GLOBEC CRUISE REPORT
CRUISE HX 275: 20 July – 12 August 2003

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Chief Scientist: Jeffrey Napp
NOAA/NMFS/AFSC
7600 Sand Point Way NE
Seattle WA 98115-0070
Tel: 206-526-4148
E-mail: Jeff.Napp@NOAA.gov.edu

Scientific Personnel:

Suzanne Strom (Project co-PI)	Microzooplankton grazing., WWU, stroms@ cc.wwu.edu
Erin Macri	^{14}C productivity, WWU
Kerri Fredrickson	Microzooplankton grazing, WWU
Franchesca Perez	Chlorophyll/nutrients, WWU
Nicole Moore	Microzooplankton grazing, WWU
Jesse Swanko	Microzooplankton grazing, WWU
Riki Sato	Larvacean grazing, LUMCON
Adriana Hashinaga	Larvacean grazing, LUMCON
Colleen Harpold	Grazing/egg production., AFSC
Cheryl Williams	Grazing/egg production, AFSC

AFSC = Alaska Fisheries Science Center (NOAA); LUMCON = Louisiana Universities Marine Consortium; WWU = Western Washington University

Scientific Purpose:

The GLOBEC Northeast Pacific program seeks to understand the relationship between climate variability and the success of marine fish, bird and mammal populations. In the coastal Gulf of Alaska, the program focuses on the mechanisms by which climate and weather can influence the physical - chemical structure of the coastal zone, how this in turn affects the coastal planktonic food web, and how food web variations influence distribution and recruitment success of pink salmon. Process cruises were conducted twice in 2003. On each cruise the aim was to visit four sites representing a diversity of physical - chemical conditions in the coastal Gulf of Alaska. At each of these core sites, rates of phytoplankton growth, zooplankton grazing and zooplankton egg production were measured, as well as aspects of phytoplankton and zooplankton community structure.

On this second 2003 process cruise we focused on post spring phytoplankton bloom conditions, the responses of the zooplankton community to changes in the phytoplankton community, the conditions leading to mesoscale variability in planktonic distribution and biological rates, and the distribution of specific prey taken by juvenile salmon after they leave Prince William Sound. Research on salmon prey and the food webs that produce them were investigated during coordinated operations with other GLOBEC supported investigators/ships

(R/V *Pandalus* and NOAA Ship *Miller Freeman*). Mesoscale physical processes were concurrently mapped by GLOBEC supported research aboard R/V *Wecoma*. Comparison with data collected during 2001 and spring 2003 process cruises will be important for testing hypotheses about planktonic processes, as well as understanding the effects of interannual variability.

Cruise Objectives:

1. Determine phytoplankton growth and ^{14}C production rates,
2. Determine rates of microzooplankton herbivory,
3. Determine rates of grazing on phyto- and microzooplankton by selected copepod taxa,
4. Determine grazing rates and distribution of larvaceans and pteropods,
5. Measure rates of egg production by copepods *Calanus*, *Pseudocalanus*, *Metridia* and other Copepoda,
6. Assess vertical distribution of temperature, salinity, light, nutrients, chlorophyll and microzooplankton at core process stations,
7. Conduct net tows (Quad Net, MOCNESS, closing Ring net, Tucker) for distribution and abundance of zooplankton at core process stations,
8. Coordinate and communicate with R/V *Wecoma* for study of mesoscale physical features and related chlorophyll/zooplankton gradients (using the measurements listed above).
9. Coordinate and communicate with R/V *Pandalus* and NOAA Ship *Miller Freeman* to study distribution of juvenile salmon prey.

SAMPLING

CHRONOLOGY

Departed Seward 0900 hrs Sunday, 20 July for a spot in Resurrection Bay to test the ship's communications systems. We learned that the ship's INMARSAT system was not working and that the Iridium system was not configured for data transfer. We returned to the dock to drop off the Lead Marine Technician and steamed to GAK 10 with short stops along the way to do CTDs at RB 2.5, GAK 1 and 2. The next morning we commenced a 4-d cycle of process studies, conducting daytime and nighttime sampling and experimental activities (dilution, grazing, and egg production). During our time there we also ventured both offshore (GAK 11 – 13) and inshore (GAK 7 – 9) to characterize copepod and microplankton communities, nutrient and chlorophyll levels, and phytoplankton growth rates/nutrient limitation. On the afternoon of the 23rd we conducted a special study of internal waves and the chlorophyll max at GAK 9 as part of an NSF REU project. In the early morning hours of 24th of July we ended operations to return to Seward for repairs to the INMARSAT antenna. A marine electrician met the ship on the afternoon of the 24th and attempted to fix the system by replacing the antenna controller unit. Unfortunately this was unsuccessful and we departed Seward that evening for operations in Prince William Sound. We arrived at station PWS-2 in the early morning of the 25th and began our cycle of sampling and experimental activities. During our four days there we not only accomplished all base activities, but also had time to examine nutrient conditions in an arm of the fjord significantly affected by freshwater runoff (Port Nellie Juan), probe a "deep" hole in Prince William Sound for overwintering *Neocalanus* using the

MOCNESS and TAPS, and examine fine-structure associated with the subsurface fluorescence maximum. We departed Knight Island Passage in the early morning of the 28th to begin a study of the connection between outflow from Prince William Sound and the Alaska Coastal Current (ACC). For this study we occupied transect stations in 5 locations between Prince William Sound and the Seward Line. The 5 locations were: Seal Is., Hogan Bay, Montague Strait, Prince William Sound Southwest, Cape Fairfield, and the Seward Line. Along each transect three or four exploratory CTDs were done to establish the location of the ACC (or strongest gradient in Prince William Sound) and then the chosen stations was revisited and sampled for chlorophyll, nutrients, microplankton community, and mesozooplankton. A microplankton growth assay experiment was also conducted at each location. This special study was concluded midday on the 29th after which we terminated operations again and returned to Seward for another attempt at fixing the INMARSAT antenna. This attempt was also unsuccessful as the parts sent were either faulty or incomplete. The Seward Marine Facility was able to configure the Iridium phone to access data on a server. During the inport we met with the scientific party from *Miller Freeman* and planned our joint studies.

We returned to the inner shelf (ACC) and began a juvenile salmon ACC front study with scientists aboard *Miller Freeman*. Over the course of 2 days we sampled for prey, hydrographic properties and conducted microplankton growth assays at 3 inshore, 3 midshelf and 2 frontal stations. Stations were aligned on an east-west, onshore offshore gradient. Scientists aboard *Miller Freeman* sampled hydrographic properties and juvenile salmon abundance.

The morning of the 2nd of August was spent setting up experiments in the ACC along the Seward Line. After this we again terminated operations and steamed to Seward for another attempt at fixing the INMARSAT antenna and to seek medical treatment for an injured crew member. This attempt to fix the antenna was successful and we left in the early evening (with a replacement crew member) to rendezvous with *R/V Pandalus* and plan joint operations. The meeting was held in Mary's Cove.

We then resumed our measurements and experiments at the core midshelf stations (GAK4 and 5). During this time we also ventured from that location to map chlorophyll, nutrients, and hydrographic properties at other mid shelf stations (GAK 3 to 6). We met R/V *Pandalus* on 5 August and began surveying the mid and inner shelf together over the next two days. The suite of measurements was similar to those done with *Miller Freeman.* On the third day, 7 August, we both ventured west, off the Seward Line to work in an area where the ACC turned south (away from the coast) and then west. We called this area the "western front" and continued our joint measurements of juvenile salmon and the food webs that support them. R/V *Pandalus* had to break off after only one half day as it had to return to port the next day. We continued sampling in a triangle pattern to resolve currents and hydrographic properties in this area. The area was outside of the fine-scale surveys conducted to date by R/V *Wecoma*.

After completing this study we steamed to Hinchinbrook Entrance on the 8th to repeat our previous ACC transect, but with additional stations to better resolve the contributions of the ACC and Prince William Sound to conditions along the Seward Line. The transect ended in the early morning hours of the 10th along the Seward Line. We then concluded the cruise by repeatedly surveying the mid shelf region to examine the diel periodicity in the fluorescence maximum that was noted during our previous occupation.

Operations were concluded around noon on the 11th and we returned to Seward to offload and prepare the ship for the LTOP cruise.

Acknowledgements

We thank Captain Bill Rook and the crew of R/V *Alpha Helix* for their hard work and helpful attitude during the cruise. We also thank Pam Blusk for filling in at First Mate, and Kevin Marlow and Rawlins _____ for exercising great flexibility when an injured crew member was unable to return to the boat. Dan Mahalak our Marine Technician overhauled the CTD and MOCNESS before the cruise and they ran without any failures.

ACCOMPLISHMENTS AND PRELIMINARY RESULTS:

Microplankton rate processes and water column sampling (Strom, Macri, Fredrickson, Perez, Moore, Swanko):

A major goal of the microplankton effort on this cruise was to contrast conditions in the surface (50% incident irradiance) layer with conditions in the chlorophyll maximum layer. A well-developed chlorophyll maximum layer was observed at all stations except, at times, at stations within the ACC. To this end we conducted 11 sets of paired reduced dilution experiments (22 total, one with near-surface water and one with water from the chlorophyll maximum layer in each case) during the cruise, at both core stations and during the cross-frontal study with NOAA Ship *Miller Freeman*. These experiments yielded rates of phytoplankton growth and microzooplankton grazing, as well as estimates of the degree of phytoplankton nutrient limitation by nitrate, phosphate, and ammonium. These and all other experiments (below) employed chlorophyll size fractionation so that differences in the response of <5 um, 5 to 20 um, and >20 um phytoplankton to experimental treatments could be measured. In addition, four full dilution experiments were conducted to examine microzooplankton grazing functional responses.

A newly developed assay for phytoplankton growth rate and nutrient limitation assessment was employed with great success during this cruise. We were able to conduct 32 growth assay experiments, including at all Seward Line stations, during transects from Prince William Sound to the Seward Line, and during cross-frontal studies with NOAA Ship *Miller Freeman* and R/V *Pandalus*. This allowed us to see how phytoplankton growth and the degree of nutrient limitation varied spatially across mesoscale physical features in the study area.

As a counterpart to studies of phytoplankton nutrient limitation, we conducted photosynthesis-irradiance (P vs. I) experiments to evaluate the extent of light limitation of phytoplankton photosynthesis rates. As for the reduced dilution experiments, P vs. I studies were paired, using water from the chlorophyll maximum layer and from the near-surface layer to contrast the production responses of the two communities. The photosynthesis response of phytoplankton in 2 size fractions (<20 um, >20 um) was determined. A total of 20 P vs. I experiments was conducted. Twice at each of the four core process stations we also measured the relationship between synthesis of new chlorophyll and uptake of 14-C by phytoplankton at both target depths. This will allow determination of a carbon: chlorophyll ratio for comparison of results from dilution experiments and growth assays (phytoplankton response measured in units of chlorophyll) and results from P vs. I experiments (phytoplankton response measured in units of carbon).

Finally, this group had primary responsibility for hydrographic work and water column sampling for core environmental parameters (chlorophyll and microplankton standing stocks, nutrient concentrations [with C. Mordy at PMEL]). With marine technician Dan Mahalak we conducted nearly 300 CTD casts for determination of hydrographic properties and frontal locations. We conducted FlowCAM analysis of samples from the chlorophyll maximum layer during some CTD transects, as well. More focused studies of the position, magnitude, diel cycling patterns, and fluorescence yield of the chlorophyll maximum layer were conducted at Gak 9 and Gak 5 on the Seward Line, and at PWS-2 in Prince William Sound.

Preliminary results:

1. The outer shelf phytoplankton community was not the same as it had been in July of 2001. While still exhibiting low total chlorophyll levels and dominance by <5 um phytoplankton, there was little *Synechococcus* present and both phytoplankton growth and microzooplankton grazing rates were low. Over the GAK 7 to GAK 13 transect, nutrient limitation was evident only at the two outermost stations, and the extent of limitation was slight.

2. Very high rates of phytoplankton growth and microzooplankton grazing were measured in the mid-shelf region (GAK 4 to GAK 5). There was no evidence of nutrient limitation of growth rates in either the chlorophyll maximum layer or in near-surface waters, even though the degree of temperature stratification was large. Relative rates of growth and grazing measured over 3 consecutive days in the GAK 5 chlorophyll maximum layer indicated that the balance between microzooplankton grazing and phytoplankton growth, the latter perhaps dictated by light availability, determined the evolution of phytoplankton biomass levels from one day to the next. We returned to the GAK 5 area at the very end of the cruise to obtain more information on this day-to-day cycling through further experimental work and repeated day vs. night CTD transects of the mid-shelf region.

3. The ACC was the only region to have any substantial fraction of the chlorophyll biomass as large cells (primarily mixed species of chain diatoms). However, the largest gradients in phytoplankton physiology, as indicated by growth assay results, were not across ACC offshore frontal gradients (e.g. at Cape Fairfield, on the Seward Line, or in the Western Front region), but rather along an east-west gradient from east of Montague Strait to the Western Front region. Phytoplankton grew rapidly with little evidence of nutrient limitation in eastern waters. The contribution of large phytoplankton to total chlorophyll increased progressively as we worked to the west. Growth rates decreased progressively from east to west; in the Seward Line region of the ACC growth rates were low to moderate and responded strongly to added macronutrients, while in the Western Front region growth rates were very low and phytoplankton were unresponsive to nutrient enrichments.

4. The Prince William Sound phytoplankton community was dominated by small (<5 um) phytoplankton, both in near-surface and in chlorophyll maximum waters. As observed in July 2001, this appeared to be an intensely regenerative community, showing a growth rate response only to added ammonium.

Mesozooplankton Standing Stock and Rate Processes. (Napp, Harpold and Williams)

Three major activities were conducted: 1) shipboard incubation experiments for copepod egg production, egg viability, and diet; 2) night time assessments of zooplankton standing stock; 3) daytime assessments of salmon prey availability. For the shipboard incubation experiments, females of the target species (*Calanus* spp., *Pseudocalanus* spp. and *Metridia* spp.) were used when available. In addition to the plankton net tows (MOCNESS and Quad net) taken at the central station within each shelf regime, zooplankton samples were collected on two transects along the axis of the ACC and one triangle sampling pattern encompassing the western front of the ACC west of the Seward Line. We also collected bioacoustic profiles of zooplankton abundance and size distribution on almost all of the CTD casts taken for hydrography (N > 280).

Activities/Preliminary Results –

- Egg production and grazing experiments were conducted in all core regions using the available species. *Pseudocalanus* females seemed to be much more abundant that in the summer of 2001 and were used at each and every station. *Calanus* and *Metridia* females were much less abundant and were used whenever possible. Egg production by *Calanus* and *Metridia* seemed low in Prince William Sound and was moderate in the ACC. Higher proportions of *Calanus* and *Metridia* females were actively laying eggs on the shelf than in PWS. We completed over 40 egg production and 11 grazing experiments.
- The abundance of pteropods (*Limacina*) appeared to be too low to estimate grazing rates from gut fluorescence and gut passage time. Only at one mid shelf station were there enough animals to attempt the gut fluorescence measurements.
- Species-specific *Pseudocalanus* egg production experiments were conducted at each location during the transects. Species composition and total egg production will be used to help characterize station and the percent contribution by Prince William Sound water in the ACC transects. Sample analysis will take place on shore.
- Eggs from all three genera hatched in the viability experiments (12 experiments in all). Viability rates will be calculated after the preserved samples are returned to our laboratory.
- Approximately 100 samples were collected to determine the carbon and nitrogen weights of the target species used in the grazing and egg production experiments.
- Three to four nighttime zooplankton collections were taken at each core station using the NEP GOA GLOBEC protocol (MOCNESS 500 µm and Quad Net 150 µm mesh) to determine the concentration and depth distribution of GLOBEC target species. In addition, tows were taken on transects between regions to look at gradients and fronts (on a coarse scale). Approximately 14 pairs of night Quad Net/MOCNESS samples were taken at the core stations. Another 12 pairs were taken as part of the ACC Transects.
- A Tracor Acoustic Profiling System (TAPS) was mounted on the CTD and used during each hydrographic cast. This will provide estimates of the size distribution and numbers of mesozooplankton in each core area as well as the transects and allow us to compare and contrast the mesozooplankton communities with more spatial and temporal resolution than provided by the MOCNESS and Quad Net. The data will be analyzed back on shore.
- The concentration of potential salmon prey was assessed at the core stations (Tucker neuston tows) and at special stations in coordinated work with NOAA Ship *Miller*

Freeman and R/V *Pandalus* (Tucker neuston and MOCNESS surface layer tow). In general, preferred prey items from two of the three past years (larvaceans and pteropods) did not appear to be very abundant. Pteropods were found in high concentrations at only one mid shelf station. Neustonic copepods (*Epilabidocera*) was common, but much less abundant that other copepods in the same collections. At some inshore stations, gelatinous zooplankton (ctenophores) dominated the neuston. Absolute concentrations of potential prey items should be available by late spring of 2004.

Cruise report from LUMCON Research Component (R. Sato and A. Hashinaga)

We conducted vertical tows using a closing ring net above and below the thermocline to determine the abundance and the vertical distribution of appendicularians along the Seward line (GAK 1 - 13) and in Prince William Sound (PWS2). *Oikopleura labradoriensis*, our target appendicularian species, was observed at almost all the stations, but its abundance was very low. A smaller species, *Fritillaria borealis*, however, was very abundant at outer shelf stations. The inshore species, *O. dioica*, was found in PWS and inner shelf stations.

O. labradoriensis was not abundant enough to conduct experiments. Moreover, captured animals were seriously damaged and never rebuilt houses in the incubation bottles. Therefore, we could not conduct experiments with this species. We tried incubation of eggs (or mature individuals) of *F. borealis* to trace their growth at 4 GAK stations. In addition, *O. dioica* were incubated and their clearance rates, house renewal rates and fecal pellet production rates were measured at 6 inner shelf stations.

Mesozooplankton grazing experiments were conducted at stations GAK 1, 5, 10 and in PWS. These experiments measure the grazing rate of the whole mesozooplankton community on phytoplankton (three size fractions). During this cruise, *Neocalanus* spp. were not always present. The intent of these experiments was to compare grazing rates of the non-*Neocalanus* component of the mesozooplankton community under conditions of *Neocalanus* presence (spring cruise) and absence (this cruise).

Individuals of *O. labradoriensis* were sorted from live ring net samples and frozen in liquid nitrogen for later measurement of dry weight, which will be used to estimate their carbon biomass at each station. *Neocalanus* were also collected for determination of dry weight and body lipid content.

Water samples were collected for flow cytometric analysis of picoplankton and DON analysis from 5 - 6 depths at several GAK stations.

We also worked together with Jeff Napp's group in conducting QUAD net, MOCNESS net and Tucker trawl sampling.

Appendices:

Table 1: Event Log HX275

Figure 1: Process Cruise Core Stations

Figure 2: ACC Transect Stations. A) 1st Pass, 28-29 July; B: 2nd Pass, 8 - 10 August

Figure 3: Salinity Front Study Stations. Collaborative sampling with NOAA Ship *Miller Freeman*

Figure 4: Seward Line and ACC Western Front Study Stations: Collaborative sampling with R/V *Pandalus*

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
1	CTD1	1	Res Bay	Res Bay 2.5	20	7	1209	60.0248	-149.3580	293	287	
2	CTD2	2	IS	GAK1	20	7	1457	59.8442	-149.4676	270	264	
3	Closing ring net		IS	GAK1	20	7	1533	59.8435	-149.4668	270	90	Dagg
4	Closing ring net		IS	GAK1	20	7	1554	59.8427	-149.4673	270	40	Dagg
5	CTD3	3	IS	GAK2	20	7	1725	59.6907	-149.3270	227	213	
6	Closing ring net		IS	GAK2	20	7	1738	59.6912	-149.3255	227	18	Dagg
7	Closing ring net		IS	GAK2	20	7	1743	59.6912	-149.3265	227	100	Dagg
8	Live ring net		OS	GAK10	21	7	0708	58.5418	-148.2102	1400	50	Napp
9	Live ring net		OS	GAK10	21	7	0716	58.5417	-148.2135	1400	75	Napp
10	Live ring net		OS	GAK10	21	7	0725	58.5415	-148.2168	1400	30	Dagg
11	Live ring net		OS	GAK10	21	7	0735	58.5413	-148.2192	1400	30	Dagg
12	CTD4	4	OS	GAK10	21	7	0800	58.5422	-148.2119	1400	100	6m fsw de#1
13	CTD5	5	OS	GAK10	21	7	0845	58.5421	-148.2157	1400	50	6m wsw de#1
14	CTD6	6	OS	GAK10	21	7	1000	58.5419	-148.2122	1400	50	18m fsw de#2
15	CTD7	7	OS	GAK10	21	7	1100	58.5424	-148.2135	1400	50	18m fsw de#2
16	CTD8	8	OS	GAK10	21	7	1200	58.5421	-148.2106	1400	1400	
17	Closing ring net		OS	GAK10	21	7	1325	58.5412	-148.2125	1400	10	Dagg
18	Closing ring net		OS	GAK10	21	7	1330	58.5407	-148.2155	1400	100	Dagg
19	Live ring net		OS	GAK10	21	7	1345	58.5400	-148.2177	1400	75	Napp
20	Live ring net		OS	GAK10	21	7	1400	58.5400	-148.2177	1400	75	Napp
21	CTD9	9	OS	GAK13	21	7	1725	58.1005	-147.7890	2099	600	ga#1
22	Closing ring net		OS	GAK13	21	7	1810	58.1065	-147.7912	2099	22	aborted
22	Closing ring net		OS	GAK13	21	7	1815	58.1077	-147.7867	2099	22	Dagg
23	Closing ring net		OS	GAK13	21	7	1820	58.1088	-147.7875	2099	100	Dagg
24	Live ring net		OS	GAK13	21	7	1830	58.1088	-147.7875	2099	30	Dagg
25	CTD10	10	OS	GAK12	21	7	1930	58.2438	-147.9339	2176	600	ga#2
26	Closing ring net		OS	GAK12	21	7	2000	58.2467	-147.9442	2176	20	Dagg
27	Closing ring net		OS	GAK12	21	7	2020	58.2473	-147.9487	2176	100	Dagg
28	CTD11	11	OS	GAK11	21	7	2129	58.3913	-148.0839	1411	600	aborted
28a	Closing ring net		OS	GAK11	21	7	2150	58.3907	-148.0775	1411	20	Dagg
28b	Closing ring net		OS	GAK11	21	7	2154	58.3908	-148.0792	1411	100	Dagg
28c	CTD12	12	OS	GAK11	21	7	2209	58.3913	-148.0839	1411	600	ga#3
29	CTD13	13	OS	GAK10	22	7	0005	58.5428	-148.2131	1400	300	
30	QUAD		OS	GAK10	22	7	0035	58.5437	-148.2188	1400	100	
31	MOCNESS01		OS	GAK10	22	7	0100	58.5381	-148.1755	1400	100	
32	Live ring net		OS	GAK10	22	7	0700	58.5407	-148.2117	1400	100	Napp
33	Live ring net		OS	GAK10	22	7	0715	58.5400	-148.2152	1400	100	Napp
33a	Live ring net		OS	GAK10	22	7	0731	58.5395	-148.2190	1400	50	Dagg
33b	Live ring net		OS	GAK10	22	7	0740	58.5392	-148.2213	1400	50	Dagg
34	CTD14	14	OS	GAK10	22	7	0801	58.5381	-148.1755	1400	30	Lumcon grazing
35	Live ring net		OS	GAK10	22	7	1037	58.5415	-148.2103	1400	100	Napp
36	Live ring net		OS	GAK10	22	7	1045	58.5423	-148.2122	1400	100	Napp
37	CTD15	15	OS	GAK10	22	7	1159	58.5417	-148.2116	1400	600	

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
38	CTD16	16	OS	GAK9	22	7	1340	58.5417	-148.2116	279	274	ga#4
39	Live ring net		OS	GAK9	22	7	1405	58.6792	-148.3407	277	50	Dagg
39a	Live ring net		OS	GAK9	22	7	1438	58.6797	-148.3498	277	50	Dagg
40	Closing ring net		OS	GAK9	22	7	1443	58.6792	-148.3493	277	20	Dagg
41	Closing ring net		OS	GAK9	22	7	1447	58.6790	-148.3487	277	100	Dagg
42	CTD17	17	MS	GAK8	22	7	1557	58.5417	-148.2116	289	284	ga#5
43	Closing ring net		MS	GAK8	22	7	1622	58.7915	-148.4930	289	24	Dagg
44	Closing ring net		MS	GAK8	22	7	1625	58.7915	-148.4935	289	100	Dagg
45	Live ring net		MS	GAK8	22	7	1641	58.7912	-148.4962	289	100	Dagg
46	Live ring net		MS	GAK8	22	7	1656	58.7912	-148.4997	289	100	Dagg
47	Live ring net		MS	GAK8	22	7	1708	58.7915	-148.5032	289	100	Dagg
48	CTD18	18	MS	GAK7	22	7	1830	58.9737	-148.6302	241	235	ga#6
49	Live ring net		MS	GAK7	22	7	1850	58.9755	-148.6305	241	100	Napp
50	Live ring net		MS	GAK7	22	7	1902	58.9768	-148.6320	241	30	failed
51	Live ring net		MS	GAK7	22	7	1907	58.9768	-148.6320	241	30	Dagg
52	Closing ring net		MS	GAK7	22	7	1915	58.9788	-148.6330	241	11	Dagg
53	Closing ring net		MS	GAK7	22	7	1920	58.9800	-148.6333	241	100	Dagg
54	CTD19	19	OS	GAK10	23	7	0003	58.9737	-148.6302	1458	300	
55	QUAD		OS	GAK10	23	7	0035	58.5442	-148.2018	1458	100	
56	MOCNESS02		OS	GAK10	23	7	0102	58.5447	-148.1992	1458	100	
57	Live ring net		OS	GAK10	23	7	0702	58.5423	-148.2135	1458	100	Napp
58	Live ring net		OS	GAK10	23	7	0715	58.5427	-148.2157	1458	100	Napp
59	Live ring net		OS	GAK10	23	7	0727	58.5433	-148.2185	1458	30	Dagg
60	Live ring net		OS	GAK10	23	7	0731	58.5435	-148.2197	1458	30	Dagg
61	CTD20	20	OS	GAK10	23	7	0801	58.5412	-148.2121	1458	80	9m fsw de#3
62	CTD21	21	OS	GAK10	23	7	0856	58.5423	-148.2106	1458	50	9m wsw de#3
63	CTD22	22	OS	GAK10	23	7	1003	58.5433	-148.2101	1458	50	21m fsw de#4
64	CTD23	23	OS	GAK10	23	7	1100	58.5414	-148.2106	1458	50	21m wsw de#4
65	CTD24	24	OS	GAK10	23	7	1201	58.5412	-148.2095	1458	600	
66	CTD25	25	OS	GAK9	23	7	1423	58.6793	-148.3457	279	80	CTD yo-yo 1
67	CTD26	26	OS	GAK9	23	7	1433	58.6795	-148.3442	279	60	CTD yo-yo 2
68	CTD27	27	OS	GAK9	23	7	1438	58.6798	-148.3407	279	60	CTD yo-yo 3
69	CTD28	28	OS	GAK9	23	7	1445	58.6801	-148.3387	279	60	CTD yo-yo 4
70	CTD29	29	OS	GAK9	23	7	1450	58.6803	-148.3362	279	60	CTD yo-yo 5
71	CTD30	30	OS	GAK9	23	7	1455	58.6806	-148.3306	279	60	CTD yo-yo 6
72	CTD31	31	OS	GAK9	23	7	1501	58.6806	-148.3306	279	60	CTD yo-yo 7
73	CTD32	32	OS	GAK9	23	7	1507	58.6807	-148.3275	279	60	CTD yo-yo 8
74	CTD33	33	OS	GAK9	23	7	1513	58.6807	-148.3248	279	60	CTD yo-yo 9
75	CTD34	34	OS	GAK9	23	7	1517	58.6808	-148.3221	279	60	CTD yo-yo 10
76	CTD35	35	OS	GAK9	23	7	1523	58.6809	-148.3201	279	60	CTD yo-yo 11
77	Live ring net		OS	GAK9	23	7	1541	58.6802	-148.3640	280	30	Dagg
78	CTD36	36	OS	GAK9	23	7	1628	58.6789	-148.3482	280	60	CTD hourly series
79	CTD37	37	OS	GAK9	23	7	1729	58.6788	-148.3498	280	60	CTD hourly series
80	CTD38	38	OS	GAK9	23	7	1835	58.6786	-148.3468	280	60	CTD hourly series

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
81	CTD39	39	OS	GAK9	23	7	1932	58.6795	-148.3495	280	60	CTD hourly series
82	CTD40	40	OS	GAK9	23	7	2030	58.6802	-148.3517	280	60	CTD hourly series
83	CTD41	41	OS	GAK9	23	7	2131	58.6817	-148.3507	280	60	CTD hourly series
84	CTD42	42	OS	GAK9	23	7	2230	58.6795	-148.3495	280	60	final hourly
85	CTD43	43	OS	GAK10	24	7	0004	58.5438	-148.2105	1486	300	
86	QUAD		OS	GAK10	24	7	0031	58.6342	-148.2592	1486	100	
87	MOCNESS03		OS	GAK10	24	7	0058	58.6342	-148.2592	1486	100	
	0730 7/24 BREAK OFF OPERATIONS TO GO TO SEWARD FOR REPAIR OF THE INMAR								0.0000			
	BEGIN STEAM TO PWS				24	7	1830		0.0000			
88	Live ring net		PWS	PWS2	25	7	0659	60.5348	-147.8043	740	30	Dagg
89	Live ring net		PWS	PWS2	25	7	0703	60.5347	-147.8052	740	50	Napp
90	Live ring net		PWS	PWS2	25	7	0712	60.5350	-147.8077	740	100	Napp
91	CTD44	44	PWS	PWS2	25	7	0801	60.5373	-147.8022	740	80	5m fsw de#5
92	CTD45	45	PWS	PWS2	25	7	0900	60.5361	-147.8027	740	50	5m wsw de#5
93	CTD46	46	PWS	PWS2	25	7	0958	60.5355	-147.8029	740	50	21m fsw de#6
94	CTD47	47	PWS	PWS2	25	7	1058	60.5357	-147.8033	740	50	21m wsw de#6
95	CTD48	48	PWS	PWS2	25	7	1158	60.5358	-147.8031	740	600	
96	Tucker		PWS	PWS2	25	7	1255	60.5353	-147.8217	738	1	
97	Tucker		PWS	PWS2	25	7	1312	60.5347	-147.8058	748	1	
98	Tucker		PWS	PWS2	25	7	1329	60.5347	-147.7907	730	1	
99	Live ring net		PWS	PWS2	25	7	1349	60.5337	-147.8005	735	50	Dagg
100	Live ring net		PWS	PWS2	25	7	1356	60.5335	-147.8027	735	50	Dagg
101	Live ring net		PWS	PWS2	25	7	1404	60.5335	-147.8053	735	100	Napp
102	CTD49	49	PWS	PNJ1	25	7	1443	60.5659	-147.8917	317	50	Port Nellie Juan nutrient transect
103	CTD50	50	PWS	PNJ2	25	7	1604	60.5649	-148.2270	620	50	Port Nellie Juan nutrient transect
104	CTD51	51	PWS	PNJ3	25	7	1621	60.5459	-148.2581	530	50	Port Nellie Juan nutrient transect
105	CTD52	52	PWS	PNJ4	25	7	1715	60.5523	-148.4714	466	50	Port Nellie Juan nutrient transect
106	CTD53	53	PWS	PNJ5	25	7	1731	60.3251	-148.3030	464	50	Port Nellie Juan nutrient transect
107	CTD54	54	PWS	PNJ6	25	7	1746	60.5324	-148.5327	463	50	Port Nellie Juan nutrient transect
108	CTD55	55	PWS	PNJ7	25	7	1901	60.5007	-148.6120	427	50	Port Nellie Juan nutrient transect
109	Live ring net		PWS	PWS2	25	7	2331	60.5340	-147.8045	745	100	Napp
110	CTD56	56	PWS	PWS2	26	7	0000	60.5370	-147.8036	738	300	
111	QUAD		PWS	PWS2	26	7	0021	60.5351	-147.8053	735	100	
112	MOCNESS04		PWS	PWS2	26	7	0043	60.5383	-147.7993	735	110	Fail.
113	MOCNESS05		PWS	PWS2	26	7	0212	60.5342	-147.8032	735	110	Repeat of moc4.
114	Live ring net		PWS	PWS3	26	7	0659	60.6543	-147.6760	745	50	Dagg
115	Live ring net		PWS	PWS3	26	7	0705	60.6545	-147.6780	745	50	Dagg
116	MOCNESS06		PWS	PWS3	26	7	0734	60.6480	-147.7210	757	650	Deep MOCNESS
117	CTD57	57	PWS	PWS3	26	7	0901	60.6560	-147.6786	745	20	for bottle soaking
118	CTD58	58	PWS	PWS3	26	7	0935	60.6560	-147.6762	745	668	Deep CTD/TAPS
119	MOCNESS07		PWS	PWS2	26	7	1117	60.5318	-147.8557	600	738	Deep MOCNESS
120	CTD59	59	PWS	PWS2	26	7	1249	60.5356	-147.8026	740	650	Deep CTD/TAPS
121	Live ring net		PWS	PWS2	26	7	1337	60.5342	-147.8007	740	100	Napp
122	Live ring net		PWS	PWS2	26	7	1350	60.5333	-147.8023	738	100	Napp

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123	Live ring net		PWS	PWS2	26	7	1405	60.5328	-147.8030	735	50	Dagg
124	Live ring net		PWS	PWS2	26	7	1414	60.5325	-147.8035	735	50	Dagg: failed
125	Live ring net		PWS	PWS2	26	7	1421	60.5323	-147.8040	742	50	Dagg: failed
126	Live ring net		PWS	PWS2	26	7	1428	60.5320	-147.8045	742	50	Dagg
127	Closing ring net		PWS	PWS2	26	7	1440	60.5317	-147.8052	733	10	Dagg
128	Closing ring net		PWS	PWS2	26	7	1444	60.5315	-147.8053	733	100	Dagg
129	CTD60	60	PWS	PWS2	26	7	1502	60.5354	-147.8026	750	50	5m fsw de#7
130	CTD61	61	PWS	PWS2	26	7	1613	60.5348	-147.8045	742	50	5m wsw de#7 10L CTD
131	Live ring net		PWS	PWS2	26	7	2203	60.5335	-147.8028	735	100	Napp: Metridia EP
132	Live ring net		PWS	PWS2	26	7	2220	60.5328	-147.8032	738	100	Napp: Metridia EP
133	Live ring net		PWS	PWS2	26	7	2316	60.5347	-147.8018	735	100	Napp: Metridia EP
134	CTD62	62	PWS	PWS2	27	7	0005	60.5349	-147.8053	735	300	
135	QUAD		PWS	PWS2	27	7	0030	60.5326	-147.8071	735	100	
136	MOCNESS08		PWS	PWS2	27	7	0058	60.5316	-147.8043	735	110	
137	Live ring net		PWS	PWS2	27	7	0702	60.5345	-147.8043	740	100	Dagg
138	Live ring net		PWS	PWS2	27	7	0714	60.5345	-147.8027	735	100	Napp
139	Live ring net		PWS	PWS2	27	7	0726	60.5342	-147.8013	730	100	Napp
140	Live ring net		PWS	PWS2	27	7	0738	60.5338	-147.7993	730	50	Napp
141	Live ring net		PWS	PWS2	27	7	0744	60.5335	-147.7983	730	50	Dagg
142	CTD63	63	PWS	PWS2	27	7	0759	60.5346	-147.8041	740	50	5m fsw de#8
143	CTD64	64	PWS	PWS2	27	7	0847	60.5349	-147.8035	735	50	5m wsw de#8
144	CTD65	65	PWS	PWS2	27	7	1000	60.5345	-147.8044	735	50	21m fsw de#9
145	CTD66	66	PWS	PWS2	27	7	1100	60.5344	-147.8037	740	50	23m wsw de#9 10L CTD
146	CTD67	67	PWS	PWS2	27	7	1159	60.5352	-147.8026	735	600	
147	Live ring net		PWS	PWS2	27	7	1250	60.5340	-147.8028	735	50	Dagg
148	Live ring net		PWS	PWS2	27	7	1255	60.5332	-147.8040	735	50	Dagg
149	Tucker		PWS	PWS2	27	7	1401	60.5320	-147.8080	735	1	
150	Tucker		PWS	PWS2	27	7	1422	60.5367	-147.7918	730	1	
151	Tucker		PWS	PWS2	27	7	1448	60.5237	-147.8022	592	1	
152	Tucker		PWS	PWS2	27	7	1511	60.5123	-147.8097	473	1	
153	CTD68	68	PWS	PWS2	27	7	1535	60.5369	-147.8001	735	40	slow 15-40m: Fine Structure
154	CTD69	69	PWS	PWS2	27	7	1545	60.5378	-147.7993	735	40	slow 3-40m
155	CTD70	70	PWS	PWS2	27	7	1555	60.5394	-147.7980	735	40	slow 3-40m
156	Live ring net		PWS	PWS2	27	7	2320	60.5330	-147.8033	742	100	Napp
157	CTD71	71	PWS	PWS2	28	7	0000	60.5392	-147.8034	747	300	
158	QUAD		PWS	PWS2	28	7	0022	60.5377	-147.8069	747	100	
159	MOCNESS09		PWS	PWS2	28	7	0036	60.5359	-147.7989	735	105	
160	CTD72	72	PWS	SI1	28	7	0602	60.4173	-147.4845	144	136	Begin ACC Transect
161	QUAD		PWS	SI1	28	7	0624	60.4163	-147.4860	137	235	
162	MOCNESS10		PWS	SI1	28	7	0643	60.4198	-147.5134	173	166	
163	CTD73	73	PWS	HB1	28	7	0902	60.1924	-147.7007	245	236	
164	CTD74	74	PWS	HB2	28	7	0934	60.1806	-147.6420	172	183	
165	CTD75	75	PWS	HB3	28	7	1008	60.1653	-147.5764	85	83.19	
166	CTD76	76	PWS	HB1	28	7	1040	60.1945	-147.7011	245	200	

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167	QUAD		PWS	HB1	28	7	1104	60.1925	-147.6997	246	95	
168	MOCNESS11		PWS	HB1	28	7	1116	60.1949	-147.6983	246	246	
169	CTD77	77	PWS	MS1	28	7	1407	59.9541	-147.9270	168	164	
170	CTD78	78	PWS	MS2	28	7	1430	59.9429	-147.8914	197	192	
171	CTD79	79	PWS	MS3	28	7	1453	59.9311	-147.8541	162	151	
172	CTD80	80	PWS	MS1	28	7	1527	59.9544	-147.9276	166	165	
173	QUAD		PWS	MS1	28	7	1542	59.9553	-147.9292	166	155	
174	MOCNESS12		PWS	MS1	28	7	1607	59.9536	-147.9265	172	189	
175	CTD81	81	IS	PWSW1	28	7	1828	59.9255	-148.3352	108	120	
176	CTD82	82	IS	PWSW2	28	7	1902	59.8658	-148.3325	69	70	
177	CTD83	83	IS	PWSW3	28	7	1932	59.8256	-148.3384	122	125	
178	CTD84	84	IS	PWSW3	28	7	1958	59.8255	-148.3378	119	113	
179	QUAD		IS	PWSW3	28	7	2021	59.8246	-148.3356	120	115	
180	MOCNESS13		IS	PWSW3	28	7	2035	59.8241	-148.3361	119	121	
181	CTD85	85	IS	CF1	28	7	2254	59.9096	-148.8678	82	78	
182	CTD86	86	IS	CF2	28	7	2315	59.8848	-148.8713	111	107	
183	CTD87	87	IS	CF3	28	7	2343	59.8513	-148.8707	155	148	
184	CTD88	88	IS	CF2	29	7	0023	59.8839	-148.8692	112	107	
185	QUAD		IS	CF2	29	7	0042	59.8827	-148.8668	114	110	
186	MOCNESS14		IS	CF2	29	7	0107	59.8824	-148.8716	107	111	
187	CTD89	89	IS	ACC0	29	7	0321	59.8075	-149.4332	278	275	
188	CTD90	90	IS	GAK1i	29	7	0400	59.7662	-149.3991	260	257	
189	CTD91	91	IS	ACC1	29	7	0433	59.7277	-149.3647	243	241	
190	CTD92	92	IS	GAK2	29	7	0505	59.6904	-149.3293	228	223	
191	QUAD		IS	ACC1	29	7	0545	58.7285	-149.3660	240	230	
192	MOCNESS15		IS	ACC1	29	7	0604	59.7262	-149.3613	240	240	
193	Live ring net		IS	ACC1	29	7	0701	59.0772	-149.3618	240	50	Dagg
194	Live ring net		IS	ACC1	29	7	0707	59.7257	-149.3618	240	50	Dagg
195	Live ring net		IS	ACC1	29	7	0714	59.7240	-149.3615	239	100	Napp
196	Live ring net		IS	ACC1	29	7	0725	59.7213	-149.3605	232	100	Napp
197	CTD93	93	IS	ACC1	29	7	0758	59.7279	-149.3619	240	100	4m fsw de#10
198	CTD94	94	IS	ACC1	29	7	0859	59.7285	-149.3631	240	50	4m wsw de#10
199	CTD95	95	IS	ACC1	29	7	1001	59.7290	-149.3640	240	40	19m fsw de#11
200	CTD96	96	IS	ACC1	29	7	1103	59.7287	-149.3645	240	40	19m wsw de#11
201	CTD97	97	IS	ACC1	29	7	1130	59.7286	-149.3641	242	230	
	SEWARD FOR REPAIRS. DEPART FOR 1200. DEPART FROM 2025.								0.0000			
202	CTD98	98	IS	GAK3i	30	7	0303	59.4816	-149.1150	205	200	Start transect to difine ACC.
203	CTD99	99	IS	GAK3	30	7	0354	59.5533	-149.1841	214	213	Transect to define ACC
204	CTD100	100	IS	GAK2i	30	7	0445	59.6260	-149.2538	212	210	Transect to define ACC
205	CTD101	101	IS	ACC2	30	7	0520	59.6572	-149.2892	219	216	Transect to define ACC
206	CTD102	102	IS	GAK2	30	7	0553	59.6903	-149.3272	225	217	Transect to define ACC
207	CTD103	103	IS	ACC1	30	7	0637	59.7237	-149.3631	242	230	Transect to define ACC
208	CTD104	104	IS	GAK1i	30	7	0717	59.7671	-149.3974	259	251	End Transect to define ACC
209	CTD105	105	IS	GAK1iA	30	7	0832	59.7718	-149.4052	262	100	Start work with Miller Freeman

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210	Tucker		IS	GAK1iA	30	7	0853	59.8052	-149.4053	262	1	
211	CTD106	106	IS	GAK1iB	30	7	0915	59.7509	-149.3902	252	243	
212	Tucker		IS	GAK1iB	30	7	0937	59.7467	-149.3865	252	1	
213	MOCNESS16		IS	GAK1iB	30	7	0952	59.7509	-149.3902	255	20	
214	Live ring net		IS	GAK1iB	30	7	1013	59.7528	-149.3893	254	100	Dagg
215	Live ring net		IS	GAK1iB	30	7	1024	59.7502	-149.3915	255	100	Dagg
216	Live ring net		IS	GAK1iB	30	7	1037	59.7472	-149.4250	255	50	Napp
217	CTD107	107	IS	GAK1iC	30	7	1157	59.7311	-149.3758	245	100	
218	Tucker		IS	GAK1iC	30	7	1113	59.7272	-149.3745	247	1	
219	CTD108	108	MS	GAK3A	30	7	1253	59.5036	-149.1459	208	100	
220	Tucker		MS	GAK3A	30	7	1307	59.5042	-149.1472	207	1	
221	CTD109	109	MS	GAK3B	30	7	1324	59.4884	-149.1300	205	203	
222	Tucker		MS	GAK3B	30	7	1346	59.4903	-149.1318	206	1	
223	MOCNESS17		MS	GAK3B	30	7	1402	59.4866	-149.1269	205	20	
224	Live ring net		MS	GAK3B	30	7	1425	59.4883	-149.1640	206	50	Napp
225	Live ring net		MS	GAK3B	30	7	1434	59.4897	-149.1293	206	100	Dagg
226	Live ring net		MS	GAK3B	30	7	1445	59.4907	-149.1297	205	50	Dagg
227	CTD110	110	MS	GAK3C	30	7	1502	59.4734	-149.1126	204	100	
228	Tucker		MS	GAK3C	30	7	1514	59.4768	-149.1135	204	1	
229	CTD111	111	MS	BS3A	30	7	1601	59.5704	-149.0000	180	100	
230	Tucker		MS	BS3A	30	7	1613	59.5725	-148.9990	180	1	
231	CTD112	112	MS	BS3B	30	7	1633	59.5533	-148.9973	181	175	
232	Tucker		MS	BS3B	30	7	1654	59.5580	-148.9933	181	1	
233	MOCNESS18		MS	BS3B	30	7	1711	59.5609	-148.9936	180	20	
234	Live ring net		MS	BS3B	30	7	1727	59.5555	-148.9928	180	100	Napp
235	Live ring net		MS	BS3B	30	7	1741	59.5573	-148.9868	179	100	Dagg
236	Live ring net		MS	BS3B	30	7	1747	59.5577	-148.9837	180	50	Dagg
237	CTD113	113	MS	BS3C	30	7	1807	59.5371	-148.9926	186	100	
238	Tucker		MS	BS3C	30	7	1820	59.5342	-148.9887	182	1	
239	CTD114	114	IS	BS1A	30	7	2048	59.8642	-149.2086	133	200	BS1 = Miller Freeman station BS2
240	Tucker		IS	BS1A	30	7	2058	59.8655	-149.2110	129	1	BS1 = Miller Freeman station BS2
241	CTD115	115	IS	BS1B	30	7	2120	59.8755	-149.1755	211	200	BS1 = Miller Freeman station BS2
242	Tucker		IS	BS1B	30	7	2141	59.8765	-149.1813	209	1	BS1 = Miller Freeman station BS2
243	MOCNESS19		IS	BS1B	30	7	2157	59.8830	-149.1852	207	20	BS1 = Miller Freeman station BS2
244	Live ring net		IS	BS1B	30	7	2214	59.8757	-149.1710	212	100	Dagg: BS1 = Miller Freeman station BS2
245	Live ring net		IS	BS1B	30	7	2229	59.8747	-149.1755	212	50	Dagg: BS1 = Miller Freeman station BS2
246	Live ring net		IS	BS1B	30	7	2237	59.8738	-149.1780	211	50	Napp: BS1 = Miller Freeman station BS2
247	CTD116		IS	BS1C	30	7	2257	59.8829	-149.1478	212	200	BS1 = Miller Freeman station BS2
248	Tucker		IS	BS1C	30	7	2315	59.8833	-149.1517	212	1	BS1 = Miller Freeman station BS2
249	QUAD		IS	BS1C	31	7	0017	59.8700	-149.1948	183	100	2 tows labeled 249:1failed, 1 good. BS1=Miller Freeman sta BS2
250	MOCNESS20		IS	BS1C	31	7	0030	59.8694	-149.1943	193	105	BS1 = Miller Freeman station BS2
251	CTD117	117	IS	CF8	31	7	0302	59.6849	-148.8688	180	174	Start Cape Fairfield Transect to define ACC.
252	CTD118	118	IS	CF7	31	7	0331	59.7171	-148.8670	184	177	Cape Fairfield Transect to define ACC.
253	CTD119	119	IS	CF6	31	7	0358	59.7504	-148.8672	191	186	Cape Fairfield Transect to define ACC.

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
254	CTD120	120	IS	CF5	31	7	0423	59.7838	-148.8660	195	186	Cape Fairfield Transect to define ACC.
255	CTD121	121	IS	CF4	31	7	0451	59.8171	-148.8643	183	181	Cape Fairfield Transect to define ACC.
256	CTD122	122	IS	CF3	31	7	0520	59.8490	-148.8637	165	161	Cape Fairfield Transect to define ACC.
257	CTD123	123	IS	CF2	31	7	0546	59.8835	-148.8672	112	111	Cape Fairfield Transect to define ACC.
258	CTD124	124	IS	CF1	31	7	0605	59.9085	-148.8664	85	82	End Cape Fairfield Transect to define ACC.
259	CTD125	125	IS	CF2A	31	7	0807	59.8826	-148.8811	100	100	recorded as CF2 on CTD record
260	Tucker		IS	CF2A	31	7	0820	59.8827	-148.8795	107	1	
261	CTD126	126	IS	CF2B	31	7	0837	59.8833	-148.8458	120	117	VP and 4m fsw de#12
262	Tucker		IS	CF2B	31	7	0853	59.8830	-148.8397	122	1	
263	MOCNESS21		IS	CF2B	31	7	0915	59.8815	-148.8547	120	20	
264	CTD127	127	IS	CF2B	31	7	0949	59.8836	-148.8488	121	50	4m wsw de#12
265	Live ring net		IS	CF2B	31	7	0959	59.8843	-148.8518		50	Dagg
266	Live ring net		IS	CF2B	31	7	1006	59.8855	-148.8563	113	50	Dagg
267	Live ring net		IS	CF2B	31	7	1012	59.8865	-148.8570	102	50	Napp
268	CTD128	128	IS	CF2C	31	7	1030	59.8853	-148.8148	134	100	
269	Tucker		IS	CF2C	31	7	1042	59.8853	-148.8210	122	1	
270	CTD129	129	MS	CF12A	31	7	1254	59.5563	-148.8249	136	100	
271	Tucker		MS	CF12A	31	7	1305	59.5563	-148.8273	138	1	
272	CTD130	130	MS	CF12B	31	7	1328	59.5642	-148.7984	105	104	VP and 5m fsw de#13
273	Tucker		MS	CF12B	31	7	1342	59.5643	-148.8002	106	1	
274	MOCNESS22		MS	CF12B	31	7	1401	59.5632	-148.8019	111	20	
275	CTD131	131	MS	CF12B	31	7	1423	59.5633	-148.7987	107	50	5m wsw de#13 recorded as CF2B on CTD file
276	Live ring net		MS	CF12B	31	7	1432	59.5648	-148.7995	107	50	Dagg
277	Live ring net		MS	CF12B	31	7	1438	59.5658	-148.8003	108	50	Dagg
278	Live ring net		MS	CF12B	31	7	1444	59.5663	-148.8007	109	50	Napp
279	CTD132	132	MS	CF12C	31	7	1501	59.5712	-148.7692	98	97	
280	Tucker		MS	CF12C	31	7	1511	59.5725	-148.7757	102	1	
281	CTD133	133	Front	CF8A	31	7	1602	59.6594	-148.9128	177	100	
282	Tucker		Front	CF8A	31	7	1615	59.6597	-148.9170	177	1	
283	CTD134	134	Front	CF8B	31	7	1634	59.6493	-148.9546	177	168	
284	Tucker		Front	CF8B	31	7	1654	59.6493	-148.9570	177	1	
285	MOCNESS23		Front	CF8B	31	7	1711	59.6520	-148.9586	177	20	
286	Live ring net		Front	CF8B	31	7	1739	59.6493	-148.9507	177	100	Dagg
287	Live ring net		Front	CF8B	31	7	1752	59.6492	-148.9517	176	50	Napp
288	CTD135	135	Front	CF8C	31	7	1808	59.6411	-148.9837	176	100	
289	Tucker		Front	CF8C	31	7	1821	59.6395	-148.9840	175	1	
290	CTD136	136	Front	GAK2A	31	7	1954	59.6979	-149.3935	189	96	GAK 2 = Miller Freeman Station AC1
291	Tucker		Front	GAK2A	31	7	2004	59.6940	-149.3907	194	1	GAK 2 = Miller Freeman Station AC1
292	CTD137	137	Front	GAK2B	31	7	2214	59.6753	-149.3890	207	198	GAK 2 = Miller Freeman Station AC1
293	Tucker		Front	GAK2B	31	7	2240	59.6687	-149.3898	226	1	GAK 2 = Miller Freeman Station AC1
294	MOCNESS24		Front	GAK2B	31	7	2255	59.6715	-149.3889	223	20	GAK 2 = Miller Freeman Station AC1
295	Live ring net		Front	GAK2B	31	7	2313	59.6788	-149.3840	203	100	Dagg: GAK 2 = Miller Freeman Station AC1
296	Live ring net		Front	GAK2B	31	7	2326	59.6742	-149.3873	209	50	Napp: GAK2 = Miller Freeman Station AC1
297	CTD138	138	Front	GAK2C	31	7	2343	59.6576	-149.3887	227	97	GAK 2 = Miller Freeman Station AC1

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298	Tucker		Front	GAK2C	31	7	2355	59.6558	-149.3935	224	1	GAK 2 = Miller Freeman Station AC1
299	QUAD		Front	GAK2B	1	8	0015	59.6755	-149.3894	210	100	GAK 2 = Miller Freeman Station AC1
300	MOCNESS25		Front	GAK2B	1	8	0036	59.6708	-149.3959	220	100	GAK 2 = Miller Freeman Station AC1
301	Live ring net		IS	GAK1i	1	8	0754	59.7672	-149.3960	259	50	Napp
302	Live ring net		IS	GAK1i	1	8	0802	59.7653	-149.3965	259	50	Napp
303	Live ring net		IS	GAK1i	1	8	0809	59.7632	-149.3967	257	50	Dagg
304	Live ring net		IS	GAK1i	1	8	0919	59.7602	-149.3970	257	50	Dagg
305	CTD139	139	IS	ACC1	1	8	0857	59.7281	-149.3633	240	100	
306	CTD140	140	IS	GAK1i	1	8	0932	59.7647	-149.3994	257	100	5m fsw de#14
307	CTD141	141	IS	GAK1i	1	8	1049	59.7654	-149.3990	257	50	5m wsw de#14 10L CTD
308	CTD142	142	IS	GAK1i	1	8	1203	59.7651	-149.4017	259	256	
309	Live ring net		IS	GAK1i	1	8	1302	59.7673	-149.3965	259	50	Napp
310	Live ring net		IS	GAK1i	1	8	1309	59.7660	-149.3983	259	50	Dagg
310a	Live ring net		IS	GAK1i	1	8	1316	59.7645	-149.4005	259	50	Dagg
311	Tucker		IS	GAK1i	1	8	1345	59.7635	-149.4003	260	1	
312	Tucker		IS	GAK1i	1	8	1358	59.7740	-149.4065	265	1	
313	Tucker		IS	GAK1i	1	8	1412	59.7812	-149.4120	270	1	
314	Live ring net		IS	GAK1i	1	8	2300	59.7673	-149.3958	258	50	Napp
315	CTD143	143	IS	GAK1i	2	8	0002	59.7668	-149.3978	260	250	File overwritten Blank
316	QUAD		IS	GAK1i	2	8	0028	59.7619	-149.4067	260	100	
317	QUAD		IS	GAK1i	2	8	0100	59.7640	-149.3990	260	100	Fail
318	MOCNESS26		IS	GAK1i	2	8	0117	59.7631	-149.4004	262	105	
319	CTD144	144	MS	GAK3i	2	8	0353	59.4819	-149.1239	208	201	
320	CTD145	145	MS	GAK3i	2	8	0436	59.5530	-149.1897	214	210	
321	CTD146	146	IS	GAK2i	2	8	0517	59.6264	-149.2607	214	209	
322	CTD147	147	IS	ACC2	2	8	0543	59.6589	-149.2933	220	214	
323	CTD148	148	IS	GAK2	2	8	0610	59.6913	-149.3280	227	224	
324	CTD149	149	IS	ACC1	2	8	0639	59.7290	-149.3632	242	239	
325	Live ring net		IS	ACC1	2	8	0658	59.7283	-149.3625	242	50	Dagg
326	Live ring net		IS	ACC1	2	8	0705	59.7292	-149.3610	241	50	Dagg
327	Live ring net		IS	ACC1	2	8	0712	59.7288	-149.3587	240	50	Napp
328	Live ring net		IS	ACC1	2	8	0719	59.7282	-149.3568	240	50	Napp
329	CTD150	150	IS	ACC1	2	8	0758	59.7278	-149.3604	240	80	18m fsw de#15
330	CTD151	151	IS	ACC1	2	8	0856	59.7283	-149.3622	240	50	16m wsw de#15
331	CTD152	152	IS	ACC1	2	8	1000	59.7300	-149.3634	240	50	4m fsw de#16
332	CTD153	153	IS	ACC1	2	8	1058	59.7297	-149.3650	240	50	4m wsw de#16
333	Live ring net		IS	ACC1	2	8	1259	59.7288	-149.3607	240	50	Dagg
334	Live ring net		IS	ACC1	2	8	1306	59.7288	-149.3607	240	50	Dagg
335	Live ring net		IS	ACC1	2	8	1311	59.7267	-149.3655	240	100	Napp
336	CTD154	154	IS	ACC1	2	8	1336	59.7273	-149.3662	242	240	
	Return to Seward for repairs. 1400 Break off operations to go to Seward for parts.								0.0000			
	1930 underway for rendezvous with Heldarson.								0.0000			
337	Live ring net		MS	GAK4	3	8	0800	59.4082	-149.0492	200	50	Dagg
338	Live ring net		MS	GAK4	3	8	0808	59.4088	-149.0453	200	50	Dagg

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Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
339	Live ring net		MS	GAK4	3	8	0816	59.4095	-149.0920	200	50	Napp
340	Live ring net		MS	GAK4	3	8	0823	59.4098	-149.0393	200	50	Napp
341	CTD155	155	MS	GAK4	3	8	1200	59.4077	-149.0489	200	194	
342	CTD156	156	MS	GAK4	3	8	1302	59.4077	-149.0489	200	50	20m fsw de#17
343	Live ring net		MS	GAK4	3	8	1310	59.4073	-149.0512	200	100	Dagg
344	Live ring net		MS	GAK4	3	8	1324	59.4060	-149.0533	200	100	Napp
345	Live ring net		MS	GAK4	3	8	1336	59.4048	-149.0557	200	75	Napp
346	Closing ring net		MS	GAK4	3	8	1346	59.4043	-149.0572	200	20	Dagg
346a	Closing ring net		MS	GAK4	3	8	1351	59.4040	-149.0582	200	100	Dagg
347	Closing ring net		MS	GAK4	3	8	1400	59.4032	-149.0610	200	100	Dagg
348	CTD157	157	MS	GAK4	3	8	1415	59.4087	-149.0489	200	50	20m wsw de#17
349	Tucker		MS	GAK4	3	8	1521	59.4085	-149.0690	202	1	
350	Tucker		MS	GAK4	3	8	1539	59.4098	-149.0542	202	1	
351	Tucker		MS	GAK4	3	8	1600	59.4127	-149.0362	198	1	
352	CTD158	158	MS	GAK6	3	8	1818	59.1169	-148.7733	150	145	
353	CTD159	159	MS	GAK5i	3	8	1903	59.1908	-148.8382	165	166	
354	CTD160	160	MS	GAK5	3	8	1945	59.2620	-148.9061	167	160	
355	CTD161	161	MS	GAK4i	3	8	2035	59.3350	-148.9745	195	190	
356	CTD162	162	MS	GAK3i	3	8	2155	59.4815	-149.1202	204	193	
357	CTD163	163	MS	GAK4	3	8	2241	59.4068	-149.0500	204	194	
358	Live ring net		MS	GAK4	3	8	2336	59.4068	-149.0475	199	50	Napp
359	CTD164	164	MS	GAK4	3	8	2356	59.4082	-149.0495	199	190	
360	QUAD		MS	GAK4	4	8	0008	59.4069	-149.0506	200	75	
361	MOCNESS27		MS	GAK4	4	8	0021	59.4040	-149.0576	200	175	
362	Live ring net		MS	GAK5	4	8	0701	59.2615	-148.9065	168	50	Dagg
363	Live ring net		MS	GAK5	4	8	0707	59.2615	-148.9063	168	50	Napp
364	Live ring net		MS	GAK5	4	8	0714	59.2617	-148.9070	168	75	Napp
365	Live ring net		MS	GAK5	4	8	0723	59.2620	-148.9082	168	50	Dagg
366	CTD165	165	MS	GAK5	4	8	0758	59.2625	-148.9088	168	55	5m fsw de#18
367	CTD166	166	MS	GAK5	4	8	0850	59.2603	-148.9093	168	24	5m wsw de#18 10L CTD.
368	CTD167	167	MS	GAK5	4	8	0957	59.2618	-148.9099	167	30	23m fsw de#19
369	CTD168	168	MS	GAK5	4	8	1041	59.2619	-148.9094	167	23	23m wsw de#19
370	CTD169	169	MS	GAK5	4	8	1154	59.2623	-148.9096	166	160	
371	Live ring net		MS	GAK5	4	8	1255	59.2617	-148.9080	167	100	Dagg
372	Live ring net		MS	GAK5	4	8	1301	59.2617	-148.9103	167	75	Napp
373	Live ring net		MS	GAK5	4	8	1310	59.2607	-148.9122	167	75	Napp
374	Closing ring net		MS	GAK5	4	8	1323	59.2590	-148.9143	167	20	Dagg
375	Closing ring net		MS	GAK5	4	8	1327	59.2587	-148.9152	167	100	Dagg
376	Live ring net		MS	GAK5	4	8	2330	59.2617	-148.9048	165	50	Napp
377	CTD170	170	MS	GAK5	5	8	0003	59.2604	-148.9081	167	160	
378	QUAD		MS	GAK5	5	8	0020	59.2587	-148.9039	163	100	
379	MOCNESS28		MS	GAK5	5	8	0035	59.2578	-148.8997	165	105	
380	CTD171	171	MS	GAK4i	5	8	0142	59.4093	-149.0496	195	192	
381	CTD172	172	MS	GAK4	5	8	0225	59.4094	-149.0497	199	196	

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
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382	CTD173	173	MS	GAK3i	5	8	0308	59.4818	-149.1187	204	199	
383	CTD174	174	MS	GAK3	5	8	0353	59.5526	-149.1909	213	211	
384	Live ring net		MS	GAK5	5	8	0830	59.2561	-148.9082	168	100	Dagg
385	Live ring net		MS	GAK5	5	8	0839	59.2632	-148.9045	168	75	Napp
386	Live ring net		MS	GAK5	5	8	0849	59.2648	-148.9007	168	50	Napp
387	CTD175	175	MS	GAK5	5	8	0931	59.2608	-148.9080	167	50	23m fsw de#20
388	CTD176	176	MS	GAK5	5	8	1021	59.2601	-148.9063	167	50	21m wsw de#20
389	CTD177	177	MS	GAK5	5	8	1200	59.2603	-148.9073	167	164	
390	Live ring net		MS	GAK5	5	8	1226	59.2625	-148.9082	166	100	Dagg
391	QUAD		MS	GAK5	5	8	1254	59.2617	-148.8980	163	75	
392	Tucker		MS	GAK5	5	8	1308	59.2610	-148.8958	162	1	
393	MOCNESS29		MS	GAK5	5	8	1327	59.2608	-148.9081	166	20	
394	CTD178	178	MS	GAK6	5	8	1441	59.1156	-148.7697	150	148	GA#18
395	QUAD		MS	GAK6	5	8	1504	59.1165	-148.7700	150	75	
396	Tucker		MS	GAK6	5	8	1518	59.1155	-148.7680	150	1	
397	MOCNESS30		MS	GAK6	5	8	1537	59.1170	-148.7720	150	20	
398	CTD179	179	MS	GAK5i	5	8	1627	59.1895	-148.8401	167	164	
399	CTD180	180	MS	GAK5	5	8	1711	59.2618	-148.9101	168	165	chl sampled 25m (chl max)
400	CTD181	181	MS	GAK4i	5	8	1757	59.3344	-148.9780	195	194	
401	CTD182	182	MS	GAK4	5	8	1844	59.4079	-149.0483	201	197	
402	QUAD		MS	GAK4	5	8	1907	59.4122	-149.0427	200	100	
403	Tucker		MS	GAK4	5	8	1920	59.4120	-149.0437	200	1	
404	MOCNESS31		MS	GAK4	5	8	1936	59.4055	-149.0517	201	20	
405	CTD183	183	MS	GAK3i	5	8	2030	59.4798	-149.1176	205	202	
406	CTD184	184	MS	GAK3	5	8	2121	59.5528	-149.1877	214	210	
407	Live ring net		MS	GAK5	5	8	2333	59.2630	-148.9073	167	100	Napp
408	CTD185	185	MS	GAK5	5	8	2347	59.2636	-148.9024	164	100	
409	QUAD		MS	GAK5	6	8	0006	59.2653	-148.8963	165	100	
410	MOCNESS32		MS	GAK5	6	8	0023	59.2603	-148.9222	167	105	
411	CTD186	186	MS	GAK5	6	8	0138	59.2600	-148.9098	167	100	
412	CTD187	187	MS	GAK4i	6	8	0225	59.3337	-148.9786	195	193	
413	CTD188	188	MS	GAK4	6	8	0310	59.4069	-149.0487	200	196	
414	CTD189	189	MS	GAK3i	6	8	0357	59.4805	-149.1194	202	200	
415	CTD190	190	MS	GAK3	6	8	0443	59.5519	-149.1899	213	211	
416	Live ring net		MS	GAK5	6	8	0704	59.2618	-148.9103	168	100	Dagg
417	Live ring net		MS	GAK5	6	8	0715	59.2642	-148.9087	168	75	Napp
418	Live ring net		MS	GAK5	6	8	0727	59.2665	-148.9078	168	50	Napp
419	CTD191	191	MS	GAK5	6	8	0802	59.2622	-148.9073	168	80	5m fsw de#21
420	CTD192	192	MS	GAK5	6	8	0858	59.2616	-148.9074	168	60	5m wsw de#21
421	CTD193	193	MS	GAK5	6	8	1001	59.2619	-148.9057	167	60	20m fsw de#22
422	CTD194	194	MS	GAK5	6	8	1104	59.2615	-148.9063	167	60	22m wsw de#22
423	CTD195	195	MS	GAK5	6	8	1159	59.2616	-148.9063	167	164	
423a	Tucker		MS	GAK4	6	8	1324	59.4092	-149.0462	199	1	live Tucker for Jeff, no samples preserved
424	CTD196	196	MS	GAK3i	6	8	1407	59.4810	-149.1216	204	198	

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
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					day	month	Local	Lattitude	Longitude	bottom	event max	
425	QUAD		MS	GAK3i	6	8	1428	59.4800	-149.1227	204	75	
426	Tucker		MS	GAK3i	6	8	1441	59.4810	-149.1237	204	1	
427	MOCNESS33		MS	GAK3i	6	8	1458	59.4758	-149.1313	206	20	
428	CTD197	197	MS	GAK3	6	8	1547	59.5534	-149.1882	212	211	
429	CTD198	198	IS	GAK2i	6	8	1639	59.6263	-149.2590	212	198	
430	QUAD		IS	GAK2i	6	8	1702	59.6238	-149.2565	212	75	
431	Tucker		IS	GAK2i	6	8	1714	59.6222	-149.2577	214	1	failed, timer stopped
432	Tucker		IS	GAK2i	6	8	1726	59.6260	-149.2583	213	1	
433	MOCNESS34		IS	GAK2i	6	8	1741	59.6257	-149.2613	213	20	
434	CTD199	199	IS	ACC2	6	8	1843	59.6576	-149.2958	220	216	
435	CTD200	200	IS	GAK2	6	8	1917	59.6912	-149.3276	227	223	
436	QUAD		IS	GAK2	6	8	1940	59.6900	-149.3263	227	100	
437	Tucker		IS	GAK2	6	8	1952	59.6907	-149.3255	227	1	
438	MOCNESS35		IS	GAK2	6	8	2008	59.6948	-149.3255	228	20	
438a	CTD201	201	IS	ACC1	6	8	2040	59.7289	-149.3629	244	240	
438b	CTD202	202	IS	GAK1i	6	8	2115	59.7663	-149.3985	262	259	
439	CTD203	203	IS	GAK3i	6	8	2323	59.4807	-149.1217	207	202	
440	CTD204	204		WF8	6	8	2353	59.4836	-149.1982	242	236	
441	CTD205	205		WF7	7	8	0025	59.4866	-149.2754	212	208	
442	CTD206	206		WF6	7	8	0055	59.4893	-149.3546	147	143	
443	CTD207	207		WF5	7	8	0124	59.4916	-149.4330	120	119	
444	CTD208	208		WF4	7	8	0158	59.4934	-149.5095	108	105	
445	CTD209	209		WF3	7	8	0225	59.4966	-149.5928	96	94	
446	CTD210	210		WF2	7	8	0248	59.4996	-149.6687	87	86	
447	CTD211	211		WF1	7	8	0312	59.5004	-149.7517	164	163	
448	Live ring net			WF1	7	8	0704	59.5002	-149.7495	162	50	Dagg
449	Live ring net			WF1	7	8	0714	59.4993	-149.7510	162	50	Dagg
450	Live ring net			WF1	7	8	0722	59.4983	-149.7520	167	75	Napp
451	Live ring net			WF1	7	8	0735	59.4970	-149.7552	170	50	Napp
452	CTD212	212		WF1	7	8	0810	59.5005	-149.7495	165	162	TAPS off; GA#23
453	Tucker			WF1	7	8	0831	59.4998	-149.7463	160	1	
454	MOCNESS36			WF1	7	8	0852	59.5029	-149.7418	156	20	
455	CTD213	213		WF2	7	8	0927	59.4999	-149.6700	89	88	TAPS off
456	CTD214	214		WF3	7	8	0956	59.4968	-149.5911	98	95	TAPS off
457	CTD215	215		WF4	7	8	1024	59.4936	-149.5108	108	106	TAPS off
458	Live ring net			WF5	7	8	1058	59.4915	-149.4328	122	50	Dagg
459	Live ring net			WF5	7	8	1106	59.4893	-149.4370	119	50	Dagg
460	Live ring net			WF5	7	8	1115	59.4872	-149.4418	118	50	Napp
461	CTD216	216		WF5	7	8	1129	59.4918	-149.4343	120	119	TAPS back on GA #24
462	Tucker			WF5	7	8	1149	59.4897	-149.4393	119	1	
463	MOCNESS37			WF5	7	8	1206	59.4909	-149.4359	150	20	
464	CTD217	217		WF6	7	8	1246	59.4882	-149.3563	146	139	
465	CTD218	218		WF7	7	8	1318	59.4864	-149.2751	212	205	GA #25
466	Live ring net			WF7	7	8	1346	59.4867	-149.2757	212	50	Napp

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
467	Tucker			WF7	7	8	1357	59.4850	-149.2765	212	1	
468	MOCNESS38			WF7	7	8	1411	59.4885	-149.2738	216	20	
469	CTD219	219		WF8	7	8	1440	59.4836	-149.1969	240	234	
470	CTD220	220		GAK3i	7	8	1520	59.4808	-149.1160	202	199	
471	Closing ring net			GAK3i	7	8	1534	59.4802	-149.1160	202	10	Dagg
472	Closing ring net			GAK3i	7	8	1538	59.4797	-149.1167	202	100	Dagg
473	CTD221	221		WF9	7	8	1603	59.4470	-149.1753	226	221	
474	CTD222	222		WF10	7	8	1636	59.4141	-149.2297	168	164	
475	CTD223	223		WF11	7	8	1707	59.3813	-149.2832	156	152	
476	CTD224	224		WF12	7	8	1737	59.3500	-149.3355	153	150	
477	CTD225	225		WF13	7	8	1808	59.3167	-149.3918	136	135	
478	CTD226	226		WF14	7	8	1837	59.2817	-149.4476	149	145	
479	Live ring net			WF15	7	8	1905	59.2497	-149.4993	138	20	Dagg
480	Live ring net			WF15	7	8	1910	59.2497	-149.4998	137	20	Dagg
481	Live ring net			WF15	7	8	1913	59.2495	-149.5007	137	50	Napp
482	CTD227	227		WF15	7	8	1924	59.2494	-149.5017	137	135	
483	Tucker			WF15	7	8	1940	59.2492	-149.5047	138	1	
484	MOCNESS39			WF15	7	8	1954	59.2544	-149.4986	137	20	
485	CTD228	228		WF16	7	8	2025	59.2841	-149.5366	128	125	
486	Live ring net			WF17	7	8	2053	59.3198	-149.5722	124	50	Napp
487	Live ring net			WF17	7	8	2101	59.3192	-149.5758	123	50	Dagg
488	CTD229	229		WF17	7	8	2113	59.3167	-149.5802	123	118	
489	Tucker			WF17	7	8	2128	59.3167	-149.5838	120	1	
490	MOCNESS40			WF17	7	8	2142	59.3200	-149.5767	123	20	
491	CTD230	230		WF18	7	8	2215	59.3563	-149.6070	101	100	
492	CTD231	231		WF19	7	8	2240	59.3935	-149.6425	110	107	
493	CTD232	232		WF20	7	8	2305	59.4283	-149.6779	103	102	
494	CTD233	233		WF21	7	8	2330	59.4645	-149.7130	113	114	
495	CTD234	234		WF1	7	8	2355	59.5002	-149.7472	161	150	
496	QUAD			WF1	8	8	0013	59.5009	-149.7466	163	100	
497	MOCNESS41			WF1	8	8	0025	59.4986	-149.7531	171	105	
498	CTD235	235		HE3	8	8	1256	60.1300	-146.6076	114	114	
499	CTD236	236		HE2	8	8	1330	60.1798	-146.6097	197	191	
500	CTD237	237		HE1	8	8	1355	60.2168	-146.6095	77	75	
501	CTD238	238		HE2	8	8	1425	60.1783	-146.6074	192	100	DE 23 fsw
502	QUAD			HE2	8	8	1443	60.1792	-146.6042	187	100	
503	MOCNESS42			HE2	8	8	1502	60.1785	-146.6074	209	209	
504	CTD239	239		HE2	8	8	1558	60.1798	-146.6072	192	100	DE 23 wsw
505	Live ring net			HE2	8	8	1614	60.1785	-146.6072	187	50	Napp
506	Live ring net			HE2	8	8	1623	60.1788	-146.6050	187	50	Dagg
507	CTD240	240		HB1	8	8	2110	60.1926	-147.6989	248	245	
508	CTD241	241		HB2	8	8	2142	60.1803	-147.6409	177	174	
509	CTD242	242		HB3	8	8	2209	60.1646	-147.5746	85	82	
510	CTD243	243		HB1	8	8	2248	60.1935	-147.7000	248	245	

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
511	QUAD			HB1	8	8	2311	60.1927	-147.6997	250	240	
512	MOCNESS43			HB1	8	8	2330	60.1937	-147.6985	253	250	
513	Live ring net			HB1	9	8	0025	60.1922	-147.6995	247	50	Napp
514	CTD244	244		MS3	9	8	0210	59.9319	-147.8597	171	168	
515	CTD245	245		MS2	9	8	0235	59.9429	-147.8965	192	189	
516	CTD246	246		MS1	9	8	0257	59.9534	-147.9276	166	163	
517	CTD247	247		CCSE1	9	8	0636	59.7420	-147.8215	61	59	
518	CTD248	248		CCSE2	9	8	0723	59.6674	-147.7262	112	104	
519	CTD249	249		CCSE3	9	8	0823	59.5722	-147.6069	108	106	
520	Live ring net			CCSE3	9	8	0847	59.5712	-147.6082	109	75	Napp
521	Live ring net			CCSE3	9	8	0859	59.5733	-147.6095	110	50	Napp
522	Live ring net			CCSE3	9	8	0910	59.5747	-147.6100	110	50	Dagg
523	Live ring net			CCSE3	9	8	0920	59.5757	-147.6100	110	50	Dagg
524	QUAD			CCSE3	9	8	0930	59.5767	-147.6098	112	110	
525	CTD250	250		CCSE3	9	8	0944	59.5701	-147.6104	109	100	DE 24 fsw
526	MOCNESS44			CCSE3	9	8	1003	59.5702	-147.6104	109	100	
527	CTD251	251		CCSE3	9	8	1040	59.5699	-147.6096	109	50	DE 24 wsw
528	CTD252	252	IS	PWSW3	9	8	1339	59.8261	-148.3304	121	118	
529	CTD253	253	IS	PWSW2	9	8	1409	59.8751	-148.3326	77	67	
530	CTD254	254	IS	PWSW1	9	8	1438	59.9242	-148.3346	96	92	
531	CTD255	255	IS	PWSW2	9	8	1509	59.8741	-148.3324	76	70	
532	QUAD		IS	PWSW2	9	8	1528	59.8742	-148.3325	76	70	
533	MOCNESS45		IS	PWSW2	9	8	1539	59.8729	-148.3287	86	86	
534	Live ring net		IS	PWSW2	9	8	1612	59.8755	-148.3305	69	50	Dagg
535	Live ring net		IS	PWSW2	9	8	1621	59.8740	-48.3290	65	50	Napp
536	CTD256	256	IS	CF4	9	8	1813	59.8170	-148.8687	181	178	
537	CTD257	257	IS	CF3	9	8	1843	59.8498	-148.8674	161	156	
538	CTD258	258	IS	CF2	9	8	1909	59.8833	-148.8678	112	110	
539	CTD259	259	IS	CF1	9	8	1931	59.9079	-148.8664	85	82	
540	CTD260	260	IS	CF3	9	8	2017	59.8500	-148.8724	159	156	
541	QUAD		IS	CF3	9	8	2040	59.8490	-148.8697	161	155	
542	MOCNESS46		IS	CF3	9	8	2053	59.8491	-148.8708	173	165	
543	Live ring net		IS	CF3	9	8	2140	59.8497	-148.8638	164	50	Napp
544	CTD261	261	IS	ACC0	9	8	2330	59.4840	-149.2584	280	275	
545	CTD262	262	IS	GAK1i	10	8	0007	59.7667	-149.3968	262	259	
546	CTD263	263	IS	ACC1	10	8	0041	59.7287	-149.3667	245	242	
547	CTD264	264	IS	GAK2	10	8	0120	59.6910	-149.3308	230	226	
548	CTD265	265	IS	ACC1	10	8	0155	59.7282	-149.3630	242	228	
549	QUAD		IS	ACC1	10	8	0225	59.7268	-149.3612	242	235	
550	MOCNESS47		IS	ACC1	10	8	0245	59.7265	-149.3607	240	234	
551	Live ring net		IS	ACC1	10	8	0339	59.7307	-149.3588	240	50	Dagg
552	Live ring net		MS	GAK5	10	8	0657	59.2612	-148.9098	165	100	Napp
553	Live ring net		MS	GAK5	10	8	0712	59.2615	-148.9107	165	50	Napp
554	CTD266	266	MS	GAK5	10	8	0800	59.2607	-148.9099	165	50	20m fsw de#25

Event Log: RV Alpha Helix GLOBEC CGOA Process #5 July/August 2003												
Event	Activity	CTD #	Region	Station	Local Date		Time	Dec	Dec	Depth (m)		Comments
					day	month	Local	Lattitude	Longitude	bottom	event max	
555	CTD267	267	MS	GAK5	10	8	0901	59.2615	-148.9092	166	50	15m wsw de#25
556	Flowmeter calibration		MS	GAK5	10	8	0943	59.2633	-148.9160	167	100	Dagg
557	CTD268	268	MS	GAK5	10	8	1014	59.2623	-148.9090	167	75	5m fsw de#26
558	CTD269	269	MS	GAK5	10	8	1111	59.2625	-148.9085	167	75	5m wsw de#26
559	CTD270	270	MS	GAK5	10	8	1202	59.2630	-148.9084	167	163	
560	Flowmeter calibration		MS	GAK5	10	8	1226	59.2672	-148.9190	167	100	Dagg
561	CTD271	271	MS	GAK6	10	8	1352	59.1160	-148.7675	150	150	DM on watch
562	CTD272	272	MS	GAK5i	10	8	1436	59.1897	-148.8391	167	162	
563	CTD273	273	MS	GAK5	10	8	1521	59.2630	-148.9061	167	163	
564	CTD274	274	MS	GAK4i	10	8	1607	59.3364	-148.9756	196	191	
565	CTD275	275	MS	GAK4	10	8	1652	59.4092	-149.0460	199	195	
566	CTD276	276	MS	GAK3i	10	8	1737	59.4823	-149.1161	202	199	
567	CTD277	277	MS	GAK3	10	8	1825	59.5534	-149.1886	215	207	
568	CTD278	278	MS	GAK3	11	8	0200	59.5543	-149.1905	214	210	
569	CTD279	279	MS	GAK3i	11	8	0300	59.4815	-149.1177	204	201	
570	CTD280	280	MS	GAK4	11	8	0345	59.9093	-149.0467	202	200	
571	CTD281	281	MS	GAK4i	11	8	0430	59.3353	-148.9770	196	191	
572	CTD282	282	MS	GAK5	11	8	0515	59.2622	-148.9062	166	163	
573	CTD283	283	MS	GAK5i	11	8	0600	59.1897	-148.8358	163	160	
574	CTD284	284	MS	GAK6	11	8	0656	59.1172	-148.7683	148	145	
575	CTD285	285	MS	GAK5	11	8	0830	59.2622	-148.9075	166	163	
576	CTD286	286	MS	GAK4i	11	8	0920	59.3358	-148.9773	194	191	
577	CTD287	287	MS	GAK4	11	8	1000	59.4085	-149.0485	198	195	
578	CTD288	288	MS	GAK3i	11	8	1044	59.4818	-149.0337	203	197	
579	CTD289	289	MS	GAK3	11	8	1128	59.5543	-149.1888	213	207	

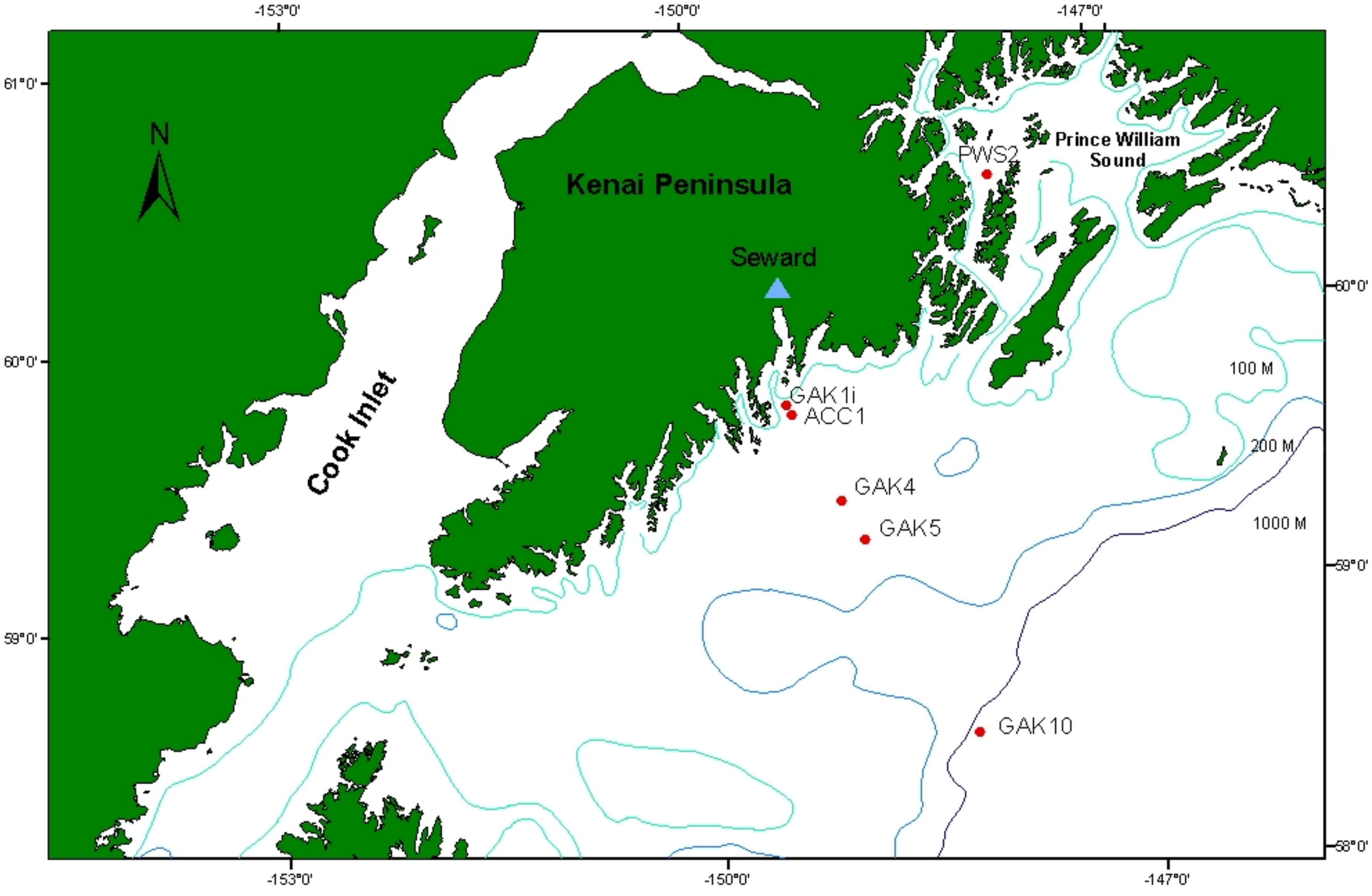

Figure 1: Core Station Map

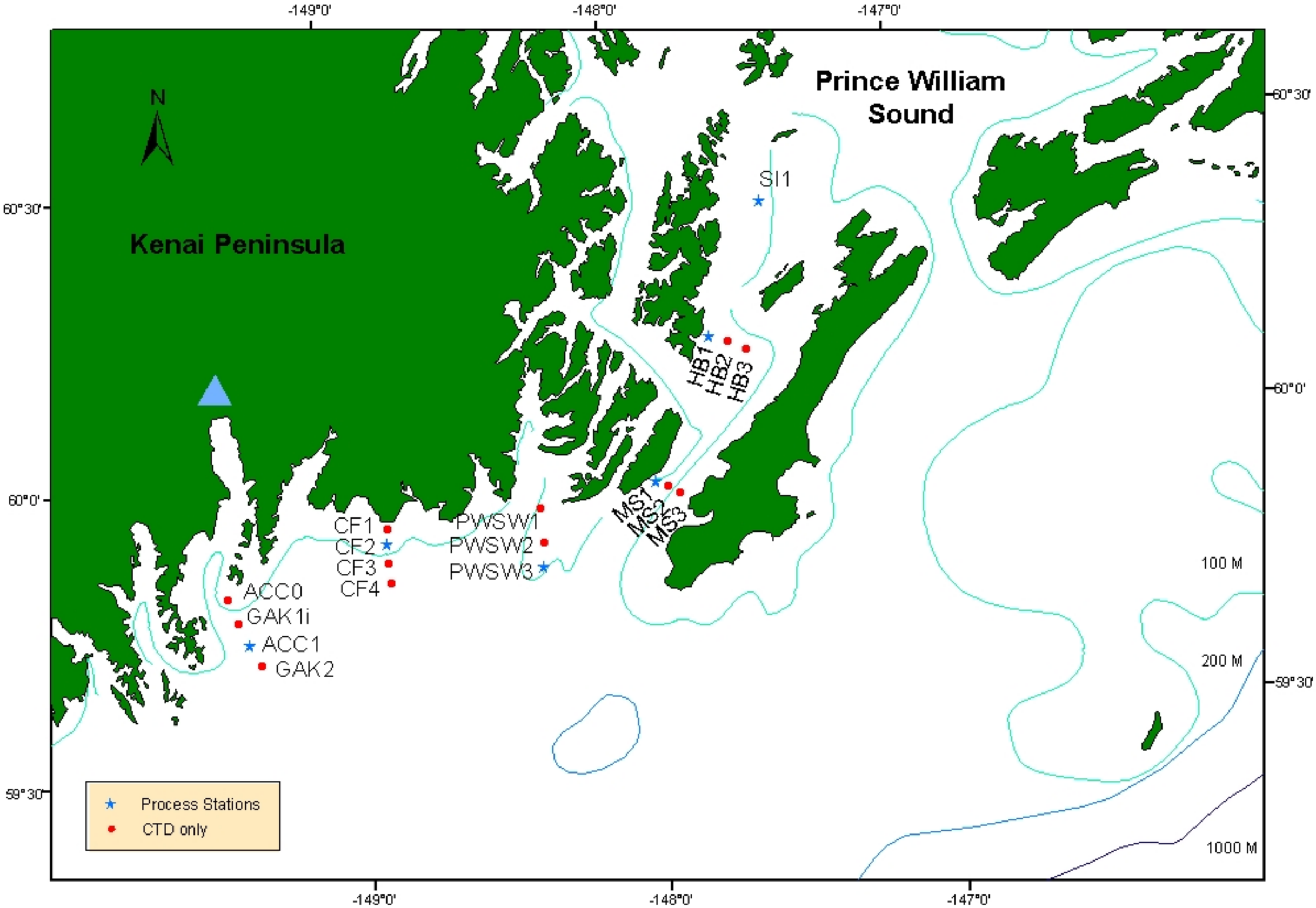

Figure 2a: ACC Transect #1 Stations (July 28-29 2003)

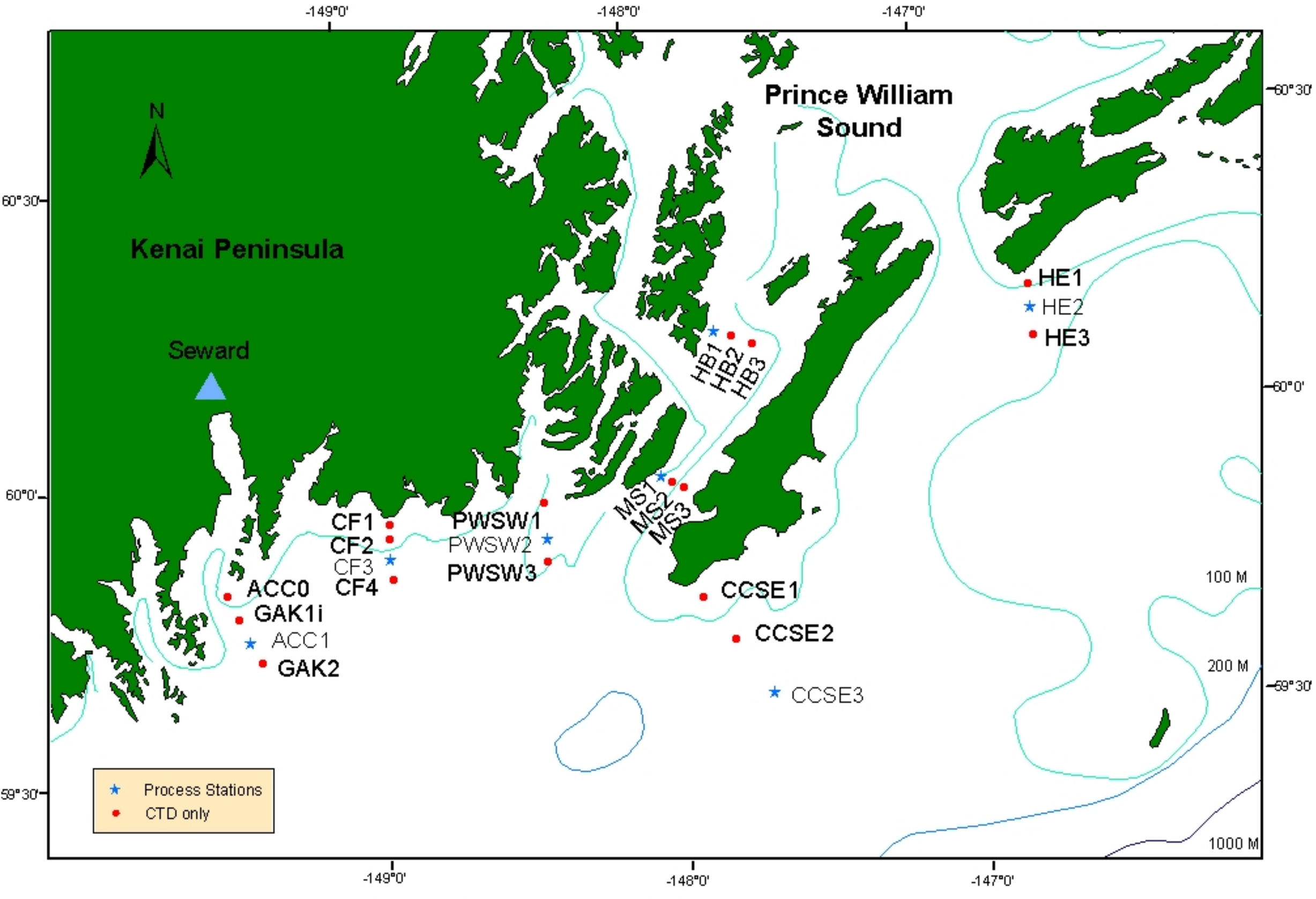

Figure 2b: ACC Transect #2 Stations (Aug 8-10 2003)

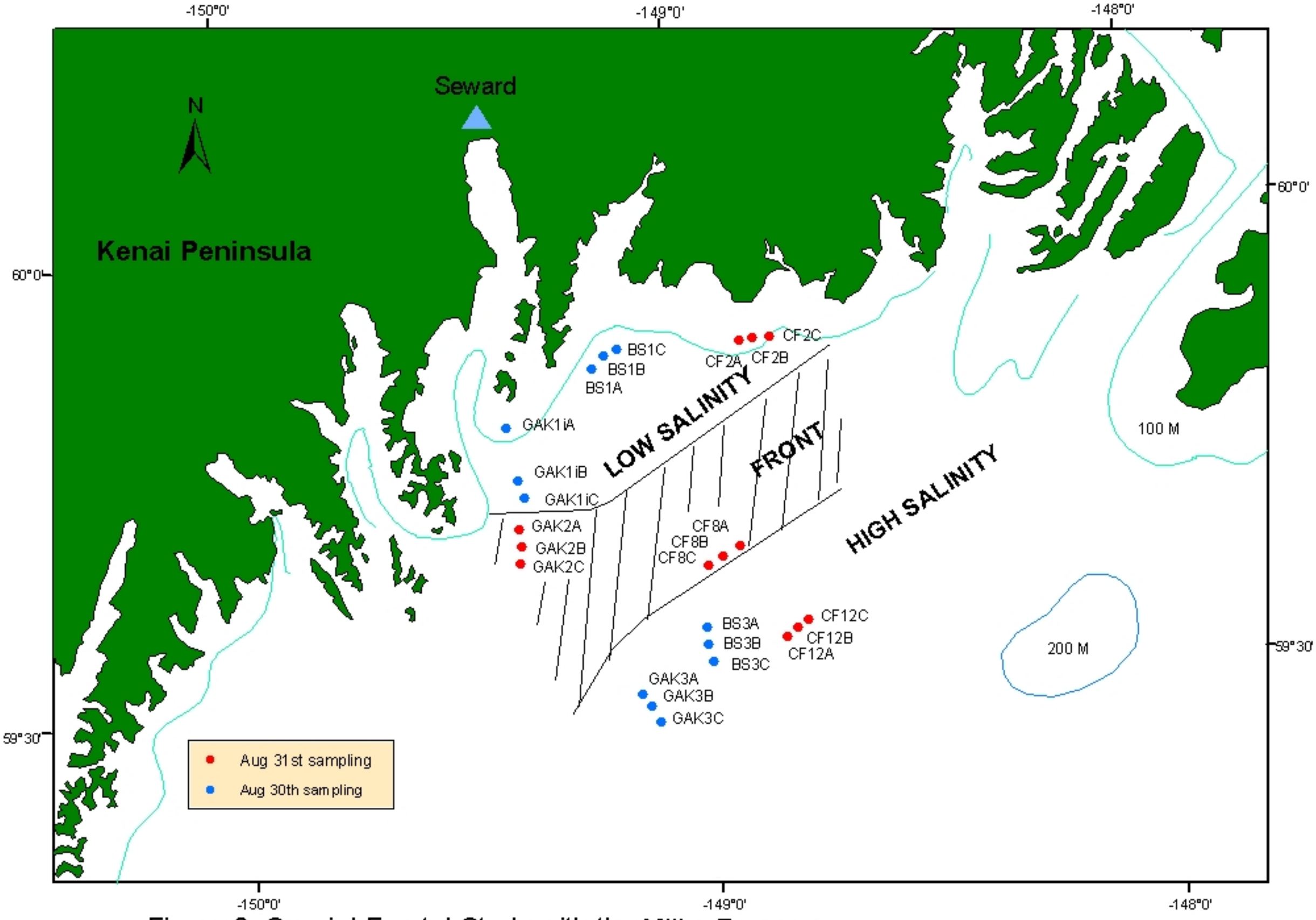

Figure 3: Special Frontal Study with the *Miller Freeman*
Note: GAK 2=Miller Freeman Station AC1 BS1=Miller Freeman Station BS2

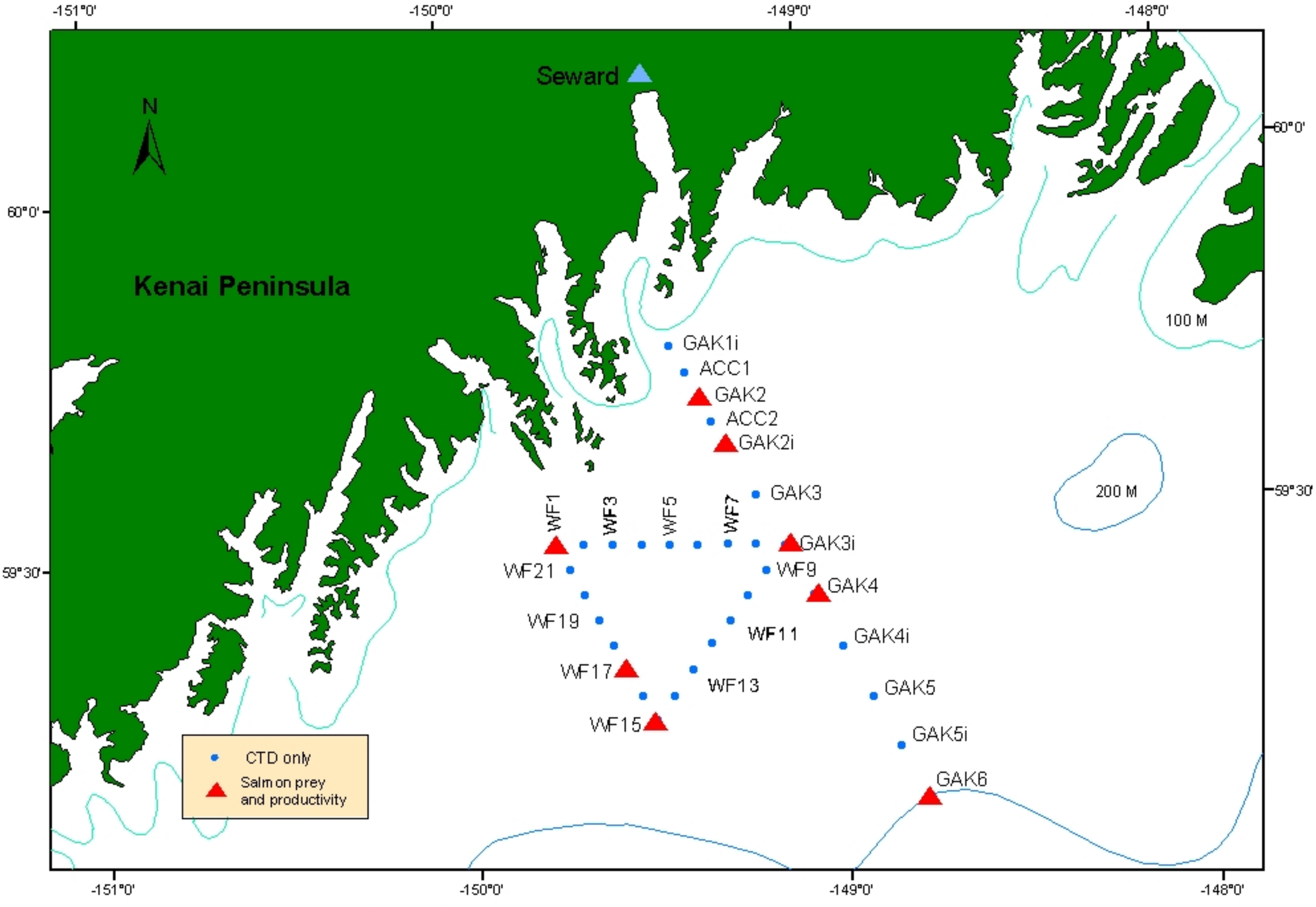

Figure 4: Joint studies with R/V *Pandalus*