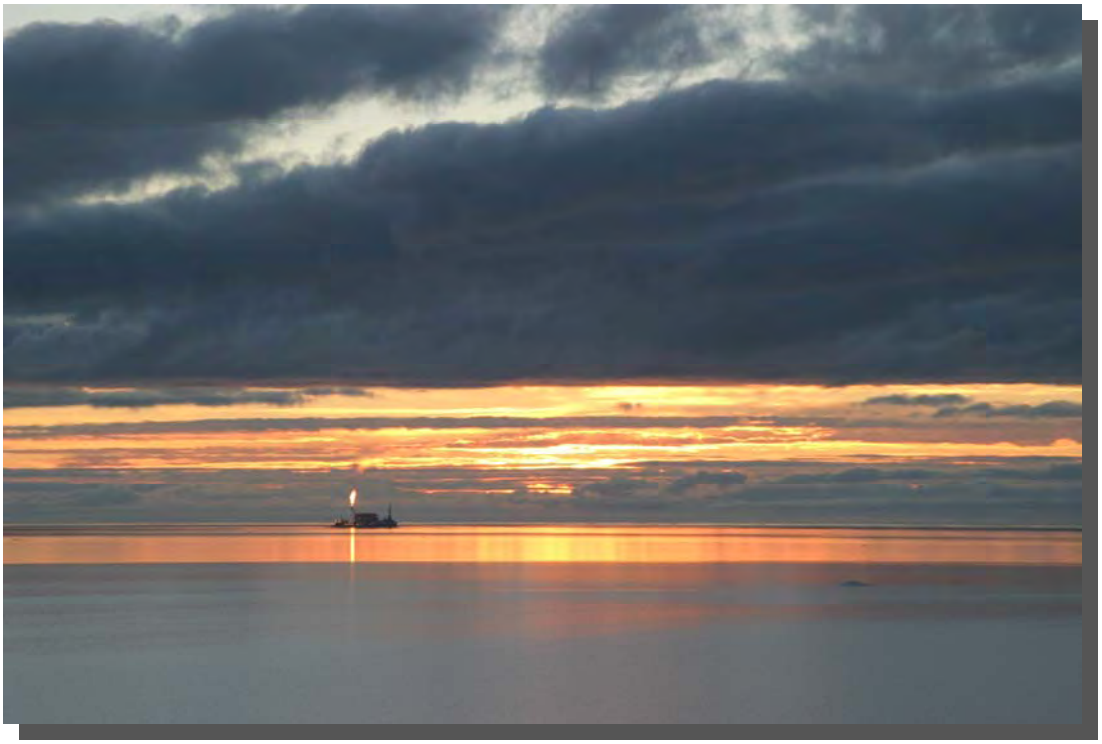
Appendix E

Field Reports

2004 Field Survey Report

Continuation of Arctic Nearshore Impact Monitoring in the Development Area (cANIMIDA)

Summer 2004 Field Survey Report



Report to

Minerals Management Service
Anchorage, AK

Report by

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The Business of Innovation

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1.0 Introduction

MMS Vessel 1273

As part of the Minerals Management Service (MMS) program entitled "Continuation of Arctic Nearshore Impact Monitoring in the Development Area" (cANIMIDA), the first summer-season field survey of this program (fifth summer survey overall, including ANIMIDA) was conducted from July 28, 2004 to August 17, 2004. The scientific crew, on board the MMS Vessel 1273, collected water, sediment, and tissue samples for physical and chemical analyses. Work also included deployment and retrieval of moorings with caged mussels and semi-permeable membrane devices (SPMDs), setting fish traps, trawling, and collection of shoreline coordinates from the program study area. This report summarizes the field activities and samples collected during the 2004 cANIMIDA summer field survey.

The following bulleted items describe components successfully completed during the 2004 cANIMIDA summer sampling survey:

- Collected 51 surface sediment samples (0 to 1 cm) for hydrocarbon and metals chemistry from 47 offshore stations. Stations were comprised of 16 historic Beaufort Sea Monitoring Program (BSMP) stations, 22 historic Northstar island and Northstar pipeline stations, seven historic Liberty stations, and two new Liberty locations. Samples included triplicates at 2 stations, and additional samples at two stations with coordinate location discrepancies.
- Collected current and turbidity profiles at 20 stations (18 offshore and 2 river locations). Collected 109 suspended sediment samples from one to eight depth strata at the same 20 locations.
- Collected six large volume water samples for organic contaminant analysis; three from Northstar, two from the BSMP, and one from the Liberty area.
- Deployed and retrieved six moorings, three adjacent to Northstar, one in the Liberty area, and two in the BSMP area. Each mooring had single mussel cages and paired semi-permeable membrane device (SPMD) systems.
- Collected 19 bivalve/amphipod/isopod samples. For amphipods, six samples were collected from the Northstar area, four from the BSMP (includes two replicates at one location), and two from the Liberty area. For bivalves, three samples were collected from the BSMP and two from the Liberty area. For isopods, one sample was collected from the BSMP and one from the Northstar area.
- Collected one crude oil source sample from Northstar.
- Delivered all field samples to analytical laboratories for appropriate analyses.

2.0 Schedule

The summer 2004 cruise was conducted from July 28 to August 17, 2002. There were three days lost in the first week, and a half day lost in the final week, due to high winds and seas causing unsafe working conditions. Ice conditions during the survey were favorable, and did not impact sampling efforts. Members of the field team arrived in Prudhoe Bay, Alaska during July 26-28. Initial "check-out" of MMS Vessel 1273 was performed on July 26 and 27 by ship captain Mark Mertz of TEG Oceanographic Services (TEG). Field sampling personnel was comprised of seven staff from three organizations; two staff from Battelle, four from the Florida Institute of Technology (FIT), and one from Kinnetic Laboratories (KLI). The scientific team and ship's captain conducted the work on a 12 to 20 hours/day basis, depending on operating conditions and logistic considerations.

3.0 Cruise Operations and Samples Collected

The MMS Vessel 1273 served as the survey platform for the summer 2004 field work. The MMS Vessel 1273 underwent extensive maintenance and retrofit of electronic equipment during the winter of 2003-2004. The vessel was delivered to Prudhoe Bay, Alaska by MMS prior to the survey and launched after inspection by MMS and TEG representatives. The MMS Vessel 1273 was also used to retrieve current meters for the MMS University of Alaska Coastal Marine Institute (CMI) program at the end of the cANIMIDA survey. A complete list of the sampling stations that were targeted and sampled in the study area is included in Table 1. Table 1 also provides the station type, latitude and longitude, depth, date and time of sampling, and the type of sample (sample matrix). Figure 1 shows the locations of the 2004 sampling stations in the cANIMIDA study area on a series of maps. Additional daily survey and sampling station information is included in the Daily Operations Logs (Attachment 1), Station Logs (Attachment 2), and Fish Sampling Logs (Attachment 3). The following narrative summarizes the field survey timeline.

Mussels in holding container with aeration prior to deployment

July 26 (Monday)

The ship's Captain (Mark Mertz) arrives at Deadhorse, AK, inspects MMS Vessel 1273, and takes custody of the vessel after inspection.

July 27 (Tuesday)

Vessel 1273 maintenance and shakedown cruise is performed in Prudhoe Bay. The captain familiarizes himself with the new electronic equipment, and remedied several minor issues remaining from the winter repairs and truck transport to Prudhoe Bay.

Field team members John Trefry, Bob Trocine, Matt Alkire (FIT) and Gary Lawley (KLI) arrive at Deadhorse, AK. The team mobilizes field and laboratory equipment/supplies at the British Petroleum (BP) Seawater Treatment Plant (STP) Facility.

Field team members John Hardin, Mike Walsh (Battelle) and Greg Delfosse (FIT) receive North Slope safety training in Anchorage.

July 28 (Wednesday)

Field team members Hardin, Walsh and Delfosse acquire BP badges in the morning, and travel to Deadhorse in the afternoon.

The field team at STP mobilizes the vessels (1273 and two inflatables) and sets up water processing laboratory at STP.

July 29 (Thursday)

Amphipod traps are deployed and retrieved at three locations within the Northstar area. Three subsurface moorings are deployed at Northstar. Each mooring is comprised of one mussel cage with ~40 mussels in a Nytex tube, two SPMD cages (four SPMDs, two in each cage), and an acoustic pinger (Figure 2).

Deploying mussel/SPMD mooring w/acoustic pinger

July 30 (Friday)

Three moorings are deployed (one at Liberty, two at BSMP locations). "Zero time" (not deployed) mussels (three samples), one SPMD field blank, and one hydraulic fluid QC sample are collected. Hydraulic fluid leak at the remote steering station (where equipment and supplies were stored) was repaired during the day. Sediment samples are collected at two BSMP locations. Anchor 1273 at West Dock.

July 31 - August 1 (Saturday – Sunday)

Winds of 25 – 50 kts prevail. Sea conditions are unsafe for sampling. Attempt was made to sample on 1 August, but team abandons attempt. River shoreline mapping for erosion studies is completed along the Sagavanirktok ('Sag') River.

August 2 (Monday)

Sediment samples are collected from seven locations within the Liberty and BSMP areas. Water is collected from two Liberty locations and one transect location (E0). One amphipod and three clam samples are collected from Liberty and BSMP areas.

August 3 (Tuesday)

Sediment samples are collected from seven locations within Liberty and BSMP areas. Water is collected from two locations (one Liberty, one BSMP). Amphipods are collected from two BSMP stations. Anchor is lost under moving iceberg during water sampling. The anchor was replaced the same day by John Tremont of MMS and shipped via airfreight from Anchorage to Deadhorse.

August 4 (Wednesday)

Winds of 25 – 40 kts and rough seas prevail; conditions are again unsafe for sampling. Sediment and tissue samples are shipped to the Battelle Duxbury laboratory.

August 5 (Thursday)

Sampling team split into two groups.

The water/sediment team collects water from seven locations (six transect and one BSMP location). Sediment is collected from one BSMP location.

The fish team deploys fyke net at Point Brower.

Van Veen grab with sediment sample

August 6 (Friday)

The water/sediment team collects sediment samples from 11 Northstar locations, and samples water at four locations (three on transect K and one at Northstar).

The fish team collects fish from the fyke net set at Point Brower. Fish are processed for tissue chemistry, estrogen-mediated suppression of cytochrome P4501A (CYP1A), and bile is removed for metabolites of fluorescent aromatic compounds (FACs) at the STP Conex building.

Dick Prentki, MMS' Contracting Officer's Technical Representative (COTR), arrives at Deadhorse.

August 7 (Sunday)

The water/sediment team collects water from two transect locations and sediment from five Northstar locations.

The fish team collects fish from Point Brower, removes net from Point Brower, and processes fish at STP. The fyke net is set at Stump Island in the afternoon.

August 8 (Monday)

The water/sediment team sets two minnow traps baited with sardines close to Northstar Island to test an alternative fish collection method. Water is collected from one BSMP, one transect, and two Northstar locations. Sediment is collected from one Northstar and three BSMP locations. Amphipods are collected from one Northstar location.

The FIT team completes their water sampling, processes their final samples, and begins packing samples and equipment.

The fish team collects fish in the morning from Stump Island net, re-sets the net, and processes samples at STP. Fish are then collected in the afternoon, the net is re-set, and the second batch of fish is processed in the evening.

August 9 (Tuesday)

The water/sediment team retrieves minnow traps from Northstar. No fish were caught, only isopods and a few amphipods. Larger traps than the minnow traps with live bait, such as isopods, might be more suitable to catch small bottom fish such as sculpin and flatfish/sand dabs and could be considered for future surveys.

Surface water sample collection near flow ice

The water/sediment team collects sediment from five Northstar locations and five BSMP locations. Amphipods are collected from one Northstar location, and clams from one BSMP location. One large volume water sample is collected from Northstar and filtered using the Infiltrex unit at STP in the evening.

The fish team collects fish from Stump Island, removes fyke net, and processes fish samples at STP.

FIT team completes de-mobilization of equipment and supplies. Three FIT staff depart Deadhorse, John Trefry remains.

August 10 (Wednesday)

Sediment, tissue and fish samples are shipped to Battelle Duxbury in the morning. Re-fueled 1273 with 200 gallons of diesel fuel and fill water tanks.

One large volume water sample was collected in the afternoon from Northstar and the sample was filtered in the evening.

August 11 (Thursday)

The single water/sediment/fish team transits to Tigvariak Island. One large volume water sample was collected from a BSMP station on the way to Tigvariak. The water sample was filtered on the 1273. Fyke net was deployed at Tigvariak. A second large volume water sample was collected from a BSMP station, and the sample was filtered while anchored at Tigvariak Island.

John Trefry departs Deadhorse.

Collecting fish from fyke net at Tigvariak

August 12 (Friday)

Fish were collected from the fyke net in the morning, the net was re-set, and the samples were process on the 1273. Clams were collected from a BSMP location in the afternoon. The fyke net was re-sampled in the evening and removed, and the samples were processed. Returned to anchor at Tigvariak Island.

August 13 (Saturday)

Two mussel/SPMD moorings (one Liberty and one BSMP location) were retrieved. Amphipod traps were set at two Liberty locations and fish were collected by trawling at Liberty. Amphipods were retrieved from one location. One large volume water sample was collected from Liberty and processed. Returned early to Endicott Island due to building winds and seas.

Collecting bile sample for FACS analysis

August 14 (Sunday)

Mussel/SPMD mooring was retrieved from a BSMP location. The amphipod trap set on 13 August was retrieved, but there were not enough organisms to keep the sample. A too long of a deployment appears to cause amphipods to lose interest in the Nytex™ wrapped bait (i.e., the bait is not available to eat, so the amphipods leave). Returned to West Dock.

August 15 (Monday)

Moorings were retrieved from three Northstar locations. Fish were collected by trawling at Northstar. A large volume water sample was collected from Northstar and the sample was filtered at STP in the evening.

The field sampling was completed for the 2004 cANIMIDA summer season.

August 16 (Tuesday)

De-mobilized equipment and supplies, and shipped samples.
Re-fueled 1273 with 200 gallons of diesel, and re-filled the water tanks.

August 17 (Wednesday)

Equipment and gear were shipped in the morning.

A Northstar crude sample was received and shipped in the evening. This is the one source sample that was collected on this trip.

Battelle and KLI staff depart Deadhorse. Mark Mertz remains to captain 1273 for the University of Alaska (UA) survey.

August 18 (Thursday) – 2 September (Thursday)

UA staff arrived on 19 August. UA equipment arrives by 21 August. The UA mooring deployment efforts were affected by several weather days, but the work was successfully completed. Mark Mertz supervises the removing of the 1273 from the water and prepares the vessel for the winter. Mertz returns to California on 2 September.

4.0 Sampling Procedures

The sampling procedures that were used were consistent with those used during the Summer 2002 program (MMS 2002), and were described in the Summer 2004 Field Logistics and Sampling Plan for the Minerals Management Service ANIMIDA Program (MMS, 2004). One additional sample type, filtered large volume (100L) water samples for organic analytes, was added to the cANIMIDA 2004 survey, and such water samples were collected from six locations.

Sampling procedures included:

- water conductivity, temperature, and depth (CTD) measurements
- water current measurements with the CTD/Doppler current meter

Sieving sediment for clams

- water sample collection via pump system from offshore suspended sediment stations, and via hand at shoreline river stations
- surface sediment grab sample collection using a modified Van-Veen grab (for sediments and bivalves)
- deployment and retrieval of amphipod traps
- deployment and retrieval of mussel cages and SPMDs from six fixed moorings
- collection of fish samples by fyke net at three locations, and by trawling at two locations
- collection of large volume water samples at six locations
- DGPS measurements of shoreline sections

Photo documentation, station logs, and field notes were recorded during the field survey. The daily operations logs are included in Attachment 1, the station logs for each sampling station are included in Attachment 2, and the fish sampling logs are included in Attachment 3. The station logs include a description of the sampling location, observations, number and type(s) of samples collected, and comments.

5.0 Technical Issues

There were no significant technical difficulties during this survey. The sampling went smoothly, with a normal amount of weather days (3.5). As expected, collecting sufficient fish offshore with a small otter trawl was difficult and returned a minimal amount of fish for analysis. Other approaches for collecting fish should be considered for future surveys. There were no permit problems with mussel collection and transport, partly because of lessons learned as part of the 2002 survey.

6.0 References

Minerals Management Service. 2002. Summer 2002 Field Sampling and Logistics Plan. July 2002.

Minerals Management Service. 2004. Summer 2004 Field Sampling and Logistics Plan. July 22, 2004.

Table 1. cANIMIDA Stations Sampled in the Summer 2004 Survey

Station ID	Station Type	Latitude[1] (WGS84)	Longitude[1] (WGS84)	Date
3A	BSMP	70° 16.9327	147° 05.4570	30-Jul; 11,12,13-Aug
3B	BSMP	70° 17.9035	147° 02.5445	30-Jul
4A	BSMP	70° 18.4539	147° 40.2372	3-Aug
4B	BSMP	70° 21.0155	147° 40.0320	3-Aug
4C	BSMP	70° 26.0898	147° 42.9757	3-Aug
5(0)	BSMP	70° 22.7435	147° 00.3850	3-Aug
5(1)	BSMP	70° 25.0763	148° 03.5628	5-Aug
5(10)	BSMP	70° 27.3238	148° 30.0676	8-Aug
5(5)	BSMP	70° 26.0820	147° 18.0805	3-Aug
5(5) - L1	BSMP	-	-	
5(5a)	BSMP	70° 26.0079	148° 18.8205	8-Aug
5A	BSMP	70° 29.6986	148° 46.0600	9-Aug
5B	BSMP	70° 34.8745	148° 55.1429	9-Aug
5D	BSMP	70° 24.4578	148° 33.5676	8-Aug
5E	BSMP	70° 38.3621	149° 16.3576	9-Aug
5F	BSMP	70° 26.4946	148° 49.5346	9-Aug
5H	BSMP	70° 22.2280	147° 47.8581	2,11,14-Aug
E0	Other	70° 23.0036	148° 00.0271	2-Aug
E1	Other	70° 23.9972	148° 00.1264	5-Aug
E2	Other	70° 26.0057	148° 00.0680	5-Aug
E3	Other	70° 27.9779	148° 06.1030	5-Aug
K0	Other	70° 26.3959	148° 41.8500	7-Aug
K1	Other	70° 27.6797	148° 41.2676	6-Aug
K2	Other	70° 28.3053	148° 40.1109	6-Aug
K3	Other	70° 28.9968	148° 38.8059	6-Aug
K4	Other	-	-	
K5	Other	-	-	
L01	Liberty	70° 17.9321	148° 40.0906	2-Aug
L01A	Liberty	70° 18.9281	147° 33.9044	11-Aug
L04	Liberty	70° 17.0604	147° 40.0976	2-Aug
L06	Liberty	70° 16.9242	147° 34.0839	2,13-Aug
L07	Liberty	70° 16.7760	147° 32.0016	2-Aug
L08	Liberty	70° 16.7007	147° 30.3426	2-Aug
L09	Liberty	70° 16.5705	147° 27.2041	2-Aug
L14	Liberty	70° 17.0095	147° 34.744	13-Aug
L17	Liberty	70° 23.6088	147° 32.9282	3,13-Aug
L18	Liberty	70° 18.3738	147° 45.6664	3,13-Aug
MZ	QA/QC	NA	NA	30-Jul
N01	Northstar	70° 31.6679	148° 41.4653	8-Aug
N02	Northstar	70° 30.5390	148° 41.3394	7-Aug
N03	Northstar	70° 30.0202	148° 41.4901	7,8-Aug
N04	Northstar	70° 29.6787	148° 48.0977	9,15-Aug
N05	Northstar	70° 29.6337	148° 44.6996	7,10,15-Aug
N06	Northstar	70° 29.5591	148° 43.2685	7,9,15-Aug
N07	Northstar	70° 29.5703	148° 40.0925	6-Aug
N08	Northstar	70° 29.4281	148° 38.3250	6-Aug
N09	Northstar	70° 29.3405	148° 35.1494	6-Aug
N10	Northstar	70° 29.0187	148° 41.7696	6-Aug
N11	Northstar	70° 28.4650	148° 42.0122	29-Jul; 6-Aug
N12	Northstar	70° 27.3503	148° 42.1061	29-Jul; 6-Aug
N13	Northstar	70° 26.9832	148° 43.5749	29-Jul; 9-Aug
N14	Northstar	70° 25.9829	148° 40.3584	9-Aug
N15	Northstar	70° 26.7197	148° 44.5858	9-Aug
N16	Northstar	70° 29.9089	148° 42.3907	7-Aug
N17	Northstar	70° 29.8177	148° 40.3584	6-Aug
N18	Northstar	70° 29.0908	148° 42.2610	6,7-Aug
N19	Northstar	70° 29.1251	148° 40.5610	6-Aug
N20	Northstar	70° 27.9697	148° 41.6865	6-Aug
N21	Northstar	70° 26.8124	148° 41.7302	9-Aug
N23	Northstar	70° 29.3749	148° 41.9297	6-Aug
N24a	Northstar	70° 38.6646	148° 39.1849	8-Aug
N25	Northstar	70° 29.7314	148° 43.9868	15-Aug
PB1	Other	70° 24.2655	148° 31.3879	7-Aug
PBS	Liberty	70° 17.5583	147° 48.1414	7-Aug
S2	Other	70° 24.3032	148° 14.1992	5,8-Aug
S4	Other	70° 25.7847	148° 14.1101	5-Aug
S5	Other	70° 26.5846	148° 14.0971	5-Aug
SIS	Northstar	70° 25.9079	148° 41.5673	8-Aug
SK1	Other	-	-	
SK2	Other	-	-	
SK4	Other	-	-	
SK6	Other	-	-	
SK7	Other	-	-	
SK8	Other	-	-	
TGV	Tigvariak Island	70° 12.4541	147° 14.2344	12-Aug
TOTALS				

[1] Only one coordinate provided per station, even when multiple visits or trawls were made

Table 1 (cont.). cANIMIDA Stations Sampled in the 2004 Summer Survey

Station ID	Sample Type								
	Sediment	Water	LV Water	Amphipods	Isopods	Bivalve (Clams)	Deployed Mussel_ SPMD	Fish	Field Blanks
3A	1		1			1	1		
3B	1								
4A	1			1					
4B	1								
4C	1	0							
5(0)	1			2	1				
5(1)	1	1							
5(10)	1								
5(5)	1	1							
5(5) - L1		0							
5(5a)	1								
5A	1								
5B	1			1					
5D	1								
5E	1								
5F	1					1			
5H	1		1			1	1		
E0		1							
E1		1							
E2		1							
E3		1							
K0		1							
K1		1							
K2		1							
K3		1							
K4		0							
K5		0							
L01	1	1							
L01A	1								4
L04	1	1		1					
L06	3		1				1		
L07	1								
L08	1					1			
L09	1					1			
L14								5	
L17	1	1							
L18	1			1					
MZ							3		
N01	1	1							
N02	1								
N03	1			1	1				
N04	1		1	1			1		2
N05	1		1				1		
N06	3		1				1		
N07	1								
N08	1								
N09	1								
N10	1								
N11	1			1					
N12	1			1					
N13	1			1					
N14	1								
N15	1								
N16	1								
N17	1								
N18	1			1					
N19	1								
N20	1								
N21	1								1
N23	1	1							
N24a		1							
N25								5	
PB1		1							
PBS								78	
S2		2							
S4		1							
S5		1							
SIS								83	
SK1		0							
SK2		0							
SK4		0							
SK6		0							
SK7		0							
SK8		0							
TGV								66	
TOTALS	51	21	6	12	2	5	9	237	7

KEY	
1	Indicates number of samples collected
1	Indicates samples collected at unplanned location
0	Indicates proposed sample not collected.

Table 1 (cont.). cANIMIDA Stations Sampled in the 2004 Summer Survey

Station ID	Comments
3A	Two SPMDs samples and one container of mussels.
3B	
4A	
4B	
4C	Water samples not collected, site beyond influence of suspended solids from rivers.
5(0)	Extra amphipod sample collected. Oportunistic isopod sample collected.
5(1)	Water station added within area containing suspended solids from rivers.
5(10)	
5(5)	
5(5) - L1	Water samples not collected, site beyond influence of suspended solids from rivers.
5(5a)	Error in coordinates for 5(5). 5(5a) added at correct location.
5A	
5B	
5D	
5E	
5F	
5H	Two SPMDs samples and one container of mussels.
E0	
E1	
E2	
E3	
K0	Water station added within area containing suspended solids from rivers.
K1	
K2	
K3	
K4	Water samples not collected, site beyond influence of suspended solids from rivers.
K5	Water samples not collected, site beyond influence of suspended solids from rivers.
L01	
L01A	Error in coordinates for L01. L01A added at correct intended location for L01.
L04	
L06	Two SPMDs samples and one container of mussels.
L07	
L08	
L09	
L14	5 total samples (from 10 fish) (2 PHC/MET, 3 CYP1A) Multiple fish/jar.
L17	New station added in Liberty area.
L18	New station added in Liberty area.
MZ	Zero time Mussels
N01	Water station added within area containing suspended solids from rivers.
N02	
N03	Oportunistic isopod sample collected.
N04	
N05	
N06	
N07	
N08	
N09	
N10	
N11	
N12	
N13	
N14	
N15	
N16	
N17	
N18	
N19	
N20	
N21	
N23	Water station added within area containing suspended solids from rivers.
N24a	Water station added within area containing suspended solids from rivers.
N25	5 total samples (from 19 fish) (3 PHC/MET, 2 CYP1A) Multiple fish/jar.
PB1	
PBS	78 total samples (25 PHC/MET, 32 CYP1A, and 21 bile)
S2	Two samples collected, one Aug 5 and one on Aug 8 to assess temporal changes.
S4	
S5	
SIS	83 total samples (28 PHC?MET, 31 CYP1A, 24 bile)
SK1	Water samples not collected, site beyond influence of suspended solids from rivers.
SK2	Water samples not collected, site beyond influence of suspended solids from rivers.
SK4	Water samples not collected, site beyond influence of suspended solids from rivers.
SK6	Water samples not collected, site beyond influence of suspended solids from rivers.
SK7	Water samples not collected, site beyond influence of suspended solids from rivers.
SK8	Water samples not collected, site beyond influence of suspended solids from rivers.
TGV	66 total samples (20 PHC/MET, 30 CYP1A, 16 Bile)
TOTALS	

Additional Blanks/Source material samples
SPMD Trip Blanks
Absorbent pad wipe of hydraulic fluid
Absorbent pad wipe of diesel fuel
Northstar composite crude oil

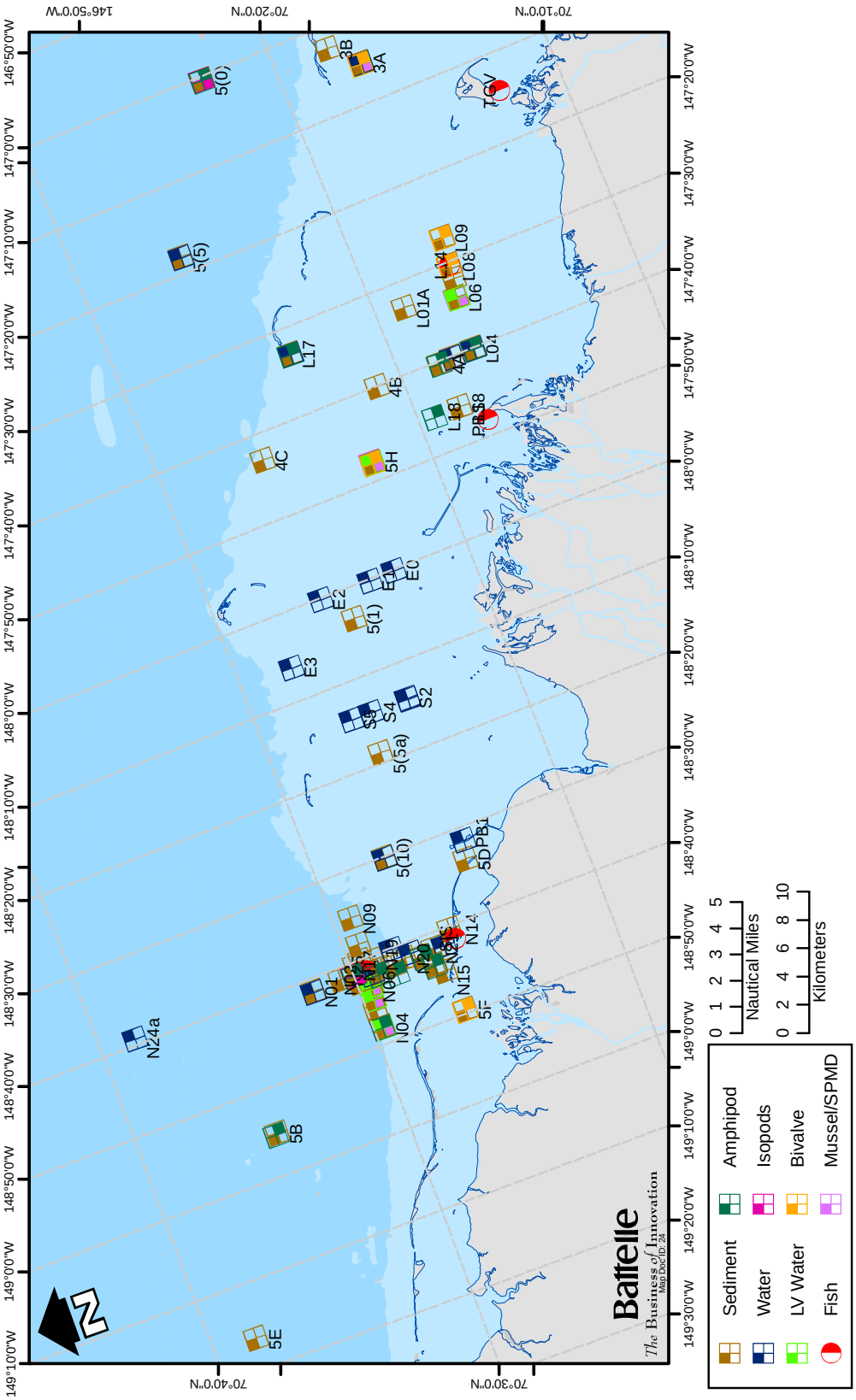

Figure 1. cANIMIDA Summer 2004 Sampling Stations
All Stations

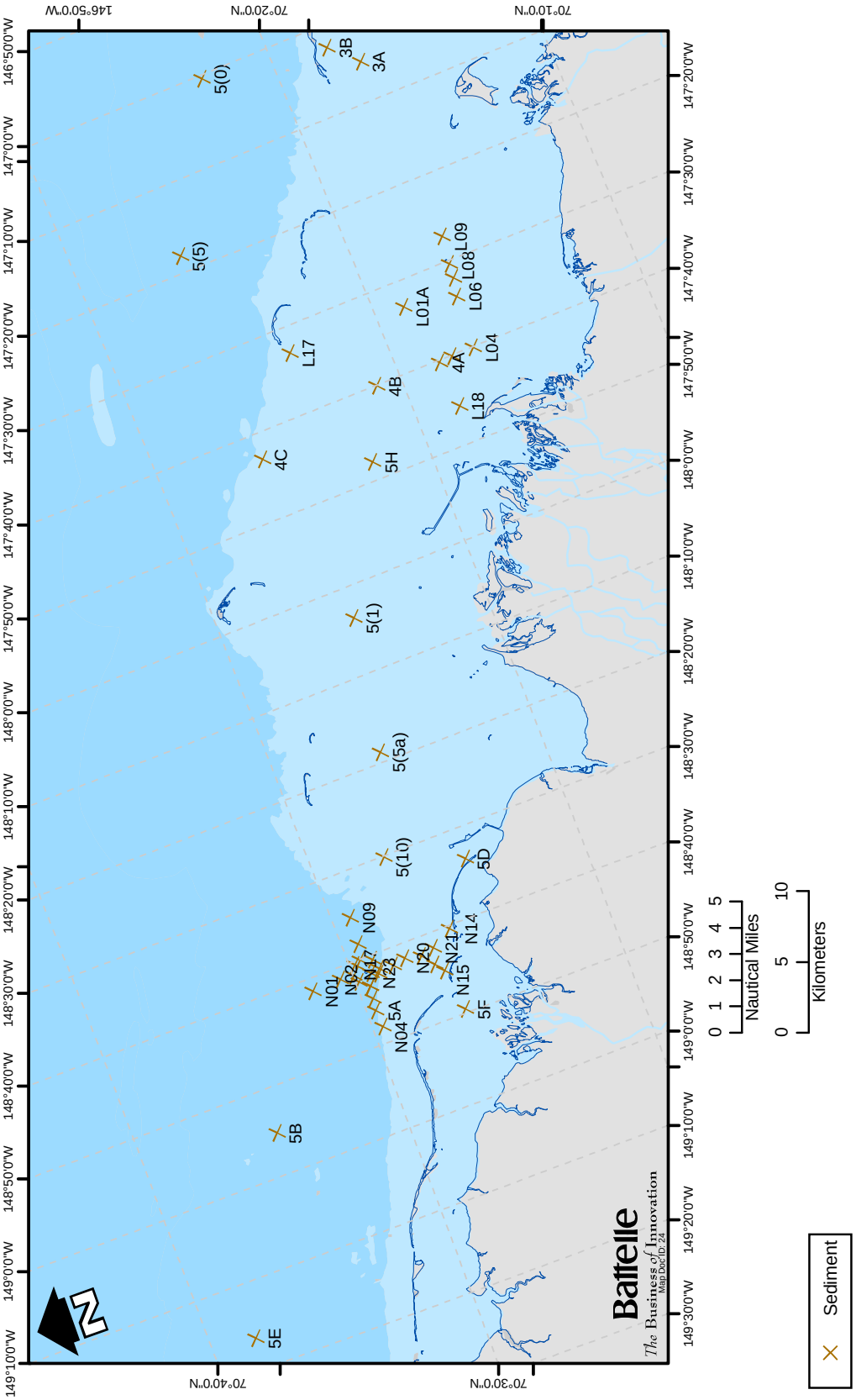

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations Sediment Stations

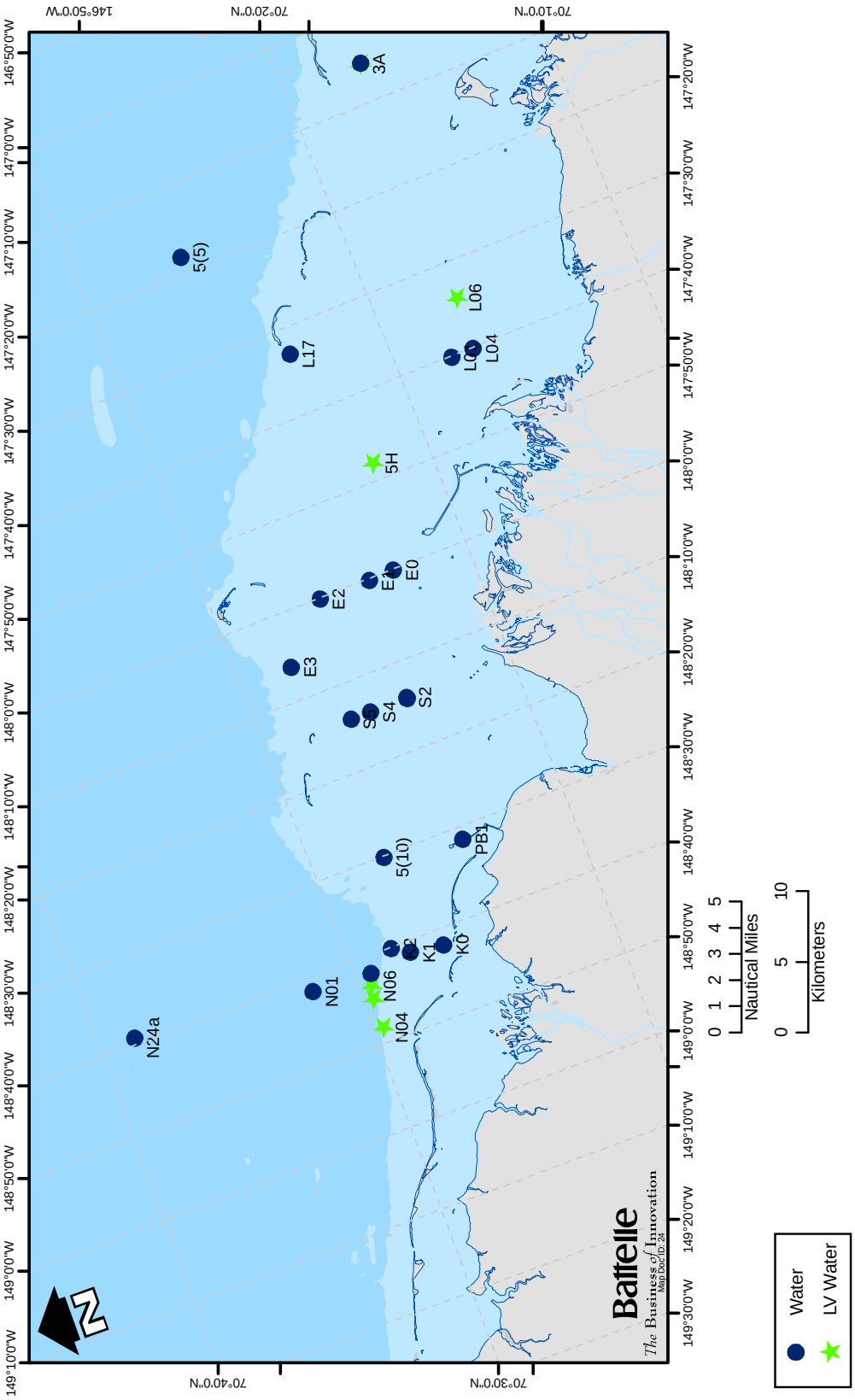

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations Standard Water and Large Volume Water Stations

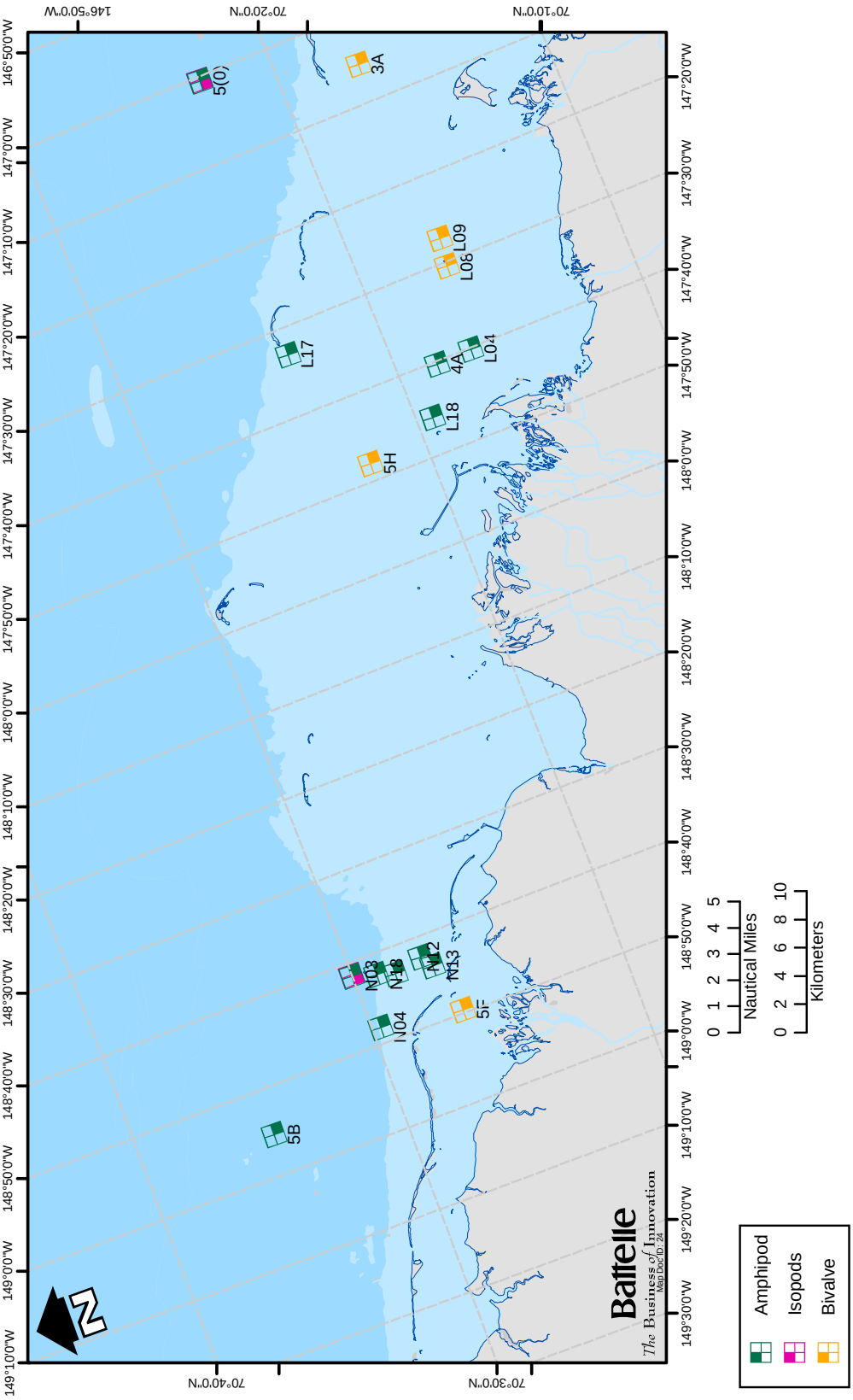

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations Amphipod and Bivalve (clam) Stations

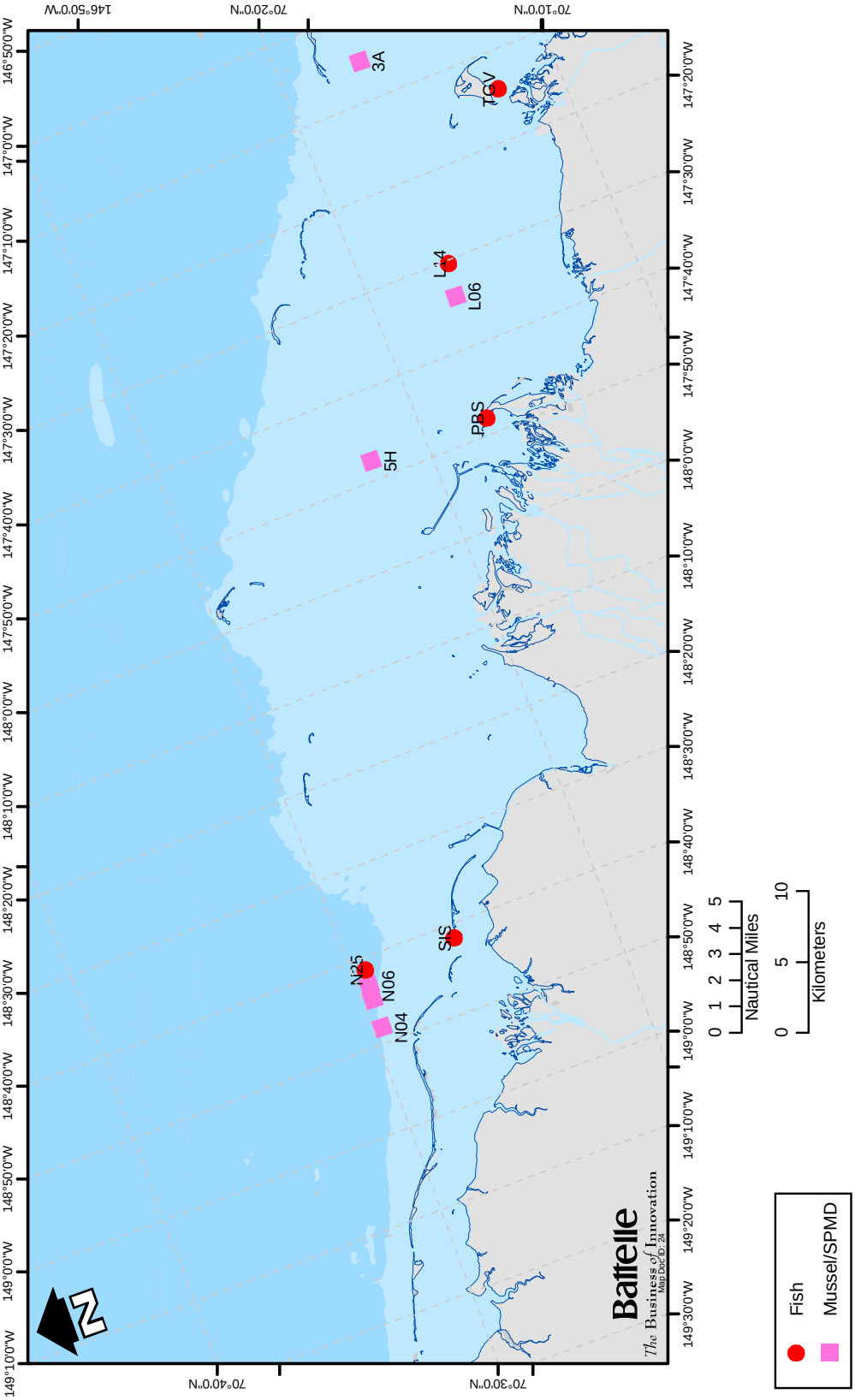

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations Fish Collection and Mussel/SPMD Deployment Stations

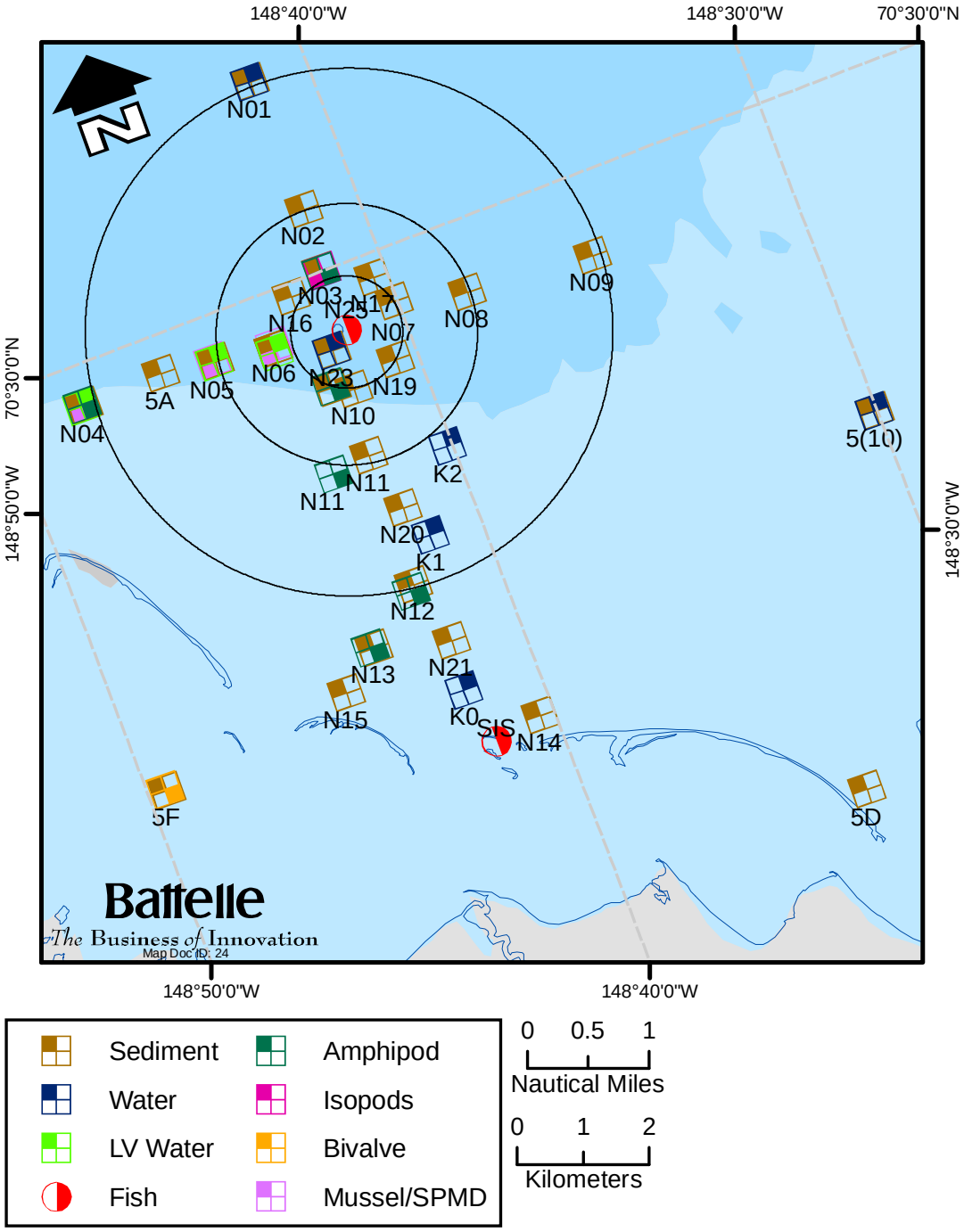

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations
Stations in the Northstar Area

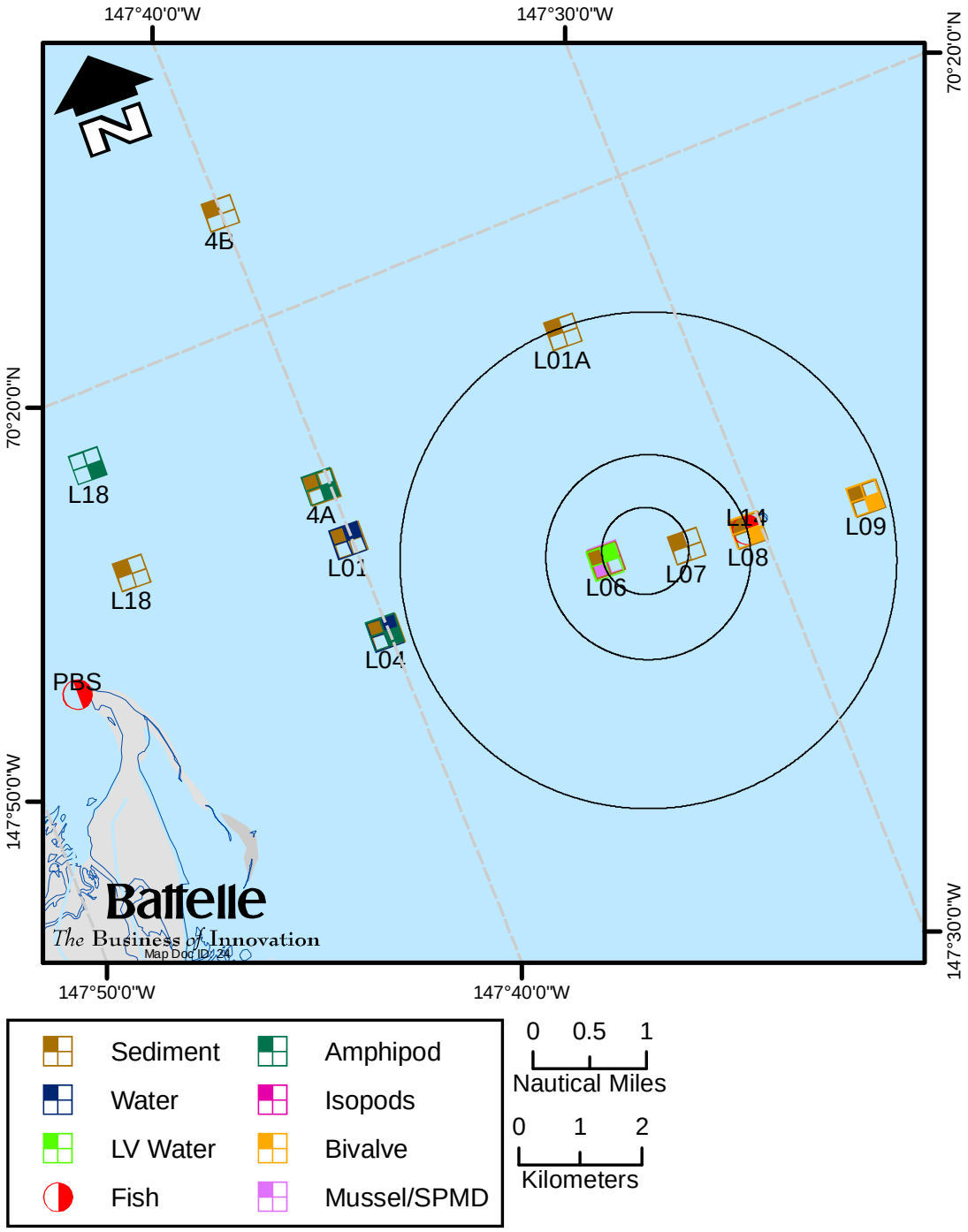

Figure 1 (cont.). cANIMIDA Summer 2004 Sampling Stations Stations in the Liberty Area

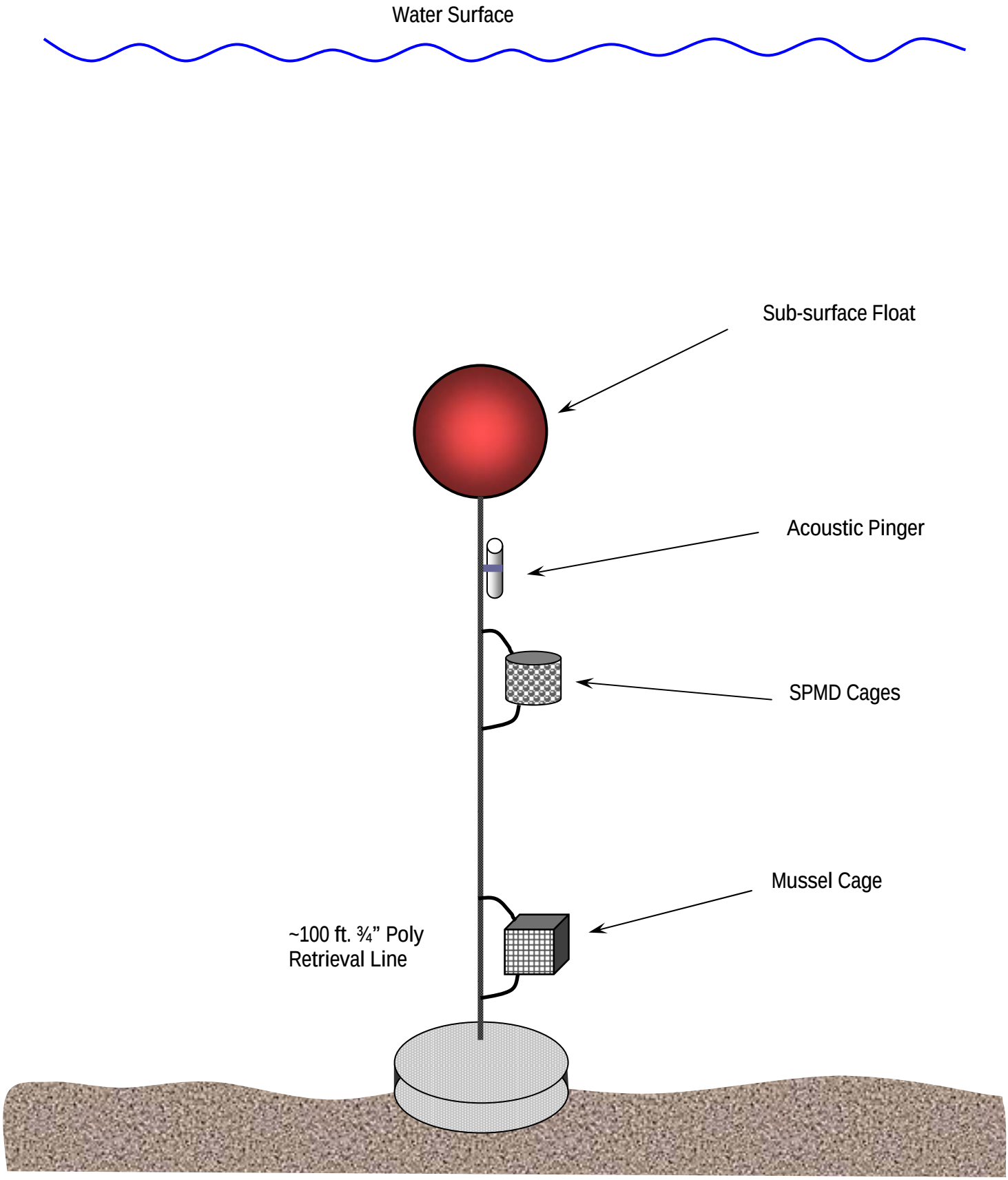

Figure 2. Schematic of the Mussel Cage and SPMD Mooring

2005 Field Survey Report

Continuation of Arctic Nearshore Impact Monitoring in the Development Area (cANIMIDA)

Summer 2005 Field Survey Report

Report to:

Dr. Richard T. Prentki
Minerals Management Service
Anchorage, AK

Report from:

John Hardin
Battelle
Duxbury, MA

25 October 2005

Battelle
The Business of Innovation

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1.0 Introduction

MMS Vessel 1273

As part of the Minerals Management Service (MMS) program entitled "Continuation of Arctic Nearshore Impact Monitoring in the Development Area" (cANIMIDA), the second summer field survey of this program (sixth survey overall) was conducted from July 26 to August 14, 2005. The scientific crew collected water, sediment, tissue, and plankton samples for physical and chemical analyses. Work was conducted from shore, inflatable boats, and the MMS Vessel 1273, and included deployment and retrieval of moorings, gravity cores, fish collection using fyke nets, and plankton tows. This report summarizes the field activities and samples collected during the 2005 summer field survey.

The following bulleted items describe components successfully completed during the 2005 cANIMIDA summer sampling survey:

- Collected 36 surface sediment samples (0 to 1 cm) for hydrocarbon and metals chemistry from 35 offshore stations.

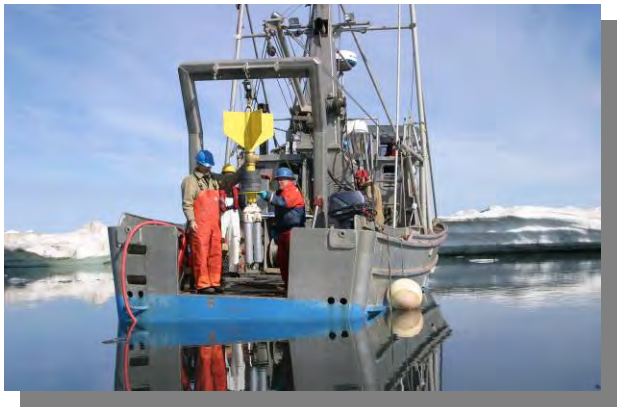
Area	Total Sediment Stations	Historical	New
BSMP	19	18	1
Northstar	9	8	1
Liberty	3	2	1
Prudhoe Bay	2	1	1
Endicott	1	1	
Boulder Patch	1		1
Totals	**35**	**30**	**5**

- Collected 14 sediment gravity cores from seven locations.
- Collected 23 CTD profiles at 18 offshore stations.

- Collected 65 discrete water samples from one to eight depth strata from 26 locations, including two rivers (Sagavanirktok and Kuparuk) and the Port Chatham Mussel Collection site.
- Deployed eight moorings with mussels and retrieved seven moorings. Each mooring had two mussel cages with at least 20 mussels per cage. One mooring (2E) was lost to ice and the mooring at 5(1) was moved by ice ~800 meters east-southeast from the deployment location. Moorings were deployed as follows:
  - One adjacent to Northstar
  - Two in the Liberty area
  - Two were between Northstar and Liberty (one in Prudhoe Bay and one at 5(1))
  - One was deployed next to Endicott in the Sagavanirktok River delta
  - Two were deployed to the east.
- A total of 22 indigenous bivalve, amphipod, or isopod samples were collected. Amphipod samples were collected from the BSMP area (5 samples), the Northstar Area (3 samples), the Boulder Patch (1 sample), and from near Endicott (1 sample). Bivalves were collected in the BSMP area (5 samples) and the Liberty Area (1 sample). Isopods were collected from the BSMP area (4 samples) and the Liberty area (2 samples). The amphipod trap at 5(1) was drug 1.6 km east-southeast by ice.
- Collected fish with fyke nets from Stump Island (17 fish) and Point Brower (19 fish). We were unable to collect enough fish from the Boulder Patch due to time constraints on the divers resulting from poor conditions prior to our arrival.
- Collected three kelp plants with the aid of Ken Dunton for metal analysis.
- Assisted Anne Hickey from the University of Colorado in deploying and retrieving two water auto-samplers. Water samples were collected once a day for 14 days to be analyzed for Total Suspended Solids in support of a study to ground truth satellite data.
- Delivered all field samples to analytical laboratories for appropriate analyses.

2.0 Schedule

The summer 2005 cruise was conducted from July 26 to August 14, 2005. There was one day lost (27 July) to weather due to high winds and seas. Ice conditions during the survey were mostly favorable; close in ice combined with poor weather forecasts did cause the team to forego sampling the 9(A), 9(B), and 9 (C) locations east of Barter Island. Members of the field team arrived in Prudhoe Bay, Alaska, July 26-27.



Gravity core sampler deployment

Initial "check-out" of MMS Vessel 1273 was performed on July 27 by ship captain Mark Mertz of TEG Oceanographic Services (TEG) and John Tremont of MMS. Field sampling personnel was comprised of seven staff from three organizations; two staff from Battelle, four from the Florida Institute of Technology (FIT), and one from Kinnetic Laboratories (KLI). The scientific team and ship's captain conducted the work on a 12 to 20 hours/day basis, depending on operating conditions and logistical considerations.

3.0 Cruise Operations and Samples Collected

The MMS Vessel 1273 served as the survey platform for the bulk of summer 2005 field work. The MMS Vessel 1273 was launched after inspection by MMS representatives and performed an abbreviated cruise working to calibrate the Coastal Ocean Dynamics Applications Radar (CODAR) system. The MMS Vessel 1273 was also used to retrieve current meters for the MMS University of Alaska Coastal Marine Institute (CMI) program at the end of the cANIMIDA survey using an alternate captain from KLI. Table 1 provides a complete list of the sampling stations that were targeted and sampled in the study area as well as station type, latitude and longitude, depth, date and time of sampling, and the type of chemical analysis for each sample. Figures 1 through 6 illustrate the locations of the 2005 sampling stations. Additional daily survey and sampling station information is included in the 2005 Station Logs (Attachment 1). The following narrative summarizes the field survey timeline.

July 24 (Sunday)

Field staff arrive at Anchorage, AK during the day and evening

July 25 (Monday)

Field team members John Hardin, Mike Walsh (Battelle), John Trefry, Bob Trocine, Matt Alkire, and Carrie Semmler (FIT), Gary Lawley (KLI) and Mark Mertz (TEG) receive Smith System Defensive Driver training in Anchorage during the afternoon. The field team and Dick Prentki (MMS Contracting Officer Technical Representative (COTR)) meet at dinner.

July 26 (Tuesday)

Mark Savoie (KLI) collects mussels from Port Chatham, AK. Collects zero time collection site samples of mussels and water.

Seven of the eight field staff (Hardin, Walsh, Trefry, Trocine, Alkire, Lawley, and Mertz) travel to Deadhorse, AK. Winds are high (>30 knots) and MMS is unable to launch the 1273, delaying the CODAR cruise. The field team collects equipment and supplies from shipping agents and begins the mobilization

North Slope, South of Deadhorse

process at the British Petroleum (BP) Seawater Treatment Plant (STP) Facility.

July 27 (Wednesday)

Winds remain high in the morning. The 1273 is inspected and launched in the afternoon by John Tremont and MMS staff after the wind recedes below 20 kts. 1273 performs an abbreviated CODAR cruise during the afternoon in rough seas. Mark Mertz inspects MMS Vessel 1273 in the evening, and takes custody of the vessel after inspection. 1273 overnights at West Dock.

Hardin and Trefry meet with Amy Peloza from BP at the Prudhoe Bay Operations Center (PBOC) to discuss the Health and Safety Plan as well as unique aspects of field sampling on the North Slope.

Field team member Carrie Semmler arrives at Deadhorse with mussels from Anchorage.

Hardin, Trefry and Semmler meet with Ken Dunton and discuss coordination of field sampling.

Dick Prentki and Anne Hickey arrive at Deadhorse. Field team, Prentki and Hickey meet at STP at 1630 and discuss project and TSS sampler logistics.

Mobilization of equipment, supplies, vessels (1273 and two inflatable boats) and water processing laboratory at STP is completed.

July 28 (Thursday)

Deploy subsurface moorings at three locations, Northstar, Prudhoe Bay, and between Northstar and Liberty (N03, PB1, and 5(1)).
Each mooring is comprised of two mussel cages, each containing ~20 mussels, and an acoustic pinger (see Figure 7).
Perform salinity gradient sampling transect in the Sagavanirktok River (includes 19 discrete samples).
1273 overnights at West Dock.
Deploy two automated TSS sample collectors, one at STP and one at the Endicott Satellite Drilling Island (SDI).

Mussel mooring w/acoustic pinger

July 29 (Friday)

Deploy three moorings: one near Endicott, one in the Boulder Patch, and one at Liberty (E01, BP01, and L08). 1273 overnights at Endicott.

July 30 (Saturday)

Collect sediment at 3A, 3B, 4A, 4B, L07, and L08. Deploy amphipod traps at 3A, 4A, and L08. No success with amphipod traps, reset traps at 4A and L08. Collect *Astarte*

clams at 3A. Collect water with Dunton from three locations in the Boulder Patch. Anne Hickey departs Deadhorse. 1273 overnights at Endicott.

July 31 (Sunday)

Mobilize fyke net and deploy at Stump Island in the afternoon. Collect water along one Liberty/Boulder Patch transect (stations L17, L17A, L17B, and 4B). Nineteen discrete water samples, four plankton samples, and CTD data are collected. Amphipods collected from traps at 4A. Dick Prentki leaves Deadhorse. 1273 overnights at Endicott.

August 1 (Monday)

Collect surface sediment and gravity core samples from E01 and BP01. Collect isopods (no amphipods) and *Astarte* clams from L08. Set amphipod traps at BP01. Collect fish and remove net from Stump Island in the afternoon, process fish in the evening. 1273 overnights at Endicott.

August 2 (Tuesday)

Collect surface sediment and core samples offshore at L17B. Collect amphipods from E01 and BP01. Deploy amphipod traps at 5(1). 1273 overnights at Endicott.

August 3 (Wednesday)

Collect water along second Liberty/Boulder Patch transect. Eighteen discrete samples, four plankton samples, and 5 CTD profiles are collected. Set fyke net near Point Brower in morning. Pick up two new 55gal drums and fill four drums with diesel for 1273. 1273 overnights at West Dock.

Setting fyke near Point Brower

Coordinate with Dunton and deploy mussel moorings at 2E and 2G (new location) using his staff and Boston Whaler. Unable to reach target location 1A due to ice near 2F extending the route to avoid the ice; high winds and seas in Camden Bay slowing the transit speed; and fuel capacity concern (exacerbated by the first two factors). Ice was thick near 2E, and likely to move/damage mooring.

August 4 (Thursday)

Refuel and fill water tank on 1273 in morning. Collect sediments from N04, N05, N06, N08, N11, N14, and N18. Collect water samples from N06 (12 discrete and CTD), N08 (six discrete and CTD), and N23 (one discrete). Gravity cores attempted at N04 and N05 were unsuccessful. Collect fish from Point Brower. 1273 overnights at West Dock.

August 5 (Friday)

Collect one discrete water sample and CTD cast at BP01. Collect plankton samples from 4A, BP01, and L18. Battelle staff packs samples and retrieves fish sampling equipment from Endicott. Organize and prepare for eastern sampling trip. 1273 overnights at Endicott.

August 6 (Saturday)

Mobilize for 1273 eastern trip in the morning. Collect surface sediment from 2E and 2F. Collect *Cyrtodaria* clams and water from 2F. Search for mooring at 2E; no evidence found, area highly scoured by ice. 1273 overnights adjacent to Flaxman Island and Leffingwell's cabin.

August 7 (Sunday)

Collect sediment surface samples from 1A, 1B, 1C, 1D, 1E and 2C. Collect sediment core from 1C. Collect amphipods and isopods from 2F. Collect *Astarte* clams from 1A and 1D, and *Cyrtodaria* clams from 1E. Collect discrete surface water samples from 1A, 1C, and 1E. Set amphipod traps at 1A, 1C, 1D, and 1E. 1273 overnights at Barter Island/Kaktovik.

Homogenizing sediment collected from Van Veen grab

August 8 (Monday)

FIT transfers crew (Trocine flies to Deadhorse and Trefry flies to Kaktovik). Collect sediment core at 2A and surface sediments at 2A, 2B, 2D, 2G, and 2H. Collect discrete water samples and CTD data at 2A and 2G. Collect amphipods at 1C, and isopods at 1A, 1D. No amphipods were collected from traps set overnight 1A, 1D, and 1E.

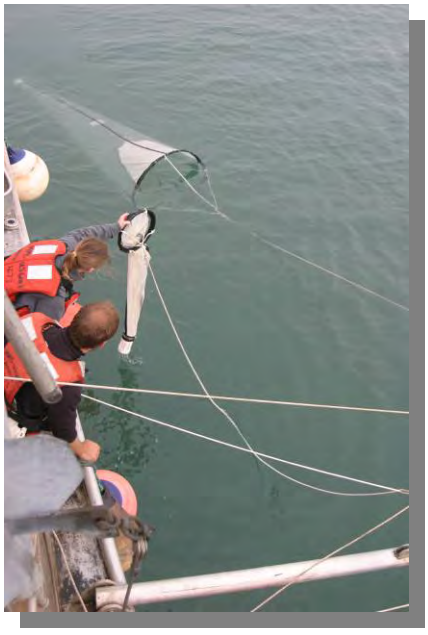
1273 overnights at Flaxman Island.

August 9 (Tuesday)

Collect surface sediment at 5(1) and 5(5). Collect *Astarte* clams at 5(1). Set amphipod traps at 5(1) and 5(5). Amphipod trap at 5(5) drug by ice soon after deployment and lost. 1273 overnights at West Dock.

August 10 (Wednesday)

Refuel and add water to 1273. Retrieve mussel mooring from PB1. Collect sediment cores at PB1A and N26. Unsuccessful core attempt performed at PB1. Collect surface sediment at N03, N26, PB1, and PB1A. Collect water and CTD data from N26. Deploy amphipod traps at N03, N11, and N18.



Deploying plankton nets

Attempts to collect clams are unsuccessful at PB1, PB1A and N03. Alkire leaves Deadhorse. 1273 overnights at West Dock.

August 11 (Thursday)

Retrieve mussel moorings from N03, 5(1), and E01. Mussel mooring at 5(1) was drug 817 meters east-southeast by ice. Collect amphipods from 5(1), N03, N11 and N18. One trap deployed at 5(1) was drug 1.6 km east-southeast by ice but found and recovered. A second trap deployed at 5(1) was lost. Collect plankton from Northstar area. Deploy amphipod traps at 4B, BP01, L07, and L08. 1273 overnights at West Dock.

August 12 (Friday)

Retrieve mussel moorings at BP1, and L08. Collect amphipods at 4B and BP01. Collect isopods from 4B, L08, no organisms are collected from L07. Field sampling completed for the 2005 cANIMIDA summer season. Return to West Dock. Begin demobilization, pack equipment and supplies for storage and shipment. Trefry, Trocine, and Semmler leave Deadhorse. UAF team arrives at Deadhorse. 1273 overnights at West Dock.

August 13 (Saturday)

Complete demobilization and pack and ship samples and equipment. Mertz takes UAF team to recover Dinkum Sands area mooring (offshore of Prudhoe Bay). 1273 overnights at West Dock.

Amphipods (*Anonyx* spp.)

August 14 (Sunday)

Hardin, Walsh, and Lawley leave Deadhorse. Ken Kronschnabl (KLI, 1273 Captain) arrives in Deadhorse, Mertz meets with Kronschnabl, discusses 1273 status, and transfers information.

August 15 (Monday)

John Tremont arrives in Deadhorse. Mertz transfers 1273 to Tremont and MMS. Tremont and MMS transfers 1273 to Kronschnabl. Mertz leaves Deadhorse.

August 16 (Tuesday)

Refueling and mobilization, travel to Flaxman Island and anchor for the night.

August 17 (Wednesday)

Retrieve Camden Bay mooring and replaced it with serviced mooring from Dinkum Sands. Retrieve mussel mooring 2G. The surface float was not present. Pinger and good coordinates used for retrieval with grapnel hook. 1273 overnights at Flaxman Island.

August 18 (Thursday)

Transit to West Dock.

August 19 (Friday)

Service Camden mooring, refuel, add water, mobilize.

August 20 (Saturday)

Transit to Pignok Bay, overnight.

August 21 (Sunday)

Transit to Smith Bay. Retrieve damaged mooring. All instruments were retrieved, but some of were significantly damaged. ADCP data indicates the mooring was taken out by ice on July 5 (probably during breakup). Smith Bay mooring is not replaced. Transit east to Theitis Island and overnight.

August 22 (Monday)

Transit to West Dock during the morning and demobilized. 1273 overnights at West Dock.

Core samples from L17B

August 23 (Tuesday)

Service moorings, refuel 1273, add water, and mobilize moorings.

August 24 (Wednesday)

Deploy moorings at Dinkum Sands and Reindeer Island. Demobilize 1273. 1273 overnights at West Dock.

August 25 (Thursday)

Haul 1273 out of the water. Transfer 1273 to MMS

August 25 (Thursday)

Demobilize 1273, ship equipment and supplies. Kronschnabl leaves Deadhorse.

4.0 Sampling Procedures

Sampling procedures followed at each sampling station were consistent with those performed during the ANIMIDA Summer 2002 program (MMS 2002), and are described in the Summer 2005 Field Logistics and Sampling Plan for the Minerals Management Service ANIMIDA Program (MMS, 2005). Typical sampling procedures included:

- conductivity, temperature, and depth (CTD) measurements
- water sample collection via pump system from offshore suspended sediment stations, and by hand at shoreline river stations
- surface sediment grab sample collection using a modified Van-Veen grab (for sediments and bivalves – as appropriate)
- core sampling with a gravity coring device equipped with a double barrel.
- deployment and retrieval of amphipod traps (as required)
- deployment of mussel cages at eight fixed moorings; seven recovered
- collection of fish samples by fyke net at two locations

Photo documentation, station logs, and field notes were recorded during the field survey. The station logs for each sampling station are included in Attachment 1. Each station log includes a description of the sampling location, observations, number and type(s) of samples collected, and comments.

5.0 Technical Issues

There were no significant technical difficulties during this survey. Amphipod and clam populations were patchy, as has been observed in previous studies, and the target number of samples were not collected. Amphipod collections were similar between collection times at sites where multiple attempts were made, indicating steady resident populations over the short time frame of sampling, and indicating additional effort(s) yield minimal return. One mussel mooring was lost to ice movement, also not unexpected in the Arctic environment. Sampling went smoothly, with only one weather day. There were no permit or local logistic problems of significance.

6.0 References

Minerals Management Service. 2002. Summer 2002 Field Sampling and Logistics Plan. July 2002.

Minerals Management Service. 2005. Summer 2005 Field Sampling and Logistics Plan. July 22, 2005.

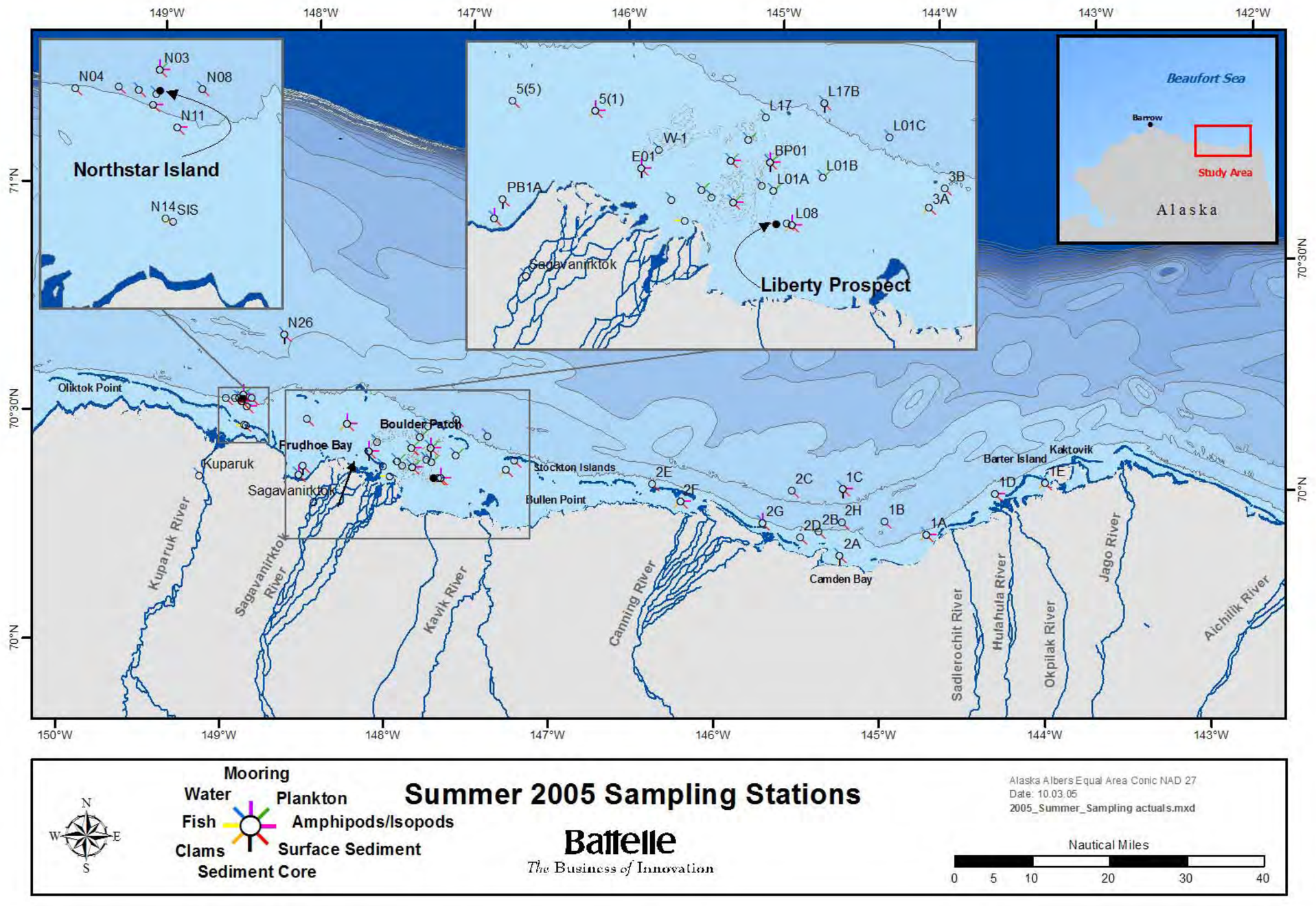


Figure 1. Summer 2005 cANIMIDA Sampling Locations.

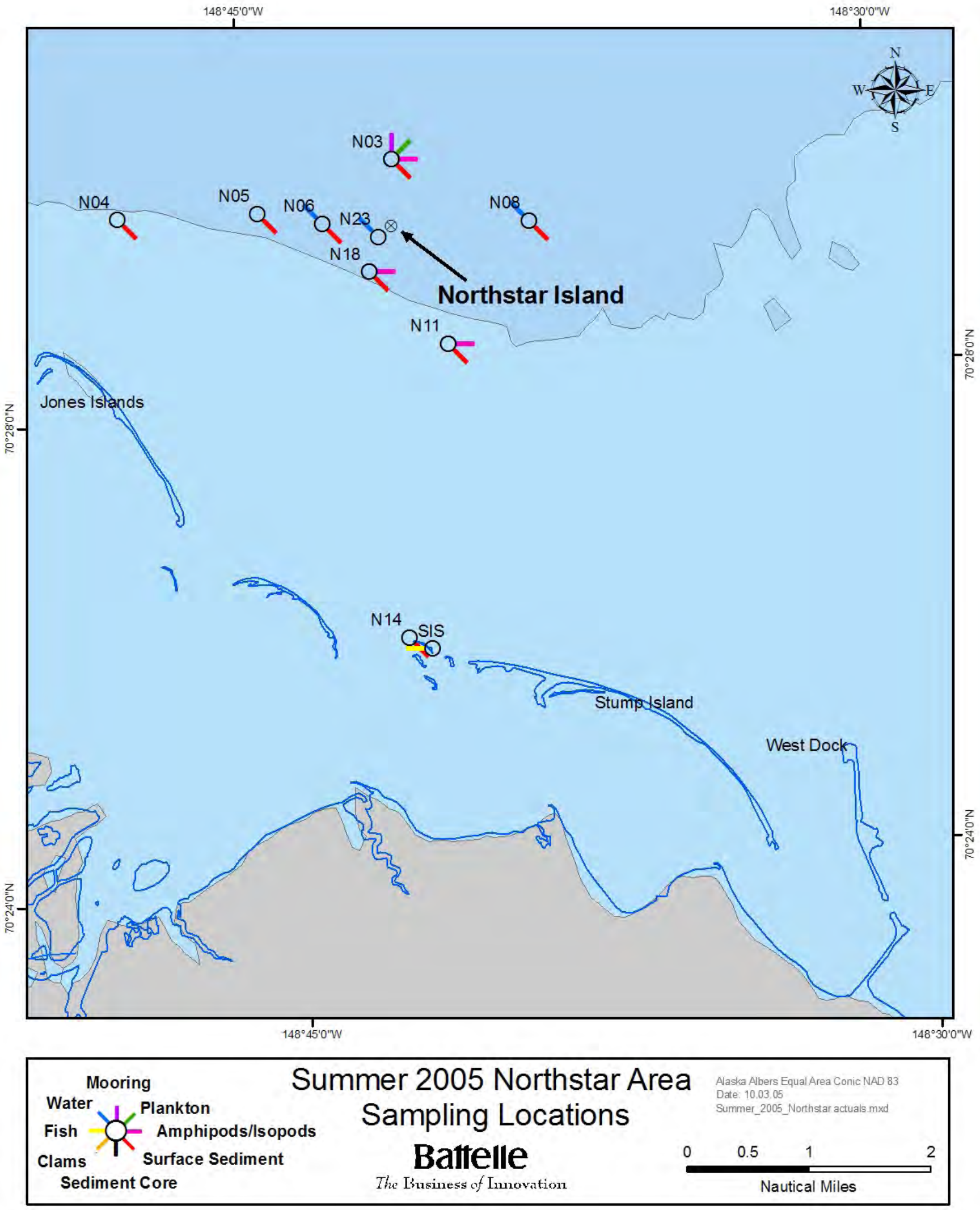
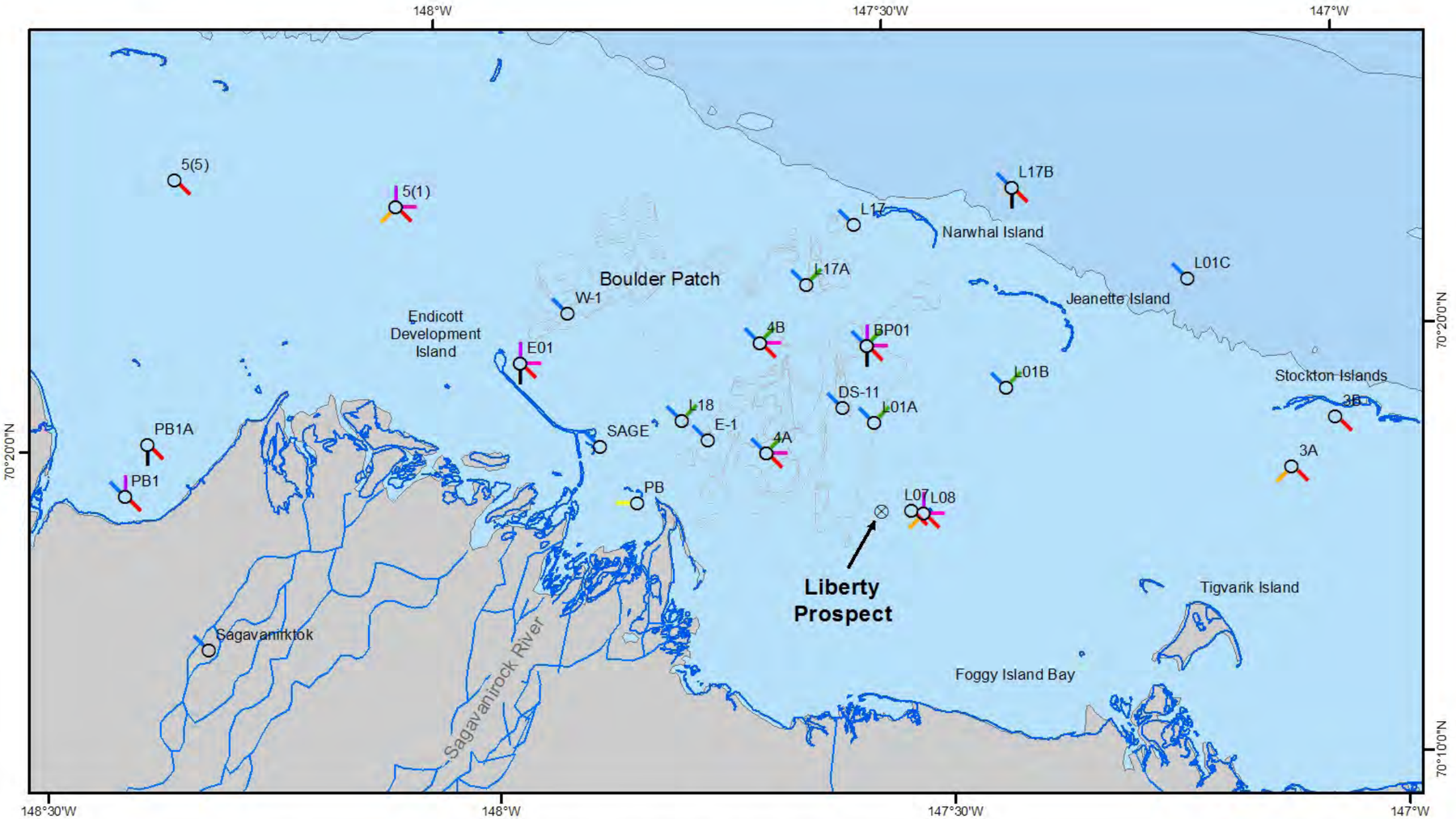


Figure 2. Northstar Sampling Locations, Summer 2005.


148°W
147°30'W
147°W
70°20'0"N
70°10'0"N
5(5)
5(1)
L17B
L17
Narwhal Island
L01C
Boulder Patch
L17A
W-1
Endicott
Development
Island
E01
4B
BP01
Jeanette Island
L01B
Stockton Islands
3B
DS-11
L01A
L18
E-1
SAGE
4A
3A
PB1A
PB1
PB
L07
L08
Liberty
Prospect
Tigvariik Island
Foggy Island Bay
Sagavanirktok
Sagavanirktok River
148°30'W
148°W
147°30'W
147°W
Mooring
Water
Plankton
Fish
Amphipods/Isopods
Clams
Surface Sediment
Sediment Core
N
S
E
W
Summer 2005 Liberty Prospect Area
Sampling Locations
Battelle
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Alaska Albers Equal Area Conic NAD 83
Date: 10.03.05
Summer_2005_Liberty actuals.mxd
Nautical Miles
0 1 2 4 6 8

Figure 3. Liberty Sampling Locations, Summer 2005.

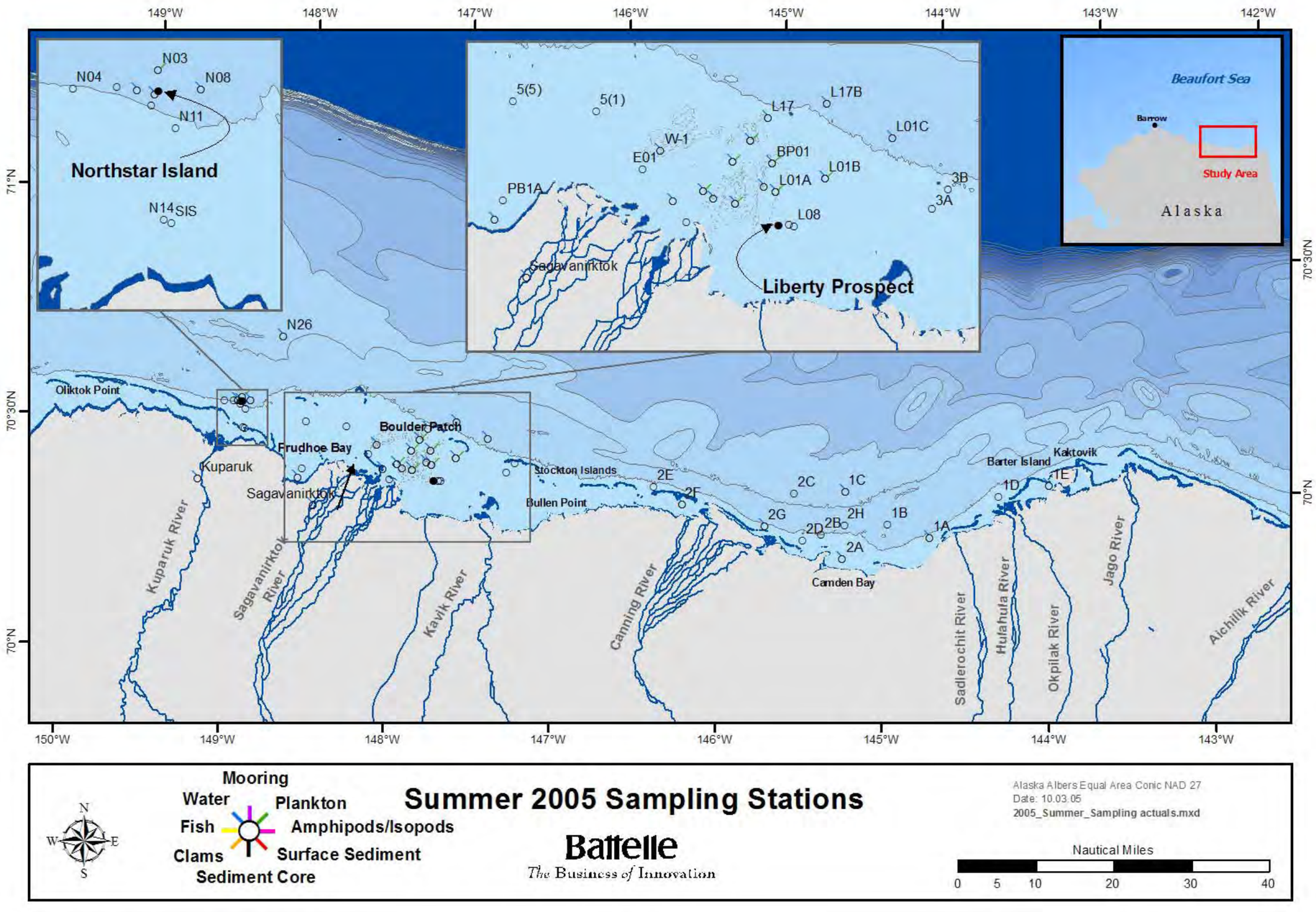

Figure 4. Water and Plankton Sampling Locations, Summer 2005.

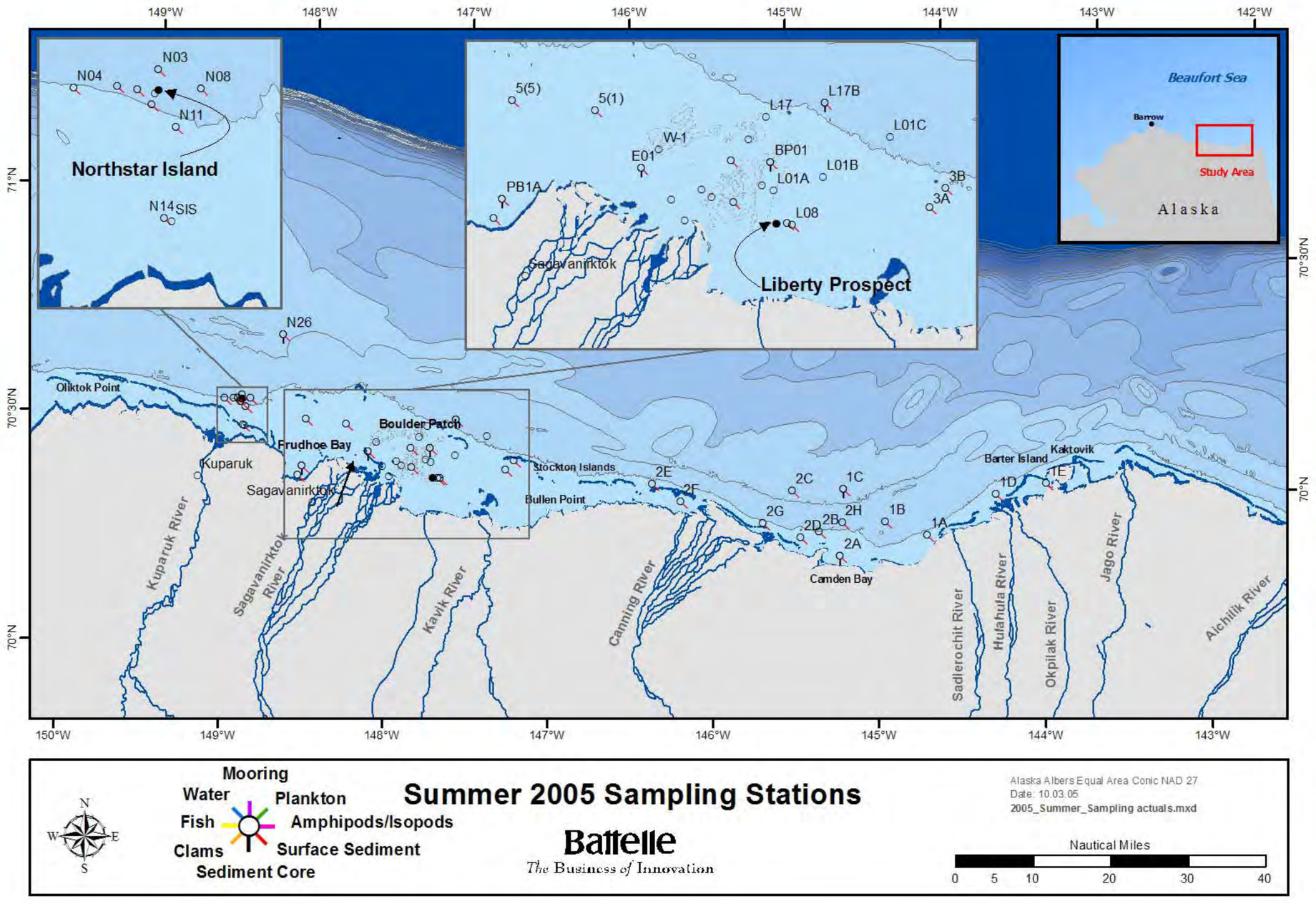

Figure 5. Sediment and Core Sampling Locations, Summer 2005.

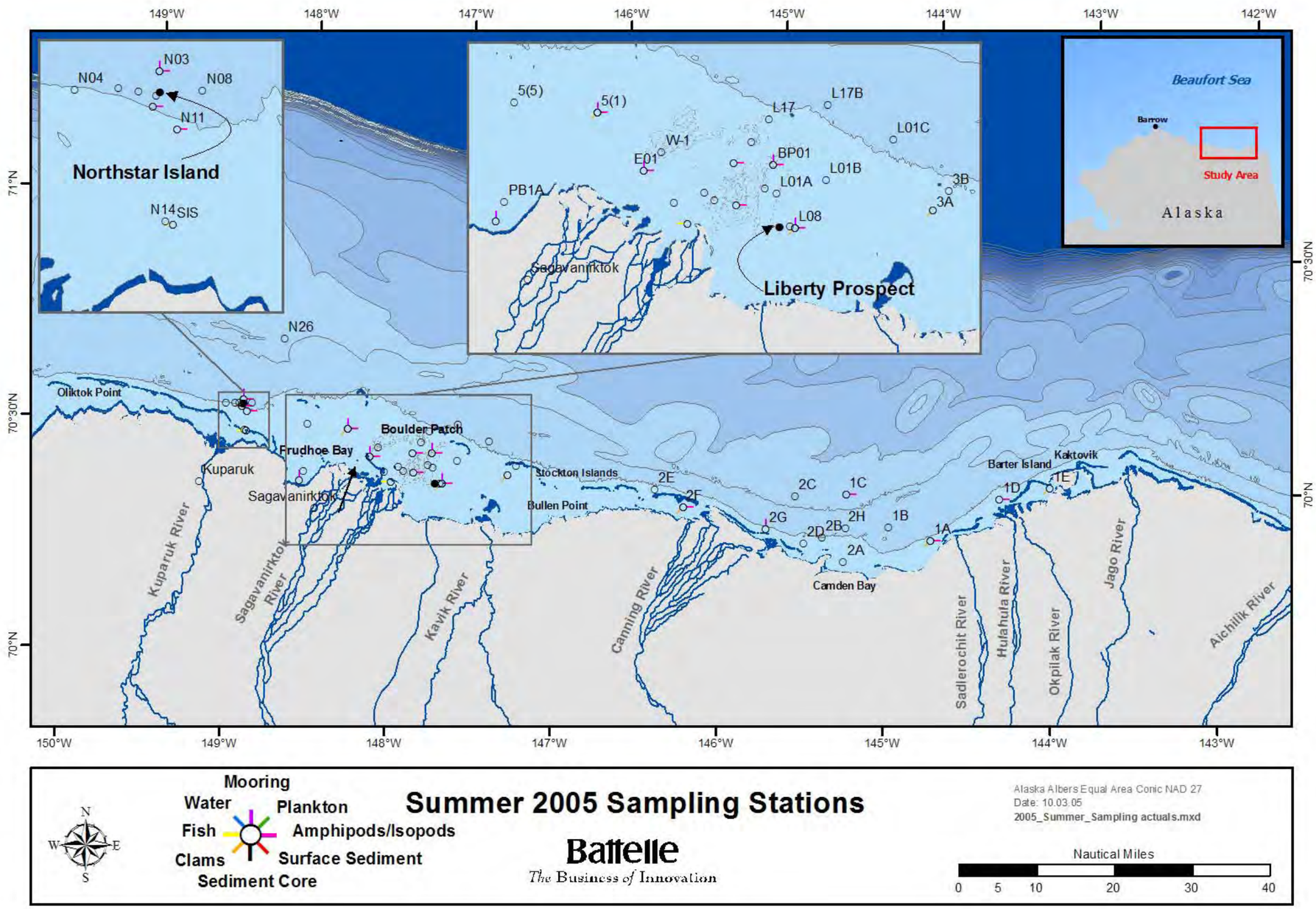

Figure 6. Mussel Moorings and Indigenous Biota Sampling Locations, Summer 2005.

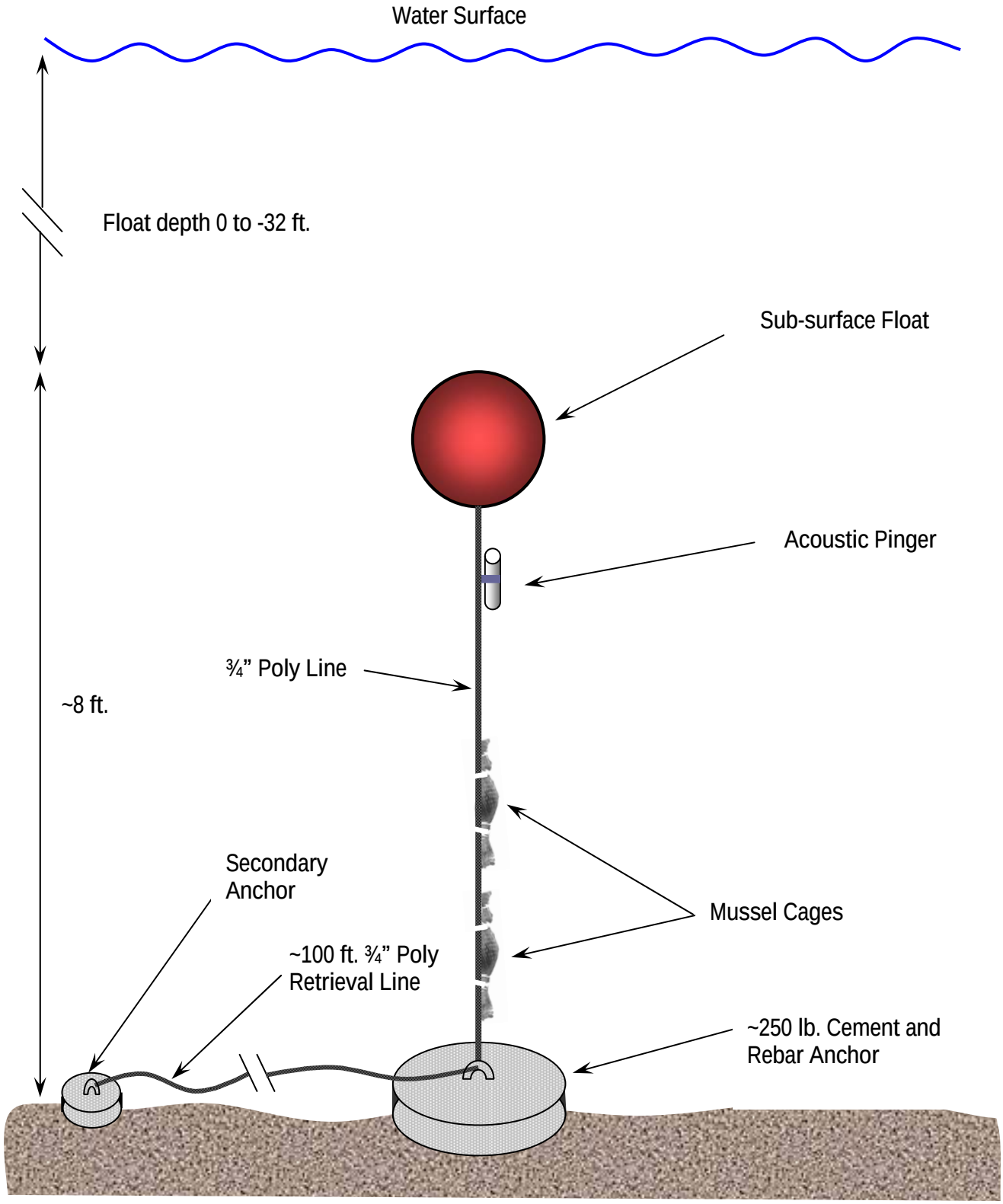

Figure 7. Schematic of the Mussel Cage and Mooring String

Table 1. 2005 MMS cANIMIDA Sampling Summary

Station ID	Station Type	Latitude (N; WGS84)		Longitude (W; WGS84)		Date(s)
1A	BSMP	70°	1.6023	144°	32.8494	7, 8 Aug
1B	BSMP	70°	4.1803	144°	47.5640	7 Aug
1C	BSMP	70°	9.1850	145°	1.3962	7, 8 Aug
1D	BSMP	70°	5.6494	144°	5.3693	7, 8 Aug
1E	BSMP	70°	6.1382	143°	46.5326	7, 8 Aug
2A	BSMP	70°	0.5031	145°	5.7580	8 Aug
2B	BSMP	70°	4.0493	145°	12.3790	8 Aug
2C	BSMP	70°	9.8125	145°	20.1312	7 Aug
2D	BSMP	70°	3.6074	145°	19.3016	8 Aug
2E	BSMP	70°	12.9076	146°	11.7098	6 Aug
2F	BSMP	70°	10.2610	146°	2.0765	6, 7 Aug
2G (CB01)	BSMP	70°	6.0654	145°	32.5651	8, 17 Aug
2H (CB02)	BSMP	70°	4.8725	145°	3.4209	8 Aug
3A	BSMP	70°	16.9268	147°	5.4828	30 Jul
3B	BSMP	70°	17.9819	147°	2.2393	30 Jul
4A	BSMP	70°	18.4483	147°	40.3106	30, 31 Jul 3, 5 Aug
4B	BSMP	70°	21.0517	147°	40.0062	30, 31 Jul 5, 11, 12 Aug
5(1)	BSMP	70°	25.0151	148°	3.4548	2, 9, 11 Aug
5(5)	BSMP	70°	18.8060	148°	23.2290	9 Aug
5B	BSMP	-	-	-	-	
9A	BSMP	-	-	-	-	
9B	BSMP	-	-	-	-	
9C	BSMP	-	-	-	-	
BP01	Boulder Patch	70°	20.7485	147°	32.9140	1, 5, 11, 12 Aug
L01A	Liberty	70°	18.9364	147°	32.9043	3 Aug
L01B	Liberty	70°	19.4442	147°	23.8834	3 Aug
L01C	Liberty	70°	21.5603	147°	11.1208	3 Aug
L01D	Liberty	-	-	-	-	
L04	Liberty	-	-	-	-	
L07	Liberty	70°	16.7876	147°	31.0398	30 Jul 11, 12 Aug
L08	Liberty	70°	16.6976	147°	30.2128	30 Jul 1, 11, 12 Aug
L17	Liberty	70°	23.5985	147°	32.9632	31 Jul
L17A	Liberty	70°	22.2986	147°	36.5152	31 Jul
L17B	Liberty	70°	24.1088	147°	22.2281	31 Jul 2 Aug
L17C	Liberty	-	-	-	-	
L18	Liberty	70°	19.3907	147°	45.7100	3, 5 Aug

Station ID	Station Type	Latitude (N; WGS84)		Longitude (W; WGS84)		Date(s)
L19	Liberty (offshore-deep)	-	-	-	-	
N01	Northstar	-	-	-	-	
N03	Northstar	70°	30.0139	148°	41.4768	10, 11 Aug
N04	Northstar	70°	29.6879	148°	48.1382	4 Aug
N05	Northstar	70°	26.0958	148°	18.1056	4 Aug
N06	Northstar	70°	29.5199	148°	43.2428	4 Aug
N08	Northstar	70°	29.4106	148°	38.3036	4 Aug
N11	Northstar	70°	28.4375	148°	41.9479	4, 10, 11 Aug
N14	Northstar	70°	26.0127	148°	40.4733	4 Aug
N18	Northstar	70°	29.0884	148°	42.2224	4, 10, 11 Aug
N23	Northstar	70°	29.3749	148°	41.9297	4 Aug
N26	Northstar (offshore-deep)	70°	37.4202	148°	24.1883	10 Aug
PB1	Prudhoe	70°	18.7944	148°	23.1992	10 Aug
PB1A	Prudhoe	70°	19.9592	148°	21.3937	10 Aug
E01	Sag - near mouth	70°	21.1003	147°	56.0895	1, 2, 11 Aug
SIS	Northstar	70°	25.9061	148°	41.4242	1 Aug
PB	Point Brower	70°	17.5666	147°	49.1731	4 Aug
SAGE	Sag - Endicott Transect	70°	18.9750	147°	51.3250	28 Jul
E-1	Dunton Boulder Patch	70°	18.8790	147°	44.0750	30 Jul
W-1	Dunton Boulder Patch	70°	22.1660	147°	52.6070	30 Jul
DS-11	Dunton Boulder Patch	70°	19.3360	147°	34.9030	30 Jul
Kuparuk	Kuparuk River	70°	19.8120	149°	0.5270	29 Jul 9 Aug
Sagavanirktok	Sagavanirktok River	70°	15.0330	148°	18.4840	29 Jul 9 Aug
PC	Port Chatham Mussel Collection	59°	12.920	151°	45.405	26 Jul

Table 1 (cont.). 2005 MMS cANIMIDA Sampling Summary

Station ID	Surface Sediment	Sediment Core	Discrete Water	CTD	Plankton	Amphipods	Isopods	Clams	Mussels	Fish	Comments
1A	1		1			0	1	1	0		Mooring could not be accessed due to fuel and ice limitations. Insufficient amphipods captured.
1B	1										
1C	1	27	1			1					
1D	1						1				Insufficient amphipods and clams captured; alternate location attempted and isopods captured.
1E	1		1			0		1			Unable to capture amphipods; alternate location attempted.
2A	1	19	1								
2B	1										
2C	1										
2D	1					0					
2E	1								0		Mooring lost to ice.
2F	1		1			1	1	1			
2G (CB01)	1		1						2		Alternate location for mooring 1A; as far east as possible based on time, weather, and fuel.
2H (CB02)	1										
3A	1					0		1			Unable to capture amphipods. No alternate locations nearby; several attempts made in Boulder Patch.
3B	1										

Station ID	Surface Sediment	Sediment Core	Discrete Water	CTD	Plankton	Amphipods	Isopods	Clams	Mussels	Fish	Comments
4A	1		10	2	2	1					
4B	1		10	2	2	1	1				Alternate location for amphipods. Isopods co-collected.
5(1)	1					1		1	2		
5(5)	1		0		0	0					Water and plankton not collected. Amphipod trap lost to ice, was not reset due to time constraints.
5B	0					0					Did not sample west of Northstar Island. Plan to sample westward in 2006.
9A	0										Did not sample based on ice, fuel concerns, and predictions of poor weather.
9B	0		0		0						Did not sample based on ice, fuel concerns, and predictions of poor weather.
9C	0	0									Did not sample based on ice, fuel concerns, and predictions of poor weather.
BP01	1	6	1	1	2	1			2	0	Unable to collect fish with divers due to poor weather influencing the Dunton dive team's schedule.
L01A			5	1	2						
L01B			6	1	2						
L01C			7	1	0						In field decision not to sample due to time constraints and ice.
L01D			0								Unable to collect water samples due to flow ice at station.
L04			0	0	0						In field decision not to sample. Coverage was adequate with 4A.
L07	1					0					Unable to capture amphipods at alternate location.

Station ID	Surface Sediment	Sediment Core	Discrete Water	CTD	Plankton	Amphipods	Isopods	Clams	Mussels	Fish	Comments
L08	1					0	2	1	2		Unable to capture amphipods; isopods collected as alternative.
L17			1	1	0						Flow ice prevents plankton sampling.
L17A			1	1	2						
L17B	1	11	1	1	0						Flow ice prevents plankton sampling
L17C			0								Flow ice at station prevents water sampling.
L18			2	2	2						
L19		0	0								Flow ice at station prevented water and sediment sampling. L17B was substituted.
N01			0								Not Sampled
N03	1				2	1		0	2		Collect plankton near Northstar as alternate location to N04, N06, and N08.
N04	1	0			0						Core unsuccessful due to refusal and inadequate recovery.
N05	1	0									Core unsuccessful at alternate location due to refusal and inadequate recovery.
N06	1		1	1	0						Field decision made to not sample plankton. Samples collected from N03 considered sufficient.
N08	1		1	1	0						Field decision made to not sample plankton. Samples collected from N03 considered sufficient.
N11	1					1					
N14	1										

Station ID	Surface Sediment	Sediment Core	Discrete Water	CTD	Plankton	Amphipods	Isopods	Clams	Mussels	Fish	Comments
N18	1					1					
N23	0		1								
N26	1	12	1								
PB1	1	0	1			0		0	2		Core unsuccessful due to refusal and inadequate recovery. Unable to capture amphipods/isopods.
PB1A	1	16						0			Moved to this deeper location after attempts at PB1 were not successful; no clams captured.
E01	1	9	0			1			2		In field decision made to not collect water samples. Sufficient water collected along transects.
SIS										17	17 Fish collected.
PB										18	19 Fish collected.
SAGE			1	1							19 samples collected.
E-1			1	1							
W-1			1	1							
DS-11			1	1							
Kuparuk			2	2							
Sagavanirktok			2	2							
PC			1						2		

Station ID	Surface Sediment	Sediment Core	Discrete Water	CTD	Plankton	Amphipods	Isopods	Clams	Mussels	Fish	Comments
TOTAL No. Stations	35	10	29	18	8	19	5	6	7	2	Includes unsuccessful attempts
TOTAL No. Samples	35	100	65	23	16	10	6	6	14	35	Plus 2 Mussel QC samples from Port Chatham
TARGET No. Samples	30	30	27	27	15	16	0	7	6	30	

KEY	
1	Indicates number of samples collected at proposed location.
0	Indicates proposed sample not collected.
1	Indicates number of samples collected at alternative location
0	Indicates alternative sample attempted but unsuccessful.

Attachment 1: 2005 Station Logs

Section 1: Daily Operations Logs

Section 2: Sediment Collection Logs

Section 3: Fish Collection Logs

Section 4: Mussel Collection Logs

Section 5: Water, Plankton, and Indigenous Biota Collection Logs

Attachment 2: 2005 Collection Permit and Fish Transfer Permit

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

Division of Commercial Fisheries

FRANK H. MURKOWSKI
GOVERNOR

P.O. BOX 25526
JUNEAU, AK 99802-5526
PHONE: (907) 465-4724
FAX: (907) 465-4168
Sara_larsen@fishgame.state.ak.us

April 12, 2005

John Hardin
Battelle Memorial Institute
703 Palomar Airport Rd. Suite 350
Carlsbad, CA 92009

Dear Mr. Hardin,

Your Fish Resource Permit (CF-04-080) expired on 12/31/2004. A final report of this year's activities is required to be submitted within 30 days of the expiration of the permit. This report must summarize the number of fish captured by location and by species, and the fate of those fish. A report is required whether or not collecting activities were undertaken. According to our records, no report has been submitted.

Please note that any applications for future permits will not be processed until the reports for the previous year have been received.

Please contact me with any questions about the reporting or the permitting process.

Sincerely,

Sara Larsen

Sara Larsen
Permit Coordinator

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
P.O. Box 25526
JUNEAU, ALASKA 99802-5526

Permit No. CF-05-074

Expires 12/31/2005

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes **John Hardin** *(whose signature is required on page 2 for permit validation)*
person
of **Battelle Memorial Institute** at **703 Palomar Airport Rd, Suite 350, Carlsbad, CA 92009**
agency or organization address

to conduct the following activities from **July 1, 2005** to **December 31, 2005** in accordance with AS 16.05.930 and AS 16.05.340(b).

Purpose: To collect target species of shellfish and amphipods for tissue analysis of petroleum hydrocarbons and trace metals in order to evaluate concentration levels of hydrocarbons in the near-shore biota of the Beaufort Sea; to examine the potential bioaccumulation of organic compounds in the water column by deploying caged mussels and analyzing them for organics and metals, and to collect target species of fish for tissue analysis of petroleum hydrocarbons, trace metals, biomarker CYP1A, and biomarker bile FAC in order to evaluate contaminant exposure of fish in the near-shore Beaufort Sea.

Location: Nearshore Beaufort Sea, 12-20 stations from Stockton Island to Griffin Point, concentrating around the Northstar Production Island and Liberty Development Area.

Species Collected: **Collect & Sacrifice:** 300 Astarte clams, 600 Cyrtodaria clams, 5000 amphipods, 10 Dolly Varden, 20 Arctic cisco, 10 broad whitefish, 20 least cisco, 10 humpback whitefish, 40 four horn sculpin, 10 Arctic cod, 10 Arctic flounder, 20 snailfish
Collect, transport, caged release & sacrifice: 380 blue mussels (see **Contingencies**).

REPORT DUE January 31, 2006. The report shall include species, numbers, dates, and locations of collection and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish. The report shall also include other information as may be required under the contingencies section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until detailed reports, as specified above, have been received by the department.
5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Craig Farrington
Division of Commercial Fisheries

Deon Bruce
Deputy Director
Division of Commercial Fisheries
Alaska Department of Fish and Game

CF-05-074 ***continued (page 2 of 2)***

Authorized Personnel: The following personnel may participate in collecting activities under terms of this permit:

John Hardin, Dick Prentki, John Trefry, Mark Savioe, Bob Trocine, Gary Lawley, Rob Rember, Mike Walsh, Carrie Semmler, Mark Mertz, Matt Alkire, Other KLI field personnel (TBA).

Contingencies:

1) **Fred Bue** (Division of Commercial Fisheries, Fa irbanks, 907-459-7217) must be contacted **prior** to you engaging in collecting activities. Division of Commercial Fish Area Management Biologists have the right to specify methods for collecting, as well as limiting the collections of any species, and the number of specimens collected by time and area.

2) All unattended collecting gear must be labeled with the permittee's name, telephone number, and permit number.

3) Invertebrates, especially sessile invertebrates, should be collected over a broad geographical area to avoid local depletion and disruption of local ecosystems.

4) Permits will indicate the number of specimens that may be taken, by species and life stage. Sampling or collecting activities must stop when the maximum allowable number of specimens is obtained. All live fish, shellfish, and aquatic plants collected in excess of the number specified on the permit must be released immediately and unharmed at the capture location, unless otherwise specified in the permit.

5) All bycatch incidentally captured during sampling will be identified, recorded and released unharmed if possible. Bycatch data should be included in the collection report.

6) This permit will fulfill the requirements of 5AAC 41.005 – 41.060 pertaining to fish transport permits (FTP's), with the condition that the transported species BE DESTROYED AND NOT BE RELEASED.

7) *A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.*

8) Issuance of this permit does not absolve the permittee from compliance in full with any and all other applicable federal, state, or local laws regulations, or ordinances.

9) **A report of activities, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Commercial Fish, PO Box 25526, Juneau, AK 99802-5526, attention Sara Larsen (465-4724; sara_larsen@fishgame.state.ak.us), within 30 days after the expiration of this permit**. This report must summarize the number of fish captured by location and by species, and the fate of those fish. A report is required whether or not collecting activities were undertaken. A report must also be sent to the Biologist(s) listed under number 1 in this Contingencies section.

10) **PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:**

Signature of Permittee

cc: Bonnie Borba
Fred Bue
Ted Meyers
Gene Sandone
CF Division Files
Alaska Bureau of Wildlife Enforcement-Coldfoot

2006 Field Survey Report

Continuation of Arctic Nearshore Impact Monitoring in the Development Area (cANIMIDA)

Summer 2006 Field Survey Report

Report to:

Dr. Richard T. Prentki
Minerals Management Service
Anchorage, AK

Report from:

John Hardin
Battelle
Duxbury, MA

26 October 2006

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1.0 Introduction

As part of the Minerals Management Service (MMS) program entitled "Continuation of Arctic Nearshore Impact Monitoring in the Development Area" (cANIMIDA), the third and final summer field survey of this program (seventh survey overall) was conducted from July 24 to August 12, 2006. The scientific crew collected water, sediment, and biota samples for physical and chemical analyses. Work was conducted from shore, inflatable boats, as well as using the MMS Vessel *1273*. Sample collection activities included deployment and retrieval of mussel moorings, gravity cores, fish collection using fyke nets, towed benthic sled, small traps, and plankton tows. This report summarizes the field activities and samples collected during the 2006 summer field survey.

MMS Vessel 1273

The following bulleted items describe components successfully completed during the 2006 cANIMIDA summer sampling survey:

- Collected 34 surface sediment samples (0 to 1 cm) for hydrocarbon and metals chemistry from 34 offshore stations.

Area	Total Sediment Stations	Historical	New
BSMP	14	13	1
Northstar	8	6	2
McCovey	1	0	1
West Dock	1	0	1
Liberty	6	2	4
Endicott/SDI	3	2	1
Boulder Patch	1	1	0
Totals	**34**	**24**	**10**

- Collected 14 sediment gravity cores from seven locations.
- Collected five source/peat material samples.

- Collected seven CTD profiles from seven offshore stations.
- Collected 53 discrete water samples comprised of 23 surface samples and 30 subsurface samples from up to seven depth strata from 23 locations including 11 samples along a transect in the Sagavanirktok River and the Port Chatham Mussel Collection site.
- Deployed and retrieved eight moorings with mussels. Each mooring had two mussel cages with 20 mussels per cage. Moorings were deployed as follows:
  - Two near Northstar
  - Two in the Liberty area
  - One between Northstar and Liberty
  - One at West Dock
  - Two deployed adjacent to Endicott (one by Endicott, one by the SDI)
- A total of 34 indigenous tissue samples were collected from the following groups of organisms: amphipod (23); isopod (6); mysid (3); and bivalves (2). Amphipod samples were collected from the BSMP area (7 samples), the Northstar area (10), the Liberty Area (2), the Boulder Patch (2), and from West Dock (2 samples). Isopods were collected from the Northstar area (3 samples), the Liberty area (1), the BSMP area (1), and West Dock (1). Bivalves were collected in the Liberty area (2 samples).
- Collected fish with fyke nets from Stump Island (19 fish) and Point Brower (20 fish). Similar to 2005, we were unable to collect fish from the Boulder Patch area due to time constraints on the divers resulting from poor diving conditions prior to our arrival.

Dr. J. Trefry collecting water sample

- Collected three kelp plants with the aid of Ken Dunton (University of Texas Marine Science Institute; cANIMIDA Task 6 PI) for metal analysis.
- Delivered all field samples to analytical laboratories for appropriate analyses.

2.0 Schedule

Summer 2006 field sampling was conducted from July 24 to August 12, 2006. There was one travel day lost (11 August) at the end of the survey due to fog. Ice conditions during

the survey were favorable for field operations. Members of the field team arrived in Prudhoe Bay, Alaska, July 24-25. Initial "check-out" of MMS Vessel *1273* was performed on July 24 by ship captain Mark Mertz of TEG Oceanographic Services (TEG) and Dee Williams of MMS. Field sampling personnel consisted of five staff from three organizations: two staff from Battelle, two from the Florida Institute of Technology (FIT), and one from Kinnetic Laboratories Inc. (KLI). The scientific team and ship's captain conducted the work on a 12 to 18 hours/day basis, depending on operating conditions and logistical considerations.

3.0 Cruise Operations and Samples Collected

The MMS Vessel *1273* served as the survey platform for the bulk of summer 2006 field work. The MMS Vessel *1273* was launched on 24 July after inspection by MMS representatives. The MMS Vessel *1273* was also used to retrieve and re-deploy current meters for the MMS University of Alaska Coastal Marine Institute (CMI) program at the end of the cANIMIDA survey using an alternate captain (Ken Kronschnabl) from KLI.

Table 1 provides information on station id, station type, location (latitude and longitude), depth, and date(s) the station was sampled. Table 2 provides a list of the sample stations (actual and target) and the types of samples collected. Figures 1 through 7 illustrate the locations of the 2006 sampling stations. Additional daily survey and sampling station information is included in the 2006 Station Logs (Attachment 1). Following Tables 1 and 2 is a narrative summarizing the field survey operations by day.

Juvenile arctic fox (*Alopex lagopus*)

Table 1. 2006 MMS cANIMIDA Station Locations, Water Depth, and Dates

Station ID	Station Type	Latitude (N; WGS84)	Longitude (W; WGS84)	Dept (ft)	Date(s)
4A	BSMP	70° 18.4578	147° 40.1781	14.7	28, 29 Jul
5(1)	BSMP	70° 24.9899	148° 03.4663	18.9	27 Jul
5(5)	BSMP	70° 26.0927	148° 18.1566	21.2	31 Jul
5A	BSMP	70° 29.6996	148° 46.1128	35.8	6, 7 Aug
6A	BSMP	70° 32.2000	149° 57.7200	9.1	3, 4 Aug
6B	BSMP	70° 33.3611	150° 24.6255	18.0	1, 2, 3 Aug
6D	BSMP	70° 44.9300	150° 28.5100	60.5	3 Aug
6F	BSMP	70° 40.1641	151° 12.1239	40.8	2, 3 Aug
6G	BSMP	70° 31.4000	149° 54.6000	6.3	3 Aug
6H	BSMP	70° 29.6753	150° 14.5986	5.5	1 Aug
7A	BSMP	70° 37.6525	152° 09.8789	7.0	2 Aug
7C	BSMP	70° 54.8501	152° 00.3010	45.2	2 Aug
7E	BSMP	70° 43.5819	152° 04.3662	8.7	2 Aug
7G	BSMP	70° 38.9050	151° 53.6441	6.5	2, 3 Aug
BP01	Boulder Patch	70° 20.7490	147° 32.9140	22.7	28, 29 Jul; 9 Aug
COL-03	Other	70° 23.9847	150° 28.9083	+2	3 Aug
E01	Other	70° 21.1034	147° 56.1035	11.2	27 Jul; 9 Aug
E02	Other	70° 21.0539	147° 58.2819	3.0	28 Jul
EI01	Other	70° 34.8687	151° 59.2539	+10	2 Aug
Kup	Other	70° 19.5355	149° 00.1299	+8	28 Jul
L03	Liberty	70° 17.3384	147° 33.2819	21.7	28, 29 Jul
L08	Liberty	70° 16.7030	147° 30.2990	20.5	28, 29 Jul; 9 Aug
L17	Liberty	70° 23.6088	147° 32.9282	22.8	29-Jul-06
L19	Liberty	70° 18.6216	147° 49.3156	7.1	27, 28 Jul
L20	Liberty	70° 15.4461	147° 43.9446	6.7	27 Jul
L21	Liberty	70° 13.7169	147° 38.2051	5.9	27 Jul
L22	Liberty	70° 29.2491	147° 16.4027	95.7	30 Jul
M01	McCovey	70° 30.7602	148° 27.3847	36.7	31-Jul-06
N01	Northstar	70° 31.6702	148° 41.4848	39.5	4 Aug
N03	Northstar	70° 30.0020	148° 41.5700	40.8	5, 6, 7 Aug
N05	Northstar	70° 29.6281	148° 44.8917	36.9	31 Jul; 6 Aug
N05N11	Northstar	70° 28.5194	148° 41.9535	28.1	10 Aug
N06	Northstar	70° 29.5360	148° 43.1940	36.7	05-Aug-06

Station ID	Station Type	Latitude (N; WGS84)		Longitude (W; WGS84)		Dept (ft)	Date(s)
N08	Northstar	70°	29.4407	148°	38.2989	36.0	04-Aug-06
N11	Northstar	70°	28.4295	148°	41.9090	27.4	5, 6, 7 Aug
N11N08	Northstar	70°	29.4192	148°	38.3415	36	10 Aug
N11S	Northstar	70°	27.0240	148°	41.9833	15	10 Aug
N14	Northstar	70°	26.0060	148°	40.4290	9.2	4, 5, 6 Aug
N17	Northstar	70°	29.8717	148°	40.2850	38.9	31 Jul
N23	Northstar	70°	29.3732	148°	41.8366	36.3	4 Aug
N26	Northstar	70°	29.4989	148°	42.1752	36.1	7 Aug
N27	Northstar	70°	29.4133	148°	42.2011	36.9	5, 6 Aug
N28	Northstar	70°	29.5230	148°	41.5252	37.8	5, 6 Aug
PC	Port Chatham	59°	12.9200	151°	45.4050	~+2-+8	24, 26 Jul
PI01	Other (Pingok Island)	70°	33.3634	149°	28.2316	+6	4 Aug
Sag	Other (Sagavanirktok River)	70°	0.0748	148°	40.0873	+1, 2.0	28 Jul
Sag	Other (Sagavanirktok River)	70°	0.0748	148°	40.0873	2.0	28 Jul
SDI01	Other (SDI)	70°	19.586	147°	52.3960	7.3	27 Jul; 9 Aug
WD01	Other (West Dock)	70°	23.847	148°	31.4233	8.0	6, 8 Aug

Table 2. 2006 MMS cANIMIDA Station Sampling Summary

Station ID	Surficial Sediment	Sediment Core	Discrete Water	Plankton	Amphipod	Isopods	Bivalves	Mussels	Fish	Other Biota	Source / Peat	Comments
4A	1				1		0					
5(1)	1				0		0					
5(5)	1		5		0		0			0		
5A	1	0			0			2				
6A	1	0			1		0					
6B	1	22		0	2	1	0			0		
6D	1				0		0					
6F	1				1		0					
6G	1				0		0					
6H	1				0		0					
7A	1	9			0		0					
7C	1	18			0		0					
7E	1	16		0	1		0			0		
7G	1	0			1		0					
BP01	1			0	2			2				
COL-03			1								1	Coleville River
DS-11			0							0		
E01	1				0		0	2				
E02	1											
EI01											1	Eskimo Island
KUP-01			1								1	Kuparuk River
L03	1		0		0		1					
L08	1		5		1	1	1	2		0		
L17			5									Plankton attempted but unsuccessful.
L19	1				1							
L20	1				0					0		
L21	1				0							
L22	1	14	7									
M01	1	0	0									
N01			6	0								
N03	1		0		1		0	2		0		
N05	1	7			0							
N06	1				1		0					
N08			6									
N11	1				2		0	2				
N14	1		3		1		0					
N17	1	22										

Station ID	Surficial Sediment	Sediment Core	Discrete Water	Plankton	Amphipod	Isopods	Bivalves	Mussels	Fish	Other Biota	Source / Peat	Comments
N23			1									
N25	0	0	0									
N26	0		0		2							
N27	1				1							
N28	1		0		1		0					
N05N11										2		1 Isopod; 1 Mysid sample
N08N02										0		
N11N08										3		1 Isopod; 1 Mysid; 1 Amphipod sample
N11S										2		1 Isopod; 1 Mysid sample
PBS									20			
PI01											1	Pingok Island, one of the Jones Islands
Sag			1								1	Sagavanirktok River
SAGE			11									
SDI-1	1		0					2				
SIS									19			
W-1			0									
WD01	1		0	0	2	1		2				West Dock
Port Chatham			1					3				QA/QC Zero Time samples
TOTAL No. Stations	34	7	13	0	17	3	2	9	2	3	5	
TOTAL No. Samples	34	108	53	0	22	3	2	19	39	7	5	Mussels include three zero time samples
TARGET No. Samples	32	28	19	5	26	0	12	8	30	6	4	
KEY												
1	Indicates number of samples collected at proposed location.											
0	Indicates proposed sample not collected.											
1	Indicates number of samples collected at alternative location.											
0	Indicates alternative sample attempted but unsuccessful.											

July 23 (Sunday)

Battelle field staff and vessel captain arrive at Anchorage, AK and meet for dinner with KLI staff (Mark Savoie).

July 24 (Monday)

Field team members John Hardin and Mike Walsh (Battelle); Gary Lawley (KLI); and Mark Mertz (TEG) travel to Prudhoe Bay. John Trefry and Bob Trocine (FIT) travel to Anchorage. The field team collects equipment and supplies from shipping agents and begins the mobilization process at the British Petroleum (BP) Seawater Treatment Plant (STP) Facility (laboratory and field storage) and Base Operations Center (BOC; housing). Begin mobilizing MMS Vessel *1273.*

Mark Savoie (KLI) collects mussels from Port Chatham, AK. Collects zero time (reference) samples of mussels and water.

Dee Williams transfers MMS Vessel *1273* responsibility to Mark Mertz in the afternoon.

July 25 (Tuesday)

John Trefry and Bob Trocine travel to Prudhoe Bay.

Field team completes mobilization of equipment, supplies, vessels (*1273* and two inflatable boats). Team deploys mussel moorings at 5(A), N03, and N11. Each mooring is comprised of two mussel cages, each containing 20 mussels, and an acoustic pinger (see Figure 8).

1273 overnights at West Dock.

July 26 (Wednesday)

Team deploys mussel moorings at West Dock (secured to the bow of the Crowley Barge), SDI, E01, L08, and BP01. Tow benthic dredge for clams at 4A without success.

Trefry and Trocine set up water processing laboratory at STP.

1273 overnights at Endicott.

Surficial sediment collected with Van-Veen sampler

July 27 (Thursday)

Hardin and Trefry meet with Ken Dunton and discuss coordination of field sampling.

The shore team deploys the fyke net at Point Brower and then performs a salinity gradient sampling transect along the Sagavanirktok River (includes 11 discrete samples). Water samples are processed at the STP.

The team on the *1273* collects sediment at 5(1), E01, SDI01, L19, L20, and L21. Amphipod traps are deployed at 5(1), E01 and L19. The clam dredge is towed at 5(1) and E01 (twice) without success.

The *1273* overnights at Endicott.

July 28 (Friday)

The *1273* team collects sediment from 4A, BP01, L03, L08, and E02. Amphipod traps are recovered at 5(1) (no sample), E01 (no sample), and L19. Amphipod traps are deployed at BP01 and L08. A CTD profile is performed and five discreet water samples are collected at L08. The clam dredge is towed twice at L08 without success.

The shore team tends the fyke net at Point Brower. High water fouled the net, no fish are collected. The net is cleaned and re-set. Water and peat samples are collected from the Sagavanirktok and Kuparuk rivers. Water samples are processed at the STP.

The cANIMIDA Contracting Officer's Technical Representative (COTR) Dr. Richard (Dick) Prentki travels to Prudhoe Bay from Anchorage.

The *1273* overnights at Endicott.

July 29 (Saturday)

The *1273* team retrieves amphipod traps from L08 (two samples), and BP01. *Astarte* clams are collected from L08 and L03. A CTD profile is performed and five discreet water samples are collected at L17. A double plankton tow with one meter diameter nets is performed at L17 for approximately one hour. The minimal sample mass recovered is not adequate for sample analysis. A highly stratified water column (salinity and temperature) suggests that upwelling of nutrients is minimal, phytoplankton productivity is low, and subsequent zooplankton populations are limited. The water mass remained stratified throughout the survey and no plankton blooms were observed. No further attempts at plankton collection were made.

The shore team collects fish from the fyke net at Point Brower and processes them at the STP.

The *1273* overnights at Endicott.

R. Trocine with dual gravity core samples

July 30 (Sunday)

The *1273* team transits ~16 NM Northeast from Endicott into thick flow ice to a water depth of 95.7 feet and collects surface sediment and two gravity core samples from L22.

A CTD profile is performed and seven discreet water samples are also collected at L22. Amphipod traps are deployed at 5(5).

The *1273* overnights at West Dock.

July 31 (Monday)

The *1273* team collects surface sediment and gravity cores from N05 and N17. Surface sediment is collected from M01 (McCovey exploration well area) but multiple gravity core attempts are unsuccessful at M01 and 5(A) due to stiff sediments limiting penetration. Amphipod traps are retrieved from 5(5), but no sample is collected.

The shore team prepares samples for shipment and processes water samples.

During the evening, the *1273* is re-fueled, water and provisions added in preparation for traveling west to Harrison Bay.

The *1273* overnights at West Dock.

J. Hardin collecting amphipods

August 1 (Tuesday)

Mobilization of the *1273* for the transit to Harrison Bay is conducted in the morning. Sediment and tissue samples are shipped to Duxbury, MA. The *1273* team transits to Oligtok Point on the eastern side of Harrison Bay during the afternoon and evening.

Surface sediment samples are collected from 6B and 6H. Gravity core samples are collected from 6B. Amphipod traps are deployed at 6B and 6H.

The shore team processes water samples and delivers delayed food shipment to Harrison Bay.

Richard Prentki returns to Anchorage.

1273 overnights at Oligtok Point.

August 2 (Wednesday)

The *1273* team collects surface sediment samples from 6F, 7A, 7C, 7E, and 7G. Collect gravity cores from 7A, 7C, and 7E. Gravity core attempt at 7G is unsuccessful due to stiff sediment. Collect amphipod traps from 6B, 6H (no sample), 7A (no sample) and 7E. Attempt clam collection at all sediment stations (6F, 7A, 7C, 7E, and 7G) without success. Collect peat sample from Eskimo Island.

The shore team processes water samples at STP and attends to errands/logistics in Prudhoe Bay.

The *1273* overnights at Eskimo Island.

August 3 (Thursday)

The *1273* team collects sediment samples from 6A, 6D, and 6G. Clam collections are attempted at 6A, 6D, and 6G without success. Amphipods traps are collected from 6B, 6F and 7G. All three have amphipod samples and one isopod sample is collected from 6B.

The shore team travels up the Colville River in the inflatable boat as far as fuel allows and collects peat and water samples at COL-03.

The *1273* overnights at Spy Island.

August 4 (Friday)

In the morning, the *1273* team collects amphipod traps from 6A and 6G (no sample was collected from 6G). The *1273* transits east toward Prudhoe Bay, stopping at Pingok Island to collect a peat sample. The *1273* arrives back at West Dock at 1310.

Flock of geese over Pingok Island

In the afternoon, the *1273* team collects surface water samples from N01 and N23. CTD casts, surface and subsurface water samples are collected at N08 (six discrete samples) and N14 (three discrete samples).

The *1273* overnights at West Dock.

August 5 (Saturday)

The *1273* team collects sediment samples at N03, N05, N06, N11, N14, N27, and N28. Amphipod traps are also deployed at N03, N05, N06, N11, N14, N27, and N28.

The shore team processes water samples.

The *1273* overnights at West Dock.

August 6 (Sunday)

The *1273* team collects sediment samples from West Dock, and 5A. Amphipod traps are collected with adequate mass for analysis at N03, N06, N11 (2 samples), N14, N27, and N28. The trap at N27 was drug by flow ice and strong winds to near N06 where it was recovered and a sample was collected. The traps at N05 were also drug by flow ice and winds and were not recovered, no sample was collected. Field equipment blank sample is collected at West Dock.

The shore team deploys the fyke net at Stump Island, deploys amphipod traps at West Dock, and completes water sample processing. FIT packs equipment and supplies.

The *1273* overnights at West Dock.

August 7 (Monday)

The *1273* team recovers mussel moorings from 5A, N03, and N11, with excellent recovery in all six samples. Amphipod traps are collected at N26 (2 samples). A field blank for amphipod collection equipment is collected at N26.

Shore team collects five fish from the fyke net at Stump Island, the net is re-set.

FIT completes shipment of equipment and supplies and departs Prudhoe Bay.

1273 overnights at West Dock.

Benthic sled on loan from Dr. Ken Dunton

August 8 (Tuesday)

Winds are too high to transit to Endicott and recover mussel moorings. Shore team collects fish from the Stump Island fyke net, remove the net, and process samples at STP. The shore team collects mussels and amphipods from West Dock (2 amphipod and 1 isopod samples).

Demobilize some equipment and supplies from the 1273. Pack samples for shipping to Duxbury laboratory.

The 1273 overnights at West Dock.

August 9 (Wednesday)

Battelle staff ship samples in the morning.

The *1273* team retrieves moorings from BP01, L08, SDI01, and E01. The mussels have excellent survival at all four locations. Deploy and retrieve amphipod traps at BP01. QA/QC sample for airborne contamination collected at SDI01.

The *1273* overnights at West Dock.

August 10 (Thursday)

The *1273* team performs four epibenthic tows in the Northstar area, collecting small volumes in seven samples. Tow N11-N08 provides amphipod, mysids, and isopod samples; tow N05-N11 collects mysids and isopods; and tow N11S collects mysids and isopods. The tow in deeper water, N08-N02, is not successful.

The *1273* is demobilized in the afternoon; samples and equipment are packed for transit in the evening.

The *1273* overnights at West Dock.

August 11 (Friday)

Battelle and KLI staff ship equipment and supplies. Departure flights are canceled due to fog.

Seth Danielson and the UAF team arrive at Prudhoe Bay. However, their gear is delayed.

The UAF team spends the night on the *1273* at West Dock due to housing shortages on the North Slope.

August 12 (Saturday)

Poor visibility continues in the afternoon but the flight is moved from Deadhorse to the Kuparuk gravel airstrip and departs in the evening.

Mark Mertz meets with UAF team again and makes some minor repairs on the *1273*.

The *1273* overnights at West Dock.

August 13 (Sunday)

The UAF team and Mark Mertz continue to organize and prepare for mooring recovery. Some UAF gear fails to arrive on time.

The *1273* overnights at West Dock

M. Walsh and G. Lawley collect fish at Stump Island

August 14 (Monday)

Captain Mertz takes UAF team to recover Dinkum Sands area mooring (offshore of Prudhoe Bay). The mooring is recovered using divers due to acoustic release failure. The team attempts to recover the Reindeer Island mooring, but the release does not work.

The *1273* overnights at West Dock.

August 15 (Tuesday)

The *1273* team returns to Reindeer Island and use an alternate set of coordinates that prove more accurate. The acoustic release functions when the *1273* gets within ~25 meters and the mooring is recovered intact.

Ken Kronschnabl (KLI, *1273* Captain) arrives in Prudhoe Bay in the evening. Mark Mertz and Ken Kronschnabl meet to discuss the *1273* status and transfer project information.

The *1273* overnights at West Dock.

August 16 (Wednesday)

Mertz transfers responsibility for the *1273* to Kronschnabl. UAF and Kronschnabl prepare the *1273* and service mooring for trip to Camden Bay.

The *1273* overnights at West Dock.

August 17 (Thursday)

The *1273* team transits toward Camden Bay.

August 18 (Friday)

Retrieve Camden mooring, replace with serviced mooring.

August 19 (Saturday)

Transit back to Prudhoe Bay.

August 20 (Sunday)

The UAF team services the moorings.
1273 overnights at West Dock.

August 21 (Monday)

The *1273* team deploys one mooring at Dinkum Island and one mooring offshore of Dinkum Island in 55 feet of water.

The *1273* overnights at West Dock.

August 22 (Tuesday)

The *1273* is pulled from the water and winterized. Ken Kronschnabl transfers responsibility of the vessel to Dee Williams of MMS.

August 23 (Wednesday)

Ken Kronschnabl leaves Prudhoe Bay.

1273 Captain M. Mertz

4.0 Sampling Procedures

Sampling procedures followed at each station were consistent with those performed during the ANIMIDA Summer 2002 program (MMS, 2002), 2004 and 2005 cANIMIDA summer surveys, and are described in the Summer 2006 Field Logistics and Sampling Plan for the Minerals Management Service ANIMIDA Program (MMS, 2006). Typical sampling procedures included:

- Conductivity, temperature, and depth (CTD) measurements
- Water sample collection via pump system from offshore suspended sediment stations, and by hand at shoreline river stations

- Surface sediment grab sample collection using a modified Van-Veen grab (for sediments and bivalves – as appropriate)
- Core sampling with a gravity coring device equipped with twin four inch diameter barrels.
- Deployment and retrieval of amphipod traps
- Deployment of mussel cages at eight fixed moorings; seven recovered
- Collection of fish samples by fyke net at two locations
- Collection of epibenthic fauna with a benthic sled provided by Dr. Ken Dunton.

Photo documentation, station logs, and field notes were recorded during the field survey. The station logs for each sampling station are included in Attachment 1. Each station log includes a description of the sampling location, observations, number and type(s) of samples collected, and comments.

5.0 Technical Issues

There were no significant technical difficulties during this survey. Due to the patchy nature of amphipod and clam populations, as encountered in previous studies, the exact target types and numbers of samples were not collected. When multiple attempts at a station occurred, the mass of amphipods recovered was similar between attempts. This pattern was also observed in 2005 and indicates that resident populations are relatively stable over the short sampling time frame. This indicates that additional effort(s) yield minimal additional return. Sampling went smoothly, with only one weather day occurring on the final travel day of the cANIMIDA portion of the survey. There were no significant administrative or local logistic problems. British Petroleum did an outstanding job of supporting the field staff and providing room and board during an unusually busy summer season.

6.0 References

Minerals Management Service. 2002. Summer 2002 Field Sampling and Logistics Plan. July 2002.

Minerals Management Service. 2006. Summer 2006 Field Sampling and Logistics Plan. July 22, 2006.

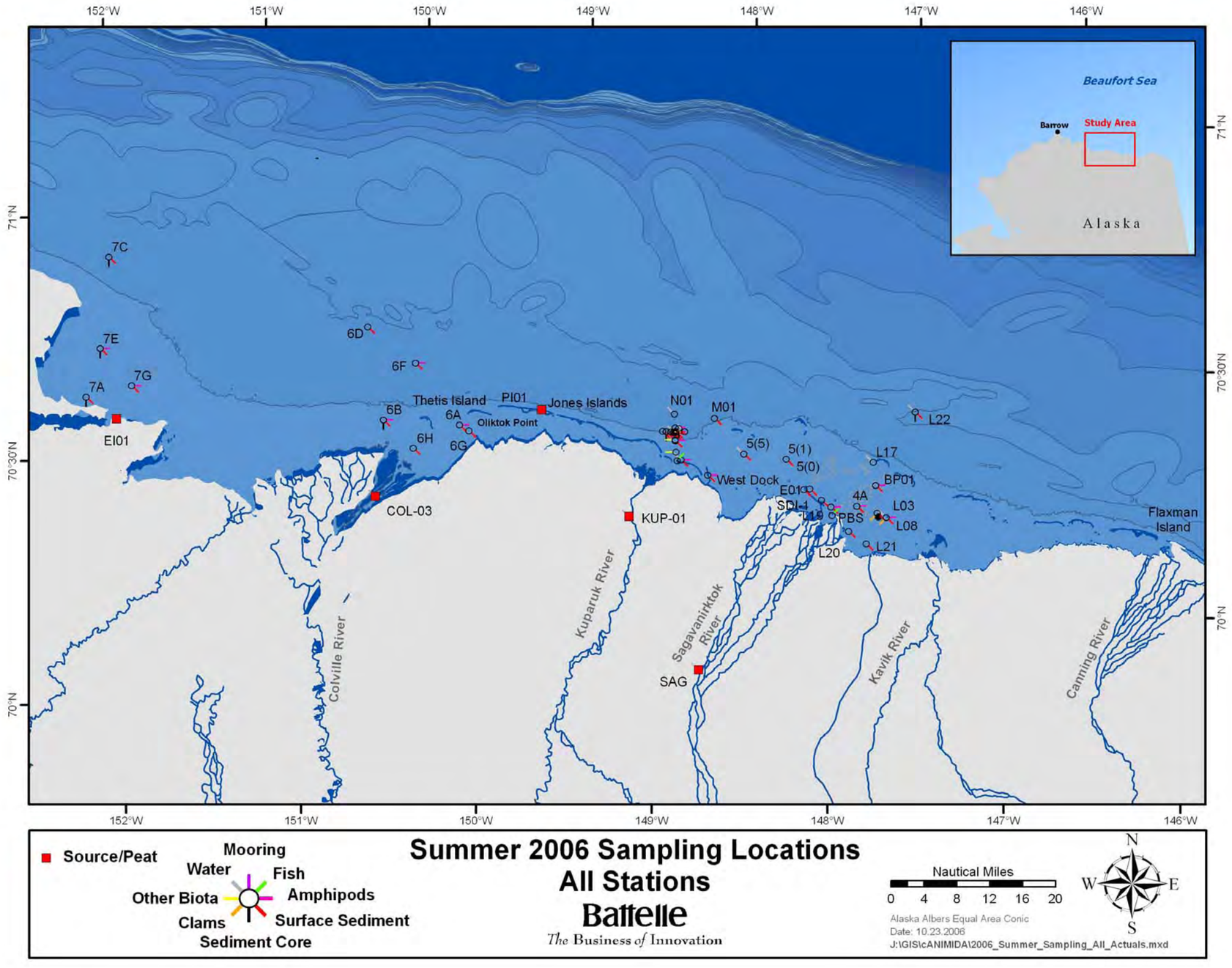

Figure 1. Summer 2006 cANIMIDA Sampling Locations.

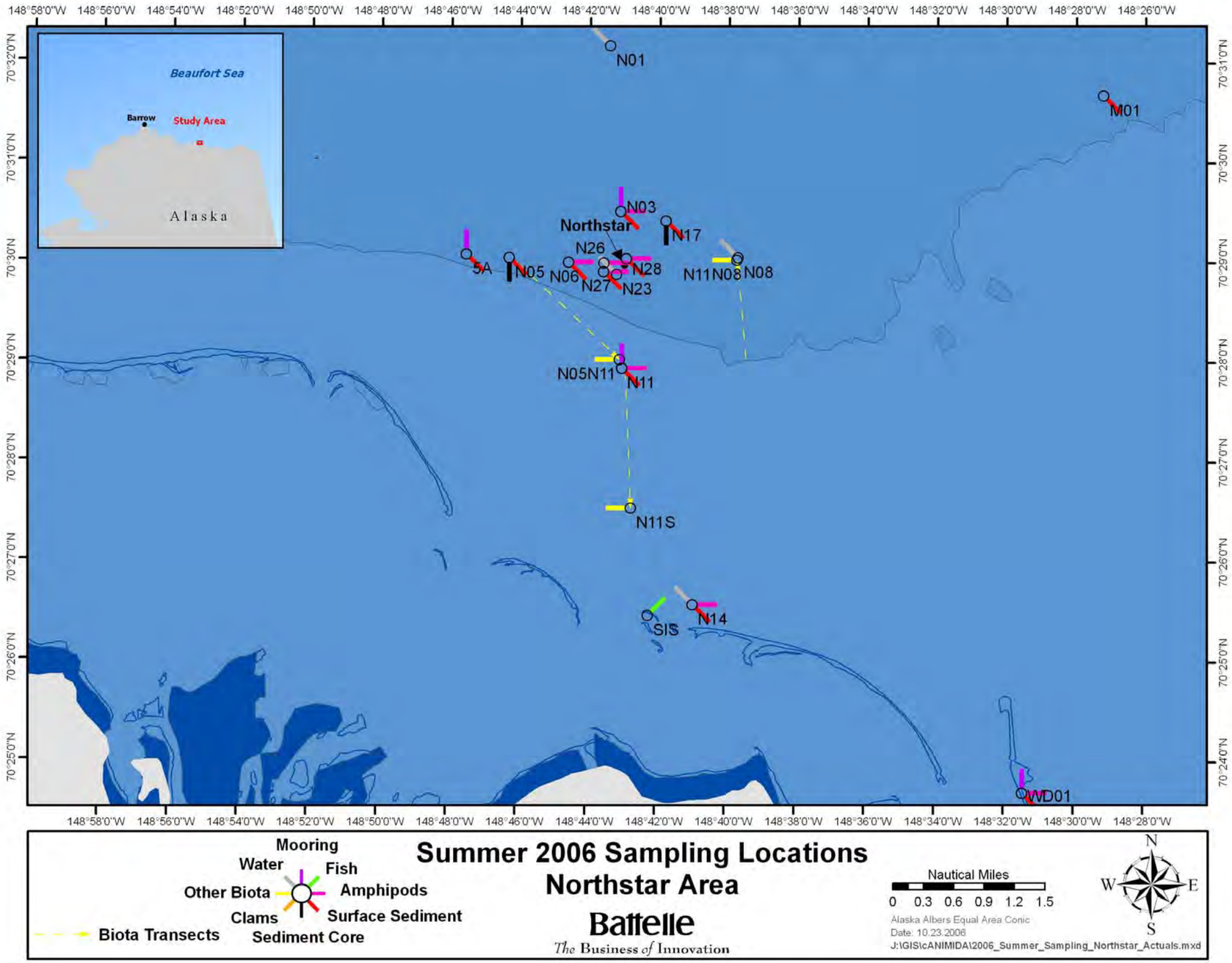

Figure 2. Northstar Area Sampling Locations, Summer 2006.

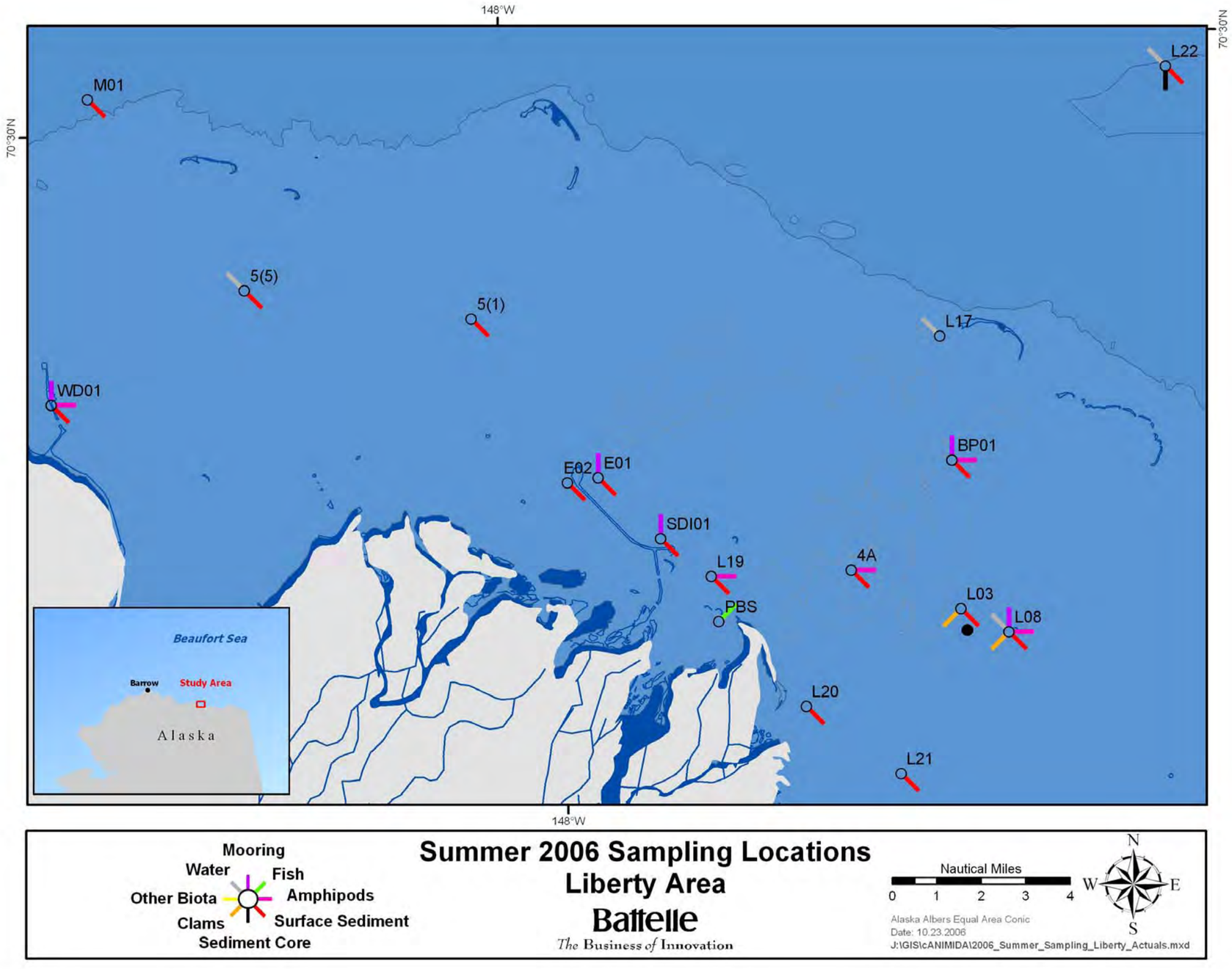

Figure 3. Liberty Area Sampling Locations, Summer 2006.

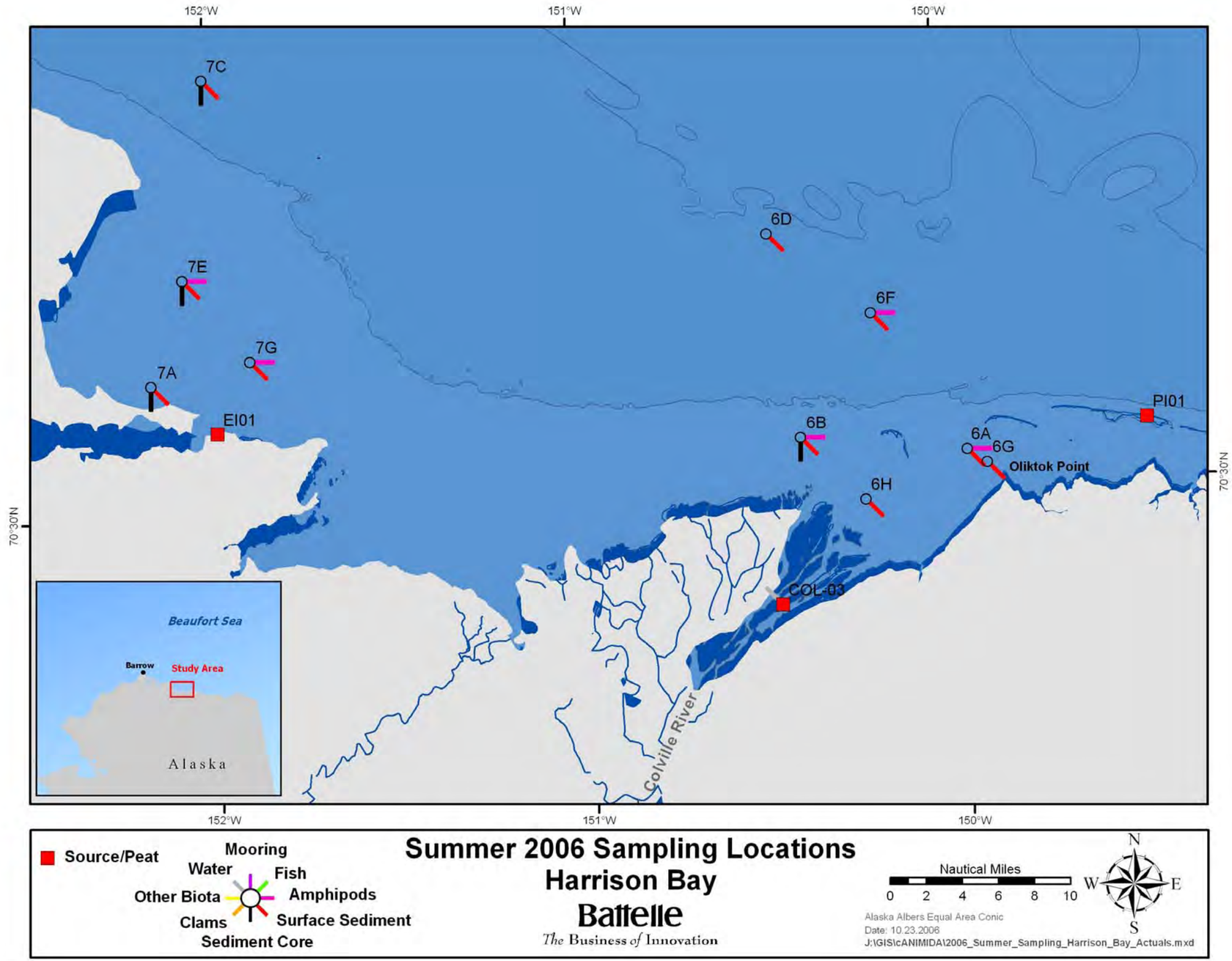

Figure 4. Harrison Bay Sampling Locations, Summer 2006.

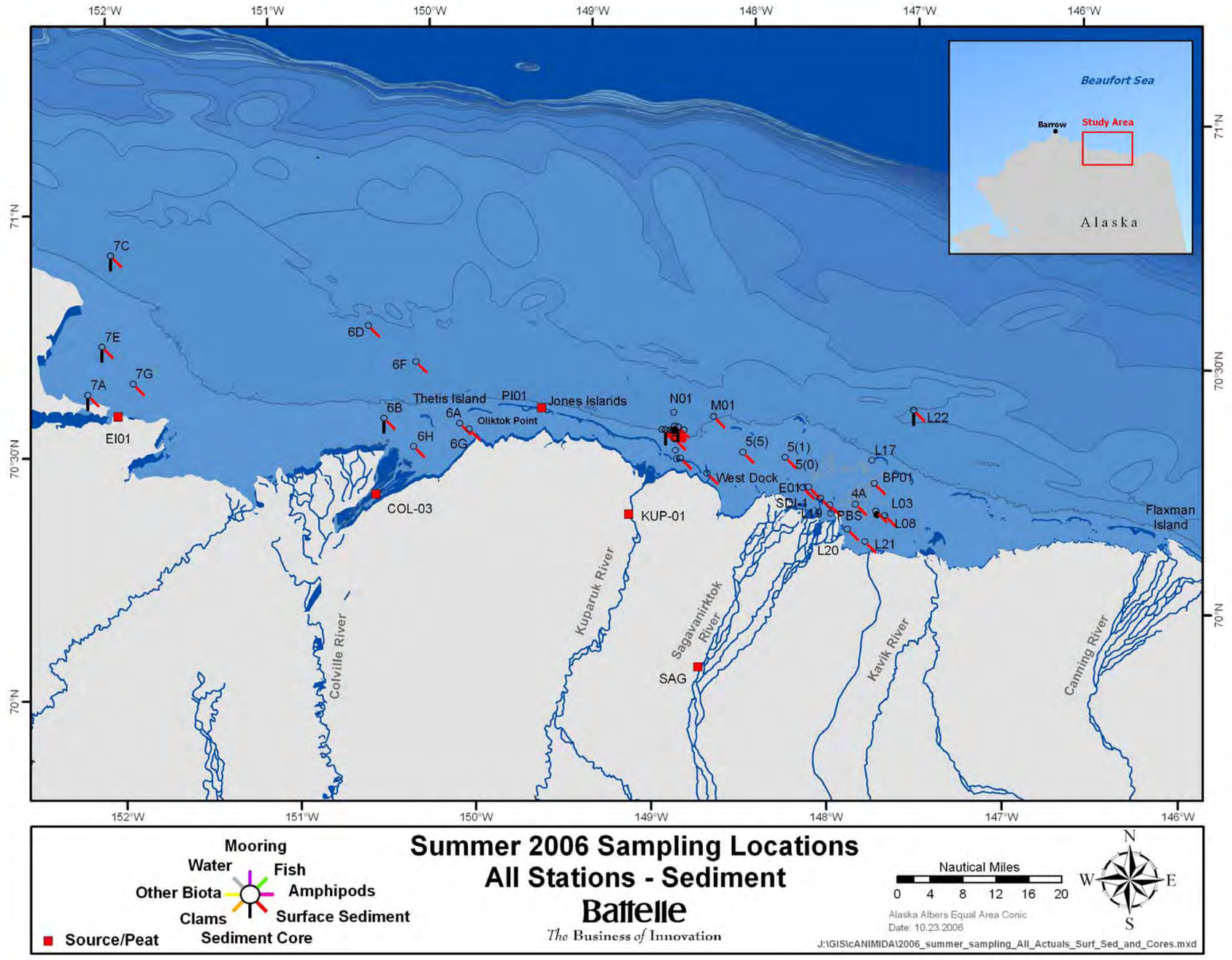

Figure 5. Sediment and Core Sampling Locations, Summer 2006.

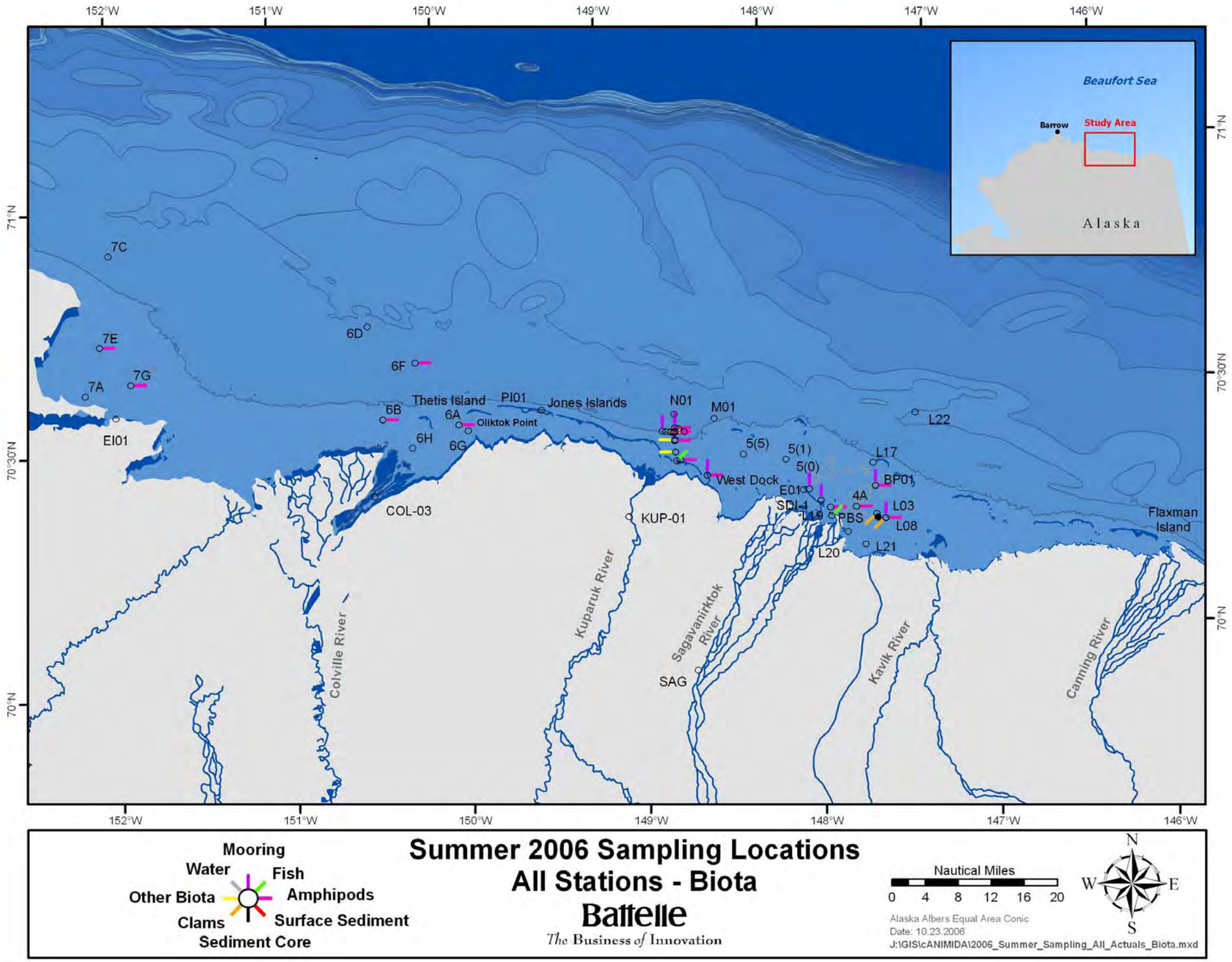

Figure 6. Mussel Moorings and Indigenous Biota Sampling Locations, Summer 2006.

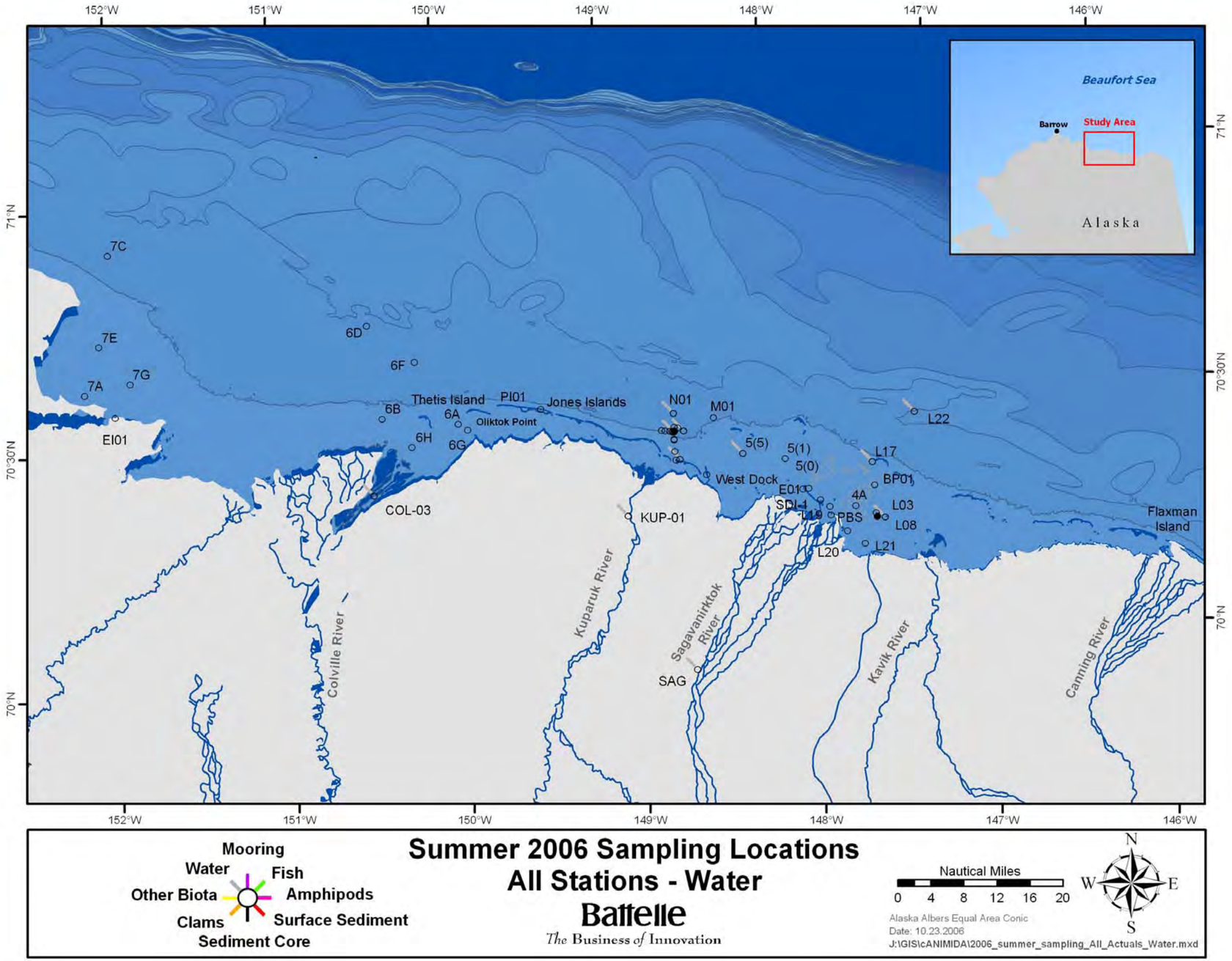

Figure 7. Water Sampling Locations, Summer 2006.

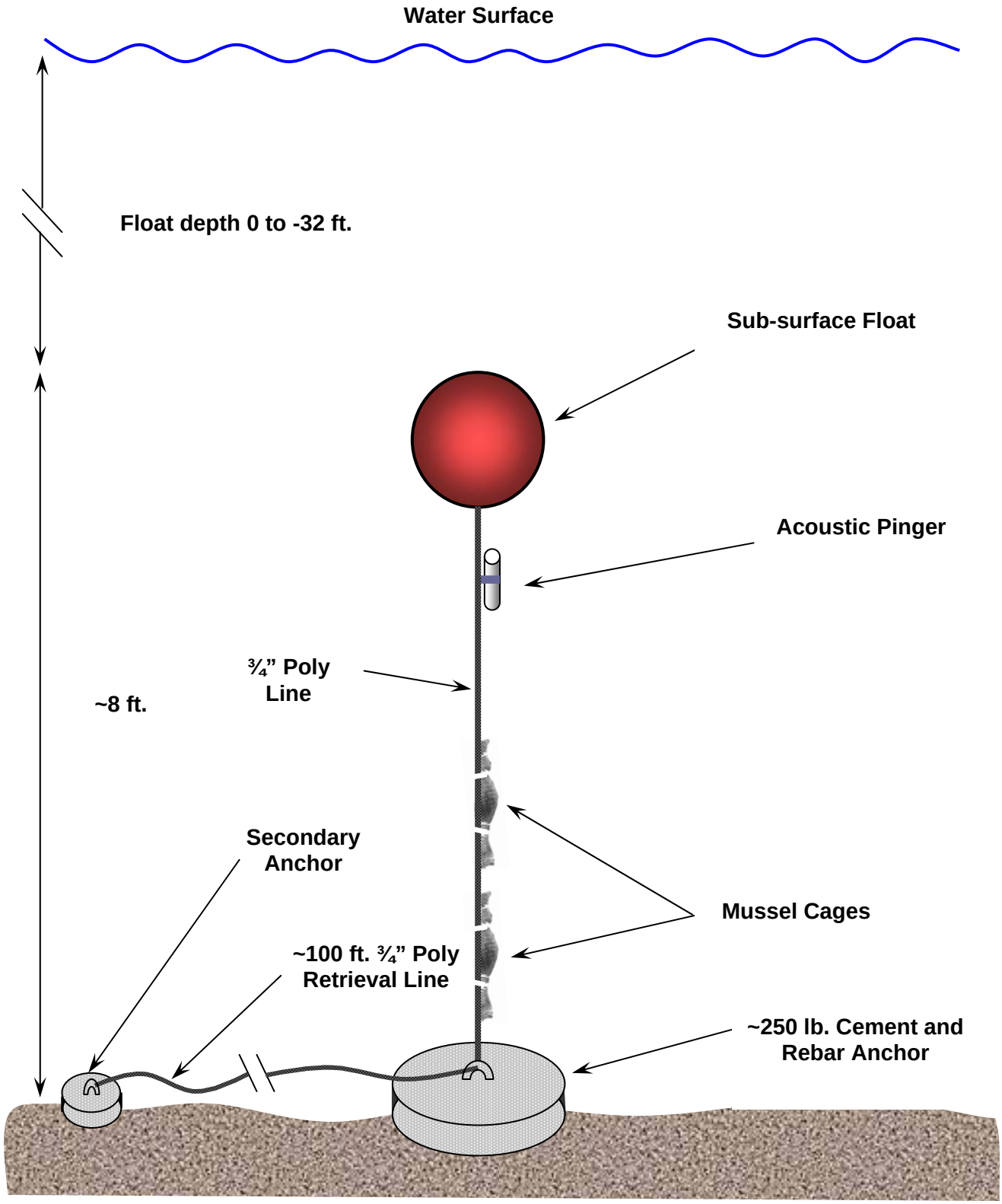

Figure 8. Schematic of the Mussel Cage and Mooring String

Attachment 1: 2006 Station Logs

Section 1: Daily Operations Logs

Section 2: Sediment Collection Logs

Section 3: Water, Plankton, and Indigenous Biota Collection Logs

Section 4: Mussel Collection Logs

Section 5: Fish Collection Logs

Attachment 2: 2006 Collection Permit and Fish Transfer Permit

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
P.O. Box 25526
JUNEAU, ALASKA 99802-5526

Permit No. CF-06-074

Expires 08/31/2006

FISH RESOURCE PERMIT
(For Scientific/Educational Purposes)

This permit authorizes **John Hardin** *(whose signature is required on page 2 for permit validation)*
person
of **Battelle Memorial Institute** at **703 Palomar Airport Rd, Suite 350, Carlsbad, CA 92009**
agency or organization address

to conduct the following activities from **July 1, 2006** to **August 31, 2006** in accordance with AS 16.05.930 and AS 16.05.340(b).

Purpose: To collect target species of shellfish and amphipods for tissue analysis of petroleum hydrocarbons and trace metals in order to evaluate concentration levels of hydrocarbons in the near-shore biota of the Beaufort Sea; to examine the potential bioaccumulation of organic compounds in the water column by deploying caged mussels and analyzing them for organics and metals, and to collect target species of fish for tissue analysis of petroleum hydrocarbons, trace metals, biomarker CYP1A, and biomarker bile FAC in order to evaluate contaminant exposure of fish in the near-shore Beaufort Sea.

Location: Nearshore Beaufort Sea, 12-20 stations from Bulletin Point to Western Harrison Bay, concentrating around the Northstar Production Island and Liberty Development Area.

Species Collected: **Collect & Sacrifice:** 300 astarte clams, 600 cyrtodaria clams, 600 mysids, 5000 amphipods, 10 Dolly Varden, 20 Arctic cisco, 10 broad whitefish, 20 least cisco, 10 humpback whitefish, 40 four horn sculpin, 10 Arctic cod, 10 Arctic flounder, 20 snailfish.
Collect, transport, caged release & sacrifice: 380 blue mussels (see **Contingencies**).

REPORT DUE September 30, 2006. The report shall include species, numbers, dates, and locations of collection and disposition, and if applicable, sex, age, and breeding condition, and lengths and weights of fish. The report shall also include other information as may be required under the contingencies section.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

1. This permit must be carried by person(s) specified during approved activities who shall show it on request to persons authorized to enforce Alaska's fish and game laws. This permit is nontransferable and will be revoked or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit unless specifically noted.
2. No specimens taken under authority hereof may be sold or bartered. All specimens must be deposited in a public museum or a public scientific or educational institution unless otherwise stated herein. Subpermittees shall not retain possession of live animals or other specimens.
3. The permittee shall keep records of all activities conducted under authority of this permit, available for inspection at all reasonable hours upon request of any authorized state enforcement officer.
4. Permits will not be renewed until detailed reports, as specified above, have been received by the department.
5. UNLESS SPECIFICALLY STATED HEREIN, THIS PERMIT DOES NOT AUTHORIZE the exportation of specimens or the taking of specimens in areas otherwise closed to hunting and fishing; without appropriate licenses required by state regulations; during closed seasons; or in any manner, by any means, at any time not permitted by those regulations.

Craig Farrington
Division of Commercial Fisheries

Patricia Nelson
Deputy Director
Division of Commercial Fisheries
Alaska Department of Fish and Game

CF-06-074 ***continued (page 2 of 2)***

Authorized Personnel: The following personnel may participate in collecting activities under terms of this permit:

John Hardin, Dick Prentki, John Trefry, Mark Savioe, Bob Trocine, Gary Lawley, Rob Rember, Mike Walsh, Carrie Semmler, Mark Mertz, Matt Alkire, Other KLI field personnel (TBA).

Contingencies:

1) **Fred Bue** (Division of Commercial Fisheries, Fairbanks, 907-459-7217) must be contacted **prior** to you engaging in collecting activities. Division of Commercial Fish Area Management Biologists have the right to specify methods for collecting, as well as limiting the collections of any species, and the number of specimens collected by time and area.

2) All unattended collecting gear must be labeled with the permittee's name, telephone number, and permit number.

3) Invertebrates, especially sessile invertebrates, should be collected over a broad geographical area to avoid local depletion and disruption of local ecosystems.

4) Permits will indicate the number of specimens that may be taken, by species and life stage. Sampling or collecting activities must stop when the maximum allowable number of specimens is obtained. All live fish, shellfish, and aquatic plants collected in excess of the number specified on the permit must be released immediately and unharmed at the capture location, unless otherwise specified in the permit.

5) All bycatch incidentally captured during sampling will be identified, recorded and released unharmed if possible. Bycatch data should be included in the collection report.

6) This permit will fulfill the requirements of 5AAC 41.005 – 41.060 pertaining to fish transport permits (FTP's), with the condition that the transported species BE DESTROYED AND NOT BE RELEASED.

7) *A copy of this permit, including any amendments, must be made available at all field collection sites and project sites for inspection upon request by a representative of the department or a law enforcement officer.*

8) Issuance of this permit does not absolve the permittee from compliance in full with any and all other applicable federal, state, or local laws regulations, or ordinances.

9) **A report of activities, referenced to this fish resource permit number, must be submitted to the Alaska Department of Fish and Game, Division of Commercial Fish, PO Box 115526, Juneau, AK 99811-5526, attention Sara Larsen (465-4724; sara_larsen@fishgame.state.ak.us), within 30 days after the expiration of this permit.** This report must summarize the number of fish captured by location and by species, and the fate of those fish. A report is required whether or not collecting activities were undertaken. A report must also be sent to the Biologist(s) listed under number 1 in this Contingencies section.

10) **PERMIT VALIDATION requires permittee's signature agreeing to abide by permit conditions before beginning collecting activities:**

Signature of Permittee

cc: Bonnie Borba
Fred Bue
Ted Meyers
Gene Sandone
CF Division Files
Alaska Bureau of Wildlife Enforcement-Coldfoot