Cruise Report

AKMAP Chukchi Sea Ledyard Bay 2010 Coastal Impact Assistance Program Assessment

August 21 – September 4, 2010

R/V *Norseman II*

The Alaska Department of Environmental Conservation (DEC) established an Alaska Monitoring and Assessment Program (AKMAP) focused on conducting applied environmental research that uses a statistical survey design to provide estimates of the spatial extent of water quality status based on stressors, such as chemical contaminants, water quality parameters (pH, temperatures, salinity, dissolved oxygen) and indicators, such as benthic fish abundance. Environmental managers use this information to support the protection and restoration of coastal marine environments, mitigate damage to the marine ecosystem and implement discharge monitoring requirements in NPDES permits. The purpose of this cruise was for DEC and University of Alaska Fairbanks, School of Fisheries and Ocean Sciences, to sample the waters of the northeast Chukchi Sea, from Pt. Hope to Pt. Lay between 10 and 40 m water depths.

After an 11-day delay due mainly to inclement weather, the R/V *Norseman II* departed Nome, AK August 21 with a crew of 16, six from the ship and 10 scientists. We arrived at AKCH10-001 in the vicinity of Pt. Lay at 1330 hrs on August 23. We progressively sampled toward the south and concluded at AKCH10-030 in the vicinity of Pt. Hope at 1535 hrs on September 3. Throughout the 12-day sampling we occupied 31 stations, all 30 of the Base stations and one Alternate station (Figure 1). The Alternate station, AKCH10-105, was added to extend a quasi-nearshore-offshore transect through mid-Ledyard Bay. There were no delays due to bad weather. Three stations were sampled on most days.

Station sampling activity typically occurred in the following sequence, with number of stations sampled in parentheses: vertical plankton tow (31), drop camera (27), CTD (31), beam trawl (31), van Veen grab (30), Haps corer (8), otter trawl (29), rod and reel (11), and air sampling (17). A complete list of activities at each station is shown in Table 1. A list of organisms collected for contaminant analyses is shown in Table 2. Measurements of dominant invertebrate organisms at selected stations were made (Table 3). Voucher specimens were collected and various photographs of the cruise were taken to enhance subsequent reports. Several organisms from selected stations were collected for stable isotope analyses. All samples were preserved (froze, ETOH, formalin, nitric acid) and will be shipped to DEC or UAF.

A Sosi Eco-Winch was purchased with the intent of deploying the CTD. Several problems were encountered with the winch, the line slipped through metered wheel and the rate and line length display did not correspond with actual lengths. The ship engineer and crew attempted to correct these problems with line angle adjustments to no avail. The winch was marked with

electrical tape at meter intervals and used in this manner for the majority of the cruise. CTD casts were intended to operate from Seabird 55 Carousel and Seabird 33 Deck Unit. During setup it was discovered the Seabird 33 would not communicate with the Seabird 55; this was assumed to be due to the serial to USB connections. Due to this inability to conduct live casts, we were unable to target the highest fluorescence level for water collection. The Seabird 55 was manually fired at surface, mid and bottom depths, and data were downloaded each night.

Demersal fishes and epibenthic invertebrates were sampled from beam trawl hauls at each site, and fishes were sampled from otter trawl hauls at most sites. The 3.05 m plumb-staff beam trawl was 7 mm mesh in the body, with a 4 mm codend liner, double tickler chain and 16 cm sections of chain attached to the footrope at 16 cm intervals; it was fished for 2-5 minutes at 1-1.5 kt. Beam trawl hauls were quantitative for area fished at all sites other than AKCH10-020, where approximately 2 tons of sand dollars were collected during a 2 minute haul that bent the beam beyond repair and tore the liner from the codend; no other hauls were attempted at that site. A boulder caused the beam trawl to rip at AKCH10-029; another net was set for a successful haul. The 9.1 m otter trawl had 38 mm mesh in the body, 19 mm mesh in the codend, 27.5 m bridles and 61x122 cm (23 kg) doors; it was fished for 10 minutes at 2-2.5 kt. The otter trawl hauls were quantitative for area fished at 22 sites, and fishes also were collected from an additional 6 sites where the otter trawl was not consistently on bottom. Temperature Depth recorders (Star-Oddi Centi or Tilt) were attached to net headropes and downloaded each night; data from these units were used to determine whether nets had fished consistently on the sea floor.

A marine bird draft report was compiled by Tim Obritschkewitsch of ABR, Inc. His report, which focused on the Spectacled Eider in Ledyard Bay, essentially stated that few eiders were observed and the presence of eiders did not impact the cruise operations. Similarly, marine mammals, as reported by Amber Stephens of ABR, Inc., were seldom encountered and caused minimal interruption to the cruise. On one occasion the ship had to maneuver around a herd of feeding Pacific walrus.

Finally, the success of this cruise was attributed to the following outstanding personal:

Crew of the R/V *Norseman II*	Scientific Crew
Captain Jack Molan	Terri Lomax, DEC
Mate Scotty Hameister,	Brenda Holladay, UAF
Engineer Todd Campbell	Pat Rivera, UAF
Cook Joanne Molan	Heloise Chenelot, UAF
Able Seaman Charlie Watson	Nora Foster, UAF
Able Seaman Jim Wells	Max Hoberg, UAF
	Roger Clark, Insignis
	Amber Stephens, ARB, Inc.
	Tim Obritschkewitsch, ABR, Inc.

Stephen C. Jewett, Ph.D., UAF
Chief Scientist
September 4, 2010

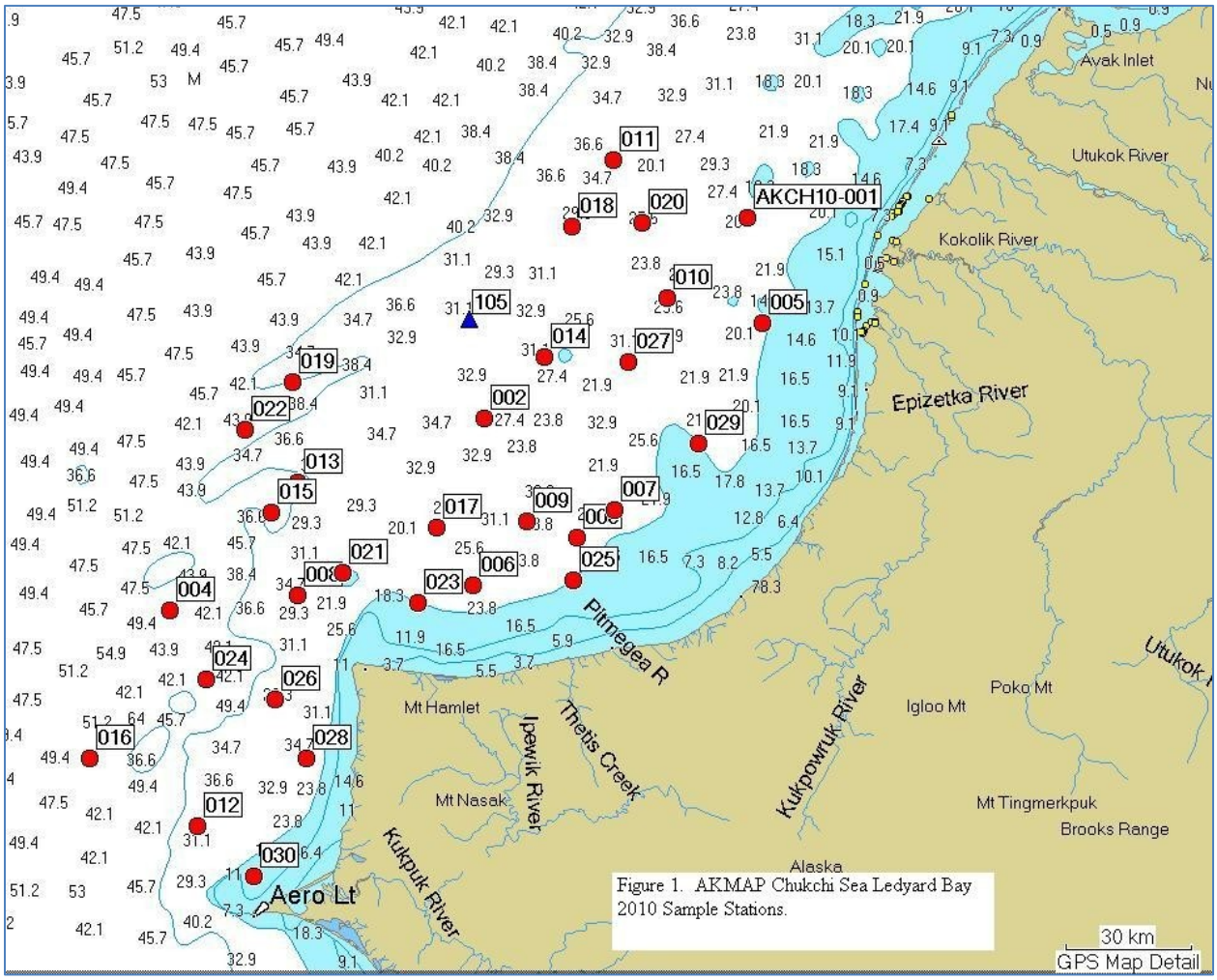

Figure 1. AKMAP Chukchi Sea Ledyard Bay 2010 Sample Stations.

Table 1. List of activities accomplished at stations on the AKMAP Chukchi Sea Ledyard Bay 2010 cruise

Date	8/23/2010	8/27/2010	8/28/2010	9/1/2010	8/25/2010	8/29/2010	8/28/2010	9/1/2010	8/29/2010	8/25/2010	8/24/2010	9/3/2010	8/31/2010	8/26/2010	8/30/2010	9/3/2010
Station	AKCH10-001	AKCH10-002	AKCH10-003	AKCH10-004	AKCH10-005	AKCH10-006	AKCH10-007	AKCH10-008	AKCH10-009	AKCH10-010	AKCH10-011	AKCH10-012	AKCH10-013	AKCH10-014	AKCH10-015	AKCH10-016
Consecutive Station #	1	11	13	25	6	16	12	24	15	5	2	30	21	9	20	31
Depth, m	26.3	35	24	49	23	23	25	36	27	28.7	36.8	34	40	34.5	41.8	49
ACTIVITY																
Vertical Plankton Tow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Drop Camera*	1	1	1		1	1	1	1	1	1	1	1	1	1	1	
CTD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Beam Trawl**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Van Veen Grabs***	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Haps Corer				1		1			1					1		
Otter Trawl****	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1
Rod & Reel*****	1				1			1			1		1	1		
Air Sample	1			1	1	1	1			1	1				1	1
Contaminant samples		1		1		1	1	1	1		1		1	1	1	1
Isotope samples					1	1	1	1	1	1				1		
Date	8/30/2010	8/24/2010	8/31/2010	8/25/2010	8/30/2010	8/31/2010	8/29/2010	9/1/2010	8/28/2010	9/2/2010	8/26/2010	9/2/2010	8/26/2010	9/2/2010	8/27/2010	
Station	AKCH10-017	AKCH10-018	AKCH10-019	AKCH10-020	AKCH10-021	AKCH10-022	AKCH10-023	AKCH10-024	AKCH10-025	AKCH10-026	AKCH10-027	AKCH10-028	AKCH10-029	AKCH10-030	AKCH10-105	
Consecutive Station #	18	3	22	4	19	23	17	26	14	28	8	27	7	29	10	
Depth, m	30	37.5	44	31	31	44	22.5	45	19.5	44	30	36	24.5	25	38.5	
ACTIVITY																TOTALS
Vertical Plankton Tow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	31
Drop Camera*	1	1	1	1	1	1	1		1		1	1	1	1	1	27
CTD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	31
Beam Trawl**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	31
Van Veen Grabs***	1	1	1	1	1	1	1	1		1	1	1	1	1	1	30
Haps Corer			1					1				1			1	8
Otter Trawl****	1		1		1	1	1	1	1	1	1	1	1	1	1	28
Rod & Reel*****		1		1					1		1				1	11
Air Sample	1	1		1		1			1	1	1		1			17
Contaminant samples	1	1	1		1	1	1	1	1	1		1		1	1	22
Isotope samples		1	1			1			1				1			12
* = 5 minutes																
** = 2-5 minutes																
*** = 1 for chemistry;																
3 for infauna																
**** = 10 minutes																
***** = 30 minutes																

Table 2. List of organisms collected for contaminants at stations on the AKMAP Chukchi Sea Ledyard Bay 2010 cruise

Date	8/23/2010	8/27/2010	8/28/2010	9/1/2010	8/25/2010	8/29/2010	8/28/2010	9/1/2010	8/29/2010	8/25/2010	8/24/2010	9/3/2010	8/31/2010	8/26/2010	8/30/2010	9/3/2010
Station	AKCH10-001	AKCH10-002	AKCH10-003	AKCH10-004	AKCH10-005	AKCH10-006	AKCH10-007	AKCH10-008	AKCH10-009	AKCH10-010	AKCH10-011	AKCH10-012	AKCH10-013	AKCH10-014	AKCH10-015	AKCH10-016
Consecutive Station #	1	11	13	25	6	16	12	24	15	5	2	30	21	9	20	31
Depth, m	26.3	35	24	49	23	23	25	36	27	28.7	36.8	34	40	34.5	41.8	49
Species for Contaminants																
Chlamys behringiana (scallop)								1							1	
Clinocardium ciliatum (cockle)				1												1
Serripes groenlandicus (cockle)																
Astarte borealis (clam)				1												1
Neptunea heros (gastropod)		1		1				1					1			1
Anonyx nugax (amphipod)							1	1	1							
Argis dentata (gray shrimp)		1		1		1	1	1	1		1		1		1	1
Hyas coarctatus (Lyre crab)		1					1	1	1		1		1		1	1
Chionoecetes opilio (Snow crab)		1		1				1	1		1		1		1	1
Telmessus cheirogonus (Helmet crab)						1	1		1							
Clupea pallasii (Pacific herring)														1		
Mallotus villosus (Capelin)																
Ammodytes hexapterus (Pacific sand lance)						1										
Boreogadus saida (Arctic cod)											1		1			
Date	8/30/2010	8/24/2010	8/31/2010	8/25/2010	8/30/2010	8/31/2010	8/29/2010	9/1/2010	8/28/2010	9/2/2010	8/26/2010	9/2/2010	8/26/2010	9/2/2010	8/27/2010	
Station	AKCH10-017	AKCH10-018	AKCH10-019	AKCH10-020	AKCH10-021	AKCH10-022	AKCH10-023	AKCH10-024	AKCH10-025	AKCH10-026	AKCH10-027	AKCH10-028	AKCH10-029	AKCH10-030	AKCH10-105	
Consecutive Station #	18	3	22	4	19	23	17	26	14	28	8	27	7	29	10	
Depth, m	30	37.5	44	31	31	44	22.5	45	19.5	44	30	36	24.5	25	38.5	
Species for Contaminants																**TOTALS**
Chlamys behringiana (scallop)																**2**
Clinocardium ciliatum (cockle)	1		1		1			1		1		1				**8**
Serripes groenlandicus (cockle)								1								**1**
Astarte borealis (clam)			1													**3**
Neptunea heros (gastropod)	1	1	1			1	1	1		1		1			1	**14**
Anonyx nugax (amphipod)												1		1		**5**
Argis dentata (gray shrimp)	1	1	1			1		1		1		1	1	1	1	**20**
Hyas coarctatus (Lyre crab)	1	1	1		1	1		1	1	1		1				**17**
Chionoecetes opilio (Snow crab)	1	1	1		1	1	1	1		1		1		1	1	**19**
Telmessus cheirogonus (Helmet crab)	1				1		1						1	1		**8**
Clupea pallasii (Pacific herring)			1							1						**3**
Mallotus villosus (Capelin)															1	**1**
Ammodytes hexapterus (Pacific sand lance)																**1**
Boreogadus saida (Arctic cod)																**2**

Table 3. Measurements of selected dominant invertebrate species at stations on the AKMAP Chukchi Sea Ledyard Bay 2010 cruise																
Date	9/1/2010		8/25/2010		8/26/2010		8/30/2010		9/3/2010		8/31/2010		8/25/2010		8/30/2010	
Station	AKCH10-004		AKCH10-010		AKCH10-014		AKCH10-015		AKCH10-016		AKCH10-019		AKCH10-020		AKCH10-021	
Consecutive Station #	25		5		9		20		31		22		4		19	
Depth, m	49		28.7		34.5		41.8		49		44		31		31	
Species for Measurements	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)
Hyas coarctatus (Lyre crab)*			17	38±9.61												
Chionoecetes opilio (Snow crab)**, ***	51	46.6±5.62			50	17±1.63	24	40.3±4.23	90	46.7±4.44	50	43.2±5.65			49	19.2±3.87
Telmessus cheirogonus (Helmet crab)**																
Echinarachnius parma (sand dollar)****			72	36.2±3.12									123	23.4±3.30		
Strongylocentrotus pallidus (sea urchin)****																
Date	8/31/2010		9/1/2010		8/28/2010		9/2/2010		9/2/2010		8/26/2010		9/2/2010		8/27/2010	
Station	AKCH10-022		AKCH10-024		AKCH10-025		AKCH10-026		AKCH10-028		AKCH10-029		AKCH10-030		AKCH10-105	
Consecutive Station #	23		26		14		28		27		7		29		10	
Depth, m	44		45		19.5		44		36		24.5		25		38.5	
Species for Measurements	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)	N	Mean±SD (mm)
Hyas coarctatus (Lyre crab)																
Chionoecetes opilio (Snow crab)**, ***	26	45±5.92	76	38.9±6.30			30	17.4±15.9	34	18.7±4.86			14	17.1±3.44	33	25.3±9.32
Telmessus cheirogonus (Helmet crab)**											50	36±5.15				
Echinarachnius parma (sand dollar)****																
Strongylocentrotus pallidus (sea urchin)****					50	49.3±4.33										

* = carapace length

** = carapace width

*** = % ovigerous females at stations: 016 = 30%;

004 = 10%; 022 = 4%; all others 0%.

**** = test width