

# FINAL CRUISE INSTRUCTIONS

## *ECO-FOCI*

NOAA Ship *MILLER FREEMAN*, Cruise MF-05-12  
September 5 – September 19, 2005  
Chief Scientist – Matthew T. Wilson, 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-05-12

1.2.2 **Eco-FOCI Number** – 7MF05

1.3 **Cruise Dates**

1.3.1 **Departure** – Depart Kodiak, Alaska, at 1500 ADT on Monday, September 5, 2005.

1.3.2 **Arrival** – Arrive Dutch Harbor, Alaska, at 0900 ADT on Monday, September 19, 2005.

1.4 **Operating Area** – Western Gulf of Alaska.

### 2.0 CRUISE OVERVIEW

2.1 **Cruise Objectives** – The primary objective is to better understand geographic variation in the productivity of fishes in the western Gulf of Alaska (GOA). This cruise will focus on the geographic distribution and size of age-0 walleye pollock and other small pelagic fishes in relation to the zooplankton on which they feed, and physical oceanography. To accomplish this, a two-part grid of 67 stations will be occupied (see [Section 9.2 Cruise MF-05-12 Chartlet](#) and [Section 9.3 Cruise MF-05-12 Station Locations](#)). The first part is along the Gulf-side of Kodiak Island. The second part is in the south Semidi Islands vicinity. The Kodiak grid includes nearshore areas previously shown to be pollock nurseries. Occupation of the Semidi grid will extend a 3-year time series, which began September 2000.

Secondary cruise objectives are as follows:

- 1) Collect midwater fishes, plankton, acoustic, and CTD samples/data in Barnabas Gully to determine if previously observed spatial separation of capelin and juvenile walleye pollock can be ascribed to a difference in prey associated with a hydrographic front.

Previously, the front has formed in the mid-shelf region of the gully. These collections will require about one day of cruise time, but may be interspersed with other operations.

- 2) Opportunistic sampling may be conducted to identify patches of strong acoustic backscatter.
- 3) Opportunistic sampling with a bottom trawl to collect piscivorous fishes for preliminary indication of predation on age-0 pollock.
- 4) Opportunistic sampling in bays or other sheltered area if weather prevents occupation of the grid.

**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 – Pacific Marine Environmental Laboratory (PMEL)  
7600 Sand Point Way N.E.  
Seattle, Washington 98115-6439

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	Nationality	E-mail Address
Matthew T. Wilson (206) 526-6522	Male	AFSC	USA	<a href="mailto:Matt.Wilson@noaa.gov">Matt.Wilson@noaa.gov</a>

**2.4.2 Participating Scientists**

Name	Gender	Affiliation	Nationality	E-mail Address
Matthew T. Wilson	Male	AFSC	USA	<a href="mailto:Matt.Wilson@noaa.gov">Matt.Wilson@noaa.gov</a>
Annette L. Dougherty	Female	AFSC	USA	<a href="mailto:Annette.Dougherty@noaa.gov">Annette.Dougherty@noaa.gov</a>
Jennifer A. Lanksbury	Female	AFSC	USA	<a href="mailto:Jennifer.Lanksbury@noaa.gov">Jennifer.Lanksbury@noaa.gov</a>
Elizabeth A. Logerwell	Female	AFSC	USA	<a href="mailto:Libby.Logerwell@noaa.gov">Libby.Logerwell@noaa.gov</a>
Frank Morado	Male	AFSC	USA	<a href="mailto:Frank.Morado@noaa.gov">Frank.Morado@noaa.gov</a>
Steven Porter	Male	AFSC	USA	<a href="mailto:Steve.Porter@noaa.gov">Steve.Porter@noaa.gov</a>
William Rugen	Male	AFSC	USA	<a href="mailto:Bill.Rugen@noaa.gov">Bill.Rugen@noaa.gov</a>
Melissa M. McKay	Female	AFSC	USA	<a href="mailto:Melissa.McKay@noaa.gov">Melissa.McKay@noaa.gov</a>

## **2.5 Administration**

### **2.5.1 Ship Operations**

Marine Operations Center, Pacific  
1801 Fairview Avenue East  
Seattle, Washington 98102-3767  
Telephone: (206) 553-4548  
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### **2.5.2 Scientific Operations**

Dr. Phyllis J. Stabeno, PMEL  
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Dr. Jeffrey M. Napp, AFSC  
Telephone: (206) 526-4148  
E-mail: [Jeff.Napp@noaa.gov](mailto:Jeff.Napp@noaa.gov)

## **3.0 OPERATIONS**

### **3.1 Data To Be Collected**

**3.1.1 Plankton Net** – The Tucker trawl will be deployed to a depth of 200 meters, or 10 meters off the bottom, whichever is shallowest. On the downcast, the drogue net (Net 0) will be equipped with a Clarke-Bumpus net (150 micron-mesh net) to collect small zooplankton. Once the Tucker is at depth, the first messenger will be sent down the wire to open Net 1. The second messenger, which closes Net 1 and opens Net 2, will be sent when the net is at 40 meters. The Sea-Cat profiler will be used to position the net in real time and to obtain profiles of water temperature and salinity. Three MOA buttons are needed to mark:

- 1) Net 2 open,
- 2) Net 1 open, and
- 3) Surface

(e.g., 12-1 Net 2 open, etc.) In this example, 12-1 refers to Station 12 Haul 1. All consecutive operations within 0.5 nautical miles of a pre-designated point are assigned the same station number. Haul number indicates operation sequence at each station.

**3.1.2 Midwater Trawl** – The anchovy/Stauffer net will be deployed to a depth of 200 meters, or 10 meters, off the bottom, whichever is shallowest. Net depth will be monitored using the ship's Furuno echosounder. Standard trawl operations will be used for deployment. Once equilibrium is achieved, as determined by the Fishing Officer or Watch Chief, ***the trawl will be retrieved at a wire rate of about 10 meters per minute.*** Thus, the trawl will usually be fished over a double-oblique path. Occasionally, the trawl may be used to target a specific depth. In this case, standard trawl deployment and retrieval is desired. Four MOA buttons are required:

- 1) Doors out,
- 2) EQ,
- 3) HB, and
- 4) Doors in.

Note that the third button (HB) will only be used when targeting a depth layer.

**3.1.3 Bottom Trawl** – A few samples may be collected with the high-opening shrimp trawl. It will be deployed to collect benthic fish known to eat age-0 pollock (e.g., arrowtooth flounder) or to sample echo-layers that are too close to the bottom to safely sample with the midwater trawl. Standard trawl operations will be used for deployment and retrieval. Once equilibrium is achieved, as determined by the Fishing Officer or Watch Chief, the trawl will be fished on the bottom for 10-20 minutes. Four MOA buttons are required:

- 1) Doors out,
- 2) EQ,
- 3) HB, and
- 4) Doors in.

**3.1.4 Acoustic backscatter** – The EK-60 (200-kHz) and EK-500 (38 and 120-kHz) will be used to continuously collect acoustic data during the cruise. Acoustic transecting will be interrupted to conduct net sampling. Four MOA buttons should be set to mark transect breaks and resumptions (e.g., Break EK Line 1, or Resume EK Line 1) as well as transect start and stop (e.g., Start EK Line 1, or Stop EK Line 1) locations. Time permitting the geographic coordinates of each break point may be used as the point at which to resume transecting.

**3.1.5 Conductivity and Temperature at Depth (CTD)** – CTD casts will be conducted in Barnabus Gully in conjunction with secondary cruise objectives, and elsewhere to ensure that the SEACAT profiler is operating correctly. A MOA button should be set up to mark the at-depth position, date, time, and bottom depth (e.g., 1-1, CTD at depth, etc).

**3.1.6 Nutrient Analyzer System (NAS)** – NAS takes a sample of seawater from the underway flow-through fluorometer system approximately every 25 minutes. The sample is automatically analyzed. The seawater sample is drawn into a syringe-like chamber, buffer is added and the solution is transferred to a Cadmium (Cd) column for reduction. The sample is then drawn from the Cd column back into the chamber, color reagents are drawn into it and the solution is injected into a colorimeter for reading. Readings are recorded on a laptop computer. Blanks and seawater standards are also analyzed.

- 3.1.7 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.
- 3.2 Staging Plan** – All equipment will be loaded August 8 through August 12, 2005 in Seattle, Washington.
- 3.3 De-staging Plan** – All equipment and samples will be off-loaded soon after the ship arrives back in Seattle, Washington, October 11, 2005.
- 3.4 Cruise Plan** – Occupation of grid locations will commence at the easternmost grid station “f29”. Samples will be collected using the 1-m<sup>2</sup> Tucker plankton net, equipped with a SeaCat temperature and salinity profiler, and the small-mesh midwater trawl. At this first station, a CTD cast will be conducted to verify accurate operation of the SeaCat. The order of station occupation will facilitate collection of acoustic data along inshore-offshore transects defined by lines of stations, e.g. Semidi transects 1-10, Kodiak transects 20-29 (see [Section 9.2 Cruise MF-05-12 Chartlet](#) and [Section 9.3 Cruise MF-05-12 Station Locations](#)). Acoustic data will be collected throughout the cruise using the Midwater Assessment and Conservation Engineering (MACE) group’s EK-60 and EK-500 scientific echosounder (38, 120, and 200-kHz).
- Approximately one day of operations will be devoted to spatial intensive sampling in Barnabus Gully (see Figure 1 inset). Exact station location depends on oceanographic conditions and will be determined during the cruise. While in this vicinity, a flow-through ship intake sampling system will make continuous measurements of sea surface temperature, conductivity, fluorescence, and nutrients using the NAS system. A CTD transect consisting of about seven stations will be conducted across the hydrographic front in the gully. Zooplankton and fish samples will be collected at several stations on either side of the front. Several acoustic transects will then be laid out about 8-nm apart with each extending about 10-nm on either side of the front. The midwater and plankton nets will be used to identify organisms composing patches of high acoustic backscatter.
- Operations will be conducted 24 hours a day. Personnel required on deck during operations include a winch operator, a scientific staff of four, and a Survey Technician. Because this cruise involves much trawling, a fishing crew will also be necessary.
- 3.5 Station Locations** – See [Section 9.3 Cruise MF-05-12 Station Locations](#).
- 3.6 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)
  - Midwater Trawls (SOI 3.2.8)
  - Bottom Trawls (see [Section 3.1.3](#))

- Tucker Trawls (SOI 3.2.9)
- Chlorophyll Sampling Operations (SOI 3.2.10)
- SIMRAD EK 500 Scientific Echosounder Monitoring (SOI 3.2.12)

**3.7 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),
- Thermosalinograph monitoring (SOI 5.3).

**3.8 Applicable Restrictions** – Sea lion rookery/haulout protected areas.

**3.9 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,
- Block for plankton tows,
- Wire speed indicators and readout for quarterdeck Oceo 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,
- Stern trawl system (winches, wire, electronics, etc.),
- Furuno netsonde system,
- Sorting tables on deck and in the slime lab,
- Freezer space for storage of biological and chemical samples,
- SIMRAD EQ-50 echosounder,
- JRC JFV-200R color sounder recorder,
- Use of Pentium PC in DataPlot for data analysis,
- Scientific Computer System (SCS),
- Removable stern platform (removed),
- 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**

- Plankton collecting gear:
  - 2 Tucker trawls, complete 1-m<sup>2</sup> sampling array (0.333-mm mesh nets),
  - 60-cm bongo sampling arrays (backup for Tucker),
  - Clarke-Bumpus net equipped with 0.150-mm mesh nets,
  - Sea-Bird Electronics' SBE-19 SEACAT system,
  - PMEL PC with SEASOFT software for CTD data collection/processing, and
  - Spare wire angle indicator.
- Fish collecting gear:
  - 3 midwater (anchovy/Stauffer) trawls (1/8" codend liner),
  - 1 bottom (high-opening shrimp) trawl,
  - Dandylines and pucker strings for all trawls,
  - Spare web for all trawls,
  - Four 5' x 7' steel-v doors (1,250 lbs each), and
  - Sea-Bird Electronics' SB-39 bathythermograph system.
- Acoustic system (MACE's system):
  - EK-60 & EK-500 (38, 120, & 200 kHz) scientific acoustic system,
  - Four HP-855C single-sheet printers,
  - Printer paper,
  - Printer cartridges (tentatively, 1 color per d and 1 b/w per 2 d), and
  - Data storage tapes and optical disks.
- Miscellaneous scientific sampling, gear mending, and catch processing equipment:
  - 5 flowmeters, calibration data, hardware for attaching and maintaining them,
  - Fish baskets, dishpans, 5-gal buckets, and wading pool,
  - Length board and strips for adult fish,
  - Length board for age-0 fish,
  - Mechanical and Marel platform scales for catch weights,
  - Triple-beam balance for individual fish weights,
  - Sieves, jar holder, funnels, squirt bottles,
  - Haul and catch forms for anchovy trawls, and COD for all other operations
  - 31 cases of 32-oz jars, closures, and labels,
  - 1000 Zip-loc bags (12"),
  - Scalpel and scalpel blade (for body piercing),
  - Material Data Safety Sheets (MSDS),
  - Preservatives and dispenser equipment,
  - Hazardous materials spill kit,
  - Miscellaneous bookkeeping equipment/supplies, and
  - Spare wire angle indicator.

- Bookkeeping:
  - Binders and folders,
  - 3-ring hole punch,
  - Pencils, pens, paper,
  - Haul, catch, length, shrink, and length-weight forms (paper and electronic versions),
  - 5 Compact disks (CD-R/W),
  - 20 3.25" 1.44 MB diskettes, and
  - Computer (w/CD read/writer), lap-top, and printer.
  
- Software:
  - SeaPlot/Globe (MACE cave),
  - Sigmaplot 2000 (lap-top),
  - Excel 97 (lap-top),
  - Word 97 (lap-top),
  - ArcMap and ArcCatalog 8.2, and
  - Cruise Operations Database (COD).
  
- Scientific ultra-cold freezer.

## 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 (e.g. CTD and Sea-Cat),
- 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** – None.

**7.0 HAZARDOUS MATERIALS**

**7.1 Inventory** – The following hazardous materials will be provided and controlled by the scientists with the Chief Scientist assuming responsibility for the safe handling of such substances. The onboard spill kit contains materials for cleanup of formaldehyde and sodium borate. All scientific staff on board are trained to handle spills.

Chemical	CAS No.	Qty	H	F	R	Storage Color Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Formaldehyde, 37%	50-00-0	10-gal	3	2	0	Flammable	3 & 8	III	1198	475 LBS	1
Sodium Borate	1330-43-4	5-gal	1	0	0	General	Not regulated				2
<p><b>Spill Response 1:</b> Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements, or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb with earth, sand or other non-combustible material and transfer to containers (except for Hydrazine). Use clean non-sparking tools to collect absorbed material.</p>											
<p><b>Spill Response 2:</b> Ventilate area of leak or spill. Wear appropriate personal protective equipment. Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.</p>											
<p><b>Nutrient Analyzer System (NAS) Chemicals</b></p>											
Cadmium (Cd) Column			46-cm Patton Cadmium/Silver (Cd/Ag) column in tygon tube (1/8" ID)								
Nitrate (NO <sub>3</sub> )			540-µMol								
Imidazol/Ammonium Chloride Solution			10% Hydrochloric Acid (HCl), Imidazol, Ammonium Chlorate, Copper Sulfate								
NAD/Sulfanilamide			Sulfanilamide, Hydrochloric Acid (HCl), Nicotinamide Adenine Dinucleotide (NAD)								

**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. MSDSs for NAS chemicals were placed in NOAA Ship *MILLER FREEMAN*'s MSDS binder (located in the aft laboratory) in September 2004. 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](mailto: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](mailto:FirstName.LastName@noaa.gov)

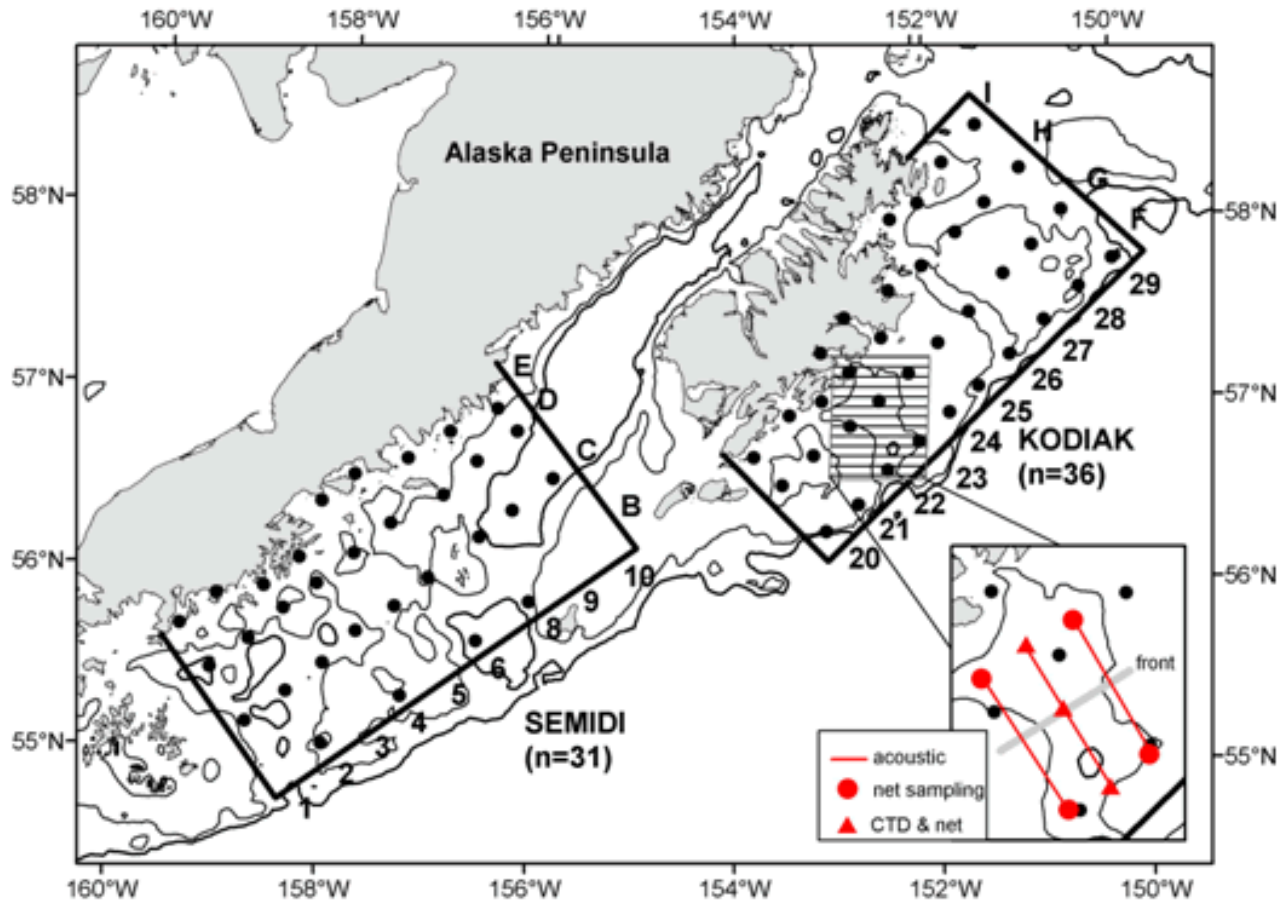
E-Mail to Radio Room: [Radio.Room@noaa.gov](mailto:Radio.Room@noaa.gov)

### 9.0 APPENDICES

#### 9.1 **Cruise MF-05-12 Equipment Inventory**

Description	Qty	Dimension	Weight
1-m2 Tucker Trawl	2	35 cuft	440 lbs
60-cm Bongo Sampling Array	1	35 cuft	220 lbs
SBE-19 SEACAT System	1	18 cuft	165 lbs
Anchovy/Stauffer Midwater Trawl	3	212 cuft	3,300 lbs
High-opening Shrimp Bottom Trawl	1	71 cuft	1,100 lbs
5' x 7' Steel-V Door	4	106 cuft	5,500 lbs
Box, Wooden, Miscellaneous Gear	4	35 cuft	440 lbs
Case, 32-oz Jars	31	71 cuft	440 lbs
Miscellaneous Equipment		106 cuft	440 lbs

**9.2 Cruise MF-05-12 Chartlet** – If necessary, for navigational concerns, some station locations may be altered. Position and number of stations to be sampled in Barnabas Gully will be determined during the cruise; tentatively, these locations are indicated in red (see inset).



**9.3 Cruise MF-05-12 Sampling Locations** – If necessary, for navigational concerns, some station locations may be altered. Position and number of stations to be sampled in Barnabas Gully will be determined during the cruise; tentatively, these are included here as the last seven locations.

Station	Latitude	Longitude
f29	57° 46.80' N	150° 04.20' W
g29	58° 03.60' N	150° 34.20' W
h29	58° 18.60' N	151° 00.00' W
i29	58° 33.00' N	151° 26.40' W
i28	58° 21.00' N	151° 48.60' W
h28	58° 07.20' N	151° 22.20' W
g28	57° 52.80' N	150° 54.00' W

Station	Latitude	Longitude
f28	57° 38.40' N	150° 25.80' W
f27	57° 27.60' N	150° 48.60' W
g27	57° 43.80' N	151° 12.60' W
h27	57° 57.60' N	151° 41.40' W
i27	58° 07.20' N	152° 04.80' W
i26	58° 02.40' N	152° 22.20' W
h26	57° 46.80' N	152° 03.00' W
g26	57° 31.20' N	151° 34.20' W
f26	57° 16.80' N	151° 10.20' W
f25	57° 06.60' N	151° 30.00' W
g25	57° 21.00' N	151° 54.00' W
h25	57° 38.40' N	152° 24.00' W
i24	57° 30.00' N	152° 51.60' W
h24	57° 23.40' N	152° 29.40' W
g24	57° 11.40' N	152° 12.60' W
f24	56° 58.20' N	151° 48.60' W
f23	56° 48.60' N	152° 07.20' W
g23	57° 02.40' N	152° 31.20' W
h23	57° 12.00' N	152° 49.20' W
i23	57° 18.60' N	153° 06.60' W
h22	57° 02.40' N	153° 06.60' W
g22	56° 54.00' N	152° 49.20' W
f22	56° 39.60' N	152° 26.40' W
f21	56° 28.20' N	152° 45.00' W
g21	56° 44.40' N	153° 11.40' W
h21	56° 57.60' N	153° 25.80' W
h20	56° 43.80' N	153° 48.00' W
g20	56° 34.80' N	153° 30.60' W
f20	56° 19.20' N	153° 04.80' W
c10	56° 36.00' N	155° 49.20' W
d10	56° 51.60' N	156° 11.40' W
e10	56° 58.80' N	156° 23.40' W
e9	56° 51.00' N	156° 51.60' W
d9	56° 41.40' N	156° 34.80' W
c9	56° 25.20' N	156° 12.60' W
b8	55° 55.20' N	156° 01.80' W
c8	56° 16.20' N	156° 32.40' W
d8	56° 30.00' N	156° 54.60' W
e8	56° 41.40' N	157° 16.80' W
e6	56° 35.40' N	157° 48.00' W

Station	Latitude	Longitude
d6	56° 19.80' N	157° 25.20' W
c6	56° 01.80' N	157° 01.80' W
b6	55° 42.00' N	156° 31.80' W
c5	55° 52.20' N	157° 21.00' W
d5	56° 09.00' N	157° 46.20' W
e5	56° 25.80' N	158° 07.20' W
e4	56° 06.60' N	158° 18.60' W
d4	55° 58.20' N	158° 07.20' W
c4	55° 43.20' N	157° 42.60' W
b4	55° 22.20' N	157° 15.00' W
c3	55° 32.40' N	158° 01.20' W
d3	55° 49.20' N	158° 26.40' W
e3	55° 56.40' N	158° 38.40' W
e2	55° 53.40' N	159° 06.60' W
d2	55° 39.00' N	158° 45.60' W
c2	55° 22.20' N	158° 22.20' W
b2	55° 05.40' N	157° 59.40' W
c1	55° 11.40' N	158° 44.40' W
d1	55° 28.20' N	159° 07.20' W
e1	55° 42.00' N	159° 27.00' W
	57° 08.40' N	152° 28.20' W
	56° 48.60' N	152° 08.40' W
	56° 43.20' N	152° 18.60' W
	56° 54.60' N	152° 30.60' W
	57° 04.80' N	152° 41.40' W
	57° 00.00' N	152° 52.80' W
	56° 40.20' N	152° 30.60' W