

GLOBEC CRUISE REPORT
Cruise HX268, 3-11 December 2002

Funding Source: NSF-NOAA (NA-67-RJ-0147)

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Scientific Purpose:

The purpose of the NE Pacific GLOBEC program is to develop a mechanistic understanding of the response of this marine ecosystem to climate variability. Toward this end the GLOBEC cruises on the Gulf of Alaska shelf will determine the physical-chemical structure, primary production and the distribution and abundance of zooplankton, yoy salmon and other planktivorous fish. These interdisciplinary cruises will occur over a seven-year period and throughout the year so that seasonal and interannual depictions of the oceanography of this shelf will be available. Some of the data will be compared with historical data sets whereas other data sets will be a product of the first systematic sampling effort from this shelf.

HX268 is the fifth consecutive December sampled by the GLOBEC GOA LTOP group. Oceanic conditions in December are typically characterized by strong winds, low coastal discharge, low air temperatures and low zooplankton abundances. Large quantities of fresh water standing stock exist on the shelf and are mixed more and more deeply by progressive storms. Heat loss from the ocean to the atmosphere is quite high and incident solar radiation is very low.

Cruise Objectives:

1. Determine thermohaline, velocity, and nutrient structure of the Gulf of Alaska shelf, emphasizing Seward Line, C. Fairfield Line, Prince William Sound stations, and offshore PWS stations (Table 1). Other lines as time permits.
2. Determine primary production and phytoplankton biomass distribution.
3. Determine the distribution and abundance of zooplankton.
4. Determine the distribution and abundance of seabirds and marine mammals.
5. Determine copepod and euphausiid rates of growth and egg production.
6. Characterize the carbon and nitrogen stable isotope concentrations in zooplankton.

SAMPLING

ACTIVITIES

1. Occupied the hydrographic transects (Table 1) and collected vertical CTD-chlorophyll-PAR profiles.
2. Collected ADCP, sea surface salinity (SSS), temperature (SST) and fluorescence (SSF) using seacrest sensors,
3. Collected discrete bottle samples at these stations for nutrients and chlorophyll pigments. Chlorophyll Size Fractionation was done at the whole numbered Seward Line stations and at every other C. Fairfield Line station.
4. Measured Primary Productivity at stations GAK1 and GAK9.
5. One CalVet Net cast was done (the CalVet frame has 4 nets) on the Seward Line stations and at selected PWS stations. There were two fine mesh nets (.053mm) and two large mesh nets (.150mm) on each tow.
6. We did deep MOCNESS tows (to 600 m) near the end of the Seward Line at station GAK13 and at station PWS2.

Detailed sampling efforts appear in the Event Log at the end of this report.

Cruise chronology:

We left port on schedule on December 3. Our first cast at RES2.5 showed some problems, and we had to repeat this station. These CTD gremlins continued to plague us for the next few days and we used many spare parts, even from the large (10-liter bottle) CTD to keep us operational through the cruise. Weather at GAK1 was unworkable on the first day so we anchored up in Thumb Cove for the evening. Next morning the wind was down and we commenced sampling on the Seward Line. CTD samples went smoothly until the evening when it was discovered that the CTD was experiencing random bottle trip events, with no log of the trip event sent to the computer. Troubleshooting led us to replacement of the Pylon, and we started sampling again. Analysis of the nutrients on the

autoanalyzer showed that stations GAK5-GAK9 were in question, so we reoccupied these stations on the way back to shore after completing the rest of the Seward Line stations. The two marine technicians put in many extra hours and efforts to keep the CTD online, and despite all the problems, we were able to finish sampling on the Seward Line by Friday (Dec 6) afternoon. Eventually we had replaced the entire underwater unit, the pylon, the hydrowinch sliprings, reterminated the CTD cable and checked every connector entering the underwater unit. We did primary productivity experiments at GAK1 and GAK9. Russ Hopcroft did two MOCNESS samples at GAK13 and one at GAK1 for zooplankton collection. Though we had some large pressure systems in the North Pacific on this cruise, the weather held remarkably well, typically blowing about 20 knots, occasionally blowing up to 30 with higher gusts. We had enough manpower on deck to safely continue our operations without breaking off sampling. We occupied the Cape Fairfield Line after the Seward line, at first for the hydrography and then for an ADCP section at the slower (6 knots) “acoustic sampling speed”.

After completion of sampling on the Hinchinbrook Entrance Line the weather appeared to allow for a window of opportunity to head east and occupy stations off of Cape Suckling. Less than two hours into transit, however, the vessel experienced mechanical difficulties and we lost all engine and generator power. We lay dead in the water from ~2am to 8am while the crew worked to find ways to refill the fuel day tanks, bypass a shorted electrical breaker panel, generate compressed air and turn over the main engines. We were drifting at ~1kt so not in immediate danger although we were in the middle of the tanker lane southeast of Hinchinbrook Entrance. VHF radio contact with the Coast Guard in Valdez and cell communications with the Seward Marine Center had a tugboat standing by in Port Etches to mobilize and retrieve us but the skills of the Captain and crew of the Helix got us back into Prince William Sound on our own accord. We did not appear to be in any danger though prudence dictated that we not work in exposed waters until the ship was given a clean bill of health by the port engineers. So, we completed our sampling in Prince William Sound and headed back to Seward to terminate the trip, happy that we got out of our muddle with no injuries but somewhat disappointed that we could not fully utilize our weather opportunity to get some extra sampling done in this historically dicey (weather-wise) month. Note that ADCP data after the time of the breakdown is probably unusable due to the fact that the ships gyro lost its bearing during the power outage and had to be manually re-slewed at sea. The vessel steamed under a “wobbly walk” for the remaining days. ADCP data was taken on the Seward, CF and HE lines so the loss of subsequent data is minimal.

PHYSICAL OCEANOGRAPHY (*Danielson*):

We collected CTDs along the Seward Line, Hinchinbrook Entrance Line, and Cape Fairfield Line on the continental shelf and in Montague Strait, Knight Island Passage, and at other locations throughout western Prince William Sound. Continuous sea surface temperature, salinity, fluorescence data, ADCP data, and underway meteorological data were collected throughout the cruise. See above for notes about bottle tripping problems.

Zooplankton (Hopcroft):

December's cruise represented a scaled-back zooplankton program. Quad-nets (a.k.a. CalVets) were taken at all regular zooplankton stations. Biomass was low. MOCNESS collections were restricted to GAK13 and PWS2 were both regular and deep collections were taken during the night. *Neocalanus flemingerii* were removed from the deep MOCNESS at PWS2 for egg production and rearing experiments (to be completed in Fairbanks). Although no *Neocalanus* nauplii were observed in the deep 100 um nets, ~half of the females collected in the nets showed very advanced oogenesis. Egg production experiments were run for *Pseudocalanus* at GAK1, GAK4, GAK9, GAK13 and PWS2, with little egg production observed. Interestingly, large numbers of at least one species of lipid-rich *Pseudocalanus* appear to diapause deep in PWS. Egg production for *Metridia* was undertaken at GAK4, GAK13 and PWS2; no females could be located at Gak1. No euphausiid experimentation was executed on this cruise, although significant populations were observed in all collections taken during darkness.

Stable C & N Isotopes (Kline):

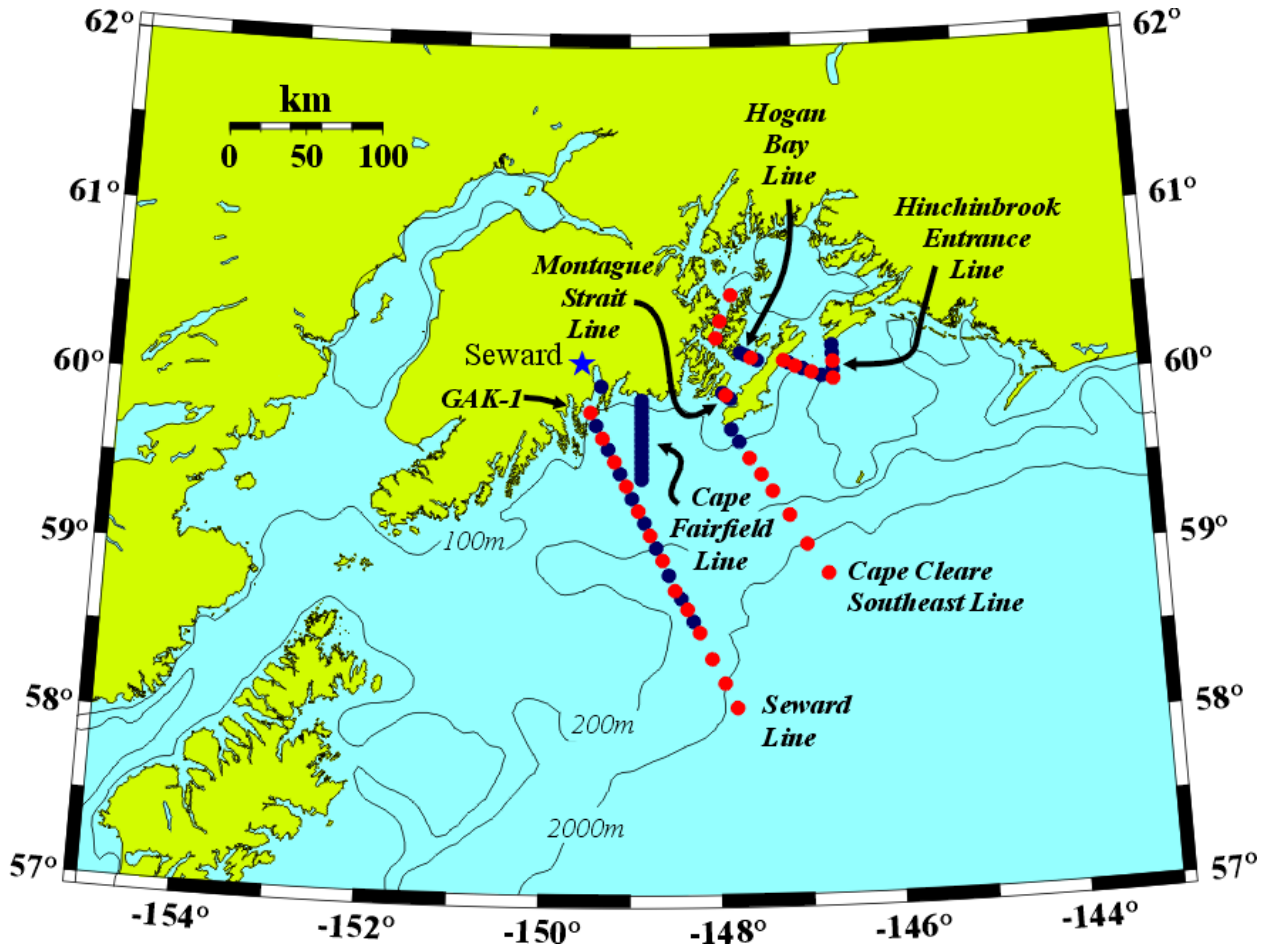
During HX265, diapausing *Neocalanus spp.* were saved for stable isotope analysis (SIA) from the contents of MOCNESS tows that sampled between 400 and 600m. Sampling stations consisted of stations GAK13 and PWS2. At GAK13 SIA samples came from net numbers 2 and 3 (100 micron mesh) that sampled respectively, from 400 to 500m and 500 to 600m during the downcast. At PWS2 SIA samples came from net numbers 2 and 3 (100 micron mesh) that sampled, respectively from 600 to 500m and from 500 to 400 and then back to 600m during the upcast. The contents of these nets were shared with Dr. R. Hopcroft who collected live materials from them. *Neocalanus* were sorted to species and frozen individually in vials for further laboratory processing.

Table 1.

NEP GLOBEC LTOP STANDARD STATIONS				
Latitude N (degrees, minutes)		Longitude W (degrees, minutes)		Station Name
<i>Resurrection Bay Station</i>				
60	1.5	149	21.5	RES2.5
<i>Seward Line</i>				
59	50.7	149	28	GAK1
59	46	149	23.8	GAK1I
59	41.5	149	19.6	GAK2
59	37.6	149	15.5	GAK2I
59	33.2	149	11.3	GAK3
59	28.9	149	7.1	GAK3I
59	24.5	149	2.9	GAK4
59	20.1	148	58.7	GAK4I
59	15.7	148	54.5	GAK5
59	11.4	148	50.3	GAK5I
59	7	148	46.2	GAK6
59	2.7	148	42	GAK6I
58	58.3	148	37.8	GAK7
58	52.9	148	33.6	GAK7I
58	47.5	148	29.4	GAK8
58	44.6	148	25.2	GAK8I
58	40.8	148	21	GAK9
58	36.7	148	16.7	GAK9I
58	32.5	148	12.7	GAK10
58	23.3	148	4.3	GAK11
58	14.6	147	56	GAK12
58	5.9	147	47.6	GAK13
<i>Cape Fairfield Line</i>				
59	54.5	148	52	CF1
59	53	148	52	CF2
59	51	148	52	CF3
59	49	148	52	CF4
59	47	148	52	CF5
59	45	148	52	CF6
59	43	148	52	CF7
59	41	148	52	CF8
59	39	148	52	CF9
59	37	148	52	CF10
59	35	148	52	CF11
59	33	148	52	CF12

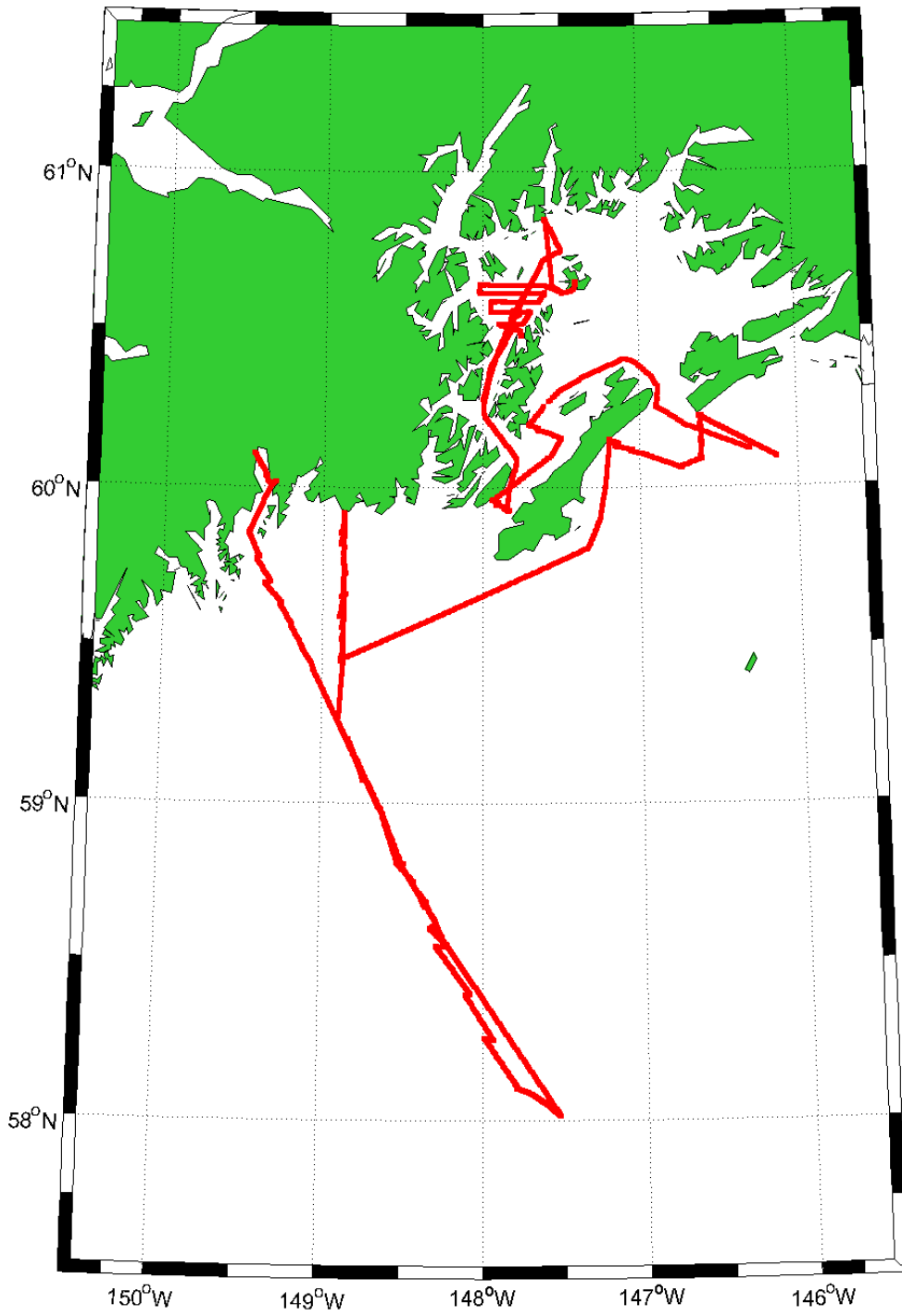
59	31	148	52	CF13
59	29	148	52	CF14
59	27	148	52	CF15
Prince William Sound Stations				
60	22.78	147	56.17	PWS1
60	32.1	147	48.2	PWS2
Knight Island Passage Station				
60	16.7	147	59.2	KIP2
Hogan Bay Line				
60	11.57	147	42	HB1
60	10.754	147	38.5	HB2
60	9.855	147	34.508	HB3
60	8.807	147	30.04	HB4
Montague Strait Line				
59	57.465	147	56.225	MS0i
59	57.257	147	55.602	MS1
59	56.982	147	54.761	MS1i
59	56.6	147	53.7	MS2
59	56.282	147	52.633	MS2i
59	55.9	147	51.4	MS3
59	55.56	147	50.611	MS3i
59	55.2	147	49.7	MS4
Hinchinbrook Entrance Line				
60	13	146	36.5	HE1
60	10.8	146	36.5	HE2
60	7.8	146	36.5	HE3
60	4.8	146	36.5	HE4
60	3.126	146	44.19	HE6.5
60	5.6	146	57.7	HE8
60	6.6	147	3	HE9
60	7.8	147	8	HE10
60	8.6	147	11.5	HE11
Cape Cleare Southeast				
59	44.5	147	49	CCSE1
59	40	147	43.6	CCSE2
59	34.25	147	36.5	CCSE3
59	28.5	147	28.5	CCSE4
59	22.5	147	21	CCSE5
59	14	147	9.5	CCSE6
59	3.5	146	58	CCSE7
58	53	146	44	CCSE8

NEP GLOBEC Standard Station Map

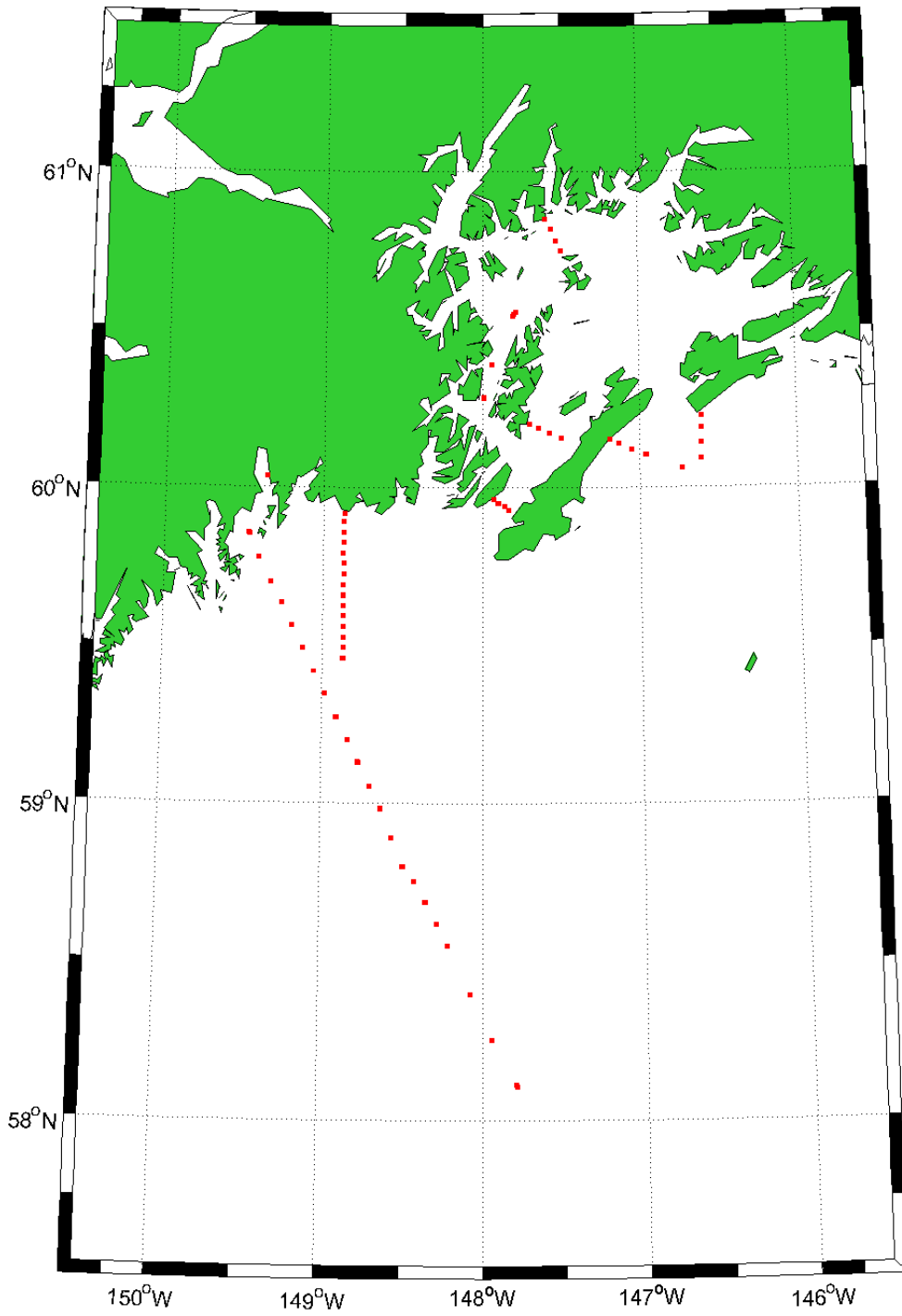


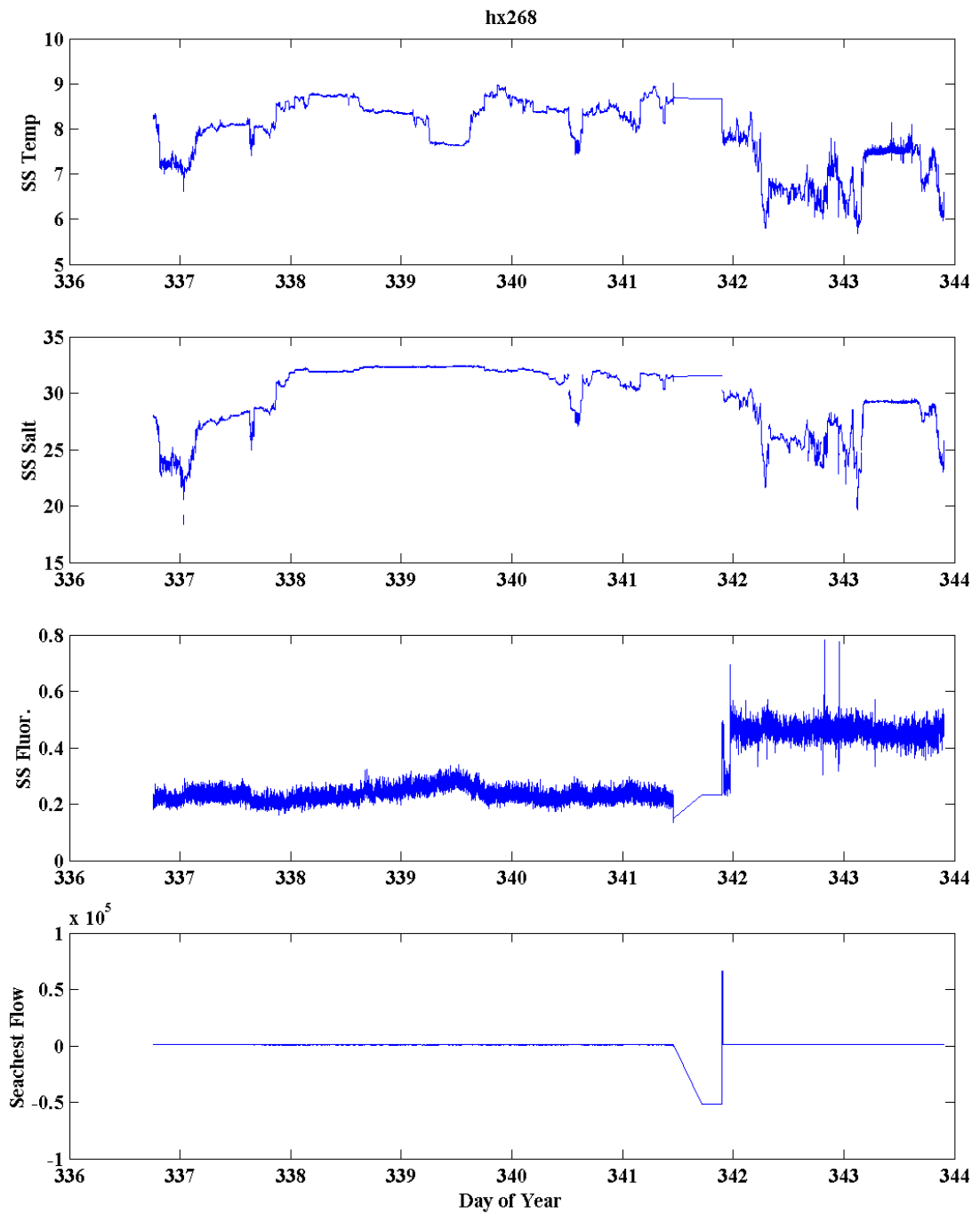
Note: The Cape Cleare Southeast Line is a standard line only in select cruises during the Process Study sampling years.

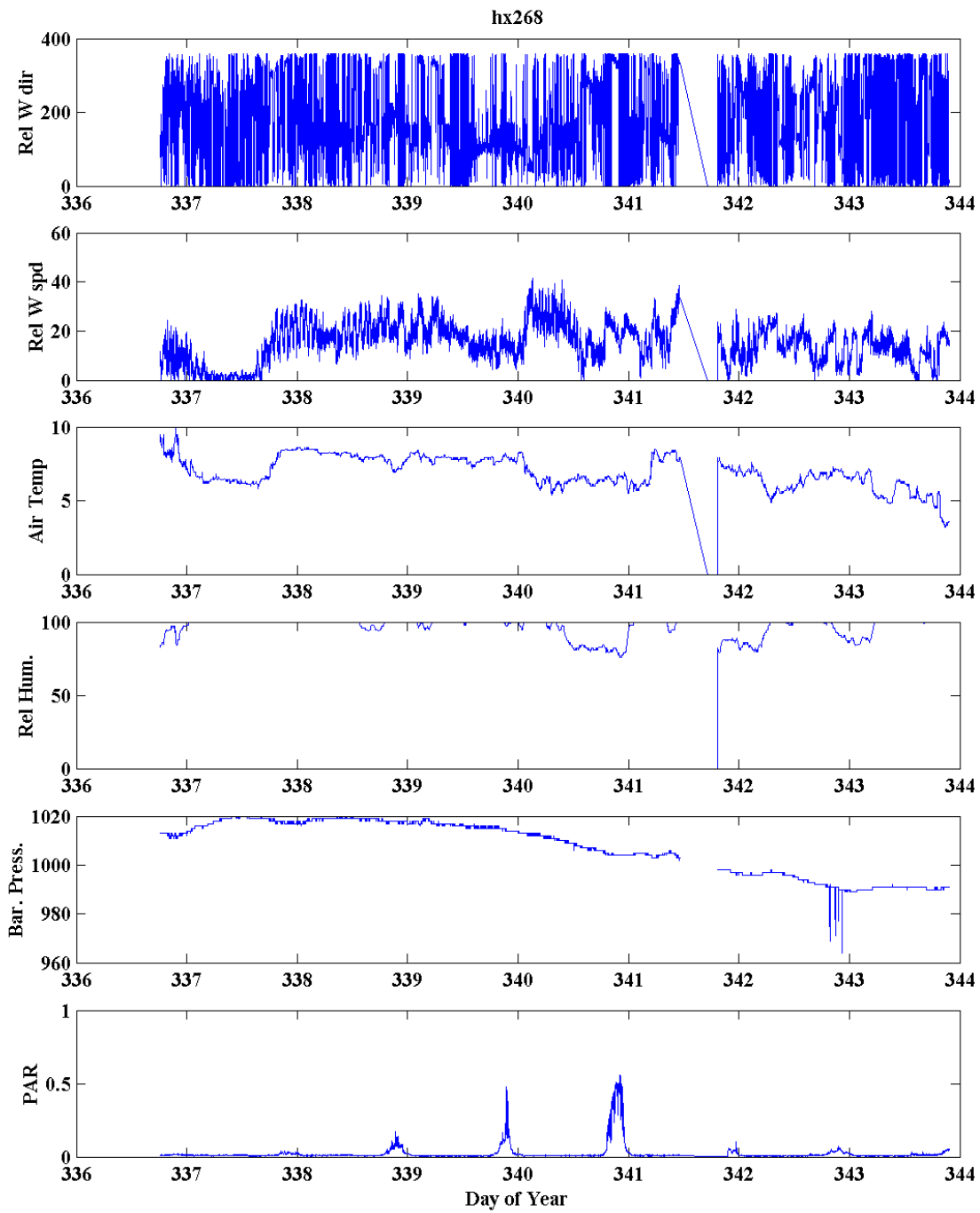
hx268 Cruise Track

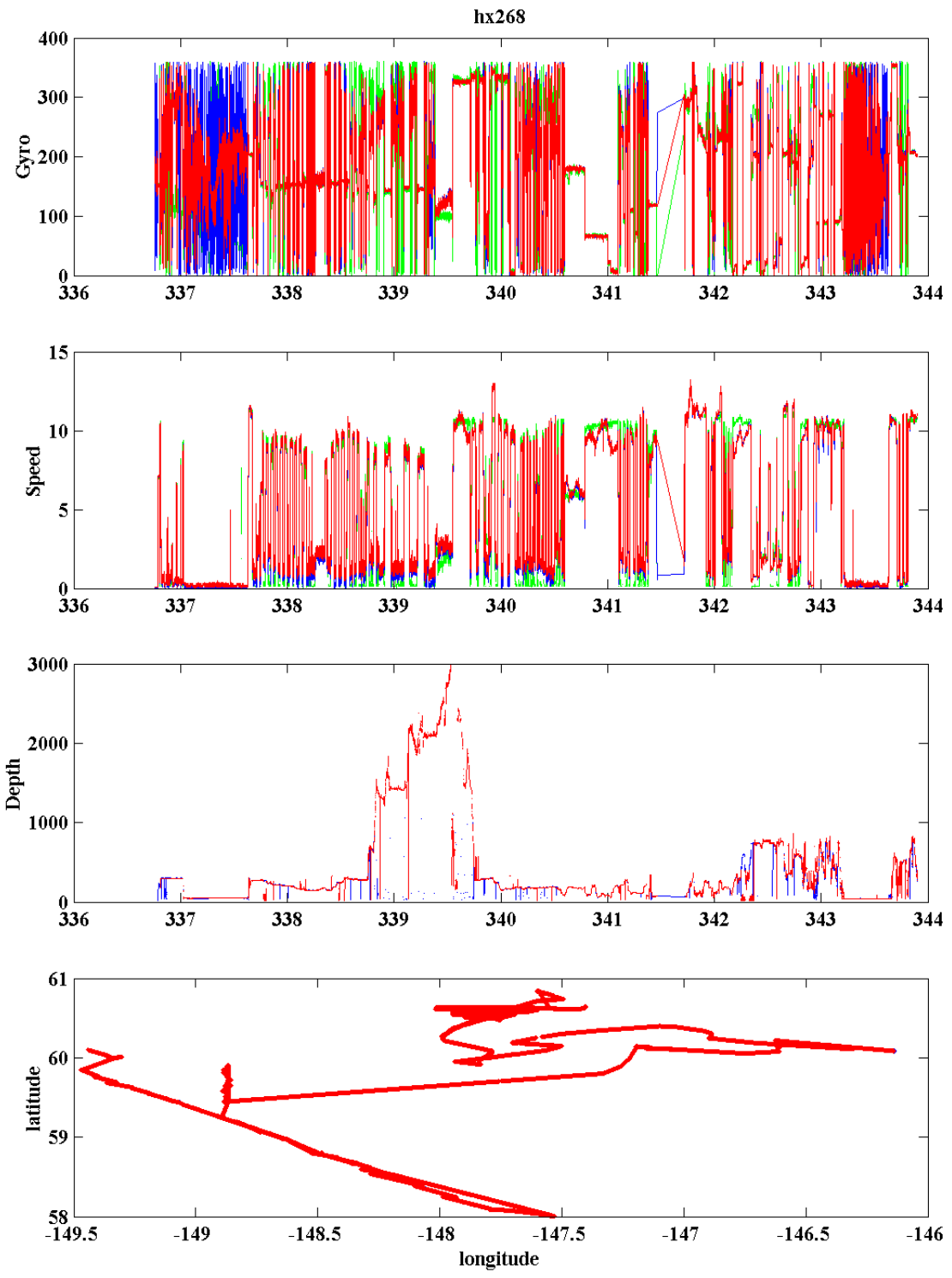


hx268 Station Locations





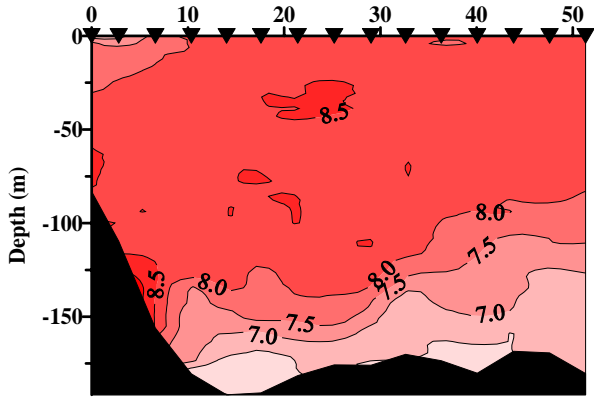




HX268 Cape Fairfield Line: 12/7/2002

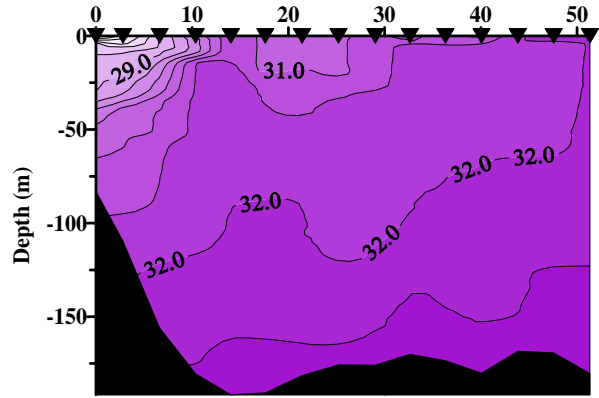
Temperature ($^{\circ}\text{C}$)

Distance (km)



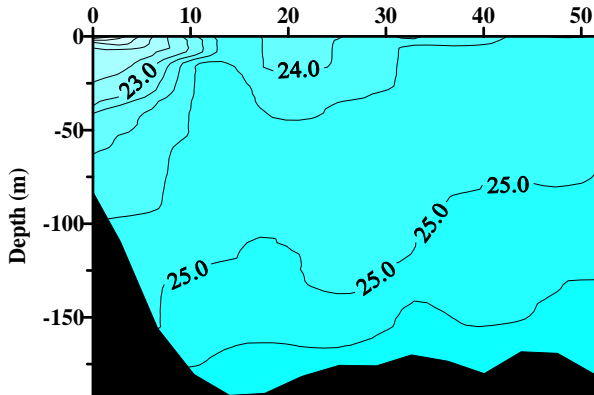
Salinity (PSU)

Distance (km)



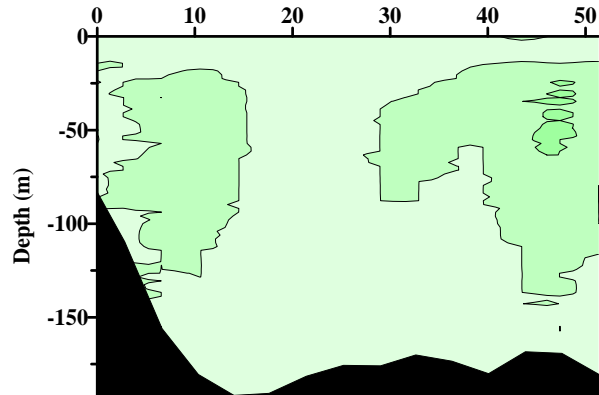
Sigma t

Distance (km)

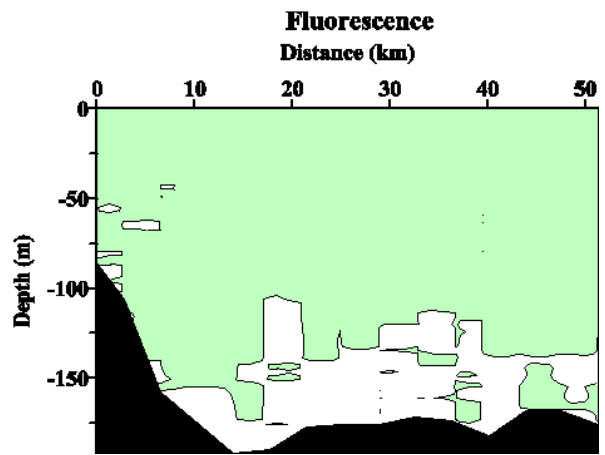
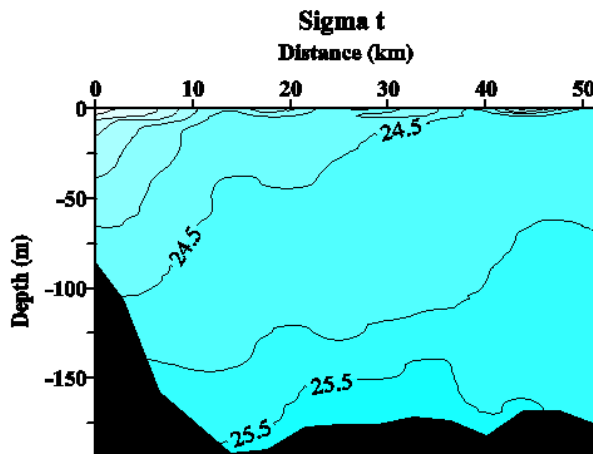
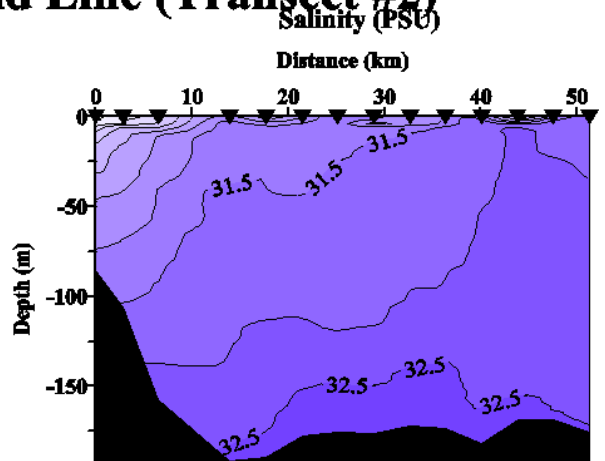
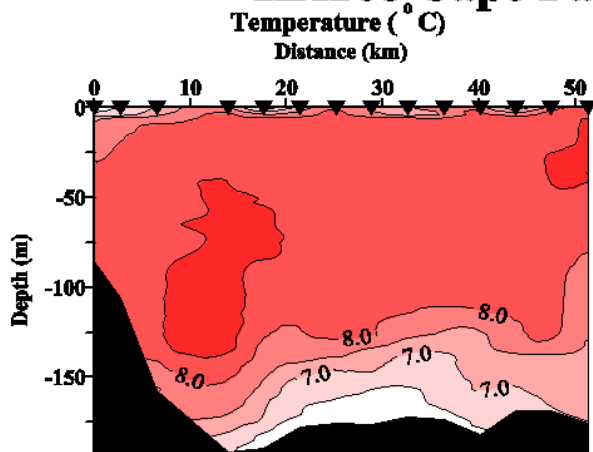


Fluorescence

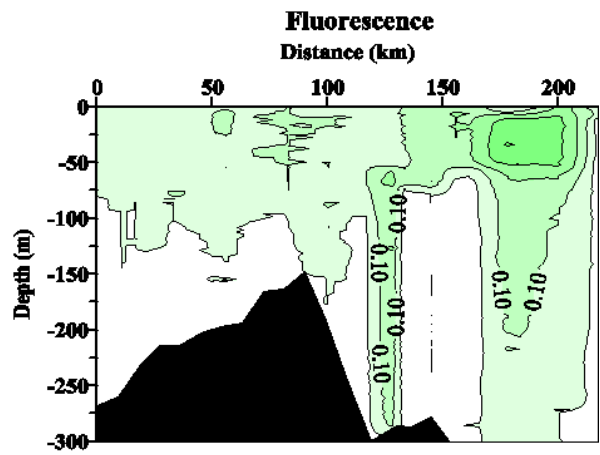
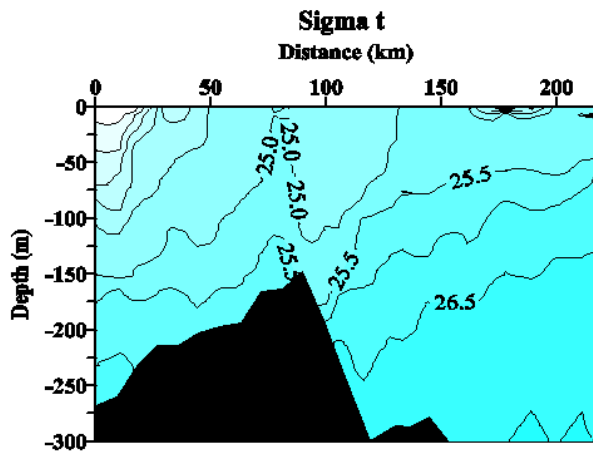
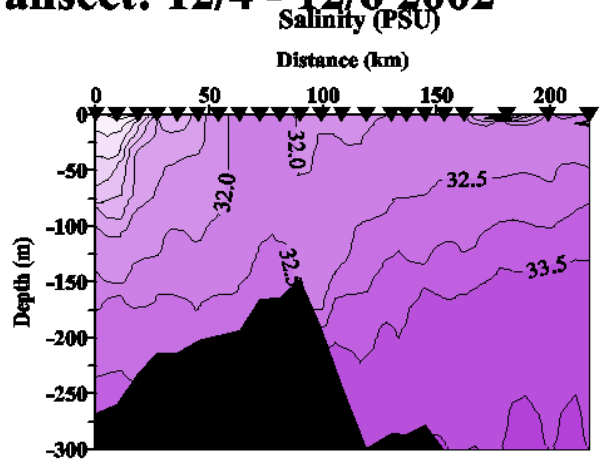
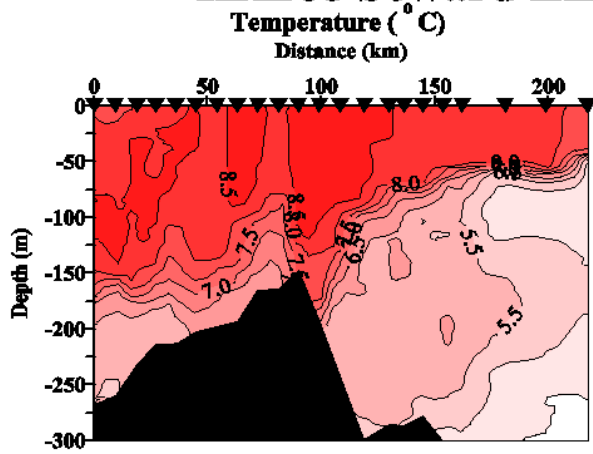
Distance (km)



HX268 Cape Fairfield Line (Transect #2)

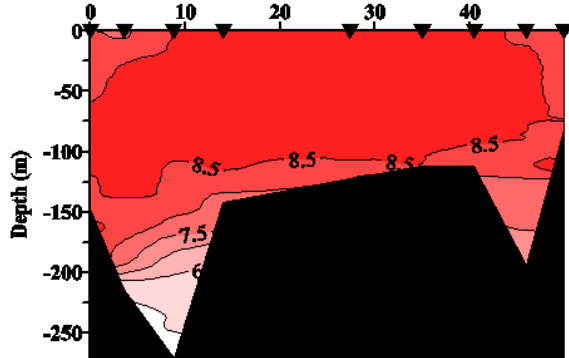


HX268 Seward Line Transect: 12/4 - 12/6 2002



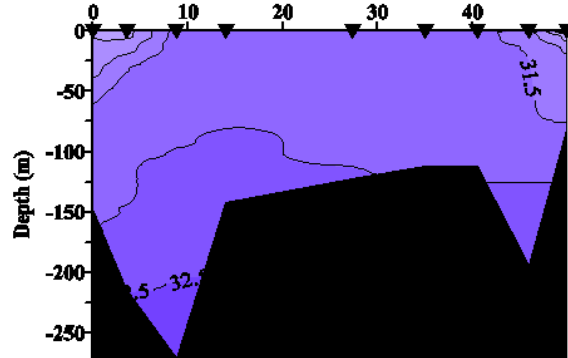
HX268 Hinchinbrook Entrance Line

Temperature ($^{\circ}\text{C}$)
Distance (km)

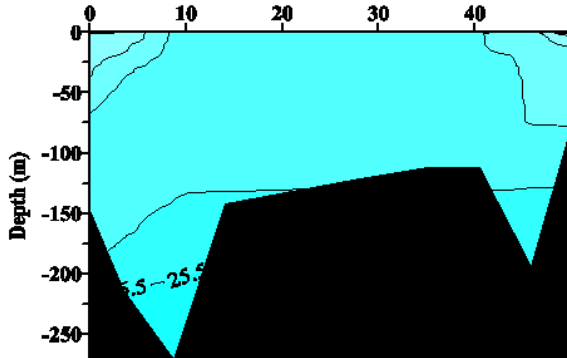


Salinity (PSU)

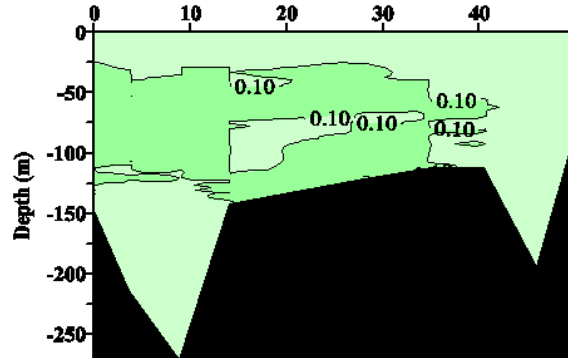
Distance (km)



Sigma t
Distance (km)



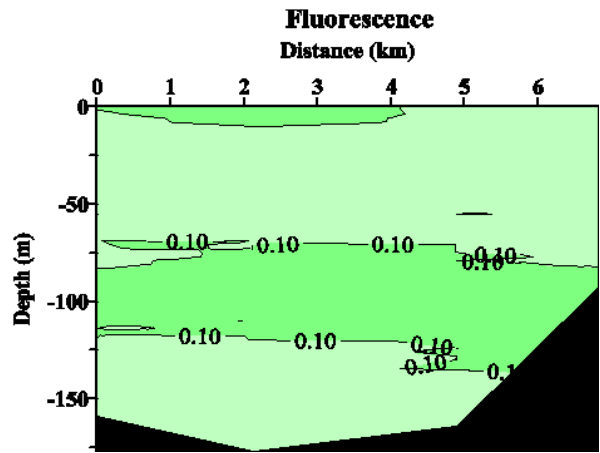
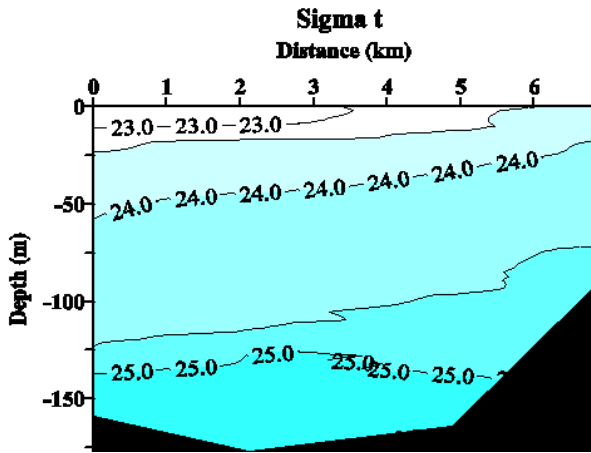
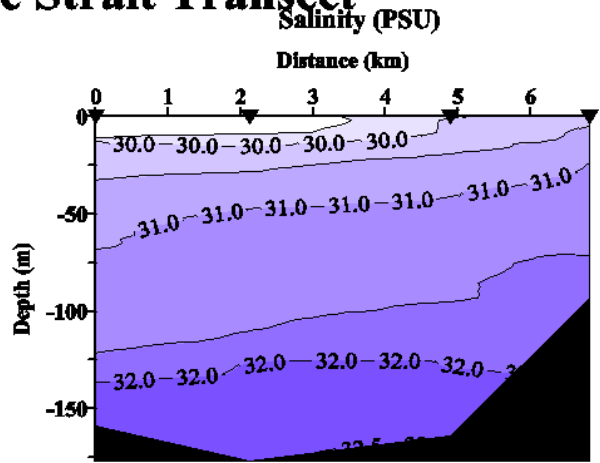
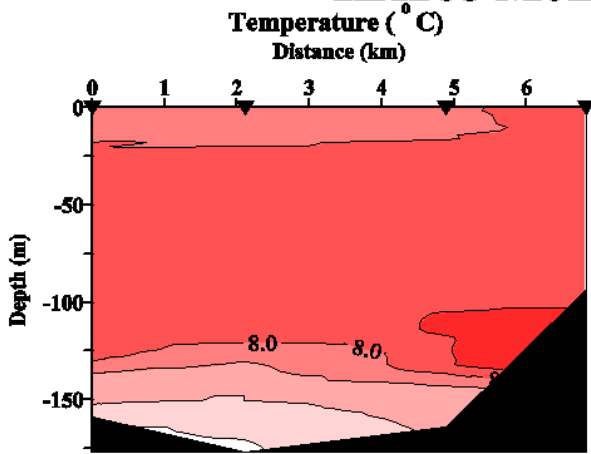
Fluorescence
Distance (km)



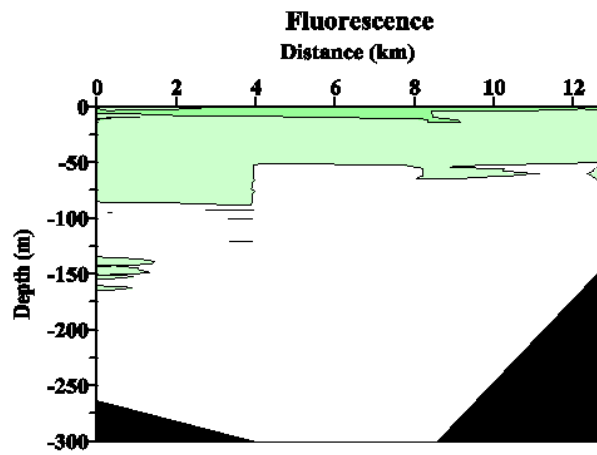
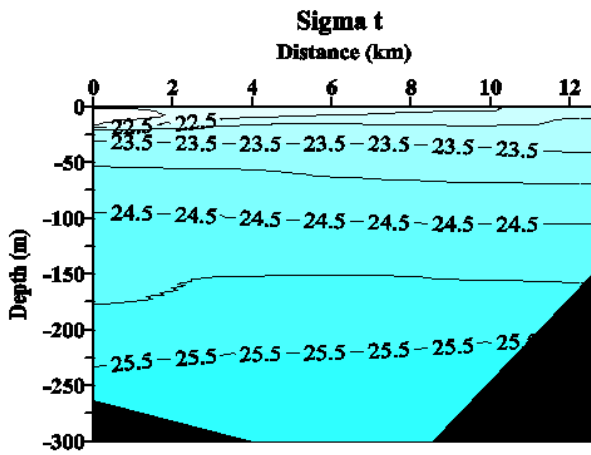
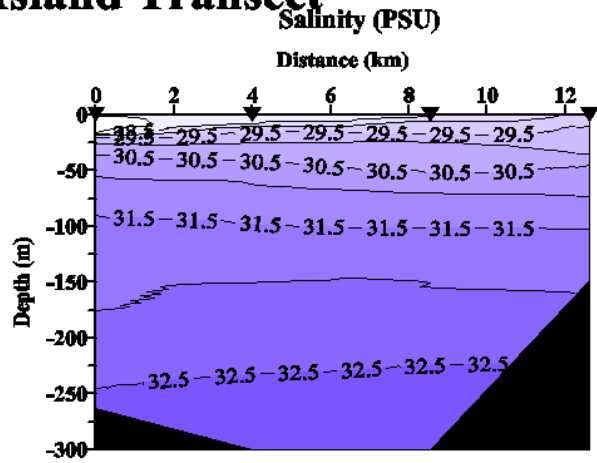
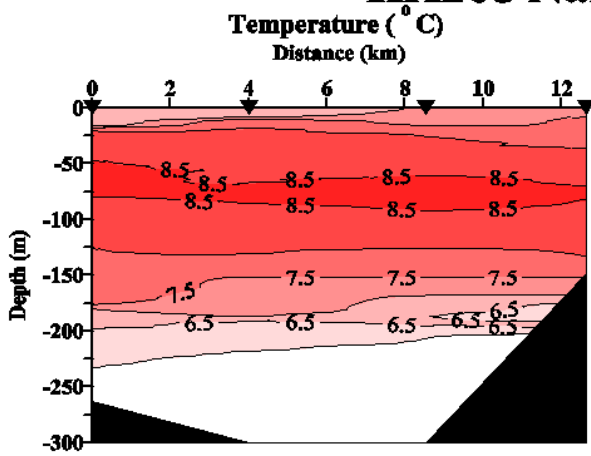
South-West Corner

North-East Corner

HX268 Montague Strait Transect



HX268 Naked Island Transect



Unless otherwise noted, CTDs were taken for T. Weingartner and T. Royer.
 Water samples taken for T. Whitledge and D. Stockwell Nutrient and Chlorophyll analysis.
 CalVet samples were taken for K. Coyle and R. Hopcroft.
 HTI and MOCNESS samples were taken for K. Coyle.
 Ring Net samples were taken for R. Hopcroft and K. Coyle.

Event	Description	station	Date	GMT	Latitude	Longitude	depth	si	Comments
HX26833702.001	CTD1 Start	RES2.5	12/3/2002	1839	60.0260	149.3587	297	Danielson	
HX26833702.002	CTD1 End	RES2.5	12/3/2002				297	Danielson	CTD failed
HX26833702.003	CTD2 Start	RES2.5	12/3/2002	1912	60.0255	149.3598	297	Danielson	
HX26833702.004	CTD2 End	RES2.5	12/3/2002				297	Danielson	CTD failed
HX26833702.005	CTD3 Start	RES2.5	12/3/2002	2335	60.0259	149.3611	297	Danielson	
HX26833702.006	CTD3 End	RES2.5	12/3/2002	2335	60.0259	149.3611	297	Danielson	
HX26833802.001	Ring Net Start	RES2.5	12/4/2002	0014	60.0188	149.3593	297	Hopcroft	
HX26833802.002	Ring Net End	RES2.5	12/4/2002	0024	60.0194	149.3601	297	Hopcroft	
HX26833802.003	Ring Net Start	GAK1	12/4/2002	1617	59.8447	149.4639	270	Hopcroft	
HX26833802.004	Ring Net End	GAK1	12/4/2002	1625	59.8449	149.4646	270	Hopcroft	
HX26833802.005	CTD4 Start	GAK1	12/4/2002	1629	59.8445	149.4652	270	Danielson	
HX26833802.006	CTD4 End	GAK1	12/4/2002	1701	59.8444	149.4666	270	Danielson	
HX26833802.007	CalVET Net Tow Start	GAK1	12/4/2002	1702	59.8444	149.4666	270	Hopcroft	
HX26833802.008	CalVET Net Tow End	GAK1	12/4/2002	1707	59.8445	149.4673	270	Hopcroft	
HX26833802.009	MOCNESS Start	GAK1	12/4/2002	1733	59.8515	149.4616	270	Hopcroft	
HX26833802.010	MOCNESS End	GAK1	12/4/2002	1741	59.8468	149.4626	270	Hopcroft	
HX26833802.011	CTD5 Start	GAK1	12/4/2002	1745	59.8456	149.4672	270	Danielson	prim prod cast
HX26833802.012	CTD5 End	GAK1	12/4/2002	1754	59.8454	149.4680	270	Danielson	
HX26833802.013	CTD6 Start	GAK1i	12/4/2002	1840	59.7679	149.3976	270	Danielson	
HX26833802.014	CTD6 End	GAK1i	12/4/2002	1906	59.7660	149.4172	270	Danielson	
HX26833802.015	CTD7 Start	GAK2	12/4/2002	1946	59.6912	149.3264	227	Danielson	
HX26833802.016	CTD7 End	GAK2	12/4/2002	2010	59.6863	149.3543	227	Danielson	
HX26833802.017	CalVET Net Tow Start	GAK2	12/4/2002	2012	59.6861	149.3596	227	Hopcroft	
HX26833802.018	CalVET Net Tow End	GAK2	12/4/2002	2019	59.6858	149.3627	227	Hopcroft	
HX26833802.019	CTD8 Start	GAK2i	12/4/2002	2058	59.6261	149.2585	214	Danielson	
HX26833802.020	CTD8 End	GAK2i	12/4/2002	2115	59.6221	149.2666	214	Danielson	
HX26833802.021	CalVET Net Tow Start	GAK3	12/4/2002	2152	59.5521	149.1904	215	Hopcroft	
HX26833802.022	CalVET Net Tow End	GAK3	12/4/2002	2157	59.5526	149.1930	215	Hopcroft	
HX26833802.023	CTD9 Start	GAK3	12/4/2002	2202	59.5538	149.1892	215	Danielson	
HX26833802.024	CTD9 End	GAK3	12/4/2002	2223	59.5550	149.1985	215	Danielson	
HX26833802.025	CTD10 Start	GAK3i	12/4/2002	2301	59.4828	149.1178	205	Danielson	
HX26833802.026	CTD10 End	GAK3i	12/4/2002	2332	59.4828	149.1178	205	Danielson	
HX26833802.027	CalVET Net Tow Start	GAK4	12/4/2002	2356	59.4081	149.0500	200	Hopcroft	
HX26833902.001	CalVET Net Tow End	GAK4	12/5/2002	0004	59.4102	149.0505	200	Hopcroft	

HX26833902.002	CTD11 Start	GAK4	12/5/2002	0009	59.4093	149.0481	200	Carney	
HX26833902.003	CTD11 End	GAK4	12/5/2002	0026	59.4112	149.0528	200	Carney	
HX26833902.004	Ring Net Start	GAK4	12/5/2002	0029	59.4117	149.0544	200	Hopcroft	
HX26833902.005	Ring Net End	GAK4	12/5/2002	0034	59.4130	149.0540	200	Hopcroft	
HX26833902.006	CTD12 Start	GAK4i	12/5/2002	0113	59.3352	148.9771	196	Carney	
HX26833902.007	CTD12 End	GAK4i	12/5/2002	0131	59.3366	148.9820	196	Carney	
HX26833902.008	CTD13 Start	GAK5	12/5/2002	0207	59.2621	148.9086	166	Carney	
HX26833902.009	CTD13 End	GAK5	12/5/2002	0226	59.2635	148.9089	166	Carney	
HX26833902.010	CalVET Net Tow Start	GAK5	12/5/2002	0229	59.2635	148.9097	166	Hopcroft	
HX26833902.011	CalVET Net Tow End	GAK5	12/5/2002	0238	59.2649	148.9091	166	Hopcroft	
HX26833902.012	CTD14 Start	GAK5i	12/5/2002	0314	59.1908	148.8347	163	Carney	
HX26833902.013	CTD14 End	GAK5i	12/5/2002	0333	59.1943	148.8333	163	Carney	12 bottles came up tripped, should have been 10. Dump water.
HX26833902.014	CTD15 Start	GAK6	12/5/2002	0421	59.1174	148.7682	147	Carney	
HX26833902.015	CTD15 End	GAK6	12/5/2002	0438	59.1196	148.7685	147	Carney	
HX26833902.016	CalVET Net Tow Start	GAK6	12/5/2002	0444	59.1208	148.7681	147	Hopcroft	cod ends on wrong nets. Dumped samples.
HX26833902.017	CalVET Net Tow End	GAK6	12/5/2002	0450	59.1221	148.7679	147	Hopcroft	
HX26833902.018	CTD16 Start	GAK6	12/5/2002	0458	59.1178	148.7683	147	Danielson	Recast CTD15
HX26833902.019	CTD16 End	GAK6	12/5/2002	0510	59.1193	148.7698	147	Danielson	same problem
HX26833902.020	CalVET Net Tow Start	GAK6	12/5/2002	0513	59.1201	148.7699	147	Hopcroft	
HX26833902.021	CalVET Net Tow End	GAK6	12/5/2002	0519	59.1217	148.7698	147	Hopcroft	
HX26833902.022	CTD17 Start	GAK6	12/5/2002	0600	59.1209	148.7741	147	Danielson	bottle firing problems
HX26833902.023	CTD17 End	GAK6	12/5/2002	0900	59.1134	148.7650	150	Danielson	
HX26833902.024	CTD18 Start	GAK6	12/5/2002	0918	59.1197	148.7702	150	Danielson	
HX26833902.025	CTD18 End	GAK6	12/5/2002	0942	59.1263	148.7757	150	Danielson	
HX26833902.026	CTD19 Start	GAK6i	12/5/2002	1025	59.0463	148.7012	189	Danielson	
HX26833902.027	CTD19 End	GAK6i	12/5/2002	1052	59.0460	148.6989	189	Danielson	
HX26833902.028	CTD20 Start	GAK7	12/5/2002	1130	58.9718	148.6276	243	Danielson	
HX26833902.029	CTD20 End	GAK7	12/5/2002	1157	58.9745	148.6279	243	Danielson	
HX26833902.030	CalVET Net Tow Start	GAK7	12/5/2002	1159	58.9749	148.6281	243	Kline	
HX26833902.031	CalVET Net Tow End	GAK7	12/5/2002	1211	58.9749	148.6281	243	Kline	
HX26833902.032	CTD21 Start	GAK7i	12/5/2002	1252	58.8820	148.5580	305	Cermak	
HX26833902.033	CTD21 End	GAK7i	12/5/2002	1319	58.8807	148.5583	305	Cermak	
HX26833902.034	CTD22 Start	GAK8	12/5/2002	1403	58.7916	148.4886	290	Cermak	
HX26833902.035	CTD22 End	GAK8	12/5/2002	1432	58.7880	148.4967	290	Cermak	
HX26833902.036	CalVET Net Tow Start	GAK8	12/5/2002	1434	58.7880	148.4976	290	Kline	
HX26833902.037	CalVET Net	GAK8	12/5/2002	1441	58.7878	148.4983	290	Kline	

	Tow End								
HX26833902.038	CTD23 Start	GAK8i	12/5/2002	1507	58.7439	148.4196	289	Cermak	
HX26833902.039	CTD23 End	GAK8i	12/5/2002	1532	58.7389	148.4275	289	Cermak	
HX26833902.040	CTD24 Start	GAK9	12/5/2002	1604	58.6801	148.3491	279	Cermak	
HX26833902.041	CTD24 End	GAK9	12/5/2002	1632	58.6734	148.3568	279	Cermak	
HX26833902.042	CalVET Net Tow Start	GAK9	12/5/2002	1638	58.6762	148.3523	279	Hopcroft	
HX26833902.043	CalVET Net Tow End	GAK9	12/5/2002	1644	58.6759	148.3532	279	Hopcroft	
HX26833902.044	CTD25 Start	GAK9	12/5/2002	1653	58.6796	148.3524	279	Thornton	prim prod cast
HX26833902.045	CTD25 End	GAK9	12/5/2002	1705	58.6765	148.3572	279	Thornton	
HX26833902.046	CalVET Net Tow Start	GAK9	12/5/2002	1709	58.6775	148.3544	279	Hopcroft	
HX26833902.047	CalVET Net Tow End	GAK9	12/5/2002	1717	58.6775	148.3548	279	Hopcroft	
HX26833902.048	Ring Net Start	GAK9	12/5/2002	1718	58.6774	148.3552	279	Hopcroft	
HX26833902.049	Ring Net End	GAK9	12/5/2002	1733	58.6765	148.3603	279	Hopcroft	
HX26833902.050	CTD26 Start	GAK9	12/5/2002	1741	58.6799	148.3506	277	Thornton	
HX26833902.051	CTD26 End	GAK9	12/5/2002	1750	58.6778	148.3569	277	Thornton	
HX26833902.052	CTD27 Start	GAK9i	12/5/2002	1825	58.6111	148.2778	277	Cermak	
HX26833902.053	CTD27 End	GAK9i	12/5/2002	1924	58.5947	148.3217	277	Cermak	
HX26833902.054	CTD28 Start	GAK10	12/5/2002	2003	58.5417	148.2133	1467	Cermak	
HX26833902.056	CTD28 End	GAK10	12/5/2002	2141	58.5386	148.2768	1467	Cermak	
HX26833902.057	CalVET Net Tow Start	GAK10	12/5/2002	2146	58.5397	148.2814	1467	Hopcroft	
HX26833902.058	CalVET Net Tow End	GAK10	12/5/2002	2151	58.5405	148.2841	1467	Hopcroft	
HX26833902.059	CalVET Net Tow Start	GAK11	12/5/2002	2316	58.3881	148.0724	1432	Hopcroft	
HX26833902.060	CalVET Net Tow End	GAK11	12/5/2002	2326	58.3880	148.0848	1432	Hopcroft	
HX26834002.001	CTD29 Start	GAK11	12/6/2002	0056	58.3885	148.0748	1432	Danielson	
HX26834002.002	CTD29 End	GAK11	12/6/2002	0208	58.3862	148.1043	1432	Danielson	
HX26834002.003	CalVET Net Tow Start	GAK12	12/6/2002	0327	58.2426	147.9359	2144	Hopcroft	
HX26834002.004	CalVET Net Tow End	GAK12	12/6/2002	0332	58.2435	147.9380	2144	Hopcroft	
HX26834002.005	CTD30 Start	GAK12	12/6/2002	0337	58.2440	147.9415	2160	Carney	
HX26834002.006	CTD30 End	GAK12	12/6/2002	0507	58.2512	147.9897	2160	Carney	
HX26834002.007	CalVET Net Tow Start	GAK13	12/6/2002	0646	58.0986	147.7943	2160	Hopcroft	
HX26834002.008	CalVET Net Tow End	GAK13	12/6/2002	0654	58.1009	147.7954	2160	Hopcroft	
HX26834002.009	CTD31 Start	GAK13	12/6/2002	0657	58.1013	147.7967	2084	Carney	
HX26834002.010	CTD31 End	GAK13	12/6/2002	0719	58.1037	147.8004	2084	Danielson	
HX26834002.011	Ring Net Start	GAK13	12/6/2002	0722	58.1038	147.8004	2084	Hopcroft	
HX26834002.012	Ring Net End	GAK13	12/6/2002	0728	58.1049	147.8009	2084	Hopcroft	
HX26834002.013	CTD32 Start	GAK13	12/6/2002	0743	58.0972	147.7914	2090	Danielson	
HX26834002.014	CTD32 End	GAK13	12/6/2002	0903	58.0926	147.7966	2090	Carney	
HX26834002.015	MOCNESS Start	GAK13	12/6/2002	0924	58.0891	147.7794	2090	Hopcroft	
HX26834002.016	MOCNESS End	GAK13	12/6/2002	1128	58.0493	147.6353	2090	Hopcroft	

HX26834002.017	MOCNESS Start	GAK13	12/6/2002	1212	58.0299	147.5838	2730	Hopcroft	
HX26834002.018	MOCNESS End	GAK13	12/6/2002	1238	58.0187	147.5635	2730	Hopcroft	
HX26834002.019	CTD33 Start	GAK10	12/6/2002	1704	58.5418	148.2129	1471	Cermak	
HX26834002.020	CTD33 End	GAK10	12/6/2002	1719	58.5391	148.2188	1471	Cermak	
HX26834002.021	CTD34 Start	GAK9	12/6/2002	1831	58.6800	148.3498	278	Cermak	
HX26834002.022	CTD34 End	GAK9	12/6/2002	1859	58.6744	148.3639	278	Cermak	
HX26834002.023	CTD35 Start	GAK8	12/6/2002	2006	58.7918	148.4900	290	Cermak	pressure spike cast aborted
HX26834002.024	CTD35 End	GAK8	12/6/2002	2022	58.7932	148.5086	290	Cermak	
HX26834002.025	CTD36 Start	GAK8	12/6/2002	2127	58.7931	148.4936	290	Danielson	fixed altimeter
HX26834002.026	CTD36 End	GAK8	12/6/2002	2148	58.7989	148.5212	290	Danielson	
HX26834002.027	CTD37 Start	GAK7	12/6/2002	2247	58.9734	148.6310	245	Carney	
HX26834002.028	CTD37 End	GAK7	12/6/2002	2312	58.9821	148.6441	245	Carney	
HX26834102.001	CTD38 Start	GAK6	12/7/2002	0008	59.1177	148.7697	152	Carney	
HX26834102.002	CTD38 End	GAK6	12/7/2002	0025	59.1171	148.7705	152	Carney	
HX26834102.003	CTD39 Start	GAK5	12/7/2002	0134	59.2623	148.9090	168	Carney	
HX26834102.004	CTD39 End	GAK5	12/7/2002	0151			168	Carney	
HX26834102.005	CTD40 Start	CF15	12/7/2002	0313	59.4493	148.8667	183	Carney	
HX26834102.006	CTD40 End	CF15	12/7/2002	0339	59.4447	148.8805	183	Carney	
HX26834102.007	CTD41 Start	CF15	12/7/2002	0357	59.4501	148.8680	183	Carney	
HX26834102.008	CTD41 End	CF15	12/7/2002	0420	59.4427	148.8852	183	Carney	
HX26834102.009	CTD42 Start	CF14	12/7/2002	0450	59.4837	148.8691	169	Carney	
HX26834102.010	CTD42 End	CF14	12/7/2002	0501	59.4814	148.8742	169	Carney	
HX26834102.011	CTD43 Start	CF13	12/7/2002	0522	59.5171	148.8692	171	Carney	
HX26834102.012	CTD43 End	CF13	12/7/2002	0541	59.5126	148.8759	171	Carney	
HX26834102.013	CTD44 Start	CF12	12/7/2002	0611	59.5506	148.8693	180	Danielson	
HX26834102.014	CTD44 End	CF12	12/7/2002	0624	59.5480	148.8763	180	Danielson	
HX26834102.015	CTD45 Start	CF11	12/7/2002	0643	59.5844	148.8681	175	Danielson	
HX26834102.016	CTD45 End	CF11	12/7/2002	0701	59.5809	148.8775	175	Danielson	
HX26834102.017	Ring Net Start	CF11	12/7/2002	0708	59.5807	148.8836	175	Hopcroft	
HX26834102.018	Ring Net End	CF11	12/7/2002	0710	59.5808	148.8851	175	Hopcroft	
HX26834102.019	CTD46 Start	CF10	12/7/2002	0734	59.6175	148.8688	175	Danielson	
HX26834102.020	CTD46 End	CF10	12/7/2002	0748	59.6141	148.8784	175	Danielson	
HX26834102.021	CTD47 Start	CF9	12/7/2002	0807	59.6503	148.8694	175	Danielson	
HX26834102.022	CTD47 End	CF9	12/7/2002	0813	59.6519	148.8649	175	Danielson	CTD lockup, cast aborted
HX26834102.023	CTD48 Start	CF9	12/7/2002	0851	59.6497	148.8694	175	Cermak	
HX26834102.024	CTD48 End	CF9	12/7/2002	0913	59.6441	148.8807	175	Cermak	
HX26834102.025	CTD49 Start	CF8	12/7/2002	0942	59.6835	148.8698	178	Cermak	
HX26834102.026	CTD49 End	CF8	12/7/2002	0954	59.6806	148.8725	178	Cermak	
HX26834102.027	CTD50 Start	CF7	12/7/2002	1014	59.7175	148.8684	182	Cermak	
HX26834102.028	CTD50 End	CF7	12/7/2002	1033	59.7147	148.8686	182	Cermak	
HX26834102.029	CTD51 Start	CF6	12/7/2002	1056	59.7513	148.8698	190	Cermak	
HX26834102.030	CTD51 End	CF6	12/7/2002	1110	59.7516	148.8733	190	Cermak	
HX26834102.031	CTD52 Start	CF5	12/7/2002	1127	59.7846	148.8693	190	Cermak	
HX26834102.033	CTD52 End	CF5	12/7/2002	1205	59.7839	148.8713	193	Cermak	
HX26834102.034	CTD53 Start	CF4	12/7/2002	1222	59.8165	148.8716	184	Cermak	

HX26834102.035	CTD53 End	CF4	12/7/2002	1236	59.8107	148.8873	184	Cermak	
HX26834102.036	CTD54 Start	CF3	12/7/2002	1300	59.8497	148.8685	160	Cermak	
HX26834102.037	CTD54 End	CF3	12/7/2002	1321	59.8444	148.8858	160	Cermak	
HX26834102.038	CTD55 Start	CF2	12/7/2002	1344	59.8836	148.8679	113	Cermak	
HX26834102.039	CTD55 End	CF2	12/7/2002	1354	59.8827	148.8730	113	Cermak	
HX26834102.040	CTD56 Start	CF1	12/7/2002	1407	59.9090	148.8674	88	Cermak	
HX26834102.041	CTD56 End	CF1	12/7/2002	1415	59.9098	148.8696	88	Cermak	
HX26834202.001	CTD57 Start	HE11	12/8/2002	0233	60.1427	147.1944	109	Danielson	
HX26834202.002	CTD57 End	HE11	12/8/2002	0241	60.1414	147.1980	109	Danielson	
HX26834202.003	CTD58 Start	HE10	12/8/2002	0255	60.1303	147.1355	216	Carney	
HX26834202.004	CTD58 End	HE10	12/8/2002	0322	60.1231	147.1555	216	Carney	
HX26834202.005	CalVET Net Tow Start	HE10	12/8/2002	0324	60.1226	147.1571	216	Kline	
HX26834202.006	CalVET Net Tow End	HE10	12/8/2002	0330	60.1217	147.1622	216	Kline	
HX26834202.007	CTD59 Start	HE9	12/8/2002	0355	60.1099	147.0497	276	Danielson	
HX26834202.008	CTD59 End	HE9	12/8/2002	0427	60.1026	147.0313	276	Danielson	
HX26834202.009	CTD60 Start	HE8	12/8/2002	0442	60.0942	146.9614	145	Carney	
HX26834202.010	CTD60 End	HE8	12/8/2002	0459	60.0935	146.9684	145	Carney	
HX26834202.011	CTD62 Start	HE6.5	12/8/2002	0551	60.0531	146.7362	120	Danielson	
HX26834202.012	CTD62 End	HE6.5	12/8/2002	0603	60.0533	146.7439	120	Danielson	
HX26834202.013	CalVET Net Tow Start	HE6.5	12/8/2002	0605	60.0535	146.7451	120	Hopcroft	
HX26834202.014	CalVET Net Tow End	HE6.5	12/8/2002	0612	60.0548	146.7486	120	Hopcroft	
HX26834202.015	CalVET Net Tow Start	HE4	12/8/2002	0646	60.0799	146.6080	112	Hopcroft	
HX26834202.016	CalVET Net Tow End	HE4	12/8/2002	0652	60.0811	146.6097	112	Hopcroft	
HX26834202.017	CTD63 Start	HE4	12/8/2002	0659	60.1439	146.6160	112	Carney	
HX26834202.018	CTD63 End	HE4	12/8/2002	0709	60.1439	146.6160	112	Carney	
HX26834202.019	CTD64 Start	HE3	12/8/2002	0733	60.1313	146.6087	111	Carney	
HX26834202.020	CTD64 End	HE3	12/8/2002	0755	60.1430	146.6166	111	Carney	
HX26834202.021	CTD65 Start	HE2	12/8/2002	0809	60.1802	146.6080	192	Carney	
HX26834202.022	CTD65 End	HE2	12/8/2002	0830	60.1814	146.6183	192	Carney	
HX26834202.023	CalVET Net Tow Start	HE2	12/8/2002	0830	60.1814	146.6186	192	Hopcroft	
HX26834202.024	CalVET Net Tow End	HE2	12/8/2002	0836	60.1821	146.6216	192	Hopcroft	
HX26834202.025	CTD66 Start	HE1	12/8/2002	0852	60.2162	146.6106	81	Cermak	
HX26834202.026	CTD66 End	HE1	12/8/2002	0903	60.2156	146.6245	81	Cermak	
HX26834202.027	CTD67 Start	HB1	12/8/2002	2212	60.1932	147.7007	247	Carney	
HX26834202.028	CTD67 End	HB1	12/8/2002	2234	60.1932	147.7007	247	Danielson	
HX26834202.029	CTD68 Start	HB2	12/8/2002	2249	60.1796	147.6420	177	Carney	
HX26834202.030	CTD68 End	HB2	12/8/2002	2307	60.1754	147.6464	177	Carney	
HX26834202.031	CalVET Net Tow Start	HB2	12/8/2002	2308	60.1752	147.6466	177	Hopcroft	
HX26834202.032	CalVET Net Tow End	HB2	12/8/2002	2314	60.1727	147.6494	177	Hopcroft	
HX26834202.033	CTD69 Start	HB3	12/8/2002	2331	60.1650	147.5750	86	Cermak	
HX26834202.034	CTD69 End	HB3	12/8/2002	2341	60.1640	147.5792	86	Cermak	
HX26834302.001	CTD70 Start	HB4	12/9/2002	0000	60.1479	147.5007	109	Carney	

HX26834302.002	CTD70 End	HB4	12/9/2002	0010	60.1474	147.5009	109	Carney	
HX26834302.003	CTD71 Start	MS1	12/9/2002	0146	59.9552	147.9285	170	Carney	
HX26834302.004	CTD71 End	MS1	12/9/2002	0159	59.9519	147.9385	170	Carney	
HX26834302.005	CalVET Net Tow Start	MS2	12/9/2002	0212	59.9418	147.8966	181	Hopcroft	
HX26834302.006	CalVET Net Tow End	MS2	12/9/2002	0218	59.9401	147.9017	181	Hopcroft	
HX26834302.007	CTD72 Start	MS2	12/9/2002	0224	59.9436	147.8961	181	Carney	CTD pressure spike; abort cast
HX26834302.008	CTD72 End	MS2	12/9/2002	0234	59.9402	147.9018	181	Carney	
HX26834302.009	CTD73 Start	MS2	12/9/2002	0246	59.9420	147.9027	181	Carney	recast of CTD72
HX26834302.010	CTD73 End	MS2	12/9/2002	0300	59.9374	147.9146	181	Carney	
HX26834302.011	CTD74 Start	MS3	12/9/2002	0319	59.9316	147.8576	165	Cermak	
HX26834302.012	CTD74 End	MS3	12/9/2002	0334	59.9253	147.8653	165	Cermak	
HX26834302.013	CTD75 Start	MS4	12/9/2002	0345	59.9209	147.8304	87	Cermak	
HX26834302.014	CTD75 End	MS4	12/9/2002	0357	59.9164	147.8382	87	Cermak	
HX26834302.015	CalVET Net Tow Start	PWS2	12/9/2002	0824	60.5350	147.8026	745	Hopcroft	
HX26834302.016	CalVET Net Tow End	PWS2	12/9/2002	0831	60.5346	147.8046	745	Hopcroft	
HX26834302.017	Ring Net Start	PWS2	12/9/2002	0833	60.5345	147.8049	745	Hopcroft	
HX26834302.018	CTD76 Start	PWS2	12/9/2002	0843	60.5333	147.8078	742	Hopcroft	
HX26834302.019	CTD76 End	PWS2	12/9/2002	0957	60.5325	147.8073	742	Hopcroft	
HX26834302.020	CTD77 Start	PWS2	12/9/2002	0957	60.5324	147.8074	742	Hopcroft	
HX26834302.021	CTD77 End	PWS2	12/9/2002	1020	60.5479	147.7617	742	Hopcroft	
HX26834302.022	MOCNESS Start	PWS2	12/9/2002	1026	60.5481	147.7617	742	Hopcroft	
HX26834302.023	MOCNESS End	PWS2	12/9/2002	1134	60.5395	147.7978	742	Hopcroft	
HX26834302.024	CTD78 Start	PWS2	12/9/2002	1237	60.5388	147.7991	742	Hopcroft	
HX26834302.025	CTD78 End	PWS2	12/9/2002	1255	60.5340	147.8075	742	Hopcroft	
HX26834302.026	MOCNESS Start	PWS2	12/9/2002	1318	60.5346	147.8122	742	Hopcroft	
HX26834302.027	MOCNESS End	PWS2	12/9/2002	1349	60.5504	147.8030	742	Hopcroft	
HX26834302.028	CTD79 Start	PWS2	12/9/2002	1404	60.5481	147.7841	742	Hopcroft	
HX26834302.029	CTD79 End	PWS2	12/9/2002				742	Hopcroft	
HX26834302.030	MOCNESS Start	PWS2	12/9/2002	1430	60.5483	147.7967	742	Hopcroft	
HX26834302.031	MOCNESS End	PWS2	12/9/2002	1518	60.5606	147.7619	742	Hopcroft	
HX26834302.032	CTD80 Start	PWS1	12/9/2002	1649	60.3799	147.9375	352	Danielson	2nd try
HX26834302.033	CTD80 End	PWS1	12/9/2002	1712	60.3749	147.9431	352	Danielson	
HX26834302.034	CalVET Net Tow Start	PWS1	12/9/2002	1716	60.3742	147.9440	352	Hopcroft	
HX26834302.035	CalVET Net Tow End	PWS1	12/9/2002	1726	60.3732	147.9473	352	Hopcroft	
HX26834302.036	CalVET Net Tow Start	KIP2	12/9/2002	1800	60.2774	147.9853	585	Hopcroft	
HX26834302.037	CalVET Net Tow End	KIP2	12/9/2002	1809	60.2782	147.9869	585	Hopcroft	
HX26834302.038	CTD81 Start	KIP2	12/9/2002	1812	60.2779	147.9885	575	Cermak	

HX26834302.039	CTD81 End	KIP2	12/9/2002	1857	60.2716	147.9902	575	Cermak	
HX26834302.040	CTD82 Start	KIP2	12/9/2002	1903	60.2783	147.9877	575	Cermak	prim prod cast
HX26834302.041	CTD82 End	KIP2	12/9/2002	1917	60.2718	147.9934	575	Cermak	
HX26834402.001	CTD83 Start	NI1	12/10/2002	1701	60.8414	147.5967	250	Cermak	
HX26834402.002	CTD83 End	NI1	12/10/2002	1723	60.8391	147.6026	250	Cermak	
HX26834402.003	CTD84 Start	NI2	12/10/2002	1740	60.8098	147.5630	507	Cermak	
HX26834402.004	CTD84 End	NI2	12/10/2002	1810	60.8098	147.5630	507	Cermak	
HX26834402.005	CTD85 Start	NI3	12/10/2002	1831	60.7730	147.5284	515	Cermak	
HX26834402.006	CTD85 End	NI3	12/10/2002	1904	60.7684	147.5311	515	Cermak	
HX26834402.007	CTD86 Start	NI4	12/10/2002	1919	60.7404	147.4939	152	Cermak	
HX26834402.008	CTD86 End	NI4	12/10/2002	1934	60.7385	147.5002	152	Cermak	
HX26834402.009	CTD87 Start	BP1	12/10/2002	2305	60.1970	148.0895	212	Danielson	
HX26834402.010	CTD87 End	BP1	12/10/2002	2316	60.1966	148.0881	212	Danielson	
HX26834402.011	CTD88 Start	FI1	12/10/2002	2355	60.1453	148.0040	292	Danielson	
HX26834502.001	CTD88 End	FI1	12/11/2002	0009	60.1440	148.0042	292	Danielson	
HX26834502.002	CTD89 Start	EV1	12/11/2002	0057	60.0840	147.9036	234	Danielson	
HX26834502.003	CTD89 End	EV1	12/11/2002	0115	60.0827	147.9092	234	Danielson	
HX26834502.004	CTD90 Start	CF1	12/11/2002	0412	59.9079	148.8688	86	Thornton	
HX26834502.005	CTD90 End	CF1	12/11/2002	0418	59.9071	148.8692	86	Thornton	
HX26834502.006	CTD91 Start	CF2	12/11/2002	0429	59.8830	148.8689	112	Danielson	
HX26834502.007	CTD91 End	CF2	12/11/2002	0437	59.8833	148.8744	112	Danielson	
HX26834502.008	CTD92 Start	CF3	12/11/2002	0454	59.8498	148.8695	158	Danielson	
HX26834502.009	CTD92 End	CF3	12/11/2002	0501	59.8478	148.8755	158	Danielson	
HX26834502.010	CTD93 Start	CF4	12/11/2002	0518	59.8165	148.8687	181	Danielson	
HX26834502.011	CTD93 End	CF4	12/11/2002	0531	59.8133	148.8722	181	Danielson	
HX26834502.012	CTD94 Start	CF5	12/11/2002	0546	59.7834	148.8693	192	Danielson	
HX26834502.013	CTD94 End	CF5	12/11/2002	0553	59.7824	148.8712	192	Danielson	
HX26834502.014	CTD95 Start	CF6	12/11/2002	0608	59.7508	148.8667	192	Danielson	
HX26834502.015	CTD95 End	CF6	12/11/2002	0620	59.7506	148.8648	192	Danielson	
HX26834502.016	CTD96 Start	CF7	12/11/2002	0636	59.7165	148.8668	180	Cermak	
HX26834502.017	CTD96 End	CF7	12/11/2002	0650	59.7071	148.8648	180	Cermak	
HX26834502.018	CTD97 Start	CF8	12/11/2002	0700	59.6831	148.8676	177	Cermak	
HX26834502.019	CTD97 End	CF8	12/11/2002	0707	59.6836	148.8673	177	Cermak	
HX26834502.020	CTD98 Start	CF9	12/11/2002	0724	59.6498	148.8675	177	Cermak	
HX26834502.021	CTD98 End	CF9	12/11/2002	0736	59.6497	148.8670	177	Cermak	
HX26834502.022	CTD99 Start	CF10	12/11/2002	0750	59.6162	148.8677	175	Cermak	
HX26834502.023	CTD99 End	CF10	12/11/2002	0801	59.6158	148.8679	175	Cermak	
HX26834502.024	CTD100 Start	CF11	12/11/2002	0812	59.5827	148.8674	175	Cermak	
HX26834502.025	CTD100 End	CF11	12/11/2002	0823	59.5827	148.8674	175	Cermak	
HX26834502.026	CTD101 Start	CF12	12/11/2002	0840	59.5491	148.8676	184	Danielson	
HX26834502.027	CTD101 End	CF12	12/11/2002	0850	59.5496	148.8677	184	Danielson	
HX26834502.028	CTD102 Start	CF13	12/11/2002	0905	59.5161	148.8676	170	Danielson	
HX26834502.029	CTD102 End	CF13	12/11/2002	0911	59.5164	148.8674	170	Danielson	
HX26834502.030	CTD103 Start	CF14	12/11/2002	0928	59.4831	148.8672	169	Danielson	
HX26834502.031	CTD103 End	CF14	12/11/2002	0936	59.4832	148.8656	169	Danielson	
HX26834502.032	CTD104 Start	CF15	12/11/2002	0953	59.4489	148.8614	176	Danielson	
HX26834502.033	CTD104 End	CF15	12/11/2002	1000	59.4499	148.8607	176	Danielson	
HX26834502.034	CTD105 Start	GAK1	12/11/2002	1454	59.8447	149.4677	278	Danielson	

HX26834502.035	CTD105 End	GAK1	12/11/2002				278	Danielson	
HX26834502.036	CTD106 Start	RES2.5	12/11/2002	1638	60.0249	149.3597	295	Danielson	
HX26834502.037	CTD106 End	RES2.5	12/11/2002	1649	60.0222	149.3582	295	Danielson	