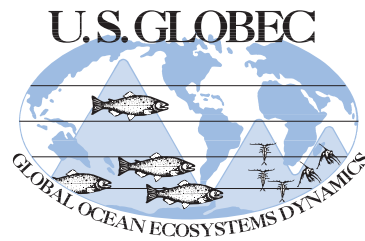


# **GLOBEC Northeast Pacific California Current**

**Cruise Report, R/V *Frosti* (FR0206)**

**1 – 18 June 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
Becky Baldwin	Cooperative Institute for Marine Resource Studies, Newport
Emily Locke	Northwest Fisheries Science Center, 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
Todd Sandell	Cooperative Institute for Marine Resource Studies, Newport
Cynthia Anderson	Fisheries and Wildlife Department, OSU, Corvallis

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

**Table 2. Cruise Statistics**

	<b>Leg 1</b>	<b>Leg 2</b>
Trawls deployed	44	60
CTD's deployed	45	60
Chlorophyll samples	45	60
Neuston tows	45	60
Stable Isotope samples	385	462
Stomach/Parasite collections	2,429	1,814

## Methods

Surveys were conducted using a chartered fishing vessel (F/V *Frosti*) in early summer from June 1 to 18, 2002 departing from Astoria and returning to Newport, with a brief port stop in Newport on June 8. A preliminary survey consisted of a mesoscale grid along 6 lines (Newport [NH], Heceta Head [HH], Umpqua River [UR], Five Mile River [FM], Rogue River [RR] off Oregon, and Crescent City, CA [CR]) which are GLOBEC transects that have been monitored for the previous several years (Table 1). All except for UR are also standard sampling transects of the Long-Term Observation Program (LTOP) cruises off Oregon and Northern California. The mesoscale survey 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 *Wecoma* and R/V *Thomas G. Thompson*). 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. Inclement weather on the Crescent City Line prevented us from sampling beyond the second inshore station. At each station, a Nordic 264 rope trawl built by Nor'Eastern Trawl Systems, Inc. was towed in surface waters (Table 10). 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. All tows were 30 minutes in duration. 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 if shallower (Table 6). Secchi depths were measured at each station (Table 9). Chlorophyll and nutrient samples were collected from 3 m depth using a 2-l Niskin water sampler (Table 8). A neuston tow with a 1-m<sup>2</sup> mouth containing 0.335 mm mesh net was towed for 5 minutes out of the wake of the vessel at each station (Table 7). General Oceanics or TSK flow meters were placed inside the net to measure the amount of water sampled. Temperature and salinity (conductivity) were measured continuously while underway from a flow-through system.

## Cruise Summary (Narrative)

**May 31.** Leg 1 loaded and departed Astoria, OR in order to sample the NH line by early morning 1 June. The objective of the mesoscale survey during Leg 1 was to sample (from shore out as far as possible) the NH, HH, UR, FM, RR, and CR lines, then travel to a good location and conduct a diel study. The first day on the June GLOBEC fish survey was windy (NW) but did not hinder our fishing ability. The NH line showed many more salmon than the June 2000 GLOBEC cruise, including large numbers of juvenile chum salmon.

**June 3.** We established a new nearshore station in about 20 m deep water on the UR line. We caught about 20 juvenile salmon and 1 large adult chinook salmon. Most of our salmon catches, which were generally low, had been in relatively shallow water near shore. Once we moved offshore we got into the small juvenile rockfish community. One obvious difference between this cruise and the previous June 2000 survey appears to be the relatively large numbers of squid, primarily *Loligo* in our catches.

We appeared to be in much warmer and less salty water when we moved offshore, and our catches remained relatively small. We captured a couple of Pacific sardines on the offshore station of the RR transect. They were gravid females and appeared to be about ready to spawn, along with some ripe Pacific saury. The neuston samples appeared to contain many crab megalopae, primarily in nearshore waters where we captured juvenile salmon in the surface trawl.

**June 6.** Started the CR line in the morning, but we were only able to sample the two inshore stations before the wind became severe enough to no longer fish safely. We began our run back to the NH5 location to conduct the diel sampling, which took close to a day because of the NW wind and southerly current.

**June 7.** By the morning, we were back at NH5 and began the 24-hour diel survey, sampling every 4 hours. The morning was very calm. We captured 4 large adult chum salmon. The catches, including the neuston samples,

changed considerably over the 24-hour period. By late afternoon, the NW winds had picked up and the sea surface temperature decreased and salinity increased. We suspect an upwelling front had passed by us. At night, we caught significantly more forage fish and squid. Neuston samples also increased in volume at night.

**June 8.** By mid-morning, we finished our last trawl at NH5 and headed into Newport for a brief port stop to exchange some scientific personnel and take on supplies. The second leg of the GLOBEC cruise began in the late afternoon. Brodeur replaced Emmett as Chief Scientist and Sandell and Anderson replaced Baldwin and Locke. The first few lines of the Northern Fine Scale study (Lines 2A and BOB; Figure 2 notes the location of named transect lines) contained some salmon (mainly juvenile chum and adult chinook salmon) but mostly contained jellyfish and squid. We next conducted joint work, including three repeat sets at the same location, with the *Wecoma* and *Thompson* on and offshore of Heceta Bank and caught few salmon but lots of jack mackerel. We did capture both juvenile and adult salmon on the inshore end of the HH line. We continued to collect salmon at the inshore ends of the next two lines (Umpqua River [UR] and Five Mile River [FM]) and lots of baitfish such as sardines, herring, smelts and squid. Larger predatory species such as jack mackerel, spiny dogfish and soupfin sharks were also caught.

The Southern Fine Scale Box was occupied over the next few days, but few juvenile salmon were caught there other than some coho juveniles on Line 8. Catches were dominated by sardines, squid, jack mackerel, and juvenile rockfish (at the offshore stations). We did a small grid of stations around the Rogue River Canyon together with the *Wecoma*. This was identified as an area having a lot of seabirds and marine mammals feeding during the earlier mesoscale survey but was not as active during our study, although a lot of echos were observed on the acoustic monitor. The water inshore was relatively cold (< 8°C) and may have been newly upwelled. We decided to conduct another diel survey with the *Wecoma* inshore on the CR line where a lot of salmon were caught during the mesoscale survey but we abandoned the series after three hauls when no salmon were caught, although we did catch lots of jellyfish and baitfishes. We continued to work our way offshore on this line working at times with the *Wecoma* and *Thompson*.

We worked our way back north occupying the inshore ends of transects that had been skipped on the way south including Lines 9, 8, 7A, 6, 4A, 3A, 1A. In general, we collected salmon at the inshore stations of most of these transects, especially the northernmost lines. We caught several large schools of herring which we observed on the acoustics, as well as many squid and jellyfish at these stations.

**June 18.** Ended sampling at station NH5.

A preliminary summary of the total catch of fish and invertebrates is given in Tables 4 and 5. The catches of both salmon and non-salmonids were higher than in June 2000, which would indicate more productive ocean conditions. Many of the salmon were large adults preparing to enter the local rivers and these appeared to be in excellent condition. Prey fish and squid were very abundant compared to previous studies from the same area. The nekton composition was more boreal in nature than the past few years and was dominated by herring, smelt, squid, dogfish, jack mackerel, and adult salmon.

**Table 3. Latitudes of Mesoscale Survey Transect Lines Sampled in June, 2002**

All but italicized (UR) line are standard LTOP transect lines.

<u>Mesoscale Line</u>	<u>LTOP Line</u>	<u>Name</u>	<u>Latitude (dec. deg)</u>
Line 1	NH	Newport Hydrographic	44.6517
Line 4	HH	Heceta Head	44.0000
<i>Line 5</i>	<i>UR</i>	<i>Umpqua River</i>	<i>43.7500</i>
Line 7	FM	Five Mile River	43.2167
Line 10	RR	Rogue River	42.5000
Line 12	CR	Crescent City	41.9000

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

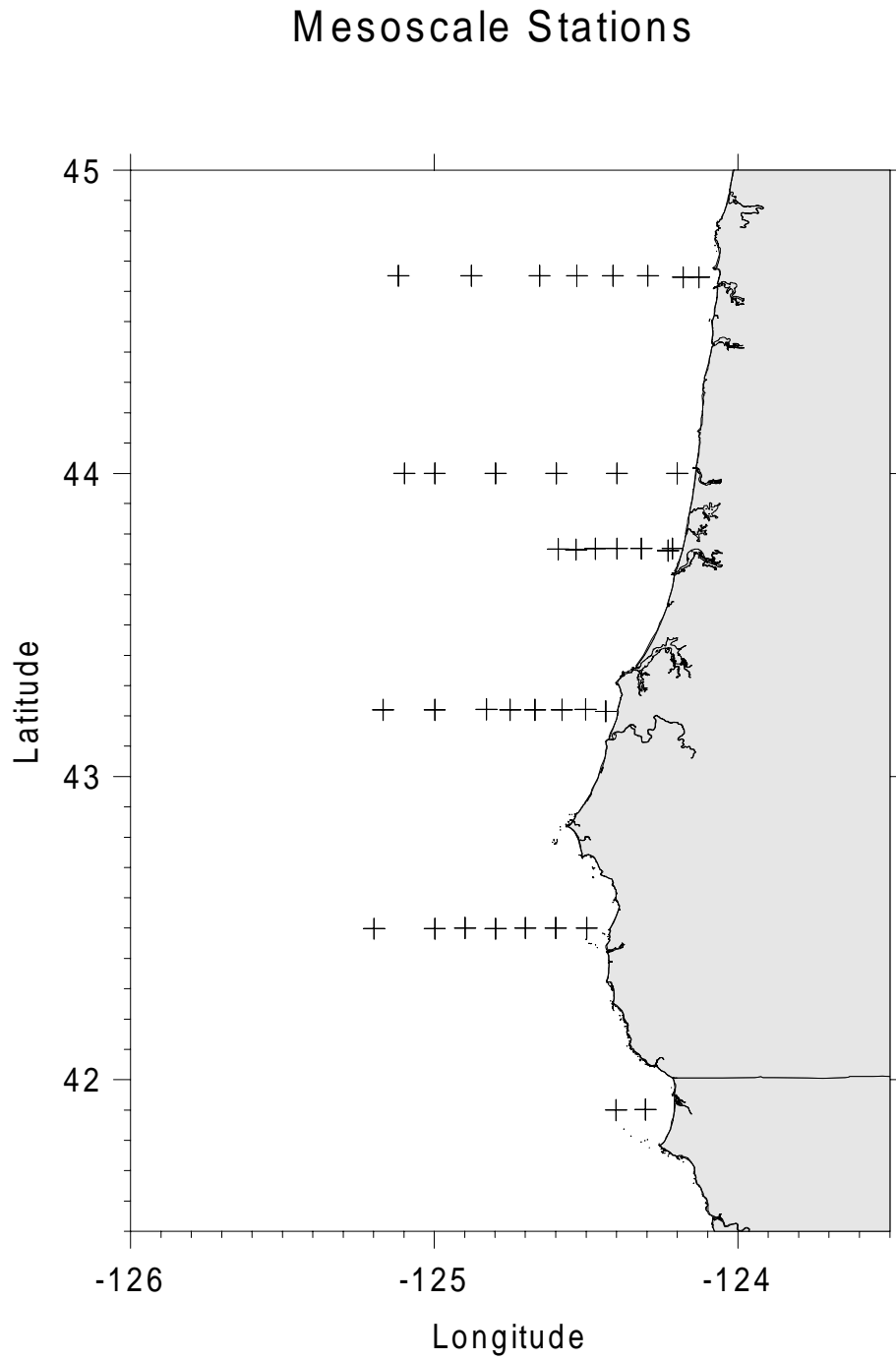
(Note: Preliminary data subject to revision).

Family	Common name	Scientific name	F.O.	Number
Agnatha				
Petromyzontidae	Pacific lamprey	<i>Lampetra tridentata</i>	1	1
Chondrichthyes				
Carcharhinidae	Soupin shark	<i>Galeorhinus zyopterus</i>	3	3
	Blue shark	<i>Prionace glauca</i>	3	3
Squalidae	Spiny dogfish	<i>Squalus acanthias</i>	11	565
Osteichthyes				
Clupeidae	Pacific herring	<i>Clupea pallasii</i>	15	54,761
	Pacific sardine	<i>Sardinops sagax</i>	28	7,625
	American shad	<i>Alosa sapidissima</i>	4	5
Engraulidae	Northern anchovy	<i>Engraulis mordax</i>	7	36
Salmonidae	Chinook salmon	<i>Oncorhynchus tshawytscha</i>	53	292
	Coho salmon	<i>Oncorhynchus kisutch</i>	32	155
	Chum salmon	<i>Oncorhynchus keta</i>	14	217
	Steelhead trout	<i>Oncorhynchus mykiss</i>	9	13
Osmeridae	Surf smelt	<i>Hypomesus pretiosus</i>	4	769
	Whitebait smelt	<i>Allosmerus elongatus</i>	3	655
	Eulachon	<i>Thaleichthys pacificus</i>	2	15
Gadidae	Pacific tomcod (juv.)	<i>Microgadus proximus</i>	7	10
	Pacific hake	<i>Merluccius productus</i>	8	71
Scomberesocidae	Pacific saury	<i>Cololabis saira</i>	15	138
Scorpaenidae	Rockfishes (juv.)	<i>Sebastes</i> spp.	41	828
	Darkblotched rockfish	<i>Sebastes cramerii</i>	2	10
	Yellowtail rockfish	<i>Sebastes flavidus</i>	2	4
	Black rockfish	<i>Sebastes melanops</i>	1	1
	Canary rockfish	<i>Sebastes pinniger</i>	1	1
Hexagrammidae	Lingcod (juv.)	<i>Ophiodon elongatus</i>	4	38
Anoplopomatidae	Sablefish (juv.)	<i>Anoplopoma fimbria</i>	4	5
Cottidae	Cabezon (juv.)	<i>Scorpaenichthys marmoratus</i>	1	1
Agonidae	Northern spearnose poacher	<i>Agonopsis vulsa</i>	1	3
Carangidae	Jack mackerel	<i>Trachurus symmetricus</i>	14	207
Trichodontidae	Pacific sandfish	<i>Trichodon trichodon</i>	4	6
Anarrhichadidae	Wolf eel (juv.)	<i>Anarrhichthys felis</i>	14	21
Ammodytidae	Pacific sandlance	<i>Ammodytes hexapterus</i>	4	29
Stromateidae	Pacific butterfish	<i>Peprilus simillimus</i>	1	1
Centrolophidae	Medusafish	<i>Icichthys lockingtoni</i>	1	3
Flatfishes	Flatfish larvae (unid.)	Flatfishes	11	19
Bothidae	Pacific sanddab	<i>Citharichthys sordidus</i>	10	53
	Speckled sanddab	<i>Citharichthys stigmaeus</i>	4	17
Pleuronectidae	Curlfin sole (juv.)	<i>Pleuronichthys decurrens</i>	2	10
	Dover sole	<i>Microstomus pacificus</i>	1	1
	Starry flounder	<i>Platichthys stellatus</i>	3	4

**Table 5. Frequency of Occurrence (F.O.) in 104 Trawls and Total Number of Invertebrate Catch from GLOBEC Cruise in June 2002**

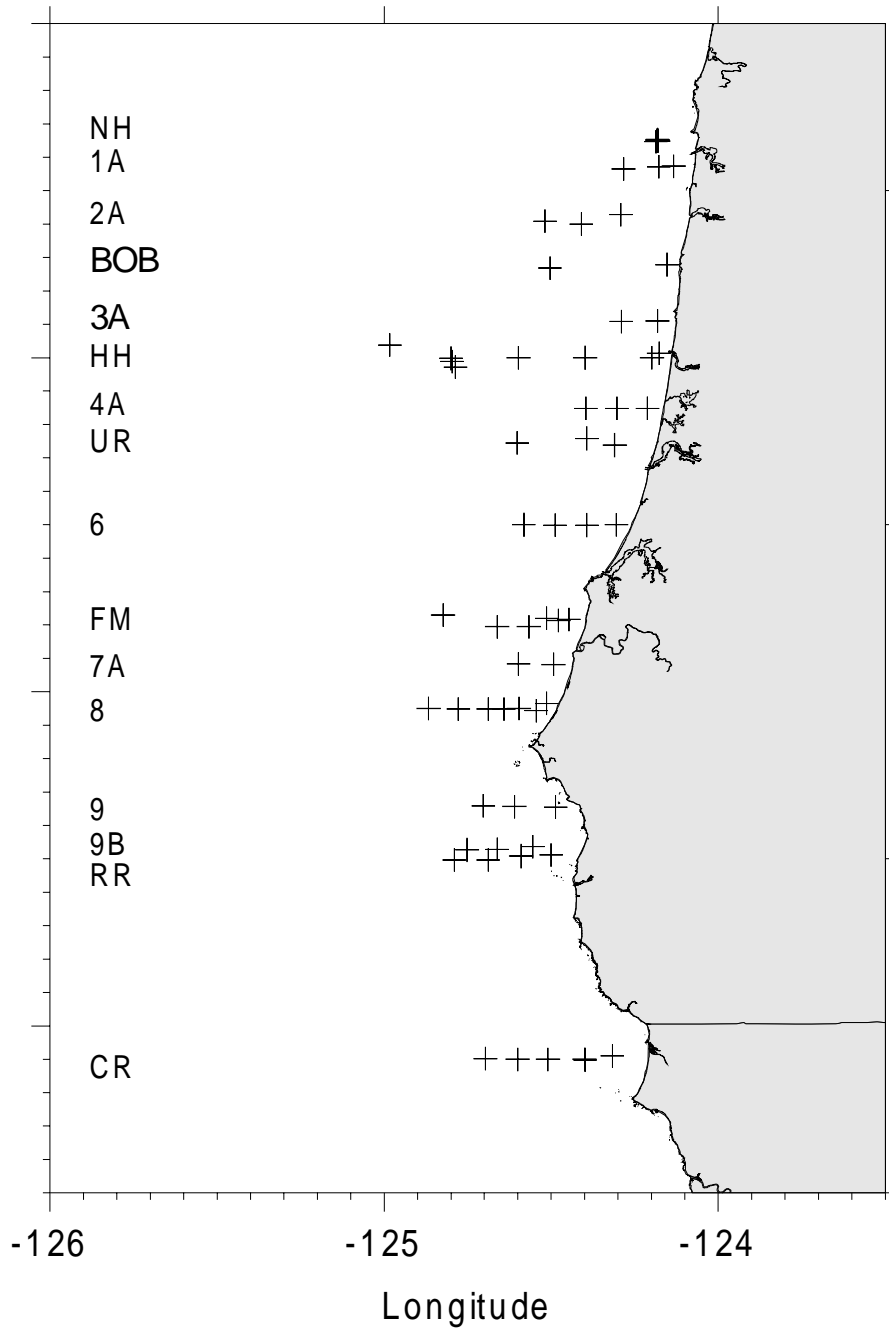
Family	Common name	Scientific name	F.O.	Number
Phylum Mollusca				
Cephalopoda	Pacific clubhook squid	<i>Onychoteuthis borealijaponicus</i>	7	60
	Market squid	<i>Loligo opalescens</i>	57	35,607
	Neon flying squid	<i>Ommastrephes bartrami</i>	2	5
	Stubby squid	<i>Rossia pacifica</i>	1	4
	Yellow-ringed octopus	<i>Japatella heathi</i>	1	1
Phylum Cnidaria				
Siphonophorae		<i>Praya</i> spp.	8	13
Aequoreidae		<i>Aequorea</i> spp.	77	4,184
Cyaneidae	Lion's mane	<i>Cyanea capillata</i>	8	8
Pelagiidae	Sea nettle	<i>Chrysaora fuscescens</i>	61	4,012
Ulmaridae	Moon jelly	<i>Aurelia aurita</i> .	36	231
Phylum Ctenophora				
Beroidae		<i>Beroe</i> spp.	58	959
Phylum Mollusca				
Heteropoda		<i>Carinaria japonica</i>	5	52
Phylum Chordata				
Salpidae		Unidentified salps	1	2

**Figure 1. Location of Trawl Stations Occupied During the Mesoscale Survey in June 2022**



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

### Fine-scale Stations





**Table 6: CTD Casts**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15202.01	CTD	1	1	NH-3	1	6	0619	S	44.6467	-124.1283	43	40	meso	
FR15202.04	CTD	2	2	NH-5	1	6	0703	S	44.6467	-124.1800	55	50	meso	
FR15202.08	CTD	3	3	NH-10	1	6	0918	S	44.6517	-124.2967	75	70	meso	
FR15202.12	CTD	4	4	NH-15	1	6	1113	S	44.6517	-124.4117	86	80	meso	
FR15202.16	CTD	5	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	100	meso	
FR15202.21	CTD	6	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	100	meso	
FR15202.26	CTD	7	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	100	meso	
FR15202.31	CTD	8	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	100	meso	
FR15302.01	CTD	9	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	50	meso	
FR15302.06	CTD	10	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	100	meso	
FR15302.12	CTD	11	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	100	meso	
FR15302.17	CTD	12	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	100	meso	
FR15302.22	CTD	13	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	100	meso	
FR15302.27	CTD	14	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	100	meso	
FR15402.01	CTD	15	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	100	meso	
FR15402.06	CTD	16	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	100	meso	
FR15402.11	CTD	17	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	100	meso	
FR15402.16	CTD	18	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	100	meso	
FR15402.21	CTD	19	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	100	meso	
FR15402.26	CTD	20	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	25	meso	
FR15402.31	CTD	21	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	45	meso	
FR15502.01	CTD	22	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	30	meso	
FR15502.06	CTD	23	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	50	meso	
FR15502.11	CTD	24	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	80	meso	
FR15502.16	CTD	25	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	100	meso	
FR15502.21	CTD	26	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	100	meso	
FR15502.26	CTD	27	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	100	meso	
FR15502.31	CTD	28	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	100	meso	
FR15502.36	CTD	29	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	100	meso	
FR15602.01	CTD	30	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	30	meso	
FR15602.06	CTD	31	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	80	meso	
FR15602.11	CTD	32	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	100	meso	
FR15602.16	CTD	33	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	100	meso	
FR15602.21	CTD	34	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	100	meso	
FR15602.26	CTD	35	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	100	meso	
FR15602.31	CTD	36	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	100	meso	
FR15702.01	CTD	37	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	30	meso	
FR15702.06	CTD	38	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	60	meso	
FR15802.01	CTD	39	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	55	NFS	
FR15802.07	CTD	40	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	55	NFS	
FR15802.12	CTD	41	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	55	NFS	
FR15802.17	CTD	42	42	NH-5D	7	6	2158	S	44.6483	-124.1800	57	55	NFS	
FR15902.01	CTD	43	43	NH-5E	8	6	0157	S	44.6517	-124.1817	58	55	NFS	
FR15902.05	CTD	44	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	55	NFS	
FR15902.10	CTD	45	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	55	NFS	
FR15902.15	CTD	46	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	60	NFS	
FR15902.22	CTD	47	47	2A-3	8	6	2251	S	44.4000	-124.4100	77	75	NFS	
FR15902.24	CTD	48	48	2A-4	8	6	2333	S	44.4083	-124.5183	94	90	NFS	

**Table 6: CTD Casts (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16002.02	CTD	49	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	35	NFS	
FR16002.09	CTD	50	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	95	NFS	
FR16002.13	CTD	51	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	100	NFS	
FR16002.19	CTD	52	52	HH-4A	9	6	2132	S	43.9883	-124.7967	114	100	NFS	
FR16002.23	CTD	53	53	HH-4B	9	6	2317	S	43.9717	-124.7867	122	100	NFS	
FR16102.03	CTD	54	54	HH-4C	10	6	0126	S	43.9983	-124.8000	107	100	NFS	
FR16102.05	CTD	55	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	45	NFS	
FR16102.10	CTD	56	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	35	NFS	
FR16102.15	CTD	57	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	100	NFS	
FR16102.20	CTD	58	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	100	NFS	
FR16102.27	CTD	59	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	100	NFS	
FR16102.32	CTD	60	60	UR-3A	10	6	2209	S	43.7583	-124.3933	111	100	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16202.02	CTD	61	61	UR-2A	11	6	0028	S	43.7383	-124.3100	100	95	NFS	
FR16202.06	CTD	62	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	75	NFS	
FR16202.11	CTD	63	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	50	NFS	
FR16202.16	CTD	64	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	50	NFS	
FR16202.20	CTD	65	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	35	NFS	
FR16202.26	CTD	66	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	100	NFS	
FR16202.31	CTD	67	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	100	NFS	
FR16302.03	CTD	68	68	8-2	12	6	0906	S	42.9433	-124.5450	49	45	NFS	
FR16302.06	CTD	69	69	8-9	12	6	1047	S	42.9500	-124.8667	174	100	NFS	
FR16302.11	CTD	70	70	8-7	12	6	1246	S	42.9483	-124.7783	158	100	NFS	
FR16302.16	CTD	71	71	8-5	12	6	1439	S	42.9483	-124.6883	120	100	NFS	
FR16302.21	CTD	72	72	8-4	12	6	1622	S	42.9483	-124.6417	95	90	NFS	
FR16302.26	CTD	73	73	8-3	12	6	1803	S	42.9500	-124.5967	79	75	NFS	
FR16402.03	CTD	74	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	100	SFS	
FR16402.06	CTD	75	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	100	SFS	
FR16402.13	CTD	76	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	75	SFS	
FR16402.18	CTD	77	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	30	SFS	
FR16402.23	CTD	78	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	70	SFS	
FR16402.28	CTD	79	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	100	SFS	
FR16402.33	CTD	80	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	100	SFS	
FR16502.01	CTD	81	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	100	SFS	
FR16502.06	CTD	82	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	60	SFS	
FR16502.11	CTD	83	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	60	SFS	
FR16502.18	CTD	84	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	35	SFS	
FR16502.21	CTD	85	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	100	SFS	
FR16502.28	CTD	86	86	CR-5	14	6	2208	S	41.9017	-124.6967	657	100	SFS	
FR16602.03	CTD	87	87	9-1	15	6	1005	S	42.6550	-124.4867	60	55	SFS	
FR16602.06	CTD	88	88	9-2	15	6	1047	S	42.6567	-124.6100	109	100	SFS	Longline gear south of 9 line. 75 into 50 fms.
FR16602.11	CTD	89	89	9-3	15	6	1238	S	42.6583	-124.7033	264	100	SFS	
FR16602.18	CTD	90	90	8-1	15	6	1800	S	42.9650	-124.5133	40	35	NFS	
FR16602.23	CTD	91	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	50	NFS	
FR16602.26	CTD	92	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	100	NFS	
FR16702.01	CTD	93	93	6-1	16	6	0800	S	43.5000	-124.3050	64	60	NFS	
FR16702.06	CTD	94	94	6-2	16	6	0943	S	43.4983	-124.3933	102	95	NFS	
FR16702.11	CTD	95	95	6-3	16	6	1127	S	43.4983	-124.4883	122	100	NFS	

**Table 6: CTD Casts (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16702.16	CTD	96	96	6-4	16	6	1309	S	43.5000	-124.5817	183	100	NFS	
FR16702.21	CTD	97	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	45	NFS	
FR16702.26	CTD	98	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	100	NFS	
FR16702.31	CTD	99	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	100	NFS	
FR16802.01	CTD	100	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	40	NFS	
FR16802.06	CTD	101	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	70	NFS	
FR16802.13	CTD	102	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	70	NFS	
FR16802.16	CTD	103	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	45	NFS	
FR16902.01	CTD	104	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	35	NFS	
FR16902.06	CTD	105	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	55	NFS	

**Table 7: Neuston Tows**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15202.03	Neuston	1	1	NH-3	1	6	0619	S	44.6467	-124.1283	43	0	meso	
FR15202.06	Neuston	2	2	NH-5	1	6	0709	S	44.6450	-124.1800	54	0	meso	
FR15202.10	Neuston	3	3	NH-10	1	6	0934	S	44.6517	-124.2967	76	0	meso	
FR15202.14	Neuston	4	4	NH-15	1	6	1122	S	44.6500	-124.4133	83	0	meso	
FR15202.19	Neuston	5	5	NH-20	1	6	1320	S	44.6450	-124.5300	136	0	meso	
FR15202.24	Neuston	6	6	NH-25	1	6	1517	S	44.6467	-124.6550	274	0	meso	
FR15202.29	Neuston	7	7	NH-35	1	6	1747	S	44.6417	-124.8783	446	0	meso	
FR15202.34	Neuston	8	8	NH-45	1	6	2013	S	44.6483	-125.1167	706	0	meso	
FR15302.04	Neuston	9	9	HH-1	2	6	0619	S	44.0033	-124.2000	50	0	meso	
FR15302.09	Neuston	10	10	HH-2	2	6	0834	S	43.9967	-124.3950	117	0	meso	
FR15302.15	Neuston	11	11	HH-3	2	6	1156	S	44.0000	-124.5950	148	0	meso	
FR15302.20	Neuston	12	12	HH-4	2	6	1409	S	43.9917	-124.7967	111	0	meso	
FR15302.25	Neuston	13	13	HH-5	2	6	1621	S	43.9983	-124.9967	923	0	meso	
FR15302.30	Neuston	14	14	HH-6	2	6	1813	S	44.0017	-125.0983	1427	0	meso	
FR15402.04	Neuston	15	15	UR-2	3	6	0635	S	43.7500	-124.3167	101	0	meso	
FR15402.09	Neuston	16	16	UR-3	3	6	0827	S	43.7417	-124.3967	112	0	meso	
FR15402.14	Neuston	17	17	UR-4	3	6	1000	S	43.7483	-124.4683	126	0	meso	
FR15402.19	Neuston	18	18	UR-5	3	6	1134	S	43.7467	-124.5300	166	0	meso	
FR15402.24	Neuston	19	19	UR-6	3	6	1315	S	43.7467	-124.5950	247	0	meso	
FR15402.29	Neuston	20	20	UR-0	3	6	1626	S	43.7550	-124.2165	33	0	meso	
FR15402.34	Neuston	21	21	UR-1	3	6	1825	S	43.7450	-124.2300	50	0	meso	
FR15502.04	Neuston	22	22	FM-1	4	6	0616	S	43.2100	-124.4350	32	0	meso	
FR15502.09	Neuston	23	23	FM-3	4	6	0755	S	43.2217	-124.5033	52	0	meso	
FR15502.14	Neuston	24	24	FM-4	4	6	0945	S	43.2183	-124.5767	81	0	meso	
FR15502.19	Neuston	25	25	FM-5	4	6	1138	S	43.2167	-124.6717	160	0	meso	
FR15502.24	Neuston	26	26	FM-6	4	6	1325	S	43.2167	-124.7500	309	0	meso	
FR15502.29	Neuston	27	27	FM-7	4	6	1514	S	43.2217	-124.8317	353	0	meso	
FR15502.34	Neuston	28	28	FM-8	4	6	1723	S	43.2200	-124.9983	1089	0	meso	
FR15502.39	Neuston	29	29	FM-9	4	6	1950	S	43.2317	-125.1650	1779	0	meso	
FR15602.04	Neuston	30	30	RR-1	5	6	0615	S	42.4983	-124.4967	33	0	meso	
FR15602.09	Neuston	31	31	RR-2	5	6	0806	S	42.5017	-124.6000	84	0	meso	
FR15602.14	Neuston	32	32	RR-3	5	6	0955	S	42.4983	-124.7000	123	0	meso	
FR15602.19	Neuston	33	33	RR-4	5	6	1159	S	42.4867	-124.7950	431	0	meso	
FR15602.24	Neuston	34	34	RR-5	5	6	1338	S	42.4967	-124.8983	1136	0	meso	
FR15602.29	Neuston	35	35	RR-6	5	6	1532	S	42.4967	-125.0000	1798	0	meso	
FR15602.34	Neuston	36	36	RR-7	5	6	1805	S	42.5033	-125.2017	2961	0	meso	
FR15702.04	Neuston	37	37	CR-1	6	6	0614	S	41.9050	-124.3050	38	0	meso	
FR15702.09	Neuston	38	38	CR-2	6	6	0814	S	41.8983	-124.4017	65	0	meso	
FR15802.04	Neuston	39	39	NH-5A	7	6	1012	S	44.6433	-124.1883	57	0	NFS	
FR15802.10	Neuston	40	40	NH-5B	7	6	1411	S	44.6483	-124.1833	57	0	NFS	
FR15802.15	Neuston	41	41	NH-5C	7	6	1800	S	44.6500	-124.1833	57	0	NFS	
FR15802.19	Neuston	42	42	NH-5D	7	6	2205	S	44.6450	-124.1817	58	0	NFS	
FR15902.03	Neuston	43	43	NH-5E	8	6	0204	S	44.6517	-124.1817	58	0	NFS	
FR15902.08	Neuston	44	44	NH-5F	8	6	0606	S	44.6517	-124.1800	57	0	NFS	
FR15902.13	Neuston	45	45	NH-5G	8	6	0932	S	44.6533	-124.1800	57	0	NFS	
FR15902.18	Neuston	46	46	2A-2	8	6	1923	S	44.4283	-124.2917	66	0	NFS	
FR15902.21	Neuston	47	47	2A-3	8	6	2232	S	44.3750	-124.4117	80	0	NFS	
FR15902.26	Neuston	48	48	2A-4	8	6	2342	S	44.4067	-124.5183	93	0	NFS	

**Table 7: Neuston Tows (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16002.05	Neuston	49	49	BOB-1	9	6	1010	S	44.2767	-124.1500	38	0	NFS	
FR16002.08	Neuston	50	50	BOB-3	9	6	1358	S	44.2617	-124.5050	100	0	NFS	
FR16002.16	Neuston	51	51	HH-5A	9	6	1912	S	44.0350	-124.9817	743	0	NFS	
FR16002.18	Neuston	52	52	HH-4A	9	6	2114	S	43.9700	-124.7950	119	0	NFS	
FR16002.22	Neuston	53	53	HH-4B	9	6	2302	S	43.9683	-124.7833	130	0	NFS	
FR16102.02	Neuston	54	54	HH-4C	10	6	0109	S	43.9950	-124.8217	102	0	NFS	
FR16102.08	Neuston	55	55	HH-1A	10	6	0952	S	44.0000	-124.1967	48	0	NFS	
FR16102.13	Neuston	56	56	HH-0A	10	6	1136	S	44.0133	-124.1750	36	0	NFS	
FR16102.18	Neuston	57	57	HH-2A	10	6	1350	S	43.9983	-124.3967	117	0	NFS	
FR16102.23	Neuston	58	58	HH-3A	10	6	1605	S	43.9967	-124.5950	151	0	NFS	
FR16102.26	Neuston	59	59	UR-6A	10	6	1918	S	43.7233	-124.6033	263	0	NFS	
FR16102.31	Neuston	60	60	UR-3A	10	6	2149	S	43.7350	-124.3867	111	0	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16202.01	Neuston	61	61	UR-2A	11	6	0018	S	43.7350	-124.3083	100	0	NFS	
FR16202.05	Neuston	62	62	FM-4A	11	6	0921	S	43.1900	-124.5650	80	0	NFS	
FR16202.10	Neuston	63	63	FM-3A	11	6	1100	S	43.2200	-124.5133	61	0	NFS	
FR16202.15	Neuston	64	64	FM-2A	11	6	1237	S	43.2250	-124.4817	60	0	NFS	
FR16202.19	Neuston	65	65	FM-1A	11	6	1330	S	43.2250	-124.4433	37	0	NFS	
FR16202.25	Neuston	66	66	FM-5A	11	6	1701	S	43.1900	-124.6633	143	0	NFS	
FR16202.30	Neuston	67	67	FM-7A	11	6	1918	S	43.2267	-124.8183	365	0	NFS	
FR16302.02	Neuston	68	68	8-2	12	6	0849	S	42.9350	-124.5500	47	0	NFS	
FR16302.09	Neuston	69	69	8-9	12	6	1056	S	42.9483	-124.8650	168	0	NFS	
FR16302.14	Neuston	70	70	8-7	12	6	1256	S	42.9467	-124.7800	157	0	NFS	
FR16302.19	Neuston	71	71	8-5	12	6	1451	S	42.9483	-124.6850	118	0	NFS	
FR16302.24	Neuston	72	72	8-4	12	6	1633	S	42.9483	-124.6400	95	0	NFS	
FR16302.29	Neuston	73	73	8-3	12	6	1812	S	42.9500	-124.5950	77	0	NFS	
FR16402.02	Neuston	74	74	RR-4A	13	6	0825	S	42.4867	-124.8000	466	0	SFS	
FR16402.09	Neuston	75	75	RR-3A	13	6	0930	S	42.4967	-124.6900	111	0	SFS	
FR16402.12	Neuston	76	76	RR-2A	13	6	1215	S	42.5133	-124.5883	81	0	SFS	
FR16402.17	Neuston	77	77	RR-1A	13	6	1412	S	42.5267	-124.4950	37	0	SFS	
FR16402.22	Neuston	78	78	9B-1	13	6	1547	S	42.5417	-124.5600	78	0	SFS	
FR16402.27	Neuston	79	79	9B-2	13	6	1732	S	42.5367	-124.6650	209	0	SFS	
FR16402.32	Neuston	80	80	9B-3	13	6	1910	S	42.5217	-124.7533	470	0	SFS	
FR16502.04	Neuston	81	81	CR-3	14	6	0814	S	41.9000	-124.5100	138	0	SFS	
FR16502.09	Neuston	82	82	CR-2A	14	6	1008	S	41.9017	-124.4017	64	0	SFS	
FR16502.14	Neuston	83	83	CR-2B	14	6	1359	S	41.8983	-124.3950	63	0	SFS	
FR16502.17	Neuston	84	84	CR-1A	14	6	1735	S	41.9167	-124.3183	43	0	SFS	
FR16502.24	Neuston	85	85	CR-4	14	6	1927	S	41.8983	-124.5967	502	0	SFS	
FR16502.27	Neuston	86	86	CR-5	14	6	2155	S	41.9067	-124.7033	661	0	SFS	
FR16602.02	Neuston	87	87	9-1	15	6	0951	S	42.6483	-124.4833	60	0	SFS	
FR16602.09	Neuston	88	88	9-2	15	6	1055	S	42.6550	-124.6083	108	0	SFS	
FR16602.14	Neuston	89	89	9-3	15	6	1248	S	42.6583	-124.7150	238	0	SFS	
FR16602.17	Neuston	90	90	8-1	15	6	1748	S	42.9600	-124.5150	40	0	NFS	
FR16602.22	Neuston	91	91	7A-1	15	6	1945	S	43.0883	-124.5017	57	0	NFS	
FR16602.29	Neuston	92	92	7A-2	15	6	2042	S	43.0817	-124.5967	111	0	NFS	
FR16702.04	Neuston	93	93	6-1	16	6	0805	S	43.5017	-124.3050	66	0	NFS	
FR16702.09	Neuston	94	94	6-2	16	6	0952	S	43.5000	-124.3933	101	0	NFS	
FR16702.14	Neuston	95	95	6-3	16	6	1135	S	43.4983	-124.4883	122	0	NFS	

**Table 7: Neuston Tows (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16702.19	Neuston	96	96	6-4	16	6	1318	S	43.5017	-124.5817	183	0	NFS	
FR16702.24	Neuston	97	97	4A-1	16	6	1719	S	43.8483	-124.2100	49	0	NFS	
FR16702.29	Neuston	98	98	4A-2	16	6	1908	S	43.8483	-124.3000	103	0	NFS	
FR16702.34	Neuston	99	99	4A-3	16	6	2052	S	43.8500	-124.3950	110	0	NFS	
FR16802.04	Neuston	100	100	3A-1	17	6	0823	S	44.1083	-124.1800	47	0	NFS	
FR16802.09	Neuston	101	101	3A-2	17	6	1027	S	44.1117	-124.2883	75	0	NFS	
FR16802.12	Neuston	102	102	1A-3	17	6	1947	S	44.5750	-124.2800	74	0	NFS	
FR16802.21	Neuston	103	103	1A-2	17	6	2157	S	44.5583	-124.1817	51	0	NFS	Redid neuston, (first sample contaminated, discarded). No Event log entry.
FR16902.04	Neuston	104	104	1A-1	18	6	0708	S	44.5767	-124.1317	41	0	NFS	
FR16902.09	Neuston	105	105	NH-5H	18	6	0905	S	44.6483	-124.1783	55	0	NFS	

**Table 8: Niskin3m Tows**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15202.02	Niskin3m	1	1	NH-3	1	6	0609	S	44.6467	-124.1283	43	3	meso	
FR15202.05	Niskin3m	2	2	NH-5	1	6	0703	S	44.6467	-124.1800	55	3	meso	
FR15202.09	Niskin3m	3	3	NH-10	1	6	0918	S	44.6517	-124.2967	75	3	meso	
FR15202.13	Niskin3m	4	4	NH-15	1	6	1113	S	44.6517	-124.4117	86	3	meso	
FR15202.18	Niskin3m	5	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	3	meso	
FR15202.23	Niskin3m	6	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	3	meso	
FR15202.28	Niskin3m	7	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	3	meso	
FR15202.33	Niskin3m	8	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	3	meso	
FR15302.03	Niskin3m	9	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	3	meso	
FR15302.08	Niskin3m	10	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	3	meso	
FR15302.14	Niskin3m	11	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	3	meso	
FR15302.19	Niskin3m	12	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	3	meso	
FR15302.24	Niskin3m	13	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	3	meso	
FR15302.29	Niskin3m	14	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	3	meso	
FR15402.03	Niskin3m	15	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	3	meso	
FR15402.08	Niskin3m	16	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	3	meso	
FR15402.13	Niskin3m	17	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	3	meso	
FR15402.18	Niskin3m	18	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	3	meso	
FR15402.23	Niskin3m	19	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	3	meso	
FR15402.28	Niskin3m	20	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	3	meso	
FR15402.33	Niskin3m	21	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	3	meso	
FR15502.03	Niskin3m	22	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	3	meso	
FR15502.08	Niskin3m	23	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	3	meso	
FR15502.13	Niskin3m	24	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	3	meso	
FR15502.18	Niskin3m	25	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	3	meso	
FR15502.23	Niskin3m	26	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	3	meso	
FR15502.28	Niskin3m	27	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	3	meso	
FR15502.33	Niskin3m	28	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	3	meso	
FR15502.38	Niskin3m	29	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	3	meso	
FR15602.03	Niskin3m	30	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	3	meso	
FR15602.08	Niskin3m	31	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	3	meso	
FR15602.13	Niskin3m	32	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	3	meso	
FR15602.18	Niskin3m	33	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	3	meso	
FR15602.23	Niskin3m	34	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	3	meso	
FR15602.28	Niskin3m	35	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	3	meso	
FR15602.33	Niskin3m	36	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	3	meso	
FR15702.03	Niskin3m	37	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	3	meso	
FR15702.08	Niskin3m	38	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	3	meso	
FR15802.03	Niskin3m	39	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	3	NFS	
FR15802.09	Niskin3m	40	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	3	NFS	
FR15802.14	Niskin3m	41	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	3	NFS	
FR15802.18	Niskin3m	42	42	NH-5D	7	6	2158	S	44.6483	-124.1800	57	3	NFS	
FR15902.02	Niskin3m	43	43	NH-5E	8	6	0157	S	44.6517	-124.1817	58	3	NFS	
FR15902.07	Niskin3m	44	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	3	NFS	
FR15902.12	Niskin3m	45	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	3	NFS	
FR15902.17	Niskin3m	46	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	3	NFS	
FR15902.23	Niskin3m	47	47	2A-3	8	6	2251	S	44.4000	-124.4100	77	3	NFS	
FR15902.25	Niskin3m	48	48	2A-4	8	6	2333	S	44.4083	-124.5183	94	3	NFS	

**Table 8: Niskin3m Tows (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16002.04	Niskin3m	49	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	3	NFS	
FR16002.11	Niskin3m	50	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	3	NFS	
FR16002.15	Niskin3m	51	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	3	NFS	
FR16002.20	Niskin3m	52	52	HH-4A	9	6	2132	S	43.9883	-124.7967	114	3	NFS	
FR16002.24	Niskin3m	53	53	HH-4B	9	6	2317	S	43.9717	-124.7867	122	3	NFS	
FR16102.04	Niskin3m	54	54	HH-4C	10	6	0126	S	43.9983	-124.8000	107	3	NFS	
FR16102.07	Niskin3m	55	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	3	NFS	
FR16102.12	Niskin3m	56	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	3	NFS	
FR16102.17	Niskin3m	57	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	3	NFS	
FR16102.22	Niskin3m	58	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	3	NFS	
FR16102.29	Niskin3m	59	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	3	NFS	
FR16102.33	Niskin3m	60	60	UR-3A	10	6	2209	S	43.7583	-124.3933	111	3	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16202.03	Niskin3m	61	61	UR-2A	11	6	0028	S	43.7383	-124.3100	100	3	NFS	
FR16202.08	Niskin3m	62	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	3	NFS	
FR16202.13	Niskin3m	63	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	3	NFS	
FR16202.18	Niskin3m	64	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	3	NFS	
FR16202.22	Niskin3m	65	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	3	NFS	
FR16202.28	Niskin3m	66	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	3	NFS	
FR16202.33	Niskin3m	67	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	3	NFS	
FR16302.05	Niskin3m	68	68	8-2	12	6	0906	S	42.9433	-124.5450	49	3	NFS	
FR16302.08	Niskin3m	69	69	8-9	12	6	1047	S	42.9500	-124.8667	174	3	NFS	
FR16302.13	Niskin3m	70	70	8-7	12	6	1246	S	42.9483	-124.7783	158	3	NFS	
FR16302.18	Niskin3m	71	71	8-5	12	6	1439	S	42.9483	-124.6883	120	3	NFS	
FR16302.23	Niskin3m	72	72	8-4	12	6	1622	S	42.9483	-124.6417	95	3	NFS	
FR16302.28	Niskin3m	73	73	8-3	12	6	1803	S	42.9500	-124.5967	79	3	NFS	
FR16402.05	Niskin3m	74	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	3	SFS	
FR16402.08	Niskin3m	75	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	3	SFS	
FR16402.15	Niskin3m	76	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	3	SFS	
FR16402.20	Niskin3m	77	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	3	SFS	
FR16402.25	Niskin3m	78	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	3	SFS	
FR16402.30	Niskin3m	79	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	3	SFS	
FR16402.35	Niskin3m	80	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	3	SFS	
FR16502.03	Niskin3m	81	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	3	SFS	
FR16502.08	Niskin3m	82	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	3	SFS	
FR16502.13	Niskin3m	83	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	3	SFS	
FR16502.20	Niskin3m	84	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	3	SFS	
FR16502.23	Niskin3m	85	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	3	SFS	
FR16502.29	Niskin3m	86	86	CR-5	14	6	2208	S	41.9017	-124.6967	657	3	SFS	
FR16602.05	Niskin3m	87	87	9-1	15	6	1005	S	42.6550	-124.4867	60	3	SFS	
FR16602.08	Niskin3m	88	88	9-2	15	6	1047	S	42.6567	-124.6100	109	3	SFS	
FR16602.13	Niskin3m	89	89	9-3	15	6	1238	S	42.6583	-124.7033	264	3	SFS	
FR16602.20	Niskin3m	90	90	8-1	15	6	1800	S	42.9650	-124.5133	40	3	NFS	
FR16602.25	Niskin3m	91	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	3	NFS	
FR16602.28	Niskin3m	92	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	3	NFS	
FR16702.03	Niskin3m	93	93	6-1	16	6	0800	S	43.5000	-124.3050	64	3	NFS	
FR16702.08	Niskin3m	94	94	6-2	16	6	0943	S	43.4983	-124.3933	102	3	NFS	
FR16702.13	Niskin3m	95	95	6-3	16	6	1127	S	43.4983	-124.4883	122	3	NFS	



**Table 8: Niskin3m Tows (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16702.18	Niskin3m	96	96	6-4	16	6	1309	S	43.5000	-124.5817	183	3	NFS	
FR16702.23	Niskin3m	97	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	3	NFS	
FR16702.28	Niskin3m	98	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	3	NFS	
FR16702.33	Niskin3m	99	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	3	NFS	
FR16802.03	Niskin3m	100	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	3	NFS	
FR16802.08	Niskin3m	101	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	3	NFS	
FR16802.15	Niskin3m	102	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	3	NFS	
FR16802.18	Niskin3m	103	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	3	NFS	
FR16902.03	Niskin3m	104	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	3	NFS	
FR16902.08	Niskin3m	105	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	3	NFS	

**Table 9: Secchi Depth Measurements**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15202.17	Secchi	1	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	7	meso	
FR15202.22	Secchi	2	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	9	meso	
FR15202.27	Secchi	3	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	8	meso	
FR15202.32	Secchi	4	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	10	meso	
FR15302.02	Secchi	5	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	5	meso	
FR15302.07	Secchi	6	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	7	meso	
FR15302.13	Secchi	7	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	7	meso	
FR15302.18	Secchi	8	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	7	meso	
FR15302.23	Secchi	9	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	12	meso	
FR15302.28	Secchi	10	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	12	meso	
FR15402.02	Secchi	11	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	7	meso	
FR15402.07	Secchi	12	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	7	meso	
FR15402.12	Secchi	13	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	8	meso	
FR15402.17	Secchi	14	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	12	meso	
FR15402.22	Secchi	15	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	14	meso	
FR15402.27	Secchi	16	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	9	meso	
FR15402.32	Secchi	17	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	9	meso	
FR15502.02	Secchi	18	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	5	meso	
FR15502.07	Secchi	19	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	6	meso	
FR15502.12	Secchi	20	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	12	meso	
FR15502.17	Secchi	21	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	16	meso	
FR15502.22	Secchi	22	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	10	meso	
FR15502.27	Secchi	22	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	12	meso	
FR15502.32	Secchi	23	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	12	meso	
FR15502.37	Secchi	24	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	15	meso	
FR15602.02	Secchi	25	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	8	meso	
FR15602.07	Secchi	26	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	9	meso	
FR15602.12	Secchi	27	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	11	meso	
FR15602.17	Secchi	28	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	7	meso	
FR15602.22	Secchi	29	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	6	meso	
FR15602.27	Secchi	30	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	9	meso	
FR15602.32	Secchi	31	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	12	meso	
FR15702.02	Secchi	32	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	4	meso	
FR15702.07	Secchi	33	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	6	meso	
FR15802.02	Secchi	34	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	9	NFS	
FR15802.08	Secchi	35	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	6	NFS	
FR15802.13	Secchi	36	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	7	NFS	
FR15902.06	Secchi	37	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	6	NFS	
FR15902.11	Secchi	38	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	4	NFS	
FR15902.16	Secchi	39	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	5	NFS	
FR16002.03	Secchi	40	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	7	NFS	
FR16002.10	Secchi	41	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	6	NFS	
FR16002.14	Secchi	42	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	7	NFS	
FR16102.06	Secchi	43	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	4	NFS	
FR16102.11	Secchi	44	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	4	NFS	
FR16102.16	Secchi	45	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	5	NFS	
FR16102.21	Secchi	46	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	4	NFS	
FR16102.28	Secchi	47	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	5	NFS	

**Table 9: 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
FR16202.07	Secchi	48	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	5	NFS	
FR16202.12	Secchi	49	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	4	NFS	
FR16202.17	Secchi	50	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	4	NFS	
FR16202.21	Secchi	51	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	4	NFS	
FR16202.27	Secchi	52	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	5	NFS	
FR16202.32	Secchi	53	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	9	NFS	
FR16302.04	Secchi	54	68	8-2	12	6	0906	S	42.9433	-124.5450	49	5	NFS	
FR16302.07	Secchi	55	69	8-9	12	6	1047	S	42.9500	-124.8667	174	13	NFS	
FR16302.12	Secchi	56	70	8-7	12	6	1246	S	42.9483	-124.7783	158	7	NFS	
FR16302.17	Secchi	57	71	8-5	12	6	1439	S	42.9483	-124.6883	120	7	NFS	
FR16302.22	Secchi	58	72	8-4	12	6	1622	S	42.9483	-124.6417	95	4	NFS	
FR16302.27	Secchi	59	73	8-3	12	6	1803	S	42.9500	-124.5967	79	3	NFS	
FR16402.04	Secchi	60	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	5	SFS	
FR16402.07	Secchi	61	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	5	SFS	
FR16402.14	Secchi	62	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	7	SFS	
FR16402.19	Secchi	63	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	5	SFS	
FR16402.24	Secchi	64	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	6	SFS	
FR16402.29	Secchi	65	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	5	SFS	
FR16402.34	Secchi	66	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	10	SFS	
FR16502.02	Secchi	67	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	5	SFS	
FR16502.07	Secchi	68	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	5	SFS	
FR16502.12	Secchi	69	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	8	SFS	
FR16502.19	Secchi	70	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	2	SFS	
FR16502.22	Secchi	71	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	4	SFS	
FR16602.04	Secchi	72	87	9-1	15	6	1005	S	42.6550	-124.4867	60	3	SFS	
FR16602.07	Secchi	73	88	9-2	15	6	1047	S	42.6567	-124.6100	109	4	SFS	
FR16602.12	Secchi	74	89	9-3	15	6	1238	S	42.6583	-124.7033	264	9	SFS	
FR16602.19	Secchi	75	90	8-1	15	6	1800	S	42.9650	-124.5133	40	4	NFS	
FR16602.24	Secchi	76	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	3	NFS	
FR16602.27	Secchi	77	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	7	NFS	
FR16702.02	Secchi	78	93	6-1	16	6	0800	S	43.5000	-124.3050	64	3	NFS	
FR16702.07	Secchi	79	94	6-2	16	6	0943	S	43.4983	-124.3933	102	4	NFS	
FR16702.12	Secchi	80	95	6-3	16	6	1127	S	43.4983	-124.4883	122	5	NFS	
FR16702.17	Secchi	81	96	6-4	16	6	1309	S	43.5000	-124.5817	183	6	NFS	
FR16702.22	Secchi	82	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	5	NFS	
FR16702.27	Secchi	83	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	5	NFS	
FR16702.32	Secchi	84	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	4	NFS	Sunset (getting dark).
FR16802.02	Secchi	85	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	4	NFS	
FR16802.07	Secchi	86	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	4	NFS	Secchi disk under boat.
FR16802.14	Secchi	87	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	6	NFS	
FR16802.17	Secchi	88	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	5	NFS	
FR16902.02	Secchi	89	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	4	NFS	
FR16902.07	Secchi	90	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	5	NFS	

**Table 10: Trawls**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15202.07	Trawl	1	2	NH-5	1	6	0739	S	44.6333	-124.1800	52	18	meso	
FR15202.07	Trawl	1	2	NH-5	1	6	0809	E	44.6583	-124.1833	58	18	meso	
FR15202.11	Trawl	2	3	NH-10	1	6	0955	S	44.6650	-124.3033	78	18	meso	
FR15202.11	Trawl	2	3	NH-10	1	6	1025	E	44.6867	-124.3083	78	18	meso	
FR15202.15	Trawl	3	4	NH-15	1	6	1151	S	44.6467	-124.4100	82	18	meso	
FR15202.15	Trawl	3	4	NH-15	1	6	1221	E	44.6700	-124.4150	97	18	meso	
FR15202.20	Trawl	4	5	NH-20	1	6	1342	S	44.6417	-124.5300	133	18	meso	
FR15202.20	Trawl	4	5	NH-20	1	6	1412	E	44.6650	-124.5317	144	18	meso	
FR15202.25	Trawl	5	6	NH-25	1	6	1539	S	44.6467	-124.6517	282	18	meso	
FR15202.25	Trawl	5	6	NH-25	1	6	1609	E	44.6700	-124.6525	302	18	meso	
FR15202.30	Trawl	6	7	NH-35	1	6	1812	S	44.6450	-124.8817	450	18	meso	
FR15202.30	Trawl	6	7	NH-35	1	6	1842	E	44.6708	-124.8750	457	18	meso	
FR15202.35	Trawl	7	8	NH-45	1	6	2036	S	44.6483	-125.1183	719	18	meso	
FR15202.35	Trawl	7	8	NH-45	1	6	2106	E	44.6750	-125.1233	675	18	meso	
FR15302.05	Trawl	8	9	HH-1	2	6	0642	S	44.0050	-124.1983	50	18	meso	
FR15302.05	Trawl	8	9	HH-1	2	6	0712	E	43.9750	-124.2033	51	18	meso	
FR15302.11	Trawl	9	10	HH-2	2	6	1005	S	43.9917	-124.3983	116	18	meso	
FR15302.11	Trawl	9	10	HH-2	2	6	1035	E	44.0150	-124.4017	115	18	meso	
FR15302.16	Trawl	10	11	HH-3	2	6	1224	S	43.9950	-124.5967	152	18	meso	
FR15302.16	Trawl	10	11	HH-3	2	6	1254	E	44.0183	-124.6150	139	18	meso	
FR15302.21	Trawl	11	12	HH-4	2	6	1433	S	43.9933	-124.7993	110	18	meso	
FR15302.21	Trawl	11	12	HH-4	2	6	1503	E	44.0183	-124.8017	99	18	meso	
FR15302.26	Trawl	12	13	HH-5	2	6	1644	S	44.0050	-124.9983	935	18	meso	
FR15302.26	Trawl	12	13	HH-5	2	6	1712	E	43.9733	-124.9983	930	18	meso	
FR15302.31	Trawl	13	14	HH-6	2	6	1836	S	44.0033	-125.1067	1432	18	meso	
FR15302.31	Trawl	13	14	HH-6	2	6	1906	E	44.0250	-125.1117	1362	18	meso	
FR15402.05	Trawl	14	15	UR-2	3	6	0658	S	43.7517	-124.3200	102	18	meso	
FR15402.05	Trawl	14	15	UR-2	3	6	0728	E	43.7183	-124.3183	101	18	meso	
FR15402.10	Trawl	15	16	UR-3	3	6	0846	S	43.7417	-124.3983	113	18	meso	
FR15402.10	Trawl	15	16	UR-3	3	6	0916	E	43.7617	-124.4000	112	18	meso	
FR15402.15	Trawl	16	17	UR-4	3	6	1022	S	43.7400	-124.4717	122	18	meso	
FR15402.15	Trawl	16	17	UR-4	3	6	1052	E	43.7633	-124.4667	124	18	meso	
FR15402.20	Trawl	17	18	UR-5	3	6	1155	S	43.7417	-124.5300	167	18	meso	
FR15402.20	Trawl	17	18	UR-5	3	6	1225	E	43.7650	-124.5283	162	18	meso	
FR15402.25	Trawl	18	19	UR-6	3	6	1341	S	43.7450	-124.5983	252	18	meso	
FR15402.25	Trawl	18	19	UR-6	3	6	1411	E	43.7717	-124.6017	257	18	meso	
FR15402.30	Trawl	19	20	UR-0	3	6	1659	S	43.7783	-124.2133	36	18	meso	
FR15402.30	Trawl	19	20	UR-0	3	6	1729	E	43.7467	-124.2183	32	18	meso	
FR15402.35	Trawl	20	21	UR-1	3	6	1858	S	43.7583	-124.2267	47	18	meso	
FR15402.35	Trawl	20	21	UR-1	3	6	1928	E	43.7250	-124.2367	46	18	meso	
FR15502.05	Trawl	21	22	FM-1	4	6	0643	S	43.1983	-124.4400	34	18	meso	
FR15502.05	Trawl	21	22	FM-1	4	6	0713	E	43.2233	-124.4333	30	18	meso	
FR15502.10	Trawl	22	23	FM-3	4	6	0817	S	43.2233	-124.5017	54	18	meso	
FR15502.10	Trawl	22	23	FM-3	4	6	0847	E	43.1950	-124.4983	58	18	meso	
FR15502.15	Trawl	23	24	FM-4	4	6	1006	S	43.2133	-124.5750	78	18	meso	
FR15502.15	Trawl	23	24	FM-4	4	6	1036	E	43.1733	-124.5733	96	18	meso	
FR15502.20	Trawl	24	25	FM-5	4	6	1203	S	43.2217	-124.6733	160	18	meso	
FR15502.20	Trawl	24	25	FM-5	4	6	1233	E	43.1950	-124.6633	142	18	meso	

**Table 10: Trawls (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15502.25	Trawl	25	26	FM-6	4	6	1355	S	43.2117	-124.7533	321	18	meso	
FR15502.25	Trawl	25	26	FM-6	4	6	1425	E	43.2350	-124.7517	321	18	meso	
FR15502.30	Trawl	26	27	FM-7	4	6	1539	S	43.2333	-124.8317	355	18	meso	
FR15502.30	Trawl	26	27	FM-7	4	6	1609	E	43.2083	-124.8250	340	18	meso	
FR15502.35	Trawl	27	28	FM-8	4	6	1753	S	43.2300	-124.9967	1086	18	meso	
FR15502.35	Trawl	27	28	FM-8	4	6	1823	E	43.2017	-124.9967	1080	18	meso	
FR15502.40	Trawl	28	29	FM-9	4	6	2011	S	43.2333	-125.1600	1772	18	meso	
FR15502.40	Trawl	28	29	FM-9	4	6	2040	E	43.2083	-125.1600	1791	18	meso	
FR15602.05	Trawl	29	30	RR-1	5	6	0641	S	42.4917	-124.4983	32	18	meso	
FR15602.05	Trawl	29	30	RR-1	5	6	0711	E	42.5167	-124.5033	36	18	meso	
FR15602.10	Trawl	30	31	RR-2	5	6	0832	S	42.5067	-124.6017	86	18	meso	
FR15602.10	Trawl	30	31	RR-2	5	6	0902	E	42.4767	-124.5983	83	18	meso	
FR15602.15	Trawl	31	32	RR-3	5	6	1023	S	42.5050	-124.7017	150	18	meso	
FR15602.15	Trawl	31	32	RR-3	5	6	1053	E	42.4717	-124.6967	117	18	meso	
FR15602.20	Trawl	32	33	RR-4	5	6	1219	S	42.3533	-124.7967	424	18	meso	
FR15602.20	Trawl	32	33	RR-4	5	6	1249	E	42.5050	-124.8017	681	18	meso	
FR15602.25	Trawl	33	34	RR-5	5	6	1408	S	42.5100	-124.9017	1176	18	meso	
FR15602.25	Trawl	33	34	RR-5	5	6	1438	E	42.4750	-124.8967	1089	18	meso	
FR15602.30	Trawl	34	35	RR-6	5	6	1600	S	42.5067	-125.0017	1789	18	meso	
FR15602.30	Trawl	34	35	RR-6	5	6	1630	E	42.4767	-124.9983	1828	18	meso	
FR15602.35	Trawl	35	36	RR-7	5	6	1829	S	42.5117	-125.2033	2969	18	meso	
FR15602.35	Trawl	35	36	RR-7	5	6	1859	E	42.4833	-125.1967	2870	18	meso	
FR15702.05	Trawl	36	37	CR-1	6	6	0653	S	41.9017	-124.3167	42	18	meso	
FR15702.05	Trawl	36	37	CR-1	6	6	0723	E	41.9267	-124.3300	47	18	meso	
FR15702.10	Trawl	37	38	CR-2	6	6	0844	S	41.8917	-124.3967	63	18	meso	
FR15702.10	Trawl	37	38	CR-2	6	6	0914	E	41.9133	-124.4100	70	18	meso	
FR15802.06	Trawl	38	39	NH-5A	7	6	1102	S	44.6517	-124.1848	59	18	NFS	
FR15802.06	Trawl	38	39	NH-5A	7	6	1132	E	44.6217	-124.1683	49	18	NFS	
FR15802.11	Trawl	39	40	NH-5B	7	6	1440	S	44.6567	-124.1833	57	18	NFS	
FR15802.11	Trawl	39	40	NH-5B	7	6	1510	E	44.6250	-124.1750	51	18	NFS	
FR15802.16	Trawl	40	41	NH-5C	7	6	1828	S	44.6583	-124.1817	58	18	NFS	
FR15802.16	Trawl	40	41	NH-5C	7	6	1858	E	44.6267	-124.1733	51	18	NFS	
FR15802.20	Trawl	41	42	NH-5D	7	6	2237	S	44.6567	-124.1800	58	18	NFS	
FR15802.20	Trawl	41	42	NH-5D	7	6	2307	E	44.6217	-124.1783	52	18	NFS	
FR15902.04	Trawl	42	43	NH-5E	8	6	0231	S	44.6617	-124.1800	57	18	NFS	
FR15902.04	Trawl	42	43	NH-5E	8	6	0301	E	44.6300	-124.1783	52	18	NFS	
FR15902.09	Trawl	43	44	NH-5F	8	6	0632	S	44.6633	-124.1800	57	18	NFS	
FR15902.09	Trawl	43	44	NH-5F	8	6	0702	E	44.6317	-124.1800	51	18	NFS	
FR15902.14	Trawl	44	45	NH-5G	8	6	1029	E	44.6300	-124.1783	52	18	NFS	
FR15902.14	Trawl	44	45	NH-5G	8	6	0959	S	44.6617	-124.1783	58	18	NFS	
FR15902.19	Trawl	45	46	2A-2	8	6	2001	S	44.4400	-124.2883	67	18	NFS	
FR15902.19	Trawl	45	46	2A-2	8	6	2031	E	44.4150	-124.2900	67	18	NFS	
FR15902.20	Trawl	46	47	2A-3	8	6	2143	S	44.4100	-124.4083	76	18	NFS	
FR15902.20	Trawl	46	47	2A-3	8	6	2213	E	44.3800	-124.4083	79	18	NFS	
FR16002.01	Trawl	47	48	2A-4	9	6	0011	S	44.4233	-124.5183	91	18	NFS	
FR16002.01	Trawl	47	48	2A-4	9	6	0041	E	44.3900	-124.5200	92	18	NFS	
FR16002.06	Trawl	48	49	BOB-1	9	6	1036	S	44.2633	-124.1533	40	18	NFS	
FR16002.06	Trawl	48	49	BOB-1	9	6	1106	E	44.2900	-124.1517	41	18	NFS	

**Table 10: Trawls (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16002.07	Trawl	49	50	BOB-3	9	6	1306	S	44.2967	-124.4967	93	18	NFS	
FR16002.07	Trawl	49	50	BOB-3	9	6	1336	E	44.2667	-124.5000	99	18	NFS	
FR16002.12	Trawl	50	51	HH-5A	9	6	1814	S	44.0117	-124.9900	858	18	NFS	
FR16002.12	Trawl	50	51	HH-5A	9	6	1844	E	44.0317	-124.9850	813	18	NFS	
FR16002.17	Trawl	51	52	HH-4A	9	6	2027	S	44.0133	-124.8017	103	18	NFS	
FR16002.17	Trawl	51	52	HH-4A	9	6	2057	E	43.9800	-124.7967	119	18	NFS	
FR16002.21	Trawl	52	53	HH-4B	9	6	2211	S	44.0117	-124.7917	109	18	NFS	
FR16002.21	Trawl	52	53	HH-4B	9	6	2241	E	43.9800	-124.7817	126	18	NFS	
FR16102.01	Trawl	53	54	HH-4C	10	6	0017	S	43.9683	-124.8050	118	18	NFS	
FR16102.01	Trawl	53	54	HH-4C	10	6	0047	E	43.9917	-124.8133	105	18	NFS	
FR16102.09	Trawl	54	55	HH-1A	10	6	1017	S	44.0133	-124.1967	49	18	NFS	
FR16102.09	Trawl	54	55	HH-1A	10	6	1047	E	43.9883	-124.2000	49	18	NFS	
FR16102.14	Trawl	55	56	HH-0A	10	6	1156	S	44.0150	-124.1767	37	18	NFS	
FR16102.14	Trawl	55	56	HH-0A	10	6	1226	E	43.9883	-124.1800	37	18	NFS	
FR16102.19	Trawl	56	57	HH-2A	10	6	1413	S	44.0100	-124.3983	117	18	NFS	
FR16102.19	Trawl	56	57	HH-2A	10	6	1443	E	43.9833	-124.4017	118	18	NFS	
FR16102.24	Trawl	57	58	HH-3A	10	6	1632	S	44.0100	-124.5983	145	18	NFS	
FR16102.24	Trawl	57	58	HH-3A	10	6	1702	E	43.9767	-124.5967	161	18	NFS	
FR16102.25	Trawl	58	59	UR-6A	10	6	1831	S	43.7617	-124.6017	259	18	NFS	
FR16102.25	Trawl	58	59	UR-6A	10	6	1901	E	43.7300	-124.6000	258	18	NFS	
FR16102.30	Trawl	59	60	UR-3A	10	6	2057	S	43.7633	-124.3983	112	18	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.30	Trawl	59	60	UR-3A	10	6	2127	E	43.7383	-124.3867	111	18	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.34	Trawl	60	61	UR-2A	10	6	2311	S	43.7617	-124.3167	102	18	NFS	
FR16102.34	Trawl	60	61	UR-2A	10	6	2341	E	43.7367	-124.3050	100	18	NFS	
FR16202.04	Trawl	61	62	FM-4A	11	6	0832	S	43.2317	-124.5833	87	18	NFS	
FR16202.04	Trawl	61	62	FM-4A	11	6	0902	E	43.2033	-124.5683	69	18	NFS	
FR16202.09	Trawl	62	63	FM-3A	11	6	1013	S	43.2017	-124.5067	60	18	NFS	
FR16202.09	Trawl	62	63	FM-3A	11	6	1043	E	43.2217	-124.5100	58	18	NFS	
FR16202.14	Trawl	63	64	FM-2A	11	6	1150	S	43.2067	-124.4717	54	18	NFS	
FR16202.14	Trawl	63	64	FM-2A	11	6	1220	E	43.2250	-124.4783	53	18	NFS	
FR16202.23	Trawl	64	65	FM-1A	11	6	1405	S	43.2133	-124.4483	42	18	NFS	
FR16202.23	Trawl	64	65	FM-1A	11	6	1435	E	43.1800	-124.4617	44	18	NFS	
FR16202.24	Trawl	65	66	FM-5A	11	6	1606	S	43.2267	-124.6583	144	18	NFS	
FR16202.24	Trawl	65	66	FM-5A	11	6	1636	E	43.1917	-124.6633	142	18	NFS	
FR16202.29	Trawl	66	67	FM-7A	11	6	1824	S	43.2100	-124.8283	340	18	NFS	
FR16202.29	Trawl	66	67	FM-7A	11	6	1854	E	43.2300	-124.8117	377	18	NFS	
FR16302.01	Trawl	67	68	8-2	12	6	0759	S	42.9683	-124.5267	50	18	NFS	
FR16302.01	Trawl	67	68	8-2	12	6	0829	E	42.9383	-124.5450	47	18	NFS	
FR16302.10	Trawl	68	69	8-9	12	6	1127	S	42.9717	-124.8600	154	18	NFS	
FR16302.10	Trawl	68	69	8-9	12	6	1157	E	42.9400	-124.8583	157	18	NFS	
FR16302.15	Trawl	69	70	8-7	12	6	1326	S	42.9667	-124.7800	151	18	NFS	
FR16302.15	Trawl	69	70	8-7	12	6	1356	E	42.9367	-124.7750	164	18	NFS	
FR16302.20	Trawl	70	71	8-5	12	6	1520	S	42.9667	-124.6833	123	18	NFS	
FR16302.20	Trawl	70	71	8-5	12	6	1550	E	42.9333	-124.6867	115	18	NFS	
FR16302.25	Trawl	71	72	8-4	12	6	1705	S	42.9633	-124.6383	94	18	NFS	
FR16302.25	Trawl	71	72	8-4	12	6	1735	E	42.9300	-124.6300	83	18	NFS	

Table 10: Trawls (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16302.30	Trawl	72	73	8-3	12	6	1849	S	42.9717	-124.5700	76	18	NFS	
FR16302.30	Trawl	72	73	8-3	12	6	1919	E	42.9450	-124.5900	72	18	NFS	
FR16402.01	Trawl	73	74	RR-4A	13	6	0738	S	42.5183	-124.7900	479	18	SFS	
FR16402.01	Trawl	73	74	RR-4A	13	6	0804	E	42.4883	-124.7917	-9999	18	SFS	Long line gear in area. Hauled back early.
FR16402.10	Trawl	74	75	RR-3A	13	6	1000	S	42.5133	-124.6750	114	18	SFS	
FR16402.10	Trawl	74	75	RR-3A	13	6	1030	E	42.4817	-124.7033	119	18	SFS	
FR16402.11	Trawl	75	76	RR-2A	13	6	1130	S	42.4817	-124.5867	77	18	SFS	
FR16402.11	Trawl	75	76	RR-2A	13	6	1200	E	42.5117	-124.5883	80	18	SFS	
FR16402.16	Trawl	76	77	RR-1A	13	6	1327	S	42.4900	-124.4967	32	18	SFS	
FR16402.16	Trawl	76	77	RR-1A	13	6	1357	E	42.5200	-124.4967	36	18	SFS	
FR16402.21	Trawl	77	78	9B-1	13	6	1500	S	42.5167	-124.5517	67	18	SFS	
FR16402.21	Trawl	77	78	9B-1	13	6	1530	E	42.5450	-124.5617	80	18	SFS	
FR16402.26	Trawl	78	79	9B-2	13	6	1646	S	42.5183	-124.6517	114	18	SFS	
FR16402.26	Trawl	78	79	9B-2	13	6	1716	E	42.5367	-124.6650	245	18	SFS	
FR16402.31	Trawl	79	80	9B-3	13	6	1824	S	42.5467	-124.7200	224	18	SFS	
FR16402.31	Trawl	79	80	9B-3	13	6	1854	E	42.5183	-124.7433	394	18	SFS	
FR16502.05	Trawl	80	81	CR-3	14	6	0841	S	41.9167	-124.5050	129	18	SFS	
FR16502.05	Trawl	80	81	CR-3	14	6	0911	E	41.8933	-124.4950	130	18	SFS	
FR16502.10	Trawl	81	82	CR-2A	14	6	1032	S	41.9167	-124.4000	67	18	SFS	
FR16502.10	Trawl	81	82	CR-2A	14	6	1102	E	41.8917	-124.3967	61	18	SFS	
FR16502.15	Trawl	82	83	CR-2B	14	6	1431	S	41.9150	-124.4033	69	18	SFS	
FR16502.15	Trawl	82	83	CR-2B	14	6	1501	E	41.8900	-124.3950	62	18	SFS	
FR16502.16	Trawl	83	84	CR-1A	14	6	1635	S	41.8933	-124.3017	39	18	SFS	
FR16502.16	Trawl	83	84	CR-1A	14	6	1705	E	41.9183	-124.3200	44	18	SFS	
FR16502.25	Trawl	84	85	CR-4	14	6	1953	S	41.9117	-124.6017	496	18	SFS	
FR16502.25	Trawl	84	85	CR-4	14	6	2023	E	41.8800	-124.5933	516	18	SFS	
FR16502.26	Trawl	85	86	CR-5	14	6	2107	S	41.8883	-124.6833	652	18	SFS	
FR16502.26	Trawl	85	86	CR-5	14	6	2137	E	41.9067	-124.7050	662	18	SFS	
FR16602.01	Trawl	86	87	9-1	15	6	0902	S	42.6783	-124.5000	60	18	SFS	
FR16602.01	Trawl	86	87	9-1	15	6	0932	E	42.6533	-124.4850	60	18	SFS	
FR16602.10	Trawl	87	88	9-2	15	6	1124	S	42.6750	-124.6083	109	18	SFS	
FR16602.10	Trawl	87	88	9-2	15	6	1154	E	42.6450	-124.6117	109	18	SFS	
FR16602.15	Trawl	88	89	9-3	15	6	1316	S	42.6717	-124.7233	244	18	SFS	
FR16602.15	Trawl	88	89	9-3	15	6	1346	E	42.6367	-124.7150	316	18	SFS	
FR16602.16	Trawl	89	90	8-1	15	6	1704	S	42.9933	-124.5017	43	18	NFS	
FR16602.16	Trawl	89	90	8-1	15	6	1734	E	42.9650	-124.5133	39	18	NFS	
FR16602.21	Trawl	90	91	7A-1	15	6	1857	S	43.0650	-124.4800	46	18	NFS	
FR16602.21	Trawl	90	91	7A-1	15	6	1927	E	43.0883	-124.4950	55	18	NFS	
FR16602.30	Trawl	91	92	7A-2	15	6	2121	S	43.0833	-124.5967	110	18	NFS	
FR16602.30	Trawl	91	92	7A-2	15	6	2151	E	43.0583	-124.6183	123	18	NFS	
FR16702.05	Trawl	92	93	6-1	16	6	0831	S	43.5183	-124.2967	65	18	NFS	
FR16702.05	Trawl	92	93	6-1	16	6	0901	E	43.4950	-124.3100	64	18	NFS	
FR16702.10	Trawl	93	94	6-2	16	6	1019	S	43.5167	-124.3900	104	18	NFS	
FR16702.10	Trawl	93	94	6-2	16	6	1049	E	43.4867	-124.3933	99	18	NFS	
FR16702.15	Trawl	94	95	6-3	16	6	1201	S	43.5150	-124.4867	126	18	NFS	
FR16702.15	Trawl	94	95	6-3	16	6	1231	E	43.4867	-124.4900	119	18	NFS	
FR16702.20	Trawl	95	96	6-4	16	6	1342	S	43.5133	-124.5850	193	18	NFS	
FR16702.20	Trawl	95	96	6-4	16	6	1412	E	43.4900	-124.5933	190	18	NFS	

**Table 10: Trawls (cont'd)**

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16702.25	Trawl	96	97	4A-1	16	6	1744	S	43.8417	-124.2117	49	18	NFS	
FR16702.25	Trawl	96	97	4A-1	16	6	1814	E	43.8667	-124.2150	54	18	NFS	
FR16702.30	Trawl	97	98	4A-2	16	6	1934	S	43.8650	-124.3017	103	18	NFS	
FR16702.30	Trawl	97	98	4A-2	16	6	2004	E	43.8350	-124.3017	102	18	NFS	
FR16702.35	Trawl	98	99	4A-3	16	6	2117	S	43.8633	-124.3967	113	18	NFS	
FR16702.35	Trawl	98	99	4A-3	16	6	2147	E	43.8383	-124.3933	108	18	NFS	
FR16802.05	Trawl	99	100	3A-1	17	6	0852	S	44.1100	-124.1850	47	18	NFS	
FR16802.05	Trawl	99	100	3A-1	17	6	0922	E	44.1350	-124.1833	46	18	NFS	
FR16802.10	Trawl	100	101	3A-2	17	6	1053	S	44.1200	-124.2833	74	18	NFS	
FR16802.10	Trawl	100	101	3A-2	17	6	1123	E	44.0950	-124.2883	75	18	NFS	
FR16802.11	Trawl	101	102	1A-3	17	6	1858	S	44.5500	-124.2817	75	18	NFS	
FR16802.11	Trawl	101	102	1A-3	17	6	1928	E	44.5700	-124.2817	75	18	NFS	
FR16802.20	Trawl	102	103	1A-2	17	6	2111	S	44.5867	-124.1817	53	18	NFS	
FR16802.20	Trawl	102	103	1A-2	17	6	2141	E	44.5600	-124.1817	51	18	NFS	
FR16902.05	Trawl	103	104	1A-1	18	6	0731	S	44.5867	-124.1350	43	18	NFS	
FR16902.05	Trawl	103	104	1A-1	18	6	0801	E	44.5600	-124.1350	43	18	NFS	
FR16902.10	Trawl	104	105	NH-5H	18	6	1000	E	44.6300	-124.1750	51	18	NFS	
FR16902.10	Trawl	104	105	NH-5H	18	6	0930	S	44.6450	-124.1750	56	18	NFS	



## **APPENDIX I**

### **FR0206 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: 3m<sup>2</sup> 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: 1m<sup>2</sup> 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
FR15202.01	CTD	1	1	NH-3	1	6	0619	S	44.6467	-124.1283	43	40	meso	
FR15202.02	Niskin3m	1	1	NH-3	1	6	0609	S	44.6467	-124.1283	43	3	meso	
FR15202.03	Neuston	1	1	NH-3	1	6	0619	S	44.6467	-124.1283	43	0	meso	
FR15202.04	CTD	2	2	NH-5	1	6	0703	S	44.6467	-124.1800	55	50	meso	
FR15202.05	Niskin3m	2	2	NH-5	1	6	0703	S	44.6467	-124.1800	55	3	meso	
FR15202.06	Neuston	2	2	NH-5	1	6	0709	S	44.6450	-124.1800	54	0	meso	
FR15202.07	Trawl	1	2	NH-5	1	6	0739	S	44.6333	-124.1800	52	18	meso	
FR15202.07	Trawl	1	2	NH-5	1	6	0809	E	44.6583	-124.1833	58	18	meso	
FR15202.08	CTD	3	3	NH-10	1	6	0918	S	44.6517	-124.2967	75	70	meso	
FR15202.09	Niskin3m	3	3	NH-10	1	6	0918	S	44.6517	-124.2967	75	3	meso	
FR15202.10	Neuston	3	3	NH-10	1	6	0934	S	44.6517	-124.2967	76	0	meso	
FR15202.11	Trawl	2	3	NH-10	1	6	0955	S	44.6650	-124.3033	78	18	meso	
FR15202.11	Trawl	2	3	NH-10	1	6	1025	E	44.6867	-124.3083	78	18	meso	
FR15202.12	CTD	4	4	NH-15	1	6	1113	S	44.6517	-124.4117	86	80	meso	
FR15202.13	Niskin3m	4	4	NH-15	1	6	1113	S	44.6517	-124.4117	86	3	meso	
FR15202.14	Neuston	4	4	NH-15	1	6	1122	S	44.6500	-124.4133	83	0	meso	
FR15202.15	Trawl	3	4	NH-15	1	6	1151	S	44.6467	-124.4100	82	18	meso	
FR15202.15	Trawl	3	4	NH-15	1	6	1221	E	44.6700	-124.4150	97	18	meso	
FR15202.16	CTD	5	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	100	meso	
FR15202.17	Secchi	1	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	7	meso	
FR15202.18	Niskin3m	5	5	NH-20	1	6	1311	S	44.6517	-124.5300	138	3	meso	
FR15202.19	Neuston	5	5	NH-20	1	6	1320	S	44.6450	-124.5300	136	0	meso	
FR15202.20	Trawl	4	5	NH-20	1	6	1342	S	44.6417	-124.5300	133	18	meso	
FR15202.20	Trawl	4	5	NH-20	1	6	1412	E	44.6650	-124.5317	144	18	meso	
FR15202.21	CTD	6	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	100	meso	
FR15202.22	Secchi	2	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	9	meso	
FR15202.23	Niskin3m	6	6	NH-25	1	6	1506	S	44.6517	-124.6533	288	3	meso	
FR15202.24	Neuston	6	6	NH-25	1	6	1517	S	44.6467	-124.6550	274	0	meso	
FR15202.25	Trawl	5	6	NH-25	1	6	1539	S	44.6467	-124.6517	282	18	meso	
FR15202.25	Trawl	5	6	NH-25	1	6	1609	E	44.6700	-124.6525	302	18	meso	
FR15202.26	CTD	7	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	100	meso	
FR15202.27	Secchi	3	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	8	meso	
FR15202.28	Niskin3m	7	7	NH-35	1	6	1729	S	44.6517	-124.8783	428	3	meso	
FR15202.29	Neuston	7	7	NH-35	1	6	1747	S	44.6417	-124.8783	446	0	meso	
FR15202.30	Trawl	6	7	NH-35	1	6	1812	S	44.6450	-124.8817	450	18	meso	
FR15202.30	Trawl	6	7	NH-35	1	6	1842	E	44.6708	-124.8750	457	18	meso	
FR15202.31	CTD	8	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	100	meso	
FR15202.32	Secchi	4	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	10	meso	
FR15202.33	Niskin3m	8	8	NH-45	1	6	2004	S	44.6517	-125.1183	718	3	meso	
FR15202.34	Neuston	8	8	NH-45	1	6	2013	S	44.6483	-125.1167	706	0	meso	
FR15202.35	Trawl	7	8	NH-45	1	6	2036	S	44.6483	-125.1183	719	18	meso	
FR15202.35	Trawl	7	8	NH-45	1	6	2106	E	44.6750	-125.1233	675	18	meso	
FR15302.01	CTD	9	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	50	meso	
FR15302.02	Secchi	5	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	5	meso	
FR15302.03	Niskin3m	9	9	HH-1	2	6	0606	S	44.0000	-124.2000	50	3	meso	
FR15302.04	Neuston	9	9	HH-1	2	6	0619	S	44.0033	-124.2000	50	0	meso	
FR15302.05	Trawl	8	9	HH-1	2	6	0642	S	44.0050	-124.1983	50	18	meso	
FR15302.05	Trawl	8	9	HH-1	2	6	0712	E	43.9750	-124.2033	51	18	meso	
FR15302.06	CTD	10	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	100	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15302.07	Secchi	6	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	7	meso	
FR15302.08	Niskin3m	10	10	HH-2	2	6	0825	S	44.0000	-124.3983	117	3	meso	
FR15302.09	Neuston	10	10	HH-2	2	6	0834	S	43.9967	-124.3950	117	0	meso	
FR15302.10	Tucker 3	1	10	HH-2	2	6	0934	S	43.9850	-124.3933	115	20	meso	Bottom net was ripped, so took that off and used 2 nets, instead of 3.
FR15302.10	Tucker 3	1	10	HH-2	2	6	0940	E	43.9883	-124.3950	116	0	meso	Top net did not trip. Bars badly bent by end of tow. Not repairable at sea.
FR15302.11	Trawl	9	10	HH-2	2	6	1005	S	43.9917	-124.3983	116	18	meso	
FR15302.11	Trawl	9	10	HH-2	2	6	1035	E	44.0150	-124.4017	115	18	meso	
FR15302.12	CTD	11	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	100	meso	
FR15302.13	Secchi	7	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	7	meso	
FR15302.14	Niskin3m	11	11	HH-3	2	6	1146	S	44.0000	-124.5983	149	3	meso	
FR15302.15	Neuston	11	11	HH-3	2	6	1156	S	44.0000	-124.5950	148	0	meso	
FR15302.16	Trawl	10	11	HH-3	2	6	1224	S	43.9950	-124.5967	152	18	meso	
FR15302.16	Trawl	10	11	HH-3	2	6	1254	E	44.0183	-124.6150	139	18	meso	
FR15302.17	CTD	12	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	100	meso	
FR15302.18	Secchi	8	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	7	meso	
FR15302.19	Niskin3m	12	12	HH-4	2	6	1355	S	44.0000	-124.7983	104	3	meso	
FR15302.20	Neuston	12	12	HH-4	2	6	1409	S	43.9917	-124.7967	111	0	meso	
FR15302.21	Trawl	11	12	HH-4	2	6	1433	S	43.9933	-124.7993	110	18	meso	
FR15302.21	Trawl	11	12	HH-4	2	6	1503	E	44.0183	-124.8017	99	18	meso	
FR15302.22	CTD	13	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	100	meso	
FR15302.23	Secchi	9	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	12	meso	
FR15302.24	Niskin3m	13	13	HH-5	2	6	1611	S	44.0000	-124.9983	929	3	meso	
FR15302.25	Neuston	13	13	HH-5	2	6	1621	S	43.9983	-124.9967	923	0	meso	
FR15302.26	Trawl	12	13	HH-5	2	6	1644	S	44.0050	-124.9983	935	18	meso	
FR15302.26	Trawl	12	13	HH-5	2	6	1712	E	43.9733	-124.9983	930	18	meso	
FR15302.27	CTD	14	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	100	meso	
FR15302.28	Secchi	10	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	12	meso	
FR15302.29	Niskin3m	14	14	HH-6	2	6	1759	S	44.0000	-125.0983	1430	3	meso	
FR15302.30	Neuston	14	14	HH-6	2	6	1813	S	44.0017	-125.0983	1427	0	meso	
FR15302.31	Trawl	13	14	HH-6	2	6	1836	S	44.0033	-125.1067	1432	18	meso	
FR15302.31	Trawl	13	14	HH-6	2	6	1906	E	44.0250	-125.1117	1362	18	meso	
FR15402.01	CTD	15	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	100	meso	
FR15402.02	Secchi	11	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	7	meso	
FR15402.03	Niskin3m	15	15	UR-2	3	6	0625	S	43.7517	-124.3183	100	3	meso	
FR15402.04	Neuston	15	15	UR-2	3	6	0635	S	43.7500	-124.3167	101	0	meso	
FR15402.05	Trawl	14	15	UR-2	3	6	0658	S	43.7517	-124.3200	102	18	meso	
FR15402.05	Trawl	14	15	UR-2	3	6	0728	E	43.7183	-124.3183	101	18	meso	
FR15402.06	CTD	16	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	100	meso	
FR15402.07	Secchi	12	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	7	meso	
FR15402.08	Niskin3m	16	16	UR-3	3	6	0813	S	43.7517	-124.3983	112	3	meso	
FR15402.09	Neuston	16	16	UR-3	3	6	0827	S	43.7417	-124.3967	112	0	meso	
FR15402.10	Trawl	15	16	UR-3	3	6	0846	S	43.7417	-124.3983	113	18	meso	
FR15402.10	Trawl	15	16	UR-3	3	6	0916	E	43.7617	-124.4000	112	18	meso	
FR15402.11	CTD	17	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	100	meso	
FR15402.12	Secchi	13	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	8	meso	
FR15402.13	Niskin3m	17	17	UR-4	3	6	0951	S	43.7515	-124.4700	120	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15402.14	Neuston	17	17	UR-4	3	6	1000	S	43.7483	-124.4683	126	0	meso	
FR15402.15	Trawl	16	17	UR-4	3	6	1022	S	43.7400	-124.4717	122	18	meso	
FR15402.15	Trawl	16	17	UR-4	3	6	1052	E	43.7633	-124.4667	124	18	meso	
FR15402.16	CTD	18	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	100	meso	
FR15402.17	Secchi	14	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	12	meso	
FR15402.18	Niskin3m	18	18	UR-5	3	6	1125	S	43.7483	-124.5333	169	3	meso	
FR15402.19	Neuston	18	18	UR-5	3	6	1134	S	43.7467	-124.5300	166	0	meso	
FR15402.20	Trawl	17	18	UR-5	3	6	1155	S	43.7417	-124.5300	167	18	meso	
FR15402.20	Trawl	17	18	UR-5	3	6	1225	E	43.7650	-124.5283	162	18	meso	
FR15402.21	CTD	19	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	100	meso	
FR15402.22	Secchi	15	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	14	meso	
FR15402.23	Niskin3m	19	19	UR-6	3	6	1302	S	43.7500	-124.5917	255	3	meso	
FR15402.24	Neuston	19	19	UR-6	3	6	1315	S	43.7467	-124.5950	247	0	meso	
FR15402.25	Trawl	18	19	UR-6	3	6	1341	S	43.7450	-124.5983	252	18	meso	
FR15402.25	Trawl	18	19	UR-6	3	6	1411	E	43.7717	-124.6017	257	18	meso	
FR15402.26	CTD	20	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	25	meso	
FR15402.27	Secchi	16	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	9	meso	
FR15402.28	Niskin3m	20	20	UR-0	3	6	1615	S	43.7517	-124.2150	31	3	meso	
FR15402.29	Neuston	20	20	UR-0	3	6	1626	S	43.7550	-124.2165	33	0	meso	
FR15402.30	Trawl	19	20	UR-0	3	6	1659	S	43.7783	-124.2133	36	18	meso	
FR15402.30	Trawl	19	20	UR-0	3	6	1729	E	43.7467	-124.2183	32	18	meso	
FR15402.31	CTD	21	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	45	meso	
FR15402.32	Secchi	17	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	9	meso	
FR15402.33	Niskin3m	21	21	UR-1	3	6	1830	S	43.7450	-124.2300	50	3	meso	
FR15402.34	Neuston	21	21	UR-1	3	6	1825	S	43.7450	-124.2300	50	0	meso	
FR15402.35	Trawl	20	21	UR-1	3	6	1858	S	43.7583	-124.2267	47	18	meso	
FR15402.35	Trawl	20	21	UR-1	3	6	1928	E	43.7250	-124.2367	46	18	meso	
FR15502.01	CTD	22	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	30	meso	
FR15502.02	Secchi	18	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	5	meso	
FR15502.03	Niskin3m	22	22	FM-1	4	6	0605	S	43.2150	-124.4350	32	3	meso	
FR15502.04	Neuston	22	22	FM-1	4	6	0616	S	43.2100	-124.4350	32	0	meso	
FR15502.05	Trawl	21	22	FM-1	4	6	0643	S	43.1983	-124.4400	34	18	meso	
FR15502.05	Trawl	21	22	FM-1	4	6	0713	E	43.2233	-124.4333	30	18	meso	
FR15502.06	CTD	23	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	50	meso	
FR15502.07	Secchi	19	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	6	meso	
FR15502.08	Niskin3m	23	23	FM-3	4	6	0749	S	43.2217	-124.5017	53	3	meso	
FR15502.09	Neuston	23	23	FM-3	4	6	0755	S	43.2217	-124.5033	52	0	meso	
FR15502.10	Trawl	22	23	FM-3	4	6	0817	S	43.2233	-124.5017	54	18	meso	
FR15502.10	Trawl	22	23	FM-3	4	6	0847	E	43.1950	-124.4983	58	18	meso	
FR15502.11	CTD	24	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	80	meso	
FR15502.12	Secchi	20	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	12	meso	
FR15502.13	Niskin3m	24	24	FM-4	4	6	0931	S	43.2200	-124.5800	83	3	meso	
FR15502.14	Neuston	24	24	FM-4	4	6	0945	S	43.2183	-124.5767	81	0	meso	
FR15502.15	Trawl	23	24	FM-4	4	6	1006	S	43.2133	-124.5750	78	18	meso	
FR15502.15	Trawl	23	24	FM-4	4	6	1036	E	43.1733	-124.5733	96	18	meso	
FR15502.16	CTD	25	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	100	meso	
FR15502.17	Secchi	21	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	16	meso	
FR15502.18	Niskin3m	25	25	FM-5	4	6	1127	S	43.2200	-124.6683	155	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15502.19	Neuston	25	25	FM-5	4	6	1138	S	43.2167	-124.6717	160	0	meso	
FR15502.20	Trawl	24	25	FM-5	4	6	1203	S	43.2217	-124.6733	160	18	meso	
FR15502.20	Trawl	24	25	FM-5	4	6	1233	E	43.1950	-124.6633	142	18	meso	
FR15502.21	CTD	26	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	100	meso	
FR15502.22	Secchi	22	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	10	meso	
FR15502.23	Niskin3m	26	26	FM-6	4	6	1315	S	43.2200	-124.7500	311	3	meso	
FR15502.24	Neuston	26	26	FM-6	4	6	1325	S	43.2167	-124.7500	309	0	meso	
FR15502.25	Trawl	25	26	FM-6	4	6	1355	S	43.2117	-124.7533	321	18	meso	
FR15502.25	Trawl	25	26	FM-6	4	6	1425	E	43.2350	-124.7517	321	18	meso	
FR15502.26	CTD	27	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	100	meso	
FR15502.27	Secchi	22	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	12	meso	
FR15502.28	Niskin3m	27	27	FM-7	4	6	1504	S	43.2217	-124.8283	353	3	meso	
FR15502.29	Neuston	27	27	FM-7	4	6	1514	S	43.2217	-124.8317	353	0	meso	
FR15502.30	Trawl	26	27	FM-7	4	6	1539	S	43.2333	-124.8317	355	18	meso	
FR15502.30	Trawl	26	27	FM-7	4	6	1609	E	43.2083	-124.8250	340	18	meso	
FR15502.31	CTD	28	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	100	meso	
FR15502.32	Secchi	23	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	12	meso	
FR15502.33	Niskin3m	28	28	FM-8	4	6	1715	S	43.2200	-124.9983	1089	3	meso	
FR15502.34	Neuston	28	28	FM-8	4	6	1723	S	43.2200	-124.9983	1089	0	meso	
FR15502.35	Trawl	27	28	FM-8	4	6	1753	S	43.2300	-124.9967	1086	18	meso	
FR15502.35	Trawl	27	28	FM-8	4	6	1823	E	43.2017	-124.9967	1080	18	meso	
FR15502.36	CTD	29	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	100	meso	
FR15502.37	Secchi	24	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	15	meso	
FR15502.38	Niskin3m	29	29	FM-9	4	6	1930	S	43.2200	-125.1683	1640	3	meso	
FR15502.39	Neuston	29	29	FM-9	4	6	1950	S	43.2317	-125.1650	1779	0	meso	
FR15502.40	Trawl	28	29	FM-9	4	6	2011	S	43.2333	-125.1600	1772	18	meso	
FR15502.40	Trawl	28	29	FM-9	4	6	2040	E	43.2083	-125.1600	1791	18	meso	
FR15602.01	CTD	30	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	30	meso	
FR15602.02	Secchi	25	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	8	meso	
FR15602.03	Niskin3m	30	30	RR-1	5	6	0609	S	42.5000	-124.4983	33	3	meso	
FR15602.04	Neuston	30	30	RR-1	5	6	0615	S	42.4983	-124.4967	33	0	meso	
FR15602.05	Trawl	29	30	RR-1	5	6	0641	S	42.4917	-124.4983	32	18	meso	
FR15602.05	Trawl	29	30	RR-1	5	6	0711	E	42.5167	-124.5033	36	18	meso	
FR15602.06	CTD	31	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	80	meso	
FR15602.07	Secchi	26	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	9	meso	
FR15602.08	Niskin3m	31	31	RR-2	5	6	0753	S	42.5000	-124.6000	84	3	meso	
FR15602.09	Neuston	31	31	RR-2	5	6	0806	S	42.5017	-124.6000	84	0	meso	
FR15602.10	Trawl	30	31	RR-2	5	6	0832	S	42.5067	-124.6017	86	18	meso	
FR15602.10	Trawl	30	31	RR-2	5	6	0902	E	42.4767	-124.5983	83	18	meso	
FR15602.11	CTD	32	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	100	meso	
FR15602.12	Secchi	27	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	11	meso	
FR15602.13	Niskin3m	32	32	RR-3	5	6	0946	S	42.5000	-124.7000	136	3	meso	
FR15602.14	Neuston	32	32	RR-3	5	6	0955	S	42.4983	-124.7000	123	0	meso	
FR15602.15	Trawl	31	32	RR-3	5	6	1023	S	42.5050	-124.7017	150	18	meso	
FR15602.15	Trawl	31	32	RR-3	5	6	1053	E	42.4717	-124.6967	117	18	meso	
FR15602.16	CTD	33	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	100	meso	
FR15602.17	Secchi	28	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	7	meso	
FR15602.18	Niskin3m	33	33	RR-4	5	6	1141	S	42.4983	-124.7983	587	3	meso	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15602.19	Neuston	33	33	RR-4	5	6	1159	S	42.4867	-124.7950	431	0	meso	
FR15602.20	Trawl	32	33	RR-4	5	6	1219	S	42.3533	-124.7967	424	18	meso	
FR15602.20	Trawl	32	33	RR-4	5	6	1249	E	42.5050	-124.8017	681	18	meso	
FR15602.21	CTD	34	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	100	meso	
FR15602.22	Secchi	29	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	6	meso	
FR15602.23	Niskin3m	34	34	RR-5	5	6	1329	S	42.5000	-124.8983	1519	3	meso	
FR15602.24	Neuston	34	34	RR-5	5	6	1338	S	42.4967	-124.8983	1136	0	meso	
FR15602.25	Trawl	33	34	RR-5	5	6	1408	S	42.5100	-124.9017	1176	18	meso	
FR15602.25	Trawl	33	34	RR-5	5	6	1438	E	42.4750	-124.8967	1089	18	meso	
FR15602.26	CTD	35	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	100	meso	
FR15602.27	Secchi	30	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	9	meso	
FR15602.28	Niskin3m	35	35	RR-6	5	6	1523	S	42.4983	-124.9983	1791	3	meso	
FR15602.29	Neuston	35	35	RR-6	5	6	1532	S	42.4967	-125.0000	1798	0	meso	
FR15602.30	Trawl	34	35	RR-6	5	6	1600	S	42.5067	-125.0017	1789	18	meso	
FR15602.30	Trawl	34	35	RR-6	5	6	1630	E	42.4767	-124.9983	1828	18	meso	
FR15602.31	CTD	36	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	100	meso	
FR15602.32	Secchi	31	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	12	meso	
FR15602.33	Niskin3m	36	36	RR-7	5	6	1743	S	42.4983	-125.1983	2990	3	meso	
FR15602.34	Neuston	36	36	RR-7	5	6	1805	S	42.5033	-125.2017	2961	0	meso	
FR15602.35	Trawl	35	36	RR-7	5	6	1829	S	42.5117	-125.2033	2969	18	meso	
FR15602.35	Trawl	35	36	RR-7	5	6	1859	E	42.4833	-125.1967	2870	18	meso	
FR15702.01	CTD	37	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	30	meso	
FR15702.02	Secchi	32	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	4	meso	
FR15702.03	Niskin3m	37	37	CR-1	6	6	0602	S	41.9017	-124.3050	38	3	meso	
FR15702.04	Neuston	37	37	CR-1	6	6	0614	S	41.9050	-124.3050	38	0	meso	
FR15702.05	Trawl	36	37	CR-1	6	6	0653	S	41.9017	-124.3167	42	18	meso	
FR15702.05	Trawl	36	37	CR-1	6	6	0723	E	41.9267	-124.3300	47	18	meso	
FR15702.06	CTD	38	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	60	meso	
FR15702.07	Secchi	33	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	6	meso	
FR15702.08	Niskin3m	38	38	CR-2	6	6	0808	S	41.9000	-124.4017	65	3	meso	
FR15702.09	Neuston	38	38	CR-2	6	6	0814	S	41.8983	-124.4017	65	0	meso	
FR15702.10	Trawl	37	38	CR-2	6	6	0844	S	41.8917	-124.3967	63	18	meso	
FR15702.10	Trawl	37	38	CR-2	6	6	0914	E	41.9133	-124.4100	70	18	meso	
FR15802.01	CTD	39	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	55	NFS	
FR15802.02	Secchi	34	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	9	NFS	
FR15802.03	Niskin3m	39	39	NH-5A	7	6	1003	S	44.6467	-124.1867	59	3	NFS	
FR15802.04	Neuston	39	39	NH-5A	7	6	1012	S	44.6433	-124.1883	57	0	NFS	
FR15802.05	Tucker 3	2	39	NH-5A	7	6	1026	S	44.6483	-124.1900	59	0	NFS	
FR15802.06	Trawl	38	39	NH-5A	7	6	1102	S	44.6517	-124.1848	59	18	NFS	
FR15802.06	Trawl	38	39	NH-5A	7	6	1132	E	44.6217	-124.1683	49	18	NFS	
FR15802.07	CTD	40	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	55	NFS	
FR15802.08	Secchi	35	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	6	NFS	
FR15802.09	Niskin3m	40	40	NH-5B	7	6	1404	S	44.6500	-124.1817	57	3	NFS	
FR15802.10	Neuston	40	40	NH-5B	7	6	1411	S	44.6483	-124.1833	57	0	NFS	
FR15802.11	Trawl	39	40	NH-5B	7	6	1440	S	44.6567	-124.1833	57	18	NFS	
FR15802.11	Trawl	39	40	NH-5B	7	6	1510	E	44.6250	-124.1750	51	18	NFS	
FR15802.12	CTD	41	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	55	NFS	
FR15802.13	Secchi	36	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	7	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR15802.14	Niskin3m	41	41	NH-5C	7	6	1753	S	44.6517	-124.1833	58	3	NFS	
FR15802.15	Neuston	41	41	NH-5C	7	6	1800	S	44.6500	-124.1833	57	0	NFS	
FR15802.16	Trawl	40	41	NH-5C	7	6	1828	S	44.6583	-124.1817	58	18	NFS	
FR15802.16	Trawl	40	41	NH-5C	7	6	1858	E	44.6267	-124.1733	51	18	NFS	
FR15802.17	CTD	42	42	NH-5D	7	6	2158	S	44.6483	-124.1800	57	55	NFS	
FR15802.18	Niskin3m	42	42	NH-5D	7	6	2158	S	44.6483	-124.1800	57	3	NFS	
FR15802.19	Neuston	42	42	NH-5D	7	6	2205	S	44.6450	-124.1817	58	0	NFS	
FR15802.20	Trawl	41	42	NH-5D	7	6	2237	S	44.6567	-124.1800	58	18	NFS	
FR15802.20	Trawl	41	42	NH-5D	7	6	2307	E	44.6217	-124.1783	52	18	NFS	
FR15902.01	CTD	43	43	NH-5E	8	6	0157	S	44.6517	-124.1817	58	55	NFS	
FR15902.02	Niskin3m	43	43	NH-5E	8	6	0157	S	44.6517	-124.1817	58	3	NFS	
FR15902.03	Neuston	43	43	NH-5E	8	6	0204	S	44.6517	-124.1817	58	0	NFS	
FR15902.04	Trawl	42	43	NH-5E	8	6	0231	S	44.6617	-124.1800	57	18	NFS	
FR15902.04	Trawl	42	43	NH-5E	8	6	0301	E	44.6300	-124.1783	52	18	NFS	
FR15902.05	CTD	44	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	55	NFS	
FR15902.06	Secchi	37	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	6	NFS	
FR15902.07	Niskin3m	44	44	NH-5F	8	6	0556	S	44.6517	-124.1800	57	3	NFS	
FR15902.08	Neuston	44	44	NH-5F	8	6	0606	S	44.6517	-124.1800	57	0	NFS	
FR15902.09	Trawl	43	44	NH-5F	8	6	0632	S	44.6633	-124.1800	57	18	NFS	
FR15902.09	Trawl	43	44	NH-5F	8	6	0702	E	44.6317	-124.1800	51	18	NFS	
FR15902.10	CTD	45	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	55	NFS	
FR15902.11	Secchi	38	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	4	NFS	
FR15902.12	Niskin3m	45	45	NH-5G	8	6	0925	S	44.6533	-124.1817	57	3	NFS	
FR15902.13	Neuston	45	45	NH-5G	8	6	0932	S	44.6533	-124.1800	57	0	NFS	
FR15902.14	Trawl	44	45	NH-5G	8	6	1029	E	44.6300	-124.1783	52	18	NFS	
FR15902.14	Trawl	44	45	NH-5G	8	6	0959	S	44.6617	-124.1783	58	18	NFS	
FR15902.15	CTD	46	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	60	NFS	
FR15902.16	Secchi	39	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	5	NFS	
FR15902.17	Niskin3m	46	46	2A-2	8	6	1915	S	44.4283	-124.2917	67	3	NFS	
FR15902.18	Neuston	46	46	2A-2	8	6	1923	S	44.4283	-124.2917	66	0	NFS	
FR15902.19	Trawl	45	46	2A-2	8	6	2001	S	44.4400	-124.2883	67	18	NFS	
FR15902.19	Trawl	45	46	2A-2	8	6	2031	E	44.4150	-124.2900	67	18	NFS	
FR15902.20	Trawl	46	47	2A-3	8	6	2143	S	44.4100	-124.4083	76	18	NFS	
FR15902.20	Trawl	46	47	2A-3	8	6	2213	E	44.3800	-124.4083	79	18	NFS	
FR15902.21	Neuston	47	47	2A-3	8	6	2232	S	44.3750	-124.4117	80	0	NFS	
FR15902.22	CTD	47	47	2A-3	8	6	2251	S	44.4000	-124.4100	77	75	NFS	
FR15902.23	Niskin3m	47	47	2A-3	8	6	2251	S	44.4000	-124.4100	77	3	NFS	
FR15902.24	CTD	48	48	2A-4	8	6	2333	S	44.4083	-124.5183	94	90	NFS	
FR15902.25	Niskin3m	48	48	2A-4	8	6	2333	S	44.4083	-124.5183	94	3	NFS	
FR15902.26	Neuston	48	48	2A-4	8	6	2342	S	44.4067	-124.5183	93	0	NFS	
FR16002.01	Trawl	47	48	2A-4	9	6	0011	S	44.4233	-124.5183	91	18	NFS	
FR16002.01	Trawl	47	48	2A-4	9	6	0041	E	44.3900	-124.5200	92	18	NFS	
FR16002.02	CTD	49	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	35	NFS	
FR16002.03	Secchi	40	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	7	NFS	
FR16002.04	Niskin3m	49	49	BOB-1	9	6	1002	S	44.2783	-124.1533	40	3	NFS	
FR16002.05	Neuston	49	49	BOB-1	9	6	1010	S	44.2767	-124.1500	38	0	NFS	
FR16002.06	Trawl	48	49	BOB-1	9	6	1036	S	44.2633	-124.1533	40	18	NFS	
FR16002.06	Trawl	48	49	BOB-1	9	6	1106	E	44.2900	-124.1517	41	18	NFS	



Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16002.07	Trawl	49	50	BOB-3	9	6	1306	S	44.2967	-124.4967	93	18	NFS	
FR16002.07	Trawl	49	50	BOB-3	9	6	1336	E	44.2667	-124.5000	99	18	NFS	
FR16002.08	Neuston	50	50	BOB-3	9	6	1358	S	44.2617	-124.5050	100	0	NFS	
FR16002.09	CTD	50	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	95	NFS	
FR16002.10	Secchi	41	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	6	NFS	
FR16002.11	Niskin3m	50	50	BOB-3	9	6	1410	S	44.2683	-124.5033	99	3	NFS	
FR16002.12	Trawl	50	51	HH-5A	9	6	1814	S	44.0117	-124.9900	858	18	NFS	
FR16002.12	Trawl	50	51	HH-5A	9	6	1844	E	44.0317	-124.9850	813	18	NFS	
FR16002.13	CTD	51	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	100	NFS	
FR16002.14	Secchi	42	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	7	NFS	
FR16002.15	Niskin3m	51	51	HH-5A	9	6	1902	S	44.0383	-124.9833	745	3	NFS	
FR16002.16	Neuston	51	51	HH-5A	9	6	1912	S	44.0350	-124.9817	743	0	NFS	
FR16002.17	Trawl	51	52	HH-4A	9	6	2027	S	44.0133	-124.8017	103	18	NFS	
FR16002.17	Trawl	51	52	HH-4A	9	6	2057	E	43.9800	-124.7967	119	18	NFS	
FR16002.18	Neuston	52	52	HH-4A	9	6	2114	S	43.9700	-124.7950	119	0	NFS	
FR16002.19	CTD	52	52	HH-4A	9	6	2132	S	43.9883	-124.7967	114	100	NFS	
FR16002.20	Niskin3m	52	52	HH-4A	9	6	2132	S	43.9883	-124.7967	114	3	NFS	
FR16002.21	Trawl	52	53	HH-4B	9	6	2211	S	44.0117	-124.7917	109	18	NFS	
FR16002.21	Trawl	52	53	HH-4B	9	6	2241	E	43.9800	-124.7817	126	18	NFS	
FR16002.22	Neuston	53	53	HH-4B	9	6	2302	S	43.9683	-124.7833	130	0	NFS	
FR16002.23	CTD	53	53	HH-4B	9	6	2317	S	43.9717	-124.7867	122	100	NFS	
FR16002.24	Niskin3m	53	53	HH-4B	9	6	2317	S	43.9717	-124.7867	122	3	NFS	
FR16102.01	Trawl	53	54	HH-4C	10	6	0017	S	43.9683	-124.8050	118	18	NFS	
FR16102.01	Trawl	53	54	HH-4C	10	6	0047	E	43.9917	-124.8133	105	18	NFS	
FR16102.02	Neuston	54	54	HH-4C	10	6	0109	S	43.9950	-124.8217	102	0	NFS	
FR16102.03	CTD	54	54	HH-4C	10	6	0126	S	43.9983	-124.8000	107	100	NFS	
FR16102.04	Niskin3m	54	54	HH-4C	10	6	0126	S	43.9983	-124.8000	107	3	NFS	
FR16102.05	CTD	55	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	45	NFS	
FR16102.06	Secchi	43	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	4	NFS	
FR16102.07	Niskin3m	55	55	HH-1A	10	6	0946	S	44.0000	-124.1983	49	3	NFS	
FR16102.08	Neuston	55	55	HH-1A	10	6	0952	S	44.0000	-124.1967	48	0	NFS	
FR16102.09	Trawl	54	55	HH-1A	10	6	1017	S	44.0133	-124.1967	49	18	NFS	
FR16102.09	Trawl	54	55	HH-1A	10	6	1047	E	43.9883	-124.2000	49	18	NFS	
FR16102.10	CTD	56	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	35	NFS	
FR16102.11	Secchi	44	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	4	NFS	
FR16102.12	Niskin3m	56	56	HH-0A	10	6	1130	S	44.0133	-124.1767	37	3	NFS	
FR16102.13	Neuston	56	56	HH-0A	10	6	1136	S	44.0133	-124.1750	36	0	NFS	
FR16102.14	Trawl	55	56	HH-0A	10	6	1156	S	44.0150	-124.1767	37	18	NFS	
FR16102.14	Trawl	55	56	HH-0A	10	6	1226	E	43.9883	-124.1800	37	18	NFS	
FR16102.15	CTD	57	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	100	NFS	
FR16102.16	Secchi	45	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	5	NFS	
FR16102.17	Niskin3m	57	57	HH-2A	10	6	1342	S	44.0000	-124.3983	117	3	NFS	
FR16102.18	Neuston	57	57	HH-2A	10	6	1350	S	43.9983	-124.3967	117	0	NFS	
FR16102.19	Trawl	56	57	HH-2A	10	6	1413	S	44.0100	-124.3983	117	18	NFS	
FR16102.19	Trawl	56	57	HH-2A	10	6	1443	E	43.9833	-124.4017	118	18	NFS	
FR16102.20	CTD	58	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	100	NFS	
FR16102.21	Secchi	46	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	4	NFS	
FR16102.22	Niskin3m	58	58	HH-3A	10	6	1555	S	44.0000	-124.5983	150	3	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16102.23	Neuston	58	58	HH-3A	10	6	1605	S	43.9967	-124.5950	151	0	NFS	
FR16102.24	Trawl	57	58	HH-3A	10	6	1632	S	44.0100	-124.5983	145	18	NFS	
FR16102.24	Trawl	57	58	HH-3A	10	6	1702	E	43.9767	-124.5967	161	18	NFS	
FR16102.25	Trawl	58	59	UR-6A	10	6	1831	S	43.7617	-124.6017	259	18	NFS	
FR16102.25	Trawl	58	59	UR-6A	10	6	1901	E	43.7300	-124.6000	258	18	NFS	
FR16102.26	Neuston	59	59	UR-6A	10	6	1918	S	43.7233	-124.6033	263	0	NFS	
FR16102.27	CTD	59	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	100	NFS	
FR16102.28	Secchi	47	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	5	NFS	
FR16102.29	Niskin3m	59	59	UR-6A	10	6	1936	S	43.7450	-124.6017	260	3	NFS	
FR16102.30	Trawl	59	60	UR-3A	10	6	2057	S	43.7633	-124.3983	112	18	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.30	Trawl	59	60	UR-3A	10	6	2127	E	43.7383	-124.3867	111	18	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.31	Neuston	60	60	UR-3A	10	6	2149	S	43.7350	-124.3867	111	0	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.32	CTD	60	60	UR-3A	10	6	2209	S	43.7583	-124.3933	111	100	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.33	Niskin3m	60	60	UR-3A	10	6	2209	S	43.7583	-124.3933	111	3	NFS	Recorded on log sheets, labeled on samples as UR-4A, but it should be UR-3A.
FR16102.34	Trawl	60	61	UR-2A	10	6	2311	S	43.7617	-124.3167	102	18	NFS	
FR16102.34	Trawl	60	61	UR-2A	10	6	2341	E	43.7367	-124.3050	100	18	NFS	
FR16202.01	Neuston	61	61	UR-2A	11	6	0018	S	43.7350	-124.3083	100	0	NFS	
FR16202.02	CTD	61	61	UR-2A	11	6	0028	S	43.7383	-124.3100	100	95	NFS	
FR16202.03	Niskin3m	61	61	UR-2A	11	6	0028	S	43.7383	-124.3100	100	3	NFS	
FR16202.04	Trawl	61	62	FM-4A	11	6	0832	S	43.2317	-124.5833	87	18	NFS	
FR16202.04	Trawl	61	62	FM-4A	11	6	0902	E	43.2033	-124.5683	69	18	NFS	
FR16202.05	Neuston	62	62	FM-4A	11	6	0921	S	43.1900	-124.5650	80	0	NFS	
FR16202.06	CTD	62	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	75	NFS	
FR16202.07	Secchi	48	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	5	NFS	
FR16202.08	Niskin3m	62	62	FM-4A	11	6	0935	S	43.1950	-124.5667	78	3	NFS	
FR16202.09	Trawl	62	63	FM-3A	11	6	1013	S	43.2017	-124.5067	60	18	NFS	
FR16202.09	Trawl	62	63	FM-3A	11	6	1043	E	43.2217	-124.5100	58	18	NFS	
FR16202.10	Neuston	63	63	FM-3A	11	6	1100	S	43.2200	-124.5133	61	0	NFS	
FR16202.11	CTD	63	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	50	NFS	
FR16202.12	Secchi	49	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	4	NFS	
FR16202.13	Niskin3m	63	63	FM-3A	11	6	1118	S	43.2200	-124.5133	55	3	NFS	
FR16202.14	Trawl	63	64	FM-2A	11	6	1150	S	43.2067	-124.4717	54	18	NFS	
FR16202.14	Trawl	63	64	FM-2A	11	6	1220	E	43.2250	-124.4783	53	18	NFS	
FR16202.15	Neuston	64	64	FM-2A	11	6	1237	S	43.2250	-124.4817	60	0	NFS	
FR16202.16	CTD	64	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	50	NFS	
FR16202.17	Secchi	50	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	4	NFS	
FR16202.18	Niskin3m	64	64	FM-2A	11	6	1251	S	43.2133	-124.4783	54	3	NFS	
FR16202.19	Neuston	65	65	FM-1A	11	6	1330	S	43.2250	-124.4433	37	0	NFS	
FR16202.20	CTD	65	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	35	NFS	
FR16202.21	Secchi	51	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	4	NFS	
FR16202.22	Niskin3m	65	65	FM-1A	11	6	1345	S	43.2167	-124.4467	40	3	NFS	
FR16202.23	Trawl	64	65	FM-1A	11	6	1405	S	43.2133	-124.4483	42	18	NFS	
FR16202.23	Trawl	64	65	FM-1A	11	6	1435	E	43.1800	-124.4617	44	18	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16202.24	Trawl	65	66	FM-5A	11	6	1606	S	43.2267	-124.6583	144	18	NFS	
FR16202.24	Trawl	65	66	FM-5A	11	6	1636	E	43.1917	-124.6633	142	18	NFS	
FR16202.25	Neuston	66	66	FM-5A	11	6	1701	S	43.1900	-124.6633	143	0	NFS	
FR16202.26	CTD	66	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	100	NFS	
FR16202.27	Secchi	52	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	5	NFS	
FR16202.28	Niskin3m	66	66	FM-5A	11	6	1713	S	43.1950	-124.6617	142	3	NFS	
FR16202.29	Trawl	66	67	FM-7A	11	6	1824	S	43.2100	-124.8283	340	18	NFS	
FR16202.29	Trawl	66	67	FM-7A	11	6	1854	E	43.2300	-124.8117	377	18	NFS	
FR16202.30	Neuston	67	67	FM-7A	11	6	1918	S	43.2267	-124.8183	365	0	NFS	
FR16202.31	CTD	67	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	100	NFS	
FR16202.32	Secchi	53	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	9	NFS	
FR16202.33	Niskin3m	67	67	FM-7A	11	6	1928	S	43.2300	-124.8233	364	3	NFS	
FR16302.01	Trawl	67	68	8-2	12	6	0759	S	42.9683	-124.5267	50	18	NFS	
FR16302.01	Trawl	67	68	8-2	12	6	0829	E	42.9383	-124.5450	47	18	NFS	
FR16302.02	Neuston	68	68	8-2	12	6	0849	S	42.9350	-124.5500	47	0	NFS	
FR16302.03	CTD	68	68	8-2	12	6	0906	S	42.9433	-124.5450	49	45	NFS	
FR16302.04	Secchi	54	68	8-2	12	6	0906	S	42.9433	-124.5450	49	5	NFS	
FR16302.05	Niskin3m	68	68	8-2	12	6	0906	S	42.9433	-124.5450	49	3	NFS	
FR16302.06	CTD	69	69	8-9	12	6	1047	S	42.9500	-124.8667	174	100	NFS	
FR16302.07	Secchi	55	69	8-9	12	6	1047	S	42.9500	-124.8667	174	13	NFS	
FR16302.08	Niskin3m	69	69	8-9	12	6	1047	S	42.9500	-124.8667	174	3	NFS	
FR16302.09	Neuston	69	69	8-9	12	6	1056	S	42.9483	-124.8650	168	0	NFS	
FR16302.10	Trawl	68	69	8-9	12	6	1127	S	42.9717	-124.8600	154	18	NFS	
FR16302.10	Trawl	68	69	8-9	12	6	1157	E	42.9400	-124.8583	157	18	NFS	
FR16302.11	CTD	70	70	8-7	12	6	1246	S	42.9483	-124.7783	158	100	NFS	
FR16302.12	Secchi	56	70	8-7	12	6	1246	S	42.9483	-124.7783	158	7	NFS	
FR16302.13	Niskin3m	70	70	8-7	12	6	1246	S	42.9483	-124.7783	158	3	NFS	
FR16302.14	Neuston	70	70	8-7	12	6	1256	S	42.9467	-124.7800	157	0	NFS	
FR16302.15	Trawl	69	70	8-7	12	6	1326	S	42.9667	-124.7800	151	18	NFS	
FR16302.15	Trawl	69	70	8-7	12	6	1356	E	42.9367	-124.7750	164	18	NFS	
FR16302.16	CTD	71	71	8-5	12	6	1439	S	42.9483	-124.6883	120	100	NFS	
FR16302.17	Secchi	57	71	8-5	12	6	1439	S	42.9483	-124.6883	120	7	NFS	
FR16302.18	Niskin3m	71	71	8-5	12	6	1439	S	42.9483	-124.6883	120	3	NFS	
FR16302.19	Neuston	71	71	8-5	12	6	1451	S	42.9483	-124.6850	118	0	NFS	
FR16302.20	Trawl	70	71	8-5	12	6	1520	S	42.9667	-124.6833	123	18	NFS	
FR16302.20	Trawl	70	71	8-5	12	6	1550	E	42.9333	-124.6867	115	18	NFS	
FR16302.21	CTD	72	72	8-4	12	6	1622	S	42.9483	-124.6417	95	90	NFS	
FR16302.22	Secchi	58	72	8-4	12	6	1622	S	42.9483	-124.6417	95	4	NFS	
FR16302.23	Niskin3m	72	72	8-4	12	6	1622	S	42.9483	-124.6417	95	3	NFS	
FR16302.24	Neuston	72	72	8-4	12	6	1633	S	42.9483	-124.6400	95	0	NFS	
FR16302.25	Trawl	71	72	8-4	12	6	1705	S	42.9633	-124.6383	94	18	NFS	
FR16302.25	Trawl	71	72	8-4	12	6	1735	E	42.9300	-124.6300	83	18	NFS	
FR16302.26	CTD	73	73	8-3	12	6	1803	S	42.9500	-124.5967	79	75	NFS	
FR16302.27	Secchi	59	73	8-3	12	6	1803	S	42.9500	-124.5967	79	3	NFS	
FR16302.28	Niskin3m	73	73	8-3	12	6	1803	S	42.9500	-124.5967	79	3	NFS	
FR16302.29	Neuston	73	73	8-3	12	6	1812	S	42.9500	-124.5950	77	0	NFS	
FR16302.30	Trawl	72	73	8-3	12	6	1849	S	42.9717	-124.5700	76	18	NFS	
FR16302.30	Trawl	72	73	8-3	12	6	1919	E	42.9450	-124.5900	72	18	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16402.01	Trawl	73	74	RR-4A	13	6	0738	S	42.5183	-124.7900	479	18	SFS	
FR16402.01	Trawl	73	74	RR-4A	13	6	0804	E	42.4883	-124.7917	-9999	18	SFS	Long line gear in area. Hauled back early.
FR16402.02	Neuston	74	74	RR-4A	13	6	0825	S	42.4867	-124.8000	466	0	SFS	
FR16402.03	CTD	74	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	100	SFS	
FR16402.04	Secchi	60	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	5	SFS	
FR16402.05	Niskin3m	74	74	RR-4A	13	6	0837	S	42.4967	-124.7900	449	3	SFS	
FR16402.06	CTD	75	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	100	SFS	
FR16402.07	Secchi	61	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	5	SFS	
FR16402.08	Niskin3m	75	75	RR-3A	13	6	0920	S	42.4967	-124.6883	111	3	SFS	
FR16402.09	Neuston	75	75	RR-3A	13	6	0930	S	42.4967	-124.6900	111	0	SFS	
FR16402.10	Trawl	74	75	RR-3A	13	6	1000	S	42.5133	-124.6750	114	18	SFS	
FR16402.10	Trawl	74	75	RR-3A	13	6	1030	E	42.4817	-124.7033	119	18	SFS	
FR16402.11	Trawl	75	76	RR-2A	13	6	1130	S	42.4817	-124.5867	77	18	SFS	
FR16402.11	Trawl	75	76	RR-2A	13	6	1200	E	42.5117	-124.5883	80	18	SFS	
FR16402.12	Neuston	76	76	RR-2A	13	6	1215	S	42.5133	-124.5883	81	0	SFS	
FR16402.13	CTD	76	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	75	SFS	
FR16402.14	Secchi	62	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	7	SFS	
FR16402.15	Niskin3m	76	76	RR-2A	13	6	1228	S	42.5083	-124.5900	80	3	SFS	
FR16402.16	Trawl	76	77	RR-1A	13	6	1327	S	42.4900	-124.4967	32	18	SFS	
FR16402.16	Trawl	76	77	RR-1A	13	6	1357	E	42.5200	-124.4967	36	18	SFS	
FR16402.17	Neuston	77	77	RR-1A	13	6	1412	S	42.5267	-124.4950	37	0	SFS	
FR16402.18	CTD	77	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	30	SFS	
FR16402.19	Secchi	63	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	5	SFS	
FR16402.20	Niskin3m	77	77	RR-1A	13	6	1427	S	42.5117	-124.5000	35	3	SFS	
FR16402.21	Trawl	77	78	9B-1	13	6	1500	S	42.5167	-124.5517	67	18	SFS	
FR16402.21	Trawl	77	78	9B-1	13	6	1530	E	42.5450	-124.5617	80	18	SFS	
FR16402.22	Neuston	78	78	9B-1	13	6	1547	S	42.5417	-124.5600	78	0	SFS	
FR16402.23	CTD	78	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	70	SFS	
FR16402.24	Secchi	64	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	6	SFS	
FR16402.25	Niskin3m	78	78	9B-1	13	6	1600	S	42.5367	-124.5550	74	3	SFS	
FR16402.26	Trawl	78	79	9B-2	13	6	1646	S	42.5183	-124.6517	114	18	SFS	
FR16402.26	Trawl	78	79	9B-2	13	6	1716	E	42.5367	-124.6650	245	18	SFS	
FR16402.27	Neuston	79	79	9B-2	13	6	1732	S	42.5367	-124.6650	209	0	SFS	
FR16402.28	CTD	79	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	100	SFS	
FR16402.29	Secchi	65	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	5	SFS	
FR16402.30	Niskin3m	79	79	9B-2	13	6	1745	S	42.5283	-124.6617	121	3	SFS	
FR16402.31	Trawl	79	80	9B-3	13	6	1824	S	42.5467	-124.7200	224	18	SFS	
FR16402.31	Trawl	79	80	9B-3	13	6	1854	E	42.5183	-124.7433	394	18	SFS	
FR16402.32	Neuston	80	80	9B-3	13	6	1910	S	42.5217	-124.7533	470	0	SFS	
FR16402.33	CTD	80	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	100	SFS	
FR16402.34	Secchi	66	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	10	SFS	
FR16402.35	Niskin3m	80	80	9B-3	13	6	1924	S	42.5267	-124.7517	367	3	SFS	
FR16502.01	CTD	81	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	100	SFS	
FR16502.02	Secchi	67	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	5	SFS	
FR16502.03	Niskin3m	81	81	CR-3	14	6	0805	S	41.9000	-124.5100	138	3	SFS	
FR16502.04	Neuston	81	81	CR-3	14	6	0814	S	41.9000	-124.5100	138	0	SFS	
FR16502.05	Trawl	80	81	CR-3	14	6	0841	S	41.9167	-124.5050	129	18	SFS	
FR16502.05	Trawl	80	81	CR-3	14	6	0911	E	41.8933	-124.4950	130	18	SFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16502.06	CTD	82	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	60	SFS	
FR16502.07	Secchi	68	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	5	SFS	
FR16502.08	Niskin3m	82	82	CR-2A	14	6	0958	S	41.9000	-124.4000	64	3	SFS	
FR16502.09	Neuston	82	82	CR-2A	14	6	1008	S	41.9017	-124.4017	64	0	SFS	
FR16502.10	Trawl	81	82	CR-2A	14	6	1032	S	41.9167	-124.4000	67	18	SFS	
FR16502.10	Trawl	81	82	CR-2A	14	6	1102	E	41.8917	-124.3967	61	18	SFS	
FR16502.11	CTD	83	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	60	SFS	
FR16502.12	Secchi	69	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	8	SFS	
FR16502.13	Niskin3m	83	83	CR-2B	14	6	1352	S	41.8983	-124.3983	64	3	SFS	
FR16502.14	Neuston	83	83	CR-2B	14	6	1359	S	41.8983	-124.3950	63	0	SFS	
FR16502.15	Trawl	82	83	CR-2B	14	6	1431	S	41.9150	-124.4033	69	18	SFS	
FR16502.15	Trawl	82	83	CR-2B	14	6	1501	E	41.8900	-124.3950	62	18	SFS	
FR16502.16	Trawl	83	84	CR-1A	14	6	1635	S	41.8933	-124.3017	39	18	SFS	
FR16502.16	Trawl	83	84	CR-1A	14	6	1705	E	41.9183	-124.3200	44	18	SFS	
FR16502.17	Neuston	84	84	CR-1A	14	6	1735	S	41.9167	-124.3183	43	0	SFS	
FR16502.18	CTD	84	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	35	SFS	
FR16502.19	Secchi	70	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	2	SFS	
FR16502.20	Niskin3m	84	84	CR-1A	14	6	1749	S	41.9100	-124.3167	42	3	SFS	
FR16502.21	CTD	85	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	100	SFS	
FR16502.22	Secchi	71	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	4	SFS	
FR16502.23	Niskin3m	85	85	CR-4	14	6	1917	S	41.9000	-124.6000	505	3	SFS	
FR16502.24	Neuston	85	85	CR-4	14	6	1927	S	41.8983	-124.5967	502	0	SFS	
FR16502.25	Trawl	84	85	CR-4	14	6	1953	S	41.9117	-124.6017	496	18	SFS	
FR16502.25	Trawl	84	85	CR-4	14	6	2023	E	41.8800	-124.5933	516	18	SFS	
FR16502.26	Trawl	85	86	CR-5	14	6	2107	S	41.8883	-124.6833	652	18	SFS	
FR16502.26	Trawl	85	86	CR-5	14	6	2137	E	41.9067	-124.7050	662	18	SFS	
FR16502.27	Neuston	86	86	CR-5	14	6	2155	S	41.9067	-124.7033	661	0	SFS	
FR16502.28	CTD	86	86	CR-5	14	6	2208	S	41.9017	-124.6967	657	100	SFS	
FR16502.29	Niskin3m	86	86	CR-5	14	6	2208	S	41.9017	-124.6967	657	3	SFS	
FR16602.01	Trawl	86	87	9-1	15	6	0902	S	42.6783	-124.5000	60	18	SFS	
FR16602.01	Trawl	86	87	9-1	15	6	0932	E	42.6533	-124.4850	60	18	SFS	
FR16602.02	Neuston	87	87	9-1	15	6	0951	S	42.6483	-124.4833	60	0	SFS	
FR16602.03	CTD	87	87	9-1	15	6	1005	S	42.6550	-124.4867	60	55	SFS	
FR16602.04	Secchi	72	87	9-1	15	6	1005	S	42.6550	-124.4867	60	3	SFS	
FR16602.05	Niskin3m	87	87	9-1	15	6	1005	S	42.6550	-124.4867	60	3	SFS	
FR16602.06	CTD	88	88	9-2	15	6	1047	S	42.6567	-124.6100	109	100	SFS	Long line gear south of 9 line. 75 into 50 fms.
FR16602.07	Secchi	73	88	9-2	15	6	1047	S	42.6567	-124.6100	109	4	SFS	
FR16602.08	Niskin3m	88	88	9-2	15	6	1047	S	42.6567	-124.6100	109	3	SFS	
FR16602.09	Neuston	88	88	9-2	15	6	1055	S	42.6550	-124.6083	108	0	SFS	
FR16602.10	Trawl	87	88	9-2	15	6	1124	S	42.6750	-124.6083	109	18	SFS	
FR16602.10	Trawl	87	88	9-2	15	6	1154	E	42.6450	-124.6117	109	18	SFS	
FR16602.11	CTD	89	89	9-3	15	6	1238	S	42.6583	-124.7033	264	100	SFS	
FR16602.12	Secchi	74	89	9-3	15	6	1238	S	42.6583	-124.7033	264	9	SFS	
FR16602.13	Niskin3m	89	89	9-3	15	6	1238	S	42.6583	-124.7033	264	3	SFS	
FR16602.14	Neuston	89	89	9-3	15	6	1248	S	42.6583	-124.7150	238	0	SFS	
FR16602.15	Trawl	88	89	9-3	15	6	1316	S	42.6717	-124.7233	244	18	SFS	
FR16602.15	Trawl	88	89	9-3	15	6	1346	E	42.6367	-124.7150	316	18	SFS	
FR16602.16	Trawl	89	90	8-1	15	6	1704	S	42.9933	-124.5017	43	18	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16602.16	Trawl	89	90	8-1	15	6	1734	E	42.9650	-124.5133	39	18	NFS	
FR16602.17	Neuston	90	90	8-1	15	6	1748	S	42.9600	-124.5150	40	0	NFS	
FR16602.18	CTD	90	90	8-1	15	6	1800	S	42.9650	-124.5133	40	35	NFS	
FR16602.19	Secchi	75	90	8-1	15	6	1800	S	42.9650	-124.5133	40	4	NFS	
FR16602.20	Niskin3m	90	90	8-1	15	6	1800	S	42.9650	-124.5133	40	3	NFS	
FR16602.21	Trawl	90	91	7A-1	15	6	1857	S	43.0650	-124.4800	46	18	NFS	
FR16602.21	Trawl	90	91	7A-1	15	6	1927	E	43.0883	-124.4950	55	18	NFS	
FR16602.22	Neuston	91	91	7A-1	15	6	1945	S	43.0883	-124.5017	57	0	NFS	
FR16602.23	CTD	91	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	50	NFS	
FR16602.24	Secchi	76	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	3	NFS	
FR16602.25	Niskin3m	91	91	7A-1	15	6	1958	S	43.0817	-124.4933	56	3	NFS	
FR16602.26	CTD	92	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	100	NFS	
FR16602.27	Secchi	77	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	7	NFS	
FR16602.28	Niskin3m	92	92	7A-2	15	6	2034	S	43.0833	-124.5983	110	3	NFS	
FR16602.29	Neuston	92	92	7A-2	15	6	2042	S	43.0817	-124.5967	111	0	NFS	
FR16602.30	Trawl	91	92	7A-2	15	6	2121	S	43.0833	-124.5967	110	18	NFS	
FR16602.30	Trawl	91	92	7A-2	15	6	2151	E	43.0583	-124.6183	123	18	NFS	
FR16702.01	CTD	93	93	6-1	16	6	0800	S	43.5000	-124.3050	64	60	NFS	
FR16702.02	Secchi	78	93	6-1	16	6	0800	S	43.5000	-124.3050	64	3	NFS	
FR16702.03	Niskin3m	93	93	6-1	16	6	0800	S	43.5000	-124.3050	64	3	NFS	
FR16702.04	Neuston	93	93	6-1	16	6	0805	S	43.5017	-124.3050	66	0	NFS	
FR16702.05	Trawl	92	93	6-1	16	6	0831	S	43.5183	-124.2967	65	18	NFS	
FR16702.05	Trawl	92	93	6-1	16	6	0901	E	43.4950	-124.3100	64	18	NFS	
FR16702.06	CTD	94	94	6-2	16	6	0943	S	43.4983	-124.3933	102	95	NFS	
FR16702.07	Secchi	79	94	6-2	16	6	0943	S	43.4983	-124.3933	102	4	NFS	
FR16702.08	Niskin3m	94	94	6-2	16	6	0943	S	43.4983	-124.3933	102	3	NFS	
FR16702.09	Neuston	94	94	6-2	16	6	0952	S	43.5000	-124.3933	101	0	NFS	
FR16702.10	Trawl	93	94	6-2	16	6	1019	S	43.5167	-124.3900	104	18	NFS	
FR16702.10	Trawl	93	94	6-2	16	6	1049	E	43.4867	-124.3933	99	18	NFS	
FR16702.11	CTD	95	95	6-3	16	6	1127	S	43.4983	-124.4883	122	100	NFS	
FR16702.12	Secchi	80	95	6-3	16	6	1127	S	43.4983	-124.4883	122	5	NFS	
FR16702.13	Niskin3m	95	95	6-3	16	6	1127	S	43.4983	-124.4883	122	3	NFS	
FR16702.14	Neuston	95	95	6-3	16	6	1135	S	43.4983	-124.4883	122	0	NFS	
FR16702.15	Trawl	94	95	6-3	16	6	1201	S	43.5150	-124.4867	126	18	NFS	
FR16702.15	Trawl	94	95	6-3	16	6	1231	E	43.4867	-124.4900	119	18	NFS	
FR16702.16	CTD	96	96	6-4	16	6	1309	S	43.5000	-124.5817	183	100	NFS	
FR16702.17	Secchi	81	96	6-4	16	6	1309	S	43.5000	-124.5817	183	6	NFS	
FR16702.18	Niskin3m	96	96	6-4	16	6	1309	S	43.5000	-124.5817	183	3	NFS	
FR16702.19	Neuston	96	96	6-4	16	6	1318	S	43.5017	-124.5817	183	0	NFS	
FR16702.20	Trawl	95	96	6-4	16	6	1342	S	43.5133	-124.5850	193	18	NFS	
FR16702.20	Trawl	95	96	6-4	16	6	1412	E	43.4900	-124.5933	190	18	NFS	
FR16702.21	CTD	97	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	45	NFS	
FR16702.22	Secchi	82	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	5	NFS	
FR16702.23	Niskin3m	97	97	4A-1	16	6	1714	S	43.8483	-124.2117	49	3	NFS	
FR16702.24	Neuston	97	97	4A-1	16	6	1719	S	43.8483	-124.2100	49	0	NFS	
FR16702.25	Trawl	96	97	4A-1	16	6	1744	S	43.8417	-124.2117	49	18	NFS	
FR16702.25	Trawl	96	97	4A-1	16	6	1814	E	43.8667	-124.2150	54	18	NFS	
FR16702.26	CTD	98	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	100	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	Reg	Comments
FR16702.27	Secchi	83	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	5	NFS	
FR16702.28	Niskin3m	98	98	4A-2	16	6	1900	S	43.8483	-124.3033	104	3	NFS	
FR16702.29	Neuston	98	98	4A-2	16	6	1908	S	43.8483	-124.3000	103	0	NFS	
FR16702.30	Trawl	97	98	4A-2	16	6	1934	S	43.8650	-124.3017	103	18	NFS	
FR16702.30	Trawl	97	98	4A-2	16	6	2004	E	43.8350	-124.3017	102	18	NFS	
FR16702.31	CTD	99	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	100	NFS	
FR16702.32	Secchi	84	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	4	NFS	Sunset (getting dark).
FR16702.33	Niskin3m	99	99	4A-3	16	6	2045	S	43.8483	-124.3967	110	3	NFS	
FR16702.34	Neuston	99	99	4A-3	16	6	2052	S	43.8500	-124.3950	110	0	NFS	
FR16702.35	Trawl	98	99	4A-3	16	6	2117	S	43.8633	-124.3967	113	18	NFS	
FR16702.35	Trawl	98	99	4A-3	16	6	2147	E	43.8383	-124.3933	108	18	NFS	
FR16802.01	CTD	100	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	40	NFS	
FR16802.02	Secchi	85	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	4	NFS	
FR16802.03	Niskin3m	100	100	3A-1	17	6	0813	S	44.1100	-124.1817	48	3	NFS	
FR16802.04	Neuston	100	100	3A-1	17	6	0823	S	44.1083	-124.1800	47	0	NFS	
FR16802.05	Trawl	99	100	3A-1	17	6	0852	S	44.1100	-124.1850	47	18	NFS	
FR16802.05	Trawl	99	100	3A-1	17	6	0922	E	44.1350	-124.1833	46	18	NFS	
FR16802.06	CTD	101	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	70	NFS	
FR16802.07	Secchi	86	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	4	NFS	Secchi disk under boat.
FR16802.08	Niskin3m	101	101	3A-2	17	6	1019	S	44.1083	-124.2900	75	3	NFS	
FR16802.09	Neuston	101	101	3A-2	17	6	1027	S	44.1117	-124.2883	75	0	NFS	
FR16802.10	Trawl	100	101	3A-2	17	6	1053	S	44.1200	-124.2833	74	18	NFS	
FR16802.10	Trawl	100	101	3A-2	17	6	1123	E	44.0950	-124.2883	75	18	NFS	
FR16802.11	Trawl	101	102	1A-3	17	6	1858	S	44.5500	-124.2817	75	18	NFS	
FR16802.11	Trawl	101	102	1A-3	17	6	1928	E	44.5700	-124.2817	75	18	NFS	
FR16802.12	Neuston	102	102	1A-3	17	6	1947	S	44.5750	-124.2800	74	0	NFS	
FR16802.13	CTD	102	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	70	NFS	
FR16802.14	Secchi	87	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	6	NFS	
FR16802.15	Niskin3m	102	102	1A-3	17	6	1959	S	44.5650	-124.2833	76	3	NFS	
FR16802.16	CTD	103	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	45	NFS	
FR16802.17	Secchi	88	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	5	NFS	
FR16802.18	Niskin3m	103	103	1A-2	17	6	2039	S	44.5717	-124.1783	51	3	NFS	
FR16802.20	Trawl	102	103	1A-2	17	6	2111	S	44.5867	-124.1817	53	18	NFS	
FR16802.20	Trawl	102	103	1A-2	17	6	2141	E	44.5600	-124.1817	51	18	NFS	
FR16802.21	Neuston	103	103	1A-2	17	6	2157	S	44.5583	-124.1817	51	0	NFS	Redid neuston, (first sample contaminated, discarded). No Event log entry.
FR16902.01	CTD	104	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	35	NFS	
FR16902.02	Secchi	89	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	4	NFS	
FR16902.03	Niskin3m	104	104	1A-1	18	6	0702	S	44.5733	-124.1333	41	3	NFS	
FR16902.04	Neuston	104	104	1A-1	18	6	0708	S	44.5767	-124.1317	41	0	NFS	
FR16902.05	Trawl	103	104	1A-1	18	6	0731	S	44.5867	-124.1350	43	18	NFS	
FR16902.05	Trawl	103	104	1A-1	18	6	0801	E	44.5600	-124.1350	43	18	NFS	
FR16902.06	CTD	105	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	55	NFS	
FR16902.07	Secchi	90	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	5	NFS	
FR16902.08	Niskin3m	105	105	NH-5H	18	6	0855	S	44.6483	-124.1800	58	3	NFS	
FR16902.09	Neuston	105	105	NH-5H	18	6	0905	S	44.6483	-124.1783	55	0	NFS	
FR16902.10	Trawl	104	105	NH-5H	18	6	1000	E	44.6300	-124.1750	51	18	NFS	
FR16902.10	Trawl	104	105	NH-5H	18	6	0930	S	44.6450	-124.1750	56	18	NFS	