Alaska Fisheries Science Center
7600 Sand Point Way Northeast
BIN C15700, Building 4
Seattle, Washington 98115-0070

December 20, 2007 F/AKC1: NR

Commanding Officer
NOAA Ship *Miller Freeman*

CRUISE INSTRUCTIONS: MF-08-03, SQUID/MESOPELAGIC TRAWL SURVEY IN THE GULF OF ALASKA

1.0 SCHEDULE - AREA OF OPERATIONS

Scientists from the Alaska Fisheries Science Center (AFSC) will conduct a survey of ichthyoplankton and mid-water species in that portion of the shelf/slope of the Gulf of Alaska between Prince William Sound and southern Kodiak Island while aboard the NOAA ship *Miller Freeman* from March 9 – March 24, 2008 (16 sea days, Fig. 1). The cruise will begin and end in Kodiak, Alaska.

2.0 VESSEL ITINERARY

March 9	Embark scientists in Kodiak, Alaska; depart at 0900. Begin transit to first station.
March 9-24	Exact itinerary has yet to be determined, however time will be equally split between Mesopelagic and Larval squid sampling protocols.
March 24	Arrive Kodiak at 0900; disembark scientific party

3.0 SCIENTIFIC OBJECTIVES

The primary objectives of the cruise are to:

3.1 Establish an index of production and species diversity in the mesopelagic zone along the shelf break in the area between Prince William Sound and southern Kodiak Island;

3.2 Conduct larval squid survey;

3.3 Collect ichtyoplanton samples using 60 cm bongo net for correlation with mesopelagic macrofauna;

3.4 Collect hydroacoustic data using the ER60 acoustic system for comparison against catch results at trawl stations;

3.5 Collect physical oceanographic data (temperature and salinity profiles) at selected sites, and continuously collect sea surface temperature, salinity, and water current profiles.

Secondary objectives of the cruise include collecting data and specimens for research projects as requested by AFSC and other investigators. Detailed descriptions of ancillary projects associated with this cruise will be provided as soon as they become available. Significant changes to these projects that affect vessel operations will be communicated as soon as they are known. Final project descriptions will be delivered to the Field Operations Officer prior to the vessel's departure from Kodiak.

4.0 OPERATIONAL PLANS

4.1 The primary sampling tool for mesopelagic portion of this cruise is the MACE–owned Aleutian wing trawl equipped with a .5" mesh liner in the codend. Station operations will be executed on a diurnal basis with a series of three tows during daylight hours and three during darkness each day (beginning series at 1000 and 2200). The trawl will be towed at a constant speed of 3 kt. Each tow will fish at its intended depth for 1 hour and each series of three tows will target one of the three depths: 250 m, 500 m and 1,000 m. Sampling will be conducted along the 1500 m isobath at the locations identified in Table 1. Each series of three tows is expected to take about 8 hours which would allow a 4-hour transit to the next station. Stations sampled during this portion of the cruise will repeat stations sampled during the 2007 cruise. A second Aleutian wing trawl (AWT) will be required as a backup in the event of a gear problem. Fishbuster doors will be used. We request that the chief boatswain keep a trawl gear logbook to record any modifications made to trawl gear during the cruise. Biological data collected from each haul will include species composition, sex composition, and length frequencies.

4.2 Larval squid will be sampled using bongo nets. Sampling will consist of 200 m (or 10 m off bottom) 60 cm bongos towed double obliquely at the positions outlined in figure 2 and table 2 until cephalopods are found. After cephalopods are located, sampling will consist of eight stations, 1 km apart, in a grid around the location of cephalopods.

At any station with more than five cephalopods collected, three additional bongo samples will be taken, these will be 100, 50, and 25 m. These additional bongos will be towed at depth for an additional amount of time, to be determined. Time permitting, 600 and 900 m bongo samples will be conducted off the shelf.

Samples will be sorted for cephalopods after each station/haul and placed in live tanks (see 4.3)

4.3 Rearing experiments will be conducted on larval cephalopods. Live tanks (planktonkreisel) will be set up in the fish lab. Animals will be placed in tanks with running filtered seawater. Sampling will done periodically depending on the number of cephalopods collected.

4.4 Ichthyoplankton samples will be collected.

4.5 Acoustic data will be collected continuously with the Simrad ER60 echo integration system incorporating four centerboard-mounted transducers (18, 38, 120, and 200 kHz). The vessel must not operate other echo sounders or acoustic equipment that interfere with collection of scientific acoustic data; thus the ADCP and Simrad EQ50 bridge sounder must be slaved (external trigger on) to the EK500 echo sounder, and the EQ50 must be operated in the high frequency (50 kHz) mode during the survey.

4.6 Conductivity-temperature-depth (CTD) data may be collected with a Seabird SeaCat system at trawl locations and at other selected locations. Temperature and depth profile data will be collected with a Seabird SBE39 micro-bathythermograph attached to the trawl headrope. Vertical temperature

profiles may be collected at selected locations along transects using expendable bathythermographs (XBTs).

The Scientific Computing System (SCS) will be configured to log data from various sensors during the cruise using the Sensor.Dat file supplied to the chief survey technician. The acoustic Doppler current profiler (ADCP) will be synchronized with the scientific acoustic system and operated continuously throughout the cruise. Immediately before the cruise, the chief survey technician and the chief scientist will ascertain that appropriate ADCP and SCS configuration files were supplied for cruise data collection. The ADCP operation should be checked daily. The "ADCP Daily Log" form should be completed regularly.

5.0 SCIENTIFIC PERSONNEL

5.1 The principal investigators are Elaina Jorgensen, AFSC, Seattle, WA: Phone 206-526-4562, fax 206-526-6723, email Elaina.Jorgensen@noaa.gov and Nate Raring, AFSC, Seattle, WA: phone 206-526-4502, fax 206-526-6723, email Nate.Raring@noaa.gov.

5.2 The Chief Scientists have the authority to revise or alter the technical portions of the instructions provided that, after consultation with the Commanding Officer, it is ascertained that the proposed changes will not jeopardize the safety of personnel on the ship, exceed the time allotted for the project, result in undue additional expense, or alter the general intent of the cruise instructions.

5.3 All scientific personnel are required to have a completed NOAA Health Services questionnaire aboard before embarking. Clearances are valid for 2 years for scientists under age 50 and 1 year for age 50 and over.

5.4 Scientific Staff:

Name	Sex/ Nationality	Position	Organization
Elaina Jorgensen	F/USA	Chief Scientist	AFSC
Nate Raring	M/USA	Chief Scientist	AFSC
Duane Stevenson	M/USA	Fish. Biologist	AFSC
Mei-Sun Yang	M/USA	Fish. Biologist	AFSC
TBN	F/USA	Fish. Biologist	AFSC
William Floering	M/USA	Fish. Biologist	PMEL
Lyle Britt	M/USA	Fish. Biologist	AFSC
Ellis Loew	M/USA	Fish. Biologist	Cornell U.

AFSC - Alaska Fisheries Science Center, Seattle, WA

6.0 EQUIPMENT

6.1 To the extent possible scientific gear should be loaded and mounted onto the vessel prior to its departure from Puget Sound in January 2008. Additional gear may be loaded during the Kodiak in port just prior to the cruise. A gear inventory list will be provided to the FOO.

6.2 Acoustic Equipment	Quantity	Vessel	Project
Simrad ER60 system in lab	1	--	X
Backup Simrad ER60 system	2	--	X
Simrad ES18 transducer	1	--	X

Simrad ES38B transducer	2	--	X
Simrad ES70 transducer	1	--	X
Simrad ES120-7C transducer	2	--	X
Simrad ES200-7C transducer	1	--	X
Standard target & suspension assembly	*	--	X
GPS (with NEMA 183 to ER60)	2	X	--
ES60 Bridge sounder (50/200 kHz)	1	X	--
Abyss shallow water sonar	1	X	--
Simrad SM2000 system	1	--	X

6.3 Trawling Equipment[1]	Quantity	Vessel	Project
Aleutian wing trawl with accessories (e.g., 1.25" and 0.5" mesh liners)	2	--	X
Dandylines (10 fm x ½ in.)	*	--	X
Dandylines (30 fm x 5/8 in.)	*	--	X
Fishbuster door with accessories	1 set	--	X
Spare webbing & twine	*	--	X
Spare hardware	*	--	X
3rd wire Simrad FS-20 net sonar w/ winch and accessories	2	X	--
Simrad ITI net mensuration system	2	X	--
Furuno CN24-40 headrope transducer	1	X	--
Tom weights (500 lbs. each)	4 items	--	X
Tom weights (250 lbs. each)	4 items	--	X
Miscellaneous supplies	*	--	X

6.4 Oceanographic Equipment	Quantity	Vessel	Project
Seabird CTD System	2	X	X
ADCP with PC computer	*	X	--
Seabird SBE39	2	--	X

6.5 Biological Sampling Equip.	Quantity	Vessel	Project
Catch sorting and weighing table	1	X	--
Dynamometer	1	--	X
Fish Lab conveyor system	1	X	--
Marel M60 60 kg scale (electr.)	2	--	X
Platform scale (mechanical)	2	--	X
Fish baskets	30	--	X
Ethanol (gallons)	7	--	X
Formalin (gallons)	12	--	X
Biological supplies (misc.)	*	--	X

6.6 Computing equipment	Quantity	Vessel	Project
IBM compatibles (w/XP Op.System)	*	--	X
Printers	*	--	X
Iomega JAZ drive	1	--	X
QD2120 magnetic tapes	6	--	X
Scientific Computing System (SCS)	1	X	--
Fisheries Scientific Computer System (FSCS)	1	X	X

Note: "*" indicates amount not specified.

[1] Trawling equipment specifications may be updated prior to the cruise.

HAZARDOUS MATERIALS

6.7 The Chief Scientists shall be responsible for complying with MOCDOC 15, Fleet Environmental Compliance #07, Hazardous Material and Hazardous Waste Management Requirements for Visiting Scientists, released July 2002. The MOCDOC web site address is:

http://205.156.48.106/

By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemicals brought aboard and a chemical hygiene plan. The amount of hazardous material arriving and leaving the vessel shall be accounted for by the Chief Scientists.

7.0 RECORDS AND REPORTS

7.1 An electronic Marine Operations Abstract (MOA) will be created to log all operations via daily transfers of position data from the ship's SCS system to RACE. An appropriate logging interval will be chosen for automated track position data. Specific events (and frequency) to be recorded will be decided at the beginning of the cruise. Globe software will be available to log operations data as a backup. All times should be recorded as Greenwich Mean Time (GMT).

7.2 The data set requested by the Chief Scientist from the ship will include the following:

7.2.1 ASCII files from the SCS of all operations logged during the cruise.

7.2.2 Backup media (e.g., compact disks) with all sensor data logged to the Scientific Computer System (SCS).

7.2.3 ADCP daily log forms and ASCII files of daily thermosalinograph data; Compact disks containing ADCP configuration file and pingdata files.

7.3 Data Disposition: The Chief Scientist will represent the AFSC lab director for data disposition. A single copy of all data gathered by the vessel will be delivered to the Chief Scientist for forwarding to the AFSC lab director, who in turn will be responsible for distributing data to other investigators desiring copies.

7.4 Operational Reports: Pertinent reports per MOC OPORDER 1.3 will be completed and forwarded.

8.0 ADDITIONAL INVESTIGATIONS AND PROJECTS

8.1 Additional Investigations: Any other work done during the cruise period will be subordinate to the main project and performed so as not to interfere with that outlined in these instructions. The Chief Scientist will determine the priority of additional work relative to the main project.

8.2 Ancillary Projects:

8.2.1 Definition: Ancillary projects are secondary to the objectives of the cruise and should be treated as additional investigations. An ancillary project does not have representation aboard and is accomplished by the ship's personnel.

8.2.2. Ancillary Projects: Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary Instructions.

9.0 MISCELLANEOUS

9.1 Navigation Control: Primary control during the project will be GPS, supplemented by radar, visual, etc. NEMA 183 data stream suitable for

the EK500 and ER60 must be provided from the GPS.

9.2 Pre- and post-cruise meetings will be held between the Commanding Officer and the Chief Scientist. The pre-cruise meeting will identify day-to-day project requirements with regard to overtime and logistic support in order to best utilize ship personnel resources. If serious problems are identified during the post-cruise meeting, the Commanding Officer shall notify the marine center by the most direct means available. The Chief Scientist shall document identified problems in the Ship Operations Evaluation Form.

10.0 COMMUNICATIONS

10.1 Daily email via the Internet will be maintained between the AFSC and the *Miller Freeman*. Radio contact will be maintained when possible. A scientific progress report will be sent to AFSC via email or other means when requested by the Chief Scientist.

10.2 Because it is sometimes necessary for the scientific staff to communicate with other research vessels, commercial vessels, and shore-based NOAA facilities, the Chief Scientist or his designee may request the use of radio transceivers aboard the vessel. The acoustics lab has a VHF radio and a station license. Scientific personnel will occasionally use the lab radio for communications and will notify the bridge before doing so.

10.3 The *Miller Freeman* is equipped with Iridium, INMARSAT (a telephone/ teletype satellite communication system), and Rapifax. The scientific staff will be obligated to pay for any incoming or outgoing calls on these systems. INMARSAT is estimated at $6.02 per minute for voice and $4. per minute for telex. Rapifax will be available to scientists at the estimated $6.02 voice rate. Because the Rapifax is often used by scientific personnel, it is considered essential for successful operations.

10.4 Communication with the commercial fishing fleet provides information that allows scientists to direct their efforts more efficiently. The bridge will notify the Chief Scientist or his designee whenever such communication is received.

The *Miller Freeman's* home port is Seattle, Washington. The telephone numbers for contacting the vessel at sea are as follows:

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

Iridium:
- (808)-659-5684

Cellular:
(206) 790-7594

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)

For further vessel specifications, please visit the *Miller Freeman* website http://www.pmc.noaa.gov/mf

CAPT Jon E. Rix, NOAA Commanding Officer Marine Operations Center, Pacific	Dr. Doug DeMaster Science and Research Director Alaska Fisheries Science Center 206-526-4000

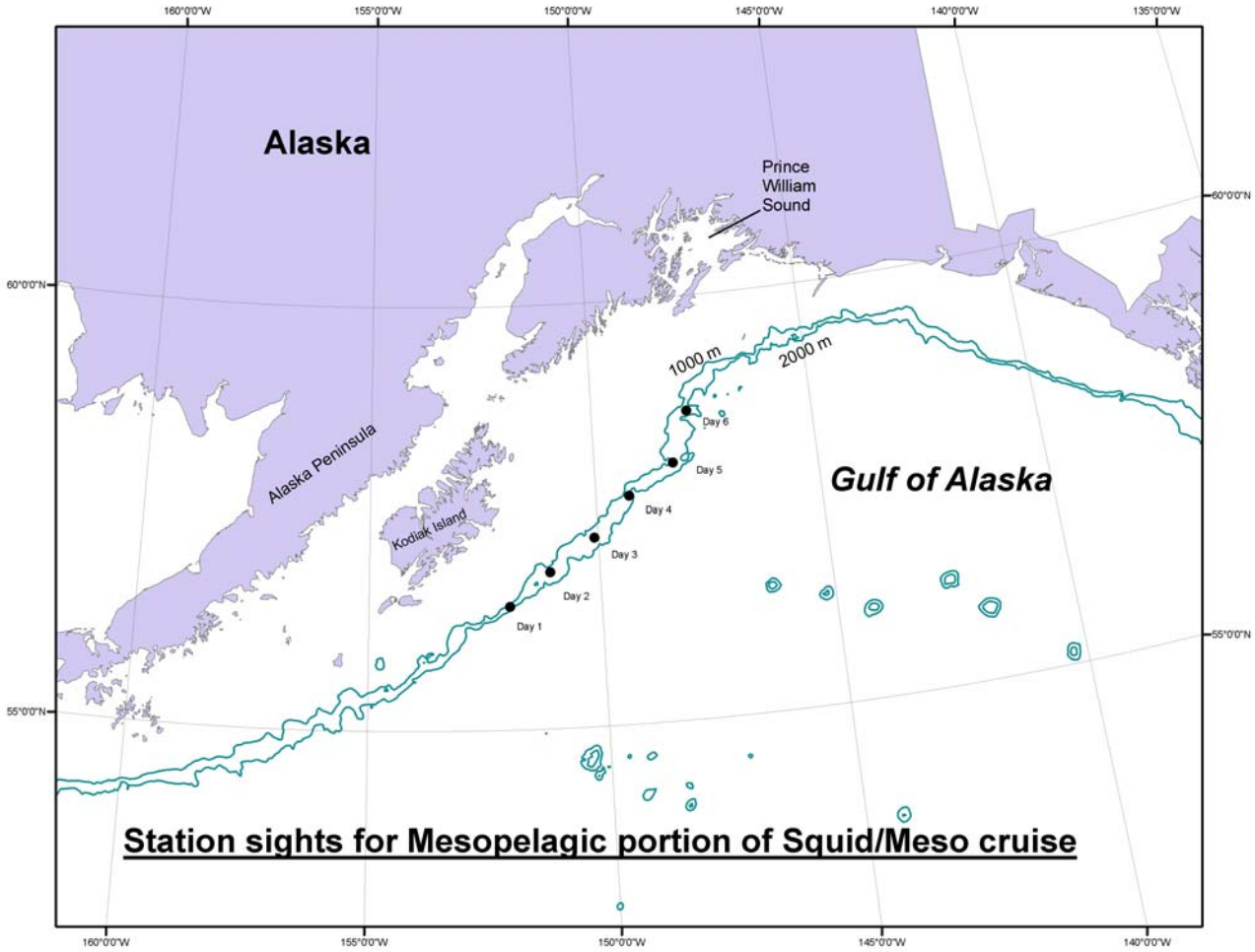

Figure 1 Mesopelagic Sampling area for MF-07-03

Table 1. Mesopelagic station locations for MF -08 - 03

Station	Latitude	Longitude
1	57.18	-150.3
2	57.67	-149.36
3	58	-148.27
4	58.65	-147.88
5	59.15	-147.01
6	59.39	-145.75

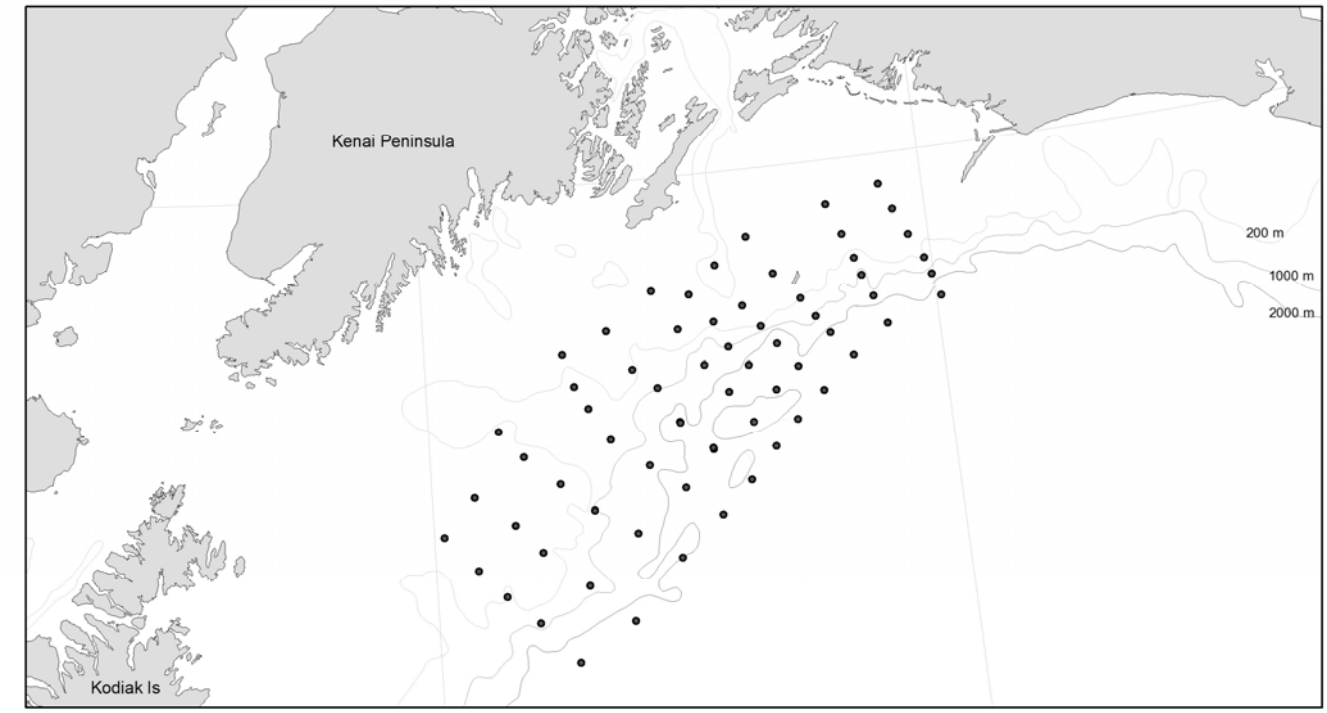

Figure 2. Larval squid sampling locations (see Table 1 for position information). Sampling will consist of 200 m (or 10 m off bottom) bongos until target is found. Sampling at location of target animals will consist of a smaller grid of samples and multiple samples at each station, varying in depth from 50 – 200 m.

Table 2. Larval squid station locations.

station	Longitude	Latitude
1	-147.265	58.316
2	-147.593	58.463
3	-147.914	58.592
4	-148.263	58.735
5	-146.965	58.472
6	-147.292	58.642
7	-147.296	58.647

8	-147.587	58.792
9	-147.586	58.791
10	-147.584	58.788
11	-147.771	58.970
12	-147.998	59.069
13	-148.219	59.269
14	-148.662	59.171
15	-148.574	59.010
16	-148.451	58.898
17	-146.711	58.610
18	-146.468	58.745
19	-146.708	58.623
20	-146.697	58.639
21	-146.183	58.873
22	-146.886	58.756
23	-146.640	58.904
24	-147.093	58.916
25	-147.305	59.059
26	-147.527	59.245
27	-147.748	59.447
28	-145.864	59.028
29	-146.060	59.151
30	-146.181	59.239
31	-146.310	59.336
32	-146.548	59.473
33	-146.402	59.005
34	-146.583	59.126
35	-146.721	59.219
36	-146.882	59.330
37	-146.877	59.036
38	-147.056	59.135
39	-147.172	59.265
40	-147.385	59.412
41	-145.497	59.162
42	-145.603	59.305
43	-145.694	59.413
44	-145.748	59.502
45	-145.836	59.627
46	-145.960	59.779
47	-144.950	59.266
48	-145.013	59.377

49	-145.066	59.461
50	-145.194	59.585
51	-145.312	59.717
52	-145.423	59.848
53	-146.777	59.667
54	-147.107	59.543
55	-147.685	58.122
56	-148.082	58.260
57	-148.472	58.391
58	-148.776	58.534
59	-149.103	58.683
60	-149.326	58.816
61	-148.176	57.828
62	-148.573	58.022
63	-148.988	58.203
64	-149.227	58.348
65	-149.597	58.497
66	-148.716	57.648
67	-149.059	57.855
68	-149.350	57.996
69	-149.600	58.135
70	-149.902	58.309