



HOKKAIDO UNIVERSITY

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THE “USHIO MARU”

CRUISE 167

CRUISE 168

CRUISE 169

IN APRIL-JUNE 2009

1. Cruise Itinerary

Cruise 167			
Departure from Hakodate	Apr.	14	, 2009
Arrival at and departure from Usujiri		14	
Start hydrographic research (US09108)		14	
Start frame trawl net sampling		14	
Arrival at Usujiri		14	
Departure from Usujiri		16	
Finish frame trawl net sampling		17	
Arrival at Usujiri		17	
Departure from Usujiri		19	
Retrieval sediment trap system		19	
Arrival at Mori		19	
Departure from Mori		20	
Set sediment trap system		20	
Finish hydrographic research (US09129)		20	
Arrival at and departure from Usujiri		20	
Return to Hakodate		22	
Total coverage 296.4 miles			
Cruise 168			
Departure from Hakodate	May	8	, 2009
Arrival at Usujiri		8	
Departure from Usujiri		9	
Research by bottom long line		9	
Start hydrographic research (US09130)		9	
Arrival at Usujiri		9	
Departure from Usujiri		10	
Start sledge net		10	
Start trawl net research		10	
Arrival at Mori		10	
Departure from Mori		11	
Finish trawl net research		11	
Finish sledge net sampling		11	
Arrival at Muroran		11	
Departure from Muroran		12	
Start frame trawl net sampling		12	
Arrival at Usujiri		12	
Departure from Usujiri		14	
Arrival at Usujiri		14	
Departure from Usujiri		15	
Finish hydrographic research (US09149)		15	
Finish frame trawl net sampling		15	
Arrival at and departure from Usujiri		16	
Return to Hakodate		17	
Total coverage 386.9 miles			
Cruise 169			
Departure from Hakodate	May	22	, 2009
Arrival at Shiraoi		22	
Departure from Shiraoi		24	
Arrival at Hanasaki		25	
Departure from Hanasaki		26	
Start hydrographic research (US09150)		26	
Arrival at Nemuro		27	
Departure from Nemuro		28	
Research by R.O.V.		29	
Finish hydrographic research (US09181)		29	
Arrival at and departure from Rausu		29	
Arrival at and departure from Abashiri		30	
Arrival at Otaru		31	
Departure from Otaru	Jun.	1	
Return to Hakodate		3	
Total coverage 1148.5 miles			

2. Vessel Personnel

Captain:		Professor	Toshimi Meguro
Crew :	Chief Officer	Assistant Professor	Osamu Kimura
	Second Officer	Assistant Professor	Naoto Kobayashi
	And 13 men		
		Cruise 167	
Research Staff:	Associate Professor	(Laboratory of Marine Environmental Science)	Toshikuni Nakatani
	Associate Professor	(Laboratory of Marine Bioresource and Environment Sensing)	Tohru Mukai
	Associate Professor	(Laboratory of Marine Environmental Science)	Hiroji Onishi
Guest Scientist (Domestic):		(Ehime University)	Michinobu Kuwae
Graduate Students:	Chair of Marine Bioresource Science:		5 persons
	Chair of Marine Environmental Science:		3 persons
	Chair of Marine Bioresource and Environment Sensing:		5 persons
Under Graduate Students:	Department of Marine Biology:		2 persons
	Department of Applied Marine Science:		2 persons
		Cruise 168	
Research Staff:	Associate Professor	(Laboratory of Marine Environmental Science)	Toshikuni Nakatani
	Associate Professor	(Laboratory of Marine Bioresource and Environment Sensing)	Susumu Shimizu
	Associate Professor	(Laboratory of Marine Bioresource and Environment Sensing)	Tohru Mukai
Graduate Students:	Chair of Marine Bioresource Science:		6 persons
	Chair of Marine Bioresource and Environment Sensing:		6 persons
Under Graduate Students:	Department of Marine Biology:		1 person
	Department of Applied Marine Science:		3 persons
	Department of Applied Marine Science (Third grade):		3 persons
	Department of Marine Production System Science (Third grade):		1 person
		Cruise 169	
Research Staff:	Professor	(Laboratory of Marine Environmental Science)	Shigeru Nontani
	Assistant Professor	(Field Science Center for Northern Biosphere)	Jun Yamamoto
	Research Associate	(Graduate School of Information Science and Technology)	Toshihiro Iwamori
Graduate Students:	Graduate School of Environmental Science:		2 persons
	Graduate School of Information Science and Technology:		1 person
Under Graduate Students:	Department of Marine Biology:		2 persons
Research Staff (Domestic):		(KOWA CORPORATION)	Yukihiro Saka
		(KOWA CORPORATION)	Osamu Numamoto

3. Data on Temperature, Salinity, and Computed Dynamic Depth Anomaly

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”.

Temperature and salinity were measured by CTD (Seabird SBE9Plus and SBE-19).

Dynamic computations were made using a desk-top computer aboard the “Ushio Maru”.

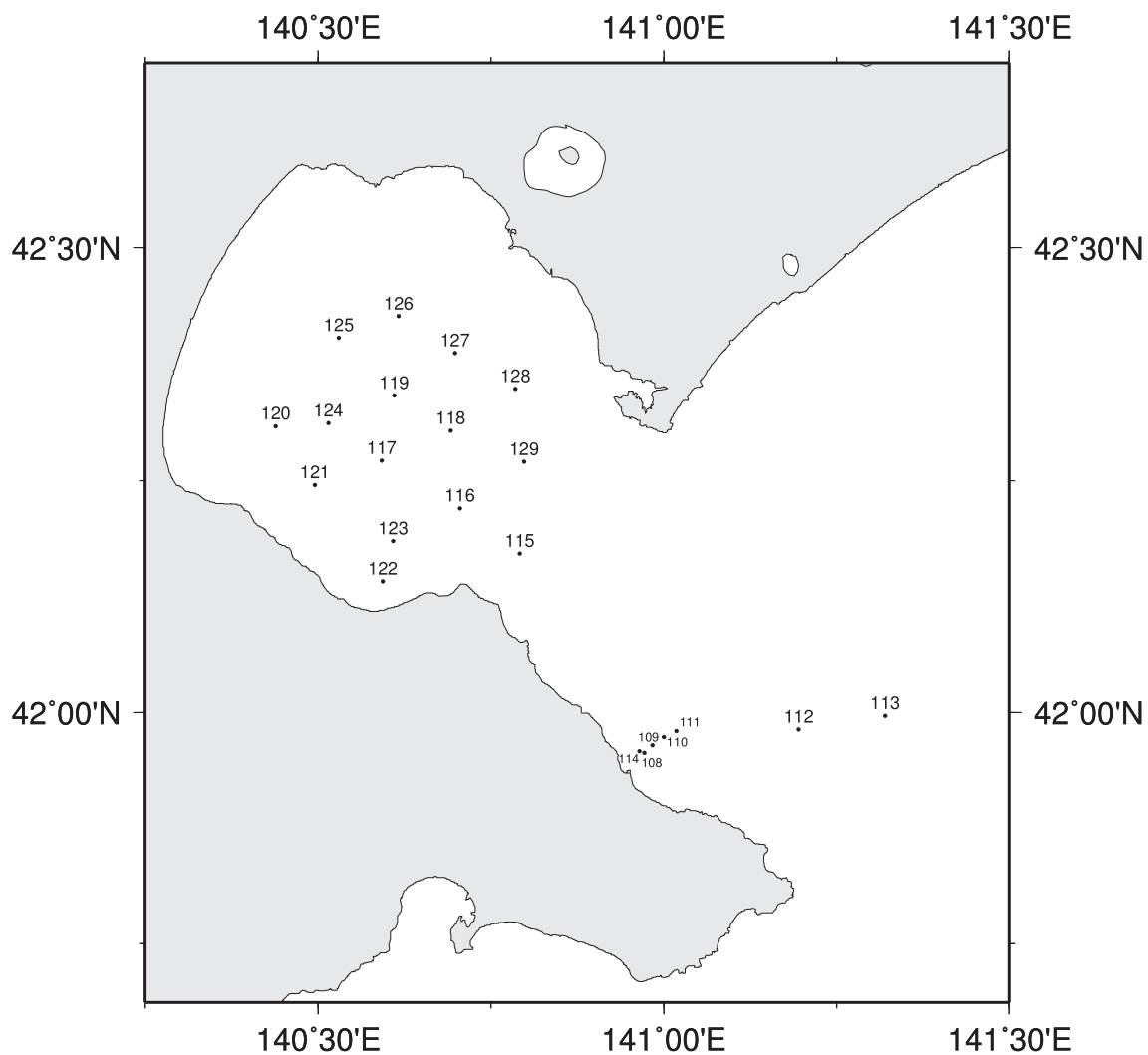


Figure 1: Oceanographic stations (Cruise 167)

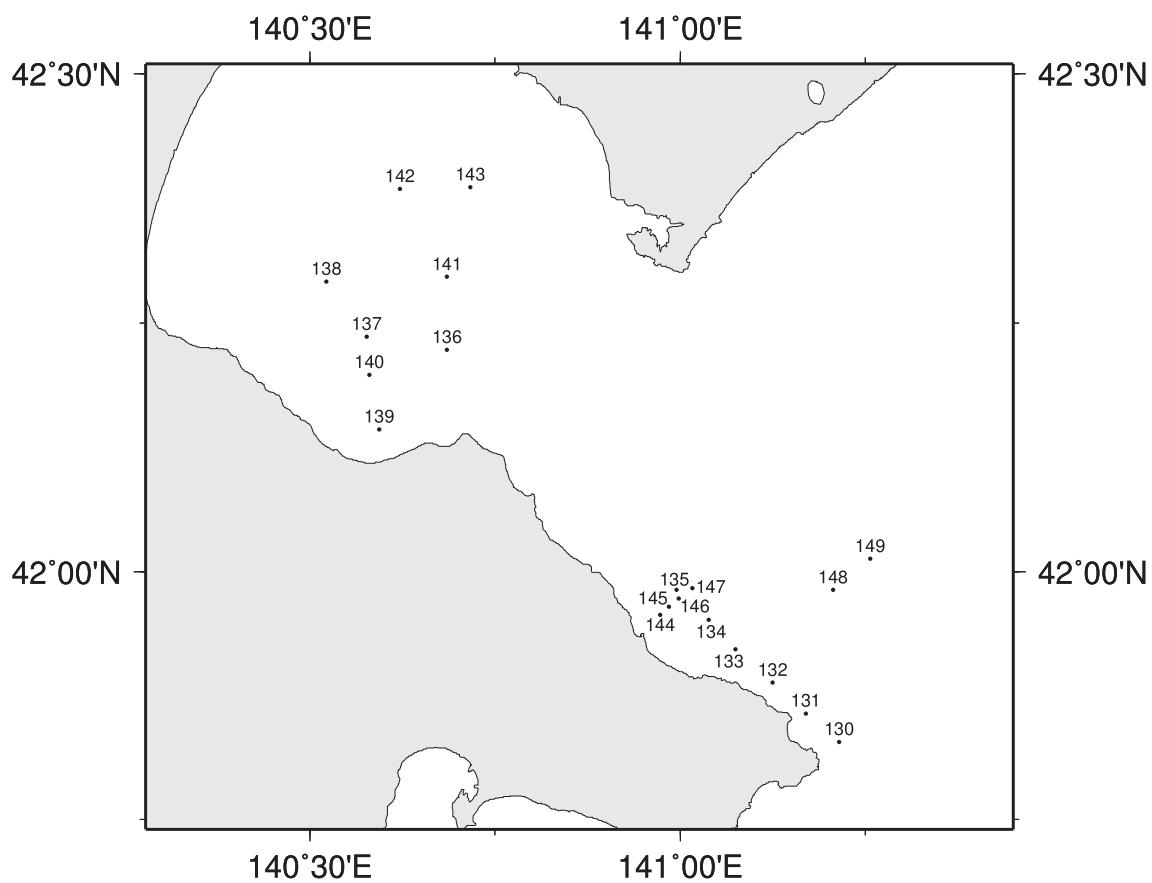


Figure 2: Oceanographic stations (Cruise 168)

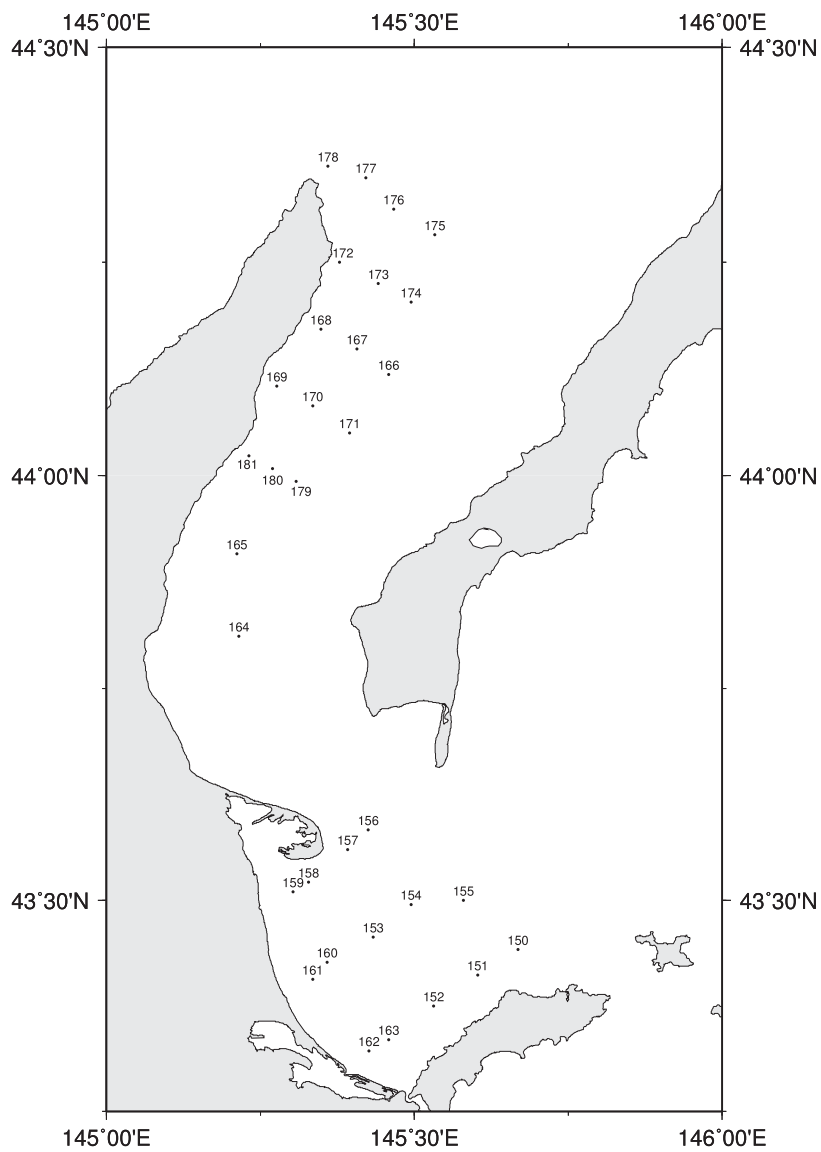


Figure 3: Oceanographic stations (Cruise 169)

Table 1: List of oceanographic stations

Cruise 167

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr. Bar. (hPa)
US09108	41-57.4	140-58.3	4/14	1455-1500	80	Calm	NE -1	Calm	7.8	5.1	o 1009.0
US09109	41-57.9	140-59.0	4/14	1506-1510	86	ESE-1	NW -1	ESE-1	6.9	4.0	o 1009.1
US09110	41-58.4	141-00.0	4/14	1517-1521	90	SE -1	NW -1	SE -2	6.2	4.0	o 1009.0
US09111	41-58.8	141-01.1	4/14	1528-1533	98	SSE-1	NW -1	SSE-3	6.2	4.0	o 1009.0
US09112	41-58.9	141-11.7	4/14	1622-1631	193	SW -1	NW -1	SW -2	6.1	4.0	o 1008.6
US09113	41-59.8	141-19.2	4/14	1720-1731	303	SW -1	NW -1	SW -2	6.2	4.6	o 1008.5
US09114	41-57.5	140-57.9	4/16	0717-0721	76	NW -3	NW -1	NW -5	4.8	4.0	bc 1009.2
US09115	42-10.3	140-47.5	4/19	0740-0744	94	West-2	ESE-1	West-4	7.0	5.2	bc 1020.1
US09116	42-13.2	140-42.3	4/19	0904-0908	90	West-1	ESE-1	West-3	8.1	5.2	bc 1020.6
US09117	42-16.3	140-35.5	4/19	1039-1043	93	WSW-1	ESE-1	WSW-2	10.6	6.0	bc 1020.8
US09118	42-18.2	140-41.5	4/19	1157-1201	71	NW -1	ESE-1	NW -3	10.7	5.9	bc 1020.6
US09119	42-20.5	140-36.6	4/19	1240-1244	87	NW -1	ESE-1	NW -3	9.8	6.3	bc 1020.0
US09120	42-18.5	140-26.3	4/19	1358-1402	74	North-2	ESE-1	North-4	9.3	6.0	bc 1020.1
US09121	42-14.7	140-29.7	4/19	1449-1453	82	North-2	ESE-1	North-4	10.6	6.4	bc 1020.1
US09122	42-08.5	140-35.6	4/19	1545-1548	64	North-1	NW -1	North-3	11.1	6.6	bc 1020.1
US09123	42-11.1	140-36.5	4/20	0657-0701	84	Calm	East-1	Calm	5.7	5.8	bc 1022.0
US09124	42-18.7	140-30.9	4/20	0918-0923	95	North-1	ESE-1	North-2	6.6	5.9	bc 1022.1
US09125	42-24.2	140-31.8	4/20	1038-1043	97	Calm	ESE-1	Calm	8.1	6.8	bc 1022.2
US09126	42-25.6	140-37.0	4/20	1137-1141	87	Calm	ESE-1	Calm	11.3	6.6	bc 1021.6
US09127	42-23.2	140-41.9	4/20	1225-1229	67	Calm	ESE-1	Calm	10.0	6.6	bc 1021.2
US09128	42-20.9	140-47.1	4/20	1307-1310	56	Calm	ESE-1	Calm	9.0	6.3	bc 1021.2
US09129	42-16.2	140-47.9	4/20	1353-1356	70	SE -1	ESE-1	SE -3	7.9	5.3	bc 1020.6

Cruise 168

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr. Bar. (hPa)
US09130	41-49.7	141-12.9	5/9	0730-0739	160	SW -2	SE -1	SW -4	11.2	6.3	bc 1010.1
US09131	41-51.4	141-10.2	5/9	0757-0802	109	SE -1	SE -1	SE -2	12.0	6.7	bc 1010.1
US09132	41-53.3	141-07.5	5/9	0821-0826	94	ESE-1	SE -1	ESE-3	11.7	7.0	bc 1009.7
US09133	41-55.3	141-04.5	5/9	0848-0853	111	ESE-1	SE -1	ESE-2	109.0	6.5	bc 1009.9
US09134	41-57.1	141-02.3	5/9	1250-1255	106	SW -2	SE -1	SW -4	16.9	7.8	bc 1008.0
US09135	41-58.9	140-59.7	5/9	1313-1317	88	South-2	SE -1	South-4	17.3	7.9	bc 1007.6
US09136	42-13.4	140-41.1	5/10	0827-0831	89	West-1	ESE-1	West-2	11.3	8.0	bc 1011.0
US09137	42-14.2	140-34.6	5/10	1110-1115	90	Calm	ESE-1	Calm	14.6	8.6	bc 1012.0
US09138	42-17.5	140-31.3	5/10	1309-1313	94	SE -1	ESE-1	SE -2	16.2	10.5	bc 1011.9
US09139	42-08.6	140-35.6	5/10	1534-1539	63	ESE-1	ESE-1	ESE-3	14.1	9.6	bc 1011.7
US09140	42-11.9	140-34.8	5/11	0626-0631	84	East-3	East-1	East-5	8.4	7.9	o 1016.3
US09141	42-17.8	140-41.1	5/11	0738-0742	70	East-3	East-1	East-5	8.0	7.3	o 1017.5
US09142	42-23.1	140-37.3	5/11	1016-1020	86	ESE-3	East-1	ESE-5	7.9	7.9	o 1017.1
US09143	42-23.2	140-43.0	5/11	1108-1112	60	ESE-4	ESE-1	ESE-6	7.7	7.2	o 1016.7
US09144	41-57.4	140-58.4	5/14	1145-1148	80	NW-1	NE -1	NW -2	7.0	7.2	r 1001.6
US09145	41-57.9	140-59.1	5/14	1154-1157	85	Calm	NE -1	Calm	7.5	7.0	r 1001.6
US09146	41-58.4	140-59.9	5/14	1203-1207	89	NW -1	NE -1	NW -2	7.9	7.0	o 1001.6
US09147	41-59.0	141-01.0	5/14	1215-1219	95	NW-1	NE -1	NW -3	8.2	7.0	c 1001.6
US09148	41-58.9	141-12.4	5/14	1310-1318	206	West-1	West-1	West-3	7.6	6.2	bc 1002.0
US09149	42-00.8	141-15.4	5/14	1447-1455	236	NW -2	NW -1	NW -4	9.0	6.6	bc 1003.0

Cruise 169

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr. Bar. (hPa)
US09150	43-26.5	145-40.1	5/26	2227-2230	31	North-3	NE -1	North-5	6.4	6.0	bc 1016.6
US09151	43-24.7	145-36.2	5/26	2254-2257	27	NNW-2	NE -1	NNW-4	7.0	7.7	bc 1016.6
US09152	43-22.5	145-31.9	5/26	2323-2326	19	North-2	NE -1	North-4	7.3	8.1	bc 1016.6
US09153	43-27.4	145-26.0	5/27	0008-0010	20	NNE-2	NE -1	NNE-4	7.2	7.4	bc 1017.0
US09154	43-29.7	145-29.7	5/27	0039-0042	24	North-2	NE -1	North-4	7.2	7.2	bc 1016.9
US09155	43-30.0	145-34.8	5/27	0109-0112	30	North-2	NE -1	North-4	6.9	7.6	bc 1016.8
US09156	43-35.0	145-25.5	5/27	0212-0214	14	NE -2	NE -1	NE -3	6.3	6.3	bc 1017.1
US09157	43-33.6	145-23.5	5/27	0228-0230	13	East-1	NE -1	East-3	6.6	6.9	bc 1017.2
US09158	43-31.3	145-19.7	5/27	0329-0330	7	NE -1	NE -1	NE -2	6.7	7.2	bc 1017.6
US09159	43-30.6	145-18.2	5/27	0340-0341	7	North-1	NE -1	North-2	6.8	7.2	bc 1017.9
US09160	43-25.6	145-21.5	5/27	0421-0422	12	NE -1	NE -1	NE -3	7.3	7.6	bc 1018.1
US09161	43-24.4	145-20.1	5/27	0433-0434	10	North-1	NE -1	North-2	7.1	8.0	bc 1018.2
US09162	43-19.3	145-25.6	5/27	0520-0521	12	NE -1	NE -1	NE -3	7.4	8.3	bc 1018.5
US09163	43-20.1	145-27.5	5/27	0532-0533	15	NE -1	NE -1	NE -3	7.3	8.8	bc 1018.8
US09164	43-48.7	145-12.9	5/28	1017-1020	41	South-3	South-1	South-5	11.0	6.4	c 1020.5
US09165	43-54.5	145-12.7	5/28	1141-1145	72	SSE-2	South-1	SSE-4	9.4	6.4	c 1020.0
US09166	44-07.1	145-27.5	5/28	1357-1437	1163	SSW-1	South-1	SSW-2	9.2	6.0	r 1019.6
US09167	44-08.9	145-24.4	5/28	1456-1530	1511	Calm	South-1	Calm	8.5	6.3	r 1019.6
US09168	44-10.3	145-20.9	5/28	1618-1626	272	SW-3	South-1	SW -3	8.6	6.1	o 1019.2
US09169	44-06.3	145-16.6	5/28	1704-1715	382	SSW-2	South-1	SSW-2	8.7	6.1	r 1019.3
US09170	44-04.9	145-20.1	5/28	1737-1803	781	SSW-3	South-1	SSW-3	8.1	6.0	r 1019.3
US09171	44-03.0	145-23.7	5/28	1828-1845	524	Calm	South-1	Calm	8.5	6.3	r 1019.3
US09172	44-15.0	145-22.7	5/28	2000-2012	340	SSW-1	South-1	SSW-2	7.7	6.1	o 1020.6
US09173	44-13.5	145-26.5	5/28	2033-2103	1640	South-1	South-1	South-3	7.4	6.0	o 1020.7
US09174	44-12.2	145-29.7	5/28	2122-2150	2070	South-1	South-1	South-2	7.5	6.1	o 1020.8
US09175	44-16.9	145-32.0	5/28	2225-2254	2054	Calm	South-1	Calm	7.6	6.3	f 1021.0
US09176	44-18.7	145-28.0	5/28	2322-2356	1585	North-1	South-1	North-3	7.0	6.3	f 1021.0
US09177	44-20.9	145-25.3	5/29	0024-0054	1078	West-2	South-1	West-4	6.8	7.4	f 1020.8
US09178	44-21.7	145-21.6	5/29	0120-0124	87	SW-3	West-1	SW -5	6.1	6.8	f 1020.6
US09179	43-59.6	145-18.5	5/29	1031-1042	283	NE -1	NE -1	NE -2	8.1	6.4	o 1023.0
US09180	44-00.5	145-16.2	5/29	1055-1112	483	NE -1	NE -1	NE -2	7.3	6.5	o 1022.7
US09181	44-01.4	145-13.9	5/29	1140-1149	253	NE -2	NE -1	NE -4	7.5	6.4	c 1022.6

(*):Fixed position by Global Positioning System

Table 2: Oceanographic data

STATION US09108 LATITUDE 41-57.4 N LONGITUDE 140-58.3 E DEPTH (m) 80				STATION US09109 LATITUDE 41-57.9 N LONGITUDE 140-59.0 E DEPTH (m) 86				STATION US09110 LATITUDE 41-58.4 N LONGITUDE 141-00.0 E DEPTH (m) 90			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	4.557	33.092	26.211	5	4.088	33.048	26.225	5	3.990	33.008	26.202
10	4.539	33.112	26.229	10	3.945	33.078	26.263	10	3.864	33.034	26.236
20	4.365	33.113	26.248	20	3.954	33.160	26.327	20	4.125	33.344	26.456
30	4.285	33.114	26.257	30	4.031	33.181	26.336	30	5.405	33.605	26.523
40	4.052	33.370	26.484	40	4.752	33.466	26.487	40	5.412	33.596	26.515
50	3.920	33.422	26.539	50	5.050	33.550	26.520	50	5.444	33.601	26.515
75	4.721	33.623	26.615	75	4.803	33.608	26.593	75	4.240	33.469	26.544
STATION US09111 LATITUDE 41-58.8 N LONGITUDE 141-01.1 E DEPTH (m) 98				STATION US09112 LATITUDE 41-58.9 N LONGITUDE 141-11.7 E DEPTH (m) 193				STATION US09113 LATITUDE 41-59.8 N LONGITUDE 141-19.2 E DEPTH (m) 303			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	4.333	32.928	26.104	5	3.837	32.839	26.083	5	5.085	33.155	26.203
10	3.948	32.927	26.142	10	3.634	32.841	26.104	10	5.605	33.444	26.371
20	4.100	33.357	26.469	20	3.355	32.861	26.146	20	5.081	33.409	26.405
30	4.748	33.483	26.501	30	2.658	32.971	26.295	30	5.478	33.563	26.481
40	5.271	33.579	26.518	40	2.340	33.083	26.410	40	5.934	33.655	26.498
50	5.179	33.561	26.514	50	2.630	33.152	26.442	50	5.654	33.623	26.507
75	5.093	33.559	26.522	75	5.319	33.591	26.522	75	5.581	33.635	26.526
				100	5.003	33.536	26.514	100	5.721	33.684	26.548
				125	4.399	33.466	26.525	125	5.234	33.613	26.549
				150	4.153	33.533	26.603	150	5.750	33.736	26.585
				175	4.207	33.604	26.654	175	4.926	33.657	26.619
								200	4.485	33.650	26.662
								250	3.606	33.602	26.713
STATION US09114 LATITUDE 41-57.5 N LONGITUDE 140-57.9 E DEPTH (m) 76				STATION US09115 LATITUDE 42-10.3 N LONGITUDE 140-47.5 E DEPTH (m) 94				STATION US09116 LATITUDE 42-13.2 N LONGITUDE 140-42.3 E DEPTH (m) 90			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	4.362	32.976	26.139	5	5.629	32.924	25.957	5	5.484	33.015	26.046
10	4.361	32.981	26.143	10	5.592	32.930	25.967	10	5.332	33.049	26.091
20	4.338	32.990	26.153	20	5.188	33.247	26.264	20	5.439	33.211	26.207
30	3.980	33.328	26.458	30	4.517	33.261	26.350	30	4.361	33.287	26.387
40	3.774	33.359	26.503	40	3.575	33.352	26.517	40	3.616	33.390	26.544
50	3.790	33.380	26.518	50	3.527	33.407	26.565	50	3.534	33.420	26.575
75	4.031	33.462	26.560	75	3.520	33.460	26.608	75	3.510	33.450	26.601
STATION US09117 LATITUDE 42-16.3 N LONGITUDE 140-35.5 E DEPTH (m) 93				STATION US09118 LATITUDE 42-18.2 N LONGITUDE 140-41.5 E DEPTH (m) 71				STATION US09119 LATITUDE 42-20.5 N LONGITUDE 140-36.6 E DEPTH (m) 87			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	5.891	33.087	26.054	5	5.993	33.112	26.062	5	6.256	33.207	26.104
10	5.824	33.108	26.079	10	5.636	33.144	26.130	10	5.885	33.219	26.160
20	5.604	33.183	26.165	20	5.384	33.174	26.184	20	5.769	33.231	26.183
30	4.197	33.305	26.418	30	4.993	33.235	26.277	30	4.964	33.275	26.312
40	3.503	33.395	26.558	40	3.921	33.249	26.401	40	4.521	33.317	26.394
50	3.502	33.420	26.578	50	4.023	33.406	26.516	50	3.772	33.422	26.553
75	3.494	33.447	26.601					75	3.468	33.436	26.594
STATION US09120 LATITUDE 42-18.5 N LONGITUDE 140-26.3 E DEPTH (m) 74				STATION US09121 LATITUDE 42-14.7 N LONGITUDE 140-29.7 E DEPTH (m) 82				STATION US09122 LATITUDE 42-08.5 N LONGITUDE 140-35.6 E DEPTH (m) 64			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.707	33.063	25.932	5	6.708	32.783	25.711	5	6.645	32.638	25.605
10	6.162	33.080	26.015	10	6.242	32.795	25.780	10	6.306	32.695	25.693
20	5.369	33.194	26.201	20	5.408	33.212	26.211	20	4.652	33.230	26.310
30	4.187	33.380	26.478	30	4.075	33.337	26.456	30	3.607	33.350	26.513
40	3.812	33.405	26.536	40	3.601	33.385	26.541	40	3.488	33.382	26.549
50	3.831	33.424	26.549	50	3.487	33.398	26.562	50	3.505	33.401	26.563
				75	3.472	33.436	26.593				

STATION US09123 LATITUDE 42-11.1 N LONGITUDE 140-36.5 E DEPTH (m) 84				STATION US09124 LATITUDE 42-18.7 N LONGITUDE 140-30.9 E DEPTH (m) 95				STATION US09125 LATITUDE 42-24.2 N LONGITUDE 140-31.8 E DEPTH (m) 97			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.005	33.073	26.030	5	6.128	33.217	26.128	5	6.487	32.913	25.842
10	5.766	33.126	26.101	10	6.008	33.215	26.141	10	6.434	33.080	25.981
20	4.539	33.258	26.344	20	5.656	33.233	26.198	20	4.709	33.274	26.339
30	3.570	33.378	26.538	30	4.884	33.285	26.329	30	3.574	33.374	26.534
40	3.519	33.401	26.561	40	3.776	33.349	26.495	40	3.471	33.399	26.564
50	3.542	33.419	26.574	50	3.482	33.392	26.558	50	3.436	33.412	26.578
75	3.488	33.443	26.597	75	3.464	33.435	26.594	75	3.536	33.460	26.607
STATION US09126 LATITUDE 42-25.6 N LONGITUDE 140-37.0 E DEPTH (m) 87				STATION US09127 LATITUDE 42-23.2 N LONGITUDE 140-41.9 E DEPTH (m) 67				STATION US09128 LATITUDE 42-20.9 N LONGITUDE 140-47.1 E DEPTH (m) 56			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.047	32.941	25.920	5	5.672	33.010	26.020	5	5.626	32.704	25.784
10	6.102	33.108	26.045	10	5.932	33.194	26.134	10	5.232	32.772	25.883
20	5.304	33.253	26.256	20	5.154	33.203	26.234	20	3.867	32.938	26.159
30	4.019	33.334	26.459	30	3.116	33.136	26.387	30	3.153	33.001	26.276
40	3.509	33.397	26.559	40	3.371	33.215	26.427	40	2.948	33.094	26.368
50	3.453	33.408	26.573	50	3.430	33.242	26.443	50	2.917	33.124	26.395
75	3.455	33.437	26.596								
STATION US09129 LATITUDE 42-16.2 N LONGITUDE 140-47.9 E DEPTH (m) 70				STATION US09130 LATITUDE 41-49.7 N LONGITUDE 141-12.9 E DEPTH (m) 160				STATION US09131 LATITUDE 41-51.4 N LONGITUDE 141-10.2 E DEPTH (m) 109			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	5.689	32.754	25.816	5	7.038	32.435	25.393	5	5.523	32.368	25.530
10	4.972	32.839	25.965	10	6.165	32.548	25.595	10	4.565	32.748	25.937
20	3.486	32.877	26.147	20	5.178	32.772	25.889	20	4.147	32.953	26.143
30	3.035	33.118	26.380	30	4.811	33.132	26.215	30	3.624	33.083	26.298
40	3.093	33.160	26.408	40	6.145	33.478	26.332	40	3.575	33.117	26.330
50	3.241	33.209	26.434	50	6.944	33.668	26.377	50	4.243	33.321	26.426
				75	5.052	33.479	26.464	75	4.622	33.477	26.510
				100	4.775	33.490	26.503	100	4.895	33.541	26.530
				125	4.755	33.548	26.551				
				150	4.674	33.547	26.560				
STATION US09132 LATITUDE 41-53.3 N LONGITUDE 141-07.5 E DEPTH (m) 94				STATION US09133 LATITUDE 41-55.3 N LONGITUDE 141-04.5 E DEPTH (m) 111				STATION US09134 LATITUDE 41-57.1 N LONGITUDE 141-02.3 E DEPTH (m) 106			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.229	32.271	25.369	5	6.470	32.359	25.408	5	7.018	32.590	25.518
10	5.370	32.521	25.669	10	6.363	32.638	25.642	10	5.577	32.758	25.832
20	4.299	32.942	26.119	20	5.302	32.973	26.035	20	4.357	32.997	26.157
30	4.579	33.083	26.202	30	5.094	33.140	26.190	30	5.041	33.240	26.275
40	4.432	33.084	26.218	40	5.279	33.259	26.264	40	6.072	33.460	26.327
50	3.442	33.025	26.269	50	6.309	33.527	26.350	50	7.135	33.693	26.371
75	4.356	33.380	26.461	75	4.796	33.464	26.480	75	6.047	33.553	26.403
				100	4.781	33.513	26.521	100	4.542	33.525	26.556
STATION US09135 LATITUDE 41-58.9 N LONGITUDE 140-59.7 E DEPTH (m) 88				STATION US09136 LATITUDE 42-13.4 N LONGITUDE 140-41.1 E DEPTH (m) 89				STATION US09137 LATITUDE 42-14.2 N LONGITUDE 140-34.6 E DEPTH (m) 90			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	8.238	32.198	25.039	5	8.406	32.316	25.107	5	8.733	32.651	25.320
10	7.409	32.302	25.239	10	7.817	32.333	25.206	10	7.334	32.339	25.278
20	5.580	32.815	25.877	20	5.131	32.615	25.770	20	5.414	32.721	25.821
30	4.293	32.964	26.137	30	4.660	32.944	26.083	30	5.547	32.938	25.978
40	3.821	33.000	26.213	40	3.934	33.012	26.212	40	4.332	32.895	26.078
50	3.731	33.123	26.320	50	2.870	32.993	26.294	50	4.159	33.065	26.231
75	4.421	33.348	26.428	75	3.882	33.360	26.493	75	3.583	33.411	26.563
STATION US09138 LATITUDE 42-17.5 N LONGITUDE 140-31.3 E DEPTH (m) 94				STATION US09139 LATITUDE 42-08.6 N LONGITUDE 140-35.6 E DEPTH (m) 63				STATION US09140 LATITUDE 42-11.9 N LONGITUDE 140-34.8 E DEPTH (m) 84			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	11.844	33.008	25.070	5	8.415	32.395	25.167	5	7.770	32.370	25.242
10	8.842	32.240	24.982	10	8.029	32.427	25.249	10	7.390	32.376	25.299
20	5.878	32.449	25.552	20	6.193	32.720	25.727	20	5.002	32.566	25.746
30	5.606	32.800	25.862	30	5.804	32.875	25.897	30	5.389	33.005	26.049
40	5.164	33.009	26.079	40	5.240	32.954	26.026	40	4.566	33.014	26.148
50	4.463	33.013	26.158	50	5.162	33.144	26.186	50	4.758	33.176	26.256
75	3.876	33.374	26.505					75	3.558	33.418	26.571

STATION US09141 LATITUDE 42-17.8 N LONGITUDE 140-41.1 E DEPTH (m) 70				STATION US09142 LATITUDE 42-23.1 N LONGITUDE 140-37.3 E DEPTH (m) 86				STATION US09143 LATITUDE 42-23.2 N LONGITUDE 140-43.0 E DEPTH (m) 60			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	7.672	32.378	25.262	5	8.331	32.346	25.141	5	7.461	32.335	25.257
10	7.595	32.432	25.315	10	8.281	32.350	25.152	10	7.430	32.346	25.270
20	5.467	32.799	25.877	20	6.449	32.682	25.665	20	5.653	32.866	25.908
30	4.274	32.939	26.119	30	5.402	32.928	25.987	30	5.371	32.991	26.041
40	3.572	32.965	26.209	40	5.169	33.122	26.168	40	5.390	33.060	26.093
50	2.852	33.002	26.303	50	3.404	33.052	26.294	50	5.335	33.108	26.137
				75	3.548	33.425	26.578				
STATION US09144 LATITUDE 41-57.4 N LONGITUDE 140-58.4 E DEPTH (m) 80				STATION US09145 LATITUDE 41-57.9 N LONGITUDE 140-59.1 E DEPTH (m) 85				STATION US09146 LATITUDE 41-58.4 N LONGITUDE 140-59.9 E DEPTH (m) 89			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	7.473	32.173	25.129	5	7.354	32.199	25.165	5	7.238	32.238	25.212
10	7.320	32.280	25.233	10	7.291	32.223	25.192	10	7.053	32.296	25.282
20	5.128	32.434	25.627	20	4.264	32.475	25.752	20	5.214	32.518	25.684
30	3.688	32.629	25.930	30	3.511	32.676	25.984	30	3.423	32.654	25.975
40	4.088	32.812	26.037	40	4.036	32.896	26.109	40	3.919	32.893	26.119
50	3.295	32.821	26.120	50	3.465	32.897	26.165	50	3.679	32.942	26.180
75	3.605	33.185	26.381	75	3.614	33.264	26.443	75	3.671	33.297	26.464
STATION US09147 LATITUDE 41-59.0 N LONGITUDE 141-01.0 E DEPTH (m) 95				STATION US09148 LATITUDE 41-58.9 N LONGITUDE 141-12.4 E DEPTH (m) 206				STATION US09149 LATITUDE 42-00.8 N LONGITUDE 141-15.4 E DEPTH (m) 236			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	7.130	32.320	25.291	5	6.243	32.187	25.300	5	6.724	32.190	25.242
10	6.944	32.380	25.363	10	6.092	32.202	25.331	10	5.943	32.315	25.438
20	4.946	32.733	25.884	20	5.770	32.264	25.419	20	3.557	32.393	25.755
30	4.294	32.872	26.064	30	8.036	33.165	25.828	30	2.643	32.536	25.948
40	4.137	32.975	26.161	40	5.103	33.102	26.159	40	2.539	32.595	26.004
50	3.666	33.002	26.229	50	6.053	33.436	26.310	50	2.573	32.690	26.077
75	3.886	33.317	26.459	75	5.610	33.469	26.391	75	4.641	33.201	26.288
				100	5.092	33.561	26.524	100	4.995	33.550	26.526
				125	5.005	33.586	26.554	125	4.964	33.596	26.567
				150	4.689	33.580	26.584	150	4.650	33.627	26.625
				175	4.944	33.669	26.626	175	4.151	33.601	26.658
								200	4.335	33.649	26.677
STATION US09150 LATITUDE 43-26.5 N LONGITUDE 145-40.1 E DEPTH (m) 31				STATION US09151 LATITUDE 43-24.7 N LONGITUDE 145-36.2 E DEPTH (m) 27				STATION US09152 LATITUDE 43-22.5 N LONGITUDE 145-31.9 E DEPTH (m) 19			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.827	32.235	25.264	5	8.141	31.711	24.672	5	8.491	30.909	23.992
10	6.777	32.238	25.273	10	8.094	31.744	24.705	10	8.443	31.619	24.555
20	6.724	32.247	25.287	20	7.950	31.790	24.761				
STATION US09153 LATITUDE 43-27.4 N LONGITUDE 145-26.0 E DEPTH (m) 20				STATION US09154 LATITUDE 43-29.7 N LONGITUDE 145-29.7 E DEPTH (m) 24				STATION US09155 LATITUDE 43-30.0 N LONGITUDE 145-34.8 E DEPTH (m) 30			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	7.435	31.771	24.818	5	7.371	32.001	25.007	5	7.484	31.911	24.921
10	7.427	31.791	24.835	10	7.149	32.060	25.084	10	6.929	32.059	25.112
				20	6.650	32.170	25.236	20	6.537	32.199	25.273
STATION US09156 LATITUDE 43-35.0 N LONGITUDE 145-25.5 E DEPTH (m) 14				STATION US09157 LATITUDE 43-33.6 N LONGITUDE 145-23.5 E DEPTH (m) 13				STATION US09158 LATITUDE 43-31.3 N LONGITUDE 145-19.7 E DEPTH (m) 7			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.829	32.173	25.215	5	7.424	31.445	24.563	5	8.160	31.464	24.475
10	6.802	32.179	25.223	10	7.788	31.916	24.883				
STATION US09159 LATITUDE 43-30.6 N LONGITUDE 145-18.2 E DEPTH (m) 7				STATION US09160 LATITUDE 43-25.6 N LONGITUDE 145-21.5 E DEPTH (m) 12				STATION US09161 LATITUDE 43-24.4 N LONGITUDE 145-20.1 E DEPTH (m) 10			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	8.317	31.422	24.419	5	8.051	31.509	24.526	5	8.564	31.428	24.388

STATION US09162 LATITUDE 43-19.3 N LONGITUDE 145-25.6 E DEPTH (m) 12				STATION US09163 LATITUDE 43-20.1 N LONGITUDE 145-27.5 E DEPTH (m) 15				STATION US09164 LATITUDE 43-48.7 N LONGITUDE 145-12.9 E DEPTH (m) 41			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	8.806	31.199	24.172	5	8.916	31.319	24.250	5	6.791	31.878	24.987
				10	8.837	31.624	24.501	10	6.504	31.894	25.037
								20	2.946	32.702	26.055
								30	2.287	32.780	26.172
STATION US09165 LATITUDE 43-54.5 N LONGITUDE 145-12.7 E DEPTH (m) 72				STATION US09166 LATITUDE 44-07.1 N LONGITUDE 145-27.5 E DEPTH (m) 1163				STATION US09167 LATITUDE 44-08.9 N LONGITUDE 145-24.4 E DEPTH (m) 1511			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.571	32.102	25.192	5	6.433	32.287	25.355	5	6.415	32.753	25.725
10	5.910	32.332	25.456	10	6.075	32.301	25.411	10	6.528	32.871	25.804
20	5.206	32.524	25.690	20	5.341	32.721	25.830	20	6.797	33.062	25.919
30	5.249	32.713	25.835	30	4.521	32.783	25.970	30	6.834	33.207	26.029
40	4.911	32.780	25.925	40	4.587	33.116	26.227	40	7.371	33.413	26.117
50	4.665	32.844	26.003	50	4.822	33.261	26.317	50	6.909	33.409	26.177
				75	4.543	33.324	26.397	75	6.482	33.489	26.297
				100	5.092	33.472	26.454	100	5.507	33.411	26.357
				125	4.477	33.478	26.526	125	3.515	33.296	26.478
				150	2.378	33.280	26.564	150	0.177	33.032	26.509
				175	1.921	33.284	26.603	175	0.382	33.139	26.585
				200	0.882	33.196	26.602	200	0.839	33.231	26.633
				250	0.991	33.293	26.673	250	0.721	33.308	26.702
				300	1.117	33.421	26.768	300	1.075	33.396	26.751
				400	1.480	33.533	26.834	400	1.290	33.513	26.831
				500	2.048	33.676	26.908	500	1.540	33.610	26.891
				600	2.161	33.747	26.955	600	1.941	33.742	26.969
				700	2.044	33.934	27.114	700	2.093	33.979	27.146
				800	2.240	34.124	27.251	800	2.245	34.135	27.259
				900	2.298	34.222	27.325	900	2.286	34.209	27.315
				1000	2.298	34.282	27.372	1000	2.289	34.286	27.377
STATION US09168 LATITUDE 44-10.3 N LONGITUDE 145-20.9 E DEPTH (m) 72				STATION US09169 LATITUDE 44-06.3 N LONGITUDE 145-16.6 E DEPTH (m) 382				STATION US09170 LATITUDE 44-04.9 N LONGITUDE 145-20.1 E DEPTH (m) 781			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.604	33.029	25.919	5	6.152	32.475	25.539	5	6.232	32.456	25.514
10	6.704	33.107	25.967	10	6.063	32.565	25.622	10	6.461	32.555	25.564
20	6.952	33.212	26.017	20	6.610	33.006	25.900	20	6.219	32.627	25.651
30	7.205	33.296	26.049	30	6.702	33.142	25.995	30	4.549	32.705	25.905
40	6.746	33.302	26.115	40	7.266	33.385	26.110	40	5.876	33.248	26.183
50	7.524	33.541	26.197	50	7.268	33.474	26.180	50	7.426	33.610	26.265
75	6.360	33.452	26.284	75	7.054	33.531	26.255	75	3.973	33.167	26.331
100	3.384	33.134	26.361	100	4.003	33.225	26.374	100	-0.133	32.960	26.466
125	0.801	33.063	26.500	125	3.111	33.237	26.468	125	1.415	33.175	26.551
150	0.375	33.177	26.615	150	0.460	33.104	26.552	150	0.824	33.150	26.569
175	0.540	33.257	26.671	175	0.314	33.204	26.641	175	0.054	33.146	26.607
				200	0.523	33.252	26.668	200	0.327	33.205	26.641
				250	1.051	33.388	26.746	250	0.686	33.299	26.697
				300	1.234	33.458	26.790	300	1.071	33.418	26.769
								400	1.365	33.532	26.841
								500	1.415	33.582	26.878
								600	1.724	33.705	26.955
								700	2.006	33.972	27.147
STATION US09171 LATITUDE 44-03.0 N LONGITUDE 145-23.7 E DEPTH (m) 524				STATION US09172 LATITUDE 44-15.0 N LONGITUDE 145-22.7 E DEPTH (m) 340				STATION US09173 LATITUDE 44-13.5 N LONGITUDE 145-26.5 E DEPTH (m) 1640			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.518	31.923	25.058	5	6.743	33.095	25.952	5	6.499	32.940	25.862
10	5.769	32.276	25.428	10	6.914	33.217	26.026	10	6.962	33.240	26.038
20	5.726	32.386	25.520	20	6.991	33.336	26.109	20	7.423	33.402	26.102
30	6.313	32.977	25.915	30	7.485	33.513	26.181	30	7.464	33.410	26.102
40	6.851	33.367	26.153	40	7.512	33.544	26.201	40	7.651	33.573	26.204
50	0.847	32.715	26.217	50	7.220	33.511	26.215	50	7.618	33.574	26.209
75	2.488	33.090	26.403	75	3.225	33.222	26.446	75	7.390	33.634	26.289
100	3.050	33.277	26.505	100	1.618	33.238	26.588	100	6.735	33.631	26.376
125	2.771	33.302	26.550	125	1.303	33.248	26.618	125	2.562	33.137	26.435
150	0.857	33.177	26.588	150	0.994	33.271	26.656	150	0.264	33.162	26.609
175	1.093	33.256	26.637	175	0.989	33.306	26.684	175	0.485	33.230	26.653
200	1.299	33.308	26.666	200	1.117	33.346	26.708	200	0.601	33.287	26.692
250	0.780	33.318	26.707	250	1.418	33.420	26.748	250	0.828	33.378	26.752
300	0.895	33.367	26.739	300	1.501	33.458	26.772	300	1.139	33.429	26.774
400	1.204	33.514	26.837					400	1.920	33.589	26.847
								500	1.838	33.645	26.899
								600	1.884	33.714	26.950
								700	1.999	33.905	27.094
								800	2.217	34.116	27.246
								900	2.301	34.211	27.316

STATION US09174 LATITUDE 44-12.2 N LONGITUDE 145-29.7 E DEPTH (m) 2070				STATION US09175 LATITUDE 44-16.9 N LONGITUDE 145-32.0 E DEPTH (m) 2054				STATION US09176 LATITUDE 44-18.7 N LONGITUDE 145-28.0 E DEPTH (m) 1585			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.907	33.207	26.019	5	5.207	32.672	25.807	5	8.900	33.549	25.998
10	7.324	33.319	26.051	10	6.133	33.083	26.021	10	8.481	33.522	26.041
20	7.375	33.326	26.049	20	7.015	33.227	26.020	20	7.964	33.474	26.081
30	7.439	33.342	26.052	30	7.188	33.263	26.025	30	7.817	33.466	26.096
40	7.383	33.334	26.054	40	7.346	33.331	26.057	40	7.681	33.458	26.109
50	7.477	33.446	26.129	50	4.295	32.946	26.123	50	7.451	33.525	26.194
75	7.739	33.619	26.227	75	2.976	33.117	26.384	75	7.643	33.571	26.203
100	3.727	33.339	26.492	100	1.586	33.155	26.523	100	6.778	33.502	26.269
125	2.361	33.177	26.484	125	0.932	33.092	26.515	125	3.957	33.360	26.486
150	-0.286	33.060	26.553	150	0.110	33.113	26.577	150	5.035	33.598	26.560
175	0.029	33.166	26.624	175	0.002	33.166	26.625	175	2.882	33.367	26.592
200	0.699	33.293	26.691	200	0.691	33.277	26.679	200	0.665	33.206	26.623
250	1.195	33.394	26.741	250	0.946	33.363	26.732	250	0.691	33.297	26.695
300	1.404	33.459	26.780	300	1.370	33.459	26.782	300	1.095	33.402	26.755
400	2.000	33.616	26.863	400	1.434	33.537	26.840	400	1.487	33.551	26.848
500	2.508	33.757	26.935	500	1.980	33.665	26.904	500	1.977	33.675	26.912
600	1.936	33.742	26.969	600	1.981	33.749	26.971	600	1.924	33.736	26.965
700	2.009	33.895	27.086	700	1.990	33.897	27.088	700	2.107	33.950	27.122
800	2.221	34.126	27.254	800	2.238	34.131	27.257	800	2.222	34.087	27.223
900	2.281	34.195	27.304	900	2.293	34.235	27.336	900	2.286	34.197	27.306
1000	2.298	34.278	27.369								

STATION US09177 LATITUDE 44-20.9 N LONGITUDE 145-25.3 E DEPTH (m) 1078				STATION US09178 LATITUDE 44-21.7 N LONGITUDE 145-21.6 E DEPTH (m) 87				STATION US09179 LATITUDE 43-59.6 N LONGITUDE 145-18.5 E DEPTH (m) 283			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	7.581	33.462	26.127	5	7.443	33.417	26.111	5	6.561	32.069	25.168
10	7.574	33.468	26.132	10	7.339	33.406	26.117	10	5.687	32.261	25.426
20	7.589	33.488	26.146	20	7.043	33.445	26.188	20	4.941	32.491	25.693
30	7.618	33.497	26.149	30	6.390	33.479	26.301	30	5.763	32.982	25.987
40	7.671	33.522	26.161	40	5.907	33.473	26.357	40	6.868	33.371	26.153
50	7.528	33.549	26.202	50	5.518	33.530	26.450	50	6.995	33.421	26.176
75	7.029	33.604	26.315					75	3.717	33.168	26.357
100	3.792	33.258	26.421					100	1.593	33.098	26.478
125	4.418	33.491	26.543					125	1.419	33.131	26.515
150	3.289	33.409	26.589					150	-0.123	33.072	26.556
175	1.691	33.249	26.592					175	-0.165	33.121	26.597
200	0.376	33.176	26.614					200	0.078	33.188	26.640
250	1.002	33.328	26.701					250	0.955	33.388	26.752
300	1.071	33.388	26.745								
400	2.242	33.597	26.829								
500	2.553	33.722	26.903								
600	2.371	33.771	26.958								
700	2.045	33.896	27.084								

STATION US09180 LATITUDE 44-00.5 N LONGITUDE 145-16.2 E DEPTH (m) 483				STATION US09181 LATITUDE 44-01.4 N LONGITUDE 145-13.9 E DEPTH (m) 253			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	6.008	32.217	25.353	5	6.446	32.002	25.129
10	5.608	32.463	25.596	10	5.945	32.446	25.542
20	5.326	32.641	25.768	20	5.391	32.576	25.710
30	4.492	32.854	26.029	30	4.970	32.824	25.954
40	6.901	33.348	26.131	40	5.603	33.014	26.031
50	6.890	33.432	26.199	50	6.272	33.243	26.130
75	3.282	33.095	26.339	75	5.534	33.231	26.212
100	3.102	33.171	26.416	100	1.869	32.914	26.310
125	1.336	33.115	26.509	125	0.596	33.044	26.496
150	0.206	33.089	26.553	150	0.054	33.114	26.581
175	0.082	33.124	26.588	175	0.146	33.148	26.604
200	0.338	33.218	26.650	200	0.180	33.191	26.637
250	0.859	33.350	26.727				
300	1.071	33.424	26.774				
400	1.219	33.504	26.828				