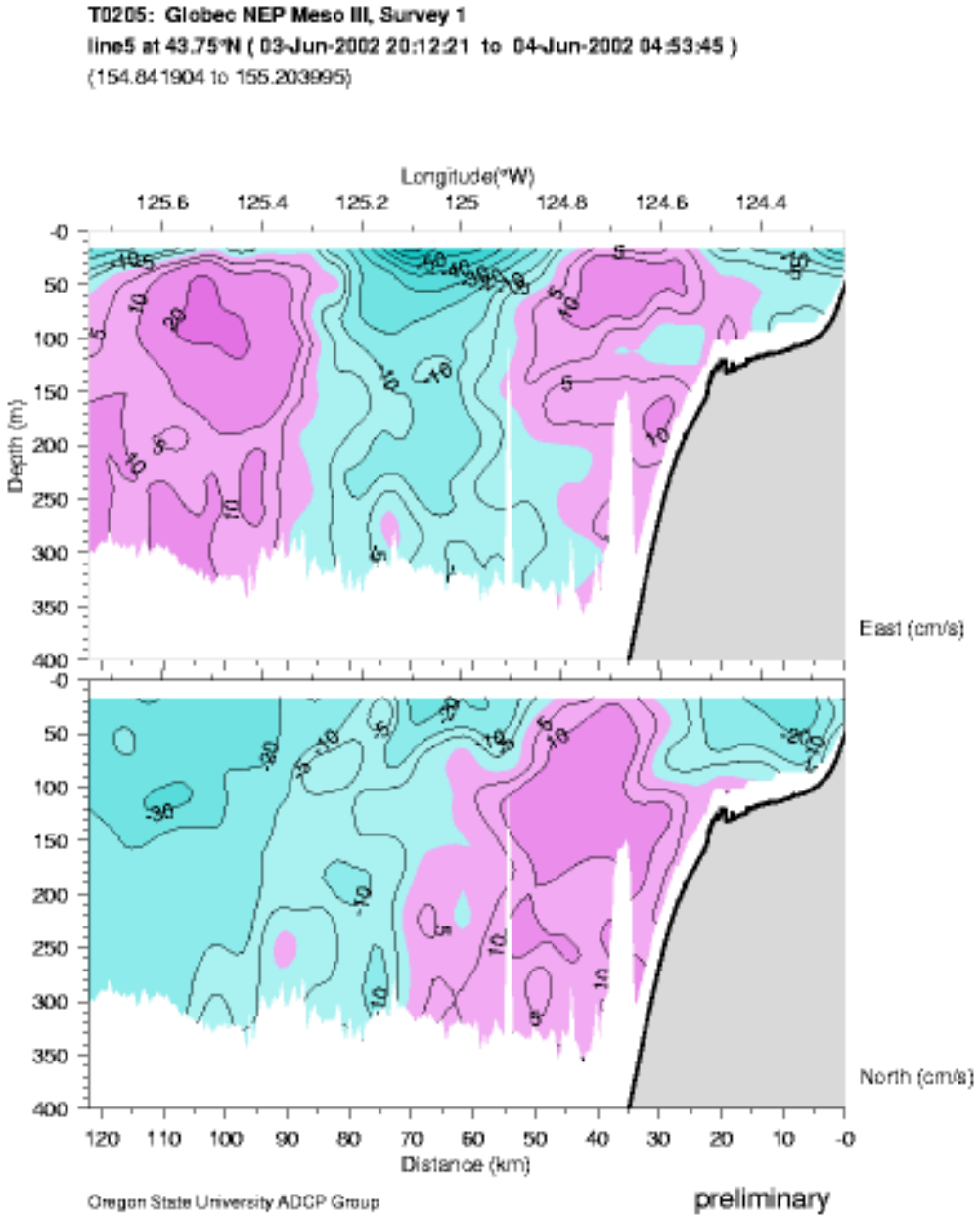


Figure 8. Eastward Velocity (top) and Northward Velocity (bottom) from 150 kHz ADCP, Line 5.

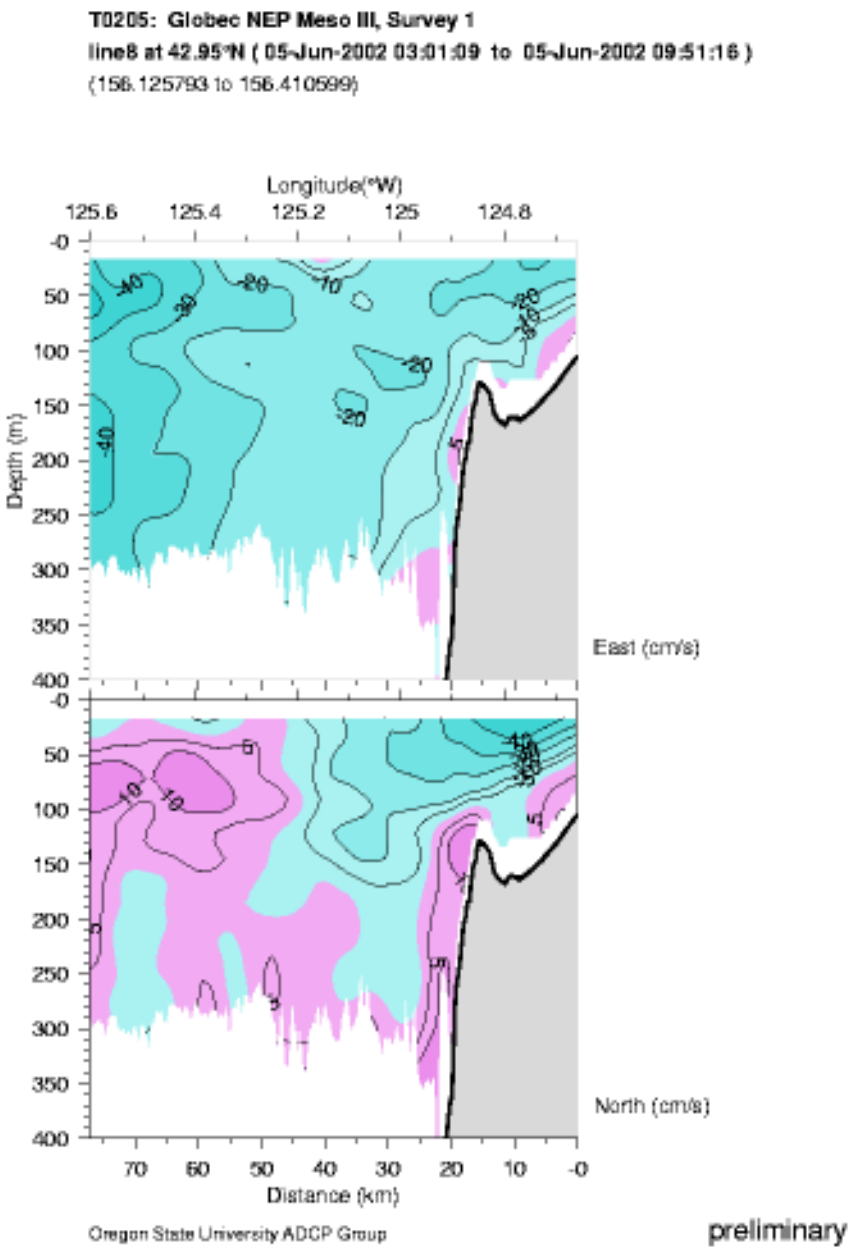


Figure 9. Eastward Velocity (top) and Northward Velocity (bottom) from 150 kHz, Line 8.

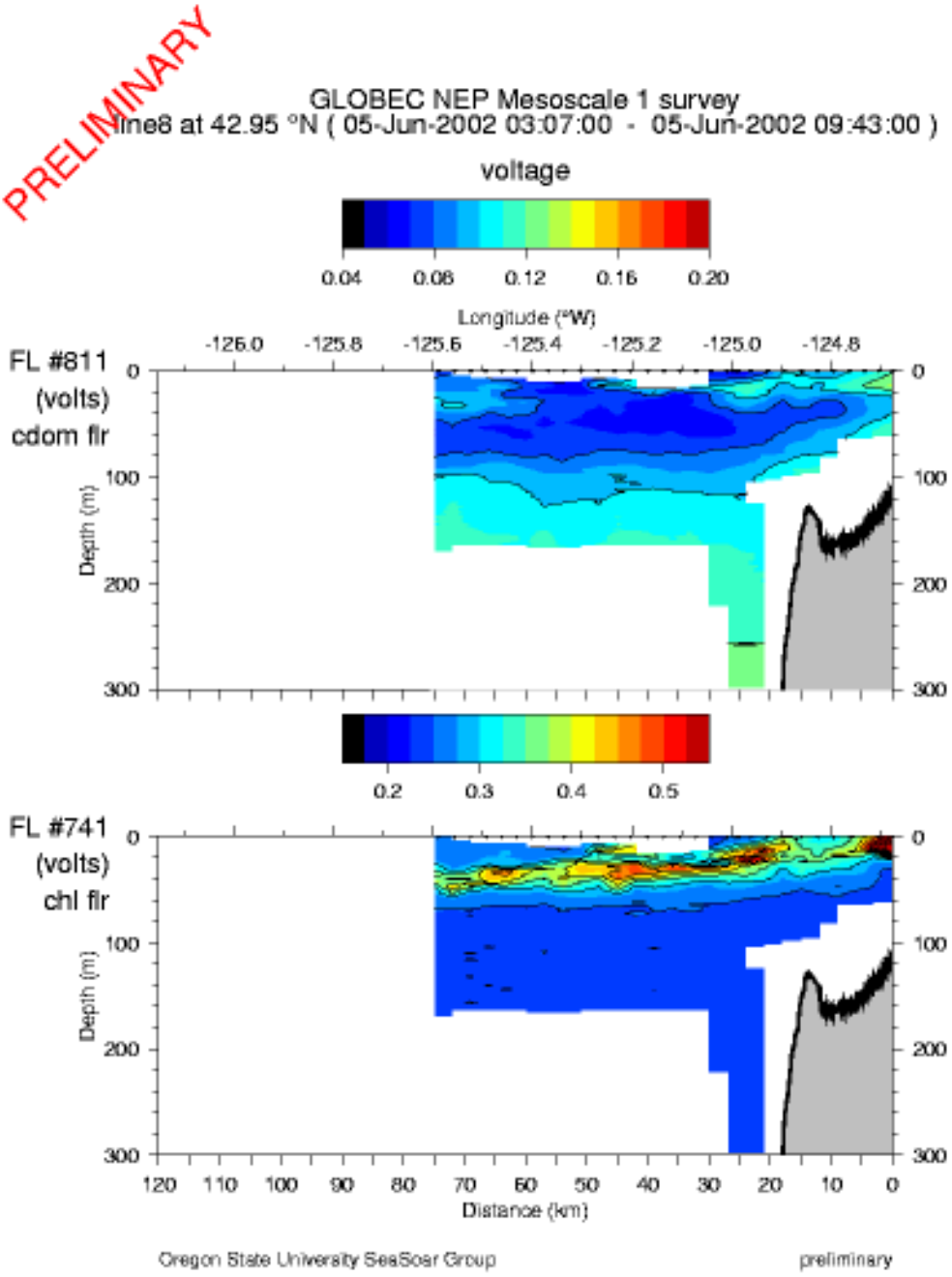


Figure 10. CDOM (top) and Chlorophyll (bottom) Fluorescence on Line 8.

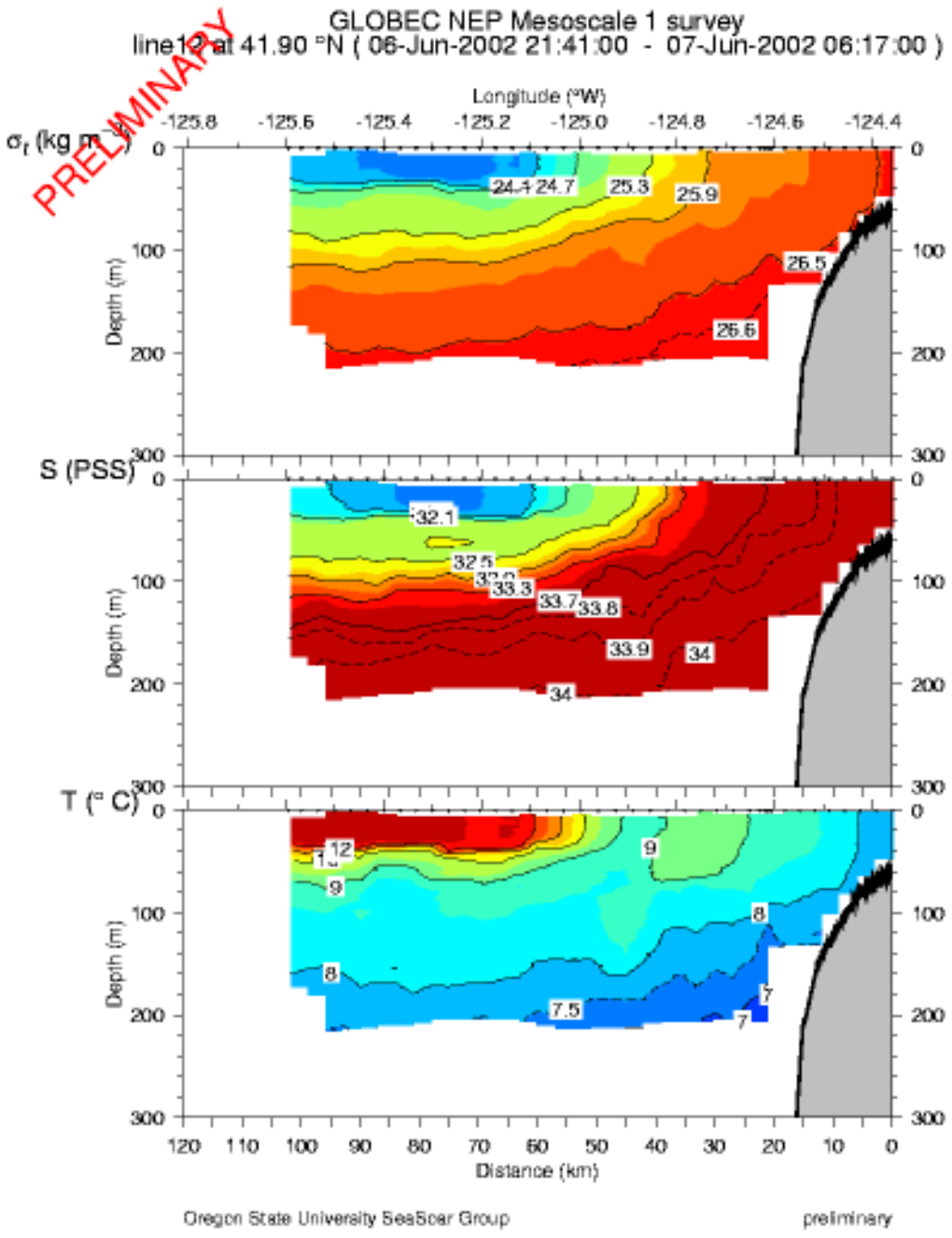


Figure 11. Density (top), Salinity (middle) and Temperature (bottom) on Line 12.

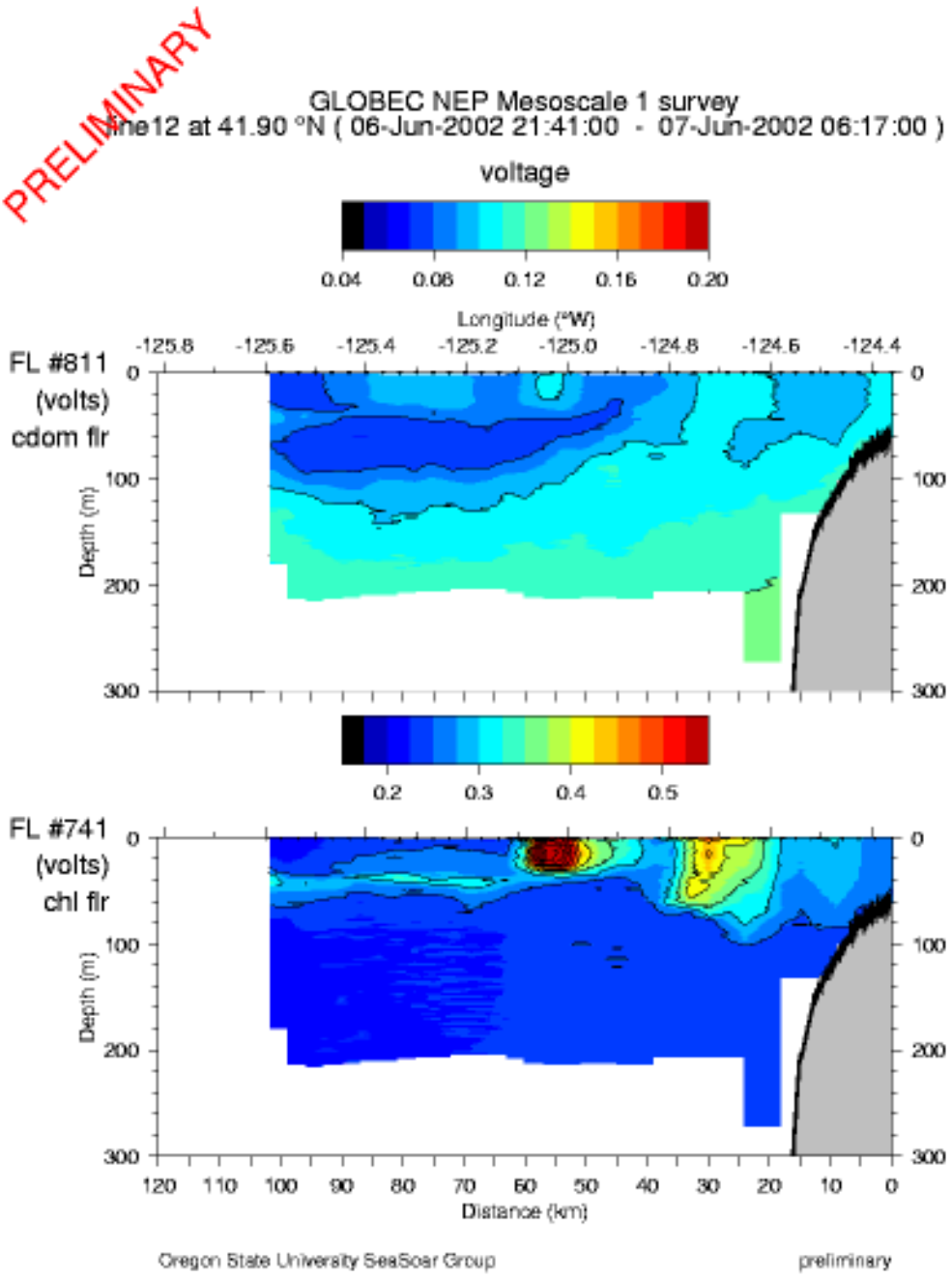


Figure 12. CDOM (top) and Chlorophyll (bottom) Fluorescence on Line 12.

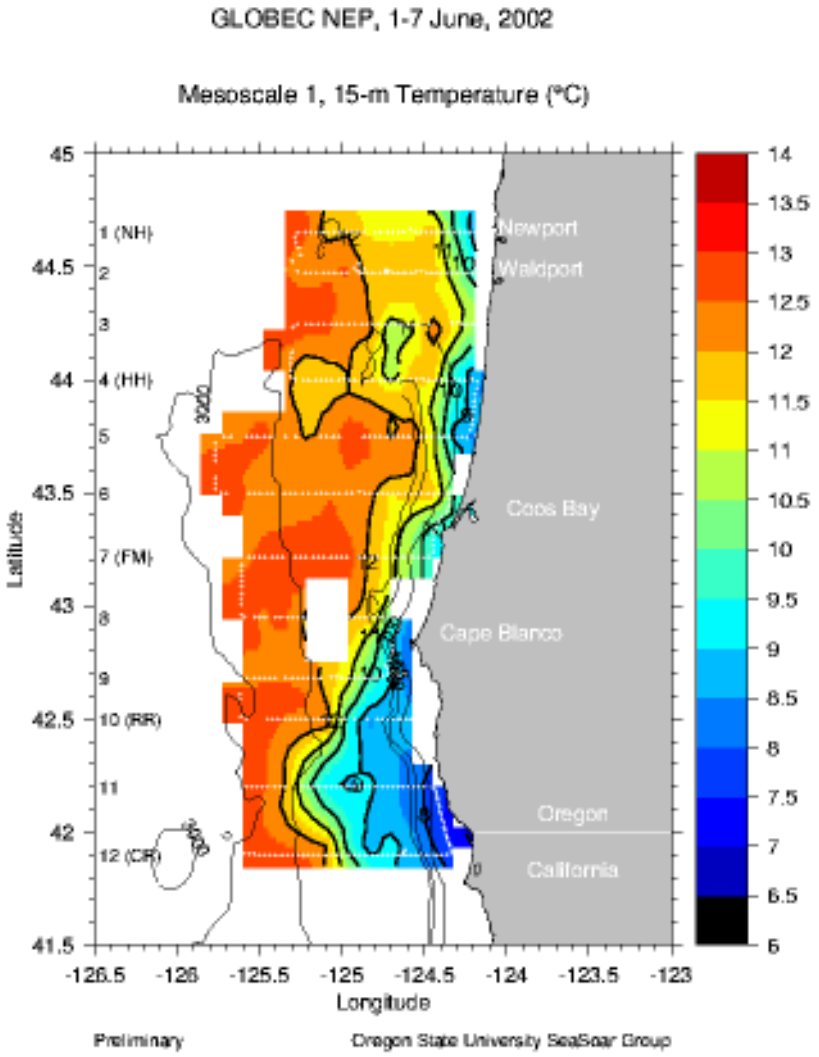


Figure 13. Temperature at 15 m depth from the Mesoscale Survey.

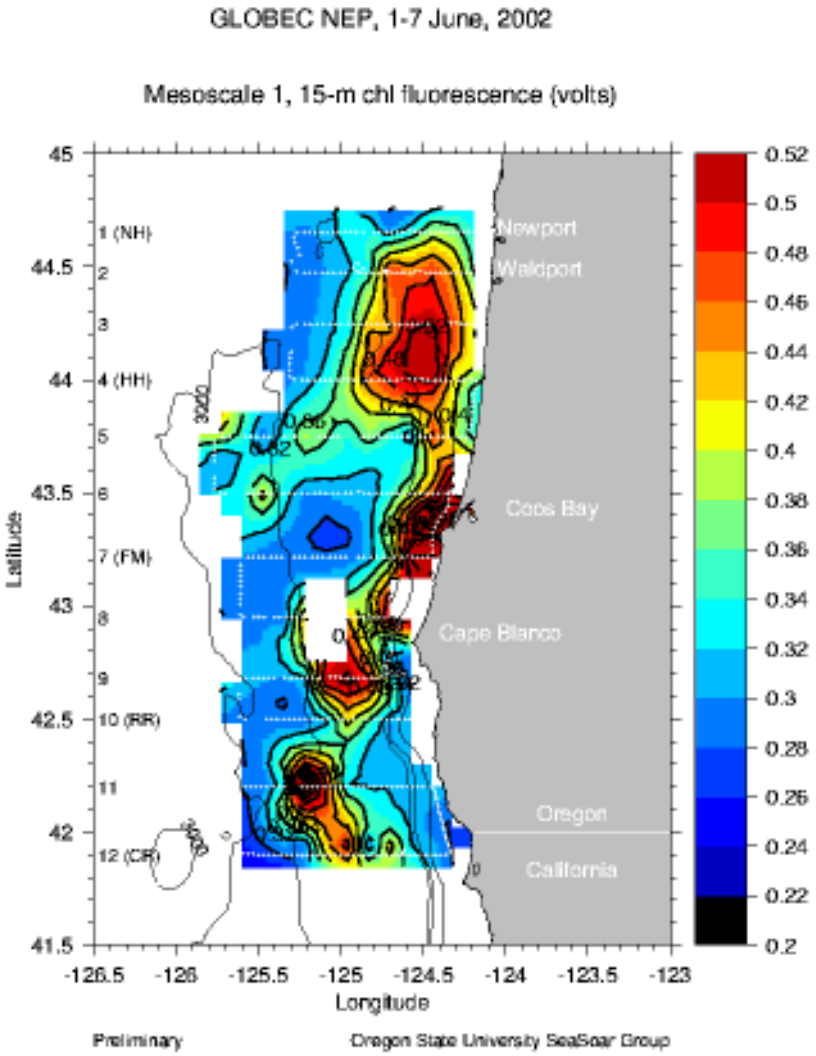


Figure 14. Chlorophyll Fluorescence at 15 m depth from the Mesoscale Survey.

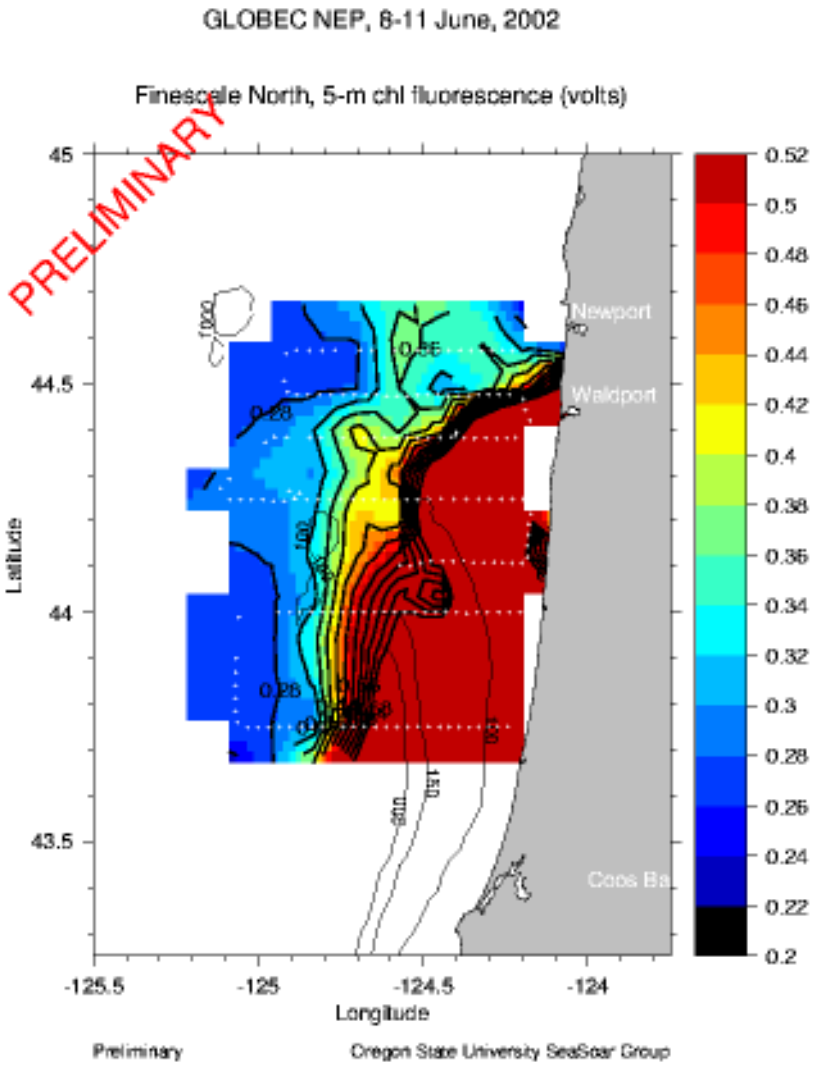


Figure 15. Chlorophyll Fluorescence at 5 m depth from the Northern Finescale Survey.

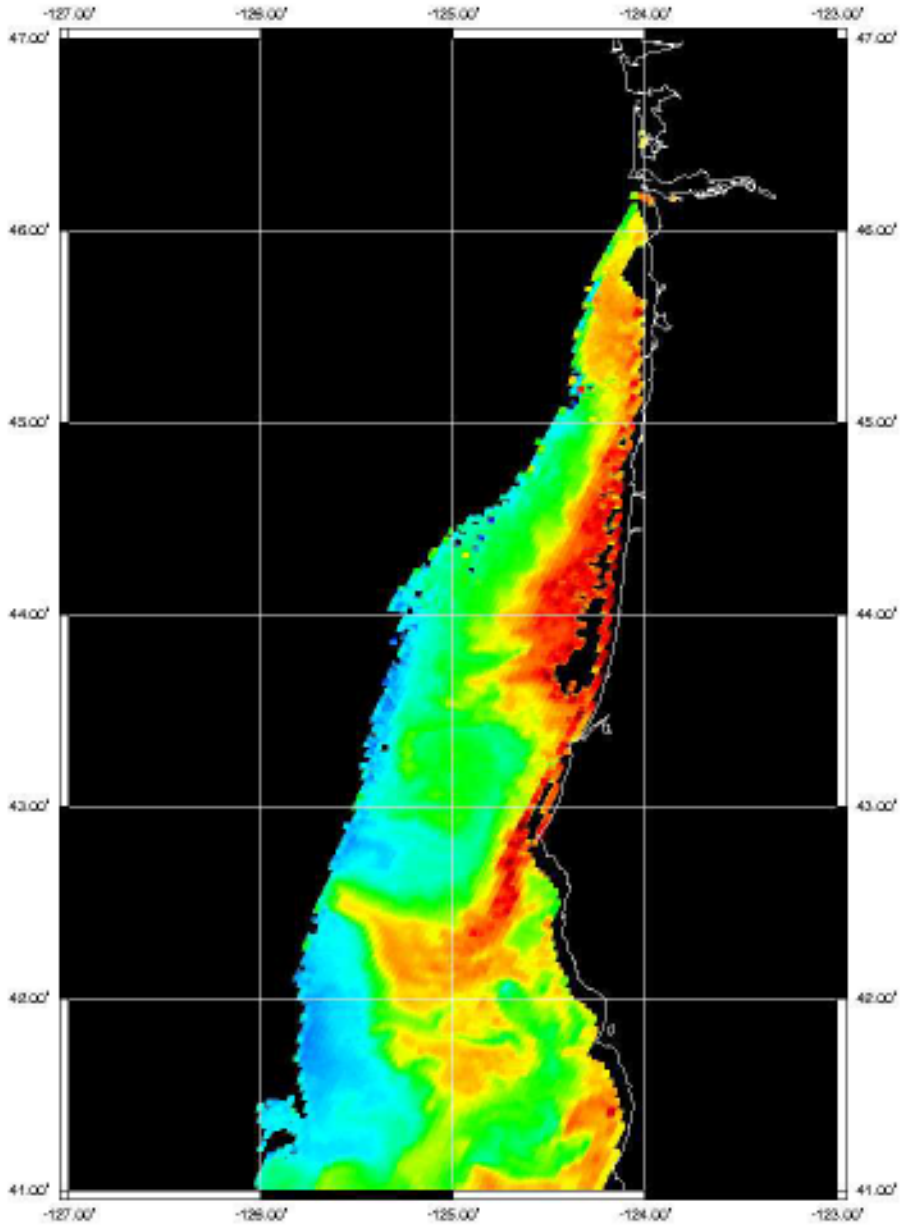


Figure 16. SeaWiFS Ocean Color Image from 11 June 2002.

Table 2: SeaSoar Surveys

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15202.05	SeaSoar	1	1	nd	1	6	1523	S	44.6522	-124.1398	48	v	Cowles/Barth	MS1	Mesoscale survey start.
TN15302.07	SeaSoar	1	nd	nd	2	6	1120	E	44.3847	-124.1452	50	v	nd	nd	End tow 1; instrument repair; inshore on Line 2.
TN15302.20	SeaSoar	2	2	nd	2	6	1953	S	44.2375	-124.1667	54	v	Cowles/Barth	MS1	
TN15602.13	SeaSoar	2	nd	nd	5	6	2045	E	42.5042	-124.5267	61	v	nd	nd	End tow 2; instrument repair; inshore on Line 10.
TN15702.12	SeaSoar	3	10	nd	6	6	1431	S	41.9002	-125.5990	>3000	v	Cowles/Barth	MS1	Western end of Line 12.
TN15802.05	SeaSoar	3	nd	nd	7	6	1216	E	42.2537	-125.6302	nd	nd	nd	nd	Western end of Line 11; last part of MS1.
TN15902.02	SeaSoar	4	11	nd	8	6	0812	S	44.5812	-124.1845	50	v	Cowles/Barth	NFS	N finescale start.
TN16002.11	SeaSoar	4	nd	nd	9	6	1233	E	44.1005	-124.7268	nd	nd	nd	nd	Crab pot; recover for repair/cable retermination.
TN16102.01	SeaSoar	5	12	nd	10	6	0805	S	43.9737	-124.1873	50	v	Cowles/Barth	NFS	Resume N finescale at 4E.
TN16102.18	SeaSoar	5	nd	nd	10	6	2100	E	43.7587	-124.2287	50	nd	nd	nd	End of N finescale.
TN16302.01	SeaSoar	6	14	nd	12	6	0741	S	43.2067	-124.4448	52	v	Cowles/Barth	SFS	Start of S finescale.
TN16402.07	SeaSoar	6	14	nd	13	6	1005	E	42.6833	-124.8967	nd	nd	nd	nd	Dead CTD on Line 9.
TN16402.10	SeaSoar	7	15	nd	13	6	1306	S	42.6825	-125.0268	2700	v	Cowles/Barth	SFS	Continue S finescale on Line 9.
TN16602.01	SeaSoar	7	nd	nd	15	6	0150	E	41.9147	-124.3155	nd	nd	nd	nd	Inshore end of Line 12 (CR).
TN16702.02	SeaSoar	8	17	nd	16	6	0033	S	43.1988	-125.2463	1800	v	Cowles/Barth	MS2	On FM line (line 7).
TN16802.03	SeaSoar	8	nd	nd	17	6	0849	E	44.6468	-124.1503	nd	nd	nd	nd	

Table 3: CTD Casts

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15602.14	CTD	1	3	RR3	5	6	2213	S	42.4982	-124.7047	133	125	Cowles	MS1	CTDs along Line 10 during SeaSoar repairs.
TN15602.15	CTD	1	nd	RR3	5	6	2231	E	42.5007	-124.7113	nd	nd	Cowles	MS1	
TN15602.16	CTD	2	4	RR4	5	6	2335	S	42.4980	-124.8055	590	500	Cowles	MS1	
TN15702.01	CTD	2	nd	RR4	6	6	0010	E	42.4965	-124.8120	nd	nd	Cowles	MS1	
TN15702.02	CTD	3	5	RR5	6	6	0100	S	42.4973	-124.9078	1020	1000	Cowles	MS1	
TN15702.03	CTD	3	nd	RR5	6	6	0200	E	42.4975	-124.9115	nd	nd	Cowles	MS1	
TN15702.04	CTD	4	6	RR6	6	6	0251	S	42.4983	-124.9983	1802	500	Cowles	MS1	
TN15702.05	CTD	4	nd	RR6	6	6	0321	E	42.4940	-125.0015	nd	nd	Cowles	MS1	
TN15702.06	CTD	5	7	RR7	6	6	0446	S	42.5010	-125.2033	3007	500	Cowles	MS1	
TN15702.07	CTD	5	nd	RR7	6	6	0514	E	42.5015	-125.2035	nd	nd	Cowles	MS1	
TN15702.08	CTD	6	8	RR8	6	6	0751	S	42.5022	-125.6018	3096	500	Cowles	MS1	
TN15702.09	CTD	6	nd	RR8	6	6	0827	E	42.5065	-125.6057	nd	nd	Cowles	MS1	
TN15702.10	CTD	7	9	Line11W	6	6	1129	S	42.2047	-125.6038	3088	500	Cowles	MS1	Offshore end of Line 11.
TN15702.11	CTD	7	nd	Line11W	6	6	1159	E	42.2018	-125.6077	nd	nd	Cowles	MS1	
TN16202.01	CTD	8	13	drift sta1	11	6	1008	S	44.0067	-124.9725	663	500	Cowles	nd	Adjacent to optical drifters.
TN16202.02	CTD	8	13	drift sta1	11	6	1029	E	44.0050	-124.9727	nd	nd	Cowles	nd	
TN16202.03	CTD	9	13	drift sta1	11	6	1046	S	44.0022	-124.9722	705	500	Cowles	nd	Adjacent to optical drifters.
TN16202.04	CTD	9	13	drift sta1	11	6	1113	E	43.9987	-124.9718	nd	nd	Cowles	nd	
TN16202.07	CTD	10	13	drift sta1	11	6	1801	S	43.9342	-125.0052	662	500	Cowles	nd	Adjacent to optical drifters.
TN16202.08	CTD	10	13	drift sta1	11	6	1833	E	43.9272	-125.0047	nd	nd	Cowles	nd	
TN16602.02	CTD	11	16	drift sta2	15	6	1114	S	42.2453	-125.0565	1761	500	Cowles	nd	Adjacent to drifter 27952.
TN16602.03	CTD	11	16	drift sta2	15	6	1147	E	42.2415	-125.0633	nd	nd	Cowles	nd	
TN16602.08	CTD	12	16	drift sta2	15	6	1500	S	42.1727	-125.0840	1845	500	Cowles	nd	Adjacent to drifter 27952.
TN16602.09	CTD	12	16	drift sta2	15	6	1529	E	42.1675	-125.0838	nd	nd	Cowles	nd	

Table 4: Marine Mammal Observation Periods

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15202.02	BigEyes	nd	nd	mams	1	6	1242	S	44.6127	-124.0750	40	nd	Tynan	nd	Just off Newport.
TN15202.03	BigEyes	nd	nd	mams	1	6	1335	E	44.6510	-124.1433	45	nd	Tynan	nd	
TN15202.06	BigEyes	nd	nd	mams	1	6	1635	S	44.6510	-124.1485	51	nd	Tynan	MS1	
TN15202.08	BigEyes	nd	nd	mams	1	6	1735	E	44.6522	-124.3157	84	nd	Tynan	MS1	
TN15202.09	BigEyes	nd	nd	mams	1	6	1805	S	44.6520	-124.3930	94	nd	Tynan	MS1	
TN15202.10	BigEyes	nd	nd	mams	1	6	2035	E	44.6515	-124.8252	365	nd	Tynan	MS1	
TN15302.01	BigEyes	nd	nd	mams	2	6	0600	S	44.4752	-124.6498	149	nd	Tynan	MS1	
TN15302.03	BigEyes	nd	nd	mams	2	6	0715	E	44.4752	-124.4642	77	nd	Tynan	MS1	
TN15302.04	BigEyes	nd	nd	mams	2	6	0745	S	44.4750	-124.3877	61	nd	Tynan	MS1	
TN15302.06	BigEyes	nd	nd	mams	2	6	0915	E	44.4732	-124.1495	46	nd	Tynan	MS1	
TN15302.09	BigEyes	nd	nd	mams	2	6	1215	S	44.3235	-124.1848	53	nd	Tynan	MS1	
TN15302.11	BigEyes	nd	nd	mams	2	6	1315	E	44.2348	-124.1737	76	nd	Tynan	MS1	
TN15302.13	BigEyes	nd	nd	mams	2	6	1632	S	44.2433	-124.1813	53	nd	Tynan	MS1	
TN15302.15	BigEyes	nd	nd	mams	2	6	1702	E	44.2467	-124.2697	76	nd	Tynan	MS1	
TN15302.17	BigEyes	nd	nd	mams	2	6	1805	S	44.2482	-124.4242	97	nd	Tynan	MS1	
TN15302.19	BigEyes	nd	nd	mams	2	6	1928	E	44.2448	-124.1803	53	nd	Tynan	MS1	
TN15402.02	BigEyes	nd	nd	mams	3	6	0655	S	44.0133	-124.9840	781	nd	Tynan	MS1	
TN15402.03	BigEyes	nd	nd	mams	3	6	0730	E	44.0000	-124.8778	86	nd	Tynan	MS1	
TN15402.04	BigEyes	nd	nd	mams	3	6	0753	S	43.9998	-124.8125	105	nd	Tynan	MS1	
TN15402.05	BigEyes	nd	nd	mams	3	6	0930	E	44.0007	-124.5113	140	nd	Tynan	MS1	
TN15402.06	BigEyes	nd	nd	mams	3	6	1000	S	43.9997	-124.4165	124	nd	Tynan	MS1	
TN15402.07	BigEyes	nd	nd	mams	3	6	1115	E	43.9995	-124.1858	45	nd	Tynan	MS1	
TN15402.10	BigEyes	nd	nd	mams	3	6	1315	S	43.7448	-124.2415	76	nd	Tynan	MS1	
TN15402.11	BigEyes	nd	nd	mams	3	6	1515	E	43.7502	-124.5865	238	nd	Tynan	MS1	
TN15402.12	BigEyes	nd	nd	mams	3	6	1530	S	43.7502	-124.6268	326	nd	Tynan	MS1	
TN15402.13	BigEyes	nd	nd	mams	3	6	1730	E	43.7498	-124.9822	1374	nd	Tynan	MS1	
TN15402.14	BigEyes	nd	nd	mams	3	6	1754	S	43.7508	-125.0628	1356	nd	Tynan	MS1	
TN15402.15	BigEyes	nd	nd	mams	3	6	2003	E	43.7493	-125.4412	3085	nd	Tynan	MS1	
TN15502.02	BigEyes	nd	nd	mams	4	6	0603	S	43.5000	-124.7562	543	nd	Tynan	MS1	Fog.
TN15502.03	BigEyes	nd	nd	mams	4	6	0706	E	43.4987	-124.5757	101	nd	Tynan	MS1	Visib less than 500m.
TN15502.04	BigEyes	nd	nd	mams	4	6	0755	S	43.4970	-124.4342	115	nd	Tynan	MS1	
TN15502.06	BigEyes	nd	nd	mams	4	6	0832	E	43.4993	-124.3347	92	nd	Tynan	MS1	
TN15502.08	BigEyes	nd	nd	mams	4	6	1130	S	43.2167	-124.4852	62	nd	Tynan	MS1	
TN15502.09	BigEyes	nd	nd	mams	4	6	1345	E	43.2167	-124.8862	407	nd	Tynan	MS1	
TN15502.10	BigEyes	nd	nd	mams	4	6	1400	S	43.2167	-124.9343	727	nd	Tynan	MS1	
TN15502.11	BigEyes	nd	nd	mams	4	6	1515	E	43.2168	-125.1595	1766	nd	Tynan	MS1	
TN15502.12	BigEyes	nd	nd	mams	4	6	1530	S	43.2165	-125.1972	1767	nd	Tynan	MS1	
TN15502.13	BigEyes	nd	nd	mams	4	6	1730	E	43.2165	-125.5488	3095	nd	Tynan	MS1	
TN15502.15	BigEyes	nd	nd	mams	4	6	2000	S	42.9533	-125.6053	3089	nd	Tynan	MS1	
TN15502.16	BigEyes	nd	nd	mams	4	6	2025	E	42.9502	-125.5355	3098	nd	Tynan	MS1	
TN15602.02	BigEyes	nd	nd	mams	5	6	0645	S	42.6895	-124.7550	458	nd	Tynan	MS1	
TN15602.04	BigEyes	nd	nd	mams	5	6	1130	E	42.6832	-125.5702	3093	nd	Tynan	MS1	
TN15602.05	BigEyes	nd	nd	mams	5	6	1330	S	42.4997	-125.5702	3096	nd	Tynan	MS1	
TN15602.07	BigEyes	nd	nd	mams	5	6	1500	E	42.5002	-125.3167	3109	nd	Tynan	MS1	
TN15602.08	BigEyes	nd	nd	mams	5	6	1520	S	42.4997	-125.2637	3108	nd	Tynan	MS1	
TN15602.09	BigEyes	nd	nd	mams	5	6	1740	E	42.5000	-124.8858	1065	nd	Tynan	MS1	
TN15602.10	BigEyes	nd	nd	mams	5	6	1825	S	42.5002	-124.8457	750	nd	Tynan	MS1	
TN15602.11	BigEyes	nd	nd	mams	5	6	2030	E	42.5002	-124.5508	67	nd	Tynan	MS1	

Table 4: Marine Mammal Observation Periods (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15702.14	BigEyes	nd	nd	mams	6	6	1501	S	41.9028	-125.5408	3092	nd	Tynan	nd	
TN15702.16	BigEyes	nd	nd	mams	6	6	2028	E	41.8997	-124.6208	630	nd	Tynan	nd	
TN15802.02	BigEyes	nd	nd	mams	7	6	0610	S	42.1997	-124.9830	1161	nd	Tynan	nd	Wind and whitecaps.
TN15802.04	BigEyes	nd	nd	mams	7	6	0947	E	42.1983	-125.6078	3092	nd	Tynan	nd	
TN15902.03	BigEyes	nd	nd	mams	8	6	0852	S	44.5708	-124.2202	66	nd	Tynan	NFS	
TN15902.05	BigEyes	nd	nd	mams	8	6	1021	E	44.5700	-124.4638	82	nd	Tynan	NFS	
TN15902.06	BigEyes	nd	nd	mams	8	6	1037	S	44.5713	-124.4987	112	nd	Tynan	NFS	
TN15902.11	BigEyes	nd	nd	mams	8	6	1130	E	44.5715	-124.6520	283	nd	Tynan	NFS	
TN15902.12	BigEyes	nd	nd	mams	8	6	1200	S	44.5722	-124.7413	341	nd	Tynan	NFS	
TN15902.13	BigEyes	nd	nd	mams	8	6	1203	E	44.5712	-124.9122	640	nd	Tynan	NFS	
TN15902.16	BigEyes	nd	nd	mams	8	6	1352	S	44.4750	-124.8527	337	nd	Tynan	NFS	
TN15902.17	BigEyes	nd	nd	mams	8	6	1533	E	44.4720	-124.5692	122	nd	Tynan	NFS	
TN15902.18	BigEyes	nd	nd	mams	8	6	1552	S	44.4737	-124.5212	96	nd	Tynan	NFS	
TN15902.19	BigEyes	nd	nd	mams	8	6	1700	E	44.4740	-124.3460	68	nd	Tynan	NFS	
TN15902.20	BigEyes	nd	nd	mams	8	6	1732	S	44.4752	-124.2615	75	nd	Tynan	NFS	
TN15902.22	BigEyes	nd	nd	mams	8	6	1755	E	44.4743	-124.1983	59	nd	Tynan	NFS	
TN15902.23	BigEyes	nd	nd	mams	8	6	1849	S	44.3812	-124.1912	55	nd	Tynan	NFS	
TN15902.26	BigEyes	nd	nd	mams	8	6	2011	E	44.3848	-124.4028	82	nd	Tynan	NFS	
TN16002.02	BigEyes	nd	nd	mams	9	6	0600	S	44.2478	-124.4293	95	nd	Tynan	NFS	
TN16002.04	BigEyes	nd	nd	mams	9	6	0730	E	44.2467	-124.1672	51	nd	Tynan	NFS	
TN16002.06	BigEyes	nd	nd	mams	9	6	0845	S	44.1062	-124.1953	55	nd	Tynan	NFS	
TN16002.07	BigEyes	nd	nd	mams	9	6	1015	E	44.1107	-124.4183	111	nd	Tynan	NFS	
TN16002.08	BigEyes	nd	nd	mams	9	6	1030	S	44.1110	-124.4663	117	nd	Tynan	NFS	
TN16002.10	BigEyes	nd	nd	mams	9	6	1145	E	44.1105	-124.6613	124	nd	Tynan	NFS	
TN16002.13	BigEyes	nd	nd	mams	9	6	1350	S	44.0935	-124.7730	120	nd	Tynan	NFS	
TN16002.15	BigEyes	nd	nd	mams	9	6	1547	E	44.1100	-125.1028	1430	nd	Tynan	NFS	
TN16002.17	BigEyes	nd	nd	mams	9	6	1637	S	44.0050	-125.0875	1430	nd	Tynan	NFS	
TN16002.19	BigEyes	nd	nd	mams	9	6	1708	E	43.9863	-124.9862	800	nd	Tynan	NFS	
TN16002.21	BigEyes	nd	nd	mams	9	6	1907	S	44.0008	-124.9962	923	nd	Tynan	NFS	
TN16002.22	BigEyes	nd	nd	mams	9	6	2036	E	43.9995	-124.6965	120	nd	Tynan	NFS	
TN16102.03	BigEyes	nd	nd	mams	10	6	0830	S	43.9983	-124.1955	53	nd	Tynan	NFS	
TN16102.04	BigEyes	nd	nd	mams	10	6	1031	E	44.0000	-124.5172	143	nd	Tynan	NFS	
TN16102.05	BigEyes	nd	nd	mams	10	6	1045	S	43.9995	-124.5547	150	nd	Tynan	NFS	
TN16102.06	BigEyes	nd	nd	mams	10	6	1151	E	44.0000	-124.7262	124	nd	Tynan	NFS	
TN16102.07	BigEyes	nd	nd	mams	10	6	1219	S	44.0000	-124.7980	120	nd	Tynan	NFS	
TN16102.09	BigEyes	nd	nd	mams	10	6	1352	E	43.9983	-125.0473	1277	nd	Tynan	NFS	
TN16102.10	BigEyes	nd	nd	mams	10	6	1545	S	43.7498	-125.0408	1200	nd	Tynan	NFS	
TN16102.12	BigEyes	nd	nd	mams	10	6	1700	E	43.7500	-124.8380	677	nd	Tynan	NFS	
TN16102.14	BigEyes	nd	nd	mams	10	6	1735	S	43.7483	-124.7473	527	nd	Tynan	NFS	
TN16102.15	BigEyes	nd	nd	mams	10	6	1900	E	43.7508	-124.5127	157	nd	Tynan	NFS	
TN16102.16	BigEyes	nd	nd	mams	10	6	1915	S	43.7508	-124.4728	128	nd	Tynan	NFS	
TN16102.17	BigEyes	nd	nd	mams	10	6	2030	E	43.7523	-124.2878	100	nd	Tynan	NFS	
TN16302.05	BigEyes	nd	nd	mams	12	6	1100	S	43.2175	-124.9285	692	nd	Tynan	SFS	
TN16302.07	BigEyes	nd	nd	mams	12	6	1230	E	43.2133	-125.1750	1732	nd	Tynan	SFS	
TN16302.08	BigEyes	nd	nd	mams	12	6	1330	S	43.0835	-125.1610	1652	nd	Tynan	SFS	
TN16302.10	BigEyes	nd	nd	mams	12	6	1530	E	43.0833	-124.8073	204	nd	Tynan	SFS	
TN16302.11	BigEyes	nd	nd	mams	12	6	1546	S	43.0835	-124.7647	232	nd	Tynan	SFS	
TN16302.13	BigEyes	nd	nd	mams	12	6	1725	E	43.0833	-124.4887	56	nd	Tynan	SFS	

Table 4: Marine Mammal Observation Periods (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN16302.15	BigEyes	nd	nd	mams	12	6	1845	S	42.9487	-124.5567	64	nd	Tynan	SFS	
TN16302.17	BigEyes	nd	nd	mams	12	6	2030	E	42.9497	-124.8240	145	nd	Tynan	SFS	
TN16402.01	BigEyes	nd	nd	mams	13	6	0638	S	42.7395	-124.6202	85	nd	Tynan	SFS	Fog.
TN16402.02	BigEyes	nd	nd	mams	13	6	0702	E	42.7120	-124.5628	84	nd	Tynan	SFS	
TN16402.04	BigEyes	nd	nd	mams	13	6	0733	S	42.6808	-124.5073	70	nd	Tynan	SFS	
TN16402.05	BigEyes	nd	nd	mams	13	6	0930	E	42.6830	-124.8242	696	nd	Tynan	SFS	
TN16402.06	BigEyes	nd	nd	mams	13	6	1000	S	42.6843	-124.8970	697	nd	Tynan	SFS	
TN16402.09	BigEyes	nd	nd	mams	13	6	1005	E	42.6840	-124.9068	697	nd	Tynan	SFS	SeaSoar lost signal.
TN16402.12	BigEyes	nd	nd	mams	13	6	1320	S	42.6790	-125.0475	1552	nd	Tynan	SFS	
TN16402.14	BigEyes	nd	nd	mams	13	6	1438	E	42.6833	-125.2565	3099	nd	Tynan	SFS	
TN16402.15	BigEyes	nd	nd	mams	13	6	1615	S	42.5003	-125.2485	3113	nd	Tynan	SFS	
TN16402.17	BigEyes	nd	nd	mams	13	6	1715	E	42.5000	-125.0892	1924	nd	Tynan	SFS	
TN16402.18	BigEyes	nd	nd	mams	13	6	1748	S	42.4998	-125.0055	1815	nd	Tynan	SFS	
TN16402.19	BigEyes	nd	nd	mams	13	6	2032	E	42.5008	-124.5790	80	nd	Tynan	SFS	
TN16502.02	BigEyes	nd	nd	mams	14	6	0603	S	42.2008	-124.9577	1053	nd	Tynan	SFS	
TN16502.03	BigEyes	nd	nd	mams	14	6	0710	E	42.1972	-124.7785	613	nd	Tynan	SFS	
TN16502.04	BigEyes	nd	nd	mams	14	6	0737	S	42.1998	-124.7128	560	nd	Tynan	SFS	
TN16502.06	BigEyes	nd	nd	mams	14	6	0932	E	42.1975	-124.4070	48	nd	Tynan	SFS	
TN16502.08	BigEyes	nd	nd	mams	14	6	1052	S	42.0460	-124.3730	53	nd	Tynan	SFS	
TN16502.09	BigEyes	nd	nd	mams	14	6	1150	E	42.0493	-124.5363	132	nd	Tynan	SFS	
TN16502.10	BigEyes	nd	nd	mams	14	6	1222	S	42.0507	-124.6238	406	nd	Tynan	SFS	
TN16502.11	BigEyes	nd	nd	mams	14	6	1457	E	42.0483	-125.0188	1159	nd	Tynan	SFS	
TN16502.12	BigEyes	nd	nd	mams	14	6	1528	S	42.0498	-125.1030	1563	nd	Tynan	SFS	
TN16502.14	BigEyes	nd	nd	mams	14	6	1623	E	42.0488	-125.2523	2874	nd	Tynan	SFS	
TN16502.15	BigEyes	nd	nd	mams	14	6	1805	S	41.9415	-125.4357	3116	nd	Tynan	SFS	
TN16502.18	BigEyes	nd	nd	mams	14	6	2052	E	41.9012	-125.0707	1267	nd	Tynan	SFS	
TN16602.11	BigEyes	nd	nd	mams	15	6	1816	S	42.5805	-125.1697	2686	nd	Tynan	nd	Transit from line 12 to line 7.
TN16602.12	BigEyes	nd	nd	mams	15	6	2026	E	43.0143	-125.2072	2177	nd	Tynan	nd	
TN16702.04	BigEyes	nd	nd	mams	16	6	0604	S	43.2177	-124.4903	67	nd	Tynan	MS2	
TN16702.07	BigEyes	nd	nd	mams	16	6	0715	E	43.2957	-124.5407	103	nd	Tynan	MS2	
TN16702.09	BigEyes	nd	nd	mams	16	6	0817	S	43.3798	-124.6598	208	nd	Tynan	MS2	
TN16702.11	BigEyes	nd	nd	mams	16	6	0945	E	43.5015	-124.8343	659	nd	Tynan	MS2	
TN16702.13	BigEyes	nd	nd	mams	16	6	1406	S	43.8880	-124.3432	114	nd	Tynan	MS2	
TN16702.15	BigEyes	nd	nd	mams	16	6	1500	E	43.9697	-124.2343	70	nd	Tynan	MS2	
TN16702.18	BigEyes	nd	nd	mams	16	6	1532	S	44.0017	-124.1953	54	nd	Tynan	MS2	
TN16702.19	BigEyes	nd	nd	mams	16	6	1557	E	43.9998	-124.2575	80	nd	Tynan	MS2	
TN16702.20	BigEyes	nd	nd	mams	16	6	1612	S	44.0015	-124.2933	93	nd	Tynan	MS2	
TN16702.21	BigEyes	nd	nd	mams	16	6	1700	E	44.0003	-124.4133	125	nd	Tynan	MS2	
TN16702.22	BigEyes	nd	nd	mams	16	6	1745	S	44.0003	-124.5333	145	nd	Tynan	MS2	
TN16702.23	BigEyes	nd	nd	mams	16	6	1845	E	43.9997	-124.6968	115	nd	Tynan	MS2	
TN16702.24	BigEyes	nd	nd	mams	16	6	1902	S	44.0000	-124.7420	131	nd	Tynan	MS2	
TN16702.25	BigEyes	nd	nd	mams	16	6	2030	E	43.9993	-124.9962	886	nd	Tynan	MS2	

Table 5: Bird Observation Periods

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15202.07	H.Binocs	nd	nd	birds	1	6	1635	S	44.6500	-124.1467	45	nd	Ainley/Tynan	MS1	
TN15202.11	H.Binocs	nd	nd	birds	1	6	2050	E	44.6500	-124.8267	354	nd	Ainley/Tynan	MS1	
TN15302.02	H.Binocs	nd	nd	birds	2	6	0645	S	44.4750	-124.6917	134	nd	Ainley/Tynan	MS1	
TN15302.05	H.Binocs	nd	nd	birds	2	6	0915	E	44.4750	-124.1933	58	nd	Ainley/Tynan	MS1	
TN15302.08	H.Binocs	nd	nd	birds	2	6	1200	S	44.3500	-124.1867	58	nd	Ainley/Tynan	MS1	
TN15302.10	H.Binocs	nd	nd	birds	2	6	1300	E	44.2500	-124.1733	52	nd	Ainley/Tynan	MS1	
TN15302.12	H.Binocs	nd	nd	birds	2	6	1630	S	44.2400	-124.1667	47	nd	Ainley/Tynan	MS1	
TN15302.14	H.Binocs	nd	nd	birds	2	6	1700	E	44.2467	-124.2683	75	nd	Ainley/Tynan	MS1	
TN15302.16	H.Binocs	nd	nd	birds	2	6	1800	S	44.2483	-124.4300	97	nd	Ainley/Tynan	MS1	
TN15302.18	H.Binocs	nd	nd	birds	2	6	1928	E	44.2450	-124.1817	53	nd	Ainley/Tynan	MS1	
TN15402.01	H.Binocs	nd	nd	birds	3	6	0540	S	44.0000	-125.0833	1408	nd	Ainley/Tynan	MS1	
TN15402.08	H.Binocs	nd	nd	birds	3	6	1200	E	44.0000	-124.1850	45	nd	Ainley/Tynan	MS1	
TN15402.09	H.Binocs	nd	nd	birds	3	6	1315	S	43.7450	-124.2400	62	nd	Ainley/Tynan	MS1	
TN15402.16	H.Binocs	nd	nd	birds	3	6	2030	E	43.7500	-125.5150	3080	nd	Ainley/Tynan	MS1	
TN15502.01	H.Binocs	nd	nd	birds	4	6	0545	S	43.5000	-124.8083	629	nd	Ainley/Tynan	MS1	
TN15502.05	H.Binocs	nd	nd	birds	4	6	0830	E	43.5033	-124.3283	97	nd	Ainley/Tynan	MS1	
TN15502.07	H.Binocs	nd	nd	birds	4	6	1130	S	43.2167	-124.4783	59	nd	Ainley/Tynan	MS1	
TN15502.14	H.Binocs	nd	nd	birds	4	6	1745	E	43.2167	-125.6000	3100	nd	Ainley/Tynan	MS1	
TN15602.01	H.Binocs	nd	nd	birds	5	6	0550	S	42.6950	-124.6217	118	nd	Ainley/Tynan	MS1	
TN15602.03	H.Binocs	nd	nd	birds	5	6	1130	E	42.6833	-125.5683	3092	nd	Ainley/Tynan	MS1	
TN15602.06	H.Binocs	nd	nd	birds	5	6	1330	S	42.5000	-125.5767	3092	nd	Ainley/Tynan	MS1	
TN15602.12	H.Binocs	nd	nd	birds	5	6	2040	E	42.5000	-124.5483	66	nd	Ainley/Tynan	MS1	
TN15702.13	H.Binocs	nd	nd	birds	6	6	1500	S	41.9028	-125.5408	3092	nd	Ainley/Tynan	nd	
TN15702.15	H.Binocs	nd	nd	birds	6	6	2028	E	41.8997	-124.6208	630	nd	Ainley/Tynan	nd	
TN15802.01	H.Binocs	nd	nd	birds	7	6	0545	S	42.2000	-124.6550	950	nd	Ainley/Tynan	nd	Wind and whitecaps.
TN15802.03	H.Binocs	nd	nd	birds	7	6	0945	E	42.2000	-125.6000	3110	nd	Ainley/Tynan	nd	
TN15902.04	H.Binocs	nd	nd	birds	8	6	0852	S	44.5708	-124.2200	66	nd	Ainley/Tynan	NFS	
TN15902.14	H.Binocs	nd	nd	birds	8	6	1245	E	44.5717	-124.8917	636	nd	Ainley/Tynan	NFS	
TN15902.15	H.Binocs	nd	nd	birds	8	6	1345	S	44.4733	-124.8500	361	nd	Ainley/Tynan	NFS	
TN15902.21	H.Binocs	nd	nd	birds	8	6	1755	E	44.4750	-124.2267	68	nd	Ainley/Tynan	NFS	
TN15902.24	H.Binocs	nd	nd	birds	8	6	1855	S	44.3817	-124.2050	59	nd	Ainley/Tynan	NFS	
TN15902.25	H.Binocs	nd	nd	birds	8	6	2010	E	44.3850	-124.4033	83	nd	Ainley/Tynan	NFS	
TN16002.01	H.Binocs	nd	nd	birds	9	6	0545	S	44.2483	-124.4817	100	nd	Ainley/Tynan	NFS	
TN16002.03	H.Binocs	nd	nd	birds	9	6	0730	E	44.2467	-124.1733	56	nd	Ainley/Tynan	NFS	
TN16002.05	H.Binocs	nd	nd	birds	9	6	0845	S	44.1067	-124.1950	55	nd	Ainley/Tynan	NFS	
TN16002.09	H.Binocs	nd	nd	birds	9	6	1130	E	44.1100	-124.6167	126	nd	Ainley/Tynan	NFS	
TN16002.12	H.Binocs	nd	nd	birds	9	6	1345	S	44.0917	-124.7667	118	nd	Ainley/Tynan	NFS	
TN16002.14	H.Binocs	nd	nd	birds	9	6	1545	E	44.1100	-125.0500	1277	nd	Ainley/Tynan	NFS	
TN16002.16	H.Binocs	nd	nd	birds	9	6	1630	S	44.0000	-125.0867	1435	nd	Ainley/Tynan	NFS	
TN16002.18	H.Binocs	nd	nd	birds	9	6	1700	E	43.9863	-124.9862	800	nd	Ainley/Tynan	NFS	
TN16002.20	H.Binocs	nd	nd	birds	9	6	1905	S	44.0067	-125.0067	922	nd	Ainley/Tynan	NFS	
TN16002.23	H.Binocs	nd	nd	birds	9	6	2045	E	44.0000	-124.6683	141	nd	Ainley/Tynan	NFS	
TN16102.02	H.Binocs	nd	nd	birds	10	6	0830	S	43.9983	-124.2000	53	nd	Ainley/Tynan	NFS	
TN16102.08	H.Binocs	nd	nd	birds	10	6	1351	E	44.0000	-125.0483	1000	nd	Ainley/Tynan	NFS	
TN16102.11	H.Binocs	nd	nd	birds	10	6	1545	S	43.7517	-125.0567	1430	nd	Ainley/Tynan	NFS	
TN16102.13	H.Binocs	nd	nd	birds	10	6	1734	E	43.7498	-124.7467	530	nd	Ainley/Tynan	NFS	
TN16302.02	H.Binocs	nd	nd	birds	12	6	0755	S	43.2167	-124.4467	44	nd	Ainley/Tynan	SFS	
TN16302.06	H.Binocs	nd	nd	birds	12	6	1215	E	43.2167	-125.1500	1612	nd	Ainley/Tynan	SFS	

Table 5: Bird Observation Periods (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN16302.09	H.Binocs	nd	nd	birds	12	6	1330	S	43.0833	-125.1550	1669	nd	Ainley/Tynan	SFS	
TN16302.12	H.Binocs	nd	nd	birds	12	6	1725	E	43.0833	-124.5117	162	nd	Ainley/Tynan	SFS	
TN16302.14	H.Binocs	nd	nd	birds	12	6	1840	S	42.9550	-124.5450	60	nd	Ainley/Tynan	SFS	
TN16302.16	H.Binocs	nd	nd	birds	12	6	2030	E	42.9500	-124.7867	162	nd	Ainley/Tynan	SFS	
TN16402.03	H.Binocs	nd	nd	birds	13	6	0730	S	42.6833	-124.5017	61	nd	Ainley/Tynan	SFS	
TN16402.08	H.Binocs	nd	nd	birds	13	6	1005	E	42.6833	-124.8967	690	nd	Ainley/Tynan	SFS	
TN16402.11	H.Binocs	nd	nd	birds	13	6	1315	S	42.6833	-125.0333	1490	nd	Ainley/Tynan	SFS	
TN16402.13	H.Binocs	nd	nd	birds	13	6	1435	E	42.6833	-125.2500	3231	nd	Ainley/Tynan	SFS	
TN16402.16	H.Binocs	nd	nd	birds	13	6	1615	S	42.5000	-125.2550	3116	nd	Ainley/Tynan	SFS	
TN16402.20	H.Binocs	nd	nd	birds	13	6	2045	E	42.5000	-124.5450	63	nd	Ainley/Tynan	SFS	
TN16502.01	H.Binocs	nd	nd	birds	14	6	0545	S	42.2000	-125.0000	1406	nd	Ainley/Tynan	SFS	Line 11.
TN16502.05	H.Binocs	nd	nd	birds	14	6	0930	E	42.2000	-124.4083	50	nd	Ainley/Tynan	SFS	
TN16502.07	H.Binocs	nd	nd	birds	14	6	1045	S	42.0500	-124.3650	48	nd	Ainley/Tynan	SFS	Line 11a.
TN16502.13	H.Binocs	nd	nd	birds	14	6	1623	E	42.0500	-125.2500	2598	nd	Ainley/Tynan	SFS	
TN16502.16	H.Binocs	nd	nd	birds	14	6	1845	S	41.9017	-125.4783	3117	nd	Ainley/Tynan	SFS	Line 12.
TN16502.17	H.Binocs	nd	nd	birds	14	6	2045	E	41.9000	-125.0933	1484	nd	Ainley/Tynan	SFS	
TN16702.03	H.Binocs	nd	nd	birds	16	6	0545	S	43.2167	-124.5333	72	nd	Ainley/Tynan	MS2	
TN16702.05	H.Binocs	nd	nd	birds	16	6	0620	E	43.2167	-124.4667	51	nd	Ainley/Tynan	MS2	
TN16702.06	H.Binocs	nd	nd	birds	16	6	0630	S	43.2267	-124.4500	46	nd	Ainley/Tynan	MS2	Transit from line 7 to 5.
TN16702.08	H.Binocs	nd	nd	birds	16	6	0730	E	43.3083	-124.5583	110	nd	Ainley/Tynan	MS2	
TN16702.10	H.Binocs	nd	nd	birds	16	6	0845	S	43.4233	-124.7250	482	nd	Ainley/Tynan	MS2	
TN16702.12	H.Binocs	nd	nd	birds	16	6	1030	E	43.5500	-124.7917	645	nd	Ainley/Tynan	MS2	
TN16702.14	H.Binocs	nd	nd	birds	16	6	1430	S	43.9233	-124.2933	104	nd	Ainley/Tynan	MS2	
TN16702.16	H.Binocs	nd	nd	birds	16	6	1510	E	43.9683	-124.2350	72	nd	Ainley/Tynan	MS2	
TN16702.17	H.Binocs	nd	nd	birds	16	6	1530	S	44.0000	-124.1883	48	nd	Ainley/Tynan	MS2	
TN16702.26	H.Binocs	nd	nd	birds	16	6	2045	E	44.0000	-125.0267	1100	nd	Ainley/Tynan	MS2	
TN16802.01	H.Binocs	nd	nd	birds	17	6	0545	S	44.6517	-124.6083	212	nd	Ainley/Tynan	MS2	NH line.
TN16802.02	H.Binocs	nd	nd	birds	17	6	0836	E	44.6517	-124.1483	54	nd	Ainley/Tynan	MS2	

Table 6: Optical Drifter Deployments

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15902.07	Drifter	1	nd	nd	8	6	1100	S	44.5728	-124.5593	125	nd	Ashe	NFS	Along Line 1A; drifter 27355.
TN15902.08	Drifter	1	nd	nd	8	6	1101	S	44.5728	-124.5607	125	nd	Ashe	NFS	Along Line 1A; drifter 27353.
TN15902.09	Drifter	1	nd	nd	8	6	1101	S	44.5727	-124.5620	125	nd	Ashe	NFS	Along Line 1A; drifter 27956.
TN15902.10	Drifter	1	nd	nd	8	6	1101	S	44.5727	-124.5634	125	nd	Ashe	NFS	Along Line 1A; drifter 27955.
TN16302.03	Drifter	2	nd	nd	12	6	0928	S	43.2146	-124.6877	125	nd	Ashe	SFS	Along Line 7; drifter 27356.
TN16302.04	Drifter	2	nd	nd	12	6	0929	S	43.2144	-124.6893	125	nd	Ashe	SFS	Along Line 7; drifter 27952.

APPENDIX I

T0205 TOP TROPHIC MAMMAL SURVEYS

GLOBEC PROCESS CRUISE #1, R/V *Thomas G. Thompson*, 1-17 June 2002

Top Trophics (Mammals)

PIs: Cynthia Tynan, David Ainley

To compare the distribution and density of cetaceans and pinnipeds relative to oceanographic features and prey density, we used standard line-transect methodology to survey mammals during the GLOBEC mesoscale and fine-scale studies. Line-transect surveys were conducted from the 03 level (37.5' above the water) of the R/V *Thomas G. Thompson* whenever the ship was underway during adequate light (approximately 0600 to 2030). Two pairs of 25x binoculars were used by three observers (Newcomer, Pusser, and Ryan) to census mammals in arcs spanning 10º from the bow (on the opposite side) to 90º on their side of the ship. The third observer guarded the track-line by eye and hand-held binoculars from a centrally located observation bench. A recorder (Tynan) entered all sightings on a laptop computer connected to the ship's GPS in the bridge. Under ideal viewing conditions, the area surveyed extended from the ship to the horizon, approximately 6.5 - 7.0 nautical miles on each side.

A total of 310 sightings of cetaceans and 104 sightings of pinnipeds were obtained during the cruise. This represented 11 species of cetaceans and 5 species of pinnipeds. Similar to the spring 2000 cruise, Pacific white-sided dolphins, which prey on a variety of fishes and squid, were the most numerically abundant species of cetacean. Humpback whales, which prey on euphausiids and schooling fish, were the most numerous large whale species. Northern elephant seals were the most abundant pinniped in the system and occurred on the shelf as well as over the slope and basin. Harbor porpoise, an important coastal denizen, occurred further offshore than was expected on Heceta Bank. Conversely, Risso's dolphin appeared further inshore on the shelf than expected.

In general, the southern fine-scale region appeared to support greater numbers of mammals than the northern fine-scale region. Frontal regions of strong SST gradient and current shear, such as the upwelling front south of Cape Blanco on line 10, attracted greater concentrations of mammals. Humpback whales, in particular, appeared to be good indicators of complex circulation and structure, presumably reflecting enhanced concentrations of euphausiids or schooling fish in the area. In addition, the complex circulation and strong divergence in the surface flow at the southern edge of Heceta Bank (lines 4 and 5), appeared to attract greater numbers of whales (humpback and fin whales) and dolphins (Risso's dolphin), albeit not necessarily seabirds. The abundance of species that rely on cephalopod prey (such as Risso's dolphins and northern elephant seals) may reflect warmer conditions and an increased prevalence of squid in the study region during spring 2002 compared to spring 2000.

The survey identified the importance of the Northern California Current to beaked whales, such as Baird's beaked whale *Berardius bairdii* and the rarely observed genus *Mesoplodon*. The sightings of *Mesoplodon* establish the NCC off Oregon as one of the few documented habitats for mothers and calves.

Table summarizing sightings of species of cetaceans and pinnipeds during the GLOBEC Northeast Pacific – Northern California Current process cruise, June, 2002.

CETACEANS:

	#Sightings	#Animals
Pacific white-sided dolphin	38	838
Harbor porpoise	113	161
Risso's dolphin (Grampus)	16	160
Dall's porpoise	38	105
Humpback whale	54	98
Baird's beaked whale *Berardius bairdii*	7	39
Killer whale	4	17
Fin whale	7	11
Mesoplodon sp.	3	10
Minke whale	7	7

Sperm whale	4	5
Unidentified large whale	15	20
Unidentified dolphin or porpoise	4	20
Total	310	1,491

PINNIPEDS:

	#Sightings	#Animals
Northern elephant seal	71	71
Northern fur seal	20	20
Harbor seal	9	9
Steller sea lion	1	7
California sea lion	1	3
Unidentified pinniped	2	3
Total	104	113

APPENDIX II

T0205 EVENT LOG

EVENT LOG CONTENTS

Column Label	Description
Event#	Unique identifier for each line of event log.
Instrument (Instr)	SeaSoar: Sea Soar Deployments CTD: SeaBird 911 with SBE oxygen sensor, PAR sensor, Seapoint Fluorometer and CStar transmissometer. BioopticProf: Bioptical Profiler Deployments; generally deployed to 150 m depth or 10 m above bottom if shallower. Drifter: Drifter Deployments HTI: HTI Multifrequency Acoustics Observations TSRB: Tethered Spectral Radiometer Buoy Measurements XBT: Expendible Bathythermograph Drops ADCP: 150 kHz Acoustic Doppler Current Profiler TAPS: Tracor Acoustic Profiling System Big Eyes: Big eye binoculars (25x; mammals) H.Binocs: Handheld binoculars (birds, sometimes mammals)
Cast	Sequence # for a particular instrument
Station (Sta)	
Station Standard (Sta std)	
Start/End (S/E) flag	S=Start of event; E=End of event
Latitude (Lat)	Decimal degrees; north is positive
Longitude (Long)	Decimal degrees; east is positive
Water Depth	Depth of bottom
Cast Depth	Maximum depth of deployment
SI	Scientific Investigator
Region	Transect line number; NFS, SFS, MS1, MS2
Day	GMT basis
Month (Mos)	GMT basis
Time	GMT time

Appendix II: Event Log

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15202.01	Depart	nd	nd	nd	1	6	1230	S	nd	nd	nd	nd	Cowles	nd	Newport.
TN15202.02	BigEyes	nd	nd	mams	1	6	1242	S	44.6127	-124.0750	40	nd	Tynan	nd	Just off Newport.
TN15202.03	BigEyes	nd	nd	mams	1	6	1335	E	44.6510	-124.1433	45	nd	Tynan	nd	
TN15202.04	HTI	1	1	nd	1	6	1507	S	44.6530	-124.1255	50	3	Pierce	MS1	Mesoscale survey start.
TN15202.05	SeaSoar	1	1	nd	1	6	1523	S	44.6522	-124.1398	48	v	Cowles/Barth	MS1	Mesoscale survey start.
TN15202.06	BigEyes	nd	nd	mams	1	6	1635	S	44.6510	-124.1485	51	nd	Tynan	MS1	
TN15202.07	H.Binocs	nd	nd	birds	1	6	1635	S	44.6500	-124.1467	45	nd	Ainley/Tynan	MS1	
TN15202.08	BigEyes	nd	nd	mams	1	6	1735	E	44.6522	-124.3157	84	nd	Tynan	MS1	
TN15202.09	BigEyes	nd	nd	mams	1	6	1805	S	44.6520	-124.3930	94	nd	Tynan	MS1	
TN15202.10	BigEyes	nd	nd	mams	1	6	2035	E	44.6515	-124.8252	365	nd	Tynan	MS1	
TN15202.11	H.Binocs	nd	nd	birds	1	6	2050	E	44.6500	-124.8267	354	nd	Ainley/Tynan	MS1	
TN15302.01	BigEyes	nd	nd	mams	2	6	0600	S	44.4752	-124.6498	149	nd	Tynan	MS1	
TN15302.02	H.Binocs	nd	nd	birds	2	6	0645	S	44.4750	-124.6917	134	nd	Ainley/Tynan	MS1	
TN15302.03	BigEyes	nd	nd	mams	2	6	0715	E	44.4752	-124.4642	77	nd	Tynan	MS1	
TN15302.04	BigEyes	nd	nd	mams	2	6	0745	S	44.4750	-124.3877	61	nd	Tynan	MS1	
TN15302.05	H.Binocs	nd	nd	birds	2	6	0915	E	44.4750	-124.1933	58	nd	Ainley/Tynan	MS1	
TN15302.06	BigEyes	nd	nd	mams	2	6	0915	E	44.4732	-124.1495	46	nd	Tynan	MS1	
TN15302.07	SeaSoar	1	nd	nd	2	6	1120	E	44.3847	-124.1452	50	v	nd	nd	End tow 1; instrument repair; inshore on Line 2.
TN15302.08	H.Binocs	nd	nd	birds	2	6	1200	S	44.3500	-124.1867	58	nd	Ainley/Tynan	MS1	
TN15302.09	BigEyes	nd	nd	mams	2	6	1215	S	44.3235	-124.1848	53	nd	Tynan	MS1	
TN15302.10	H.Binocs	nd	nd	birds	2	6	1300	E	44.2500	-124.1733	52	nd	Ainley/Tynan	MS1	
TN15302.11	BigEyes	nd	nd	mams	2	6	1315	E	44.2348	-124.1737	76	nd	Tynan	MS1	
TN15302.12	H.Binocs	nd	nd	birds	2	6	1630	S	44.2400	-124.1667	47	nd	Ainley/Tynan	MS1	
TN15302.13	BigEyes	nd	nd	mams	2	6	1632	S	44.2433	-124.1813	53	nd	Tynan	MS1	
TN15302.14	H.Binocs	nd	nd	birds	2	6	1700	E	44.2467	-124.2683	75	nd	Ainley/Tynan	MS1	
TN15302.15	BigEyes	nd	nd	mams	2	6	1702	E	44.2467	-124.2697	76	nd	Tynan	MS1	
TN15302.16	H.Binocs	nd	nd	birds	2	6	1800	S	44.2483	-124.4300	97	nd	Ainley/Tynan	MS1	
TN15302.17	BigEyes	nd	nd	mams	2	6	1805	S	44.2482	-124.4242	97	nd	Tynan	MS1	
TN15302.18	H.Binocs	nd	nd	birds	2	6	1928	E	44.2450	-124.1817	53	nd	Ainley/Tynan	MS1	
TN15302.19	BigEyes	nd	nd	mams	2	6	1928	E	44.2448	-124.1803	53	nd	Tynan	MS1	
TN15302.20	SeaSoar	2	2	nd	2	6	1953	S	44.2375	-124.1667	54	v	Cowles/Barth	MS1	
TN15402.01	H.Binocs	nd	nd	birds	3	6	0540	S	44.0000	-125.0833	1408	nd	Ainley/Tynan	MS1	
TN15402.02	BigEyes	nd	nd	mams	3	6	0655	S	44.0133	-124.9840	781	nd	Tynan	MS1	
TN15402.03	BigEyes	nd	nd	mams	3	6	0730	E	44.0000	-124.8778	86	nd	Tynan	MS1	
TN15402.04	BigEyes	nd	nd	mams	3	6	0753	S	43.9998	-124.8125	105	nd	Tynan	MS1	
TN15402.05	BigEyes	nd	nd	mams	3	6	0930	E	44.0007	-124.5113	140	nd	Tynan	MS1	
TN15402.06	BigEyes	nd	nd	mams	3	6	1000	S	43.9997	-124.4165	124	nd	Tynan	MS1	
TN15402.07	BigEyes	nd	nd	mams	3	6	1115	E	43.9995	-124.1858	45	nd	Tynan	MS1	
TN15402.08	H.Binocs	nd	nd	birds	3	6	1200	E	44.0000	-124.1850	45	nd	Ainley/Tynan	MS1	
TN15402.09	H.Binocs	nd	nd	birds	3	6	1315	S	43.7450	-124.2400	62	nd	Ainley/Tynan	MS1	
TN15402.10	BigEyes	nd	nd	mams	3	6	1315	S	43.7448	-124.2415	76	nd	Tynan	MS1	
TN15402.11	BigEyes	nd	nd	mams	3	6	1515	E	43.7502	-124.5865	238	nd	Tynan	MS1	
TN15402.12	BigEyes	nd	nd	mams	3	6	1530	S	43.7502	-124.6268	326	nd	Tynan	MS1	
TN15402.13	BigEyes	nd	nd	mams	3	6	1730	E	43.7498	-124.9822	1374	nd	Tynan	MS1	
TN15402.14	BigEyes	nd	nd	mams	3	6	1754	S	43.7508	-125.0628	1356	nd	Tynan	MS1	
TN15402.15	BigEyes	nd	nd	mams	3	6	2003	E	43.7493	-125.4412	3085	nd	Tynan	MS1	
TN15402.16	H.Binocs	nd	nd	birds	3	6	2030	E	43.7500	-125.5150	3080	nd	Ainley/Tynan	MS1	

Appendix II: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15502.01	H.Binocs	nd	nd	birds	4	6	0545	S	43.5000	-124.8083	629	nd	Ainley/Tynan	MS1	
TN15502.02	BigEyes	nd	nd	mams	4	6	0603	S	43.5000	-124.7562	543	nd	Tynan	MS1	Fog.
TN15502.03	BigEyes	nd	nd	mams	4	6	0706	E	43.4987	-124.5757	101	nd	Tynan	MS1	Visib less than 500m.
TN15502.04	BigEyes	nd	nd	mams	4	6	0755	S	43.4970	-124.4342	115	nd	Tynan	MS1	
TN15502.05	H.Binocs	nd	nd	birds	4	6	0830	E	43.5033	-124.3283	97	nd	Ainley/Tynan	MS1	
TN15502.06	BigEyes	nd	nd	mams	4	6	0832	E	43.4993	-124.3347	92	nd	Tynan	MS1	
TN15502.07	H.Binocs	nd	nd	birds	4	6	1130	S	43.2167	-124.4783	59	nd	Ainley/Tynan	MS1	
TN15502.08	BigEyes	nd	nd	mams	4	6	1130	S	43.2167	-124.4852	62	nd	Tynan	MS1	
TN15502.09	BigEyes	nd	nd	mams	4	6	1345	E	43.2167	-124.8862	407	nd	Tynan	MS1	
TN15502.10	BigEyes	nd	nd	mams	4	6	1400	S	43.2167	-124.9343	727	nd	Tynan	MS1	
TN15502.11	BigEyes	nd	nd	mams	4	6	1515	E	43.2168	-125.1595	1766	nd	Tynan	MS1	
TN15502.12	BigEyes	nd	nd	mams	4	6	1530	S	43.2165	-125.1972	1767	nd	Tynan	MS1	
TN15502.13	BigEyes	nd	nd	mams	4	6	1730	E	43.2165	-125.5488	3095	nd	Tynan	MS1	
TN15502.14	H.Binocs	nd	nd	birds	4	6	1745	E	43.2167	-125.6000	3100	nd	Ainley/Tynan	MS1	
TN15502.15	BigEyes	nd	nd	mams	4	6	2000	S	42.9533	-125.6053	3089	nd	Tynan	MS1	
TN15502.16	BigEyes	nd	nd	mams	4	6	2025	E	42.9502	-125.5355	3098	nd	Tynan	MS1	
TN15602.01	H.Binocs	nd	nd	birds	5	6	0550	S	42.6950	-124.6217	118	nd	Ainley/Tynan	MS1	
TN15602.02	BigEyes	nd	nd	mams	5	6	0645	S	42.6895	-124.7550	458	nd	Tynan	MS1	
TN15602.03	H.Binocs	nd	nd	birds	5	6	1130	E	42.6833	-125.5683	3092	nd	Ainley/Tynan	MS1	
TN15602.04	BigEyes	nd	nd	mams	5	6	1130	E	42.6832	-125.5702	3093	nd	Tynan	MS1	
TN15602.05	BigEyes	nd	nd	mams	5	6	1330	S	42.4997	-125.5702	3096	nd	Tynan	MS1	
TN15602.06	H.Binocs	nd	nd	birds	5	6	1330	S	42.5000	-125.5767	3092	nd	Ainley/Tynan	MS1	
TN15602.07	BigEyes	nd	nd	mams	5	6	1500	E	42.5002	-125.3167	3109	nd	Tynan	MS1	
TN15602.08	BigEyes	nd	nd	mams	5	6	1520	S	42.4997	-125.2637	3108	nd	Tynan	MS1	
TN15602.09	BigEyes	nd	nd	mams	5	6	1740	E	42.5000	-124.8858	1065	nd	Tynan	MS1	
TN15602.10	BigEyes	nd	nd	mams	5	6	1825	S	42.5002	-124.8457	750	nd	Tynan	MS1	
TN15602.11	BigEyes	nd	nd	mams	5	6	2030	E	42.5002	-124.5508	67	nd	Tynan	MS1	
TN15602.12	H.Binocs	nd	nd	birds	5	6	2040	E	42.5000	-124.5483	66	nd	Ainley/Tynan	MS1	
TN15602.13	SeaSoar	2	nd	nd	5	6	2045	E	42.5042	-124.5267	61	v	nd	nd	End tow 2; instrument repair; inshore on Line 10.
TN15602.14	CTD	1	3	RR3	5	6	2213	S	42.4982	-124.7047	133	125	Cowles	MS1	CTDs along Line 10 during SeaSoar repairs.
TN15602.15	CTD	1	nd	RR3	5	6	2231	E	42.5007	-124.7113	nd	nd	Cowles	MS1	
TN15602.16	CTD	2	4	RR4	5	6	2335	S	42.4980	-124.8055	590	500	Cowles	MS1	
TN15702.01	CTD	2	nd	RR4	6	6	0010	E	42.4965	-124.8120	nd	nd	Cowles	MS1	
TN15702.02	CTD	3	5	RR5	6	6	0100	S	42.4973	-124.9078	1020	1000	Cowles	MS1	
TN15702.03	CTD	3	nd	RR5	6	6	0200	E	42.4975	-124.9115	nd	nd	Cowles	MS1	
TN15702.04	CTD	4	6	RR6	6	6	0251	S	42.4983	-124.9983	1802	500	Cowles	MS1	
TN15702.05	CTD	4	nd	RR6	6	6	0321	E	42.4940	-125.0015	nd	nd	Cowles	MS1	
TN15702.06	CTD	5	7	RR7	6	6	0446	S	42.5010	-125.2033	3007	500	Cowles	MS1	
TN15702.07	CTD	5	nd	RR7	6	6	0514	E	42.5015	-125.2035	nd	nd	Cowles	MS1	
TN15702.08	CTD	6	8	RR8	6	6	0751	S	42.5022	-125.6018	3096	500	Cowles	MS1	
TN15702.09	CTD	6	nd	RR8	6	6	0827	E	42.5065	-125.6057	nd	nd	Cowles	MS1	
TN15702.10	CTD	7	9	Line11W	6	6	1129	S	42.2047	-125.6038	3088	500	Cowles	MS1	Offshore end of Line 11.
TN15702.11	CTD	7	nd	Line11W	6	6	1159	E	42.2018	-125.6077	nd	nd	Cowles	MS1	
TN15702.12	SeaSoar	3	10	nd	6	6	1431	S	41.9002	-125.5990	>3000	v	Cowles/Barth	MS1	Western end of Line 12.
TN15702.13	H.Binocs	nd	nd	birds	6	6	1500	S	41.9028	-125.5408	3092	nd	Ainley/Tynan	nd	
TN15702.14	BigEyes	nd	nd	mams	6	6	1501	S	41.9028	-125.5408	3092	nd	Tynan	nd	

Appendix II: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN15702.15	H.Binocs	nd	nd	birds	6	6	2028	E	41.8997	-124.6208	630	nd	Ainley/Tynan	nd	
TN15702.16	BigEyes	nd	nd	mams	6	6	2028	E	41.8997	-124.6208	630	nd	Tynan	nd	
TN15802.01	H.Binocs	nd	nd	birds	7	6	0545	S	42.2000	-124.6550	950	nd	Ainley/Tynan	nd	Wind and whitecaps.
TN15802.02	BigEyes	nd	nd	mams	7	6	0610	S	42.1997	-124.9830	1161	nd	Tynan	nd	Wind and whitecaps.
TN15802.03	H.Binocs	nd	nd	birds	7	6	0945	E	42.2000	-125.6000	3110	nd	Ainley/Tynan	nd	
TN15802.04	BigEyes	nd	nd	mams	7	6	0947	E	42.1983	-125.6078	3092	nd	Tynan	nd	
TN15802.05	SeaSoar	3	nd	nd	7	6	1216	E	42.2537	-125.6302	nd	nd	nd	nd	Western end of Line 11; last part of MS1.
TN15802.06	HTI	1	nd	nd	7	6	1251	E	42.2535	-125.6300	nd	nd	Pierce	MS1	Mesoscale survey end.
TN15902.01	HTI	2	11	nd	8	6	0808	S	44.6233	-124.1833	50	3	Pierce	NFS	N finescale start.
TN15902.02	SeaSoar	4	11	nd	8	6	0812	S	44.5812	-124.1845	50	v	Cowles/Barth	NFS	N finescale start.
TN15902.03	BigEyes	nd	nd	mams	8	6	0852	S	44.5708	-124.2202	66	nd	Tynan	NFS	
TN15902.04	H.Binocs	nd	nd	birds	8	6	0852	S	44.5708	-124.2200	66	nd	Ainley/Tynan	NFS	
TN15902.05	BigEyes	nd	nd	mams	8	6	1021	E	44.5700	-124.4638	82	nd	Tynan	NFS	
TN15902.06	BigEyes	nd	nd	mams	8	6	1037	S	44.5713	-124.4987	112	nd	Tynan	NFS	
TN15902.07	Drifter	1	nd	nd	8	6	1100	S	44.5728	-124.5593	125	nd	Ashe	NFS	Along Line 1A; drifter 27355.
TN15902.08	Drifter	1	nd	nd	8	6	1101	S	44.5728	-124.5607	125	nd	Ashe	NFS	Along Line 1A; drifter 27353.
TN15902.09	Drifter	1	nd	nd	8	6	1101	S	44.5727	-124.5620	125	nd	Ashe	NFS	Along Line 1A; drifter 27956.
TN15902.10	Drifter	1	nd	nd	8	6	1101	S	44.5727	-124.5634	125	nd	Ashe	NFS	Along Line 1A; drifter 27955.
TN15902.11	BigEyes	nd	nd	mams	8	6	1130	E	44.5715	-124.6520	283	nd	Tynan	NFS	
TN15902.12	BigEyes	nd	nd	mams	8	6	1200	S	44.5722	-124.7413	341	nd	Tynan	NFS	
TN15902.13	BigEyes	nd	nd	mams	8	6	1203	E	44.5712	-124.9122	640	nd	Tynan	NFS	
TN15902.14	H.Binocs	nd	nd	birds	8	6	1245	E	44.5717	-124.8917	636	nd	Ainley/Tynan	NFS	
TN15902.15	H.Binocs	nd	nd	birds	8	6	1345	S	44.4733	-124.8500	361	nd	Ainley/Tynan	NFS	
TN15902.16	BigEyes	nd	nd	mams	8	6	1352	S	44.4750	-124.8527	337	nd	Tynan	NFS	
TN15902.17	BigEyes	nd	nd	mams	8	6	1533	E	44.4720	-124.5692	122	nd	Tynan	NFS	
TN15902.18	BigEyes	nd	nd	mams	8	6	1552	S	44.4737	-124.5212	96	nd	Tynan	NFS	
TN15902.19	BigEyes	nd	nd	mams	8	6	1700	E	44.4740	-124.3460	68	nd	Tynan	NFS	
TN15902.20	BigEyes	nd	nd	mams	8	6	1732	S	44.4752	-124.2615	75	nd	Tynan	NFS	
TN15902.21	H.Binocs	nd	nd	birds	8	6	1755	E	44.4750	-124.2267	68	nd	Ainley/Tynan	NFS	
TN15902.22	BigEyes	nd	nd	mams	8	6	1755	E	44.4743	-124.1983	59	nd	Tynan	NFS	
TN15902.23	BigEyes	nd	nd	mams	8	6	1849	S	44.3812	-124.1912	55	nd	Tynan	NFS	
TN15902.24	H.Binocs	nd	nd	birds	8	6	1855	S	44.3817	-124.2050	59	nd	Ainley/Tynan	NFS	
TN15902.25	H.Binocs	nd	nd	birds	8	6	2010	E	44.3850	-124.4033	83	nd	Ainley/Tynan	NFS	
TN15902.26	BigEyes	nd	nd	mams	8	6	2011	E	44.3848	-124.4028	82	nd	Tynan	NFS	
TN16002.01	H.Binocs	nd	nd	birds	9	6	0545	S	44.2483	-124.4817	100	nd	Ainley/Tynan	NFS	
TN16002.02	BigEyes	nd	nd	mams	9	6	0600	S	44.2478	-124.4293	95	nd	Tynan	NFS	
TN16002.03	H.Binocs	nd	nd	birds	9	6	0730	E	44.2467	-124.1733	56	nd	Ainley/Tynan	NFS	
TN16002.04	BigEyes	nd	nd	mams	9	6	0730	E	44.2467	-124.1672	51	nd	Tynan	NFS	
TN16002.05	H.Binocs	nd	nd	birds	9	6	0845	S	44.1067	-124.1950	55	nd	Ainley/Tynan	NFS	
TN16002.06	BigEyes	nd	nd	mams	9	6	0845	S	44.1062	-124.1953	55	nd	Tynan	NFS	
TN16002.07	BigEyes	nd	nd	mams	9	6	1015	E	44.1107	-124.4183	111	nd	Tynan	NFS	
TN16002.08	BigEyes	nd	nd	mams	9	6	1030	S	44.1110	-124.4663	117	nd	Tynan	NFS	
TN16002.09	H.Binocs	nd	nd	birds	9	6	1130	E	44.1100	-124.6167	126	nd	Ainley/Tynan	NFS	
TN16002.10	BigEyes	nd	nd	mams	9	6	1145	E	44.1105	-124.6613	124	nd	Tynan	NFS	
TN16002.11	SeaSoar	4	nd	nd	9	6	1233	E	44.1005	-124.7268	nd	nd	nd	nd	Crab pot; recover for repair/cable retermination.
TN16002.12	H.Binocs	nd	nd	birds	9	6	1345	S	44.0917	-124.7667	118	nd	Ainley/Tynan	NFS	

Appendix II: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN16002.13	BigEyes	nd	nd	mams	9	6	1350	S	44.0935	-124.7730	120	nd	Tynan	NFS	
TN16002.14	H.Binocs	nd	nd	birds	9	6	1545	E	44.1100	-125.0500	1277	nd	Ainley/Tynan	NFS	
TN16002.15	BigEyes	nd	nd	mams	9	6	1547	E	44.1100	-125.1028	1430	nd	Tynan	NFS	
TN16002.16	H.Binocs	nd	nd	birds	9	6	1630	S	44.0000	-125.0867	1435	nd	Ainley/Tynan	NFS	
TN16002.17	BigEyes	nd	nd	mams	9	6	1637	S	44.0050	-125.0875	1430	nd	Tynan	NFS	
TN16002.18	H.Binocs	nd	nd	birds	9	6	1700	E	43.9863	-124.9862	800	nd	Ainley/Tynan	NFS	
TN16002.19	BigEyes	nd	nd	mams	9	6	1708	E	43.9863	-124.9862	800	nd	Tynan	NFS	
TN16002.20	H.Binocs	nd	nd	birds	9	6	1905	S	44.0067	-125.0067	922	nd	Ainley/Tynan	NFS	
TN16002.21	BigEyes	nd	nd	mams	9	6	1907	S	44.0008	-124.9962	923	nd	Tynan	NFS	
TN16002.22	BigEyes	nd	nd	mams	9	6	2036	E	43.9995	-124.6965	120	nd	Tynan	NFS	
TN16002.23	H.Binocs	nd	nd	birds	9	6	2045	E	44.0000	-124.6683	141	nd	Ainley/Tynan	NFS	
TN16102.01	SeaSoar	5	12	nd	10	6	0805	S	43.9737	-124.1873	50	v	Cowles/Barth	NFS	Resume N finescale at 4E.
TN16102.02	H.Binocs	nd	nd	birds	10	6	0830	S	43.9983	-124.2000	53	nd	Ainley/Tynan	NFS	
TN16102.03	BigEyes	nd	nd	mams	10	6	0830	S	43.9983	-124.1955	53	nd	Tynan	NFS	
TN16102.04	BigEyes	nd	nd	mams	10	6	1031	E	44.0000	-124.5172	143	nd	Tynan	NFS	
TN16102.05	BigEyes	nd	nd	mams	10	6	1045	S	43.9995	-124.5547	150	nd	Tynan	NFS	
TN16102.06	BigEyes	nd	nd	mams	10	6	1151	E	44.0000	-124.7262	124	nd	Tynan	NFS	
TN16102.07	BigEyes	nd	nd	mams	10	6	1219	S	44.0000	-124.7980	120	nd	Tynan	NFS	
TN16102.08	H.Binocs	nd	nd	birds	10	6	1351	E	44.0000	-125.0483	1000	nd	Ainley/Tynan	NFS	
TN16102.09	BigEyes	nd	nd	mams	10	6	1352	E	43.9983	-125.0473	1277	nd	Tynan	NFS	
TN16102.10	BigEyes	nd	nd	mams	10	6	1545	S	43.7498	-125.0408	1200	nd	Tynan	NFS	
TN16102.11	H.Binocs	nd	nd	birds	10	6	1545	S	43.7517	-125.0567	1430	nd	Ainley/Tynan	NFS	
TN16102.12	BigEyes	nd	nd	mams	10	6	1700	E	43.7500	-124.8380	677	nd	Tynan	NFS	
TN16102.13	H.Binocs	nd	nd	birds	10	6	1734	E	43.7498	-124.7467	530	nd	Ainley/Tynan	NFS	
TN16102.14	BigEyes	nd	nd	mams	10	6	1735	S	43.7483	-124.7473	527	nd	Tynan	NFS	
TN16102.15	BigEyes	nd	nd	mams	10	6	1900	E	43.7508	-124.5127	157	nd	Tynan	NFS	
TN16102.16	BigEyes	nd	nd	mams	10	6	1915	S	43.7508	-124.4728	128	nd	Tynan	NFS	
TN16102.17	BigEyes	nd	nd	mams	10	6	2030	E	43.7523	-124.2878	100	nd	Tynan	NFS	
TN16102.18	SeaSoar	5	nd	nd	10	6	2100	E	43.7587	-124.2287	50	nd	nd	nd	End of N finescale.
TN16202.01	CTD	8	13	drift sta	11	6	1008	S	44.0067	-124.9725	663	500	Cowles	nd	Adjacent to optical drifters.
TN16202.02	CTD	8	13	drift sta	11	6	1029	E	44.0050	-124.9727	nd	nd	Cowles	nd	
TN16202.03	CTD	9	13	drift sta	11	6	1046	S	44.0022	-124.9722	705	500	Cowles	nd	Adjacent to optical drifters.
TN16202.04	CTD	9	13	drift sta	11	6	1113	E	43.9987	-124.9718	nd	nd	Cowles	nd	
TN16202.05	TSRB	1	13	drift sta	11	6	1431	S	43.9639	-124.9842	750	1	Ashe	nd	Adjacent to optical drifters.
TN16202.06	TSRB	1	13	drift sta	11	6	1452	E	43.9609	-124.9877	nd	nd	nd	nd	
TN16202.07	CTD	10	13	drift sta	11	6	1801	S	43.9342	-125.0052	662	500	Cowles	nd	Adjacent to optical drifters.
TN16202.08	CTD	10	13	drift sta	11	6	1833	E	43.9272	-125.0047	nd	nd	Cowles	nd	
TN16302.01	SeaSoar	6	14	nd	12	6	0741	S	43.2067	-124.4448	52	v	Cowles/Barth	SFS	Start of S finescale.
TN16302.02	H.Binocs	nd	nd	birds	12	6	0755	S	43.2167	-124.4467	44	nd	Ainley/Tynan	SFS	
TN16302.03	Drifter	2	nd	nd	12	6	0928	S	43.2146	-124.6877	125	nd	Ashe	SFS	Along Line 7; drifter 27356.
TN16302.04	Drifter	2	nd	nd	12	6	0929	S	43.2144	-124.6893	125	nd	Ashe	SFS	Along Line 7; drifter 27952.
TN16302.05	BigEyes	nd	nd	mams	12	6	1100	S	43.2175	-124.9285	692	nd	Tynan	SFS	
TN16302.06	H.Binocs	nd	nd	birds	12	6	1215	E	43.2167	-125.1500	1612	nd	Ainley/Tynan	SFS	
TN16302.07	BigEyes	nd	nd	mams	12	6	1230	E	43.2133	-125.1750	1732	nd	Tynan	SFS	
TN16302.08	BigEyes	nd	nd	mams	12	6	1330	S	43.0835	-125.1610	1652	nd	Tynan	SFS	
TN16302.09	H.Binocs	nd	nd	birds	12	6	1330	S	43.0833	-125.1550	1669	nd	Ainley/Tynan	SFS	
TN16302.10	BigEyes	nd	nd	mams	12	6	1530	E	43.0833	-124.8073	204	nd	Tynan	SFS	
TN16302.11	BigEyes	nd	nd	mams	12	6	1546	S	43.0835	-124.7647	232	nd	Tynan	SFS	

Appendix II: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN16302.12	H.Binocs	nd	nd	birds	12	6	1725	E	43.0833	-124.5117	162	nd	Ainley/Tynan	SFS	
TN16302.13	BigEyes	nd	nd	mams	12	6	1725	E	43.0833	-124.4887	56	nd	Tynan	SFS	
TN16302.14	H.Binocs	nd	nd	birds	12	6	1840	S	42.9550	-124.5450	60	nd	Ainley/Tynan	SFS	
TN16302.15	BigEyes	nd	nd	mams	12	6	1845	S	42.9487	-124.5567	64	nd	Tynan	SFS	
TN16302.16	H.Binocs	nd	nd	birds	12	6	2030	E	42.9500	-124.7867	162	nd	Ainley/Tynan	SFS	
TN16302.17	BigEyes	nd	nd	mams	12	6	2030	E	42.9497	-124.8240	145	nd	Tynan	SFS	
TN16402.01	BigEyes	nd	nd	mams	13	6	0638	S	42.7395	-124.6202	85	nd	Tynan	SFS	Fog.
TN16402.02	BigEyes	nd	nd	mams	13	6	0702	E	42.7120	-124.5628	84	nd	Tynan	SFS	
TN16402.03	H.Binocs	nd	nd	birds	13	6	0730	S	42.6833	-124.5017	61	nd	Ainley/Tynan	SFS	
TN16402.04	BigEyes	nd	nd	mams	13	6	0733	S	42.6808	-124.5073	70	nd	Tynan	SFS	
TN16402.05	BigEyes	nd	nd	mams	13	6	0930	E	42.6830	-124.8242	696	nd	Tynan	SFS	
TN16402.06	BigEyes	nd	nd	mams	13	6	1000	S	42.6843	-124.8970	697	nd	Tynan	SFS	
TN16402.07	SeaSoar	6	14	nd	13	6	1005	E	42.6833	-124.8967	nd	nd	nd	nd	Dead CTD on Line 9.
TN16402.08	H.Binocs	nd	nd	birds	13	6	1005	E	42.6833	-124.8967	690	nd	Ainley/Tynan	SFS	
TN16402.09	BigEyes	nd	nd	mams	13	6	1005	E	42.6840	-124.9068	697	nd	Tynan	SFS	SeaSoar lost signal.
TN16402.10	SeaSoar	7	15	nd	13	6	1306	S	42.6825	-125.0268	2700	v	Cowles/Barth	SFS	Continue S finescale on Line 9.
TN16402.11	H.Binocs	nd	nd	birds	13	6	1315	S	42.6833	-125.0333	1490	nd	Ainley/Tynan	SFS	
TN16402.12	BigEyes	nd	nd	mams	13	6	1320	S	42.6790	-125.0475	1552	nd	Tynan	SFS	
TN16402.13	H.Binocs	nd	nd	birds	13	6	1435	E	42.6833	-125.2500	3231	nd	Ainley/Tynan	SFS	
TN16402.14	BigEyes	nd	nd	mams	13	6	1438	E	42.6833	-125.2565	3099	nd	Tynan	SFS	
TN16402.15	BigEyes	nd	nd	mams	13	6	1615	S	42.5003	-125.2485	3113	nd	Tynan	SFS	
TN16402.16	H.Binocs	nd	nd	birds	13	6	1615	S	42.5000	-125.2550	3116	nd	Ainley/Tynan	SFS	
TN16402.17	BigEyes	nd	nd	mams	13	6	1715	E	42.5000	-125.0892	1924	nd	Tynan	SFS	
TN16402.18	BigEyes	nd	nd	mams	13	6	1748	S	42.4998	-125.0055	1815	nd	Tynan	SFS	
TN16402.19	BigEyes	nd	nd	mams	13	6	2032	E	42.5008	-124.5790	80	nd	Tynan	SFS	
TN16402.20	H.Binocs	nd	nd	birds	13	6	2045	E	42.5000	-124.5450	63	nd	Ainley/Tynan	SFS	
TN16502.01	H.Binocs	nd	nd	birds	14	6	0545	S	42.2000	-125.0000	1406	nd	Ainley/Tynan	SFS	Line 11.
TN16502.02	BigEyes	nd	nd	mams	14	6	0603	S	42.2008	-124.9577	1053	nd	Tynan	SFS	
TN16502.03	BigEyes	nd	nd	mams	14	6	0710	E	42.1972	-124.7785	613	nd	Tynan	SFS	
TN16502.04	BigEyes	nd	nd	mams	14	6	0737	S	42.1998	-124.7128	560	nd	Tynan	SFS	
TN16502.05	H.Binocs	nd	nd	birds	14	6	0930	E	42.2000	-124.4083	50	nd	Ainley/Tynan	SFS	
TN16502.06	BigEyes	nd	nd	mams	14	6	0932	E	42.1975	-124.4070	48	nd	Tynan	SFS	
TN16502.07	H.Binocs	nd	nd	birds	14	6	1045	S	42.0500	-124.3650	48	nd	Ainley/Tynan	SFS	Line 11a.
TN16502.08	BigEyes	nd	nd	mams	14	6	1052	S	42.0460	-124.3730	53	nd	Tynan	SFS	
TN16502.09	BigEyes	nd	nd	mams	14	6	1150	E	42.0493	-124.5363	132	nd	Tynan	SFS	
TN16502.10	BigEyes	nd	nd	mams	14	6	1222	S	42.0507	-124.6238	406	nd	Tynan	SFS	
TN16502.11	BigEyes	nd	nd	mams	14	6	1457	E	42.0483	-125.0188	1159	nd	Tynan	SFS	
TN16502.12	BigEyes	nd	nd	mams	14	6	1528	S	42.0498	-125.1030	1563	nd	Tynan	SFS	
TN16502.13	H.Binocs	nd	nd	birds	14	6	1623	E	42.0500	-125.2500	2598	nd	Ainley/Tynan	SFS	
TN16502.14	BigEyes	nd	nd	mams	14	6	1623	E	42.0488	-125.2523	2874	nd	Tynan	SFS	
TN16502.15	BigEyes	nd	nd	mams	14	6	1805	S	41.9415	-125.4357	3116	nd	Tynan	SFS	
TN16502.16	H.Binocs	nd	nd	birds	14	6	1845	S	41.9017	-125.4783	3117	nd	Ainley/Tynan	SFS	Line 12.
TN16502.17	H.Binocs	nd	nd	birds	14	6	2045	E	41.9000	-125.0933	1484	nd	Ainley/Tynan	SFS	
TN16502.18	BigEyes	nd	nd	mams	14	6	2052	E	41.9012	-125.0707	1267	nd	Tynan	SFS	
TN16602.01	SeaSoar	7	nd	nd	15	6	0150	E	41.9147	-124.3155	nd	nd	nd	nd	Inshore end of Line 12 (CR).
TN16602.02	CTD	11	16	drift sta	15	6	1114	S	42.2453	-125.0565	1761	500	Cowles	nd	Adjacent to drifter 27952.
TN16602.03	CTD	11	16	drift sta	15	6	1147	E	42.2415	-125.0633	nd	nd	Cowles	nd	
TN16602.04	TSRB	2	16	drift sta	15	6	1247	S	42.2114	-125.0787	1790	1	Ashe	nd	Adjacent to drifter 27952.

Appendix II: Event Log (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Region	Comments
TN16602.05	TSRB	2	16	drift sta	15	6	1312	E	42.2089	-125.0800	nd	nd	nd	nd	
TN16602.06	BioopticProf	1	16	drift sta	15	6	1352	S	42.1907	-125.0712	1825	110	Cowles	nd	Adjacent to drifter 27952.
TN16602.07	BioopticProf	1	16	drift sta	15	6	1437	E	42.1785	-125.0831	nd	nd	Cowles	nd	
TN16602.08	CTD	12	16	drift sta	15	6	1500	S	42.1727	-125.0840	1845	500	Cowles	nd	Adjacent to drifter 27952.
TN16602.09	CTD	12	16	drift sta	15	6	1529	E	42.1675	-125.0838	nd	nd	Cowles	nd	
TN16602.10	HTI	2	nd	nd	15	6	1554	E	42.1633	-125.0983	nd	nd	Pierce	NFS	
TN16602.11	BigEyes	nd	nd	mams	15	6	1816	S	42.5805	-125.1697	2686	nd	Tynan	nd	Transit from line 12 to line 7.
TN16602.12	BigEyes	nd	nd	mams	15	6	2026	E	43.0143	-125.2072	2177	nd	Tynan	nd	
TN16602.13	HTI	3	17	nd	15	6	2220	S	43.2173	-125.2505	1760	3	Pierce	MS2	On FM line (line 7).
TN16602.14	TAPS	1	17	nd	15	6	2245	S	43.2145	-125.2497	1760	v	Cowles	MS2	Test with HTI.
TN16702.01	TAPS	1	17	nd	16	6	0015	E	43.2008	-125.2455	nd	nd	nd	nd	
TN16702.02	SeaSoar	8	17	nd	16	6	0033	S	43.1988	-125.2463	1800	v	Cowles/Barth	MS2	On FM line (line 7).
TN16702.03	H.Binocs	nd	nd	birds	16	6	0545	S	43.2167	-124.5333	72	nd	Ainley/Tynan	MS2	
TN16702.04	BigEyes	nd	nd	mams	16	6	0604	S	43.2177	-124.4903	67	nd	Tynan	MS2	
TN16702.05	H.Binocs	nd	nd	birds	16	6	0620	E	43.2167	-124.4667	51	nd	Ainley/Tynan	MS2	
TN16702.06	H.Binocs	nd	nd	birds	16	6	0630	S	43.2267	-124.4500	46	nd	Ainley/Tynan	MS2	Transit from line 7 to 5.
TN16702.07	BigEyes	nd	nd	mams	16	6	0715	E	43.2957	-124.5407	103	nd	Tynan	MS2	
TN16702.08	H.Binocs	nd	nd	birds	16	6	0730	E	43.3083	-124.5583	110	nd	Ainley/Tynan	MS2	
TN16702.09	BigEyes	nd	nd	mams	16	6	0817	S	43.3798	-124.6598	208	nd	Tynan	MS2	
TN16702.10	H.Binocs	nd	nd	birds	16	6	0845	S	43.4233	-124.7250	482	nd	Ainley/Tynan	MS2	
TN16702.11	BigEyes	nd	nd	mams	16	6	0945	E	43.5015	-124.8343	659	nd	Tynan	MS2	
TN16702.12	H.Binocs	nd	nd	birds	16	6	1030	E	43.5500	-124.7917	645	nd	Ainley/Tynan	MS2	
TN16702.13	BigEyes	nd	nd	mams	16	6	1406	S	43.8880	-124.3432	114	nd	Tynan	MS2	
TN16702.14	H.Binocs	nd	nd	birds	16	6	1430	S	43.9233	-124.2933	104	nd	Ainley/Tynan	MS2	
TN16702.15	BigEyes	nd	nd	mams	16	6	1500	E	43.9697	-124.2343	70	nd	Tynan	MS2	
TN16702.16	H.Binocs	nd	nd	birds	16	6	1510	E	43.9683	-124.2350	72	nd	Ainley/Tynan	MS2	
TN16702.17	H.Binocs	nd	nd	birds	16	6	1530	S	44.0000	-124.1883	48	nd	Ainley/Tynan	MS2	
TN16702.18	BigEyes	nd	nd	mams	16	6	1532	S	44.0017	-124.1953	54	nd	Tynan	MS2	
TN16702.19	BigEyes	nd	nd	mams	16	6	1557	E	43.9998	-124.2575	80	nd	Tynan	MS2	
TN16702.20	BigEyes	nd	nd	mams	16	6	1612	S	44.0015	-124.2933	93	nd	Tynan	MS2	
TN16702.21	BigEyes	nd	nd	mams	16	6	1700	E	44.0003	-124.4133	125	nd	Tynan	MS2	
TN16702.22	BigEyes	nd	nd	mams	16	6	1745	S	44.0003	-124.5333	145	nd	Tynan	MS2	
TN16702.23	BigEyes	nd	nd	mams	16	6	1845	E	43.9997	-124.6968	115	nd	Tynan	MS2	
TN16702.24	BigEyes	nd	nd	mams	16	6	1902	S	44.0000	-124.7420	131	nd	Tynan	MS2	
TN16702.25	BigEyes	nd	nd	mams	16	6	2030	E	43.9993	-124.9962	886	nd	Tynan	MS2	
TN16702.26	H.Binocs	nd	nd	birds	16	6	2045	E	44.0000	-125.0267	1100	nd	Ainley/Tynan	MS2	
TN16802.01	H.Binocs	nd	nd	birds	17	6	0545	S	44.6517	-124.6083	212	nd	Ainley/Tynan	MS2	NH line.
TN16802.02	H.Binocs	nd	nd	birds	17	6	0836	E	44.6517	-124.1483	54	nd	Ainley/Tynan	MS2	
TN16802.03	SeaSoar	8	nd	nd	17	6	0849	E	44.6468	-124.1503	nd	nd	nd	nd	
TN16802.04	TAPS	2	18	nd	17	6	0942	S	44.6492	-124.2187	68	v	Cowles	nd	Test with HTI near NH5.
TN16802.05	TAPS	2	18	nd	17	6	1030	E	44.6478	-124.2083	nd	nd	nd	nd	
TN16802.06	HTI	3	nd	nd	17	6	1045	E	44.6480	-124.2085	nd	nd	Pierce	MS2	
TN16802.07	Arrive	nd	nd	nd	17	6	1200	E	nd	nd	nd	nd	Cowles	nd	Arrive in Newport.