Cruise Report

Alaska Monitoring and Assessment Program

Oil/Gas Wastewater Study - Simpson Lagoon and Gwydyr Bay 2014
Coastal Impact Assistance Program

August 5 – August 14, 2014

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Cruise Report

AKMAP Simpson Lagoon and Gwydyr Bay Oil/Gas Wastewater Study

In August of 2014 the Alaska Department of Environmental Conservation (DEC) and University of Alaska Fairbanks Institute of Marine Science (IMS) under the Alaska Monitoring and Assessment Program (AKMAP) conducted a Beaufort Sea Oil/Gas Wastewater Study in Simpson Lagoon and Gwydyr Bay. Originally the study was planned in western Harrison Bay, due to unsafe sea conditions the study was shifted to Simpson Lagoon and Gwydyr Bay (Figure 1). The goal of the survey is to address information gaps relevant to Ocean Discharge Criteria Evaluation of State lease sale areas relating to oil and gas development in the Beaufort Sea Study, objectives are to:

- Determine baseline concentrations of hydrocarbons and trace metals in amphipods and mysids; and
- Conduct a limited assessment of water quality and sediment condition based on EPAs National Coastal Condition Assessment methodology.

The randomized survey design allows valid population estimates of the spatial distribution of environmental parameters, such as sediment trace metal concentrations, with 95% upper confidence bounds.

Field Study Redesign

Gale force winds and high seas along the Beaufort Sea coast made sampling in Harrison Bay dangerous. Safety was our main concern, the R/V Ukpik and our team remained docked at West Dock pending weather improvement for the first five days of our charter. The weather pattern continued to deteriorate and it became unlikely that we would be able to sample western Harrison Bay within our charter schedule (August 5 - 14, 2014).

Douglas Dasher, Chief Scientist, in discussion with Terri Lomax, DEC project manager, and Captain Mike Fleming, R/V Ukpik, made the decision to relocate the sampling efforts to the closest region that could be safely sampled. Simpson Lagoon and Gwydyr Bay were selected due to proximity, historic and current oil and gas activities, and protection provided by barrier islands. A target population was delineated within a zone where depth was expected to be approximately 1.5 to 2 meters. Note that due to the recent weather conditions the seawater level was equivalent to about a -1 foot tide, based on data from NOAA Prudhoe Bay, AK - Station ID: 9497645.

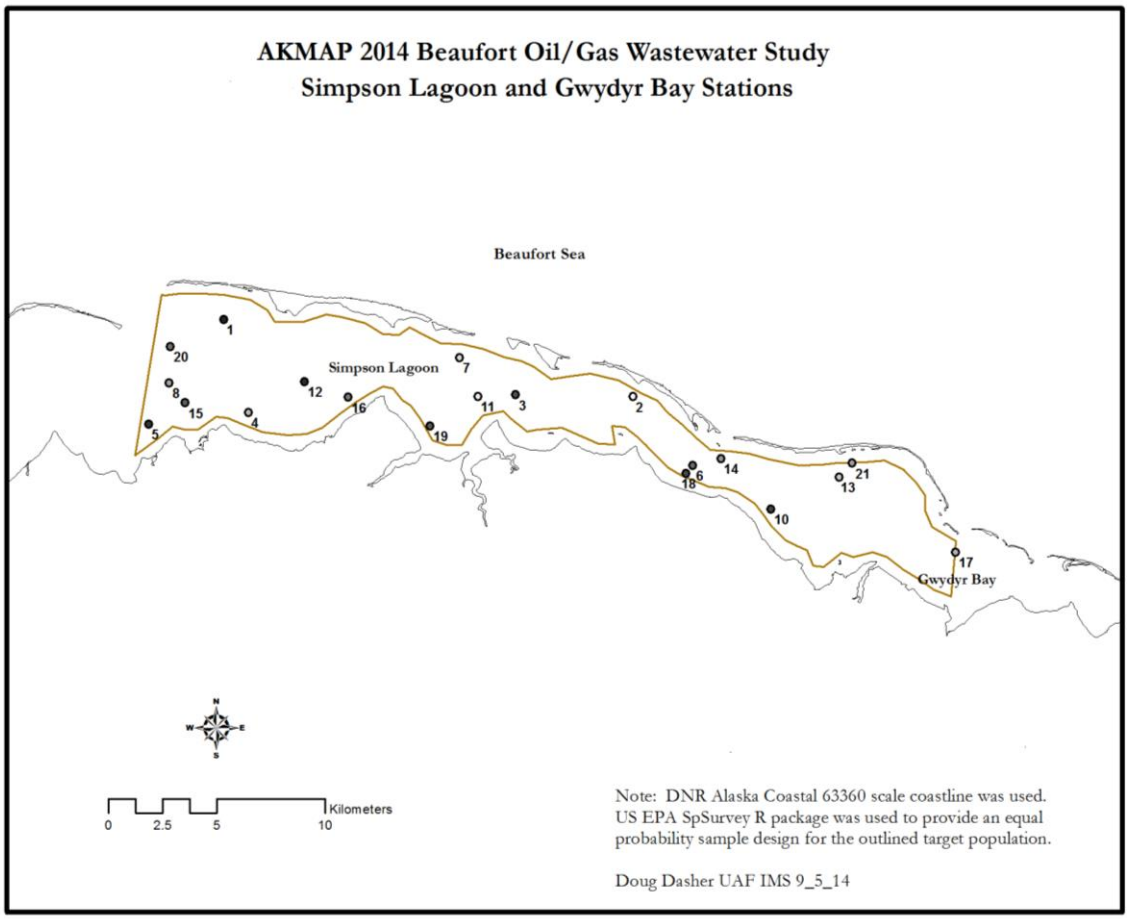

Figure 1

Planned Sampling Sequence

At each station the following sequence of sampling events occurred:

1. Confirm site location within ± 0.02 nm (37m) against vessel GPS readings.
2. Anchor the boat to stay within the site radius.
3. The following water and sediment sampling activities are carried out in the listed order:
    a. Collect water sample for chlorophyll a, nutrients, salinity, pH and DO analysis from a 0.5 meter depth.
    b. Water column is profiled with a Seabird 19plus SeaCAT CTD profiler for conductivity, dissolved oxygen, pH and pressure (depth).
    c. Collect sediment samples with a Ponar 0.05 m^2 grab sampler for benthic infaunal abundance, and sediment grain size and chemical analysis.
4. Deploy amphipod and mysid traps overnight and recover in the morning.

Stations and Sampling Activities

Sampling activities occurred August 10th -13th and are detailed in Table 1. Station coordinates are provided in Table 2. The tables include the 20 sampled stations, including duplicates, and 1 attempted station (AKSL-09). The attempted station was too shallow for us to sample and was replaced with AKSL-21.

Discussion

While unable to accomplish our study as originally planned at west Harrison Bay, an alternate plan that maintained the original design objectives was developed for 20 stations in Simpson Lagoon and Gwydyr Bay. The number of stations were reduced as the time period remaining under the R/V Ukpik charter only allowed 4 sampling days. The project was able to complete the planned sampling of water column and sediments at 20 stations. From August 10th – 12th, twelve amphipod and mysid traps were set. The first set of traps set out on the 10th may not have stayed on the bottom, which was corrected for subsequent sampling. Amphipods and mysids proved scarce and none were collected in the 12 sampling attempts. At test of the amphipod trap earlier while at West Dock did show the trap could collect amphipods.

It was not possible to positively establish why the traps did not collected amphipods and mysids, though previous scientific studies in the region have encountered periods of scarcity. The minnow trap mesh was small enough to collect the size amphipods of interest, but would have allowed escape of smaller amphipods. The weather and sea conditions may have stirred up marine sediments in our sampling region, or caused altered currents, which may have interfered with the collection of amphipods and mysids.

Sampling Team

The success of this cruise was attributed to the following personal:

Crew of the R/V Ukpik	Field Scientific Team (Figure 2)
Captain Mike Fleming	Amber Bethe, DEC
	Douglas Dasher, UAF
	Max Hoberg, UAF
	Brian Stillie, DEC

Figure 2 - AKMAP Field Sampling Team. From left to right– Amber Bethe, Max Hoberg, Doug Dasher, and Brian Stillie.

Terri Lomax, DEC, while unable to assist with field sampling did provide support through the study design, implementation and demobilizing. Bad weather continued to plague us even after field work was completed. Heavy fog prevented our departure from Deadhorse, Alaska as planned on August 15, the fog lifted and we were finally able to fly home on August 17th.

Douglas Dasher, Ph.D., Research Professional V UAF IMS
Chief Scientist
September 15, 2014

Table 1

Table 1. List of activities accomplished at stations on the 2014 AKMAP Beaufort Sea Simpson Lagoon and Gwydyr Bay Survey												
Date	10-Aug	10-Aug	10-Aug	10-Aug	10-Aug	10-Aug	11-Aug	11-Aug	11-Aug	11-Aug	11-Aug	11-Aug
Station ID (abbreviated)	**13**	**14**	**06**	**18**	**02**	**03**	**07**	**19**	**11**	**16**	**16D**	**12**
Depth, ft	6.6	8.5	7	6.3	6.8	7	4.7	6.8	6.6	5.4	5.4	7.1
Depth, m	2	2.6	2.1	1.9	2.1	2.1	1.4	2.1	2	1.7	1.7	2.2
ACTIVITY												
Water samples												
Total Nutrients	X	X	X	X	X	X	X	X	X	X	X	X
Dissolved Nutrients	X	X	X	X	X	X	X	X	X	X	X	X
Chlorophyll a	X	X	X	X	X	X	X	X	X	X	X	X
Microbial	X	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CTD Profile	X	X	X	X	X	X	X	X	X	X	X	X
Sediment Samples												
Organic	X	X	X	X	X	X	X	X	X	X	X	X
Inorganic	X	X	X	X	X	X	X	X	X	X	X	X
TOC	X	X	X	X	X	X	X	X	X	X	X	X
Carbonate	X	X	X	X	X	X	X	X	X	X	X	X
Grain Size	X	X	X	X	X	X	X	X	X	X	X	X
Macro -invertebrates	X	X	X	X	X	X	X	X	X	X	X	X
Carbon & Nitrogen Isotopes	X	X	X	X	X	X	X	X	X	X	X	X
Microbial	X	X	X	NS	NS	NS	X	X	X	NS	NS	NS
Amphipod & Mysid Traps	X	X	X	X	NS	NS	X	X	X	X	NS	NS

Table 1. List of activities accomplished at stations on the 2014 AKMAP Beaufort Sea Simpson Lagoon and Gwydyr Bay Survey											
Date	12-Aug	12-Aug	12-Aug	12-Aug	12-Aug	12-Aug	13-Aug	13-Aug	13-Aug	13-Aug	13-Aug
Station ID (abbreviated)	**04**	**01**	**20**	**08**	**15**	**05**	**10**	**09***	**21**	**17**	**17D**
Depth, ft	7.1	6.5	7.6	7.4	6.8	7.3	4.5	>4	5.6	4.2	4.2
Depth, m	2.2	2	2.3	2.3	2.1	2.2	1.4	>1.2	1.7	1.3	1.3
ACTIVITY											
Water samples											
Total Nutrients	X	X	X	X	X	X	X	NS	X	X	X
Dissolved Nutrients	X	X	X	X	X	X	X	NS	X	X	X
Chlorophyll a	X	X	X	X	X	X	X	NS	X	X	X
Microbial	NS	NS	NS	NS	X	NS	NS	NS	NS	NS	NS
CTD Profile	X	X	X	X	X	X	X	NS	X	X	X
Sediment Samples											
Organic	X	X	X	X	X	X	X	NS	X	X	X
Inorganic	X	X	X	X	X	X	X	NS	X	X	X
TOC	X	X	X	X	X	X	X	NS	X	X	X
Carbonate	X	X	X	X	X	X	X	NS	X	X	X
Grain Size	X	X	X	X	X	X	X	NS	X	X	X
Macro - invertebrates	X	X	X	X	X	X	X	NS	X	X	X
Carbon & Nitrogen Isotopes	X	X	X	X	X	X	X	NS	X	X	X
Microbial	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Amphipod & Mysid Traps	X	X	X	X	X	X	NS	NS	NS	NS	NS

* This station was attempted, but not sampled due to depth <4 feet. Oversample station AKSL-21 was sampled instead.

Table 2 – Sampled Stations Coordinates

Latitude	Longitude	Station ID
70.55331	-149.650	AKSL14-01
70.50888	-149.161	AKSL14-02
70.51319	-149.302	AKSL14-03
70.51356	-149.628	AKSL14-04
70.51131	-149.75	AKSL14-05
70.47816	-149.094	AKSL14-06
70.53055	-149.367	AKSL14-07
70.52817	-149.721	AKSL14-08
70.45734	-149.004	AKSL14-10
70.51359	-149.348	AKSL14-11
70.52484	-149.557	AKSL14-12
70.46866	-148.918	AKSL14-13
70.48016	-149.06	AKSL14-14
70.51927	-149.704	AKSL14-15
70.51702	-149.505	AKSL14-16
70.43317	-148.785	AKSL14-17
70.47498	-149.103	AKSL14-18
70.50265	-149.409	AKSL14-19
70.54342	-149.717	AKSL14-20
70.47403	-148.901	AKSL14-21

Datum - NAD83 Alaska Albers Equal Area USGS