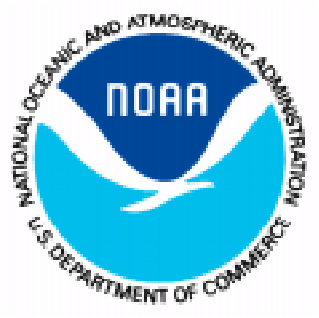
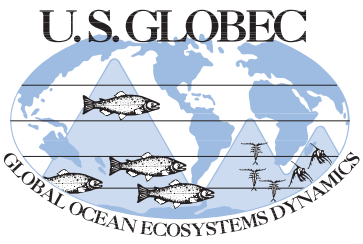
GLOBEC Northeast Pacific, California Current

Cruise Report, R/V *Wecoma* (W0005A)

29 May – 17 June 2000





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Cruise Report, R/V *Wecoma* (W0005A)

29 May – 17 June 2000

Chief Scientist:

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

Cruise Objectives

1. To conduct a mesoscale hydrographic, bio-acoustic and bio-optical survey of coastal waters between Crescent City CA and Newport OR;
2. To conduct at least two finescale hydrographic, bio-acoustic and bio-optical surveys over the continental shelf and shallow continental slope – one over Heceta Bank, the other bracketing Cape Blanco;
3. To deploy (and later recover) optical drifters during each of the finescale surveys;
4. 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;
5. To obtain profiles of hydrographic, bio-optical and photosynthetic properties near the optical drifiters;
6. To obtain CTD profiles of hydrographic properties along the mesoscale survey lines as time and conditions permit.
7. Coordinate mesoscale sampling with process studies and surveying conducted by the R/V *New Horizon* (plankton, CTD sampling), and the F/V *Sea Eagle* (salmon trawling).

Summaries of each of the GLOBEC projects may be found at the web site: http://globec.coas.oregonstate.edu/groups/nep/projs.html.

Table 1. GLOBEC Cruise Participants

Tim Cowles	SeaSoar, OSU
Jack Barth	SeaSoar, OSU
Steve Pierce	Acoustics, OSU
Bob O'Malley	SeaSoar, OSU
Russ Desiderio	Optics, OSU
Malinda Sutor	Optics, OSU
Marc Willis	Marine Tech, OSU
Linda Fayler	Marine Tech, OSU
Daryl Swensen	Marine Tech, OSU
Toby Martin	Marine Tech, OSU
Ricardo Letelier	Phytoplankton biomass and physiology, OSU
Nobu Kawasaki	Phytoplankton biomass and physiology, OSU
Alex Gonzalez	Optical Plankton Counter, U. Minnesota
Anders Roestad	Zooplankton acoustics, OSU

Summary of Cruise

Appendix I (Event Log) lists station operations and locations in chronological order. Figure 1 shows the trackline of the cruise; Figure 2 shows trackline covered for specific portions of the cruise.

Daily Cruise Summary (Narrative)

Note: All times referred to in cruise summary are local (GMT +7) time.

29 May. We departed Newport on schedule at 0900 29 May 2000. We steamed south from Newport, OR to the the W-E transit line (Line 12) just north of Crescent City, CA. We followed the 50m isobath most of the way south in order to mark locations of crab pots that would be in our tow path during the SeaSoar surveys. We arrived at the inshore end of Line 12 shortly before midnight local time on 29 May.

Mesoscale Survey

30 May. Winds picked up in strength during the final hours of our southerly transit, reaching about 30 knots as we prepared to deploy the first CTD of the cruise (Table 2 summarizes all CTD casts). We completed the CTD, then deployed the HTI acoustic system. The increasing winds and rising sea state caused us to cancel deployment of the free-fall optical profiling system (SLOWDROP) at this station. SeaSoar was deployed about 0100 30 May and we proceeded west along Line 12. We observed cold surface waters near the coast, indicative of recent upwelling (Figure 1). We had spoken to Cyndy Tynan, Chief Scientist on the *New Horizon* and learned that they would not arrive at the start of Line 12 until nearly 2000 on 30 May due to heavy winds and sea state during their transit north from Redwood City. We proceeded along Lines 12 and 11 with SeaSoar and HTI deployed. Underway T, S, fluorescence, absorption and attenuation (ac-9), and photosynthetic parameters (Fast Repetition Rate Fluorescence) were recorded underway as well.

In order to coordinate activities with the *New Horizon*, we turned south at the inshore end of Line 11 in order to repeat the first portion of Line 12 with SeaSoar. We recovered SeaSoar and HTI at station CR-4, then did CTD casts to within 10m of the bottom at CR-4, CR-5, CR-6, and CR-7. We then broke off operations on Line 12 and steamed to the inshore end of Line 10 to prepare for SeaSoar deployment and the continuation of the mesoscale survey. *New Horizon* was able to conduct some limited sampling along Line 12 – they followed us to Line 10 to continue the survey work. Weather continued to be marginal, with winds in excess of 30 knots.

31 May. Just before noon on May 31, we deployed SeaSoar and HTI at the inshore end of Line 10 to continue the mesoscale survey. We towed these systems north along the mesoscale survey track while collecting continuous data on particulate absorption and attenuation, fluorescence, and photosynthetic parameters along with discrete samples every hour for nutrients, chlorophyll, and HPLC. The strong upwelling favorable winds had established steeply sloping isopycnals close to the coast along each of the E-W lines of the mesoscale survey.

3 June. Following completion of the mesoscale survey (Figure 2a) on the inshore end of the Newport line on June 3, Bill Peterson, Mark Huntley, and Tammy Baiz came over in a small boat from the *New Horizon* to discuss sampling plans and obtain plots of temperature, salinity, sigma-t, fluorescence, ADCP velocities, and bio-acoustic biomass estimates from each of the mesoscale survey lines. Based on the observations from the *New Horizon* of a large euphausiid patch on Line 5, we agreed to move the northern finescale survey one line to the south by starting on Line 1A and ending on Line 5.

Northern Finescale Survey

During the evening of June 3, we deployed the SLOWDROP optical profiler near NH-10, then proceeded to the inshore end of Line 1A to begin the northern finescale survey. Winds were light from the south. We began the survey just before midnight on June 3. As we moved across the estimated position of the velocity front along Line 1A, we deployed four optical satellite-tracked drifters in close proximity. These drifters would be recovered later in the cruise.

4-6 June. We traversed Lines 1A through 5 with SeaSoar, HTI and underway sampling over the next 56 hours, completing the survey on the eastern end of Line 5 in shallow water on June 6 (Figure 2c).

Winds remained downwelling favorable (northward) during the entire finescale survey. After consultation with the *New Horizon* about their sampling plans, we steamed to the latest known position of the cluster of optical drifters within the northern finescale survey grid. We needed to determine how difficult it was to locate the drifters with the ARGOS rdf and visual sightings, then evaluate the possibility of leaving the drifters in the water for several more days. We arrived at the position of the most recent satellite fix for one of the drifters in the early afternoon of June 6. After one hour of searching with the ARGOS rdf within a few miles of the latest satellite fix, we obtained a visual sighting of one of the drifters. We located two more drifters within another hour. Based on our success in finding three of the drifters, it was our opinion that it was worth leaving the optical drifters in the water. We spoke with Mark Abbott by cell phone, and he agreed with that decision. We then deployed the TSRB at the drifter location to provide calibration with the optical drifters. We then deployed the SLOWDROP optical profiler at four closely spaced stations orthogonal to the flow axis of the current in which the drifters were located. We kept the bio-acoustics system (HTI) in the water while doing the optical profiles to assess the coherence in the vertical finestructure of bio-optical and bio-acoustical signals.

Southern Finescale Survey

7-9 June. We proceeded directly to the starting point of the southern finescale survey (Figure 2c), arriving at the eastern end of Line 7 by 0600 on June 7. The *Sea Eagle* was completing a tow for juvenile salmon at this location as we arrived. We deployed SeaSoar and HTI under light southward winds and proceeded along Lines 7 – 11a for the next 54 hours, completing the survey at the western end of Line 11a the afternoon of June 9. Southward winds weakened during the second day of this finescale survey and turned northward. The *New Horizon* was sampling a few lines behind us, so we decided to do a CTD section along Line 11a to anchor our upper 120m measurements with the SeaSoar.

Drifter recoveries and short process survey (Lines 7, 7a, 8)

9-11 June. In coordination with the *New Horizon* and the *Sea Eagle*, we arranged a June 11 rendezvous at the northern end of the southern finescale grid. This schedule would permit the *New Horizon* and the *Sea Eagle* to complete sampling near Line 11 while we returned to the northern grid to recover the first cluster of optical drifters. We steamed north during the night of June 9, arriving near the drifters about 0830. With the assistance of the ARGOS rdf and recent satellite fixes, we were able to locate all four drifters within two hours. We pulled three of them on board, and left the fourth to drift while we conducted optical sampling around it for several hours. This involved deployment of the TSRB, multiple profiles with the SLOWDROP optical profiling system, and simultaneous deployment of the HTI bio-acoustics system. At the end of the afternoon, we recovered the fourth and final optical drifter and proceeded to our rendezvous point at the eastern end of Line 7 with the *New Horizon* and *Sea Eagle*.

En route to the June 11 morning rendezvous, we did a series of deep CTDs along the FM line (Line 7) from offshore to inshore. These deep CTDs served to anchor our upper 120m surveys with the SeaSoar along this same line just a few hours later. We spoke by radio with the *New Horizon* and they indicated they would follow us along Lines 7, 7a, and 8. Northward winds began increasing in strength as we started towing to the west along Line 7, reaching in excess of 30 knots within a few hours. The *New Horizon* followed behind us, but was unable to sample under these weather conditions. We observed strong downwelling at the inshore ends of each line during this short survey.

Late on June 11, the *New Horizon* notified us that they were breaking off to sample the Newport line before they ran out of shiptime. We continued our survey over Line 7, 7a, and 8 until the afternoon of June 12, when we steamed north to the last received satellite fix for the southern cluster of optical drifters (deployed on June 7). It took nearly three hours to locate and recover the four drifters, but still less time than we expected when we launched the drifters. Since the final drifter recovery occurred at sunset, we did not deploy the TSRB. We deployed the SLOWDROP optical profiler at the site of the last drifter location, and obtained high-resolution vertical profiles of hydrographic and bio-optical properties while the HTI system was collecting bio-acoustical information.

Inshore survey to complement the offshore mesoscale survey

The forecast indicated that upwelling favorable winds would begin blowing on June 13. We took this opportunity to observe the initiation of the upwelling response by conducting an inshore mesoscale SeaSoar survey over a limited portion of the mesoscale survey grid. We covered the eastern segments of Lines 5-9 during this inshore survey (Figure 2d) and observed the tilting of isopycnals in the upper 20-30 meters within 10-15 km of shore.

14 June. We recovered the SeaSoar and HTI along Line 9 on the morning of June 14 so that we could steam south to the Crescent City line (Line 12) to begin the offshore mesoscale survey with the SeaSoar on the faired tow cable. Upon arrival on Line 12, we did CTDs at stations CR-2 and CR-3 in order to obtain water column characterization of the inshore end of Line 12 at water depths less than 500m. During these CTD stations, southward winds increased in intensity, such that our SeaSoar deployment near station CR-4 was conducted in 35 knot winds. We decided that conditions were questionable for deployment of the HTI system, so we deferred deployment. That was the right decision, as winds continued to increase and seas continued to build as we towed to the west along Line 12. By the time we turned north at the offshore end of Line 12, winds were gusting to 45-50 knots and we were having difficulty maintaining our planned tow path. As can be seen from the actual cruise track for this tow (Figure 2b), it was necessary to modify the track so that the ship could maintain sufficient headway to continue SeaSoar undulations. We continued our NW-NE doglegs until reaching the western end of the Newport line at which time the winds had moderated sufficiently for us to steam eastward along the NH line. We recovered the SeaSoar just offshore of station NH-35. We completed our cruise operations with CTD casts at NH-25, NH-20, NH-15, NH-10, and NH-5.

Summary of Sampling Operations

Daytime Activities:

SeaSoar CTD and bio-optics (Cowles and Barth)

Temperature and conductivity data were collected during all SeaSoar operations with dual Sea-Bird temperature and conductivity sensor suites 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. The system functioned well during the cruise, with few interruptions in data acquisition or degradation of data quality.

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, each recording pigment fluorescence at 685 nm, where one system used 440 nm excitation and the other 500 nm excitation. Quantum-corrected ratios of 685 nm fluorescence reveals the contribution of accessory pigments to the photosynthetic apparatus. Table 5 summarizes SeaSoar deployments.

Optical drifters (Abbott and Letelier)

Two clusters consisting of 4 optical drifters each were deployed around 44º 34.29'N, 124º 30.10'W and 43º 05.00'N, 124º 42.50'W, at the beginning of the Northern and Southern fine scale survey, respectively. Each drifter contained optical sensors in the surface float – one to record downwelling light intensity and another to record upwelling radiance at seven wavelengths. All drifters were recovered after the end of the southern fine scale survey and, when possible, a Tethered Spectral Radiometer Buoy was deployed in the vicinity of the drifters for calibration purposes. Tables 3 and 7 summarize drifter deployments and TSRB casts, respectively.

SLOWDROP optical profiling (Cowles)

We deployed a free-fall profiling system to provide high resolution vertical profiles of temperature, salinity, density (using Sea-Bird 911 CTD), along with bio-optical properties based on multi-wavelength absorption and attenuation (Wetlabs ac-9) as well as multi-wavelength fluorescence. These profiles were conducted as the optical drifters were recovered in order to provide water column assessments of the optical properties detected by the surface drifters. The optical instruments on the SLOWDROP profiler also provide calibration for the ac-9 and fluorometers used on the SeaSoar. Table 6 summarizes SLOWDROP casts.

Underway optical properties (Abbott and Letelier)

This program component focused on the assessment of the spatial and temporal variability in phytoplankton biomass and physiology. This goal was achieved principally by gathering a continuous record of phytoplankton in vivo fluorescence, variable fluorescence, and water absorption and attenuation, using a 10-AU Turner Designs fluorometer, a Chelsea fast Repetition Rate fluorometer, and a Wetlabs ac-9 in a flow-through mode during SeaSoar survey periods.

In addition to the continuous records, discrete samples for chlorophyll fluorometric determinations, pigment analysis, particle absorption, and nutrients were collected every hour during the SeaSoar mesoscale survey (approximately every 10 nm) and every half hour during fine scale surveys. Samples for phytoplankton specific determination were collected at selected locations and preserved with formaldehyde.

ADCP (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 approximately 17 to 350 m. Bottom-tracking was enabled when the bottom depth was less than 500 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 2.5 min. The instrument was also configured to collect raw backscatter amplitude data at a 1 s. rate, 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 operated continuously except for planned brief interruptions to change system parameters or diskettes. The Ashtech GPS experienced occasional dropouts, but the gyro compass was still available for heading, so this implies only a small decrease in velocity accuracy. A preliminary analysis suggests overall ADCP data quality for the cruise was excellent.

Bio-acoustical system (Peterson and Pierce)

A four frequency bioacoustics instrument was towed on a short cable off the port quarter of the *Wecoma* during much of the cruise. This was a Hydroacoustic Technology, Inc. Model 244 instrument, mounted on a towed sled at 1-2 m depth, 3 m off from the side of the ship. The four frequencies were 38, 120, 200, and 420 kHz. The instrument was usually deployed during the same time periods as the Seasoar. We configured the instrument to collect echo integration data and to use a raw ping rate of about 4 pings/s, or 1 ping/s for each frequency. Depth bins were 1 m in width, and depth range was 200 m (38 and 120 kHz), 150 m (200 kHz), and 100 m (420 kHz). The ensemble averaging time was 12 s. At the beginning of the cruise, GPS data were being attached in realtime to each 12 s. ensemble, fed in via serial port on the HTI PC. We discovered however that processing of the GPS data stream was causing extreme slowing of the PC, leading to disruptions of the acoustics data acquisition, so the GPS option was abandoned on the second day of the cruise, May 30 (GPS data will be attached in post-processing). We also experienced some intermittent data dropouts possibly connected with the relatively high ping rate which we are demanding. Overall data quality appears good. Table 4 summarizes HTI deployments.

We thank Captain Danny J. Arnsdorf and the crew of the R/V *Wecoma* for all their hard work, good humor and great attitude during this long field season. Their efforts greatly contributed to this very

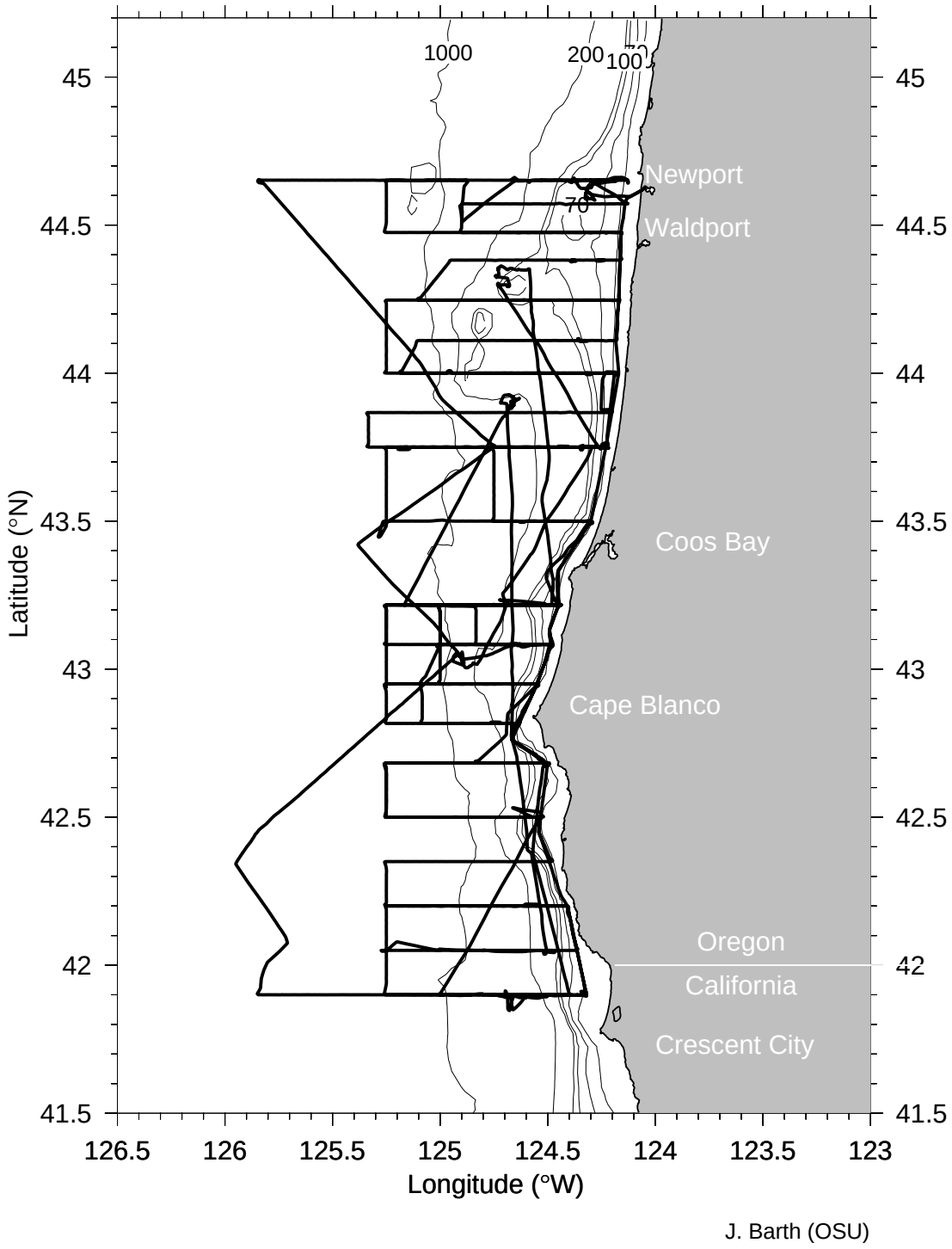

Figure 1 - Trackline covered during *Wecoma* cruise W0005A, 29 May - 17 June 2001.

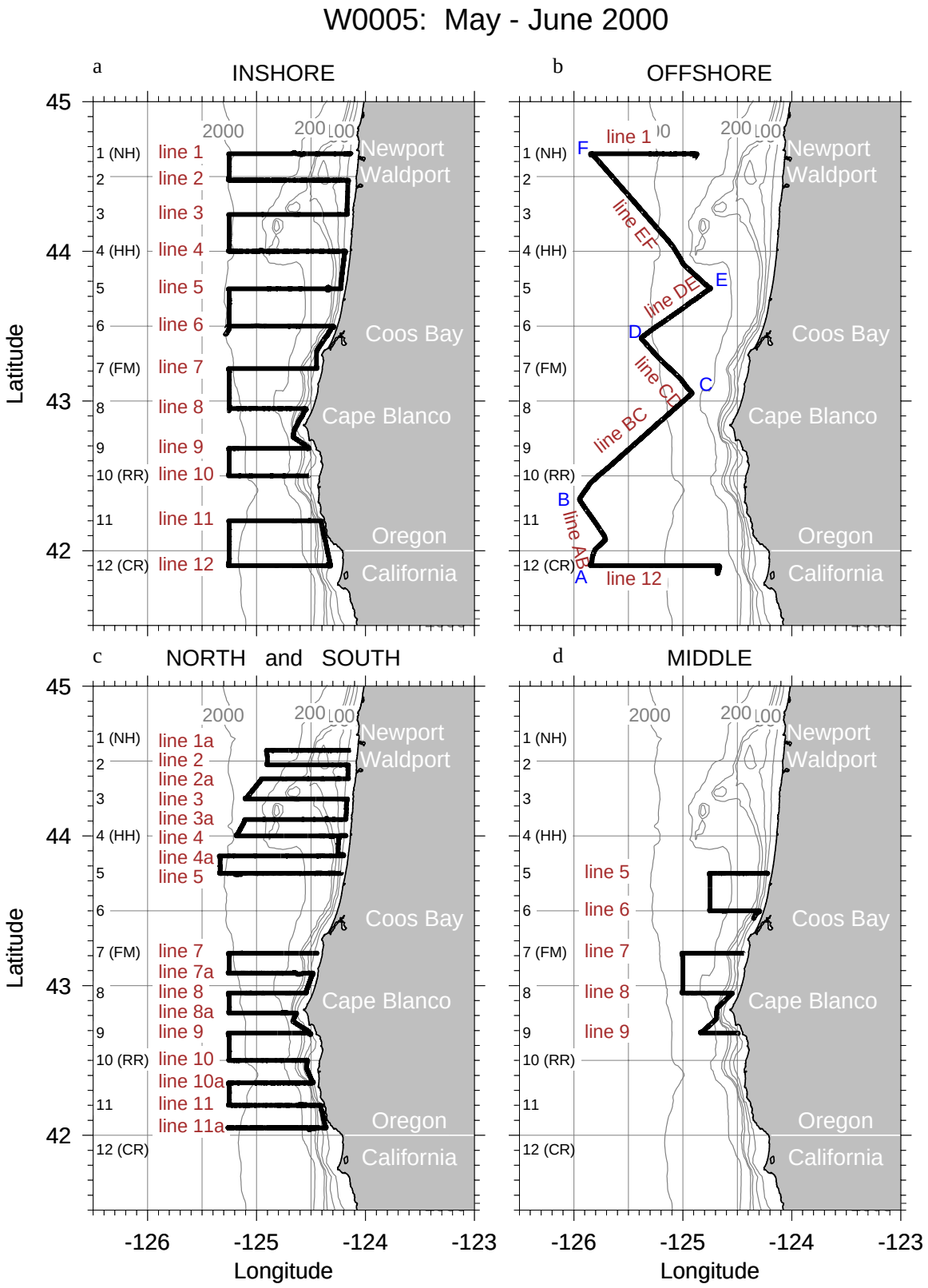

Figure 2 a) (upper left) - Trackline of initial inshore grid; b) (upper right) - Trackline of final offshore grid; c) (lower left) - Trackline of northern and southern finescale surveys; d) (lower right) - Repeated inshore grid survey for lines 5-9.

Table 2: CTD Casts

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15000.02	CTD	1	1	nd	29	5	2350	S	41.8985	-124.3203	47	37	Cowles,Barth	Line	
WE15000.02	CTD	1	1	nd	30	5	0010	E	41.8987	-124.3202	nd	nd	nd	nd	
WE15100.03	CTD	2	2	CR-4	30	5	2058	S	41.8980	-124.6010	530	517	Cowles,Barth	nd	
WE15100.03	CTD	2	nd	nd	30	5	2144	E	41.8987	-124.6018	nd	nd	nd	nd	
WE15100.04	CTD	3	3	CR-5	30	5	2231	S	41.9007	-124.6990	667	651	Cowles,Barth	nd	
WE15100.04	CTD	3	nd	nd	30	5	2317	E	41.8948	-124.7033	nd	nd	nd	nd	
WE15200.01	CTD	4	4	CR-6	31	5	0012	S	41.9020	-124.7993	705	694	Cowles,Barth	nd	
WE15200.01	CTD	4	nd	nd	31	5	0055	E	41.9003	-124.8007	nd	nd	nd	nd	
WE15200.02	CTD	5	5	CR-7	31	5	0211	S	41.9002	-124.9998	830	820	Cowles,Barth	nd	
WE15200.02	CTD	5	nd	nd	31	5	0255	E	41.9000	-124.0007	nd	nd	nd	nd	
WE16100.01	CTD	6	14	nd	9	6	1455	S	42.0510	-125.2498	2997	1000	Cowles,Barth	nd	sta 11 8
WE16100.01	CTD	6	14	nd	9	6	1549	E	42.0515	-125.2505	2997	nd	nd	nd	
WE16100.02	CTD	7	15	nd	9	6	1716	S	42.0500	-125.0005	1190	1000	Cowles,Barth	nd	sta 11 7
WE16100.02	CTD	7	15	nd	9	6	1800	E	42.0522	-125.0017	1190	nd	nd	nd	
WE16100.03	CTD	8	16	nd	9	6	1906	S	42.0342	-124.7997	679	669	Cowles,Barth	nd	sta 11 6
WE16100.03	CTD	8	16	nd	9	6	1945	E	42.0495	-124.8007	679	nd	nd	nd	
WE16100.04	CTD	9	17	nd	9	6	2055	S	42.0500	-124.6010	285	275	Cowles,Barth	nd	sta 11 5
WE16100.04	CTD	9	17	nd	9	6	2115	E	42.0467	-124.6050	285	nd	nd	nd	
WE16100.05	CTD	10	18	nd	9	6	2155	S	42.0498	-124.5010	115	105	Cowles,Barth	nd	sta 11 4
WE16100.05	CTD	10	18	nd	9	6	2210	E	42.0467	-124.0043	115	nd	nd	nd	
WE16200.05	CTD	11	20	FM-9	10	6	2230	S	43.2168	-125.1653	1651	1000	Cowles,Barth	FM-9	
WE16200.05	CTD	11	20	nd	10	6	2315	E	43.2157	-125.1623	1615	nd	nd	nd	
WE16300.01	CTD	12	21	FM-8	11	6	0006	S	43.2162	-124.9998	1093	1000	Cowles,Barth	FM-8	
WE16300.01	CTD	12	21	nd	11	6	0100	E	43.2145	-124.9967	nd	nd	nd	nd	
WE16300.02	CTD	13	22	FM-7	11	6	0157	S	43.2155	-124.8317	346	332	Cowles,Barth	FM-7	
WE16300.02	CTD	13	22	nd	11	6	0229	E	43.2150	-124.8340	346	nd	nd	nd	
WE16300.03	CTD	14	23	FM-6	11	6	0303	S	43.2165	-124.7497	315	303	Cowles,Barth	FM-6	
WE16300.03	CTD	14	23	nd	11	6	0332	E	43.2170	-124.7515	nd	nd	nd	nd	
WE16300.04	CTD	15	24	FM-5	11	6	0404	S	43.2167	-124.6673	156	151	Cowles,Barth	FM-5	
WE16300.04	CTD	15	24	nd	11	6	0425	E	43.2168	-124.6670	nd	nd	nd	nd	
WE16600.01	CTD	16	28	CR-2	14	6	1201	S	41.8993	-124.4002	69	63	Cowles,Barth	nd	
WE16600.01	CTD	16	28	nd	14	6	1215	E	41.8985	-124.4005	nd	nd	nd	nd	
WE16600.02	CTD	17	29	CR-3	14	6	1259	S	41.8997	-124.5002	139	131	Cowles,Barth	nd	
WE16600.02	CTD	17	29	nd	14	6	1319	E	41.8957	-124.5023	nd	nd	nd	nd	
WE16800.02	CTD	18	31	NH-25	16	6	1951	S	44.6510	-124.6502	297	289	Cowles,Barth	nd	
WE16800.02	CTD	18	31	NH-25	16	6	2020	E	44.6490	-124.6522	nd	nd	nd	nd	
WE16800.03	CTD	19	32	NH-20	16	6	2114	S	44.6502	-124.5288	144	136	Cowles,Barth	nd	
WE16800.03	CTD	19	32	NH-20	16	6	2130	E	44.6497	-124.5315	nd	nd	nd	nd	
WE16800.04	CTD	20	33	NH-15	16	6	2228	S	44.6515	-124.4123	92	86	Cowles,Barth	nd	
WE16800.04	CTD	20	33	NH-15	16	6	2242	E	44.6487	-124.4167	nd	nd	nd	nd	
WE16800.05	CTD	21	34	NH-10	16	6	2349	S	44.6508	-124.2980	83	79	Cowles,Barth	nd	
WE16800.05	CTD	21	34	NH-10	16	6	2354	E	44.6493	-124.3048	nd	nd	nd	nd	
WE16900.01	CTD	22	35	NH-5	17	6	0100	S	44.6508	-124.1777	62	56	Cowles,Barth	nd	
WE16900.01	CTD	22	35	NH-5	17	6	0105	E	44.6483	-124.1800	nd	nd	nd	nd	

Table 3: Drifter Deployments

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15600.01	Drifter 26913	1	nd	nd	4	6	0207	S	44.5715	-124.5000	nd	nd	Letelier	nd	Drifters deployed along 1A
WE15600.01	Drifter 26913	nd	nd	nd	10	6	1801	E	43.8875	-124.6718	nd	nd	Letelier	nd	
WE15600.02	Drifter 27353	1	nd	nd	4	6	0207	S	44.5715	-124.5013	nd	nd	Letelier	nd	
WE15600.02	Drifter 27353	nd	nd	nd	10	6	0927	E	43.9263	-124.6777	nd	nd	Letelier	nd	
WE15600.03	Drifter 27354	1	nd	nd	4	6	0208	S	44.5715	-124.5022	nd	nd	Letelier	nd	Recovered near 4A
WE15600.03	Drifter 27354	nd	nd	nd	10	6	1001	E	43.9195	-124.6618	nd	nd	Letelier	nd	
WE15600.04	Drifter 26912	1	nd	nd	4	6	nd	S	44.5715	-124.5032	nd	nd	Letelier	nd	
WE15600.04	Drifter 26912	nd	nd	nd	10	6	0950	E	43.9182	-124.6663	nd	nd	Letelier	nd	
WE15900.01	Drifter 26911	1	nd	nd	7	6	1712	S	43.0832	-124.7128	nd	nd	Letelier	nd	Deployed along 7A
WE15900.01	Drifter 26911	1	nd	nd	12	6	2049	E	43.0065	-124.8682	nd	nd	nd	SFS	
WE15900.02	Drifter 26910	1	nd	nd	7	6	1713	S	43.0832	-124.7107	nd	nd	nd	nd	
WE15900.02	Drifter 26910	1	nd	nd	12	6	1857	E	43.0585	-124.9233	nd	nd	nd	nd	Recovered near line 8
WE15900.03	Drifter 27356	1	nd	nd	7	6	1714	S	43.0833	-124.7077	nd	nd	nd	nd	
WE15900.03	Drifter 27356	1	nd	nd	12	6	2013	E	43.0457	-124.9118	nd	nd	nd	nd	
WE15900.04	Drifter 27355	1	nd	nd	7	6	1716	S	43.0832	-124.7047	nd	nd	nd	nd	
WE15900.04	Drifter 27355	1	nd	nd	12	6	1846	E	43.0505	-124.9195	nd	nd	nd	nd	

Table 4: HTI Acoustic System Casts

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15100.01	HTI	1	1	nd	30	5	0100	S	41.9002	-124.3223	48	3	Pierce	nd	
WE15100.01	HTI	1	nd	nd	30	5	1929	E	41.8985	-124.6002	470	nd	nd	nd	
WE15200.03	HTI	2	6	nd	31	5	1101	S	42.5108	-124.5300	51	v	Pierce	MS	Line 10 - eastern end
WE15200.03	HTI	2	nd	nd	3	6	1518	E	44.6462	-124.1253	nd	nd	nd	nd	
WE15500.02	HTI	3	8	nd	3	6	2330	S	44.5725	-124.1280	46	v	Pierce	nd	
WE15500.02	HTI	nd	nd	nd	6	6	0707	E	43.7657	-124.2213	nd	nd	nd	nd	
WE15800.02	HTI	4	9	nd	6	6	1737	S	44.3517	-124.7283	108	nd	Pierce	nd	
WE15800.02	HTI	4	nd	nd	6	6	2316	E	44.3513	-124.5868	100	nd	Pierce	nd	
WE15900.01	HTI	5	13	nd	7	6	0810	S	43.2172	-124.4425	40	nd	Pierce	SFS	Start at 7E
WE15900.01	HTI	5	nd	nd	9	6	1433	E	42.0500	-125.2707	2800	nd	Pierce	nd	End at 11W
WE16200.02	HTI	6	19	nd	10	6	1239	S	43.8938	-124.6638	223	nd	Pierce	nd	
WE16200.02	HTI	6	19	nd	10	6	1645	E	43.9145	-124.6333	nd	nd	nd	nd	
WE16300.05	HTI	7	25	nd	11	6	0719	S	43.2172	-124.4413	nd	nd	Pierce	nd	
WE16300.05	HTI	7	nd	nd	12	6	1640	E	43.0822	-124.6330	nd	nd	nd	nd	
WE16400.01	HTI	8	26	nd	12	6	2125	S	43.0132	-124.8547	166	nd	Pierce	nd	
WE16400.01	HTI	8	26	nd	12	6	2335	E	43.0180	-124.8375	nd	nd	nd	nd	
WE16500.01	HTI	9	27	nd	13	6	0759	S	43.7482	-124.2182	38	nd	Cowles,Barth	nd	Short inshore tow along lines 5,6,7,8,9
WE16500.01	HTI	9	nd	nd	14	6	0749	E	42.6778	-124.4978	54	nd	nd	nd	
WE16800.01	HTI	10	31	NH-25	16	6	1937	S	44.6508	-124.6497	296	nd	Pierce	NH	
WE16800.01	HTI	10	nd	nd	17	6	0120	E	44.6483	-124.1817	nd	nd	nd	nd	

Table 5: SeaSoar Surveys

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15100.02	SeaSoar	1	1	nd	30	5	0107	S	41.8993	-124.3273	48	v	Cowles,Barth	MS	Mesoscale survey
WE15100.02	SeaSoar	1	nd	nd	30	5	1920	E	41.8983	-124.6003	470	nd	nd	nd	
WE15200.04	SeaSoar	2	6	nd	31	5	1109	S	42.5063	-124.5268	51	v	Cowles,Barth	nd	
WE15200.04	SeaSoar	2	nd	nd	3	6	1515	E	44.6460	-124.1253	nd	nd	nd	nd	
WE15500.03	SeaSoar	3	8	nd	3	6	2338	S	44.5730	-124.1312	46	v	Cowles,Barth	NFS	Start of FSN @ 1AE
WE15500.03	SeaSoar	3	nd	nd	6	6	0700	E	43.7628	-124.2200	nd	nd	nd	nd	End of FSN @ 5E
WE15900.02	SeaSoar	4	13	nd	7	6	0815	S	43.2170	-124.4448	40	nd	Cowles,Barth	SFS	Start at 7E
WE15900.02	SeaSoar	4	nd	nd	9	6	1426	E	42.0498	-125.2657	2800	nd	Cowles,Barth	nd	End at 11W
WE16300.06	SeaSoar	5	25	nd	11	6	0725	S	43.2172	-124.4378	nd	nd	Cowles,Barth	nd	
WE16300.06	SeaSoar	5	nd	nd	12	6	1632	E	43.0807	-124.6357	nd	nd	nd	nd	
WE16500.02	SeaSoar	6	27	nd	13	6	0805	S	43.7478	-124.2177	38	nd	Cowles,Barth	nd	Short inshore tow along lines 5,6,7,8,9
WE16500.02	SeaSoar	6	nd	nd	14	6	0750	E	42.6745	-124.4970	54	nd	nd	nd	
WE16600.03	SeaSoar	7	30	12-M	14	6	1605	S	41.8928	-124.6873	650	v	Cowles,Barth	OMS	Deployed in marginal conditions; no HTI deployment
WE16600.03	SeaSoar	7	nd	nd	16	6	1748	E	44.5222	-124.8985	nd	nd	nd	nd	

Table 6: SLOWDROP Optical Profiling System Surveys

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15500.01	SLOWDROP	1	7	nd	3	6	2146	S	44.6485	-124.3027	90	75	Cowles	nd	Near NH-10
WE15500.01	SLOWDROP	1	nd	nd	3	6	0000	E	nd	nd	nd	nd	nd	nd	
WE15800.03	SLOWDROP	2	9	nd	6	6	1832	S	44.3507	-124.7297	106	nd	Cowles	nd	Optical work after first visual of drifters
WE15800.03	SLOWDROP	2	9	nd	6	6	1933	E	44.3602	-124.7213	106	nd	Cowles	nd	
WE15800.03	SLOWDROP	3	10	nd	6	6	2002	S	44.3498	-124.6833	101	nd	Cowles	nd	
WE15800.03	SLOWDROP	3	10	nd	6	6	2050	E	44.3505	-124.6797	101	nd	Cowles	nd	
WE15800.03	SLOWDROP	4	11	nd	6	6	2120	S	44.3500	-124.6380	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	4	11	nd	6	6	2202	E	44.3487	-124.6265	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	5	12	nd	6	6	2232	S	44.3512	-124.5900	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	5	12	nd	6	6	2313	E	44.3518	-124.5863	100	nd	Cowles	nd	
WE16200.03	SLOWDROP	6	19	nd	10	6	1300	S	43.8917	-124.6632	220	80	Cowles	nd	Optical work after northern drifter recovery
WE16200.03	SLOWDROP	6	19	nd	10	6	1538	E	43.9038	-124.6523	nd	nd	nd	nd	
WE16400.02	SLOWDROP	7	26	nd	12	6	2157	S	43.0172	-124.8483	165	70	Cowles	nd	Optical profiling after drifter recovery
WE16400.02	SLOWDROP	7	26	nd	12	6	2316	E	43.0197	-124.8403	nd	nd	nd	nd	

Table 7: TSRB Surveys

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15800.01	TSRB	1	9	nd	6	6	1600	S	44.3333	-124.7267	110	nd	Letelier	nd	Optical work after first visual of drifters
WE15800.01	TSRB	1	9	nd	6	6	1643	E	44.3442	-124.7290	109	nd	Letelier	nd	
WE16200.01	TSRB	2	19	nd	10	6	1045	S	43.9052	-124.6595	224	0	Letelier	nd	Optical work after northern drifter recovery
WE16200.01	TSRB	2	19	nd	10	6	1142	E	43.8993	-124.6653	224	nd	nd	nd	
WE16200.04	TSRB	3	19	nd	10	6	1555	S	43.9090	-124.6447	220	0	Letelier	nd	Optical work after northern drifter recovery
WE16200.04	TSRB	3	19	nd	10	6	1637	E	43.9142	-124.6338	nd	nd	nd	nd	

APPENDIX I

W0005A EVENT LOG

EVENT LOG CONTENTS

Column Label	Description
Event#	Unique identifier for each line of event log
Instrument (Instr)	CTD: Seabird CTD for conductivity, temperature, depth, fluorescence and other optics; Drifters: Satellite-tracked optical drifter dragged at 30m depth; HTI: Hydroacoustic Technology Inc., Model 244, 4-frequency bioacoustics instruments; SeaSoar: Towed undulator with C, T, depth, florescence, ac-9, etc. SLOWDROP: Free fall profiler for C, T, depth, bio-optics; TSRB: Tethered Spectral Radiometric Buoy with optics package.
Cast	Sequence # for a particular instrument
Station (Sta)	
Station Standard (Sta std)	
Day	Local time basis
Month (Mos)	Local time basis
Time	Local time
Latitude (Lat)	Decimal degrees; north is positive
Longitude (Long)	Decimal degrees; east is positive
Water Depth	Depth of bottom (meters)
Cast Depth	Maximum depth of deployment (meters); v = variable
Scientific Investigator (SI)	
Region	Region sampled: MS = mesoscale survey; NFS = northern fine-scale survey; SFS = southern fine-scale survey; OMS = offshore mesoscale survey or a particular sampling line.
Comments	

Appendix I

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15000.01	Depart	nd	nd	nd	29	5	0900	S	44.6133	-124.0667	nd	nd	Cowles	nd	Depart Newport
WE15000.02	CTD	1	1	nd	29	5	2350	S	41.8985	-124.3203	47	37	Cowles,Barth	Line	
WE15000.02	CTD	1	1	nd	30	5	0010	E	41.8987	-124.3202	nd	nd	nd	nd	
WE15100.01	HTI	1	1	nd	30	5	0100	S	41.9002	-124.3223	48	3	Pierce	nd	
WE15100.01	HTI	1	nd	nd	30	5	1929	E	41.8985	-124.6002	470	nd	nd	nd	
WE15100.02	SeaSoar	1	1	nd	30	5	0107	S	41.8993	-124.3273	48	v	Cowles,Barth	MS	Mesoscale survey
WE15100.02	SeaSoar	1	nd	nd	30	5	1920	E	41.8983	-124.6003	470	nd	nd	nd	
WE15100.03	CTD	2	2	CR-4	30	5	2058	S	41.8980	-124.6010	530	517	Cowles,Barth	nd	
WE15100.03	CTD	2	nd	nd	30	5	2144	E	41.8987	-124.6018	nd	nd	nd	nd	
WE15100.04	CTD	3	3	CR-5	30	5	2231	S	41.9007	-124.6990	667	651	Cowles,Barth	nd	
WE15100.04	CTD	3	nd	nd	30	5	2317	E	41.8948	-124.7033	nd	nd	nd	nd	
WE15200.01	CTD	4	4	CR-6	31	5	0012	S	41.9020	-124.7993	705	694	Cowles,Barth	nd	
WE15200.01	CTD	4	nd	nd	31	5	0055	E	41.9003	-124.8007	nd	nd	nd	nd	
WE15200.02	CTD	5	5	CR-7	31	5	0211	S	41.9002	-124.9998	830	820	Cowles,Barth	nd	
WE15200.02	CTD	5	nd	nd	31	5	0255	E	41.9000	-124.0007	nd	nd	nd	nd	
WE15200.03	HTI	2	6	nd	31	5	1101	S	42.5108	-124.5300	51	v	Pierce	MS	Line 10 - eastern end
WE15200.03	HTI	2	nd	nd	3	6	1518	E	44.6462	-124.1253	nd	nd	nd	nd	
WE15200.04	SeaSoar	2	6	nd	31	5	1109	S	42.5063	-124.5268	51	v	Cowles,Barth	nd	
WE15200.04	SeaSoar	2	nd	nd	3	6	1515	E	44.6460	-124.1253	nd	nd	nd	nd	
WE15500.01	SLOWDROP	1	7	nd	3	6	2146	S	44.6485	-124.3027	90	75	Cowles	nd	Near NH-10
WE15500.01	SLOWDROP	1	nd	nd	3	6	0000	E	nd	nd	nd	nd	nd	nd	
WE15500.02	HTI	3	8	nd	3	6	2330	S	44.5725	-124.1280	46	v	Pierce	nd	
WE15500.02	HTI	nd	nd	nd	6	6	0707	E	43.7657	-124.2213	nd	nd	nd	nd	
WE15500.03	SeaSoar	3	8	nd	3	6	2338	S	44.5730	-124.1312	46	v	Cowles,Barth	NFS	Start of FSN @ 1AE
WE15500.03	SeaSoar	3	nd	nd	6	6	0700	E	43.7628	-124.2200	nd	nd	nd	nd	End of FSN @ 5E
WE15600.01	Drifter 26913	1	nd	nd	4	6	0207	S	44.5715	-124.5000	nd	nd	Letelier	nd	Drifters deployed along 1A
WE15600.01	Drifter 26913	nd	nd	nd	10	6	1801	E	43.8875	-124.6718	nd	nd	Letelier	nd	
WE15600.02	Drifter 27353	1	nd	nd	4	6	0207	S	44.5715	-124.5013	nd	nd	Letelier	nd	
WE15600.02	Drifter 27353	nd	nd	nd	10	6	0927	E	43.9263	-124.6777	nd	nd	Letelier	nd	
WE15600.03	Drifter 27354	1	nd	nd	4	6	0208	S	44.5715	-124.5022	nd	nd	Letelier	nd	Recovered near 4A
WE15600.03	Drifter 27354	nd	nd	nd	10	6	1001	E	43.9195	-124.6618	nd	nd	Letelier	nd	
WE15600.04	Drifter 26912	1	nd	nd	4	6	nd	S	44.5715	-124.5032	nd	nd	Letelier	nd	
WE15600.04	Drifter 26912	nd	nd	nd	10	6	0950	E	43.9182	-124.6663	nd	nd	Letelier	nd	
WE15800.01	TSRB	1	9	nd	6	6	1600	S	44.3333	-124.7267	110	nd	Letelier	nd	Optical work after first visual of drifters
WE15800.01	TSRB	1	9	nd	6	6	1643	E	44.3442	-124.7290	109	nd	Letelier	nd	
WE15800.02	HTI	4	9	nd	6	6	1737	S	44.3517	-124.7283	108	nd	Pierce	nd	
WE15800.02	HTI	4	nd	nd	6	6	2316	E	44.3513	-124.5868	100	nd	Pierce	nd	
WE15800.03	SLOWDROP	2	9	nd	6	6	1832	S	44.3507	-124.7297	106	nd	Cowles	nd	Optical work after first visual of drifters
WE15800.03	SLOWDROP	2	9	nd	6	6	1933	E	44.3602	-124.7213	106	nd	Cowles	nd	
WE15800.03	SLOWDROP	3	10	nd	6	6	2002	S	44.3498	-124.6833	101	nd	Cowles	nd	
WE15800.03	SLOWDROP	3	10	nd	6	6	2050	E	44.3505	-124.6797	101	nd	Cowles	nd	
WE15800.03	SLOWDROP	4	11	nd	6	6	2120	S	44.3500	-124.6380	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	4	11	nd	6	6	2202	E	44.3487	-124.6265	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	5	12	nd	6	6	2232	S	44.3512	-124.5900	100	nd	Cowles	nd	
WE15800.03	SLOWDROP	5	12	nd	6	6	2313	E	44.3518	-124.5863	100	nd	Cowles	nd	
WE15900.01	HTI	5	13	nd	7	6	0810	S	43.2172	-124.4425	40	nd	Pierce	SFS	Start at 7E

Appendix I (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE15900.01	HTI	5	nd	nd	9	6	1433	E	42.0500	-125.2707	2800	nd	Pierce	nd	End at 11W
WE15900.02	SeaSoar	4	13	nd	7	6	0815	S	43.2170	-124.4448	40	nd	Cowles,Barth	SFS	Start at 7E
WE15900.02	SeaSoar	4	nd	nd	9	6	1426	E	42.0498	-125.2657	2800	nd	Cowles,Barth	nd	End at 11W
WE15900.01	Drifter 26911	1	nd	nd	7	6	1712	S	43.0832	-124.7128	nd	nd	Letelier	nd	Deployed along 7A
WE15900.01	Drifter 26911	1	nd	nd	12	6	2049	E	43.0065	-124.8682	nd	nd	nd	SFS	
WE15900.02	Drifter 26910	1	nd	nd	7	6	1713	S	43.0832	-124.7107	nd	nd	nd	nd	
WE15900.02	Drifter 26910	1	nd	nd	12	6	1857	E	43.0585	-124.9233	nd	nd	nd	nd	Recovered near line 8
WE15900.03	Drifter 27356	1	nd	nd	7	6	1714	S	43.0833	-124.7077	nd	nd	nd	nd	
WE15900.03	Drifter 27356	1	nd	nd	12	6	2013	E	43.0457	-124.9118	nd	nd	nd	nd	
WE15900.04	Drifter 27355	1	nd	nd	7	6	1716	S	43.0832	-124.7047	nd	nd	nd	nd	
WE15900.04	Drifter 27355	1	nd	nd	12	6	1846	E	43.0505	-124.9195	nd	nd	nd	nd	
WE16100.01	CTD	6	14	nd	9	6	1455	S	42.0510	-125.2498	2997	1000	Cowles,Barth	nd	Sta 11 8
WE16100.01	CTD	6	14	nd	9	6	1549	E	42.0515	-125.2505	2997	nd	nd	nd	
WE16100.02	CTD	7	15	nd	9	6	1716	S	42.0500	-125.0005	1190	1000	Cowles,Barth	nd	Sta 11 7
WE16100.02	CTD	7	15	nd	9	6	1800	E	42.0522	-125.0017	1190	nd	nd	nd	
WE16100.03	CTD	8	16	nd	9	6	1906	S	42.0342	-124.7997	679	669	Cowles,Barth	nd	Sta 11 6
WE16100.03	CTD	8	16	nd	9	6	1945	E	42.0495	-124.8007	679	nd	nd	nd	
WE16100.04	CTD	9	17	nd	9	6	2055	S	42.0500	-124.6010	285	275	Cowles,Barth	nd	Sta 11 5
WE16100.04	CTD	9	17	nd	9	6	2115	E	42.0467	-124.6050	285	nd	nd	nd	
WE16100.05	CTD	10	18	nd	9	6	2155	S	42.0498	-124.5010	115	105	Cowles,Barth	nd	Sta 11 4
WE16100.05	CTD	10	18	nd	9	6	2210	E	42.0467	-124.0043	115	nd	nd	nd	
WE16200.01	TSRB	2	19	nd	10	6	1045	S	43.9052	-124.6595	224	0	Letelier	nd	Optical work after northern drifter recovery
WE16200.01	TSRB	2	19	nd	10	6	1142	E	43.8993	-124.6653	224	nd	nd	nd	
WE16200.02	HTI	6	19	nd	10	6	1239	S	43.8938	-124.6638	223	nd	Pierce	nd	
WE16200.02	HTI	6	19	nd	10	6	1645	E	43.9145	-124.6333	nd	nd	nd	nd	
WE16200.03	SLOWDROP	6	19	nd	10	6	1300	S	43.8917	-124.6632	220	80	Cowles	nd	Optical work after northern drifter recovery
WE16200.03	SLOWDROP	6	19	nd	10	6	1538	E	43.9038	-124.6523	nd	nd	nd	nd	
WE16200.04	TSRB	3	19	nd	10	6	1555	S	43.9090	-124.6447	220	0	Letelier	nd	Optical work after northern drifter recovery
WE16200.04	TSRB	3	19	nd	10	6	1637	E	43.9142	-124.6338	nd	nd	nd	nd	
WE16200.05	CTD	11	20	FM-9	10	6	2230	S	43.2168	-125.1653	1651	1000	Cowles,Barth	FM-9	
WE16200.05	CTD	11	20	nd	10	6	2315	E	43.2157	-125.1623	1615	nd	nd	nd	
WE16300.01	CTD	12	21	FM-8	11	6	0006	S	43.2162	-124.9998	1093	1000	Cowles,Barth	FM-8	
WE16300.01	CTD	12	21	nd	11	6	0100	E	43.2145	-124.9967	nd	nd	nd	nd	
WE16300.02	CTD	13	22	FM-7	11	6	0157	S	43.2155	-124.8317	346	332	Cowles,Barth	FM-7	
WE16300.02	CTD	13	22	nd	11	6	0229	E	43.2150	-124.8340	346	nd	nd	nd	
WE16300.03	CTD	14	23	FM-6	11	6	0303	S	43.2165	-124.7497	315	303	Cowles,Barth	FM-6	
WE16300.03	CTD	14	23	nd	11	6	0332	E	43.2170	-124.7515	nd	nd	nd	nd	
WE16300.04	CTD	15	24	FM-5	11	6	0404	S	43.2167	-124.6673	156	151	Cowles,Barth	FM-5	
WE16300.04	CTD	15	24	nd	11	6	0425	E	43.2168	-124.6670	nd	nd	nd	nd	
WE16300.05	HTI	7	25	nd	11	6	0719	S	43.2172	-124.4413	nd	nd	Pierce	nd	
WE16300.05	HTI	7	nd	nd	12	6	1640	E	43.0822	-124.6330	nd	nd	nd	nd	
WE16300.06	SeaSoar	5	25	nd	11	6	0725	S	43.2172	-124.4378	nd	nd	Cowles,Barth	nd	
WE16300.06	SeaSoar	5	nd	nd	12	6	1632	E	43.0807	-124.6357	nd	nd	nd	nd	
WE16400.01	HTI	8	26	nd	12	6	2125	S	43.0132	-124.8547	166	nd	Pierce	nd	
WE16400.01	HTI	8	26	nd	12	6	2335	E	43.0180	-124.8375	nd	nd	nd	nd	

Appendix I (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
WE16400.02	SLOWDROP	7	26	nd	12	6	2157	S	43.0172	-124.8483	165	70	Cowles	nd	Optical profiling after drifter recovery
WE16400.02	SLOWDROP	7	26	nd	12	6	2316	E	43.0197	-124.8403	nd	nd	nd	nd	
WE16500.01	HTI	9	27	nd	13	6	0759	S	43.7482	-124.2182	38	nd	Cowles,Barth	nd	Short inshore tow along lines 5,6,7,8,9
WE16500.01	HTI	9	nd	nd	14	6	0749	E	42.6778	-124.4978	54	nd	nd	nd	
WE16500.02	SeaSoar	6	27	nd	13	6	0805	S	43.7478	-124.2177	38	nd	Cowles,Barth	nd	Short inshore tow along lines 5,6,7,8,9
WE16500.02	SeaSoar	6	nd	nd	14	6	0750	E	42.6745	-124.4970	54	nd	nd	nd	
WE16600.01	CTD	16	28	CR-2	14	6	1201	S	41.8993	-124.4002	69	63	Cowles,Barth	nd	
WE16600.01	CTD	16	28	nd	14	6	1215	E	41.8985	-124.4005	nd	nd	nd	nd	
WE16600.02	CTD	17	29	CR-3	14	6	1259	S	41.8997	-124.5002	139	131	Cowles,Barth	nd	
WE16600.02	CTD	17	29	nd	14	6	1319	E	41.8957	-124.5023	nd	nd	nd	nd	
WE16600.03	SeaSoar	7	30	12-M	14	6	1605	S	41.8928	-124.6873	650	v	Cowles,Barth	OMS	Deployed in marginal conditions; no HTI deployment
WE16600.03	SeaSoar	7	nd	nd	16	6	1748	E	44.5222	-124.8985	nd	nd	nd	nd	
WE16800.01	HTI	10	31	NH-25	16	6	1937	S	44.6508	-124.6497	296	nd	Pierce	NH	
WE16800.01	HTI	10	nd	nd	17	6	0120	E	44.6483	-124.1817	nd	nd	nd	nd	
WE16800.02	CTD	18	31	NH-25	16	6	1951	S	44.6510	-124.6502	297	289	Cowles,Barth	nd	
WE16800.02	CTD	18	31	NH-25	16	6	2020	E	44.6490	-124.6522	nd	nd	nd	nd	
WE16800.03	CTD	19	32	NH-20	16	6	2114	S	44.6502	-124.5288	144	136	Cowles,Barth	nd	
WE16800.03	CTD	19	32	NH-20	16	6	2130	E	44.6497	-124.5315	nd	nd	nd	nd	
WE16800.04	CTD	20	33	NH-15	16	6	2228	S	44.6515	-124.4123	92	86	Cowles,Barth	nd	
WE16800.04	CTD	20	33	NH-15	16	6	2242	E	44.6487	-124.4167	nd	nd	nd	nd	
WE16800.05	CTD	21	34	NH-10	16	6	2349	S	44.6508	-124.2980	83	79	Cowles,Barth	nd	
WE16800.05	CTD	21	34	NH-10	16	6	2354	E	44.6493	-124.3048	nd	nd	nd	nd	
WE16900.01	CTD	22	35	NH-5	17	6	0100	S	44.6508	-124.1777	62	56	Cowles,Barth	nd	
WE16900.01	CTD	22	35	NH-5	17	6	0105	E	44.6483	-124.1800	nd	nd	nd	nd	
WE15000.01	Arrive	nd	nd	nd	17	6	0900	E	44.6133	-124.0667	nd	nd	Cowles	nd	Arrive Newport