FINAL CRUISE INSTRUCTIONS
FOCI

NOAA Ship *MILLER FREEMAN*, MF-06-10 Leg 1
September 8 – September 23, 2006
Chief Scientist: Janet Duffy-Anderson

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-06-10 Leg 1

1.2.2 FOCI Number – 6MF06

1.3 Cruise Dates:

1.3.1 Departure – Depart Kodiak, Alaska, at 1500 on Friday, September 8, 2006.

1.3.2 Arrival – Arrive Dutch Harbor, Alaska, at 0800 on Saturday, September 23, 2006.

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – We will be conducting an ichthyoplankton and juvenile fish survey in the Eastern Bering Sea in the waters contiguous to the Alaska Peninsula and Unimak Island, Alaska. This work is needed to describe larval fish and zooplankton assemblages in the Bering Sea – basin, slope, outer shelf, middle shelf – in autumn. In particular, this area is a known nursery area for walleye pollock, northern rocksole, Greenland halibut, and Alaska plaice, and abundances of larvae and juveniles at this time of year are high. Zooplankton data and data on physical characteristics of the water column will also be collected. Limited beam trawling activities may also be conducted to study settlement and nursery areas for age-0 flatfishes.

2.2 Applicability – These instructions, with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN***, dated March 23, 2006, present complete information for this cruise.

2.3 Operating Area – Eastern Bering Sea

2.4 Participating Organizations

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

2.5 Personnel

2.5.1 Chief Scientist

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

2.5.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address
Dongwha Sohn	Female	OSU	dongwhasohn@gmail.com
Christina Jump	Female	AFSC	Christina.Jump@noaa.gov
Jennifer Lanksbury	Female	AFSC	Jennifer.Lanksbury@noaa.gov
Colleen Harpold	Female	AFSC	Colleen.Harpold@noaa.gov
Ingrid Spies	Female	AFSC	Ingrid.Spies@noaa.gov
William Floering	Male	PMEL	William.Floering@noaa.gov

2.6 Administrative

2.6.1 Ship Operations

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1801 Fairview Avenue East
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2.6.2 Scientific Operations

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

Dr. Jeffrey Napp, AFSC
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E-mail: Jeff.Napp@noaa.gov

3.0 OPERATIONS

3.1.1 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 and zooplankton data using 60-cm Bongo nets (60BON) and 20-cm Bongo nets (20BON), and a Neuston net. A Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS) will be used at selected stations to examine depth-discrete distributions of larvae, A $3m^2$ beam trawl will be employed at selected stations to collect newly-settled age-0 flatfishes. 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, salinity). Sea-Bird Electronics SBE 911*plus* Conductivity, Temperature, and Depth (CTDB) casts will collect physical data as well as data on nutrients, microzooplankton, and chlorophyll at selected stations. This cruise will provide new information on larval and juvenile fish assemblages on the Eastern Bering Sea shelf during the late summer and early fall. Samples will be collected from a grid of approximately 100 stations.

3.1.2 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 – The majority of the equipment necessary for the cruise was loaded onto the **NOAA ship *MILLER FREEMAN*** when the ship departed from Seattle, Washington. The beam trawl will be picked up by the scientists in Kodiak, AK on September 7th. We request that we be allowed to set up equipment, including the MOCNESS (+ termination if necessary), on the day prior to departure. To accomplish this, three scientists (Lanksbury, Jump, Duffy-Anderson) will arrive on Wednesday, September 6, 2006, and if possible, we request that they be allowed to berth overnight on the vessel beginning the night of September 6th. We request that the ET and someone from the Deck Department be available on September 7th to assist the scientists with setting up the MOCNESS. We will use the chemistry lab, the rough lab, and the slime lab for sample and equipment preparation, and we request as much

counter and cabinet space as possible. We will use DataPlot for CTD, MOCNESS, and SEACAT operations.

3.3 De-staging Plan – The samples and gear will remain on board the ship until the ship returns to Seattle in November, 2006.

3.4 Cruise Plan – The cruise will depart from Kodiak, Alaska, at 1500 on Friday, September 8, 2006, and occupy a series of approximately 100 stations. Station positions and a chartlet of the working area are located in sections **9.2 Tables** and **9.3 Figures**, respectively.

3.4.1 Grid Survey – During the regular grid survey (EBS), the Sameoto Neuston net will be deployed first. The net will collect fish larvae in the surface layer. Samples from the Neuston net will be preserved in 1.8% buffered Formaldehyde (5% formalin).

Marks should be made at surface (in) and surface (out).

Following completion of the Neuston tow, a Marine Assessment Monitoring and Prediction (MARMAP) Bongo tow (SOI 3.2.2) will be conducted. The SBE 19 SEACAT, the 20-cm Bongo (20BON) net with 0.150-mm mesh netting and the 60-cm Bongo (60BON) net mounted with 0.505-mm mesh (Nets 1 and 2) will all be mounted together for this tow. Bongo tows will be to a depth of 300 meters in the Bering Sea (200 m in the Gulf of Alaska) , or to 10 meters off bottom, whichever is shallowest.

Marks should be made at surface (in), at-depth, surface (out). The sample from 60BON Net 1 will be preserved in its entirety in 1.8% buffered Formaldehyde (5% formalin). The sample from 60BON Net 2 will be discarded. The sample from 20BON Net 1 will be preserved in its entirety in 1.8% buffered Formaldehyde (5% formalin) and the sample from Net 2 will be discarded.

Selected stations will be chosen for CTDB (8 bottles) casts to collect water samples for microzooplankton, chlorophyll, and nutrient data (SOI 3.2.1). At these stations, the CTD cast will follow the Neuston and Bongo tows. CTD casts will be made to 300 meters in the Eastern Bering Sea (200 m in the Gulf of Alaska) or to 10 meters off bottom, whichever is shallowest. Marks for CTD casts should be surface (in), at-depth, and surface (out).

MOCNESS – We will opportunistically fly the MOCNESS at selected stations in the Gulf of Alaska, in Bering Canyon, and on the Bering Sea continental shelf during the survey. At each of these stations the CTDB cast (with 8 bottles) will occur first followed by the MOCNESS tow. Samples will be preserved in formalin. Afterwards, regular grid activities will resume. Locations for this sampling to be determined at sea at the discretion of the

Chief Scientist and the CO. One or more 24-hr station occupations may occur to examine diel changes in vertical distribution of ichthyoplankton and zooplankton. A few selected stations may be occupied in the Gulf of Alaska. Marks for MOCNESS tows should be surface (in), at-depth, one mark for each subsequent closed net, and surface (out).

3.4.2

Beam Trawl – A modified plumb-staff 3m beam trawl will be deployed at selected stations to collect small demersal juvenile fishes. We will opportunistically fly the beam trawl at selected inshore stations on the Gulf of Alaska and Bering Sea continental shelves during the survey. Final locations will be determined at sea at the discretion of the Chief Scientist and the CO. The remainder of this paragraph details how the catch is to be processed. Flatfishes are the priority for catch processing, other taxa may be discarded. Flatfish juveniles are to be sorted to species, then counted and weighed. If catch of any one flatfish species is very high (more than 50 individuals of one species), a subsample may be taken for counting and weighing, and the remainder of the sample may be weighed and discarded. After counting and weighing, put fish into individual freezer bags (1 bag per species) and put in the -80 ^{o}C freezer in the rough lab. After 24 hours, bags of frozen fish may be transferred to the (-20^{o} F, slime lab freezer).

3.4.3 Acoustic backscatter – The EK-60 will be used to continuously collect acoustic data during the cruise.

3.5 Station Locations – See section **9.2 Tables**

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),
- MARMAP Bongo Tows (SOI 3.2.2),
- MOCNESS Tows (SOI 3.2.5),
- Chlorophyll Samples (SOI 3.2.10), and
- SIMRAD EK60 Scientific Echosounder Monitoring (SOI 3.2.12).

3.6.1 Beam Trawls

3.6.1.1 Description – Beam trawls are used for sampling demersal fauna over the upper few centimeters of the bottom. The trawl has a rigid 3 m beam in front of the net to maintain a fixed opening. The net is described in detail in Gunderson and Ellis (1986) and in Abookire and Rose (2005) (attached). The body of the net is constructed on 14 mm square knotless nylon, and the cod-end is lined with 5.5 mm mesh.

The headrope and footrope are 5.1 m and 4.1 m respectively. The 3-m beam is constructed of 3.8 cm aluminum stock. A beam bridle is attached to the trawl warp for towing. The trawl does not need a conducting cable and can be deployed from the Marco winch. See **9.3 Figures**.

3.6.1.2 Rates/Fishing – The vessel should be moving slowly ahead, about 1.5 knots. Deployment is initiated by carefully paying out the net, cod end first, off the stern. The trawl is towed on the surface for a short distance to ensure proper tow configuration. The trawl warp is then released at the same speed at the ship and the trawl sinks. When the proper scope as been reached, the trawl is assumed to be on the bottom. It is generally possible to determine that the trawl is the being towed along the bottom because vibrations from contact with the bottom are propagated along the trawl warp. This should be able to be visualized from the deck. Tow time will be approximately 5 minutes, at a speed of 1-1.5 kts. The tow distance will be approximately 215 m. Retrieval is engaged when the proper time has elapsed. Vessel position should be maintained or moving slightly forward. Marks for beam trawls should be surface (in), at-depth, haulback, and surface (out). Once the net is on board the vessel, the cod end is opened and the catch is removed.

3.6.2 Neuston Net Tows

3.6.2.1 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.

3.6.2.2 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.

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

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

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),
- Acoustic Doppler Current Profiler (ADCP) Operations (SOI 3.2.13)
- Thermosalinograph Monitoring (SOI 5.3), and
- Fluorometer 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-19 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 for the two systems,
- 10-liter Niskin sampling bottles for use with rosette (10 plus 4 spares),
- 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, Rowe winch, Marco winch
- 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.)
- Freezer space for storage of biological and chemical samples (both blast and storage freezers, -80 and -20),
- Sorting table in slime lab,
- SIMRAD EQ-60 echosounder,
- JRC JFV-200R color sounder recorder,
- Bench space in DataPlot for PCs, monitor, printer to fly MOCNESS,
- Use of Pentium PC in DataPlot for data analyses,
- 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 - 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

- Sea-Bird Electronics' SBE-19 SEACAT system (**primary 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 primary CTD,
- CTD rosette sampler,
- 60-cm Bongo sampling arrays,
- 20-cm Bongo arrays,
- IAPSO standard water,
- Spare wire angle indicator,
- Beam trawl array,
- Fishbaskets, dishpans, 5-gal buckets
- Neuston frame and nets,
- Bridle for neuston net,
- Length boards,
- Plastic bags,
- Sieves, jars, squirt bottles, funnels, jar holder
- MOCNESS,
- Miscellaneous scientific sampling and processing equipment,
- Scientific ultra-cold freezer, and
- Cruise Operations Database (COD).

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 and scientific instruments used,
- PMEL CTD weather observation logs,

- CTD VHS videocassettes,
- CTD Cast Information/Rosette Log,
- Autosalinometer Logs,
- Electronic Navigation suite's export files on diskette,
- 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

Chemical	Amount	Neutralizer	Contact
Formaldehyde, 37%	3 x 20-Liter Buckets	Spill Kit	Wilson
Sodium Borate	500-g	Dust Pan/Water	Wilson
Alcohol, Reagent, 95%	1 x 20-Liter Carboy	3-M Sorbent Pads	Wilson
Saturated Sodium Borate Solution	1 x 20-Liter Carboy	See Note	Wilson

Note – Saturated Sodium Borate Solution is a non-regulated substance by the Department of Transportation (DOT) and does not have Material Data Safety Sheets (MSDS).

7.2 Material Safety Data Sheet (MSDS) – Submitted separately

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/mop.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: Phyllis.Stabeno@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: Russ.Nelson@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) 660-7167

INMARSAT Mini-M
- 011-872-761-267-346 (voice/PBX)

- 011-872-761-267-347 (voice)
- 011-872-761-267-348 (fax)

INMARSAT B

- 011-872-330-394-113 (voice)
- 011-872-330-394-114 (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: Larry.Mordock@noaa.gov

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

9.0 APPENDICES

9.1 Equipment Inventory

Equipment	Quantity	Dimension	Weight
Larval Supply Trunks	1	20" x 22" x 36"	80-lbs
Microzooplankton Supply Trunks	2	20" x 22" x 36"	90-lbs (ea)
Formaldehyde Containers	3 x 20-Liter		40-lbs (ea)
Carboy, 95% Reagent Alcohol	1 x 20-Liter		40-lbs
Miscellaneous Gear Trunks	4	20" x 22" x 36"	80-lbs (ea)
60-cm Bongo Frame	1	8" x 26" x 60"	40 lbs
20-cm Bongo Frame	1	8" x 14" x 16"	40 lbs
MOCNESS Frame	1	90” x 90”	250 lbs
Cases, Glass Jars, 32-oz	30 cases	8" x 12" x 15"	50-lbs
Cases, Glass Jars, 8-oz	10 cases	4" x 6" x 8"	8-lbs
Beam Trawl array	1	3m	200-lbs

Tables Note: Stations may be dropped, added, or relocated at the discretion of the Chief Scientist and the CO. Order of station occupations is also subject to change at the discretion of the CO and the Chief Scientist.

Operation	LatDeg	LatMin	LongDeg	LongMin	DecLat	DecLong
Depart Kodiak, AK	57	43.600	-152	31.060	57.727	-152.518
GOA1	57	17.600	-151	17.400	57.293	-151.290
GOA2	57	26.600	-151	32.700	57.443	-151.545
GOA3	57	19.500	-152	23.900	57.325	-152.398
GOA4	56	33.900	-152	18.702	56.565	-152.312
GOA5	56	55.974	-152	40.764	56.933	-152.679
GOA6	57	3.702	-153	3.900	57.062	-153.065
GOA7	57	0.000	-153	25.800	57.000	-153.430
GOA8	56	40.722	-153	56.484	56.679	-153.941
a13	57	38.130	-158	27.410	57.636	-158.457
a10	57	24.930	-158	14.030	57.416	-158.234
A10	57	17.770	-158	37.910	57.296	-158.632
A13	57	30.970	-158	51.240	57.516	-158.854
B13	57	23.810	-159	15.070	57.397	-159.251
B10	57	10.610	-159	1.790	57.177	-159.030
B7	56	57.420	-159	-11.280	56.957	-158.812
E7	56	50.260	-159	12.600	56.838	-159.210

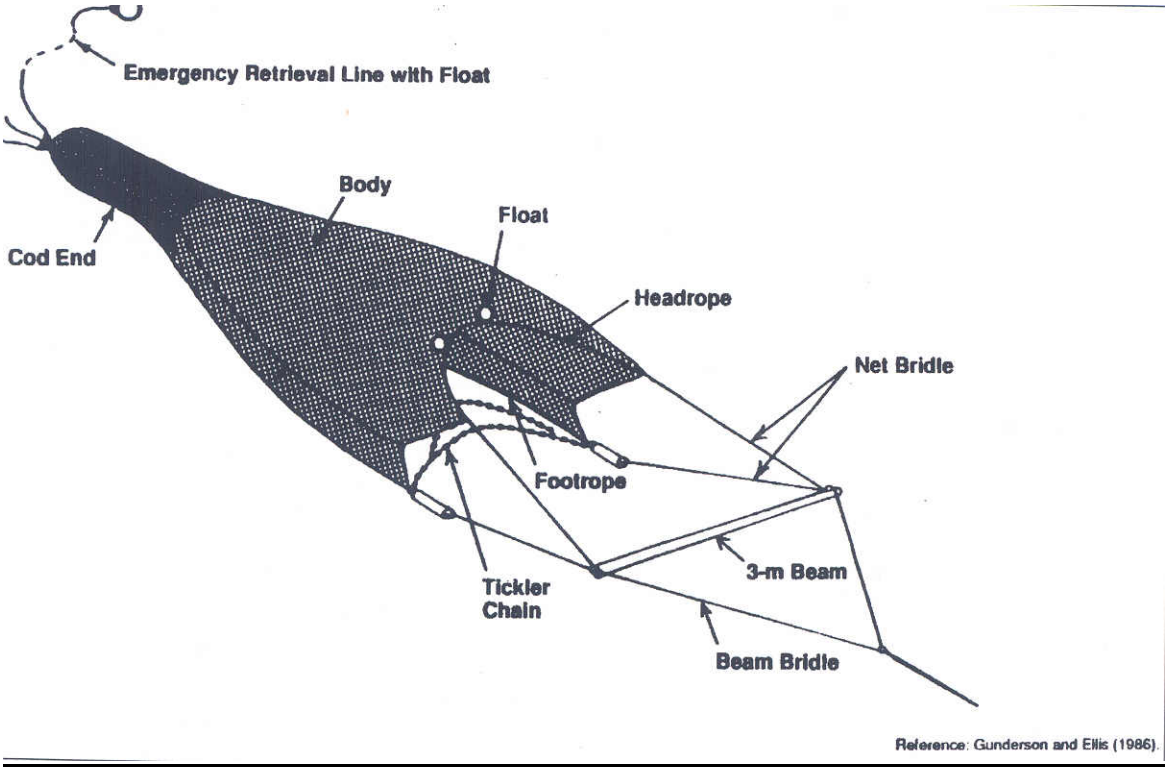
E10	57	3.450	-159	25.670	57.058	-159.428
E13	57	16.650	-159	38.900	57.278	-159.648
H13	57	9.490	-160	2.730	57.158	-160.046
H10	56	56.290	-159	49.550	56.938	-159.826
H7	56	43.100	-159	36.480	56.718	-159.608
K7	56	35.940	-160	0.380	56.599	-160.006
K10	56	49.130	-160	13.430	56.819	-160.224
K13	57	2.320	-160	26.560	57.039	-160.443
N13	56	55.150	-160	50.390	56.919	-160.840
N10	56	41.970	-160	37.310	56.699	-160.622
N7	56	28.780	-160	24.310	56.480	-160.405
Q4	56	8.426	-160	35.262	56.140	-160.588
Q7	56	21.620	-160	48.150	56.360	-160.803
Q10	56	34.800	-161	1.120	56.580	-161.019
Q13	56	47.990	-161	14.150	56.800	-161.236
T13	56	40.830	-161	37.840	56.681	-161.631
T10	56	27.640	-161	24.850	56.461	-161.414
T7	56	14.450	-161	11.920	56.241	-161.199
T4	56	1.265	-160	59.072	56.021	-160.985
W7	56	7.290	-161	35.620	56.122	-161.594
W10	56	20.480	-161	48.500	56.341	-161.808
W13	56	33.670	-162	1.460	56.561	-162.024
Z13	56	26.510	-162	25.000	56.442	-162.417
Z10	56	13.320	-162	12.080	56.222	-162.201
Z7	56	0.130	-161	59.240	56.002	-161.987
AC7	55	52.970	-162	22.790	55.883	-162.380
AC10	56	6.160	-162	35.600	56.103	-162.593
AC13	56	19.350	-162	48.470	56.323	-162.808
AF13	56	12.190	-163	11.870	56.203	-163.198
AF10	55	59.000	-162	59.030	55.983	-162.984
AF7	55	45.810	-162	46.270	55.764	-162.771
AF4	55	32.620	-162	33.580	55.544	-162.560
AI4	55	25.460	-162	57.020	55.424	-162.950
AI7	55	38.650	-163	9.680	55.644	-163.161
AI10	55	51.840	-163	22.400	55.864	-163.373
AI13	56	5.030	-163	35.200	56.084	-163.587
AL13	55	57.870	-163	58.460	55.964	-163.974
AL10	55	44.680	-163	45.700	55.745	-163.762
AL7	55	31.490	-163	33.020	55.525	-163.550
AL4	55	18.300	-163	20.400	55.305	-163.340
AO4	55	11.140	-163	43.700	55.186	-163.728
AO7	55	24.330	-163	56.280	55.406	-163.938
AO10	55	37.520	-164	8.930	55.625	-164.149
AO13	55	50.710	-164	21.650	55.845	-164.361

AR13	55	43.540	-164	44.770	55.726	-164.746
AR10	55	30.360	-164	32.090	55.506	-164.535
AR7	55	17.170	-164	19.480	55.286	-164.325
AR4	55	3.980	-164	6.940	55.066	-164.116
AU4	54	56.820	-164	30.100	54.947	-164.502
AU7	55	10.010	-164	42.600	55.167	-164.710
AU10	55	23.190	-164	55.180	55.387	-164.920
AU13	55	36.380	-165	7.810	55.606	-165.130
AX13	55	29.220	-165	30.800	55.487	-165.513
AX10	55	16.030	-165	18.190	55.267	-165.303
AX7	55	2.840	-165	5.660	55.047	-165.094
AX4	54	49.650	-164	53.190	54.828	-164.887
BA4	54	42.490	-165	16.220	54.708	-165.270
BA7	54	55.680	-165	28.640	54.928	-165.477
BA10	55	8.870	-165	41.140	55.148	-165.686
BA13	55	22.060	-165	53.710	55.368	-165.895
BD13	55	14.900	-166	16.550	55.248	-166.276
BD10	55	1.710	-166	4.020	55.029	-166.067
BD7	54	48.520	-165	51.560	54.809	-165.859
BD4	54	35.330	-165	39.170	54.589	-165.653
BG1	54	14.980	-165	49.770	54.250	-165.830
BG4	54	28.170	-166	2.060	54.470	-166.034
BG7	54	41.360	-166	14.410	54.689	-166.240
BG10	54	54.550	-166	26.840	54.909	-166.447
BG13	55	7.740	-166	39.330	55.129	-166.656
BJ13	55	0.580	-167	2.040	55.010	-167.034
BJ10	54	47.390	-166	49.580	54.790	-166.826
BJ7	54	34.200	-166	37.200	54.570	-166.620
BJ4	54	21.010	-166	24.880	54.350	-166.415
BJ1	54	7.820	-166	12.620	54.130	-166.210
BM1	54	0.660	-166	35.420	54.011	-166.590
BM4	54	13.850	-166	47.630	54.231	-166.794
BM7	54	27.040	-166	59.920	54.451	-166.999
BM10	54	40.230	-167	12.270	54.671	-167.205
BM13	54	53.420	-167	24.680	54.890	-167.411
BP13	54	46.260	-167	47.260	54.771	-167.788
BP10	54	33.070	-167	34.880	54.551	-167.581
BP7	54	19.880	-167	22.570	54.331	-167.376
BP4	54	6.690	-167	10.320	54.112	-167.172
BS1	53	46.340	-167	20.800	53.772	-167.347
BS4	53	59.530	-167	32.940	53.992	-167.549
BS7	54	12.720	-167	45.160	54.212	-167.753
BS10	54	25.910	-167	57.430	54.432	-167.957
BS13	54	39.090	-168	9.780	54.652	-168.163

BV13	54	31.930	-168	32.230	54.532	-168.537
BV10	54	18.750	-168	19.920	54.312	-168.332
BV7	54	5.560	-168	7.670	54.093	-168.128
BV4	53	52.370	-167	55.500	53.873	-167.925
BV1	53	39.180	-167	43.390	53.653	-167.723

9.2 Figures

BEAM TRAWL



STATION MAP