ALASKA MONITORING AND ASSESSMENT PROGRAM

Freshwater Coastal

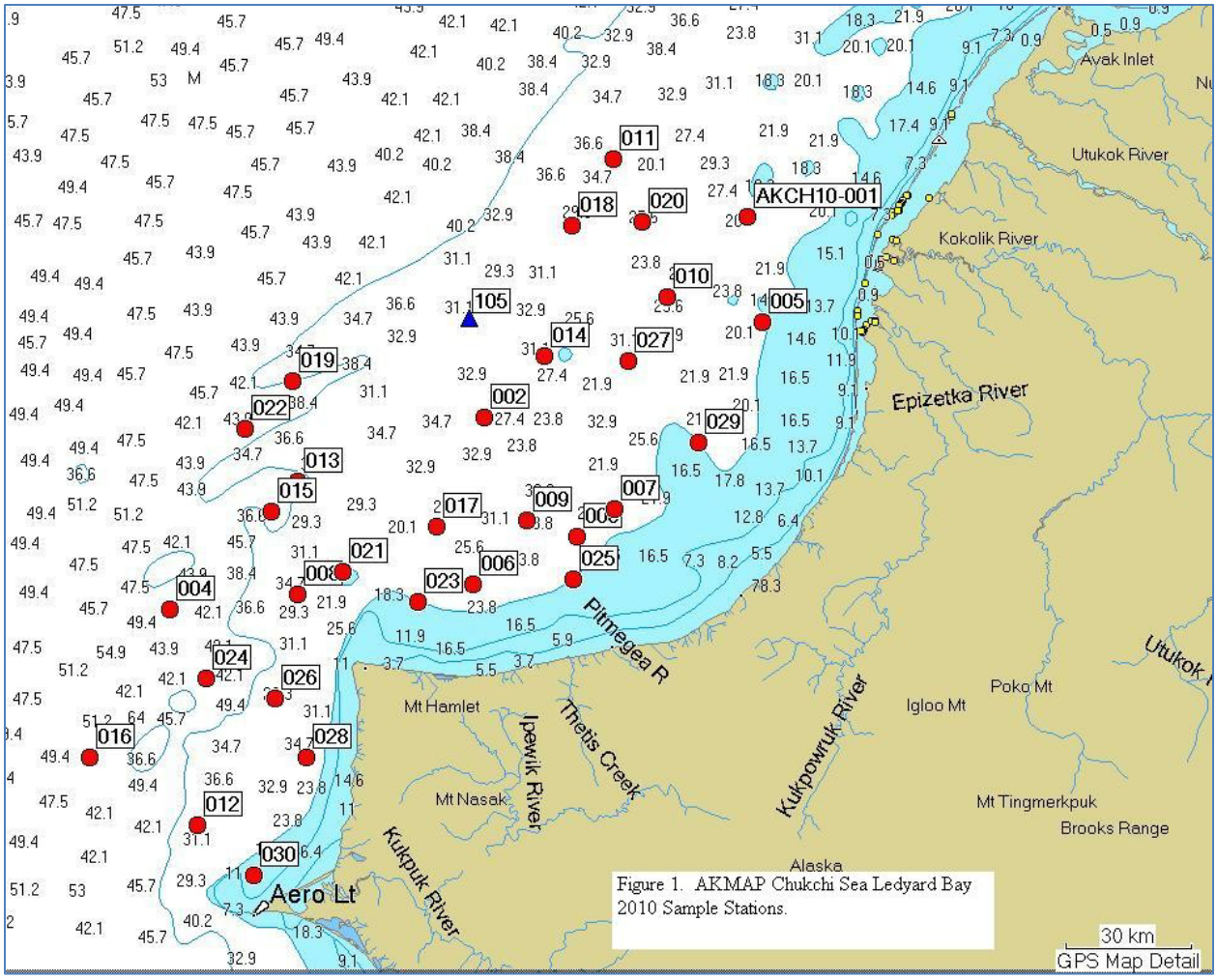
www.dec.alaska.gov/water/wqsar/monitoring/emap_Map.htm

2010 Cruise Report

Alaska Monitoring and Assessment Program (AKMAP)

Chukchi Sea 2010 Survey

Coastal Impact Assistance Program



Acknowledgement and Disclaimer

This report (study, brochure, poster, website etc.) is funded (in part) with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, Fish and Wildlife Service, U.S. Department of the Interior.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government.

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 Sound Ocean Systems 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	Brenda Holladay, UAF
Mate Scotty Hameister,	Heloise Chenelot, UAF	Nora Foster, UAF
Engineer Todd Campbell	Pat Rivera, UAF	Max Hoberg, UAF
Cook Joanne Molan	Roger Clark, Insignis	Amber Stephens, ARB, Inc.
Able Seaman Charlie Watson	Tim Obritschkewitsch, ABR, Inc.	
Able Seaman Jim Wells		

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

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

ALASKA MONITORING AND ASSESSMENT PROGRAM

Freshwater Coastal

www.dec.state.ak.us/water/akmap

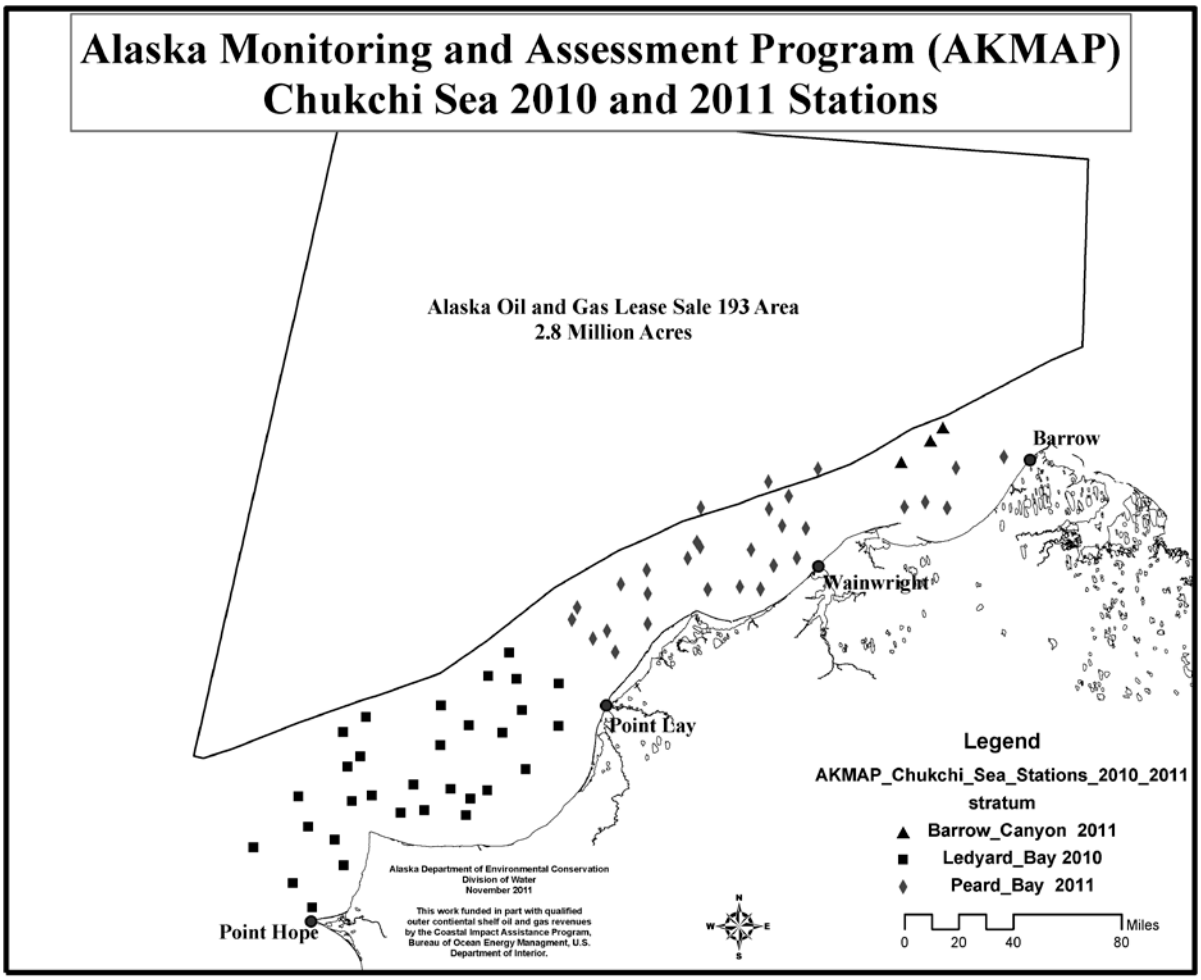
Cruise Report

Alaska Monitoring and Assessment Program (AKMAP) Chukchi Sea 2011 Coastal Impact Assistance Program Assessment

September 04 – September 17, 2011

Acknowledgements

This report is funded in part with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, Bureau of Ocean Energy Management, Regulation, and Enforcement, U.S. Department of the Interior.



Cruise Report

AKMAP Chukchi Sea 2011 Coastal Impact Assistance Program Assessment

September 04 – September 17, 2011

R/V *Norseman II*

The Alaska Department of Environmental Conservation (DEC) with its University of Alaska partner established an Alaska Monitoring and Assessment Program (AKMAP) focused on conducting aquatic resource surveys of Alaska's waters. DEC and the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences (UAF,SFOS) conducted research cruises in 2010 and 2011 to survey the Chukchi Sea coastal environment. In 2011, the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends Program joined this effort.

AKMAP used a statistical survey design for the Chukchi Sea assessment to provide for estimates of the spatial extent of water quality status based on stressors, such as chemical contaminants, water quality parameters (pH, temperatures, salinity, and 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 National Pollution Discharge Elimination System (NPDES) permits. The purpose of the 2011 cruise was to assess the water quality and ecological status of waters of the northeast Chukchi Sea, from Pt. Lay to Barrow, between the 10 and 50 meter water depths within the Beaufort-Chukchi Coastal – Shelf ecosystem.

The AKMAP sampling team departed Oliktok Point, at Prudhoe Bay, late on September 4th, on small lightering vessels to the R/V *Norseman II* and departed for AKCH11-031 just to the Northwest of Barrow, AK. We arrived on station at 19:30 on September 5th. The field team consisted of nine ship crew and 13 scientists. Stations sampled in 2011 are shown in Figure 1.

Station sampling proceeded progressively southward until September 11th, when we attempted to move south to AKCH11-050, near Pt. Lay, but were turned back by rough weather. At that point we returned to near Wainwright and sampled AKCH11-060, 048 and 058 on September 11th. That evening we moved south to AKCH11-050 and worked from the south northward to finish our final Base station, AKCH11-036 on September 15th. Over the 11-day sampling period, 30 Base stations were occupied, meeting our 100% completeness goal. No delays were experienced due to bad weather. Three stations were sampled on most days. Activities conducted at these three stations are shown in Table 1, with species associated with contaminant sampling listed in Table 2.

Upon completion of the 30 stations planned for 2011 we still had one field day remaining, losing no days to weather. Three stations, AKCH-062 (79 m), 064 (110 m) and 069 (98 m), (Figure 1) within the upper region of the Barrow Canyon target were selected for opportunistic sampling. Sediments encountered were fine sand with clay, with Station 064 containing a ubiquitous population of *Musculus discors*, which had formed thick byssal thread mats in the sediments.

Table 1. List of activities accomplished at stations on the AKMAP Chukchi Sea Peard Bay 2011 cruise

Date	Station Id	Consecutive #	Depth, m	Plankton Tow (Vertical and Oblique)	Drop Camera*	CTD/WQ Collections	Van Veen Sediment Grab [c]	Beam Trawl**	Otter Trawl***	Biological Contaminant samples	Biological Isotope samples
9/5/11	AKCH11-031	1	60	X		X		X	X	X	X
9/6/11	AKCH11-035	2	54	X		X	X	X	X	X	X
9/6/11	AKCH11-047	3	27	X	X	X	X	X	X	X	X
9/6/11	AKCH11-039	4	28	X	X	X	X				
9/7/11	AKCH11-053	5	25	X	X	X	X	X	X	X	X
9/7/11	AKCH11-043	6	53	X		X	X	X	X	X	X
9/8/11	AKCH11-044	7	57	X		X	X	X	X	X	X
9/8/11	AKCH11-049	8	52	X		X	X	X	X	X	X
9/8/11	AKCH11-059	9	51	X		X	X [d]	X	X	X	X
9/08/11 [a]	AKCH11-033	10	52	X		X	X [d]	X	X	X	X
9/9/11	AKCH11-051	11	53	X		X	X [d]	X		X	X
9/9/11	AKCH11-032	12	26	X	X	X	X	X	X	X	X
9/09/11 [a]	AKCH11-048	13	32	X	X	X	X	X	X	X	X
9/10/11	AKCH11-037	14	44	X		X	X	X	X	X	X
9/10/11	AKCH11-57	15	46	X		X	X	X		X	X
9/11/11	AKCH11-060	16	22	X	X	X	X	X	X	X	X
9/11/11	AKCH11-046	17	27	X	X	X	X	X	X	X	X
9/11/11	AKCH11-058	18	24	X	X	X	X	X	X	X	X
9/12/11	AKCH11-050	19	33	X	X	X	X	X	X	X	X
9/12/11	AKCH11-45	20	30	X	X	X	X	X	X	X	X
9/12/11	AKCH11-056	21	20	X	X	X	X	X	X	X	X
9/12/11 [a]	AKCH11-038	22	28	X	X	X	X	X	X	X	X
9/13/11	AKCH11-041	23	32	X	X	X	X	X		X	X
9/13/11	AKCH11-052	24	17	X	X	X	X	X	X	X	X
9/13/11 [a]	AKCH11-054	25	25	X	X	X	X	X	X	X	X
9/14/11	AKCH11-034	26	34	X	X	X	X	X	X	X	X
9/14/11	AKCH11-042	27	37	X	X	X	X	X	X	X	X
9/14/11 [a]	AKCH11-040	28	39	X		X	X	X	X	X	X
9/15/11	AKCH11-055	29	40	X		X	X	X		X	X
9/15/11	AKCH11-036	30	43	X		X	X	X	X	X	X
9/16/11	AKCH-062	31	70	X		X [b]	X				
9/16/11	AKCH-069	32	98	X		X [b]	X				
9/16/11	AKCH-064	33	110	X		X [b]	X	X	X	X	X
			Totals	33	17	33	32	30	26	30	30

a - Drop cam., Zooplankton tows, CTD and Van Veen conducted night before and beam and otter trawl sequence done next morning.

b - CTD profile only. No water samples.

c - Generally sediment chemistry and macroinvertebrates.

d -Sediment chemistry only no invertebrates.

* = 5 minutes

** = 2-5 minutes

*** = 10 minutes

Table 2. List of species collected for contaminants at stations on the AKMAP Chukchi Sea Peard Bay 2011 cruise

				Invertebrates										Fish					
Date	**Station Id**	**Consecutive Station #**	**Depth, m**	***Chlamys behringiana* (scallop)**	***Astarte borealis* (clam)**	***Neptunea heros* (gastropod)**	***Anonyx nugax* (amphipod)**	***Hyas coarctatus* (Lyre crab)**	***Chionoecetes opilio* (Snow crab)**	***Telmessus cheirogonus* (Helmet crab)**	***Argis lar (Northern Argid shrimp)***	***Sclerocrangon boreas (Sculptured shrimp)***	***Tecticeps sp. (Isopods)***	***L. fubricii***	***M. scorpius***	***G. tricuspus***	***Mallotus villosus* (Capelin)**	***A. hexapterus***	***Boreogadus saida* (Arctic cod)**
9/5/11	AKCH11-031	1	60	X			X	X				X							
9/6/11	AKCH11-035	2	54			X	X	X			X	X							
9/6/11	AKCH11-047	3	27		X	X	X				X								
9/6/11	AKCH11-039	4	28																
9/7/11	AKCH11-053	5	25			X	X			X	X			X	X	X			X
9/7/11	AKCH11-043	6	53					X											
9/8/11	AKCH11-044	7	57		X	X	X	X			X								
9/8/11	AKCH11-049	8	52			X	X	X	X		X	X							
9/8/11	AKCH11-059	9	51			X	X	X			X	X							
9/8/11	AKCH11-033	10	52			X	X	X	X		X	X							
9/9/11	AKCH11-051	11	53				X	X			X	X							
9/9/11	AKCH11-032	12	26				X						X						
9/9/11	AKCH11-048	13	32				X	X			X								
9/10/11	AKCH11-037	14	44			X		X			X	X							
9/10/11	AKCH11-057	15	46			X		X			X	X							
9/11/11	AKCH11-060	16	22			X	X			X	X	X		X	X	X	X		X
9/11/11	AKCH11-046	17	27				X				X	X					X		
9/11/11	AKCH11-058	18	24				X	X			X				X	X	X		X
9/12/11	AKCH11-050	19	33			X		X	X		X	X							
9/12/11	AKCH11-045	20	30			X		X			X	X		X	X	X	X		X
9/12/11	AKCH11-056	21	20							X	X							X	
9/12/11	AKCH11-038	22	28					X			X	X				X		X	
9/13/11	AKCH11-041	23	32			X		X	X		X								
9/13/11	AKCH11-052	24	17								X						X	X	
9/13/11	AKCH11-054	25	25				X	X			X	X							
9/14/11	AKCH11-034	26	34					X	X		X	X							
9/14/11	AKCH11-042	27	37					X	X		X								
9/14/11	AKCH11-040	28	39			X		X			X	X							
9/15/11	AKCH11-055	29	40			X		X			X								
9/15/11	AKCH11-036	30	43			X	X	X			X								
9/16/11	AKCH-062	31	70																
9/16/11	AKCH-069	32	98																
9/16/11	AKCH-064	33	110						X			X							
			Total	1	2	16	16	22	7	3	26	17	1	3	4	5	5	3	4

Station sampling activity typically occurred, in the following sequence: drop camera; vertical and oblique zooplankton tow; conductivity, temperature and depth (CTD) profiles (with some auxiliary measurements); Niskin bottle water samples; Van Veen grab sediment collection; beam trawl and otter trawl. The drop camera was deployed to record/characterize the benthic substrate; only 17 sites were within the depth range (~45 m) of the system. A two to five minute video was recorded on DVD as a station reference.

Voucher specimens were collected and photographs were taken to enhance subsequent reports. Organisms from each station were also collected for stable isotope analyses, which will help us to understand the existing food web. All biological, sediment, and water samples were preserved (frozen, ETOH, formalin, nitric acid, or refrigerated) on board. At cruise completion, samples will be analyzed at either at UAF or Texas A&M Geological Environmental Research Group (GERG) laboratory. Analytes that are typically run on the collected environmental media (water, sediments, and tissues) are shown in Table 3.

Table 3 – Analytes

Analytes	Water (Individual Niskin bottles*)	Marine Sediments	Biological Tissue Samples
Dissolved Nutrients	X		
Chlorophyll a	X		
Sediment Chlorophyll a		X	
Total Suspended Solids	X		
pH, Salinity, Dissolved Oxygen (CTD check sampled)	X		
Dissolved Inorganic Carbon, Total Alkalinity, and pH (for pCO_2)	X		
Trace Metals		X	X
Hydrocarbons		X	X
PCB's & Organochlorine pesticides		X	X
Total Organic Carbon		X	
Total Inorganic Carbon		X	
Sediment Grain Size		X	
Stable Isotopes (^{13}C&^{15}N)		X	X
% Lipids			X

Holo- and meroplanktonic organisms and cnidarians were sampled at a total of 33 stations. Two gears, each having two collection nets, were deployed at each station. A 10 minute double oblique tow with 505 µm mesh nets was conducted with the ship was underway at an average of two knots to target larger more mobile zooplankton. A five minute vertical haul with 150 µm nets while the ship was stationary was done to capture smaller more fragile zooplankton. General Oceanic flow meters were mounted in all nets to calculate volume of water filtered and Star-Oddi temperature depth recorders (TDRs) were attached to the vertical frames for an accurate record of deployment depth. Samples from the "A" nets were preserved for species composition, abundance and biomass analysis. Samples from the "B" net were preserved in ethanol for genetic sequencing. If the A sample was compromised due to jellyfish the B sample was then preserved.

The CTD (SBE 25 attached to a SBE 55) was operated autonomously rather than in real-time as the Eco-Winch wire line cable had a break occur in the conductor wire at an unknown location during the previous cruise. Water collections occurred with Niskin bottles from the two meter depth, mid-depth and two to three meters off the bottom, using either a SBE 55 timed mode or the SBE 55/SBE25 pressure sequence setting. At the 33 stations conductivity, pressure and temperature measurement profiles were taken. Due to problems, which were overcome, fluorescence, pH, dissolved oxygen and PAR were not taken at the first 15 stations. After the 15th station (057), casts were also taken with a SBE 19Plus that provided backup CTD measurements. The CTD data were downloaded daily and backed up nightly. Water samples were taken at the three depths for dissolved nutrients, chlorophyll a, and total suspended solids. No water samples were collected at the Barrow Canyon stations, 062, 069 and 064. Samples were also taken at the two meter depth for a dissolved inorganic carbon, total alkalinity and pH for Dr. Jeremy Mathis for ocean acidification assessment (pCO_2 measurements). No Niskin bottle water samples were collected at the Barrow Canyon stations, 062, 069 and 064. On board measurements for pH and refractometer salinity checks were made on water samples collected from the Niskin bottles. A limited number of modified Winkler method dissolved oxygen checks were also completed as part of the Quality Control and Assurance.

Benthic infaunal, sediment grain size, and chemistry samples were collected using a double Van Veen sediment sampler. Rocks and cobble at four sites prevented the collection of sediment samples. Three replicate benthic infaunal samples from 26 sites were washed on a 1mm mesh screen. One benthic infaunal sample will be processed for taxonomic identification, and the remaining two will be held for future processing, which depends on funding.

Demersal fishes and epibenthic invertebrates were sampled from beam trawl hauls, and fishes were sampled from otter trawl hauls. 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 stations, with the exception of AKCH11-062, 069 and 039 where no trawls were conducted. 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 28 sites. 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.

Marine bird and marine mammal transect observations were conducted by respectively by Tawna Morgan and Amber Stephens of ABR, Inc. Presence of sea birds or marine mammals did not impact the cruise operations. Once the transect data are analyzed a report will be provided to AKMAP.

On September 17th, the AKMAP scientific team departed the Norsemann II at Wainwright. The success of this cruise was attributed to the following outstanding personal:

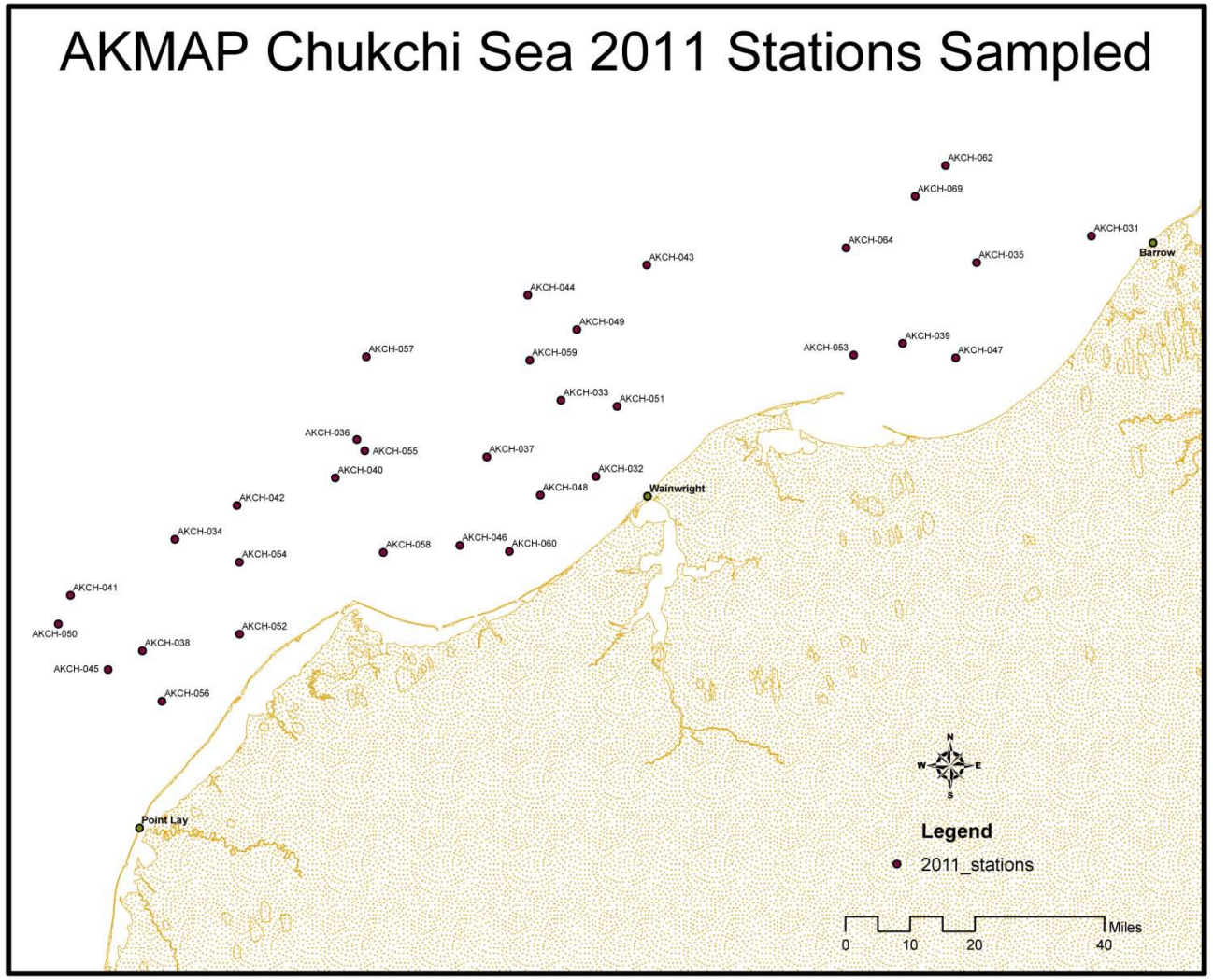
Crew of the R/V *Norseman II*	Scientific Crew
Captain Jack Molan	Terri Lomax, DEC
Mate Perry Seyler	Brenda Holladay, UAF
Engineer Todd Campbell	Patricia Rivera, UAF
Engineer David Christenson	Heloise Chenelot, UAF
Cook Evan Dunaway	Nora Foster, Contractor
Cook Joanne Molan	Max Hoberg, UAF
Boatswain Scott Hameister	Roger Clark, Contractor
Able Seaman Charlie Watson	Ian Hartwell, NOAA
Able Seaman Jim Wells	Jennifer Questel, UAF
	Benjamin Gray, UAF
	Amber Stephens, ARB, Inc.
	Tawna Morgan, ABR, Inc.

Douglas Dasher, Ph.D., ADEC, Affiliate Professor UAF SFOS
Chief Scientist
September 28, 2011

Note:

Station depths provided here are all final updated values that correct all recorded depths logged before September 13th. The Norseman II (NII) reported a discrepancy in reported depths on Sept 13, 2011. It was determined that depth has been over reported by ~8m from the onset of the cruise. In programming the NII fathometer to account for ship berth a 12 ft correction was added, later for our cruise the instrument was changed to report depth in meters. The 12 foot correction was not converted correctly to meters therefore depths were exaggerated by 12 meters. The correct conversion should have been ~ 4 meters. Station depths and corresponding calculations were adjusted by subtracting ~ 8 meters (12m – 4 m) from reported depths. Stations occupied on September 13th, (AKCH11-041) to the end of the cruise are assumed to be the correct depth.

Figure 1 - 2011 AKMAP Chukchi Sea Stations



AKMAP CIAP Chukchi Sea 2011 Vessel and Scientific Crew

ALASKA MONITORING AND ASSESSMENT PROGRAM

Freshwater Coastal

www.dec.state.ak.us/water/akmap

Cruise Report

Alaska Monitoring and Assessment Program (AKMAP) Chukchi Sea 2012
Coastal Impact Assistance Program

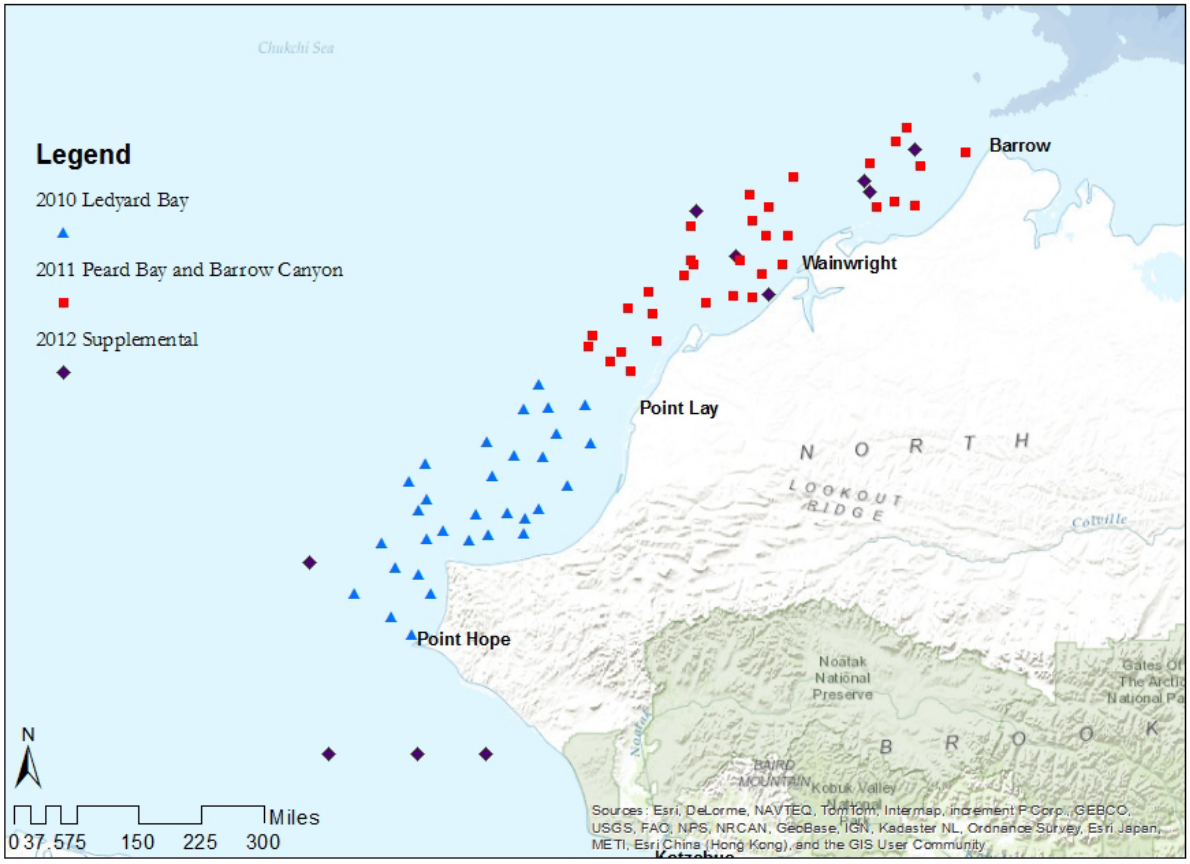
August 5 – 15, 2012

Acknowledgements

This report is funded (in part) with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, Fish and Wildlife Service, U.S. Department of the Interior.

NOAA provided major support in providing the NOAA *Fairweather* to support our sampling effort in 2012.

Alaska Monitoring and Assessment Program (AKMAP)
Chukchi Sea 2010-2012 Stations



Acknowledgment: This work is funded (in part) with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, Fish and Wildlife Service, U.S. Department of the Interior.

Cruise Report

AKMAP Chukchi Sea 2012 Coastal Impact Assistance Program Assessment

August 5-15, 2012

R/V *Norseman II*

The Alaska Department of Environmental Conservation (DEC) with its University of Alaska partner established an Alaska Monitoring and Assessment Program (AKMAP) focused on conducting aquatic resource surveys of Alaska's waters. DEC and the University of Alaska Fairbanks, School of Fisheries and Ocean Sciences (UAF, SFOS) conducted research cruises in 2010 and 2011 to survey the Chukchi Sea coastal environment. In 2011, the National Oceanic and Atmospheric Administration (NOAA) National Status and Trends Program joined this effort. In 2012, the NOAA Alaska Coordinators' office offered berth space to AKMAP aboard the NOAA ship *Fairweather*. This opportunity would have allowed AKMAP to sample deeper locations in the Barrow Canyon area and to samples locations missed in previous years.

AKMAP used a statistical survey design for the Chukchi Sea assessment to provide for estimates of the spatial extent of water quality status based on stressors, such as chemical contaminants, water quality parameters (pH, temperatures, salinity, and 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 Alaska Pollution Discharge Elimination System (APDES) permits. The purpose of the 2012 cruise was to collect targeted samples from Barrow Canyon and southern Chukchi Sea locations for comparisons with the 2010 and 2011 sample results.

The AKMAP sampling team departed Kotzebue, AK on August 5th, to the *Fairweather* and departed for AKCH12-004 just to the southeast of Point Hope, AK. We arrived on station at 12:18 on August 7th. The field team consisted of 3 scientists. Stations sampled in 2012 are shown in Figure 1.

Station sampling was planned in a zig-zag pattern along the ships hydrograph survey lines as sites came in proximity to planned lines, instead sites were sampled opportunistically due to sea ice. Although the 2012 sea ice was at the lowest recorded levels, a large pack of sea ice was circulating in the Chukchi Sea region, with a large part of our sampling area covered by this ice. The *Fairweather* was very accommodating in navigating around and through ice patterns in an attempt to reach our stations. Unfortunately, we were not able to reach the Barrow Canyon and northwest Chukchi stations. Over the 11-day sampling period, 10 targeted stations were occupied. Multiple delays were experienced due to ice patterns and navigational concerns. Activities conducted at stations are shown in Table 1, with species associated with contaminant sampling listed.

Table 1. Summary of data collected during the AKMAP 2012 Chukchi Sea Survey.

Date Sampled	Time	Site ID	Consecutive #	Depth (m)	Latitude	Longitude	CTD Collection	Van-Veen Grab	Air Hydrocarbon Sample
8/7/2012	12:18	**AKCH12-004**	1	37	67.64635	-165.553	NOAA	X	
8/7/2012	3:44	**AKCH12-003**	2	44	67.64187	-166.7421	NOAA	X	X
8/7/2012	8:20	**AKCH12-002**	3	45	67.64663	-168.2814	NOAA	X	
8/8/2012	9:05	**AKCH12-001**	4	53	68.87859	-168.6154	NOAA	X	X
8/9/2012	21:50	**AKCH12-005**	5	52	71.08437	-158.8609	NOAA	X	
8/12/2012	21:55	**AKCH12-006**	6	84	71.14049	-158.9712	NOAA	X	
8/13/2012	1:37	**AKCH12-009**	7	112	71.31950	-158.0881	NOAA	X	
8/14/2012	4:25	**AKCH12-DF005**	8	40	70.97517	-161.8952	NOAA	X	
8/14/2012	7:00	**AKCH12-DF003**	9	38	70.70988	-161.1877	NOAA	X	
8/14/2012	9:50	**AKCH12-DF001**	10	13	70.49602	-160.6245	NOAA	X	

Date Sampled	Time	Site ID	Specimens collected for contaminant analysis		
8/7/2012	12:18	**AKCH12-004**			
8/7/2012	3:44	**AKCH12-003**			
8/7/2012	8:20	**AKCH12-002**	snails	bi-valves	
8/8/2012	9:05	**AKCH12-001**			
8/9/2012	21:50	**AKCH12-005**			
8/12/2012	21:55	**AKCH12-006**	bi-valves		
8/13/2012	1:37	**AKCH12-009**			
8/14/2012	4:25	**AKCH12-DF005**			
8/14/2012	7:00	**AKCH12-DF003**	polychaetes		
8/14/2012	9:50	**AKCH12-DF001**	amphipod	clams	brittle star

Station sampling activity typically occurred, in the following sequence: air hydrocarbon sample collection (randomly chosen sites); conductivity, temperature and depth (CTD) profiles; and Van-Veen grab sediment collection.

Macroinvertebrate samples were collected, though due to time constraints only a single sample was collected at each station. At some stations biological samples were also taken for potential contaminant or stable isotope analyses. All biological, and sediment samples were preserved (frozen, formalin, or refrigerated) on board. Samples will be analyzed at either at UAF or Texas A&M Geological Environmental Research Group (GERG) laboratory. Analytes that are typically run on the collected environmental media (sediments and tissues) are shown in Table 2.

Table 2. Analytes

Analytes	Marine Sediments	Biological Tissue Samples
Hydrocarbons	X	X
PCB's & Organochlorine pesticides	X	X
Sediment Chlorophyll a	X	
Sediment Grain Size	X	
Stable Isotopes (^{13}C&^{15}N)	X	X
Total Inorganic Carbon	X	
Total Organic Carbon	X	
Trace Metals	X	X
% Lipids		X

Data was collected by Fairweather and the DEC AKMAP scientific crew. The CTD profile was performed by *Fairweather's* hydrogragh survey crew. Benthic infaunal, sediment grain size, and chemistry samples were collected by AKMAP using a double Van Veen sediment sampler. Rocks and cobble at one site prevented the collection of sediment samples. Benthic infaunal samples from all sites were washed on a 1mm mesh screen. The benthic infaunal samples will be processed for taxonomic identification. Marine bird and marine mammal observations were conducted by *Fairweather* crew. Once the *Fairweather* collected data are analyzed a report will be provided to AKMAP.

On August 16th, the AKMAP scientific team departed the *Fairweather* in Barrow, AK. The success of this cruise was attributed to the following outstanding personal:

Crew of the NOAA *Fairweather*	Scientific Crew
Commander James Crocker	Douglas Dasher, UAF
Executive Office Lt. Matthew Jaskoski	Terri Lomax, DEC
	Ian Hartwell, NOAA

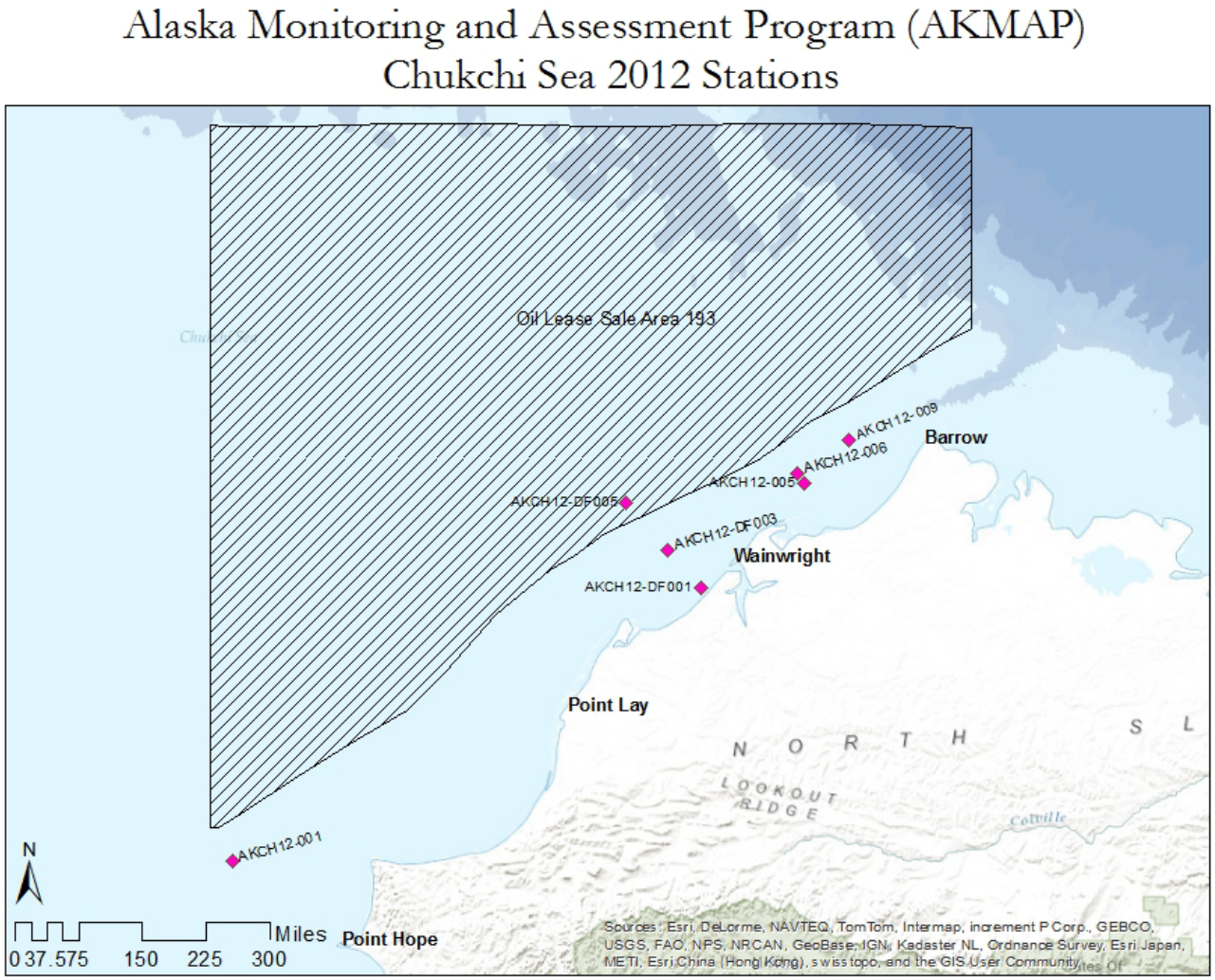
Numerous other hydrograph, ship support and engineering crew of the NOAA *Fairweather*.

Douglas Dasher, Ph.D., Affiliate Professor UAF SFOS
Chief Scientist
March 20, 2013

Disclaimer

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Government. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Government.

Figure 1 - 2012 AKMAP Chukchi Sea Stations



Acknowledgment: This work is funded (in part) with qualified outer continental shelf oil and gas revenues by the Coastal Impact Assistance Program, Fish and Wildlife Service, U.S. Department of the Interior.

AKMAP CIAP Chukchi Sea 2012 Scientific Crew

Dr. Doug Dasher (UAF) and Dr. Ian Hartwell (NOAA), from right to left

Terri Lomax (ADEC)