FINAL CRUISE INSTRUCTIONS
ECO-FOCI

NOAA Ship *MILLER FREEMAN*, Cruise MF-05-07
May 9 – May 21, 2005
Chief Scientist – Janet Duffy-Anderson, NOAA/AFSC

1.0 FINAL CRUISE INSTRUCTIONS

1.1 Cruise Title – Ecosystem and Fisheries-Oceanography Coordinated Investigations (Eco-FOCI).

1.2 Cruise Numbers

1.2.1 Cruise Number – MF-05-07

1.2.2 Eco-FOCI Number – 5MF05

1.3 Cruise Dates

1.3.1 Departure – Depart Dutch Harbor, Alaska, at 1500 hours on Monday, May 9, 2005.

1.3.2 Arrival – Arrive Dutch Harbor, Alaska, at 0800 hours on Saturday, May 21, 2005.

1.4 Operating Area – Southeast Bering Sea.

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – Eco-FOCI will conduct an ichthyoplankton survey in the Bering Sea in the vicinity of Unimak Island, Alaska. This work is needed to describe larval fish and zooplankton assemblages in the Bering Sea – outer shelf, middle shelf – in the spring. In particular, this area is a known spawning ground for walleye pollock, northern rocksole, Pacific cod, and Alaska plaice, and abundances of larvae at this time of year are high. Data on physical characteristics of the water column will also be collected. Satellite tracked drifters will be released in the Unimak Island vicinity to study depth-discrete current trajectories and to test an oceanographic model of water movements for use in studies of larval transport.

2.2 Applicability – These instructions, with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN***, dated March 1, 2005, present complete information for this cruise.

2.3 Participating Organizations

NOAA – Alaska Fisheries Science Center (AFSC)
7600 Sand Point Way N.E.
Seattle, Washington 98115-0070

2.4 Personnel

2.4.1 Chief Scientist

Name	Gender	Affiliation	E-mail Address
Janet T. Duffy-Anderson (206) 526-6465	Female	AFSC	Janet.Duffy-Anderson@noaa.gov

2.4.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address
Janet T. Duffy-Anderson	Female	AFSC	Janet.Duffy-Anderson@noaa.gov
William Rugen	Male	AFSC	Bill.Rugen@noaa.gov
Andre Buchheister	Male	AFSC	Andre.Buchhesiter@noaa.gov
Susan J. Picquelle	Female	AFSC	Susan.Picquelle@noaa.gov
Colleen E. Harpold	Female	AFSC	Colleen.Harpold@noaa.gov
Deborah M. Blood	Female	AFSC	Debbie.Blood@noaa.gov

2.5 Administration

2.5.1 Ship Operations

Marine Operations Center, Pacific
1801 Fairview Avenue East
Seattle, Washington 98102-3767
Telephone: (206) 553-4548
Fax: (206) 553-1109

Commander Mark P. Ablondi, NOAA
Chief, Operations Division, Pacific (MOP1)
Telephone: (206) 553-8705
Cellular: (206) 390-7527
E-mail: Mark.Ablondi@noaa.gov

Larry Mordock
Deputy Chief, Operations Division (MOP1x1)
Telephone – Work: (206) 553-4764
Home: (206) 365-3567
Cellular: (206) 465-9316
E-mail: Larry.Mordock@noaa.gov

2.5.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453
E-mail: Phyllis.Stabeno@noaa.gov

Dr. Jeffrey Napp, AFSC
Telephone: (206) 526-4148
E-mail: Jeff.Napp@noaa.gov

3.0 OPERATIONS

3.1 Data To Be Collected – A goal of the Eco-FOCI program is to identify the physical and biological factors that underlie ecosystem change and to understand how those factors interact. One focus is the effects of perturbations at lower trophic levels. To this end, we will collect ichthyoplankton using 60-cm Bongo nets (60BON) and zooplankton using 20-cm Bongo nets (20BON), and a Neuston net. We will also employ a Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS) at selected locations.

We expect to spend one to three days testing the ship's Continuous Underway Fish Egg Sampler (CUFES). Testing may include comparison of sampling with the CUFES and ground-truthing CUFES egg density data with MOCNESS tows in the same locale. We intend to deploy several – four to six – Advanced Research and Global Observation Satellite (ARGOS) satellite-tracked drifters in the vicinity of Unimak Island to study current trajectories. Finally, we will collect data on the physical environment using the Sea-Bird Electronics SBE 19 SEACAT Profiler to relate larval assemblage structure to environmental variables – temperature and salinity.

We also anticipate running the SIMRAD EK 500 Scientific Echosounder Monitoring system to collect ancillary data on adult fish aggregations during the entire cruise.

3.2 Data To Be Collected

3.2.1 Scientific Computer System (SCS) – The ship's SCS shall operate throughout the cruise, acquiring and logging data from navigation, meteorological, oceanographic, and fisheries sensors. See ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI 5.2) for specific requirements.

3.3 Staging Plan – The majority of the equipment necessary for the cruise was loaded onto **NOAA Ship *MILLER FREEMAN*** before the ship's departure from Seattle, Washington. We request that we be allowed to set up equipment, including the MOCNESS hardware and the MOCNESS termination, on Sunday, May 8, 2005. We anticipate sending two scientists – one male (Buchheister) and one female (Harpold) – the evening of Saturday, May 7, 2005, for this purpose, and we request that these persons be allowed to stay on board the ship on the evenings of May 7 and May 8, 2005, if space is available.

We request that that some support personnel from the ship – an electronics technician and someone from the deck department – be available the morning of Sunday, May 8, 2005, to assist the scientists in the setup of the MOCNESS. It would be of considerable help if, prior to the arrival of the scientists, the ship's Electronic Technician (ET) could check out:

1) The continuity of the cable for the MOCNESS – Is the cable good? Could the ET cut off the end of the cable as part of checking the continuity?, and
2) Determine whether the signal can be received in DataPlot.

The scientists will also need to have the cable run down to the rough lab so they can work on it on Sunday, May 8. We will use the chemistry lab, the rough lab, and the slime lab for sample and equipment preparation and request as much counter and cabinet space as possible. We will also be using DataPlot for CTD, MOCNESS, CUFES, and SEACAT operations.

3.4 **De-staging Plan** – Samples and gear will remain on board the ship until the ship returns to Seattle, Washington, on Sunday, June 12, 2005. Additional sampling equipment will remain on board, in the hold, for use during Cruise MF-05-12.

3.5 **Cruise Plan** – The cruise will depart from Dutch Harbor, Alaska, at 1500 hours on Monday, May 9, 2005, and occupy a series of approximately 75 stations from the Bering Sea FOCI grid and on the inner shelf. Stations will also include Unimak Pass. See Section 9.2 Cruise MF-05-07 Station Locations and Section 9.3 Cruise MF-05-07 Chartlet for details.

At every station, a Sameoto Neuston net will be deployed first to collect fish larvae in the surface layer. Samples from the Neuston net gear will be preserved in 1.8% buffered formaldehyde.

Following completion of the Neuston tow, a Bongo tow (SOI 3.2.2) will be conducted. The SBE 19 SEACAT, the 20-cm Bongo net with 0.150-mm mesh netting and the 60-cm Bongo net with 0.505-mm mesh netting will all be mounted together for this tow. Bongo tows will be to a depth of 300 meters, or to 10 meters off bottom, whichever is shallower. The sample from 60BON Net 1 will be preserved in its entirety in 1.8% buffered formaldehyde. The sample from 60BON Net 2 will be sorted for rough counts of Alaska plaice eggs and/or larvae and then discarded. The sample from 20BON Net 1 will be preserved in its entirety in 1.8% buffered formaldehyde; the sample from Net 2 will be discarded.

When it is determined that sufficient numbers of Alaska plaice eggs and/or larvae have been located, a series of MOCNESS tows – 0.505-mm mesh – will be performed at selected stations, time permitting, to determine vertical distribution of larvae. Possible sampling stations are indicated in Section 9.3, though exact locations will be determined at sea. CTDs will be conducted prior to each MOCNESS tow to collect physical data.

The CUFES system will be tested over a period of one to three days, and the CUFES will be groundtruthed against the MOCNESS. The CUFES system will sample eggs over a discrete time interval – 15 minutes or 30 minutes – and then a MOCNESS tow will follow in approximately the same locale to determine whether eggs are being effectively sampled by the CUFES. Specific days of testing will be determined at sea at the discretion of the Chief Scientist – depending on density of Alaska plaice and walleye pollock eggs as determined by rough counts from 60BON Net 2 – and the Commanding Officer. In this system, water is continuously pumped at ca. 600-700 liters per minute from 4-m depth to the concentrator. Particles are concentrated by an oscillating net – 500 micron Nitex mesh – in approximately 3% of the flow. The filtrate is discharged overboard. The concentrate passes to the sample collector where particles are retained over sequential sampling intervals (e.g. 5-30 min) on a cod end of the same size mesh as used in the concentrator. Fish eggs will be counted at sea prior to preserving the sample. The sample will be preserved in formalin. Simultaneously, ancillary data are continuously collected for date, time, position, temperature, salinity, and chlorophyll *a* fluorescence.

Note: The CUFES groundtruth testing may occur in the same locales as MOCNESS sampling for Alaska plaice eggs/larvae (see above).

3.6 **Station Locations** – See Section 9.2 Cruise MF-05-07 Station Locations.

3.7 Station Operations – The following are operations to be conducted on this cruise. The procedures for these operations are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- CTD/Water Sample Operations (SOI 3.2.1),
- MARMAP Bongo Tows (SOI 3.2.2),
- Bongo Larval Condition Tows (SOI 3.2.3),
- MOCNESS Tows (SOI 3.2.5),
- ARGOS Satellite Tracked Drifter Buoy Deployments (SOI 3.2.11), and
- SIMRAD EK 500 Scientific Echosounder Monitoring (SOI 3.2.12).

3.7.1 Neuston Net Tows

3.7.1.1 Description – Neuston nets are used for sampling the upper few centimeters of the water column. There are many frame styles that may be used; however, we use a Sameoto sampler made of stainless steel. The mouth opening is 30-cm x 50-cm, and is designed to fish half in and half out of the water.

3.7.1.2 Rates/Fishing – The vessel should be moving slowly ahead, about 1.5 to 2.0 knots so that the net is fishing half in and half out of the water. The exact speed is a learning process and may vary with sea conditions. Lower the Neuston net to the surface and pay out 10 to 15 meters of wire. It may be necessary to adjust the ship's speed to maintain the proper skimming action. Start the stopwatch when the net starts to fish and tow the net for approximately 9.5 minutes, unless otherwise instructed. After 9.5 minutes, the vessel should decrease speed so that the net can be hauled in. Advise winch operator when time is nearly up and retrieve when ready. Read and record flow meter revolutions, time of tow, and any comments.

3.7.1.3 Preservation – The Neuston sample should be preserved immediately, as specified in the ***FOCI Field Manual*** or sample collection request forms.

3.7.1.4 Maintenance – Check net for holes and fill flow meter with water.

3.8 Underway Operations – The following are underway operations to be conducted on this cruise. The procedures for these operations are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- Scientific Computer System (SCS) Data Acquisition (SOI 5.2),
- Fluorometer monitoring (SOI 5.3), and
- Thermosalinograph monitoring (SOI 5.3).

3.8.1 Continuous Underway Fish Egg Sampler (CUFES)

3.8.1.1 Description – The CUFES is used to map the distribution of fish eggs in the surface waters. In the Southeast Bering Sea, most walleye pollock eggs are believed to be in the upper 10 meters of the water column and the CUFES

system may be an important tool to examine abundance, transport, and interannual variability. The intake of the CUFES system on the **NOAA Ship *MILLER FREEMAN*** is about three meters below the surface. Particles are concentrated into a 0.505-mm mesh cod end.

3.8.1.2 Methods – The Chief Scientist will work with the ship's command to establish a track line in the area of high abundance of fish eggs and larvae. The track will probably be oriented across the current that flows along the 50-meter isobath into Bristol Bay. We will attempt to take a new sample every 15 minutes – every 4.6 km or 2.5 nm. The ship speed should be at 10 knots (18.5 km/hr). The sampling frequency may need to be modified depending on the amount of plankton retained by the mesh. During the sampling, the Data Acquisition System (DAS) will acquire time and GPS position from the ship's GPS signal fed to the DAS.

3.8.1.3 Preservation – Each CUFES egg sample should be preserved immediately with 1.8% formaldehyde and labeled according to methods to be supplied before the cruise.

3.8.1.4 Maintenance – The sample cups should be checked after each use for holes. In addition the shaker apparatus should be checked frequently for clogging.

3.9 Applicable Restrictions – None.

3.10 Small Boat Operations – None.

4.0 FACILITIES

4.1 Equipment and Capabilities Provided by Ship

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD,
- Manual wire-angle indicator,
- Oceanographic winch with slip rings and 3-conductor cable terminated for the SBE SEACAT, for net tow operations,
- Sea-Bird Electronics' SBE 911*plus* CTD system with stand, each CTD system should include underwater CTD, weights, and pinger. There should be one deck unit and tape recorder for the two systems,
- 10-liter Niskin sampling bottles for use with rosette (10 plus 4 spares),
- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary),
- AUTOSAL salinometer, for CTD field corrections,
- Sea-Bird Electronics' SBE-19 SEACAT system,
- Meter block for plankton tows,
- Wire speed indicators and readout for quarterdeck and Rowe winches,
- For meteorological observations: 2 anemometers (one R. M. Young system interfaced to the SCS), calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph,
- Freezer space for storage of biological and chemical samples (blast and storage freezers, indicate desired temperatures),
- SIMRAD EQ-50 echosounder,

- Bench space in DataPlot for PCs, monitor, printer and VCR to fly MOCNESS,
- Use of Pentium PC in DataPlot for data analysis,
- Scientific Computer System (SCS),
- Aft Rowe winch with single conductor cable and slip rings for MOCNESS,
- Electrical connection between Rowe winch and DataPlot,
- Removable stern platform (in place),
- Laboratory space with exhaust hood, sink, lab tables and storage space,
- Sea-water hoses and nozzles to wash nets (quarterdeck and aft deck),
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar,
- Safety harnesses for working on quarterdeck and fantail, and
- Ship's crane(s) used for loading and/or deploying.

4.2 Equipment and Capabilities Provided by Scientists

- Sea-Bird Electronics' SBE 911*plus* CTD system,
- Sea-Bird Electronics' SBE-19 SEACAT system,
- PMEL PC with SEASOFT software for CTD data collection and processing,
- Fluorometer and light meter to be mounted on CTD,
- CTD stand modified for attachment of fluorometer,
- Conductivity and temperature sensor package to provide dual sensors on the CTD (backup),
- CTD rosette sampler,
- 60-cm Bongo sampling arrays,
- 20-cm Bongo arrays,
- Spare wire angle indicator,
- Neuston frame and nets,
- Bridle for neuston net,
- MOCNESS,
- ARGOS tracked drifter buoys with optical sensors,
- Miscellaneous scientific sampling and processing equipment,
- Scientific ultra-cold freezer,
- Cruise Operations Database (COD), and
- CUFES EDAS, computer, software, and sample cups.

5.0 DISPOSITION OF DATA AND REPORTS

5.1 The following data products will be included in the cruise data package:

- **NOAA Form 77-13d, *Deck Log – Weather Observation Sheets*,**
- Electronic Marine Operations Abstracts,
- SCS backup - recordable compact diskette (CD-RW),
- Calibration Sheets for all ship's instruments used,
- PMEL CTD Weather Observation Logs,
- CTD Cast Information/Rosette Log,
- Autosalinometer Logs, and
- Ultra-cold Freezer Temperature Daily Log (SOI 5.4).

5.2 Pre and Post-cruise Meetings – Cruise meetings may be held in accordance with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI 5.5).

6.0 ADDITIONAL PROJECTS

6.1 Definition – Ancillary and piggyback projects are secondary to the objectives of the cruise and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force.

6.2 Ancillary Projects – Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the ***NOAA Fleet Standing Ancillary Instructions***.

6.3 Piggyback Projects

6.3.1 EUPHAUSIID COLLECTION

6.3.1.1 Samples and Time of Day – The euphausiids should be collected in an area of high early stage larval walleye pollock abundance, rough count of around 1,000 pollock larvae – extrapolated for the whole cod end. History tells us this will be in the vicinity of 56°-57°N, 165°-167°W. We would like to conduct the experiment six times. Live tows should be conducted at night when the euphausiids are up in the water column and most likely to encounter pollock larvae.

6.3.1.2 Protocol

- Place the collector in the support frame and secure it in the slime lab. We would recommend that it be secured off the floor – on a counter – so that water can easily be drained out of the hose and into the 20-μm sieve. Place Blue Ice blocks in the -20°C freezer.

- Use filtered seawater to fill the collector. To filter seawater, first clear the ship's system by allowing the water to run for about 30 minutes. Then attach the cuno filter housing and filter and run seawater for a few minutes to clean the filter.

- Fill a couple of carboys with seawater and place them in the refrigerator. Use the pinch clamp or "C" clamp to seal the end of the hose on the collector, and then fill the collector about half full using filtered seawater just before you are ready to start collecting euphausiids.

- At six stations of high larval pollock abundance use a live Bongo tow to collect euphausiids and large amphipods. The ship does not need to be repositioned for the live tow. This is a vertical tow using taped cod ends towed from 100 meters to the surface – wire speed out is 40-m/min, and

then 10 to 20-m/min back. Do not wash the net down when it is back on deck. Try to get the euphausiids moved from the net to the collector as quickly as possible. **NOTE: if only a small number of euphausiids are being collected each live cast, and then a standard Bongo tow can be used to collect them.**

- Place the 1,000-μm sieve in a large bowl and pore contents of the cod end through it to separate small zooplanktons and fish larvae from the euphausiids. Remove the sieve and use a squeeze bottle filled with filtered seawater to wash euphausiids off the sieve and into another bowl of filtered seawater.

- Gently pour the bowl of euphausiids into the collector. Place a Blue Ice block in the collector to keep the seawater from warming up too much during the eight hour holding period. We recommend that the temperature not go above 10°C. Mix 1/8 teaspoon of "euphausiid food" in a 1-L beaker of seawater and add it to the collector.

- Use 5% formalin to preserve the small zooplankton and fish larvae that were separated from the euphausiids and are remaining in the bowl – just preserve the contents from one tow, if multiple tows are done. The sample can be preserved just like a Bongo tow (i.e. use the 333-μm sieve to remove excess water). Label the quart jar like a standard Bongo tow, and put "Euphausiid Live Tow" on it also. Place all the sample jars together in a box with Steve Porter's name on it. We would like several hundred euphausiids and amphipods in the collector, the minimum number is 50.

- Keep the euphausiids in the collector for eight hours.

- At the end of eight hours, tap and gently shake any fecal material through the mesh or on edge. If there is some material that is not going through the mesh then run the scraper over the mesh to force it through. Let this settle a few minutes.

- Slowly unscrew the clamp to start a flow of water out of the hose and into the 20-μm sieve. Wetting the sieve before starting will help the water to flow through it faster. When the sieve starts to clog up or the feces collector is completely drained, use a squeeze bottle filled with filtered seawater to rinse the contents of the sieve into a plastic sample bottle. Place the funnel in the sampling bottle to aid washing the sample into it. Fill a sample bottle no more than 3/4 full, use another bottle if necessary. Repeat this process until the collector is completely drained. Place the sample bottles into the labeled zip-lock bag, record sample information on the sample sheet, and place the bottle in the -80°C freezer or into the walk-in freezer down near the machine shop. If samples are put into the walk-in freezer please put the jars in a box with Steve Porter's name on it. For identification purposes preserve about ten euphausiids and amphipods in 95% ethanol in a scintillation vial labeled with cruise, station number, and "Steve Porter".

6.3.2 ALASKA PLAICE GENETICS

Samples are needed to study the landscape genetics of Alaska plaice and Greenland halibut in the Eastern Bering Sea. Larval flatfish samples to be collected will be derived from 60BON Net2. Remove all flatfish larvae from Net2 and preserve in scintillation vials filled with 95% (non-denatured) EtOH. If high concentrations of flatfish larvae are encountered, then preserve 100 individuals from a single station. Otherwise, do not collect more than 300 flatfish larvae total from all stations combined.

7.0 HAZARDOUS MATERIALS

7.1 Inventory – See Section 9.4 Cruise MF-05-07 HAZMAT Inventory.

7.2 Material Safety Data Sheet (MSDS) – All MSDSs can be found on the ***OERD HAZMAT Emergency Guidelines – MSDS*** compact diskette dated January 25, 2005, supplied to the ship. A copy of all required MSDS will also be delivered with the chemicals when ship is loaded.

8.0 MISCELLANEOUS

8.1 Communications – Specific information on how to contact the **NOAA Ship *MILLER FREEMAN*** and all other fleet vessels can be found at:

http://www.moc.noaa.gov/phone.htm

8.2 Important Telephone and Facsimile Numbers and E-mail Addresses

8.2.1 Pacific Marine Environmental Laboratory (PMEL)

FOCI – Ocean Environmental Research Division (OERD2):
- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:
- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

E-Mail: FirstName.LastName@noaa.gov

8.2.2 Alaska Fisheries Science Center (AFSC)

FOCI – Resource Assessment and Conservation Engineering (RACE):
- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

E-Mail: FirstName.LastName@noaa.gov

8.2.3 **NOAA Ship *MILLER FREEMAN*** – Telephone methods listed in order of increasing expense:

Homeport – Seattle, Washington:
- (206) 553-4589
- (206) 553-4581
- (206) 553-8344

United States Coast Guard – Kodiak, Alaska:
- (907) 487-9752
- (907) 487-9753
- (907) 487-4397
- (907) 487-4398

Cellular:
- (206) 790-7594

Iridium:
- (808) 659-5684

INMARSAT Mini-M:
- 011-872-761-267-346 (voice/PBX)
- 011-872-761-267-347 (voice)
- 011-872-761-267-348 (fax)

INMARSAT B:
- 011-872-330-394-120 (voice)
- 011-872-330-394-121 (fax)

E-Mail: NOAA.Ship.Miller.Freeman@noaa.gov (mention the person's name in SUBJECT field)

8.2.4 **Marine Operations Center, Pacific (MOP)**

Operations Division (MOP1):
- (206) 553-4548 (voice)
- (206) 553-1109 (facsimile)

E-Mail: FirstName.LastName@noaa.gov

E-Mail to Radio Room: Radio.Room@noaa.gov

9.0 APPENDICES

9.1 Cruise MF-05-07 Equipment Inventory

Equipment	Quantity	Dimension	Weight		Total Weight	
Larval Supply Trunks	1	20"x22"x36"	80	lbs	80	lbs
Microzooplankton Supply Trunks	2	20"x22"x36"	90	lbs	180	lbs
Formaldehyde Containers	3	20-L	40	lbs	120	lbs
Carboy, 95% Reagent Alcohol	1	20-L	40	lbs	40	lbs
Miscellaneous Gear Trunks	4	20"x22"x36"	80	lbs	320	lbs
60-cm Bongo Frame	1	8"x26"x60"	80	lbs	80	lbs
20-cm Bongo Frame	1	8"x14"x16"	40	lbs	40	lbs
MOCNESS Frame	1	45”x120”	250	lbs	250	lbs
Cases, Glass Jars, 32-oz	30	8"x12"x15"	50	lbs	1,500	lbs
Cases, Glass Jars, 8-oz	10	4"x6" 8"	8	lbs	80	lbs
			TOTAL:		**2,570**	**lbs**
Equipment in white footlocker labeled “Euphausiid Project”						
Collector, Feces						
Frame, Support, Collector						
Clamp, Pinch						
Bottles, Plastic, 16-oz.	6					
Scraper, Plastic						
Sieve, 20-µm						
Funnel						
“C” Clamp						
Other Equipment						
1,000-µm sieve (in egg spawning equipment blue footlocker)						
Large plastic bowls (in egg spawning equipment blue footlocker)						
Squeeze bottle (in egg spawning equipment blue footlocker)						
Cuno filter and housing (in egg spawning equipment blue footlocker)						
Thermometer (in egg spawning equipment blue footlocker)						
Filtered seawater carboys (in blue tote)						

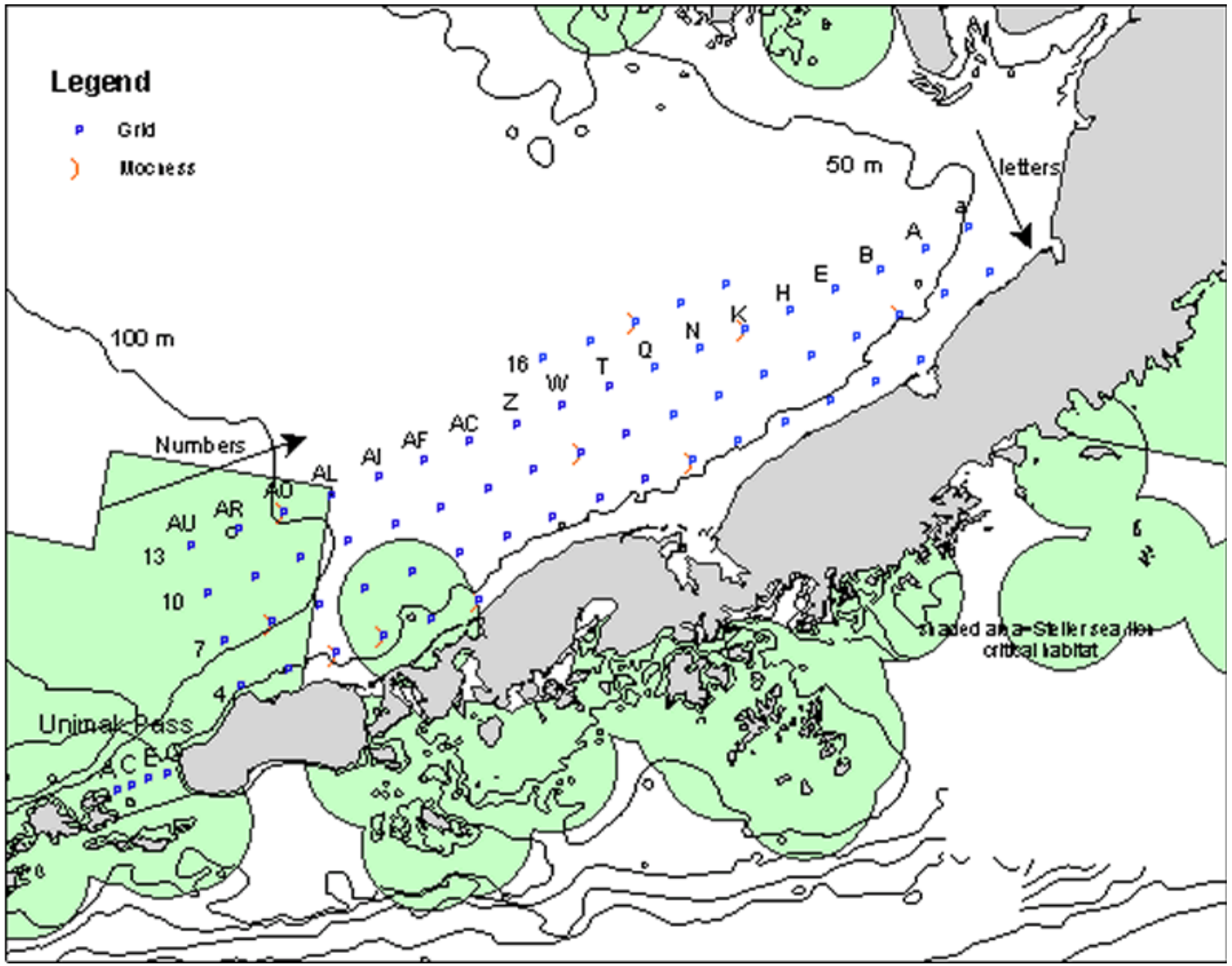
9.2 Cruise MF-05-07 Station Locations

Operation	Latitude	Longitude	DecLat	DecLong
Unimak Pass A	54° 19.800' N	165° 24.420' W	54.330	-165.407
Unimak Pass C	54° 22.320' N	165° 17.040' W	54.372	-165.284
Unimak Pass E	54° 24.900' N	165° 09.000' W	54.415	-165.150
Unimak Pass G	54° 27.660' N	165° 00.840' W	54.461	-165.014

Operation	Latitude	Longitude	DecLat	DecLong
AU4	54° 56.820' N	164° 30.120' W	54.947	-164.502
AR4	55° 03.960' N	164° 06.960' W	55.066	-164.116
AO4	55° 11.160' N	163° 43.680' W	55.186	-163.728
AL4	55° 18.300' N	163° 20.400' W	55.305	-163.340
AI4	55° 25.440' N	162° 57.000' W	55.424	-162.950
AF4	55° 32.640' N	162° 33.600' W	55.544	-162.560
AF7	55° 45.840' N	162° 46.260' W	55.764	-162.771
AC7	55° 52.980' N	162° 22.800' W	55.883	-162.380
Z7	56° 00.120' N	161° 59.220' W	56.002	-161.987
W7	56° 07.320' N	161° 35.640' W	56.122	-161.594
T7	56° 14.460' N	161° 11.940' W	56.241	-161.199
Q7	56° 21.600' N	160° 48.180' W	56.360	-160.803
N7	56° 28.800' N	160° 24.300' W	56.480	-160.405
K7	56° 35.940' N	160° 00.360' W	56.599	-160.006
H7	56° 43.080' N	159° 36.480' W	56.718	-159.608
E7	56° 50.280' N	159° 12.600' W	56.838	-159.210
B7	56° 57.420' N	158° 48.720' W	56.957	-158.812
A10	57° 17.760' N	158° 37.920' W	57.296	-158.632
a10	57° 24.960' N	158° 14.040' W	57.416	-158.234
a13	57° 38.160' N	158° 27.420' W	57.636	-158.457
A13	57° 30.960' N	158° 51.240' W	57.516	-158.854
B13	57° 23.820' N	159° 15.060' W	57.397	-159.251
B10	57° 10.620' N	159° 01.800' W	57.177	-159.030
E10	57° 03.480' N	159° 25.680' W	57.058	-159.428
E13	57° 16.680' N	159° 38.880' W	57.278	-159.648
H13	57° 09.480' N	160° 02.760' W	57.158	-160.046
H10	56° 56.280' N	159° 49.560' W	56.938	-159.826
K10	56° 49.140' N	160° 13.440' W	56.819	-160.224
K13	57° 02.340' N	160° 26.580' W	57.039	-160.443
K16	57° 15.480' N	160° 39.780' W	57.258	-160.663
N16	57° 08.340' N	161° 03.540' W	57.139	-161.059
N13	56° 55.140' N	160° 50.400' W	56.919	-160.840
N10	56° 41.940' N	160° 37.320' W	56.699	-160.622
Q10	56° 34.800' N	161° 01.140' W	56.580	-161.019
Q13	56° 48.000' N	161° 14.160' W	56.800	-161.236
Q16	57° 01.200' N	161° 27.300' W	57.020	-161.455
T16	56° 54.000' N	161° 50.940' W	56.900	-161.849
T13	56° 40.860' N	161° 37.860' W	56.681	-161.631
T10	56° 27.660' N	161° 24.840' W	56.461	-161.414
W10	56° 20.460' N	161° 48.480' W	56.341	-161.808

Operation	Latitude	Longitude	DecLat	DecLong
W13	56° 33.660' N	162° 01.440' W	56.561	-162.024
W16	56° 46.860' N	162° 14.520' W	56.781	-162.242
Z13	56° 26.520' N	162° 25.020' W	56.442	-162.417
Z10	56° 13.320' N	162° 12.060' W	56.222	-162.201
AC10	56° 06.180' N	162° 35.580' W	56.103	-162.593
AC13	56° 19.320' N	162° 48.480' W	56.322	-162.808
AF13	56° 12.180' N	163° 11.880' W	56.203	-163.198
AF10	55° 58.980' N	162° 59.040' W	55.983	-162.984
AI7	55° 38.640' N	163° 09.660' W	55.644	-163.161
AI10	55° 51.840' N	163° 22.380' W	55.864	-163.373
AI13	56° 05.040' N	163° 35.220' W	56.084	-163.587
AL13	55° 57.840' N	163° 58.440' W	55.964	-163.974
AL10	55° 44.700' N	163° 45.720' W	55.745	-163.762
AL7	55° 31.500' N	163° 33.000' W	55.525	-163.550
AO7	55° 24.300' N	163° 56.280' W	55.405	-163.938
AO10	55° 37.500' N	164° 08.940' W	55.625	-164.149
AO13	55° 50.700' N	164° 21.660' W	55.845	-164.361
AR13	55° 43.560' N	164° 44.760' W	55.726	-164.746
AR10	55° 30.360' N	164° 32.100' W	55.506	-164.535
AR7	55° 17.160' N	164° 19.500' W	55.286	-164.325
AU7	55° 10.020' N	164° 42.600' W	55.167	-164.710
AU10	55° 23.220' N	164° 55.200' W	55.387	-164.920
AU13	55° 36.360' N	165° 07.800' W	55.606	-165.130

9.3 Cruise MF-05-07 Chartlet



9.4 Cruise MF-05-07 HAZMAT Inventory

Chemical	CAS Number	Respondee	Org	Qty	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Ethanol	64-17-5	Duffy-Anderson	AFSC	20-L	3	4	2	Flammable	3	II	1170	5,000 LBS	1
Formaldehyde	50-00-0	Duffy-Anderson	AFSC	60-L	3	2	2	Flammable	3 & 8	III	1198	100 LBS	1
Sodium Borate	1330-43-4	Duffy-Anderson	AFSC		1	0	0	General	Not regulated				2
Spill Response 1: Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, or earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. U.S. Regulations (CERCLA) requires reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the U.S. Coast Guard National Response Center is (800) 424-8802.													
Spill Response 2: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust.													