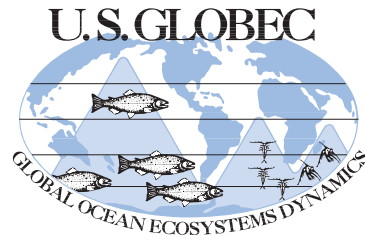


GLOBEC Northeast Pacific California Current

Cruise Report, F/V *Frosti* (FR0208)

1 – 18 August 2002



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Chief Scientists:

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Cruise Goals

To determine the meso-scale and fine-scale distribution of juvenile salmon along with their prey, predators and potential competitors in the California Current System (CCS) region from Crescent City, CA to Newport, OR relative to environmental conditions.

Summaries of each of the GLOBEC projects may be found at the web site: <http://globec.oce.orst.edu/groups/nep/projs.html>.

Table 1. GLOBEC Cruise Participants

Leg 1

Robert Emmett	Northwest Fisheries Science Center, Newport
Suzan Pool	Cooperative Institute for Marine Resource Studies, Newport
Todd Miller	Cooperative Institute for Marine Resource Studies, Newport
Todd Sandell	Cooperative Institute for Marine Resource Studies, Newport
Jaelyn Richards	Oregon State University, Newport

Leg 2

Richard Brodeur	Northwest Fisheries Science Center, Newport
Suzan Pool	Cooperative Institute for Marine Resource Studies, Newport
Todd Miller	Cooperative Institute for Marine Resource Studies, Newport
Doug Reese	Cooperative Institute for Marine Resource Studies, Newport
Tammy Wenham	University of Oregon, Eugene

GLOBEC Principal Investigators: Richard Brodeur, Robert Emmett, William Percy, and Edmundo Casillas.

Table 2. Cruise Statistics

Surface trawls deployed	99
Midwater trawls deployed	2
CTD's deployed	101
Chlorophyll samples	101
Neuston tows	103
Tucker trawls	5
Stable Isotope samples	155
Stomach/Parasite collections	2,422

Methods

Surveys were conducted aboard a chartered fishing vessel (F/V *Frosti*) in late summer from August 1 to 18, 2002. The ship departed from Newport and returned to Newport, with an overnight port stop on August 8-9 to repair the ship's compass. A preliminary survey consisted of a mesoscale grid along 6 lines (off Newport, Heceta Head, Umpqua River, Five Mile River, Rogue River and Crescent City, CA.) which were designated GLOBEC transects that have been monitored for the previous several years. This was followed by fine-scale process stations at locations of interest based on features observed in the physical environment (fronts or eddies) or acoustic sampling conducted by two accompanying oceanographic vessels (R/V *Revelle* and R/V *New Horizon*). The stations occupied during each survey are shown in Figures 1 and 2.

For the mesoscale survey, stations were established at regular intervals extending from 3 to at least 30 miles from shore on each of the six transects. At each station, a Nordic 264 rope trawl built by Nor'Eastern Trawl Systems, Inc. was towed in surface waters (Table 9). This rope trawl has a maximum mouth opening of approximately 30 m x 18 m. Mesh sizes ranged from 162.6 cm in the throat of the trawl near the jib lines to 8.9 cm in the codend. To maintain catches of small fish and squid, a 6.1 m long, 0.8 cm knotless liner was sewn into the codend. Except for a few tows which quickly filled with jellyfish, all tows were 30 min in duration. For two fine-scale tows, the floats were removed and the net was fished in midwater. The position of the headrope was monitored acoustically using a Scanmar net sonar system. All fish and squid caught were counted and measured at sea. All juvenile salmon caught were immediately frozen for later analysis of growth, condition, pathology, genetic analysis, and food habits. We also enumerated and measured the large invertebrates (e.g., jellyfish) collected in the trawl.

The physical and biological environment was monitored and sampled at each station immediately prior to setting or after retrieving the trawl. A CTD cast was made with a Sea-Bird SBE 19 Seacat profiler to 100 m or within 10 m of the bottom (Table 5). Secchi depths were measured at each station (Table 8). Chlorophyll samples were collected from 3 m depth using a 2-l Niskin water sampler (Table 7). A neuston tow with a 1-m² mouth containing 0.335 mm mesh net was towed for 5 min out of the wake of the vessel at each station (Table 6). General Oceanics flow meters were placed inside the net to measure the amount of water filtered. Flow-through conductivity and temperature data were also collected throughout the cruise and 38 kHz acoustic echograms were logged during the fish tows using the Simrad ES-60 system aboard the ship.

Cruise Summary (Narrative)

August 1. Leg 1 loaded in and departed from Newport, OR on 1 August at 1100 to sample the NH line. The first few hauls contained a variety of species including salmon at NH-5 and NH-10. Offshore, where the water was warmer, mainly jack mackerel and blue sharks were caught.

August 2. We obtained a substantial catch of juvenile salmon at the nearshore station, HH-2, but at offshore stations we resumed catching blue sharks, jack mackerel and sardines.

August 3. The *Frosti* fished the Umpqua River line and juvenile salmon were caught at almost every station except UR-1 and UR-7. The inshore station (UR-1) had lots of jellies. Since the weather was calm and forecasted to continue to be calm, it was decided that the *Frosti* would skip a transect and head down the next day to the Rogue River line and then on to the Crescent City line. This way, both lines could be sampled before rough seas hindered the sampling efforts down south. On the Rogue River line, only 2 steelhead were caught at RR-2 and mostly jellyfish were caught at every station. The jellyfish were also plentiful off the Crescent City line. The tow at CR-1 had to be shortened to 15 minutes because a large catch (approximately 10,000 lbs.) of *Aurelia* sunk the codend.

August 6. The ship headed north again to complete the last Mesoscale transect (FM Line). Some juvenile salmon were caught on this line, but again, jellyfish were dominant. It was decided that the diel sampling would take place at HH-2 where a good catch of salmon occurred during the mesoscale study. The Tucker trawl was deployed successfully at this station until the net ripped on the fifth attempt (Table 10). Diel sampling occurred every four hours for 24 hours. A total of seven tows were deployed, each of which contained salmon. Altogether, 1 steelhead, 24 chinook, and 6 coho were sampled. During the day, sardines, blue sharks, herring, anchovy, jack mackerel, squids, and some jellyfish were caught. Many sardines in the second day tow were fat and their gonads were well developed. At night, the tows retrieved Pacific hake, Pacific sanddabs, jack mackerel, eulachon, spiny dogfish, and American shad. Some market squid and a neon flying squid were also in the night tows. Upon completion of the diel study, we

headed into Newport.

August 9. For leg 2, Brodeur replaced Emmett as Chief Scientist and Reese and Wenham replaced Sandell and Richards. The cruise resumed around 1100. We sampled on the 2A line by early afternoon and completed 4 stations in thick fog. We caught a few juvenile and adult salmon, some jack mackerel and other fishes, quite a few squid, and many jellyfish, especially at the inshore station, where we had to cut the tow short because of all the jellies.

August 10. The fog had lifted but the seas were a bit rougher. We completed 5 stations on the Bob line and HH-2 where the diel survey was conducted. We caught adult salmon at every station but juveniles only at Bob-2. We had one big catch of sardines as well. Water was very dark compared to previous observations.

August 11. We moved down to line 4A and occupied the offshore stations during the morning. We caught a few juvenile and adult salmon, some jack mackerel and sardines. On this line the water was very dark (Secchi depths < 3m) and full of plankton. The *Frosti* was asked to join the *Revelle* and *New Horizon* back on the HH line at a region of high bird and mammal activity to do some joint sampling. We arrived first and sighted a lot of humpback whales and albatrosses oriented along a front. There was a very thick heavy layer at 80-100 m in acoustics and our surface tow did not catch much. Next we deployed the net in midwater (headrope at 60 m) and caught some hake and jack mackerel but probably missed the layer. The *New Horizon* towed the MOCNESS parallel to us while the *Revelle* steamed between us using the acoustics and SeaSoar. We repeated midwater sampling after dark with the headrope at 80 m and caught a substantial amount of hake, dogfish, and some rockfish. We finished this station around midnight with a surface tow that caught more hake, jack mackerel and a few salmon.

August 12. On Line 6, we entered much clearer water but did not catch many juvenile salmon. Instead, we caught mostly squid and jellyfish. Similar results were seen on Line 7A. Based on a tip from the *Revelle*, we headed down to Coquille Bank where a lot of bird and mammal activity was seen during the mesoscale survey. Although we did not see much of this activity, we did catch adult salmon in all three sets and even caught 22 in one haul. Lots of euphausiids were also caught in the trawls.

We decided to take advantage of the break in the weather and head to the southern part of the Southern Fine-scale grid. We occupied Line 11 which was enveloped in thick fog. We had to cancel the first two stations on this line because of all the large medusae we could see in the water. We were able to count close to 100 at a time standing at the ship's rail and figured that we would certainly fill the net up in short order at these stations. We caught only 1 juvenile coho, 1 blue shark, jellyfish and fish larvae at the four stations on this line. The seas were picking up as we headed north and we had to scrap the offshore stations on line 10A. We caught 1 juvenile salmon and lots of herring and squid at the inshore station on line 10A.

August 15. Heading north, we spent the whole day on Lines 9 and 8 but did not catch any salmon. The catches were almost entirely jellyfish and we got clear water right into our nearshore stations.

August 16. We got salmon again as we got into the productive water on Heceta Bank (Line 4). As we got off the bank offshore, we caught blue sharks and adult salmon and saw some whales. We finished up on Line 3A that evening and got a big haul of jellies, sanddabs, and herring inshore after dark.

August 17. Our last day of fishing was among our most successful as we caught salmon at almost every station. At a station where we did not catch salmon, we observed a salmon swimming in the net with an underwater camera so it must have escaped during the tow or recovery. We finished up operations around 1900.

August 18. We returned to Newport early in the morning.

A preliminary summary of the total catch of fish and invertebrates is given in Tables 3 and 4. The catches of juvenile coho, chinook and chum salmon were all lower than in June, although many large adults were collected during this cruise. The dominant non-salmonids caught were herring, sardines, hake, jack mackerel and market squid. Gelatinous zooplankton were much more common than in any previous GLOBEC cruises and represented the highest biomass collected during this cruise.

The event log (Appendix I) contains a summary of the times and locations for all sampling activities; separate specific tables are also provided for each instrument.

Table 3. Frequency of Occurrence (F.O.) in 104 Trawls and Total Number of Vertebrate Catch from GLOBEC Cruise in August 2002

(Note: Preliminary data subject to revision).

Family	Common name	Scientific name	F.O.	Number
Agnatha				
Petromyzontidae	Pacific lamprey	<i>Lampetra tridentata</i>	2	2
Chondrichthyes				
Carcharhinidae	Blue shark	<i>Prionace glauca</i>	17	27
Squalidae	Spiny dogfish	<i>Squalus acanthias</i>	4	10
Rajidae	Big skate	<i>Raja binoculata</i>	1	1
Osteichthyes				
Congridae	Eel	<i>leptocephalus</i>	1	1
Clupeidae	Pacific herring	<i>Clupea pallasii</i>	26	3,132
	Pacific sardine	<i>Sardinops sagax</i>	18	5,534
	American shad	<i>Alosa sapidissima</i>	3	4
Engraulidae	Northern anchovy	<i>Engraulis mordax</i>	14	75
Salmonidae	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	46	197
	Coho salmon	<i>Oncorhynchus kisutch</i>	29	56
	Chum salmon	<i>Oncorhynchus keta</i>	1	1
	Pink salmon	<i>Oncorhynchus gorbuscha</i>	1	1
	Sockeye salmon	<i>Oncorhynchus nerka</i>	1	1
	Steelhead trout	<i>Oncorhynchus mykiss</i>	9	10
	Cutthroat trout	<i>Oncorhynchus clarki</i>	4	4
Myctophidae	Northern lampfish	<i>Stenobrachius leucopsarus</i>	1	1
Osmeridae	Surf smelt	<i>Hypomesus pretiosus</i>	4	245
	Whitebait smelt	<i>Allosmerus elongatus</i>	4	140
	Eulachon	<i>Thaleichthys pacificus</i>	2	12
Gadidae	Pacific tomcod (juv.)	<i>Microgadus proximus</i>	17	27
	Pacific hake	<i>Merluccius productus</i>	10	1,331
Trachipteridae	King-of-the-salmon (juv.)	<i>Trachipterus altivelis</i>	4	5
Scomberesocidae	Pacific saury	<i>Cololabis saira</i>	7	565
Scorpaenidae	Rockfishes (juv.)	<i>Sebastes</i> spp.	5	21
	Yellowtail rockfish	<i>Sebastes flavidus</i>	1	3
Hexagrammidae	Kelp greenling	<i>Hexagrammus decagrammus</i>	1	1
Anoplopomatidae	Sablefish (juv.)	<i>Anoplopoma fimbria</i>	6	17
Agonidae	Northern spearnose poacher	<i>Agonopsis vulsa</i>	3	3
Carangidae	Jack mackerel	<i>Trachurus symmetricus</i>	26	227
Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>	1	1
Scombridae	Chub mackerel	<i>Scomber japonicus</i>	1	1
Anarrhichadidae	Wolf eel (juv.)	<i>Anarrhichthys felis</i>	15	17
Icosteidae	Ragfish	<i>Icosteus aenigmaticus</i>	2	2
Centrolophidae	Medusafish	<i>Icichthys lockingtoni</i>	15	37
Bothidae	Pacific sanddab	<i>Citharichthys sordidus</i>	5	67
	Speckled sanddab (juv.)	<i>Citharichthys stigmaeus</i>	2	2
Pleuronectidae	Butter sole (juv)	<i>Pleuronectes isolepis</i>	2	2
	Dover sole	<i>Microstomus pacificus</i>	3	3
	Starry flounder	<i>Platichthys stellatus</i>	2	4
	Rex sole (juv.)	<i>Errex zachirus</i>	27	170

Table 4. Frequency of Occurrence (F.O.) in 104 Trawls and Total Number of Invertebrate Catch from GLOBEC Cruise in August 2002

Family	Common name	Scientific name	F.O.	Number
Phylum Mollusca				
Cephalopoda	Market squid	<i>Loligo opalescens</i>	58	5,595
	Neon flying squid	<i>Ommastrephes bartrami</i>	1	1
Phylum Cnidaria				
Aequoreidae		<i>Aequorea</i> spp.	59	2,366
Cyaneidae	Lion's mane	<i>Cyanea capillata</i>	2	3
Pelagiidae	Sea nettle	<i>Chrysaora fuscescens</i>	58	10,985
Ulmaridae	Moon jelly	<i>Aurelia aurita</i>	49	3,128
	Fried egg jelly	<i>Phacellophora camtschatica</i>	41	1,455
Phylum Ctenophora				
Beroidae		<i>Beroe</i> spp.	16	x
Phylum Mollusca				
Heteropoda		<i>Carinaria japonica</i>	4	8

Figure 1. Location of Trawl Stations Occupied During the Mesoscale Survey in August 2002

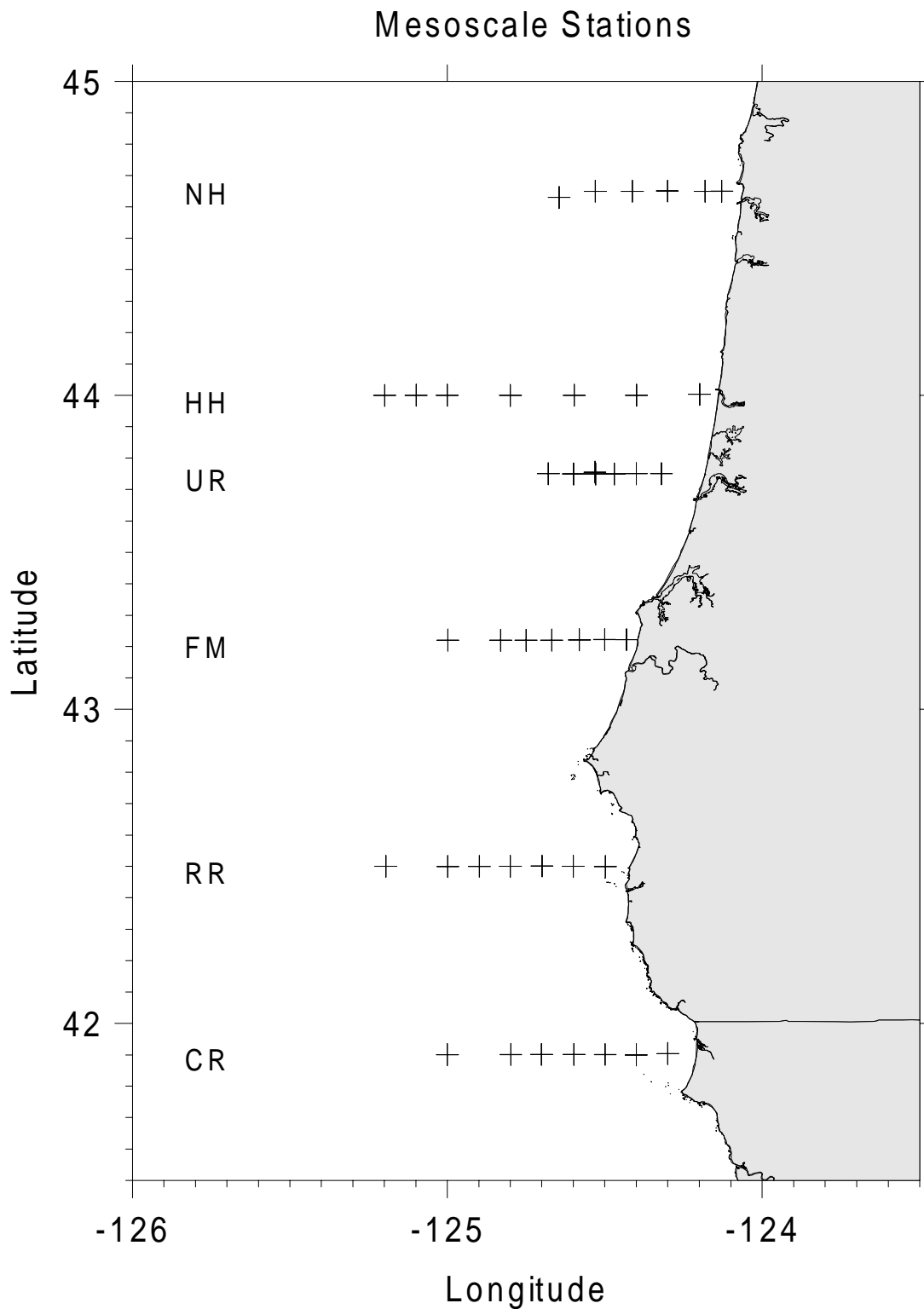


Figure 2. Location of Trawl Stations Occupied During the Fine-scale Survey in August 2002
 (The names on the left side of the map are the transect lines referred to in the map)

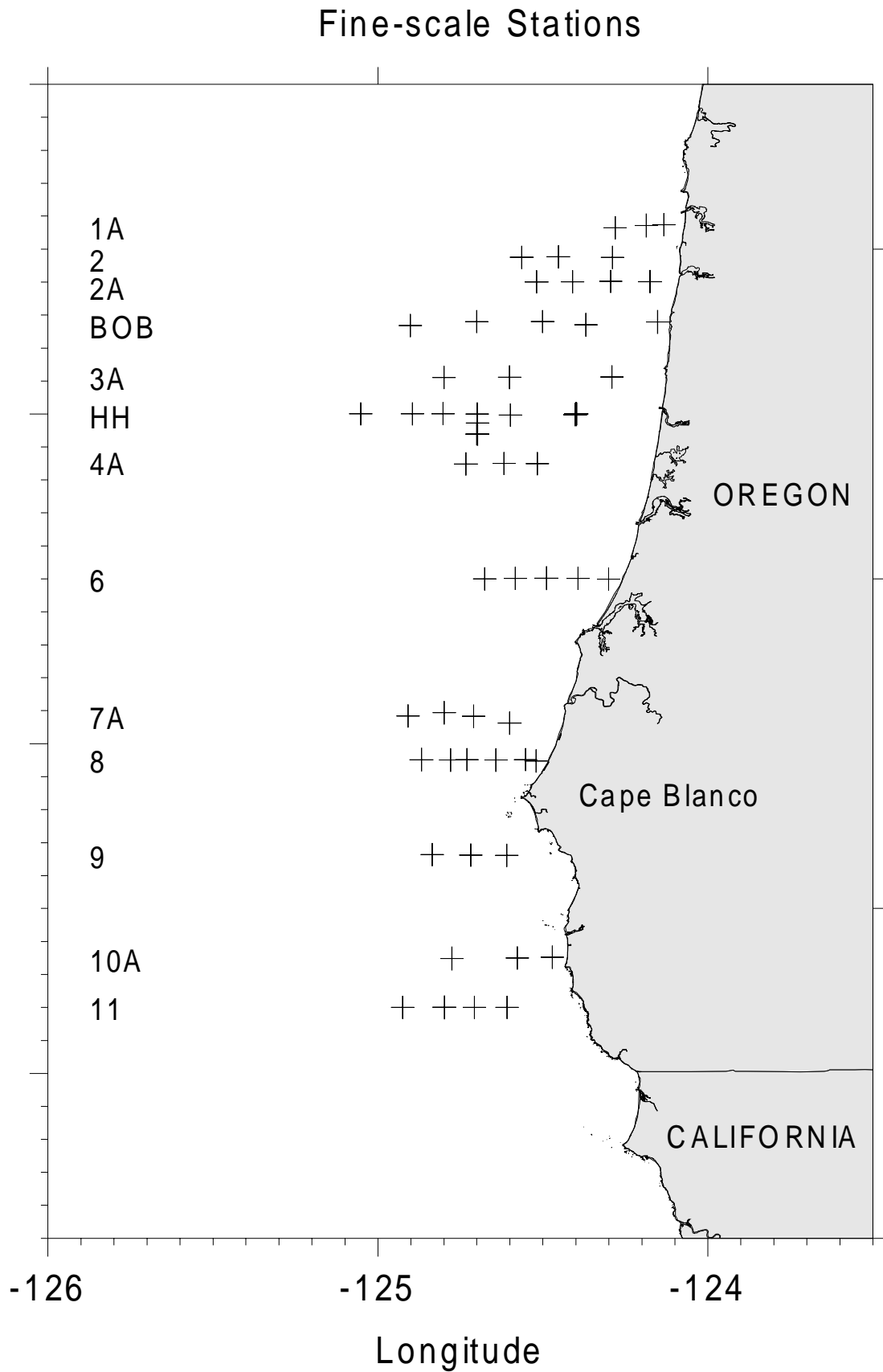


Table 5: CTD Casts

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.01	CTD	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	40	meso	
FR21302.05	CTD	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	50	meso	
FR21302.10	CTD	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	75	meso	
FR21302.15	CTD	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	80	meso	
FR21302.20	CTD	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	100	meso	
FR21302.26	CTD	6	6	NH-25	1	8	2129	S	44.6303	-124.6452	274	100	meso	
FR21402.01	CTD	7	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	45	meso	
FR21402.06	CTD	8	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	100	meso	
FR21402.11	CTD	9	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	100	meso	
FR21402.16	CTD	10	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	100	meso	
FR21402.21	CTD	11	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	100	meso	
FR21402.26	CTD	12	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	100	meso	
FR21402.31	CTD	13	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	100	meso	
FR21502.01	CTD	14	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	45	meso	
FR21502.06	CTD	15	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	95	meso	
FR21502.11	CTD	16	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	100	meso	
FR21502.16	CTD	17	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	100	meso	
FR21502.21	CTD	18	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	100	meso	
FR21502.26	CTD	19	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	100	meso	
FR21502.31	CTD	20	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	100	meso	
FR21602.01	CTD	21	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	30	meso	
FR21602.06	CTD	22	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	80	meso	
FR21602.11	CTD	23	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	100	meso	
FR21602.16	CTD	24	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	100	meso	
FR21602.21	CTD	25	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	100	meso	
FR21602.26	CTD	26	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	100	meso	
FR21602.31	CTD	27	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	100	meso	
FR21702.01	CTD	28	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	30	meso	
FR21702.06	CTD	29	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	60	meso	
FR21702.11	CTD	30	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	100	meso	
FR21702.16	CTD	31	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	100	meso	
FR21702.21	CTD	32	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	100	meso	
FR21702.26	CTD	33	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	100	meso	
FR21702.31	CTD	34	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	100	meso	
FR21802.01	CTD	35	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	25	meso	
FR21802.06	CTD	36	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	50	meso	
FR21802.11	CTD	37	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	80	meso	
FR21802.16	CTD	38	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	100	meso	
FR21802.21	CTD	39	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	100	meso	
FR21802.26	CTD	40	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	100	meso	
FR21802.31	CTD	41	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	100	meso	
FR21902.02	CTD	42	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	100	NFS	
FR21902.07	CTD	43	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	100	NFS	
FR21902.13	CTD	44	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	100	NFS	
FR21902.19	CTD	45	45	HH-2D	7	8	2132	S	43.9995	-124.4007	118	100	NFS	
FR22002.01	CTD	46	46	HH-2E	8	8	0127	S	44.0020	-124.4000	117	100	NFS	
FR22002.06	CTD	47	47	HH-2F	8	8	0522	S	43.9993	-124.3990	115	100	NFS	
FR22002.10	CTD	48	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	100	NFS	

Table 5: CTD Casts (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22102.01	CTD	49	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	75	NFS	
FR22102.06	CTD	50	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	85	NFS	
FR22102.11	CTD	51	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	60	NFS	
FR22102.16	CTD	52	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	45	NFS	
FR22202.01	CTD	53	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	100	NFS	
FR22202.06	CTD	54	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	65	NFS	
FR22202.11	CTD	55	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	95	NFS	
FR22202.16	CTD	56	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	80	NFS	
FR22202.21	CTD	57	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	35	NFS	
FR22202.27	CTD	58	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	100	NFS	
FR22302.01	CTD	59	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	100	NFS	
FR22302.06	CTD	60	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	100	NFS	
FR22302.11	CTD	61	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	100	NFS	
FR22302.16	CTD	62	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	100	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.25	CTD	63	65	HH-3.5C	11	8	2333	S	43.9392	-124.6978	162	100	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.01	CTD	64	66	6-5	12	8	0857	S	43.5000	-124.6767	392	100	NFS	
FR22402.06	CTD	65	67	6-4	12	8	1107	S	43.5012	-124.5837	184	100	NFS	
FR22402.11	CTD	66	68	6-3	12	8	1302	S	43.5017	-124.4893	124	100	NFS	
FR22402.16	CTD	67	69	6-2	12	8	1457	S	43.5012	-124.3938	104	100	NFS	
FR22402.21	CTD	68	70	6-1	12	8	1649	S	43.4993	-124.3012	56	50	NFS	
FR22402.28	CTD	69	71	7A-2	12	8	2144	S	43.0627	-124.6010	112	100	NFS	
FR22502.01	CTD	70	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	100	NFS	
FR22502.07	CTD	71	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	100	NFS	
FR22502.11	CTD	72	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	100	NFS	
FR22502.16	CTD	73	75	8-7	13	8	1308	S	42.9505	-124.7797	156	100	NFS	
FR22502.21	CTD	74	76	8-6	13	8	1444	S	42.9520	-124.7305	144	100	NFS	
FR22502.26	CTD	75	77	8-9	13	8	1707	S	42.9515	-124.8680	171	100	NFS	
FR22602.01	CTD	76	78	11-3	14	8	0722	S	42.2000	-124.6087	268	100	SFS	
FR22602.06	CTD	77	79	11-4	14	8	0908	S	42.2000	-124.7082	549	100	SFS	
FR22602.12	CTD	78	80	11-5	14	8	1113	S	42.2003	-124.7987	655	100	SFS	
FR22602.17	CTD	79	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	100	SFS	
FR22602.22	CTD	80	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	100	SFS	
FR22602.25	CTD	81	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	100	SFS	No trawl or neuston. Too rough; heading inshore.
FR22602.29	CTD	82	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	35	SFS	
FR22702.01	CTD	83	85	9-4	15	8	0702	S	42.6635	-124.8353	691	100	SFS	
FR22702.06	CTD	84	86	9-3	15	8	0859	S	42.6622	-124.7185	240	100	SFS	
FR22702.11	CTD	85	87	9-2	15	8	1052	S	42.6612	-124.6093	110	100	SFS	
FR22702.16	CTD	86	88	8-1	15	8	1640	S	42.9478	-124.5202	36	30	NFS	
FR22702.21	CTD	87	89	8-2	15	8	1807	S	42.9518	-124.5528	60	55	NFS	
FR22702.26	CTD	88	90	8-4	15	8	1953	S	42.9502	-124.6425	96	90	NFS	
FR22802.01	CTD	89	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	100	NFS	
FR22802.06	CTD	90	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	100	NFS	
FR22802.11	CTD	91	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	70	NFS	Station is between HH-4 and HH-5.
FR22802.16	CTD	92	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	100	NFS	Station is between HH-5 and HH-6.
FR22802.21	CTD	93	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	95	NFS	
FR22802.26	CTD	94	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	100	NFS	

Table 5: CTD Casts (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22802.31	CTD	95	97	3A-2	16	8	2050	S	44.1125	-124.2907	77	75	NFS	
FR22902.01	CTD	96	98	2-4	17	8	0659	S	44.4753	-124.5645	117	100	NFS	
FR22902.06	CTD	97	99	2-2	17	8	0848	S	44.4767	-124.4533	73	70	NFS	
FR22902.11	CTD	98	100	2-1	17	8	1046	S	44.4748	-124.2892	75	70	NFS	
FR22902.16	CTD	99	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	35	NFS	
FR22902.21	CTD	100	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	50	NFS	
FR22902.26	CTD	101	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	70	NFS	

Table 6: Neuston Tows

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.04	Neuston	1	1	NH-3	1	8	1238	S	44.6523	-124.1330	43	0	meso	
FR21302.08	Neuston	2	2	NH-5	1	8	1313	S	44.6472	-124.1827	57	0	meso	
FR21302.13	Neuston	3	3	NH-10	1	8	1520	S	44.6488	-124.2982	79	0	meso	
FR21302.18	Neuston	4	4	NH-15	1	8	1702	S	44.6462	-124.4125	83	0	meso	
FR21302.23	Neuston	5	5	NH-20	1	8	1855	S	44.6477	-124.5287	141	0	meso	
FR21302.28	Neuston	6	6	NH-25	1	8	2137	S	44.6295	-124.6435	273	0	meso	Sample lost when bottom of cod end fell out. No redo because of darkness.
FR21402.04	Neuston	7	7	HH-1	2	8	0633	S	44.0033	-124.1983	48	0	meso	
FR21402.09	Neuston	8	8	HH-2	2	8	0856	S	44.0005	-124.3982	117	0	meso	
FR21402.14	Neuston	9	9	HH-3	2	8	1115	S	43.9993	-124.5952	150	0	meso	
FR21402.19	Neuston	10	10	HH-4	2	8	1353	S	43.9978	-124.7965	111	0	meso	
FR21402.24	Neuston	11	11	HH-5	2	8	1616	S	43.9992	-124.9990	930	0	meso	
FR21402.29	Neuston	12	12	HH-6	2	8	1808	S	44.0005	-125.0977	1430	0	meso	
FR21402.34	Neuston	13	13	HH-7	2	8	1958	S	43.9987	-125.1983	1711	0	meso	
FR21502.04	Neuston	14	14	UR-1	3	8	0634	S	43.7532	-124.2290	47	0	meso	
FR21502.09	Neuston	15	15	UR-2	3	8	0812	S	43.7498	-124.3190	101	0	meso	
FR21502.14	Neuston	16	16	UR-3	3	8	1006	S	43.7490	-124.3985	112	0	meso	
FR21502.19	Neuston	17	17	UR-4	3	8	1152	S	43.7480	-124.4697	125	0	meso	
FR21502.24	Neuston	18	18	UR-5	3	8	1339	S	43.7530	-124.5297	165	0	meso	
FR21502.29	Neuston	19	19	UR-6	3	8	1517	S	43.7498	-124.6002	255	0	meso	
FR21502.34	Neuston	20	20	UR-7	3	8	1658	S	43.7502	-124.6777	422	0	meso	
FR21602.04	Neuston	21	21	RR-1	4	8	0632	S	42.5000	-124.4963	31	0	meso	
FR21602.09	Neuston	22	22	RR-2	4	8	0816	S	42.5012	-124.5990	83	0	meso	
FR21602.14	Neuston	23	23	RR-3	4	8	1015	S	42.5018	-124.6972	128	0	meso	
FR21602.19	Neuston	24	24	RR-4	4	8	1211	S	42.4993	-124.7978	577	0	meso	
FR21602.24	Neuston	25	25	RR-5	4	8	1401	S	42.5012	-124.8973	1171	0	meso	
FR21602.29	Neuston	26	26	RR-6	4	8	1547	S	42.4978	-124.9975	1795	0	meso	
FR21602.34	Neuston	27	27	RR-7	4	8	1810	S	42.5022	-125.1915	2955	0	meso	
FR21702.04	Neuston	28	28	CR-1	5	8	0641	S	41.9042	-124.2977	35	0	meso	
FR21702.09	Neuston	29	29	CR-2	5	8	0824	S	41.9008	-124.3980	63	0	meso	
FR21702.14	Neuston	30	30	CR-3	5	8	1022	S	41.9027	-124.4957	127	0	meso	
FR21702.19	Neuston	31	31	CR-4	5	8	1213	S	41.9030	-124.5940	481	0	meso	
FR21702.24	Neuston	32	32	CR-5	5	8	1357	S	41.9020	-124.6992	658	0	meso	
FR21702.29	Neuston	33	33	CR-6	5	8	1548	S	41.9023	-124.7955	700	0	meso	
FR21702.34	Neuston	34	34	CR-7	5	8	1807	S	41.9012	-124.9997	839	0	meso	Cod end broke, needed to redo.
FR21702.35	Neuston	35	34	CR-7	5	8	1830	S	41.9173	-125.0003	856	0	meso	Had to redo, cod end broke.
FR21802.04	Neuston	36	35	FM-1	6	8	0635	S	43.2218	-124.4315	29	0	meso	
FR21802.09	Neuston	37	36	FM-3	6	8	0806	S	43.2173	-124.5005	53	0	meso	
FR21802.14	Neuston	38	37	FM-4	6	8	0946	S	43.2222	-124.5787	83	0	meso	
FR21802.19	Neuston	39	38	FM-5	6	8	1134	S	43.2218	-124.6675	154	0	meso	
FR21802.24	Neuston	40	39	FM-6	6	8	1318	S	43.2193	-124.7498	309	0	meso	
FR21802.29	Neuston	41	40	FM-7	6	8	1516	S	43.2190	-124.8292	348	0	meso	
FR21802.34	Neuston	42	41	FM-8	6	8	1730	S	43.2195	-124.9968	1088	0	meso	
FR21902.05	Neuston	43	42	HH-2A	7	8	0825	S	43.9997	-124.3967	115	0	NFS	
FR21902.10	Neuston	44	43	HH-2B	7	8	1237	S	43.9980	-124.4005	117	0	NFS	
FR21902.16	Neuston	45	44	HH-2C	7	8	1637	S	43.9980	-124.3968	116	0	NFS	
FR21902.21	Neuston	46	45	HH-2D	7	8	2142	S	43.9978	-124.3993	118	0	NFS	
FR22002.03	Neuston	47	46	HH-2E	8	8	0138	S	43.9998	-124.3988	117	0	NFS	

Table 6: Neuston Tows (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22002.08	Neuston	48	47	HH-2F	8	8	0532	S	43.9978	-124.3978	114	0	NFS	
FR22002.13	Neuston	49	48	HH-2G	8	8	0936	S	44.0000	-124.3965	116	0	NFS	
FR22102.04	Neuston	50	49	2A-3	9	8	1352	S	44.3998	-124.4095	77	0	NFS	
FR22102.09	Neuston	51	50	2A-4	9	8	1536	S	44.4002	-124.5185	90	0	NFS	
FR22102.14	Neuston	52	51	2A-2	9	8	1759	S	44.4017	-124.2938	65	0	NFS	
FR22102.19	Neuston	53	52	2A-1	9	8	1958	S	44.4023	-124.1743	45	0	NFS	
FR22202.04	Neuston	54	53	BOB-5	10	8	0710	S	44.2677	-124.9017	186	0	NFS	
FR22202.09	Neuston	55	54	BOB-4	10	8	0944	S	44.2802	-124.7005	70	0	NFS	
FR22202.14	Neuston	56	55	BOB-3	10	8	1205	S	44.2802	-124.4998	97	0	NFS	
FR22202.19	Neuston	57	56	BOB-2	10	8	1407	S	44.2700	-124.3677	83	0	NFS	
FR22202.24	Neuston	58	57	BOB-1	10	8	1622	S	44.2772	-124.1513	39	0	NFS	Tow was redone as it was forgotten to record the ending revolution number.
FR22202.25	Neuston	59	57	BOB-1	10	8	1648	S	44.2602	-124.1538	40	0	NFS	A redo of the previous tow.
FR22202.30	Neuston	60	58	HH-2H	10	8	1958	S	43.9955	-124.4023	116	0	NFS	
FR22302.04	Neuston	61	59	4A-6	11	8	0708	S	43.8463	-124.7323	338	0	NFS	
FR22302.09	Neuston	62	60	4A-5	11	8	0926	S	43.8487	-124.6150	266	0	NFS	
FR22302.14	Neuston	63	61	4A-4	11	8	1112	S	43.8475	-124.5135	141	0	NFS	
FR22302.19	Neuston	64	62	HH-3.5	11	8	1412	S	43.9983	-124.6973	108	0	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.24	Neuston	65	65	HH-3.5C	11	8	2321	S	43.9343	-124.6960	170	0	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.04	Neuston	66	66	6-5	12	8	0906	S	43.4978	-124.6778	395	0	NFS	
FR22402.09	Neuston	67	67	6-4	12	8	1118	S	43.4985	-124.5828	182	0	NFS	
FR22402.14	Neuston	68	68	6-3	12	8	1311	S	43.4998	-124.4887	124	0	NFS	
FR22402.19	Neuston	69	69	6-2	12	8	1506	S	43.5000	-124.3927	104	0	NFS	
FR22402.24	Neuston	70	70	6-1	12	8	1655	S	43.4987	-124.3008	56	0	NFS	
FR22402.27	Neuston	71	71	7A-2	12	8	2132	S	43.0565	-124.6020	112	0	NFS	
FR22502.04	Neuston	72	72	7A-3	13	8	0706	S	43.0820	-124.7102	175	0	NFS	
FR22502.10	Neuston	73	73	7A-4	13	8	1008	S	43.0932	-124.7990	125	0	NFS	
FR22502.14	Neuston	74	74	7A-5	13	8	1059	S	43.0848	-124.9082	522	0	NFS	
FR22502.19	Neuston	75	75	8-7	13	8	1317	S	42.9518	-124.7780	155	0	NFS	
FR22502.24	Neuston	76	76	8-6	13	8	1454	S	42.9508	-124.7282	143	0	NFS	
FR22502.29	Neuston	77	77	8-9	13	8	1716	S	42.9528	-124.8653	158	0	NFS	
FR22602.04	Neuston	78	78	11-3	14	8	0730	S	42.2002	-124.6083	266	0	SFS	
FR22602.09	Neuston	79	79	11-4	14	8	0919	S	42.2000	-124.7065	547	0	SFS	Cod end broke.
FR22602.11	Neuston	80	79	11-4	14	8	1036	S	42.1767	-124.7090	562	0	SFS	A redo of previous tow.
FR22602.15	Neuston	81	80	11-5	14	8	1122	S	42.2002	-124.7973	652	0	SFS	
FR22602.20	Neuston	82	81	11-6	14	8	1319	S	42.2002	-124.9260	1030	0	SFS	
FR22602.32	Neuston	83	84	10A-1	14	8	1936	S	42.3543	-124.4693	39	0	SFS	Sample spilled.
FR22602.34	Neuston	84	84	10A-1	14	8	2051	S	42.3767	-124.5182	75	0	SFS	Redo. Contents from 2nd tow lost when leaked through bottom of cod end. No third try.
FR22702.04	Neuston	85	85	9-4	15	8	0711	S	42.6612	-124.8328	700	0	SFS	
FR22702.09	Neuston	86	86	9-3	15	8	0909	S	42.6610	-124.7172	239	0	SFS	
FR22702.14	Neuston	87	87	9-2	15	8	1101	S	42.6597	-124.6078	109	0	SFS	
FR22702.19	Neuston	88	88	8-1	15	8	1646	S	42.9467	-124.5193	36	0	NFS	
FR22702.24	Neuston	89	89	8-2	15	8	1815	S	42.9507	-124.5527	58	0	NFS	
FR22702.29	Neuston	90	90	8-4	15	8	2001	S	42.9502	-124.6415	97	0	NFS	
FR22802.04	Neuston	91	91	HH-3A	16	8	0712	S	43.9942	-124.5958	153	0	NFS	

Table 6: Neuston Tows (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22802.09	Neuston	92	92	HH-4A	16	8	0920	S	44.0012	-124.8002	106	0	NFS	
FR22802.14	Neuston	93	93	HH-4.5	16	8	1101	S	44.0005	-124.8950	81	0	NFS	Station is between HH-4 and HH-5.
FR22802.19	Neuston	94	94	HH-5.5	16	8	1313	S	43.9997	-125.0510	1337	0	NFS	Station is between HH-5 and HH-6.
FR22802.24	Neuston	95	95	3A-5	16	8	1607	S	44.1108	-124.8017	99	0	NFS	
FR22802.29	Neuston	96	96	3A-4	16	8	1818	S	44.1097	-124.5998	119	0	NFS	
FR22802.34	Neuston	97	97	3A-2	16	8	2057	S	44.1127	-124.2893	77	0	NFS	
FR22902.04	Neuston	98	98	2-4	17	8	0708	S	44.4750	-124.5635	118	0	NFS	
FR22902.09	Neuston	99	99	2-2	17	8	0855	S	44.4762	-124.4518	72	0	NFS	
FR22902.14	Neuston	100	100	2-1	17	8	1053	S	44.4747	-124.2877	74	0	NFS	
FR22902.19	Neuston	101	101	1A-1	17	8	1321	S	44.5747	-124.1323	40	0	NFS	
FR22902.24	Neuston	102	102	1A-2	17	8	1455	S	44.5722	-124.1868	51	0	NFS	
FR22902.29	Neuston	103	103	1A-3	17	8	1635	S	44.5647	-124.2805	75	0	NFS	

Table 7: Niskin3m Samples

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.02	Niskin3m	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	3	meso	
FR21302.06	Niskin3m	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	3	meso	
FR21302.11	Niskin3m	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	3	meso	
FR21302.16	Niskin3m	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	3	meso	
FR21302.21	Niskin3m	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	3	meso	
FR21302.27	Niskin3m	6	6	NH-25	1	8	2129	S	44.6303	-124.6452	274	3	meso	
FR21402.02	Niskin3m	7	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	3	meso	
FR21402.07	Niskin3m	8	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	3	meso	
FR21402.12	Niskin3m	9	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	3	meso	
FR21402.17	Niskin3m	10	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	3	meso	
FR21402.22	Niskin3m	11	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	3	meso	
FR21402.27	Niskin3m	12	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	3	meso	
FR21402.32	Niskin3m	13	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	3	meso	
FR21502.02	Niskin3m	14	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	3	meso	
FR21502.07	Niskin3m	15	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	3	meso	
FR21502.12	Niskin3m	16	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	3	meso	
FR21502.17	Niskin3m	17	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	3	meso	
FR21502.22	Niskin3m	18	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	3	meso	
FR21502.27	Niskin3m	19	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	3	meso	
FR21502.32	Niskin3m	20	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	3	meso	
FR21602.02	Niskin3m	21	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	3	meso	
FR21602.07	Niskin3m	22	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	3	meso	
FR21602.12	Niskin3m	23	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	3	meso	
FR21602.17	Niskin3m	24	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	3	meso	
FR21602.22	Niskin3m	25	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	3	meso	
FR21602.27	Niskin3m	26	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	3	meso	
FR21602.32	Niskin3m	27	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	3	meso	
FR21702.02	Niskin3m	28	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	3	meso	
FR21702.07	Niskin3m	29	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	3	meso	
FR21702.12	Niskin3m	30	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	3	meso	
FR21702.17	Niskin3m	31	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	3	meso	
FR21702.22	Niskin3m	32	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	3	meso	
FR21702.27	Niskin3m	33	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	3	meso	
FR21702.32	Niskin3m	34	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	3	meso	
FR21802.02	Niskin3m	35	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	3	meso	
FR21802.07	Niskin3m	36	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	3	meso	
FR21802.12	Niskin3m	37	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	3	meso	
FR21802.17	Niskin3m	38	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	3	meso	
FR21802.22	Niskin3m	39	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	3	meso	
FR21802.27	Niskin3m	40	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	3	meso	
FR21802.32	Niskin3m	41	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	3	meso	
FR21902.03	Niskin3m	42	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	3	NFS	
FR21902.08	Niskin3m	43	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	3	NFS	
FR21902.14	Niskin3m	44	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	3	NFS	
FR21902.20	Niskin3m	45	45	HH-2D	7	8	2132	S	43.9995	-124.4007	118	3	NFS	
FR22002.02	Niskin3m	46	46	HH-2E	8	8	0127	S	44.0020	-124.4000	117	3	NFS	
FR22002.07	Niskin3m	47	47	HH-2F	8	8	0522	S	43.9993	-124.3990	115	3	NFS	
FR22002.11	Niskin3m	48	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	3	NFS	

Table 7: Niskin3m Samples (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22102.02	Niskin3m	49	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	3	NFS	
FR22102.07	Niskin3m	50	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	3	NFS	
FR22102.12	Niskin3m	51	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	3	NFS	
FR22102.17	Niskin3m	52	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	3	NFS	
FR22202.02	Niskin3m	53	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	3	NFS	
FR22202.07	Niskin3m	54	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	3	NFS	
FR22202.12	Niskin3m	55	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	3	NFS	
FR22202.17	Niskin3m	56	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	3	NFS	
FR22202.22	Niskin3m	57	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	3	NFS	
FR22202.28	Niskin3m	58	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	3	NFS	
FR22302.02	Niskin3m	59	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	3	NFS	
FR22302.07	Niskin3m	60	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	3	NFS	
FR22302.12	Niskin3m	61	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	3	NFS	
FR22302.17	Niskin3m	62	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.26	Niskin3m	63	65	HH-3.5C	11	8	2333	S	43.9392	-124.6978	162	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.02	Niskin3m	64	66	6-5	12	8	0857	S	43.5000	-124.6767	392	3	NFS	
FR22402.07	Niskin3m	65	67	6-4	12	8	1107	S	43.5012	-124.5837	184	3	NFS	
FR22402.12	Niskin3m	66	68	6-3	12	8	1302	S	43.5017	-124.4893	124	3	NFS	
FR22402.17	Niskin3m	67	69	6-2	12	8	1457	S	43.5012	-124.3938	104	3	NFS	
FR22402.22	Niskin3m	68	70	6-1	12	8	1649	S	43.4993	-124.3012	56	3	NFS	
FR22402.29	Niskin3m	69	71	7A-2	12	8	2144	S	43.0627	-124.6010	112	3	NFS	
FR22502.02	Niskin3m	70	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	3	NFS	
FR22502.08	Niskin3m	71	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	3	NFS	
FR22502.12	Niskin3m	72	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	3	NFS	
FR22502.17	Niskin3m	73	75	8-7	13	8	1308	S	42.9505	-124.7797	156	3	NFS	
FR22502.22	Niskin3m	74	76	8-6	13	8	1444	S	42.9520	-124.7305	144	3	NFS	
FR22502.27	Niskin3m	75	77	8-9	13	8	1707	S	42.9515	-124.8680	171	3	NFS	
FR22602.02	Niskin3m	76	78	11-3	14	8	0722	S	42.2000	-124.6087	268	3	SFS	
FR22602.07	Niskin3m	77	79	11-4	14	8	0908	S	42.2000	-124.7082	549	3	SFS	
FR22602.13	Niskin3m	78	80	11-5	14	8	1113	S	42.2003	-124.7987	655	3	SFS	
FR22602.18	Niskin3m	79	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	3	SFS	
FR22602.23	Niskin3m	80	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	3	SFS	No trawl or neuston. Too rough; heading inshore.
FR22602.26	Niskin3m	81	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	3	SFS	
FR22602.30	Niskin3m	82	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	3	SFS	
FR22702.02	Niskin3m	83	85	9-4	15	8	0702	S	42.6635	-124.8353	691	3	SFS	
FR22702.07	Niskin3m	84	86	9-3	15	8	0859	S	42.6622	-124.7185	240	3	SFS	
FR22702.12	Niskin3m	85	87	9-2	15	8	1052	S	42.6612	-124.6093	110	3	SFS	
FR22702.17	Niskin3m	86	88	8-1	15	8	1640	S	42.9478	-124.5202	36	3	NFS	
FR22702.22	Niskin3m	87	89	8-2	15	8	1807	S	42.9518	-124.5528	60	3	NFS	
FR22702.27	Niskin3m	88	90	8-4	15	8	1953	S	42.9502	-124.6425	96	3	NFS	
FR22802.02	Niskin3m	89	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	3	NFS	
FR22802.07	Niskin3m	90	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	3	NFS	
FR22802.12	Niskin3m	91	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	3	NFS	Between HH-4 and HH-5. Niskin rope angle large due to strong current.
FR22802.17	Niskin3m	92	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	3	NFS	Station is between HH-5 and HH-6.

Table 7: Niskin3m Samples (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22802.22	Niskin3m	93	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	3	NFS	
FR22802.27	Niskin3m	94	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	3	NFS	
FR22802.32	Niskin3m	95	97	3A-2	16	8	2050	S	44.1127	-124.2893	77	3	NFS	
FR22902.02	Niskin3m	96	98	2-4	17	8	0659	S	44.4753	-124.5645	117	3	NFS	
FR22902.07	Niskin3m	97	99	2-2	17	8	0848	S	44.4767	-124.4533	73	3	NFS	
FR22902.12	Niskin3m	98	100	2-1	17	8	1046	S	44.4748	-124.2892	75	3	NFS	
FR22902.17	Niskin3m	99	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	3	NFS	
FR22902.22	Niskin3m	100	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	3	NFS	
FR22902.27	Niskin3m	101	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	3	NFS	

Table 8: Secchi Depth Measurements

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.03	Secchi	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	7	meso	
FR21302.07	Secchi	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	5	meso	
FR21302.12	Secchi	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	9	meso	
FR21302.17	Secchi	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	5	meso	
FR21302.22	Secchi	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	4	meso	
FR21402.03	Secchi	6	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	6	meso	
FR21402.08	Secchi	7	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	5	meso	
FR21402.13	Secchi	8	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	6	meso	
FR21402.18	Secchi	9	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	7	meso	
FR21402.23	Secchi	10	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	9	meso	
FR21402.28	Secchi	11	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	8	meso	
FR21402.33	Secchi	12	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	5	meso	
FR21502.03	Secchi	13	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	5	meso	
FR21502.08	Secchi	14	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	12	meso	
FR21502.13	Secchi	15	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	6	meso	
FR21502.18	Secchi	16	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	7	meso	
FR21502.23	Secchi	17	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	5	meso	
FR21502.28	Secchi	18	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	7	meso	
FR21502.33	Secchi	19	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	5	meso	
FR21602.03	Secchi	20	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	4	meso	
FR21602.08	Secchi	21	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	10	meso	
FR21602.13	Secchi	22	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	12	meso	
FR21602.18	Secchi	23	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	13	meso	
FR21602.23	Secchi	24	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	11	meso	
FR21602.28	Secchi	25	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	10	meso	
FR21602.33	Secchi	26	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	14	meso	
FR21702.03	Secchi	27	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	5	meso	
FR21702.08	Secchi	28	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	7	meso	
FR21702.13	Secchi	29	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	15	meso	
FR21702.18	Secchi	30	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	10	meso	
FR21702.23	Secchi	31	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	11	meso	
FR21702.28	Secchi	32	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	12	meso	
FR21702.33	Secchi	33	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	12	meso	
FR21802.03	Secchi	34	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	4	meso	
FR21802.08	Secchi	35	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	5	meso	
FR21802.13	Secchi	36	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	11	meso	
FR21802.18	Secchi	37	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	7	meso	
FR21802.23	Secchi	38	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	3	meso	
FR21802.28	Secchi	39	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	4	meso	
FR21802.33	Secchi	40	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	9	meso	
FR21902.04	Secchi	41	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	3	NFS	
FR21902.09	Secchi	42	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	3	NFS	
FR21902.15	Secchi	43	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	3	NFS	
FR22002.12	Secchi	44	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	3	NFS	
FR22102.03	Secchi	45	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	3	NFS	
FR22102.08	Secchi	46	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	3	NFS	
FR22102.13	Secchi	47	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	3	NFS	
FR22102.18	Secchi	48	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	4	NFS	

Table 8: Secchi Depth Measurements (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22202.03	Secchi	49	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	3	NFS	
FR22202.08	Secchi	50	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	2	NFS	
FR22202.13	Secchi	51	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	3	NFS	
FR22202.18	Secchi	52	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	3	NFS	
FR22202.23	Secchi	53	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	8	NFS	
FR22202.29	Secchi	54	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	3	NFS	
FR22302.03	Secchi	55	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	4	NFS	
FR22302.08	Secchi	56	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	3	NFS	
FR22302.13	Secchi	57	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	3	NFS	
FR22302.18	Secchi	58	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.03	Secchi	59	66	6-5	12	8	0857	S	43.5000	-124.6767	392	4	NFS	
FR22402.08	Secchi	60	67	6-4	12	8	1107	S	43.5012	-124.5837	184	7	NFS	
FR22402.13	Secchi	61	68	6-3	12	8	1302	S	43.5017	-124.4893	124	9	NFS	Secchi kept going under boat during measure; could be underestimated.
FR22402.18	Secchi	62	69	6-2	12	8	1457	S	43.5012	-124.3938	104	12	NFS	
FR22402.23	Secchi	63	70	6-1	12	8	1649	S	43.4993	-124.3012	56	9	NFS	
FR22502.03	Secchi	64	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	9	NFS	
FR22502.09	Secchi	65	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	9	NFS	
FR22502.13	Secchi	66	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	9	NFS	
FR22502.18	Secchi	67	75	8-7	13	8	1308	S	42.9505	-124.7797	156	4	NFS	
FR22502.23	Secchi	68	76	8-6	13	8	1444	S	42.9520	-124.7305	144	5	NFS	
FR22502.28	Secchi	69	77	8-9	13	8	1707	S	42.9515	-124.8680	171	4	NFS	
FR22602.03	Secchi	70	78	11-3	14	8	0722	S	42.2000	-124.6087	268	13	SFS	
FR22602.08	Secchi	71	79	11-4	14	8	0908	S	42.2000	-124.7082	549	14	SFS	
FR22602.14	Secchi	72	80	11-5	14	8	1113	S	42.2003	-124.7987	655	13	SFS	13 - 14 m; water surface too ripply.
FR22602.19	Secchi	73	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	8	SFS	
FR22602.24	Secchi	74	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	12	SFS	Too rough for good secchi measurement. No trawl or neuston. Heading inshore.
FR22602.27	Secchi	75	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	11	SFS	
FR22602.31	Secchi	76	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	2	SFS	
FR22702.03	Secchi	77	85	9-4	15	8	0702	S	42.6635	-124.8353	691	8	SFS	
FR22702.08	Secchi	78	86	9-3	15	8	0859	S	42.6622	-124.7185	240	10	SFS	
FR22702.13	Secchi	79	87	9-2	15	8	1052	S	42.6612	-124.6093	110	13	SFS	
FR22702.18	Secchi	80	88	8-1	15	8	1640	S	42.9478	-124.5202	36	7	NFS	
FR22702.23	Secchi	81	89	8-2	15	8	1807	S	42.9518	-124.5528	60	4	NFS	
FR22702.28	Secchi	82	90	8-4	15	8	1953	S	42.9502	-124.6425	96	4	NFS	
FR22802.03	Secchi	83	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	2	NFS	
FR22802.08	Secchi	84	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	2	NFS	
FR22802.13	Secchi	85	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	3	NFS	Station is between HH-4 and HH-5.
FR22802.18	Secchi	86	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	3	NFS	Station is between HH-5 and HH-6.
FR22802.23	Secchi	87	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	3	NFS	
FR22802.28	Secchi	88	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	3	NFS	
FR22802.33	Secchi	89	97	3A-2	16	8	2050	S	44.1127	-124.2893	77	3	NFS	Getting dark.
FR22902.03	Secchi	90	98	2-4	17	8	0659	S	44.4753	-124.5645	117	3	NFS	
FR22902.08	Secchi	91	99	2-2	17	8	0848	S	44.4767	-124.4533	73	7	NFS	
FR22902.13	Secchi	92	100	2-1	17	8	1046	S	44.4748	-124.2892	75	3	NFS	
FR22902.18	Secchi	93	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	5	NFS	

Table 8: Secchi Depth Measurements (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22902.23	Secchi	94	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	4	NFS	
FR22902.28	Secchi	95	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	7	NFS	

Table 9: Trawls

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.09	Trawl	1	2	NH-5	1	8	1347	S	44.6650	-124.1845	59	18	meso	
FR21302.09	Trawl	1	2	NH-5	1	8	1417	E	44.6332	-124.1783	51	18	meso	
FR21302.14	Trawl	2	3	NH-10	1	8	1541	S	44.6512	-124.2973	78	18	meso	
FR21302.14	Trawl	2	3	NH-10	1	8	1611	E	44.6767	-124.3172	77	18	meso	
FR21302.19	Trawl	3	4	NH-15	1	8	1728	S	44.6378	-124.4058	75	18	meso	
FR21302.19	Trawl	3	4	NH-15	1	8	1758	E	44.6667	-124.4143	98	18	meso	
FR21302.24	Trawl	4	5	NH-20	1	8	1919	S	44.6380	-124.5223	132	18	meso	
FR21302.24	Trawl	4	5	NH-20	1	8	1949	E	44.6633	-124.5357	147	18	meso	
FR21302.25	Trawl	5	6	NH-25	1	8	2042	S	44.6603	-124.6502	298	18	meso	
FR21302.25	Trawl	5	6	NH-25	1	8	2112	E	44.6322	-124.6477	273	18	meso	
FR21402.05	Trawl	6	7	HH-1	2	8	0708	S	44.0102	-124.1978	49	18	meso	
FR21402.05	Trawl	6	7	HH-1	2	8	0738	E	43.9795	-124.2008	49	18	meso	
FR21402.10	Trawl	7	8	HH-2	2	8	0926	S	44.0098	-124.4030	117	18	meso	
FR21402.10	Trawl	7	8	HH-2	2	8	0956	E	43.9825	-124.3962	116	18	meso	
FR21402.15	Trawl	8	9	HH-3	2	8	1155	S	44.0100	-124.6045	145	18	meso	
FR21402.15	Trawl	8	9	HH-3	2	8	1225	E	43.9822	-124.5872	158	18	meso	
FR21402.20	Trawl	9	10	HH-4	2	8	1422	S	44.0125	-124.8058	95	18	meso	
FR21402.20	Trawl	9	10	HH-4	2	8	1452	E	43.9823	-124.7913	115	18	meso	
FR21402.25	Trawl	10	11	HH-5	2	8	1643	S	44.0117	-124.9978	938	18	meso	
FR21402.25	Trawl	10	11	HH-5	2	8	1713	E	43.9833	-125.0040	882	18	meso	
FR21402.30	Trawl	11	12	HH-6	2	8	1835	S	44.0133	-125.1023	1406	18	meso	
FR21402.30	Trawl	11	12	HH-6	2	8	1905	E	43.9863	-125.0970	1473	18	meso	
FR21402.35	Trawl	12	13	HH-7	2	8	2034	S	44.0108	-125.1980	1790	18	meso	
FR21402.35	Trawl	12	13	HH-7	2	8	2104	E	43.9822	-125.2027	1858	18	meso	
FR21502.05	Trawl	13	14	UR-1	3	8	0700	S	43.7400	-124.2313	45	18	meso	Short tow, haul full of jellyfish.
FR21502.05	Trawl	13	14	UR-1	3	8	0714	E	43.7513	-124.2317	50	18	meso	Short tow, haul full of jellyfish.
FR21502.10	Trawl	14	15	UR-2	3	8	0839	S	43.7617	-124.3223	101	18	meso	
FR21502.10	Trawl	14	15	UR-2	3	8	0909	E	43.7335	-124.3120	100	18	meso	
FR21502.15	Trawl	15	16	UR-3	3	8	1034	S	43.7613	-124.4030	112	18	meso	
FR21502.15	Trawl	15	16	UR-3	3	8	1104	E	43.7292	-124.3912	112	18	meso	
FR21502.20	Trawl	16	17	UR-4	3	8	1218	S	43.7605	-124.4682	125	18	meso	
FR21502.20	Trawl	16	17	UR-4	3	8	1248	E	43.7265	-124.4703	119	18	meso	
FR21502.25	Trawl	17	18	UR-5	3	8	1404	S	43.7603	-124.5288	164	18	meso	
FR21502.25	Trawl	17	18	UR-5	3	8	1434	E	43.7258	-124.5357	174	18	meso	
FR21502.30	Trawl	18	19	UR-6	3	8	1542	S	43.7627	-124.5995	253	18	meso	
FR21502.30	Trawl	18	19	UR-6	3	8	1612	E	43.7303	-124.5980	252	18	meso	
FR21502.35	Trawl	19	20	UR-7	3	8	1724	S	43.7630	-124.6873	443	18	meso	
FR21502.35	Trawl	19	20	UR-7	3	8	1754	E	43.7345	-124.6700	406	18	meso	
FR21602.05	Trawl	20	21	RR-1	4	8	0658	S	42.4892	-124.4947	31	18	meso	
FR21602.05	Trawl	20	21	RR-1	4	8	0728	E	42.5192	-124.5023	36	18	meso	
FR21602.10	Trawl	21	22	RR-2	4	8	0852	S	42.5145	-124.6020	86	18	meso	
FR21602.10	Trawl	21	22	RR-2	4	8	0922	E	42.4882	-124.5958	80	18	meso	
FR21602.15	Trawl	22	23	RR-3	4	8	1039	S	42.5102	-124.6922	138	18	meso	
FR21602.15	Trawl	22	23	RR-3	4	8	1109	E	42.4855	-124.7067	121	18	meso	
FR21602.20	Trawl	23	24	RR-4	4	8	1244	S	42.5122	-124.7870	556	18	meso	
FR21602.20	Trawl	23	24	RR-4	4	8	1314	E	42.4898	-124.8110	510	18	meso	
FR21602.25	Trawl	24	25	RR-5	4	8	1426	S	42.5152	-124.8972	1155	18	meso	
FR21602.25	Trawl	24	25	RR-5	4	8	1456	E	42.4873	-124.8995	1113	18	meso	

Table 9: Trawls (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21602.30	Trawl	25	26	RR-6	4	8	1614	S	42.5087	-125.0058	1811	18	meso	
FR21602.30	Trawl	25	26	RR-6	4	8	1644	E	42.4780	-124.9813	1713	18	meso	
FR21602.35	Trawl	26	27	RR-7	4	8	1844	S	42.5122	-125.1910	3000	18	meso	
FR21602.35	Trawl	26	27	RR-7	4	8	1914	E	42.4897	-125.2023	-9999	18	meso	
FR21702.05	Trawl	27	28	CR-1	5	8	0709	S	41.8870	-124.2930	33	18	meso	Haul ended early because full of Aurelia and slowed the vessel.
FR21702.05	Trawl	27	28	CR-1	5	8	0720	E	41.8989	-124.2987	35	18	meso	Haul ended early because full of Aurelia and slowed the vessel.
FR21702.10	Trawl	28	29	CR-2	5	8	0857	S	41.8953	-124.3947	61	18	meso	
FR21702.10	Trawl	28	29	CR-2	5	8	0927	E	41.9205	-124.4137	71	18	meso	
FR21702.15	Trawl	29	30	CR-3	5	8	1048	S	41.9160	-124.5062	132	18	meso	
FR21702.15	Trawl	29	30	CR-3	5	8	1118	E	41.8907	-124.4958	134	18	meso	
FR21702.20	Trawl	30	31	CR-4	5	8	1237	S	41.9110	-124.5935	467	18	meso	
FR21702.20	Trawl	30	31	CR-4	5	8	1307	E	41.8883	-124.6078	540	18	meso	
FR21702.25	Trawl	31	32	CR-5	5	8	1428	S	41.9083	-124.6935	655	18	meso	
FR21702.25	Trawl	31	32	CR-5	5	8	1458	E	41.8858	-124.7072	668	18	meso	
FR21702.30	Trawl	32	33	CR-6	5	8	1613	S	41.9128	-124.7993	708	18	meso	
FR21702.30	Trawl	32	33	CR-6	5	8	1643	E	41.8848	-124.7968	693	18	meso	
FR21702.36	Trawl	33	34	CR-7	5	8	1849	S	41.9148	-125.0017	853	18	meso	
FR21702.36	Trawl	33	34	CR-7	5	8	1919	E	41.8882	-124.9998	873	18	meso	
FR21802.05	Trawl	34	35	FM-1	6	8	0657	S	43.2173	-124.4468	39	18	meso	
FR21802.05	Trawl	34	35	FM-1	6	8	0727	E	43.1932	-124.4565	42	18	meso	
FR21802.10	Trawl	35	36	FM-3	6	8	0832	S	43.2092	-124.4985	63	18	meso	
FR21802.10	Trawl	35	36	FM-3	6	8	0902	E	43.2370	-124.5010	58	18	meso	
FR21802.15	Trawl	36	37	FM-4	6	8	1011	S	43.2322	-124.5803	88	18	meso	
FR21802.15	Trawl	36	37	FM-4	6	8	1041	E	43.2037	-124.5770	80	18	meso	
FR21802.20	Trawl	37	38	FM-5	6	8	1158	S	43.2325	-124.6707	151	18	meso	
FR21802.20	Trawl	37	38	FM-5	6	8	1228	E	43.2057	-124.6690	158	18	meso	
FR21802.25	Trawl	38	39	FM-6	6	8	1347	S	43.2282	-124.7580	332	18	meso	
FR21802.25	Trawl	38	39	FM-6	6	8	1417	E	43.2048	-124.7328	247	18	meso	
FR21802.30	Trawl	39	40	FM-7	6	8	1541	S	43.2327	-124.8353	352	18	meso	
FR21802.30	Trawl	39	40	FM-7	6	8	1611	E	43.2042	-124.8183	343	18	meso	
FR21802.35	Trawl	40	41	FM-8	6	8	1755	S	43.2307	-125.0080	1086	18	meso	
FR21802.35	Trawl	40	41	FM-8	6	8	1825	E	43.2065	-124.9887	1076	18	meso	
FR21902.06	Trawl	41	42	HH-2A	7	8	0851	S	44.0120	-124.4053	116	18	NFS	
FR21902.06	Trawl	41	42	HH-2A	7	8	0921	E	43.9825	-124.3933	115	18	NFS	
FR21902.12	Trawl	42	43	HH-2B	7	8	1321	S	44.0113	-124.4023	117	18	NFS	
FR21902.12	Trawl	42	43	HH-2B	7	8	1351	E	43.9833	-124.3960	117	18	NFS	
FR21902.18	Trawl	43	44	HH-2C	7	8	1725	S	44.0127	-124.4090	117	18	NFS	
FR21902.18	Trawl	43	44	HH-2C	7	8	1755	E	43.9840	-124.3920	116	18	NFS	
FR21902.23	Trawl	44	45	HH-2D	7	8	2235	S	44.0117	-124.4058	118	18	NFS	
FR21902.23	Trawl	44	45	HH-2D	7	8	2305	E	43.9835	-124.3927	117	18	NFS	
FR22002.05	Trawl	45	46	HH-2E	8	8	0221	S	44.0122	-124.4020	117	18	NFS	
FR22002.05	Trawl	45	46	HH-2E	8	8	0251	E	43.9820	-124.3977	116	18	NFS	
FR22002.09	Trawl	46	47	HH-2F	8	8	0559	S	44.0087	-124.4000	114	18	NFS	
FR22002.09	Trawl	46	47	HH-2F	8	8	0629	E	43.9828	-124.3933	114	18	NFS	
FR22002.14	Trawl	47	48	HH-2G	8	8	1000	S	44.0122	-124.4000	116	18	NFS	
FR22002.14	Trawl	47	48	HH-2G	8	8	1030	E	43.9843	-124.4007	117	18	NFS	

Table 9: Trawls (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22102.05	Trawl	48	49	2A-3	9	8	1415	S	44.4100	-124.4112	76	18	NFS	
FR22102.05	Trawl	48	49	2A-3	9	8	1445	E	44.3815	-124.4078	77	18	NFS	
FR22102.10	Trawl	49	50	2A-4	9	8	1604	S	44.4108	-124.5233	93	18	NFS	
FR22102.10	Trawl	49	50	2A-4	9	8	1634	E	44.3847	-124.5137	90	18	NFS	
FR22102.15	Trawl	50	51	2A-2	9	8	1830	S	44.4235	-124.2963	66	18	NFS	
FR22102.15	Trawl	50	51	2A-2	9	8	1900	E	44.3920	-124.2907	66	18	NFS	
FR22102.20	Trawl	51	52	2A-1	9	8	2024	S	44.4123	-124.1738	46	18	NFS	Hauled back early; full of Chrysaora.
FR22102.20	Trawl	51	52	2A-1	9	8	2040	E	44.3990	-124.1748	47	18	NFS	Hauled back early; full of Chrysaora.
FR22202.05	Trawl	52	53	BOB-5	10	8	0745	S	44.2802	-124.8957	199	18	NFS	
FR22202.05	Trawl	52	53	BOB-5	10	8	0815	E	44.2535	-124.9147	170	18	NFS	
FR22202.10	Trawl	53	54	BOB-4	10	8	1009	S	44.2917	-124.7007	70	18	NFS	
FR22202.10	Trawl	53	54	BOB-4	10	8	1039	E	44.2642	-124.7020	88	18	NFS	
FR22202.15	Trawl	54	55	BOB-3	10	8	1239	S	44.2917	-124.4995	97	18	NFS	
FR22202.15	Trawl	54	55	BOB-3	10	8	1309	E	44.2637	-124.5008	102	18	NFS	
FR22202.20	Trawl	55	56	BOB-2	10	8	1433	S	44.2817	-124.3762	84	18	NFS	
FR22202.20	Trawl	55	56	BOB-2	10	8	1503	E	44.2548	-124.3618	85	18	NFS	
FR22202.26	Trawl	56	57	BOB-1	10	8	1710	S	44.2765	-124.1543	40	18	NFS	Hauled back early; lots of Chrysaora.
FR22202.26	Trawl	56	57	BOB-1	10	8	1725	E	44.2885	-124.1552	40	18	NFS	Hauled back early; lots of Chrysaora.
FR22202.31	Trawl	57	58	HH-2H	10	8	2024	S	44.0077	-124.4008	115	18	NFS	
FR22202.31	Trawl	57	58	HH-2H	10	8	2054	E	43.9760	-124.3998	116	18	NFS	
FR22302.05	Trawl	58	59	4A-6	11	8	0754	S	43.8605	-124.7297	298	18	NFS	
FR22302.05	Trawl	58	59	4A-6	11	8	0824	E	43.8312	-124.7315	380	18	NFS	
FR22302.10	Trawl	59	60	4A-5	11	8	0950	S	43.8608	-124.6162	261	18	NFS	
FR22302.10	Trawl	59	60	4A-5	11	8	1020	E	43.8330	-124.6150	271	18	NFS	
FR22302.15	Trawl	60	61	4A-4	11	8	1137	S	43.8588	-124.5172	140	18	NFS	
FR22302.15	Trawl	60	61	4A-4	11	8	1207	E	43.8303	-124.5128	138	18	NFS	
FR22302.20	Trawl	61	62	HH-3.5	11	8	1439	S	44.0103	-124.6990	120	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.20	Trawl	61	62	HH-3.5	11	8	1509	E	43.9817	-124.6978	127	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.21	Trawl	62	63	HH-3.5A	11	8	1735	S	43.9725	-124.6983	127	78	NFS	Wire out 300 m headrope, ~60 m depth. Between HH-3 and HH-4.
FR22302.21	Trawl	62	63	HH-3.5A	11	8	1855	E	43.9898	-124.7028	117	78	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.22	Trawl	63	64	HH-3.5B	11	8	2105	S	43.9395	-124.7005	158	93	NFS	Wire out 175 fm headrope, 75 m depth. Between HH-3 and HH-4.
FR22302.22	Trawl	63	64	HH-3.5B	11	8	2153	E	43.9800	-124.7162	129	93	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.23	Trawl	64	65	HH-3.5C	11	8	2234	S	43.9638	-124.7102	129	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.23	Trawl	64	65	HH-3.5C	11	8	2304	E	43.9380	-124.6992	164	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.05	Trawl	65	66	6-5	12	8	0940	S	43.5037	-124.6790	402	18	NFS	
FR22402.05	Trawl	65	66	6-5	12	8	1010	E	43.4757	-124.6988	438	18	NFS	
FR22402.10	Trawl	66	67	6-4	12	8	1147	S	43.5067	-124.5830	186	18	NFS	
FR22402.10	Trawl	66	67	6-4	12	8	1217	E	43.4747	-124.5812	160	18	NFS	
FR22402.15	Trawl	67	68	6-3	12	8	1343	S	43.5065	-124.4907	127	18	NFS	
FR22402.15	Trawl	67	68	6-3	12	8	1413	E	43.4770	-124.4897	118	18	NFS	

Table 9: Trawls (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22402.20	Trawl	68	69	6-2	12	8	1535	S	43.5093	-124.3943	105	18	NFS	
FR22402.20	Trawl	68	69	6-2	12	8	1605	E	43.4810	-124.3922	100	18	NFS	
FR22402.25	Trawl	69	70	6-1	12	8	1720	S	43.5090	-124.3037	69	18	NFS	
FR22402.25	Trawl	69	70	6-1	12	8	1750	E	43.4833	-124.3192	68	18	NFS	
FR22402.26	Trawl	70	71	7A-2	12	8	2047	S	43.0888	-124.5992	109	18	NFS	
FR22402.26	Trawl	70	71	7A-2	12	8	2117	E	43.0605	-124.6008	112	18	NFS	
FR22502.05	Trawl	71	72	7A-3	13	8	0732	S	43.0952	-124.7088	186	18	NFS	
FR22502.05	Trawl	71	72	7A-3	13	8	0802	E	43.0660	-124.7098	162	18	NFS	
FR22502.06	Trawl	72	73	7A-4	13	8	0915	S	43.0635	-124.8028	94	18	NFS	
FR22502.06	Trawl	72	73	7A-4	13	8	0945	E	43.0888	-124.7997	122	18	NFS	
FR22502.15	Trawl	73	74	7A-5	13	8	1124	S	43.0938	-124.9088	536	18	NFS	
FR22502.15	Trawl	73	74	7A-5	13	8	1154	E	43.0688	-124.9065	500	18	NFS	
FR22502.20	Trawl	74	75	8-7	13	8	1341	S	42.9618	-124.7768	153	18	NFS	
FR22502.20	Trawl	74	75	8-7	13	8	1411	E	42.9378	-124.7767	162	18	NFS	
FR22502.25	Trawl	75	76	8-6	13	8	1531	S	42.9333	-124.7267	141	18	NFS	
FR22502.25	Trawl	75	76	8-6	13	8	1601	E	42.9627	-124.7295	145	18	NFS	
FR22502.30	Trawl	76	77	8-9	13	8	1738	S	42.9633	-124.8667	175	18	NFS	
FR22502.30	Trawl	76	77	8-9	13	8	1808	E	42.9385	-124.8645	170	18	NFS	
FR22602.05	Trawl	77	78	11-3	14	8	0755	S	42.2115	-124.6072	258	18	SFS	
FR22602.05	Trawl	77	78	11-3	14	8	0825	E	42.1832	-124.6085	266	18	SFS	
FR22602.10	Trawl	78	79	11-4	14	8	0952	S	42.2077	-124.7077	544	18	SFS	
FR22602.10	Trawl	78	79	11-4	14	8	1022	E	42.1782	-124.7107	564	18	SFS	
FR22602.16	Trawl	79	80	11-5	14	8	1151	S	42.2160	-124.7985	601	18	SFS	
FR22602.16	Trawl	79	80	11-5	14	8	1221	E	42.1870	-124.7997	679	18	SFS	
FR22602.21	Trawl	80	81	11-6	14	8	1343	S	42.2132	-124.9275	1034	18	SFS	
FR22602.21	Trawl	80	81	11-6	14	8	1413	E	42.1858	-124.9287	1045	18	SFS	
FR22602.28	Trawl	81	83	10A-2	14	8	1759	S	42.3593	-124.5767	115	18	SFS	
FR22602.28	Trawl	81	83	10A-2	14	8	1829	E	42.3317	-124.5783	135	18	SFS	
FR22602.33	Trawl	82	84	10A-1	14	8	2000	S	42.3578	-124.4850	51	18	SFS	
FR22602.33	Trawl	82	84	10A-1	14	8	2030	E	42.3782	-124.5158	72	18	SFS	
FR22702.05	Trawl	83	85	9-4	15	8	0737	S	42.6508	-124.8253	690	18	SFS	
FR22702.05	Trawl	83	85	9-4	15	8	0807	E	42.6790	-124.8323	661	18	SFS	
FR22702.10	Trawl	84	86	9-3	15	8	0933	S	42.6720	-124.7222	235	18	SFS	
FR22702.10	Trawl	84	86	9-3	15	8	1003	E	42.6455	-124.7148	316	18	SFS	
FR22702.15	Trawl	85	87	9-2	15	8	1127	S	42.6692	-124.6128	112	18	SFS	
FR22702.15	Trawl	85	87	9-2	15	8	1157	E	42.6432	-124.5995	104	18	SFS	
FR22702.20	Trawl	86	88	8-1	15	8	1714	S	42.9582	-124.5138	37	18	NFS	Hauled back early due to jellyfish.
FR22702.20	Trawl	86	88	8-1	15	8	1737	E	42.9383	-124.5320	42	18	NFS	Hauled back early due to jellyfish.
FR22702.25	Trawl	87	89	8-2	15	8	1845	S	42.9645	-124.5437	62	18	NFS	
FR22702.25	Trawl	87	89	8-2	15	8	1915	E	42.9378	-124.5607	56	18	NFS	
FR22702.30	Trawl	88	90	8-4	15	8	2023	S	42.9593	-124.6438	100	18	NFS	
FR22702.30	Trawl	88	90	8-4	15	8	2053	E	42.9320	-124.6425	89	18	NFS	
FR22802.05	Trawl	89	91	HH-3A	16	8	0733	S	43.9888	-124.5890	155	18	NFS	
FR22802.05	Trawl	89	91	HH-3A	16	8	0803	E	44.0100	-124.6102	145	18	NFS	
FR22802.10	Trawl	90	92	HH-4A	16	8	0944	S	44.0135	-124.8020	103	18	NFS	Cross over a front during tow.
FR22802.10	Trawl	90	92	HH-4A	16	8	1014	E	43.9878	-124.8015	112	18	NFS	
FR22802.15	Trawl	91	93	HH-4.5	16	8	1124	S	44.0063	-124.8995	93	18	NFS	Station is between HH-4 and HH-5.
FR22802.15	Trawl	91	93	HH-4.5	16	8	1154	E	43.9810	-124.8910	76	18	NFS	Station is between HH-4 and HH-5.

Table 9: Trawls (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22802.20	Trawl	92	94	HH-5.5	16	8	1341	S	44.0080	-125.0493	1328	18	NFS	Station is between HH-5 and HH-6.
FR22802.20	Trawl	92	94	HH-5.5	16	8	1411	E	43.9793	-125.0508	1323	18	NFS	Station is between HH-5 and HH-6.
FR22802.25	Trawl	93	95	3A-5	16	8	1630	S	44.1195	-124.7997	99	18	NFS	
FR22802.25	Trawl	93	95	3A-5	16	8	1700	E	44.0920	-124.8002	107	18	NFS	
FR22802.30	Trawl	94	96	3A-4	16	8	1841	S	44.1188	-124.6037	120	18	NFS	
FR22802.30	Trawl	94	96	3A-4	16	8	1911	E	44.0903	-124.5935	124	18	NFS	
FR22802.35	Trawl	95	97	3A-2	16	8	2119	S	44.1187	-124.2925	77	18	NFS	
FR22802.35	Trawl	95	97	3A-2	16	8	2149	E	44.0917	-124.2952	79	18	NFS	
FR22902.05	Trawl	96	98	2-4	17	8	0731	S	44.4863	-124.5680	120	18	NFS	
FR22902.05	Trawl	96	98	2-4	17	8	0801	E	44.4595	-124.5648	112	18	NFS	
FR22902.10	Trawl	97	99	2-2	17	8	0919	S	44.4878	-124.4538	73	18	NFS	
FR22902.10	Trawl	97	99	2-2	17	8	0949	E	44.4590	-124.4517	72	18	NFS	
FR22902.15	Trawl	98	100	2-1	17	8	1122	S	44.4887	-124.2903	77	18	NFS	
FR22902.15	Trawl	98	100	2-1	17	8	1152	E	44.4567	-124.2878	69	18	NFS	
FR22902.20	Trawl	99	101	1A-1	17	8	1350	S	44.5837	-124.1360	42	18	NFS	Hauled back early due to jellies.
FR22902.20	Trawl	99	101	1A-1	17	8	1410	E	44.5648	-124.1360	43	18	NFS	Hauled back early due to jellies.
FR22902.25	Trawl	100	102	1A-2	17	8	1518	S	44.5815	-124.1887	53	18	NFS	
FR22902.25	Trawl	100	102	1A-2	17	8	1548	E	44.5558	-124.1943	54	18	NFS	
FR22902.30	Trawl	101	103	1A-3	17	8	1708	S	44.5765	-124.2830	74	18	NFS	
FR22902.30	Trawl	101	103	1A-3	17	8	1738	E	44.5467	-124.2847	76	18	NFS	

Table 10: Tucker Trawls

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21902.01	Tucker_3	1	42	HH-2A	7	8	0732	S	43.9975	-124.3995	116	0	NFS	
FR21902.11	Tucker_3	2	43	HH-2B	7	8	1245	S	44.0018	-124.4003	118	0	NFS	
FR21902.17	Tucker_3	3	44	HH-2C	7	8	1650	S	44.0053	-124.4008	116	0	NFS	
FR21902.22	Tucker_3	4	45	HH-2D	7	8	2158	S	44.0077	-124.4007	117	0	NFS	
FR22002.04	Tucker_3	5	46	HH-2E	8	8	0150	S	44.0067	-124.3995	117	0	NFS	Net ripped, so no Tuckers for the remainder of the cruise.

APPENDIX I

FR0208 EVENT LOG

EVENTLOG CONTENTS

Column Label

Event#

Instrument (Instr)

Cast

Station (Sta)

Station Standard (Sta std)

Day

Month (Mos)

Time

Start/End (S/E) flag

Latitude (Lat)

Longitude (Long)

Water Depth

Cast Depth

Region

Comments

Description

Unique identifier for each line of event log.

Trawl: Nordic 264 Rope Trawl; 30-m wide; 18-m deep mesh size ranges from 162.6 cm in the throat to 8.9 cm in the codend; 6.1-m long, 0.8 cm knotless liner sewn into codend; towed for 30 min.

Tucker_3: 3m² mouth area Tucker trawl; damaged on first deployment; not used subsequently.

Secchi: Secchi depth measurement.

Niskin3m: Samples from 3m with 2-L Niskin for nutrients and chlorophyll.

Neuston: 1m² mouth area neuston net with 0.335 mm mesh; towed for 5-min out of vessel wake.

CTD: SeaBird SBE 19 Seacat Profiler; generally deployed to 100-m or within 10-m of bottom if shallower.

Sequence # for a particular instrument

Local time basis

Local time basis

Local time

S=Start of event; E=End of event

Decimal degrees; north is positive

Decimal degrees; east is positive

Depth of bottom

Maximum depth of deployment

Meso: mesoscale survey; NFS: Northern Fine Scale; SFS: Southern Fine Scale

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21302.01	CTD	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	40	meso	
FR21302.02	Niskin3m	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	3	meso	
FR21302.03	Secchi	1	1	NH-3	1	8	1220	S	44.6503	-124.1287	42	7	meso	
FR21302.04	Neuston	1	1	NH-3	1	8	1238	S	44.6523	-124.1330	43	0	meso	
FR21302.05	CTD	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	50	meso	
FR21302.06	Niskin3m	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	3	meso	
FR21302.07	Secchi	2	2	NH-5	1	8	1304	S	44.6497	-124.1817	56	5	meso	
FR21302.08	Neuston	2	2	NH-5	1	8	1313	S	44.6472	-124.1827	57	0	meso	
FR21302.09	Trawl	1	2	NH-5	1	8	1347	S	44.6650	-124.1845	59	18	meso	
FR21302.09	Trawl	1	2	NH-5	1	8	1417	E	44.6332	-124.1783	51	18	meso	
FR21302.10	CTD	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	75	meso	
FR21302.11	Niskin3m	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	3	meso	
FR21302.12	Secchi	3	3	NH-10	1	8	1509	S	44.6510	-124.3010	80	9	meso	
FR21302.13	Neuston	3	3	NH-10	1	8	1520	S	44.6488	-124.2982	79	0	meso	
FR21302.14	Trawl	2	3	NH-10	1	8	1541	S	44.6512	-124.2973	78	18	meso	
FR21302.14	Trawl	2	3	NH-10	1	8	1611	E	44.6767	-124.3172	77	18	meso	
FR21302.15	CTD	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	80	meso	
FR21302.16	Niskin3m	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	3	meso	
FR21302.17	Secchi	4	4	NH-15	1	8	1651	S	44.6497	-124.4123	86	5	meso	
FR21302.18	Neuston	4	4	NH-15	1	8	1702	S	44.6462	-124.4125	83	0	meso	
FR21302.19	Trawl	3	4	NH-15	1	8	1728	S	44.6378	-124.4058	75	18	meso	
FR21302.19	Trawl	3	4	NH-15	1	8	1758	E	44.6667	-124.4143	98	18	meso	
FR21302.20	CTD	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	100	meso	
FR21302.21	Niskin3m	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	3	meso	
FR21302.22	Secchi	5	5	NH-20	1	8	1843	S	44.6502	-124.5305	140	4	meso	
FR21302.23	Neuston	5	5	NH-20	1	8	1855	S	44.6477	-124.5287	141	0	meso	
FR21302.24	Trawl	4	5	NH-20	1	8	1919	S	44.6380	-124.5223	132	18	meso	
FR21302.24	Trawl	4	5	NH-20	1	8	1949	E	44.6633	-124.5357	147	18	meso	
FR21302.25	Trawl	5	6	NH-25	1	8	2042	S	44.6603	-124.6502	298	18	meso	
FR21302.25	Trawl	5	6	NH-25	1	8	2112	E	44.6322	-124.6477	273	18	meso	
FR21302.26	CTD	6	6	NH-25	1	8	2129	S	44.6303	-124.6452	274	100	meso	
FR21302.27	Niskin3m	6	6	NH-25	1	8	2129	S	44.6303	-124.6452	274	3	meso	
FR21302.28	Neuston	6	6	NH-25	1	8	2137	S	44.6295	-124.6435	273	0	meso	Sample lost when bottom of cod end fell out. No redo because of darkness.
FR21402.01	CTD	7	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	45	meso	
FR21402.02	Niskin3m	7	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	3	meso	
FR21402.03	Secchi	6	7	HH-1	2	8	0626	S	44.0033	-124.1988	49	6	meso	
FR21402.04	Neuston	7	7	HH-1	2	8	0633	S	44.0033	-124.1983	48	0	meso	
FR21402.05	Trawl	6	7	HH-1	2	8	0708	S	44.0102	-124.1978	49	18	meso	
FR21402.05	Trawl	6	7	HH-1	2	8	0738	E	43.9795	-124.2008	49	18	meso	
FR21402.06	CTD	8	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	100	meso	
FR21402.07	Niskin3m	8	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	3	meso	
FR21402.08	Secchi	7	8	HH-2	2	8	0846	S	44.0005	-124.3995	117	5	meso	
FR21402.09	Neuston	8	8	HH-2	2	8	0856	S	44.0005	-124.3982	117	0	meso	
FR21402.10	Trawl	7	8	HH-2	2	8	0926	S	44.0098	-124.4030	117	18	meso	
FR21402.10	Trawl	7	8	HH-2	2	8	0956	E	43.9825	-124.3962	116	18	meso	
FR21402.11	CTD	9	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	100	meso	
FR21402.12	Niskin3m	9	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21402.13	Secchi	8	9	HH-3	2	8	1105	S	44.0005	-124.5970	150	6	meso	
FR21402.14	Neuston	9	9	HH-3	2	8	1115	S	43.9993	-124.5952	150	0	meso	
FR21402.15	Trawl	8	9	HH-3	2	8	1155	S	44.0100	-124.6045	145	18	meso	
FR21402.15	Trawl	8	9	HH-3	2	8	1225	E	43.9822	-124.5872	158	18	meso	
FR21402.16	CTD	10	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	100	meso	
FR21402.17	Niskin3m	10	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	3	meso	
FR21402.18	Secchi	9	10	HH-4	2	8	1342	S	43.9998	-124.7995	107	7	meso	
FR21402.19	Neuston	10	10	HH-4	2	8	1353	S	43.9978	-124.7965	111	0	meso	
FR21402.20	Trawl	9	10	HH-4	2	8	1422	S	44.0125	-124.8058	95	18	meso	
FR21402.20	Trawl	9	10	HH-4	2	8	1452	E	43.9823	-124.7913	115	18	meso	
FR21402.21	CTD	11	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	100	meso	
FR21402.22	Niskin3m	11	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	3	meso	
FR21402.23	Secchi	10	11	HH-5	2	8	1606	S	44.0005	-125.0007	938	9	meso	
FR21402.24	Neuston	11	11	HH-5	2	8	1616	S	43.9992	-124.9990	930	0	meso	
FR21402.25	Trawl	10	11	HH-5	2	8	1643	S	44.0117	-124.9978	938	18	meso	
FR21402.25	Trawl	10	11	HH-5	2	8	1713	E	43.9833	-125.0040	882	18	meso	
FR21402.26	CTD	12	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	100	meso	
FR21402.27	Niskin3m	12	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	3	meso	
FR21402.28	Secchi	11	12	HH-6	2	8	1758	S	44.0005	-125.0992	1432	8	meso	
FR21402.29	Neuston	12	12	HH-6	2	8	1808	S	44.0005	-125.0977	1430	0	meso	
FR21402.30	Trawl	11	12	HH-6	2	8	1835	S	44.0133	-125.1023	1406	18	meso	
FR21402.30	Trawl	11	12	HH-6	2	8	1905	E	43.9863	-125.0970	1473	18	meso	
FR21402.31	CTD	13	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	100	meso	
FR21402.32	Niskin3m	13	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	3	meso	
FR21402.33	Secchi	12	13	HH-7	2	8	1949	S	43.9997	-125.1990	1705	5	meso	
FR21402.34	Neuston	13	13	HH-7	2	8	1958	S	43.9987	-125.1983	1711	0	meso	
FR21402.35	Trawl	12	13	HH-7	2	8	2034	S	44.0108	-125.1980	1790	18	meso	
FR21402.35	Trawl	12	13	HH-7	2	8	2104	E	43.9822	-125.2027	1858	18	meso	
FR21502.01	CTD	14	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	45	meso	
FR21502.02	Niskin3m	14	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	3	meso	
FR21502.03	Secchi	13	14	UR-1	3	8	0627	S	43.7552	-124.5313	50	5	meso	
FR21502.04	Neuston	14	14	UR-1	3	8	0634	S	43.7532	-124.2290	47	0	meso	
FR21502.05	Trawl	13	14	UR-1	3	8	0700	S	43.7400	-124.2313	45	18	meso	Short tow, haul full of jellyfish.
FR21502.05	Trawl	13	14	UR-1	3	8	0714	E	43.7513	-124.2317	50	18	meso	Short tow, haul full of jellyfish.
FR21502.06	CTD	15	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	95	meso	
FR21502.07	Niskin3m	15	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	3	meso	
FR21502.08	Secchi	14	15	UR-2	3	8	0804	S	43.7508	-124.3200	101	12	meso	
FR21502.09	Neuston	15	15	UR-2	3	8	0812	S	43.7498	-124.3190	101	0	meso	
FR21502.10	Trawl	14	15	UR-2	3	8	0839	S	43.7617	-124.3223	101	18	meso	
FR21502.10	Trawl	14	15	UR-2	3	8	0909	E	43.7335	-124.3120	100	18	meso	
FR21502.11	CTD	16	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	100	meso	
FR21502.12	Niskin3m	16	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	3	meso	
FR21502.13	Secchi	15	16	UR-3	3	8	0956	S	43.7507	-124.3998	112	6	meso	
FR21502.14	Neuston	16	16	UR-3	3	8	1006	S	43.7490	-124.3985	112	0	meso	
FR21502.15	Trawl	15	16	UR-3	3	8	1034	S	43.7613	-124.4030	112	18	meso	
FR21502.15	Trawl	15	16	UR-3	3	8	1104	E	43.7292	-124.3912	112	18	meso	
FR21502.16	CTD	17	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	100	meso	
FR21502.17	Niskin3m	17	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21502.18	Secchi	16	17	UR-4	3	8	1143	S	43.7500	-124.4697	125	7	meso	
FR21502.19	Neuston	17	17	UR-4	3	8	1152	S	43.7480	-124.4697	125	0	meso	
FR21502.20	Trawl	16	17	UR-4	3	8	1218	S	43.7605	-124.4682	125	18	meso	
FR21502.20	Trawl	16	17	UR-4	3	8	1248	E	43.7265	-124.4703	119	18	meso	
FR21502.21	CTD	18	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	100	meso	
FR21502.22	Niskin3m	18	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	3	meso	
FR21502.23	Secchi	17	18	UR-5	3	8	1321	S	43.7500	-124.5287	165	5	meso	
FR21502.24	Neuston	18	18	UR-5	3	8	1339	S	43.7530	-124.5297	165	0	meso	
FR21502.25	Trawl	17	18	UR-5	3	8	1404	S	43.7603	-124.5288	164	18	meso	
FR21502.25	Trawl	17	18	UR-5	3	8	1434	E	43.7258	-124.5357	174	18	meso	
FR21502.26	CTD	19	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	100	meso	
FR21502.27	Niskin3m	19	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	3	meso	
FR21502.28	Secchi	18	19	UR-6	3	8	1506	S	43.7500	-124.5992	253	7	meso	
FR21502.29	Neuston	19	19	UR-6	3	8	1517	S	43.7498	-124.6002	255	0	meso	
FR21502.30	Trawl	18	19	UR-6	3	8	1542	S	43.7627	-124.5995	253	18	meso	
FR21502.30	Trawl	18	19	UR-6	3	8	1612	E	43.7303	-124.5980	252	18	meso	
FR21502.31	CTD	20	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	100	meso	
FR21502.32	Niskin3m	20	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	3	meso	
FR21502.33	Secchi	19	20	UR-7	3	8	1649	S	43.7505	-124.6793	427	5	meso	
FR21502.34	Neuston	20	20	UR-7	3	8	1658	S	43.7502	-124.6777	422	0	meso	
FR21502.35	Trawl	19	20	UR-7	3	8	1724	S	43.7630	-124.6873	443	18	meso	
FR21502.35	Trawl	19	20	UR-7	3	8	1754	E	43.7345	-124.6700	406	18	meso	
FR21602.01	CTD	21	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	30	meso	
FR21602.02	Niskin3m	21	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	3	meso	
FR21602.03	Secchi	20	21	RR-1	4	8	0626	S	42.4998	-124.4983	32	4	meso	
FR21602.04	Neuston	21	21	RR-1	4	8	0632	S	42.5000	-124.4963	31	0	meso	
FR21602.05	Trawl	20	21	RR-1	4	8	0658	S	42.4892	-124.4947	31	18	meso	
FR21602.05	Trawl	20	21	RR-1	4	8	0728	E	42.5192	-124.5023	36	18	meso	
FR21602.06	CTD	22	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	80	meso	
FR21602.07	Niskin3m	22	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	3	meso	
FR21602.08	Secchi	21	22	RR-2	4	8	0809	S	42.5005	-124.6003	83	10	meso	
FR21602.09	Neuston	22	22	RR-2	4	8	0816	S	42.5012	-124.5990	83	0	meso	
FR21602.10	Trawl	21	22	RR-2	4	8	0852	S	42.5145	-124.6020	86	18	meso	
FR21602.10	Trawl	21	22	RR-2	4	8	0922	E	42.4882	-124.5958	80	18	meso	
FR21602.11	CTD	23	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	100	meso	
FR21602.12	Niskin3m	23	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	3	meso	
FR21602.13	Secchi	22	23	RR-3	4	8	1005	S	42.5008	-124.6993	132	12	meso	
FR21602.14	Neuston	23	23	RR-3	4	8	1015	S	42.5018	-124.6972	128	0	meso	
FR21602.15	Trawl	22	23	RR-3	4	8	1039	S	42.5102	-124.6922	138	18	meso	
FR21602.15	Trawl	22	23	RR-3	4	8	1109	E	42.4855	-124.7067	121	18	meso	
FR21602.16	CTD	24	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	100	meso	
FR21602.17	Niskin3m	24	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	3	meso	
FR21602.18	Secchi	23	24	RR-4	4	8	1200	S	42.5002	-124.7998	600	13	meso	
FR21602.19	Neuston	24	24	RR-4	4	8	1211	S	42.4993	-124.7978	577	0	meso	
FR21602.20	Trawl	23	24	RR-4	4	8	1244	S	42.5122	-124.7870	556	18	meso	
FR21602.20	Trawl	23	24	RR-4	4	8	1314	E	42.4898	-124.8110	510	18	meso	
FR21602.21	CTD	25	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	100	meso	
FR21602.22	Niskin3m	25	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21602.23	Secchi	24	25	RR-5	4	8	1352	S	42.5000	-124.8987	1164	11	meso	
FR21602.24	Neuston	25	25	RR-5	4	8	1401	S	42.5012	-124.8973	1171	0	meso	
FR21602.25	Trawl	24	25	RR-5	4	8	1426	S	42.5152	-124.8972	1155	18	meso	
FR21602.25	Trawl	24	25	RR-5	4	8	1456	E	42.4873	-124.8995	1113	18	meso	
FR21602.26	CTD	26	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	100	meso	
FR21602.27	Niskin3m	26	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	3	meso	
FR21602.28	Secchi	25	26	RR-6	4	8	1538	S	42.4995	-124.9988	1785	10	meso	
FR21602.29	Neuston	26	26	RR-6	4	8	1547	S	42.4978	-124.9975	1795	0	meso	
FR21602.30	Trawl	25	26	RR-6	4	8	1614	S	42.5087	-125.0058	1811	18	meso	
FR21602.30	Trawl	25	26	RR-6	4	8	1644	E	42.4780	-124.9813	1713	18	meso	
FR21602.31	CTD	27	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	100	meso	
FR21602.32	Niskin3m	27	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	3	meso	
FR21602.33	Secchi	26	27	RR-7	4	8	1803	S	42.5003	-125.1950	2843	14	meso	
FR21602.34	Neuston	27	27	RR-7	4	8	1810	S	42.5022	-125.1915	2955	0	meso	
FR21602.35	Trawl	26	27	RR-7	4	8	1844	S	42.5122	-125.1910	3000	18	meso	
FR21602.35	Trawl	26	27	RR-7	4	8	1914	E	42.4897	-125.2023	-9999	18	meso	
FR21702.01	CTD	28	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	30	meso	
FR21702.02	Niskin3m	28	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	3	meso	
FR21702.03	Secchi	27	28	CR-1	5	8	0633	S	41.9037	-124.2998	35	5	meso	
FR21702.04	Neuston	28	28	CR-1	5	8	0641	S	41.9042	-124.2977	35	0	meso	
FR21702.05	Trawl	27	28	CR-1	5	8	0709	S	41.8870	-124.2930	33	18	meso	Haul ended early because full of Aurelia and slowed the vessel.
FR21702.05	Trawl	27	28	CR-1	5	8	0720	E	41.8989	-124.2987	35	18	meso	Haul ended early because full of Aurelia and slowed the vessel.
FR21702.06	CTD	29	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	60	meso	
FR21702.07	Niskin3m	29	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	3	meso	
FR21702.08	Secchi	28	29	CR-2	5	8	0814	S	41.8998	-124.4002	64	7	meso	
FR21702.09	Neuston	29	29	CR-2	5	8	0824	S	41.9008	-124.3980	63	0	meso	
FR21702.10	Trawl	28	29	CR-2	5	8	0857	S	41.8953	-124.3947	61	18	meso	
FR21702.10	Trawl	28	29	CR-2	5	8	0927	E	41.9205	-124.4137	71	18	meso	
FR21702.11	CTD	30	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	100	meso	
FR21702.12	Niskin3m	30	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	3	meso	
FR21702.13	Secchi	29	30	CR-3	5	8	1011	S	41.9008	-124.4990	131	15	meso	
FR21702.14	Neuston	30	30	CR-3	5	8	1022	S	41.9027	-124.4957	127	0	meso	
FR21702.15	Trawl	29	30	CR-3	5	8	1048	S	41.9160	-124.5062	132	18	meso	
FR21702.15	Trawl	29	30	CR-3	5	8	1118	E	41.8907	-124.4958	134	18	meso	
FR21702.16	CTD	31	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	100	meso	
FR21702.17	Niskin3m	31	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	3	meso	
FR21702.18	Secchi	30	31	CR-4	5	8	1203	S	41.9012	-124.5982	498	10	meso	
FR21702.19	Neuston	31	31	CR-4	5	8	1213	S	41.9030	-124.5940	481	0	meso	
FR21702.20	Trawl	30	31	CR-4	5	8	1237	S	41.9110	-124.5935	467	18	meso	
FR21702.20	Trawl	30	31	CR-4	5	8	1307	E	41.8883	-124.6078	540	18	meso	
FR21702.21	CTD	32	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	100	meso	
FR21702.22	Niskin3m	32	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	3	meso	
FR21702.23	Secchi	31	32	CR-5	5	8	1348	S	41.9010	-124.7012	659	11	meso	
FR21702.24	Neuston	32	32	CR-5	5	8	1357	S	41.9020	-124.6992	658	0	meso	
FR21702.25	Trawl	31	32	CR-5	5	8	1428	S	41.9083	-124.6935	655	18	meso	
FR21702.25	Trawl	31	32	CR-5	5	8	1458	E	41.8858	-124.7072	668	18	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21702.26	CTD	33	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	100	meso	
FR21702.27	Niskin3m	33	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	3	meso	
FR21702.28	Secchi	32	33	CR-6	5	8	1539	S	41.9008	-124.7985	700	12	meso	
FR21702.29	Neuston	33	33	CR-6	5	8	1548	S	41.9023	-124.7955	700	0	meso	
FR21702.30	Trawl	32	33	CR-6	5	8	1613	S	41.9128	-124.7993	708	18	meso	
FR21702.30	Trawl	32	33	CR-6	5	8	1643	E	41.8848	-124.7968	693	18	meso	
FR21702.31	CTD	34	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	100	meso	
FR21702.32	Niskin3m	34	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	3	meso	
FR21702.33	Secchi	33	34	CR-7	5	8	1757	S	41.9002	-125.0000	840	12	meso	
FR21702.34	Neuston	34	34	CR-7	5	8	1807	S	41.9012	-124.9997	839	0	meso	Cod end broke, needed to redo.
FR21702.35	Neuston	35	34	CR-7	5	8	1830	S	41.9173	-125.0003	856	0	meso	Had to redo, cod end broke.
FR21702.36	Trawl	33	34	CR-7	5	8	1849	S	41.9148	-125.0017	853	18	meso	
FR21702.36	Trawl	33	34	CR-7	5	8	1919	E	41.8882	-124.9998	873	18	meso	
FR21802.01	CTD	35	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	25	meso	
FR21802.02	Niskin3m	35	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	3	meso	
FR21802.03	Secchi	34	35	FM-1	6	8	0625	S	43.2218	-124.4307	29	4	meso	
FR21802.04	Neuston	36	35	FM-1	6	8	0635	S	43.2218	-124.4315	29	0	meso	
FR21802.05	Trawl	34	35	FM-1	6	8	0657	S	43.2173	-124.4468	39	18	meso	
FR21802.05	Trawl	34	35	FM-1	6	8	0727	E	43.1932	-124.4565	42	18	meso	
FR21802.06	CTD	36	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	50	meso	
FR21802.07	Niskin3m	36	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	3	meso	
FR21802.08	Secchi	35	36	FM-3	6	8	0758	S	43.2223	-124.5005	52	5	meso	
FR21802.09	Neuston	37	36	FM-3	6	8	0806	S	43.2173	-124.5005	53	0	meso	
FR21802.10	Trawl	35	36	FM-3	6	8	0832	S	43.2092	-124.4985	63	18	meso	
FR21802.10	Trawl	35	36	FM-3	6	8	0902	E	43.2370	-124.5010	58	18	meso	
FR21802.11	CTD	37	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	80	meso	
FR21802.12	Niskin3m	37	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	3	meso	
FR21802.13	Secchi	36	37	FM-4	6	8	0938	S	43.2215	-124.5807	85	11	meso	
FR21802.14	Neuston	38	37	FM-4	6	8	0946	S	43.2222	-124.5787	83	0	meso	
FR21802.15	Trawl	36	37	FM-4	6	8	1011	S	43.2322	-124.5803	88	18	meso	
FR21802.15	Trawl	36	37	FM-4	6	8	1041	E	43.2037	-124.5770	80	18	meso	
FR21802.16	CTD	38	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	100	meso	
FR21802.17	Niskin3m	38	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	3	meso	
FR21802.18	Secchi	37	38	FM-5	6	8	1125	S	43.2208	-124.6688	156	7	meso	
FR21802.19	Neuston	39	38	FM-5	6	8	1134	S	43.2218	-124.6675	154	0	meso	
FR21802.20	Trawl	37	38	FM-5	6	8	1158	S	43.2325	-124.6707	151	18	meso	
FR21802.20	Trawl	37	38	FM-5	6	8	1228	E	43.2057	-124.6690	158	18	meso	
FR21802.21	CTD	39	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	100	meso	
FR21802.22	Niskin3m	39	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	3	meso	
FR21802.23	Secchi	38	39	FM-6	6	8	1307	S	43.2197	-124.7502	311	3	meso	
FR21802.24	Neuston	40	39	FM-6	6	8	1318	S	43.2193	-124.7498	309	0	meso	
FR21802.25	Trawl	38	39	FM-6	6	8	1347	S	43.2282	-124.7580	332	18	meso	
FR21802.25	Trawl	38	39	FM-6	6	8	1417	E	43.2048	-124.7328	247	18	meso	
FR21802.26	CTD	40	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	100	meso	
FR21802.27	Niskin3m	40	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	3	meso	
FR21802.28	Secchi	39	40	FM-7	6	8	1506	S	43.2197	-124.8308	347	4	meso	
FR21802.29	Neuston	41	40	FM-7	6	8	1516	S	43.2190	-124.8292	348	0	meso	
FR21802.30	Trawl	39	40	FM-7	6	8	1541	S	43.2327	-124.8353	352	18	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR21802.30	Trawl	39	40	FM-7	6	8	1611	E	43.2042	-124.8183	343	18	meso	
FR21802.31	CTD	41	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	100	meso	
FR21802.32	Niskin3m	41	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	3	meso	
FR21802.33	Secchi	40	41	FM-8	6	8	1720	S	43.2203	-124.9987	1089	9	meso	
FR21802.34	Neuston	42	41	FM-8	6	8	1730	S	43.2195	-124.9968	1088	0	meso	
FR21802.35	Trawl	40	41	FM-8	6	8	1755	S	43.2307	-125.0080	1086	18	meso	
FR21802.35	Trawl	40	41	FM-8	6	8	1825	E	43.2065	-124.9887	1076	18	meso	
FR21902.01	Tucker_3	1	42	HH-2A	7	8	0732	S	43.9975	-124.3995	116	0	NFS	
FR21902.02	CTD	42	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	100	NFS	
FR21902.03	Niskin3m	42	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	3	NFS	
FR21902.04	Secchi	41	42	HH-2A	7	8	0816	S	44.0003	-124.3980	116	3	NFS	
FR21902.05	Neuston	43	42	HH-2A	7	8	0825	S	43.9997	-124.3967	115	0	NFS	
FR21902.06	Trawl	41	42	HH-2A	7	8	0851	S	44.0120	-124.4053	116	18	NFS	
FR21902.06	Trawl	41	42	HH-2A	7	8	0921	E	43.9825	-124.3933	115	18	NFS	
FR21902.07	CTD	43	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	100	NFS	
FR21902.08	Niskin3m	43	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	3	NFS	
FR21902.09	Secchi	42	43	HH-2B	7	8	1227	S	43.9980	-124.4023	118	3	NFS	
FR21902.10	Neuston	44	43	HH-2B	7	8	1237	S	43.9980	-124.4005	117	0	NFS	
FR21902.11	Tucker_3	2	43	HH-2B	7	8	1245	S	44.0018	-124.4003	118	0	NFS	
FR21902.12	Trawl	42	43	HH-2B	7	8	1321	S	44.0113	-124.4023	117	18	NFS	
FR21902.12	Trawl	42	43	HH-2B	7	8	1351	E	43.9833	-124.3960	117	18	NFS	
FR21902.13	CTD	44	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	100	NFS	
FR21902.14	Niskin3m	44	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	3	NFS	
FR21902.15	Secchi	43	44	HH-2C	7	8	1627	S	44.0003	-124.3990	116	3	NFS	
FR21902.16	Neuston	45	44	HH-2C	7	8	1637	S	43.9980	-124.3968	116	0	NFS	
FR21902.17	Tucker_3	3	44	HH-2C	7	8	1650	S	44.0053	-124.4008	116	0	NFS	
FR21902.18	Trawl	43	44	HH-2C	7	8	1725	S	44.0127	-124.4090	117	18	NFS	
FR21902.18	Trawl	43	44	HH-2C	7	8	1755	E	43.9840	-124.3920	116	18	NFS	
FR21902.19	CTD	45	45	HH-2D	7	8	2132	S	43.9995	-124.4007	118	100	NFS	
FR21902.20	Niskin3m	45	45	HH-2D	7	8	2132	S	43.9995	-124.4007	118	3	NFS	
FR21902.21	Neuston	46	45	HH-2D	7	8	2142	S	43.9978	-124.3993	118	0	NFS	
FR21902.22	Tucker_3	4	45	HH-2D	7	8	2158	S	44.0077	-124.4007	117	0	NFS	
FR21902.23	Trawl	44	45	HH-2D	7	8	2235	S	44.0117	-124.4058	118	18	NFS	
FR21902.23	Trawl	44	45	HH-2D	7	8	2305	E	43.9835	-124.3927	117	18	NFS	
FR22002.01	CTD	46	46	HH-2E	8	8	0127	S	44.0020	-124.4000	117	100	NFS	
FR22002.02	Niskin3m	46	46	HH-2E	8	8	0127	S	44.0020	-124.4000	117	3	NFS	
FR22002.03	Neuston	47	46	HH-2E	8	8	0138	S	43.9998	-124.3988	117	0	NFS	
FR22002.04	Tucker_3	5	46	HH-2E	8	8	0150	S	44.0067	-124.3995	117	0	NFS	Net ripped, so no Tuckers for the remainder of the cruise.
FR22002.05	Trawl	45	46	HH-2E	8	8	0221	S	44.0122	-124.4020	117	18	NFS	
FR22002.05	Trawl	45	46	HH-2E	8	8	0251	E	43.9820	-124.3977	116	18	NFS	
FR22002.06	CTD	47	47	HH-2F	8	8	0522	S	43.9993	-124.3990	115	100	NFS	
FR22002.07	Niskin3m	47	47	HH-2F	8	8	0522	S	43.9993	-124.3990	115	3	NFS	
FR22002.08	Neuston	48	47	HH-2F	8	8	0532	S	43.9978	-124.3978	114	0	NFS	
FR22002.09	Trawl	46	47	HH-2F	8	8	0559	S	44.0087	-124.4000	114	18	NFS	
FR22002.09	Trawl	46	47	HH-2F	8	8	0629	E	43.9828	-124.3933	114	18	NFS	
FR22002.10	CTD	48	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	100	NFS	
FR22002.11	Niskin3m	48	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	3	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22002.12	Secchi	44	48	HH-2G	8	8	0925	S	44.0000	-124.3985	116	3	NFS	
FR22002.13	Neuston	49	48	HH-2G	8	8	0936	S	44.0000	-124.3965	116	0	NFS	
FR22002.14	Trawl	47	48	HH-2G	8	8	1000	S	44.0122	-124.4000	116	18	NFS	
FR22002.14	Trawl	47	48	HH-2G	8	8	1030	E	43.9843	-124.4007	117	18	NFS	
FR22102.01	CTD	49	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	75	NFS	
FR22102.02	Niskin3m	49	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	3	NFS	
FR22102.03	Secchi	45	49	2A-3	9	8	1340	S	44.4008	-124.4100	77	3	NFS	
FR22102.04	Neuston	50	49	2A-3	9	8	1352	S	44.3998	-124.4095	77	0	NFS	
FR22102.05	Trawl	48	49	2A-3	9	8	1415	S	44.4100	-124.4112	76	18	NFS	
FR22102.05	Trawl	48	49	2A-3	9	8	1445	E	44.3815	-124.4078	77	18	NFS	
FR22102.06	CTD	50	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	85	NFS	
FR22102.07	Niskin3m	50	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	3	NFS	
FR22102.08	Secchi	46	50	2A-4	9	8	1529	S	44.4005	-124.5192	91	3	NFS	
FR22102.09	Neuston	51	50	2A-4	9	8	1536	S	44.4002	-124.5185	90	0	NFS	
FR22102.10	Trawl	49	50	2A-4	9	8	1604	S	44.4108	-124.5233	93	18	NFS	
FR22102.10	Trawl	49	50	2A-4	9	8	1634	E	44.3847	-124.5137	90	18	NFS	
FR22102.11	CTD	51	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	60	NFS	
FR22102.12	Niskin3m	51	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	3	NFS	
FR22102.13	Secchi	47	51	2A-2	9	8	1753	S	44.4022	-124.2943	66	3	NFS	
FR22102.14	Neuston	52	51	2A-2	9	8	1759	S	44.4017	-124.2938	65	0	NFS	
FR22102.15	Trawl	50	51	2A-2	9	8	1830	S	44.4235	-124.2963	66	18	NFS	
FR22102.15	Trawl	50	51	2A-2	9	8	1900	E	44.3920	-124.2907	66	18	NFS	
FR22102.16	CTD	52	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	45	NFS	
FR22102.17	Niskin3m	52	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	3	NFS	
FR22102.18	Secchi	48	52	2A-1	9	8	1953	S	44.4012	-124.1755	47	4	NFS	
FR22102.19	Neuston	53	52	2A-1	9	8	1958	S	44.4023	-124.1743	45	0	NFS	
FR22102.20	Trawl	51	52	2A-1	9	8	2024	S	44.4123	-124.1738	46	18	NFS	Hauled back early; full of Chrysaora.
FR22102.20	Trawl	51	52	2A-1	9	8	2040	E	44.3990	-124.1748	47	18	NFS	Hauled back early; full of Chrysaora.
FR22202.01	CTD	53	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	100	NFS	
FR22202.02	Niskin3m	53	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	3	NFS	
FR22202.03	Secchi	49	53	BOB-5	10	8	0701	S	44.2687	-124.9017	188	3	NFS	
FR22202.04	Neuston	54	53	BOB-5	10	8	0710	S	44.2677	-124.9017	186	0	NFS	
FR22202.05	Trawl	52	53	BOB-5	10	8	0745	S	44.2802	-124.8957	199	18	NFS	
FR22202.05	Trawl	52	53	BOB-5	10	8	0815	E	44.2535	-124.9147	170	18	NFS	
FR22202.06	CTD	54	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	65	NFS	
FR22202.07	Niskin3m	54	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	3	NFS	
FR22202.08	Secchi	50	54	BOB-4	10	8	0936	S	44.2803	-124.7008	70	2	NFS	
FR22202.09	Neuston	55	54	BOB-4	10	8	0944	S	44.2802	-124.7005	70	0	NFS	
FR22202.10	Trawl	53	54	BOB-4	10	8	1009	S	44.2917	-124.7007	70	18	NFS	
FR22202.10	Trawl	53	54	BOB-4	10	8	1039	E	44.2642	-124.7020	88	18	NFS	
FR22202.11	CTD	55	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	95	NFS	
FR22202.12	Niskin3m	55	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	3	NFS	
FR22202.13	Secchi	51	55	BOB-3	10	8	1155	S	44.2807	-124.5008	97	3	NFS	
FR22202.14	Neuston	56	55	BOB-3	10	8	1205	S	44.2802	-124.4998	97	0	NFS	
FR22202.15	Trawl	54	55	BOB-3	10	8	1239	S	44.2917	-124.4995	97	18	NFS	
FR22202.15	Trawl	54	55	BOB-3	10	8	1309	E	44.2637	-124.5008	102	18	NFS	
FR22202.16	CTD	56	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	80	NFS	
FR22202.17	Niskin3m	56	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	3	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22202.18	Secchi	52	56	BOB-2	10	8	1359	S	44.2705	-124.3695	84	3	NFS	
FR22202.19	Neuston	57	56	BOB-2	10	8	1407	S	44.2700	-124.3677	83	0	NFS	
FR22202.20	Trawl	55	56	BOB-2	10	8	1433	S	44.2817	-124.3762	84	18	NFS	
FR22202.20	Trawl	55	56	BOB-2	10	8	1503	E	44.2548	-124.3618	85	18	NFS	
FR22202.21	CTD	57	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	35	NFS	
FR22202.22	Niskin3m	57	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	3	NFS	
FR22202.23	Secchi	53	57	BOB-1	10	8	1617	S	44.2788	-124.1525	40	8	NFS	
FR22202.24	Neuston	58	57	BOB-1	10	8	1622	S	44.2772	-124.1513	39	0	NFS	Tow was redone as it was forgotten to record the ending revolution number.
FR22202.25	Neuston	59	57	BOB-1	10	8	1648	S	44.2602	-124.1538	40	0	NFS	A redo of the previous tow.
FR22202.26	Trawl	56	57	BOB-1	10	8	1710	S	44.2765	-124.1543	40	18	NFS	Hauled back early; lots of Chrysaora.
FR22202.26	Trawl	56	57	BOB-1	10	8	1725	E	44.2885	-124.1552	40	18	NFS	Hauled back early; lots of Chrysaora.
FR22202.27	CTD	58	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	100	NFS	
FR22202.28	Niskin3m	58	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	3	NFS	
FR22202.29	Secchi	54	58	HH-2H	10	8	1949	S	43.9980	-124.4020	117	3	NFS	
FR22202.30	Neuston	60	58	HH-2H	10	8	1958	S	43.9955	-124.4023	116	0	NFS	
FR22202.31	Trawl	57	58	HH-2H	10	8	2024	S	44.0077	-124.4008	115	18	NFS	
FR22202.31	Trawl	57	58	HH-2H	10	8	2054	E	43.9760	-124.3998	116	18	NFS	
FR22302.01	CTD	59	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	100	NFS	
FR22302.02	Niskin3m	59	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	3	NFS	
FR22302.03	Secchi	55	59	4A-6	11	8	0700	S	43.8482	-124.7333	333	4	NFS	
FR22302.04	Neuston	61	59	4A-6	11	8	0708	S	43.8463	-124.7323	338	0	NFS	
FR22302.05	Trawl	58	59	4A-6	11	8	0754	S	43.8605	-124.7297	298	18	NFS	
FR22302.05	Trawl	58	59	4A-6	11	8	0824	E	43.8312	-124.7315	380	18	NFS	
FR22302.06	CTD	60	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	100	NFS	
FR22302.07	Niskin3m	60	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	3	NFS	
FR22302.08	Secchi	56	60	4A-5	11	8	0916	S	43.8500	-124.6175	269	3	NFS	
FR22302.09	Neuston	62	60	4A-5	11	8	0926	S	43.8487	-124.6150	266	0	NFS	
FR22302.10	Trawl	59	60	4A-5	11	8	0950	S	43.8608	-124.6162	261	18	NFS	
FR22302.10	Trawl	59	60	4A-5	11	8	1020	E	43.8330	-124.6150	271	18	NFS	
FR22302.11	CTD	61	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	100	NFS	
FR22302.12	Niskin3m	61	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	3	NFS	
FR22302.13	Secchi	57	61	4A-4	11	8	1103	S	43.8492	-124.5168	143	3	NFS	
FR22302.14	Neuston	63	61	4A-4	11	8	1112	S	43.8475	-124.5135	141	0	NFS	
FR22302.15	Trawl	60	61	4A-4	11	8	1137	S	43.8588	-124.5172	140	18	NFS	
FR22302.15	Trawl	60	61	4A-4	11	8	1207	E	43.8303	-124.5128	138	18	NFS	
FR22302.16	CTD	62	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	100	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.17	Niskin3m	62	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.18	Secchi	58	62	HH-3.5	11	8	1403	S	43.9997	-124.6990	105	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.19	Neuston	64	62	HH-3.5	11	8	1412	S	43.9983	-124.6973	108	0	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.20	Trawl	61	62	HH-3.5	11	8	1439	S	44.0103	-124.6990	120	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.20	Trawl	61	62	HH-3.5	11	8	1509	E	43.9817	-124.6978	127	18	NFS	Station is between the regular HH-3 and HH-4 stations.

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22302.21	Trawl	62	63	HH-3.5A	11	8	1735	S	43.9725	-124.6983	127	78	NFS	Wire out 300 m headrope, ~60 m depth. Between HH-3 and HH-4.
FR22302.21	Trawl	62	63	HH-3.5A	11	8	1855	E	43.9898	-124.7028	117	78	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.22	Trawl	63	64	HH-3.5B	11	8	2105	S	43.9395	-124.7005	158	93	NFS	Wire out 175 fm headrope, 75 m depth. Between HH-3 and HH-4.
FR22302.22	Trawl	63	64	HH-3.5B	11	8	2153	E	43.9800	-124.7162	129	93	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.23	Trawl	64	65	HH-3.5C	11	8	2234	S	43.9638	-124.7102	129	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.23	Trawl	64	65	HH-3.5C	11	8	2304	E	43.9380	-124.6992	164	18	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.24	Neuston	65	65	HH-3.5C	11	8	2321	S	43.9343	-124.6960	170	0	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.25	CTD	63	65	HH-3.5C	11	8	2333	S	43.9392	-124.6978	162	100	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22302.26	Niskin3m	63	65	HH-3.5C	11	8	2333	S	43.9392	-124.6978	162	3	NFS	Station is between the regular HH-3 and HH-4 stations.
FR22402.01	CTD	64	66	6-5	12	8	0857	S	43.5000	-124.6767	392	100	NFS	
FR22402.02	Niskin3m	64	66	6-5	12	8	0857	S	43.5000	-124.6767	392	3	NFS	
FR22402.03	Secchi	59	66	6-5	12	8	0857	S	43.5000	-124.6767	392	4	NFS	
FR22402.04	Neuston	66	66	6-5	12	8	0906	S	43.4978	-124.6778	395	0	NFS	
FR22402.05	Trawl	65	66	6-5	12	8	0940	S	43.5037	-124.6790	402	18	NFS	
FR22402.05	Trawl	65	66	6-5	12	8	1010	E	43.4757	-124.6988	438	18	NFS	
FR22402.06	CTD	65	67	6-4	12	8	1107	S	43.5012	-124.5837	184	100	NFS	
FR22402.07	Niskin3m	65	67	6-4	12	8	1107	S	43.5012	-124.5837	184	3	NFS	
FR22402.08	Secchi	60	67	6-4	12	8	1107	S	43.5012	-124.5837	184	7	NFS	
FR22402.09	Neuston	67	67	6-4	12	8	1118	S	43.4985	-124.5828	182	0	NFS	
FR22402.10	Trawl	66	67	6-4	12	8	1147	S	43.5067	-124.5830	186	18	NFS	
FR22402.10	Trawl	66	67	6-4	12	8	1217	E	43.4747	-124.5812	160	18	NFS	
FR22402.11	CTD	66	68	6-3	12	8	1302	S	43.5017	-124.4893	124	100	NFS	
FR22402.12	Niskin3m	66	68	6-3	12	8	1302	S	43.5017	-124.4893	124	3	NFS	
FR22402.13	Secchi	61	68	6-3	12	8	1302	S	43.5017	-124.4893	124	9	NFS	Secchi kept going under boat during measure; could be underestimated.
FR22402.14	Neuston	68	68	6-3	12	8	1311	S	43.4998	-124.4887	124	0	NFS	
FR22402.15	Trawl	67	68	6-3	12	8	1343	S	43.5065	-124.4907	127	18	NFS	
FR22402.15	Trawl	67	68	6-3	12	8	1413	E	43.4770	-124.4897	118	18	NFS	
FR22402.16	CTD	67	69	6-2	12	8	1457	S	43.5012	-124.3938	104	100	NFS	
FR22402.17	Niskin3m	67	69	6-2	12	8	1457	S	43.5012	-124.3938	104	3	NFS	
FR22402.18	Secchi	62	69	6-2	12	8	1457	S	43.5012	-124.3938	104	12	NFS	
FR22402.19	Neuston	69	69	6-2	12	8	1506	S	43.5000	-124.3927	104	0	NFS	
FR22402.20	Trawl	68	69	6-2	12	8	1535	S	43.5093	-124.3943	105	18	NFS	
FR22402.20	Trawl	68	69	6-2	12	8	1605	E	43.4810	-124.3922	100	18	NFS	
FR22402.21	CTD	68	70	6-1	12	8	1649	S	43.4993	-124.3012	56	50	NFS	
FR22402.22	Niskin3m	68	70	6-1	12	8	1649	S	43.4993	-124.3012	56	3	NFS	
FR22402.23	Secchi	63	70	6-1	12	8	1649	S	43.4993	-124.3012	56	9	NFS	
FR22402.24	Neuston	70	70	6-1	12	8	1655	S	43.4987	-124.3008	56	0	NFS	
FR22402.25	Trawl	69	70	6-1	12	8	1720	S	43.5090	-124.3037	69	18	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22402.25	Trawl	69	70	6-1	12	8	1750	E	43.4833	-124.3192	68	18	NFS	
FR22402.26	Trawl	70	71	7A-2	12	8	2047	S	43.0888	-124.5992	109	18	NFS	
FR22402.26	Trawl	70	71	7A-2	12	8	2117	E	43.0605	-124.6008	112	18	NFS	
FR22402.27	Neuston	71	71	7A-2	12	8	2132	S	43.0565	-124.6020	112	0	NFS	
FR22402.28	CTD	69	71	7A-2	12	8	2144	S	43.0627	-124.6010	112	100	NFS	
FR22402.29	Niskin3m	69	71	7A-2	12	8	2144	S	43.0627	-124.6010	112	3	NFS	
FR22502.01	CTD	70	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	100	NFS	
FR22502.02	Niskin3m	70	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	3	NFS	
FR22502.03	Secchi	64	72	7A-3	13	8	0658	S	43.0832	-124.7100	176	9	NFS	
FR22502.04	Neuston	72	72	7A-3	13	8	0706	S	43.0820	-124.7102	175	0	NFS	
FR22502.05	Trawl	71	72	7A-3	13	8	0732	S	43.0952	-124.7088	186	18	NFS	
FR22502.05	Trawl	71	72	7A-3	13	8	0802	E	43.0660	-124.7098	162	18	NFS	
FR22502.06	Trawl	72	73	7A-4	13	8	0915	S	43.0635	-124.8028	94	18	NFS	
FR22502.06	Trawl	72	73	7A-4	13	8	0945	E	43.0888	-124.7997	122	18	NFS	
FR22502.07	CTD	71	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	100	NFS	
FR22502.08	Niskin3m	71	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	3	NFS	
FR22502.09	Secchi	65	73	7A-4	13	8	0959	S	43.0942	-124.7993	124	9	NFS	
FR22502.10	Neuston	73	73	7A-4	13	8	1008	S	43.0932	-124.7990	125	0	NFS	
FR22502.11	CTD	72	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	100	NFS	
FR22502.12	Niskin3m	72	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	3	NFS	
FR22502.13	Secchi	66	74	7A-5	13	8	1050	S	43.0843	-124.9087	525	9	NFS	
FR22502.14	Neuston	74	74	7A-5	13	8	1059	S	43.0848	-124.9082	522	0	NFS	
FR22502.15	Trawl	73	74	7A-5	13	8	1124	S	43.0938	-124.9088	536	18	NFS	
FR22502.15	Trawl	73	74	7A-5	13	8	1154	E	43.0688	-124.9065	500	18	NFS	
FR22502.16	CTD	73	75	8-7	13	8	1308	S	42.9505	-124.7797	156	100	NFS	
FR22502.17	Niskin3m	73	75	8-7	13	8	1308	S	42.9505	-124.7797	156	3	NFS	
FR22502.18	Secchi	67	75	8-7	13	8	1308	S	42.9505	-124.7797	156	4	NFS	
FR22502.19	Neuston	75	75	8-7	13	8	1317	S	42.9518	-124.7780	155	0	NFS	
FR22502.20	Trawl	74	75	8-7	13	8	1341	S	42.9618	-124.7768	153	18	NFS	
FR22502.20	Trawl	74	75	8-7	13	8	1411	E	42.9378	-124.7767	162	18	NFS	
FR22502.21	CTD	74	76	8-6	13	8	1444	S	42.9520	-124.7305	144	100	NFS	
FR22502.22	Niskin3m	74	76	8-6	13	8	1444	S	42.9520	-124.7305	144	3	NFS	
FR22502.23	Secchi	68	76	8-6	13	8	1444	S	42.9520	-124.7305	144	5	NFS	
FR22502.24	Neuston	76	76	8-6	13	8	1454	S	42.9508	-124.7282	143	0	NFS	
FR22502.25	Trawl	75	76	8-6	13	8	1531	S	42.9333	-124.7267	141	18	NFS	
FR22502.25	Trawl	75	76	8-6	13	8	1601	E	42.9627	-124.7295	145	18	NFS	
FR22502.26	CTD	75	77	8-9	13	8	1707	S	42.9515	-124.8680	171	100	NFS	
FR22502.27	Niskin3m	75	77	8-9	13	8	1707	S	42.9515	-124.8680	171	3	NFS	
FR22502.28	Secchi	69	77	8-9	13	8	1707	S	42.9515	-124.8680	171	4	NFS	
FR22502.29	Neuston	77	77	8-9	13	8	1716	S	42.9528	-124.8653	158	0	NFS	
FR22502.30	Trawl	76	77	8-9	13	8	1738	S	42.9633	-124.8667	175	18	NFS	
FR22502.30	Trawl	76	77	8-9	13	8	1808	E	42.9385	-124.8645	170	18	NFS	
FR22602.01	CTD	76	78	11-3	14	8	0722	S	42.2000	-124.6087	268	100	SFS	
FR22602.02	Niskin3m	76	78	11-3	14	8	0722	S	42.2000	-124.6087	268	3	SFS	
FR22602.03	Secchi	70	78	11-3	14	8	0722	S	42.2000	-124.6087	268	13	SFS	
FR22602.04	Neuston	78	78	11-3	14	8	0730	S	42.2002	-124.6083	266	0	SFS	
FR22602.05	Trawl	77	78	11-3	14	8	0755	S	42.2115	-124.6072	258	18	SFS	
FR22602.05	Trawl	77	78	11-3	14	8	0825	E	42.1832	-124.6085	266	18	SFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22602.06	CTD	77	79	11-4	14	8	0908	S	42.2000	-124.7082	549	100	SFS	
FR22602.07	Niskin3m	77	79	11-4	14	8	0908	S	42.2000	-124.7082	549	3	SFS	
FR22602.08	Secchi	71	79	11-4	14	8	0908	S	42.2000	-124.7082	549	14	SFS	
FR22602.09	Neuston	79	79	11-4	14	8	0919	S	42.2000	-124.7065	547	0	SFS	Cod end broke.
FR22602.10	Trawl	78	79	11-4	14	8	0952	S	42.2077	-124.7077	544	18	SFS	
FR22602.10	Trawl	78	79	11-4	14	8	1022	E	42.1782	-124.7107	564	18	SFS	
FR22602.11	Neuston	80	79	11-4	14	8	1036	S	42.1767	-124.7090	562	0	SFS	A redo of previous tow.
FR22602.12	CTD	78	80	11-5	14	8	1113	S	42.2003	-124.7987	655	100	SFS	
FR22602.13	Niskin3m	78	80	11-5	14	8	1113	S	42.2003	-124.7987	655	3	SFS	
FR22602.14	Secchi	72	80	11-5	14	8	1113	S	42.2003	-124.7987	655	13	SFS	13 - 14 m; water surface too ripply.
FR22602.15	Neuston	81	80	11-5	14	8	1122	S	42.2002	-124.7973	652	0	SFS	
FR22602.16	Trawl	79	80	11-5	14	8	1151	S	42.2160	-124.7985	601	18	SFS	
FR22602.16	Trawl	79	80	11-5	14	8	1221	E	42.1870	-124.7997	679	18	SFS	
FR22602.17	CTD	79	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	100	SFS	
FR22602.18	Niskin3m	79	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	3	SFS	
FR22602.19	Secchi	73	81	11-6	14	8	1309	S	42.2002	-124.9250	1032	8	SFS	
FR22602.20	Neuston	82	81	11-6	14	8	1319	S	42.2002	-124.9260	1030	0	SFS	
FR22602.21	Trawl	80	81	11-6	14	8	1343	S	42.2132	-124.9275	1034	18	SFS	
FR22602.21	Trawl	80	81	11-6	14	8	1413	E	42.1858	-124.9287	1045	18	SFS	
FR22602.22	CTD	80	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	100	SFS	No trawl or neuston. Too rough; heading inshore.
FR22602.23	Niskin3m	80	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	3	SFS	No trawl or neuston. Too rough; heading inshore.
FR22602.24	Secchi	74	82	10A-4	14	8	1612	S	42.3482	-124.7755	596	12	SFS	Too rough for good secchi measurement. No trawl or neuston. Heading inshore.
FR22602.25	CTD	81	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	100	SFS	
FR22602.26	Niskin3m	81	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	3	SFS	
FR22602.27	Secchi	75	83	10A-2	14	8	1732	S	42.3500	-124.5777	121	11	SFS	
FR22602.28	Trawl	81	83	10A-2	14	8	1759	S	42.3593	-124.5767	115	18	SFS	
FR22602.28	Trawl	81	83	10A-2	14	8	1829	E	42.3317	-124.5783	135	18	SFS	
FR22602.29	CTD	82	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	35	SFS	
FR22602.30	Niskin3m	82	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	3	SFS	
FR22602.31	Secchi	76	84	10A-1	14	8	1930	S	42.3528	-124.4712	41	2	SFS	
FR22602.32	Neuston	83	84	10A-1	14	8	1936	S	42.3543	-124.4693	39	0	SFS	Sample spilled.
FR22602.33	Trawl	82	84	10A-1	14	8	2000	S	42.3578	-124.4850	51	18	SFS	
FR22602.33	Trawl	82	84	10A-1	14	8	2030	E	42.3782	-124.5158	72	18	SFS	
FR22602.34	Neuston	84	84	10A-1	14	8	2051	S	42.3767	-124.5182	75	0	SFS	Redo. Contents from 2nd tow lost when leaked through bottom of cod end. No third try.
FR22702.01	CTD	83	85	9-4	15	8	0702	S	42.6635	-124.8353	691	100	SFS	
FR22702.02	Niskin3m	83	85	9-4	15	8	0702	S	42.6635	-124.8353	691	3	SFS	
FR22702.03	Secchi	77	85	9-4	15	8	0702	S	42.6635	-124.8353	691	8	SFS	
FR22702.04	Neuston	85	85	9-4	15	8	0711	S	42.6612	-124.8328	700	0	SFS	
FR22702.05	Trawl	83	85	9-4	15	8	0737	S	42.6508	-124.8253	690	18	SFS	
FR22702.05	Trawl	83	85	9-4	15	8	0807	E	42.6790	-124.8323	661	18	SFS	
FR22702.06	CTD	84	86	9-3	15	8	0859	S	42.6622	-124.7185	240	100	SFS	
FR22702.07	Niskin3m	84	86	9-3	15	8	0859	S	42.6622	-124.7185	240	3	SFS	
FR22702.08	Secchi	78	86	9-3	15	8	0859	S	42.6622	-124.7185	240	10	SFS	
FR22702.09	Neuston	86	86	9-3	15	8	0909	S	42.6610	-124.7172	239	0	SFS	
FR22702.10	Trawl	84	86	9-3	15	8	0933	S	42.6720	-124.7222	235	18	SFS	
FR22702.10	Trawl	84	86	9-3	15	8	1003	E	42.6455	-124.7148	316	18	SFS	
FR22702.11	CTD	85	87	9-2	15	8	1052	S	42.6612	-124.6093	110	100	SFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22702.12	Niskin3m	85	87	9-2	15	8	1052	S	42.6612	-124.6093	110	3	SFS	
FR22702.13	Secchi	79	87	9-2	15	8	1052	S	42.6612	-124.6093	110	13	SFS	
FR22702.14	Neuston	87	87	9-2	15	8	1101	S	42.6597	-124.6078	109	0	SFS	
FR22702.15	Trawl	85	87	9-2	15	8	1127	S	42.6692	-124.6128	112	18	SFS	
FR22702.15	Trawl	85	87	9-2	15	8	1157	E	42.6432	-124.5995	104	18	SFS	
FR22702.16	CTD	86	88	8-1	15	8	1640	S	42.9478	-124.5202	36	30	NFS	
FR22702.17	Niskin3m	86	88	8-1	15	8	1640	S	42.9478	-124.5202	36	3	NFS	
FR22702.18	Secchi	80	88	8-1	15	8	1640	S	42.9478	-124.5202	36	7	NFS	
FR22702.19	Neuston	88	88	8-1	15	8	1646	S	42.9467	-124.5193	36	0	NFS	
FR22702.20	Trawl	86	88	8-1	15	8	1714	S	42.9582	-124.5138	37	18	NFS	Hauled back early due to jellyfish.
FR22702.20	Trawl	86	88	8-1	15	8	1737	E	42.9383	-124.5320	42	18	NFS	Hauled back early due to jellyfish.
FR22702.21	CTD	87	89	8-2	15	8	1807	S	42.9518	-124.5528	60	55	NFS	
FR22702.22	Niskin3m	87	89	8-2	15	8	1807	S	42.9518	-124.5528	60	3	NFS	
FR22702.23	Secchi	81	89	8-2	15	8	1807	S	42.9518	-124.5528	60	4	NFS	
FR22702.24	Neuston	89	89	8-2	15	8	1815	S	42.9507	-124.5527	58	0	NFS	
FR22702.25	Trawl	87	89	8-2	15	8	1845	S	42.9645	-124.5437	62	18	NFS	
FR22702.25	Trawl	87	89	8-2	15	8	1915	E	42.9378	-124.5607	56	18	NFS	
FR22702.26	CTD	88	90	8-4	15	8	1953	S	42.9502	-124.6425	96	90	NFS	
FR22702.27	Niskin3m	88	90	8-4	15	8	1953	S	42.9502	-124.6425	96	3	NFS	
FR22702.28	Secchi	82	90	8-4	15	8	1953	S	42.9502	-124.6425	96	4	NFS	
FR22702.29	Neuston	90	90	8-4	15	8	2001	S	42.9502	-124.6415	97	0	NFS	
FR22702.30	Trawl	88	90	8-4	15	8	2023	S	42.9593	-124.6438	100	18	NFS	
FR22702.30	Trawl	88	90	8-4	15	8	2053	E	42.9320	-124.6425	89	18	NFS	
FR22802.01	CTD	89	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	100	NFS	
FR22802.02	Niskin3m	89	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	3	NFS	
FR22802.03	Secchi	83	91	HH-3A	16	8	0701	S	43.9970	-124.5990	152	2	NFS	
FR22802.04	Neuston	91	91	HH-3A	16	8	0712	S	43.9942	-124.5958	153	0	NFS	
FR22802.05	Trawl	89	91	HH-3A	16	8	0733	S	43.9888	-124.5890	155	18	NFS	
FR22802.05	Trawl	89	91	HH-3A	16	8	0803	E	44.0100	-124.6102	145	18	NFS	
FR22802.06	CTD	90	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	100	NFS	
FR22802.07	Niskin3m	90	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	3	NFS	
FR22802.08	Secchi	84	92	HH-4A	16	8	0911	S	44.0008	-124.8023	105	2	NFS	
FR22802.09	Neuston	92	92	HH-4A	16	8	0920	S	44.0012	-124.8002	106	0	NFS	
FR22802.10	Trawl	90	92	HH-4A	16	8	0944	S	44.0135	-124.8020	103	18	NFS	Cross over a front during tow.
FR22802.10	Trawl	90	92	HH-4A	16	8	1014	E	43.9878	-124.8015	112	18	NFS	
FR22802.11	CTD	91	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	70	NFS	Station is between HH-4 and HH-5.
FR22802.12	Niskin3m	91	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	3	NFS	Between HH-4 and HH-5. Niskin rope angle large due to strong current.
FR22802.13	Secchi	85	93	HH-4.5	16	8	1055	S	44.0002	-124.8957	75	3	NFS	Station is between HH-4 and HH-5.
FR22802.14	Neuston	93	93	HH-4.5	16	8	1101	S	44.0005	-124.8950	81	0	NFS	Station is between HH-4 and HH-5.
FR22802.15	Trawl	91	93	HH-4.5	16	8	1124	S	44.0063	-124.8995	93	18	NFS	Station is between HH-4 and HH-5.
FR22802.15	Trawl	91	93	HH-4.5	16	8	1154	E	43.9810	-124.8910	76	18	NFS	Station is between HH-4 and HH-5.
FR22802.16	CTD	92	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	100	NFS	Station is between HH-5 and HH-6.
FR22802.17	Niskin3m	92	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	3	NFS	Station is between HH-5 and HH-6.
FR22802.18	Secchi	86	94	HH-5.5	16	8	1305	S	44.0002	-125.0525	1340	3	NFS	Station is between HH-5 and HH-6.
FR22802.19	Neuston	94	94	HH-5.5	16	8	1313	S	43.9997	-125.0510	1337	0	NFS	Station is between HH-5 and HH-6.
FR22802.20	Trawl	92	94	HH-5.5	16	8	1341	S	44.0080	-125.0493	1328	18	NFS	Station is between HH-5 and HH-6.
FR22802.20	Trawl	92	94	HH-5.5	16	8	1411	E	43.9793	-125.0508	1323	18	NFS	Station is between HH-5 and HH-6.

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22802.21	CTD	93	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	95	NFS	
FR22802.22	Niskin3m	93	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	3	NFS	
FR22802.23	Secchi	87	95	3A-5	16	8	1558	S	44.1112	-124.7998	100	3	NFS	
FR22802.24	Neuston	95	95	3A-5	16	8	1607	S	44.1108	-124.8017	99	0	NFS	
FR22802.25	Trawl	93	95	3A-5	16	8	1630	S	44.1195	-124.7997	99	18	NFS	
FR22802.25	Trawl	93	95	3A-5	16	8	1700	E	44.0920	-124.8002	107	18	NFS	
FR22802.26	CTD	94	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	100	NFS	
FR22802.27	Niskin3m	94	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	3	NFS	
FR22802.28	Secchi	88	96	3A-4	16	8	1809	S	44.1115	-124.6012	121	3	NFS	
FR22802.29	Neuston	96	96	3A-4	16	8	1818	S	44.1097	-124.5998	119	0	NFS	
FR22802.30	Trawl	94	96	3A-4	16	8	1841	S	44.1188	-124.6037	120	18	NFS	
FR22802.30	Trawl	94	96	3A-4	16	8	1911	E	44.0903	-124.5935	124	18	NFS	
FR22802.31	CTD	95	97	3A-2	16	8	2050	S	44.1125	-124.2907	77	75	NFS	
FR22802.32	Niskin3m	95	97	3A-2	16	8	2050	S	44.1127	-124.2893	77	3	NFS	
FR22802.33	Secchi	89	97	3A-2	16	8	2050	S	44.1127	-124.2893	77	3	NFS	Getting dark.
FR22802.34	Neuston	97	97	3A-2	16	8	2057	S	44.1127	-124.2893	77	0	NFS	
FR22802.35	Trawl	95	97	3A-2	16	8	2119	S	44.1187	-124.2925	77	18	NFS	
FR22802.35	Trawl	95	97	3A-2	16	8	2149	E	44.0917	-124.2952	79	18	NFS	
FR22902.01	CTD	96	98	2-4	17	8	0659	S	44.4753	-124.5645	117	100	NFS	
FR22902.02	Niskin3m	96	98	2-4	17	8	0659	S	44.4753	-124.5645	117	3	NFS	
FR22902.03	Secchi	90	98	2-4	17	8	0659	S	44.4753	-124.5645	117	3	NFS	
FR22902.04	Neuston	98	98	2-4	17	8	0708	S	44.4750	-124.5635	118	0	NFS	
FR22902.05	Trawl	96	98	2-4	17	8	0731	S	44.4863	-124.5680	120	18	NFS	
FR22902.05	Trawl	96	98	2-4	17	8	0801	E	44.4595	-124.5648	112	18	NFS	
FR22902.06	CTD	97	99	2-2	17	8	0848	S	44.4767	-124.4533	73	70	NFS	
FR22902.07	Niskin3m	97	99	2-2	17	8	0848	S	44.4767	-124.4533	73	3	NFS	
FR22902.08	Secchi	91	99	2-2	17	8	0848	S	44.4767	-124.4533	73	7	NFS	
FR22902.09	Neuston	99	99	2-2	17	8	0855	S	44.4762	-124.4518	72	0	NFS	
FR22902.10	Trawl	97	99	2-2	17	8	0919	S	44.4878	-124.4538	73	18	NFS	
FR22902.10	Trawl	97	99	2-2	17	8	0949	E	44.4590	-124.4517	72	18	NFS	
FR22902.11	CTD	98	100	2-1	17	8	1046	S	44.4748	-124.2892	75	70	NFS	
FR22902.12	Niskin3m	98	100	2-1	17	8	1046	S	44.4748	-124.2892	75	3	NFS	
FR22902.13	Secchi	92	100	2-1	17	8	1046	S	44.4748	-124.2892	75	3	NFS	
FR22902.14	Neuston	100	100	2-1	17	8	1053	S	44.4747	-124.2877	74	0	NFS	
FR22902.15	Trawl	98	100	2-1	17	8	1122	S	44.4887	-124.2903	77	18	NFS	
FR22902.15	Trawl	98	100	2-1	17	8	1152	E	44.4567	-124.2878	69	18	NFS	
FR22902.16	CTD	99	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	35	NFS	
FR22902.17	Niskin3m	99	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	3	NFS	
FR22902.18	Secchi	93	101	1A-1	17	8	1315	S	44.5742	-124.1332	41	5	NFS	
FR22902.19	Neuston	101	101	1A-1	17	8	1321	S	44.5747	-124.1323	40	0	NFS	
FR22902.20	Trawl	99	101	1A-1	17	8	1350	S	44.5837	-124.1360	42	18	NFS	Hauled back early due to jellies.
FR22902.20	Trawl	99	101	1A-1	17	8	1410	E	44.5648	-124.1360	43	18	NFS	Hauled back early due to jellies.
FR22902.21	CTD	100	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	50	NFS	
FR22902.22	Niskin3m	100	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	3	NFS	
FR22902.23	Secchi	94	102	1A-2	17	8	1449	S	44.5718	-124.1868	52	4	NFS	
FR22902.24	Neuston	102	102	1A-2	17	8	1455	S	44.5722	-124.1868	51	0	NFS	
FR22902.25	Trawl	100	102	1A-2	17	8	1518	S	44.5815	-124.1887	53	18	NFS	
FR22902.25	Trawl	100	102	1A-2	17	8	1548	E	44.5558	-124.1943	54	18	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR22902.26	CTD	101	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	70	NFS	
FR22902.27	Niskin3m	101	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	3	NFS	
FR22902.28	Secchi	95	103	1A-3	17	8	1627	S	44.5648	-124.2812	75	7	NFS	
FR22902.29	Neuston	103	103	1A-3	17	8	1635	S	44.5647	-124.2805	75	0	NFS	
FR22902.30	Trawl	101	103	1A-3	17	8	1708	S	44.5765	-124.2830	74	18	NFS	
FR22902.30	Trawl	101	103	1A-3	17	8	1738	E	44.5467	-124.2847	76	18	NFS	