HOKKAIDO UNIVERSITY

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3

THE " USHIO MARU "

CRUISE 306
CRUISE 307
CRUISE 308

IN APRIL 2014
IN MAY 2014

1. Cruise Itinerary

Cruise 306			
Departure from Hakodate	Apr.	23, 2014	
Start hydrographic research (US14193)		23	
Finish hydrographic research (US14196)		24	
Return to Hakodate		25	
Total coverage 260.2 miles			
Cruise 307			
Departure from Hakodate	May.	7, 2014	
Arrival at and departure from Usujiri			7
Start hydrographic research (US14197)		7	
Calibration of echo sounder		7	
Arrival at Usujiri		8	
Departure from Usujiri		9	
Sampling by frame trawl net		9	
Sampling by frame trawl net		10	
Arrival ar Usujiri		10	
Departure from Usujiri		11	
Arrival at Muroran		11	
Departure from Muroran		12	
Arrival at and departure from Muroran		12	
Arrival at Usujiri		12	
Departure from Usujiri		13	
Sampling by bottom longline		13	
Arrival at Usujiri		13	
Departure from Usujiri		14	
Arrival at and departure from Usujiri			14
Finish hydrographic research (US14222)		15	
Arrival at and departure from Usujiri			15
Return to Hakodate		15	
Total coverage 543.3 miles			
Cruise 308			
Departure from Hakodate	May.	21, 2014	
Start hydrographic research (US14223)		22	
Finish hydrographic research (US14227)		22	
Return to Hakodate		22	
Total coverage 70.0 miles			

2. Data on Temperature, Salinity and Pressure

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 SBE-9Plus and SBE-19).

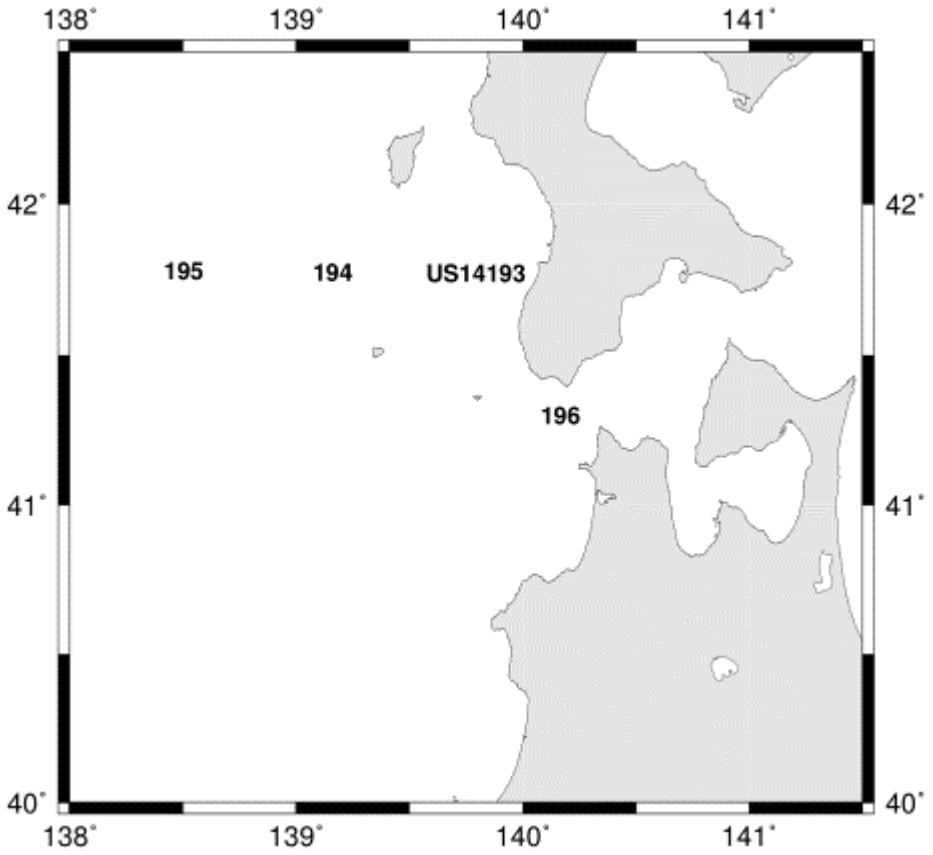

Figure 1. Oceanographic stations (Cruise 306)

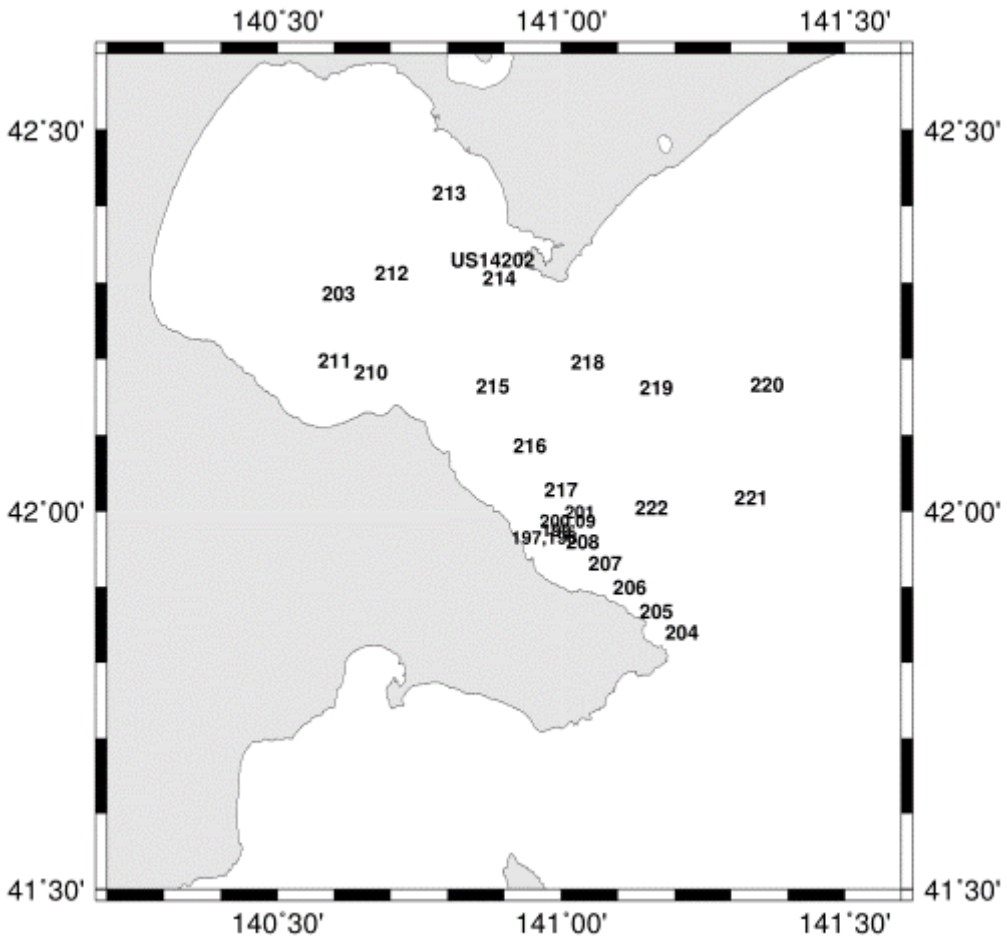

Figure 2. Oceanographic stations (Cruise 307)

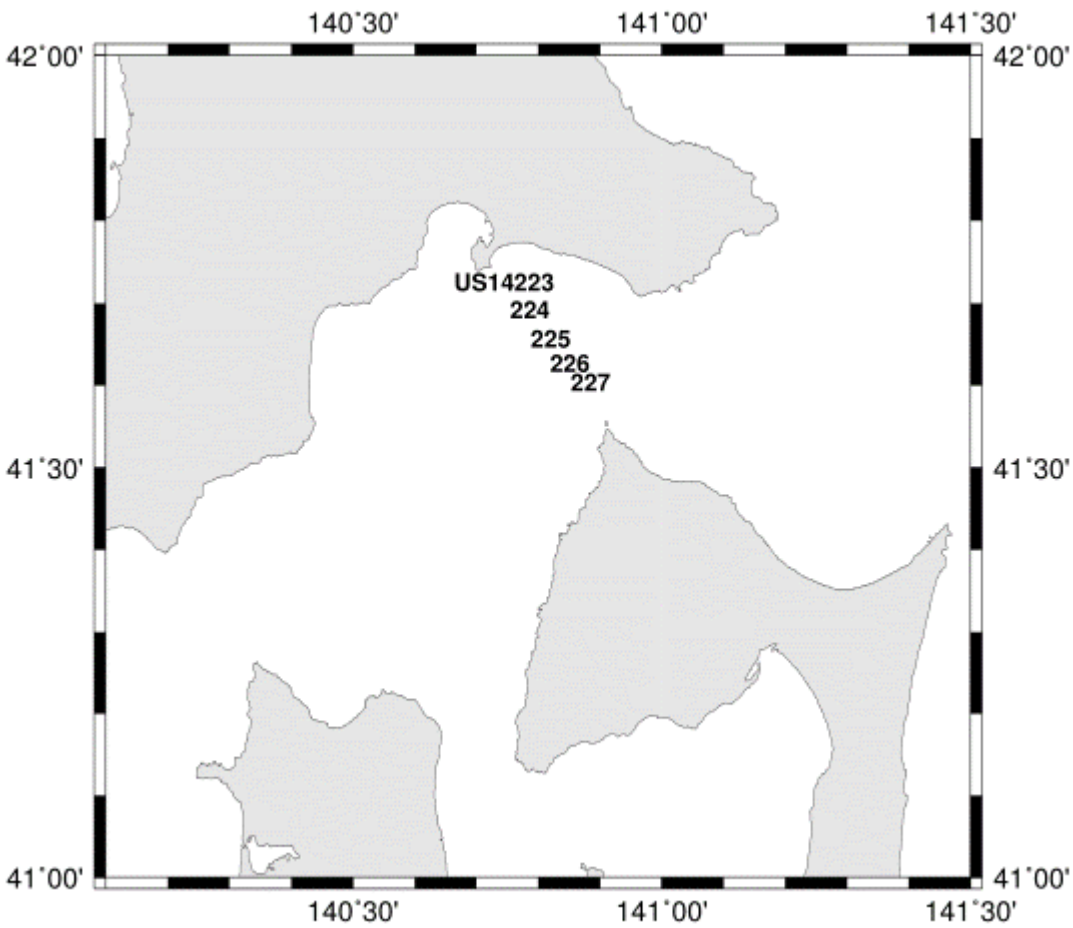

Figure 3. Oceanographic stations (Cruise 308)

Table 1. List of Oceanographic Station

Cruise 306

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14193	41-44.6	139-47.5	4/23	1413-1444	1430	West-1	West-1	West-3	10.1	9.9	bc
US14194	41-44.8	139-09.6	4/23	1829-1904	2065	West-2	West-1	West-4	7.7	9.5	o
US14195	41-45.1	138-30.1	4/23	2259-2332	3704	SW -2	WSW-1	SW -4	7.0	8.2	o
US14196	41-16.3	140-09.9	4/24	1153-1200	151	SW -3	SW -1	SW -5	10.0	9.6	bc

Cruise 307

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14197	41-57.6	140-57.8	5/7	1430-1435	74	South-1	SE -1	South-3	12.8	7.0	c
US14198	41-57.4	140-58.2	5/9	1110-1114	79	SW -2	East-1	SW -4	12.7	7.5	c
US14199	41-58.0	140-59.5	5/9	1122-1126	88	SSW-2	East-1	SSW-4	11.8	6.8	c
US14200	41-58.7	141-00.7	5/9	1134-1138	95	SSW-2	East-1	SSW-4	11.3	6.5	bc
US14201	41-59.4	141-02.0	5/9	1147-1151	102	SSW-2	East-1	SSW-4	11.6	6.1	bc
US14202	42-19.2	140-52.8	5/9	1932-1936	48	Calm	SE -1	Calm	8.3	6.8	bc
US14202-2	42-17.8	140-50.0	5/9	2053-2052	57	Calm	SE -1	Calm	7.9	7.0	bc
US14202-3	42-19.1	140-52.9	5/9	2200-2203	45	Calm	SE -1	Calm	8.3	6.8	bc
US14202-4	42-17.6	140-55.1	5/9	2313-2317	57	Calm	SE -1	Calm	7.7	6.5	bc
US14202-5	42-19.4	140-52.2	5/10	1431-1435	46	West-3	West-1	West-5	12.2	7.0	bc
US14202-6	42-16.4	140-56.9	5/10	1617-1621	60	WNW-3	West-1	WNW-6	12.4	6.9	bc
US14203	42-16.6	140-36.5	5/12	0734-0745	90	Calm	East-1	Calm	10.0	7.7	c
US14204	41-49.8	141-12.8	5/13	0726-0732	162	SSW-2	SE -1	SSW-4	12.3	7.0	c
US14205	41-51.5	141-10.1	5/13	0753-0757	108	SW -2	SE -1	SW -3	14.7	7.9	c
US14206	41-53.4	141-07.3	5/13	0818-0824	95	SW -2	SE -1	SW -3	15.6	8.8	c
US14207	41-55.3	141-04.7	5/13	0948-0953	111	SW -3	SE -1	SW -5	15.1	9.1	c
US14208	41-57.0	141-02.3	5/13	1015-1020	105	SW -2	SE -1	SW -4	14.5	8.1	c
US14209	41-58.8	141-00.0	5/13	1040-1045	89	South-3	SE -1	South-5	14.4	7.9	c
US14210	42-10.4	140-39.9	5/14	0924-0929	83	NE -1	East-1	NE -3	11.6	8.2	bc
US14211	42-11.3	140-36.1	5/14	1015-1019	81	NE -1	East-1	NE -3	11.5	8.8	m
US14203-2	42-16.3	140-36.4	5/14	1058-1106	91	East-1	East-1	East-3	11.6	8.9	m
US14212	42-18.2	140-42.1	5/14	1234-1239	64	East-1	East-1	East-3	12.1	8.8	c
US14213	42-24.5	140-48.2	5/14	1340-1343	46	Calm	East-1	Calm	13.6	9.6	m
US14214	42-17.8	140-53.5	5/14	1441-1445	57	Calm	East-1	Calm	14.6	10.5	m
US14215	42-09.3	140-52.8	5/14	1557-1602	79	Calm	East-1	Calm	14.7	9.2	m
US14216	42-04.6	140-56.7	5/14	1650-1654	86	NNW-3	East-1	NNW-5	12.1	8.4	o
US14217	42-01.1	141-00.0	5/14	1741-1745	87	Calm	East-1	Calm	13.2	9.0	o
US14218	42-11.2	141-02.8	5/15	0455-0500	83	Calm	ESE-1	Calm	8.7	7.3	m
US14219	42-09.2	141-10.1	5/15	0602-0608	127	Calm	ESE-1	Calm	9.4	9.0	m
US14220	42-09.4	141-21.8	5/15	0736-0750	402	Calm	ESE-1	Calm	9.6	7.0	m
US14221	42-00.5	141-20.1	5/15	0950-1000	315	Calm	SE -1	Calm	10.0	7.6	m
US14222	41-59.7	141-09.6	5/15	1111-1118	135	Calm	SE -1	Calm	12.9	7.9	m

Cruise 308

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14223	41-42.9	140-44.7	5/22	0533-0543	83	SW -1	SE -1	SW -2	10.6	10.7	o
US14224	41-40.9	140-47.2	5/22	0604-0623	218	Calm	SE -1	Calm	10.5	11.2	o
US14225	41-38.8	140-49.2	5/22	0644-0710	350	Calm	SE -1	Calm	10.6	11.2	o
US14226	41-37.0	140-51.1	5/22	0733-0743	97	Calm	SE -2	Calm	10.7	11.2	o
US14227	41-35.6	140-53.1	5/22	0803-0810	50	Calm	SE -2	Calm	11.0	11.2	o

(*): Fixed position by Global Positioning System

S.M.T.: Ship's mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14193
LATITUDE 41-44.6 N
LONGITUI 139-47.5 E
DEPTH (m) 1430

Press.	Temp.	Salinity	Sigma-T
5	9.682	33.817	26.081
10	9.324	33.841	26.159
20	9.040	33.881	26.236
30	8.653	33.945	26.346
40	7.802	34.028	26.540
50	7.580	34.045	26.585
75	6.124	34.013	26.757
100	5.067	34.010	26.883
125	3.708	34.012	27.029
150	2.873	34.017	27.112
175	2.171	34.023	27.176
200	1.813	34.033	27.211
250	1.295	34.041	27.255
300	0.958	34.055	27.289
400	0.785	34.062	27.305
500	0.682	34.067	27.315
600	0.578	34.069	27.322
700	0.504	34.069	27.328

STATION US14194
LATITUDE 41-44.8 N
LONGITUI 139-09.6 E
DEPTH (m) 2065

Press.	Temp.	Salinity	Sigma-T
5	9.889	33.857	26.078
10	9.454	33.864	26.156
20	9.275	33.870	26.190
30	8.627	33.955	26.358
40	8.098	34.016	26.487
50	7.793	34.034	26.545
75	6.731	34.053	26.709
100	4.564	34.027	26.952
125	2.916	34.022	27.112
150	2.360	34.039	27.173
175	1.799	34.036	27.215
200	1.425	34.032	27.239
250	1.058	34.045	27.274
300	0.940	34.053	27.288
400	0.806	34.060	27.301
500	0.725	34.067	27.313
600	0.612	34.070	27.322
700	0.501	34.070	27.328

STATION US14195
LATITUDE 41-45.1 N
LONGITUI 138-30.1 E
DEPTH (m) 3704

Press.	Temp.	Salinity	Sigma-T
5	9.889	33.857	26.078
10	9.454	33.864	26.156
20	9.275	33.870	26.190
30	8.627	33.955	26.358
40	8.098	34.016	26.487
50	7.793	34.034	26.545
75	6.731	34.053	26.709
100	4.564	34.027	26.952
125	2.916	34.022	27.112
150	2.360	34.039	27.173
175	1.799	34.036	27.215
200	1.425	34.032	27.239
250	1.058	34.045	27.274
300	0.940	34.053	27.288
400	0.806	34.060	27.301
500	0.725	34.067	27.313
600	0.612	34.070	27.322
700	0.501	34.070	27.328

STATION US14196
LATITUDE 41-16.3 N
LONGITUI 140-09.9 E
DEPTH (m) 151

Press.	Temp.	Salinity	Sigma-T
5	9.744	33.695	25.976
10	9.652	33.747	26.032
20	9.292	33.867	26.184
30	8.913	33.893	26.265
40	8.553	33.907	26.332
50	8.344	33.930	26.382
75	8.001	33.974	26.468
100	7.301	33.952	26.552
125	6.918	34.000	26.642

STATION US14197
LATITUDE 41-57.6 N
LONGITUI 140-57.8 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	7.255	32.196	25.176
10	6.150	32.238	25.352
20	3.456	32.408	25.776
30	2.782	32.538	25.939
40	2.582	32.617	26.018
50	2.476	32.708	26.099

STATION US14198
LATITUDE 41-57.4 N
LONGITUI 140-58.2 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	7.602	32.122	25.071
10	6.993	32.171	25.192
20	4.549	32.338	25.613
30	1.500	32.347	25.881
40	0.821	32.439	25.997
50	1.631	32.633	26.102

STATION US14199
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	6.960	32.010	25.069
10	6.447	32.116	25.219
20	2.270	32.154	25.672
30	1.371	32.348	25.891
40	0.885	32.425	25.982
50	0.856	32.489	26.035
75	2.394	32.917	26.273

STATION US14200
LATITUDE 41-58.7 N
LONGITUI 141-00.7 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.509	32.023	25.138
10	5.382	32.049	25.294
20	2.029	32.211	25.735
30	1.943	32.411	25.902
40	1.309	32.439	25.967
50	1.170	32.513	26.035
75	1.128	32.644	26.143

STATION US14201
LATITUDE 41-59.4 N
LONGITUI 141-02.0 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	6.298	32.111	25.234
10	5.864	32.166	25.330
20	1.863	32.233	25.765
30	0.985	32.300	25.876
40	1.707	32.453	25.952
50	1.263	32.493	26.013
75	1.571	32.697	26.157

STATION US14202
LATITUDE 42-19.2 N
LONGITUI 140-52.8 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	7.039	31.495	24.654
10	6.877	31.524	24.698
20	5.814	31.733	24.994
30	4.274	32.164	25.504
40	3.112	32.257	25.687

STATION US14203
LATITUDE 42-16.6 N
LONGITUI 140-36.5 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	7.477	31.604	24.681
10	7.341	31.842	24.886
20	6.921	32.150	25.185
30	4.581	32.216	25.513
40	3.311	32.477	25.845
50	2.620	32.604	26.004
75	3.219	33.054	26.313

STATION US14204
LATITUDE 41-49.8 N
LONGITUI 141-12.8 E
DEPTH (m) 162

Press.	Temp.	Salinity	Sigma-T
5	7.202	31.988	25.020
10	5.770	31.968	25.184
20	1.536	32.222	25.778
30	1.227	32.340	25.893
40	1.221	32.461	25.990
50	0.916	32.524	26.060
75	2.766	32.996	26.306
100	2.650	33.108	26.405
125	5.178	33.545	26.501
150	4.198	33.427	26.514

Table 2. (Continued)

STATION US14205
LATITUDE 41-51.5 N
LONGITUI 141-10.1 E
DEPTH (m) 108

Press.	Temp.	Salinity	Sigma-T
5	7.057	31.914	24.981
10	6.395	31.946	25.091
20	2.191	32.023	25.573
30	1.020	32.207	25.799
40	1.008	32.382	25.940
50	0.674	32.445	26.010
75	1.869	32.759	26.186
100	3.434	33.246	26.446

STATION US14206
LATITUDE 41-53.4 N
LONGITUI 141-07.3 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	9.068	32.034	24.786
10	8.178	32.038	24.923
20	6.699	32.106	25.179
30	3.163	32.247	25.674
40	2.128	32.554	26.003
50	1.585	32.607	26.084
75	2.509	32.881	26.235

STATION US14207
LATITUDE 41-55.3 N
LONGITUI 141-04.7 E
DEPTH (m) 111

Press.	Temp.	Salinity	Sigma-T
5	6.911	31.979	25.052
10	6.385	32.020	25.151
20	5.874	32.059	25.245
30	0.905	32.135	25.747
40	0.706	32.402	25.974
50	1.980	32.686	26.119
75	2.479	32.842	26.206
100	3.652	33.334	26.495

STATION US14208
LATITUDE 41-57.0 N
LONGITUI 141-02.3 E
DEPTH (m) 105

Press.	Temp.	Salinity	Sigma-T
5	8.222	32.086	24.954
10	6.452	32.007	25.132
20	3.985	32.107	25.486
30	2.702	32.482	25.901
40	2.196	32.582	26.020
50	1.493	32.575	26.064
75	2.243	32.771	26.168
100	3.460	33.198	26.405

STATION US14209
LATITUDE 41-58.8 N
LONGITUI 141-00.0 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.010	31.995	24.913
10	7.205	32.010	25.037
20	3.174	32.206	25.640
30	2.800	32.447	25.864
40	2.262	32.559	25.997
50	2.395	32.641	26.052
75	2.512	32.822	26.187

STATION US14210
LATITUDE 42-10.4 N
LONGITUI 140-39.9 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	8.322	31.581	24.543
10	6.695	31.635	24.809
20	5.156	32.200	25.438
30	3.274	32.331	25.731
40	1.973	32.461	25.940
50	2.526	32.613	26.019
75	3.601	33.209	26.401

STATION US14211
LATITUDE 42-11.3 N
LONGITUI 140-36.1 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	8.294	31.826	24.740
10	8.023	32.101	24.994
20	6.420	32.276	25.349
30	3.451	32.299	25.689
40	2.110	32.442	25.915
50	2.532	32.632	26.034
75	3.401	33.138	26.363

STATION US14212
LATITUDE 42-18.2 N
LONGITUI 140-42.1 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	8.934	31.596	24.464
10	8.561	31.940	24.790
20	5.644	32.118	25.318
30	3.200	32.190	25.625
40	2.366	32.327	25.803
50	1.907	32.432	25.921

STATION US14213
LATITUDE 42-24.5 N
LONGITUI 140-48.2 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	8.651	31.813	24.676
10	8.724	32.029	24.835
20	7.734	32.205	25.117
30	3.683	32.249	25.629
40	2.700	32.390	25.827

STATION US14214
LATITUDE 42-17.8 N
LONGITUI 140-53.5 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	8.139	31.243	24.305
10	6.752	31.540	24.726
20	3.729	32.195	25.581
30	2.440	32.285	25.764
40	1.838	32.375	25.881
50	1.869	32.502	25.980

STATION US14215
LATITUDE 42-09.3 N
LONGITUI 140-52.8 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	6.832	31.693	24.837
10	5.645	31.766	25.040
20	2.216	32.015	25.565
30	1.494	32.203	25.766
40	0.510	32.266	25.874
50	0.466	32.371	25.961
75	1.998	32.868	26.264

STATION US14216
LATITUDE 42-04.6 N
LONGITUI 140-56.7 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	8.217	31.743	24.686
10	6.486	31.806	24.970
20	2.164	32.058	25.603
30	1.587	32.184	25.744
40	1.245	32.352	25.902
50	1.150	32.438	25.977
75	3.801	33.347	26.491

STATION US14217
LATITUDE 42-01.1 N
LONGITUI 141-00.0 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	7.983	31.953	24.884
10	7.195	31.959	24.998
20	5.208	32.304	25.515
30	3.414	32.444	25.809
40	2.259	32.520	25.966
50	1.972	32.619	26.067
75	3.379	33.151	26.375

STATION US14218
LATITUDE 42-11.2 N
LONGITUI 141-02.8 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	5.952	32.046	25.225
10	5.334	32.067	25.314
20	2.069	32.165	25.696
30	0.446	32.292	25.899
40	0.933	32.460	26.007
50	0.850	32.543	26.079
75	1.549	32.838	26.272

STATION US14219
LATITUDE 42-09.2 N
LONGITUI 141-10.1 E
DEPTH (m) 127

Press.	Temp.	Salinity	Sigma-T
5	6.253	32.032	25.177
10	3.360	31.971	25.437
20	1.334	32.193	25.768
30	1.071	32.367	25.925
40	1.209	32.494	26.017
50	1.403	32.600	26.090
75	1.729	32.955	26.353
100	2.334	33.134	26.451

Table 2. (Continued)

STATION US14220
LATITUDE 42-09.4 N
LONGITUI 141-21.8 E
DEPTH (m) 402

Press.	Temp.	Salinity	Sigma-T
5	6.713	31.880	24.999
10	4.923	32.125	25.405
20	1.721	32.278	25.811
30	0.965	32.510	26.045
40	2.020	32.746	26.165
50	1.088	32.713	26.201
75	2.064	33.022	26.382
100	3.911	33.348	26.481
125	4.431	33.433	26.495
150	4.921	33.533	26.521
175	4.523	33.526	26.559
200	4.009	33.488	26.582
250	2.818	33.430	26.648

STATION US14221
LATITUDE 42-00.5 N
LONGITUI 141-20.1 E
DEPTH (m) 315

Press.	Temp.	Salinity	Sigma-T
5	7.444	32.000	24.996
10	5.138	32.099	25.360
20	2.467	32.311	25.783
30	1.596	32.377	25.899
40	1.259	32.466	25.992
50	0.782	32.551	26.089
75	1.213	32.783	26.250
100	2.086	32.998	26.361
125	3.739	33.318	26.474
150	3.589	33.329	26.497
175	4.039	33.465	26.561
200	4.131	33.532	26.605
250	3.592	33.601	26.714

STATION US14222
LATITUDE 41-59.7 N
LONGITUI 141-09.6 E
DEPTH (m) 135

Press.	Temp.	Salinity	Sigma-T
5	7.503	31.948	24.947
10	4.068	32.001	25.393
20	1.625	32.259	25.802
30	1.238	32.368	25.915
40	1.589	32.544	26.033
50	1.205	32.550	26.063
75	2.193	32.992	26.348
100	2.421	33.131	26.442
125	3.296	33.309	26.509

STATION US14223
LATITUDE 41-42.9 N
LONGITUI 140-44.7 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	10.944	33.587	25.685
10	10.409	33.733	25.893
20	9.815	33.816	26.059
30	9.805	33.825	26.067
40	9.789	33.830	26.073
50	9.602	33.878	26.143
75	8.869	33.986	26.345

STATION US14224
LATITUDE 41-40.9 N
LONGITUI 140-47.2 E
DEPTH (m) 218

Press.	Temp.	Salinity	Sigma-T
5	11.397	33.436	25.486
10	11.114	33.563	25.636
20	11.094	33.587	25.659
30	11.022	33.625	25.701
40	10.367	33.815	25.964
50	9.731	33.909	26.145
75	9.342	33.922	26.219
100	9.069	33.958	26.292
125	8.976	33.970	26.316
150	8.587	33.982	26.386
175	8.171	34.009	26.470
200	8.055	34.016	26.493

STATION US14225
LATITUDE 41-38.8 N
LONGITUI 140-49.2 E
DEPTH (m) 350

Press.	Temp.	Salinity	Sigma-T
5	11.066	33.483	25.582
10	10.794	33.799	25.877
20	9.783	33.838	26.081
30	9.640	33.882	26.139
40	9.534	33.900	26.171
50	9.482	33.907	26.185
75	9.236	33.935	26.246
100	9.069	33.964	26.296
125	9.000	33.974	26.315
150	8.995	33.991	26.329
175	8.962	33.993	26.336
200	8.759	33.992	26.367
250	8.344	34.009	26.444
300	8.038	34.017	26.496

STATION US14226
LATITUDE 41-37.0 N
LONGITUI 140-51.1 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	11.380	33.310	25.392
10	11.356	33.315	25.399
20	10.904	33.517	25.638
30	9.798	33.829	26.071
40	9.606	33.886	26.148
50	9.392	33.917	26.207
75	9.293	33.944	26.244

STATION US14227
LATITUDE 41-35.6 N
LONGITUI 140-53.1 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	11.317	33.362	25.443
10	10.450	33.655	25.825
20	10.185	33.744	25.940
30	10.059	33.776	25.986
40	9.982	33.794	26.013