FINAL CRUISE INSTRUCTIONS

ECO-FOCI

NOAA Ship *MILLER FREEMAN*, MF-08-10
September 9 – September 20, 2008
Chief Scientist: Janet Duffy-Anderson

1.0 FINAL CRUISE INSTRUCTIONS

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

1.2 Cruise Numbers:

1.2.1 Cruise Number – MF-08-10

1.2.2 FOCI Number – 3MF08

1.3 Cruise Dates:

1.3.1 Departure – Depart Dutch Harbor, Alaska, at 1500 on Tuesday, September 9, 2008.

1.3.2 Arrival – Arrive Dutch Harbor, Alaska, at 0800 on Saturday, September 20, 2008.

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. Beam trawling activities will be conducted to study settlement and nursery areas for age-0 flatfishes. Benthic samples will be collected to determine settlement substratum for age-0 flatfishes.

2.2 Applicability – These instructions, with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN***, dated March 2007, 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	Citizenship
Janet Duffy-Anderson	Female	AFSC	Janet.Duffy-Anderson@noaa.gov	USA

(206) 526-6465

2.5.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address	Citizenship
Daniel Cooper	Male	AFSC	Dan.Cooper@noaa.gov	USA
Matthew Wilson	Male	AFSC	Matt.Wilson@noaa.gov	USA
Thomas Hurst	Male	AFSC	Thomas.Hurst@noaa.gov	USA
Ann Matarese	Female	AFSC	Ann.Matarese@noaa.gov	USA
Steve Porter	Male	AFSC	Steve.Porter@noaa.gov	USA
Knut Vollset *	Male	Univ. of Bergen	Knut.Vollset@bio.uib.no	Norway, FNV paperwork approved
Marty Reedy	Male	USFWS	mtreedy@verizon.net	USA
Ashlee Maust	Female	UW	Ashlee.Maust@noaa.gov	USA

*FNV clearance is in process

2.6 Administrative

2.6.1 Ship Operations

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

LCDR Douglas Schleiger, NOAA
Chief, Operations Division, Pacific (MOP1)
Telephone: (206) 553-8705
Cellular: (206) 390-7527
E-mail: ChiefOps.MOP@noaa.gov

2.6.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453

Dr. Jeffrey Napp, AFSC
Telephone: (206) 526-4148

E-mail: Phyllis.Stabeno@noaa.gov 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). We will also collect newly-settled age-0 flatfishes and Pacific cod using a 3-m beam trawl. 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 (CTD) casts will collect physical data at selected stations. A van Veen benthic sampling grab will provide bottom sediment samples at locations where the beam trawl is deployed. We may use the Munson launch to collected beam trawl samples from shallow depths, weather and time permitting. 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** – Gear was loaded onto the NOAAA Ship MILLER FREEMAN during the August 7-8 inport. We will need to pick up some gear at FTS in Dutch Harbor, AK prior to departure. 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, and SEACAT operations.

3.3

3.4 **De-staging Plan** – We request that the samples, chemicals, and gear will remain on board the ship until the ship returns to Seattle in October, 2008. Additionally, at the completion of our field work, we will collect the MOCNESS net frame, associated MOCNESS totes from FTS in Dutch Harbor for transit back aboard the Miller Freeman to Seattle. (NOTE: The could also be done prior to departure, if space and approval are granted). We will offload all gear in Seattle, WA.

3.5 **Cruise Plan** – The cruise will depart from Dutch Harbor, Alaska, at 1500 on Tuesday, September 9, 2008, and occupy a series of approximately 100 stations. Station positions and a chartlet of the working area are located in sections **11.0 Tables** and **12.0 Figures**, respectively.

3.5.1 **Grid Survey** – During the regular grid survey (EBS), a Marine Assessment Monitoring and Prediction (MARMAP) Bongo tow (SOI 3.2.2) will be

conducted first. 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 sorted at sea and taxa of interest will be preserved in EtOH. 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.

Following the bongo tow, a modified plumb-staff 3 m beam trawl (SOI 3.2.10) will be deployed. We request assistance from the Bridge and Deck Dept with deployment, fishing/monitoring, and retrieval of beam trawls. We will use the Furuno depth sounder on the beam trawl to localize the trawl at depth. Assistance from the Bridge and Deck department with Furuno is requested. We are investigating whether a backup system can be brought out by scientific personnel. Marks should be made at Surface (in), EQ, HB, and Surface (out). Distance fished will need to be determined at sea.

Details for how the catch is to be processed: Flatfishes and Pacific cod are the priority for catch processing, other taxa may enumerated and weighed and the discarded (but see Special Projects). Flatfish juveniles and Pacific cod 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).

Following the beam trawl, a van Veen benthic grab will be deployed within the path of the beam trawled area. Sediment will be collected from the substrate. If the grab does not collect sediment during the first attempt, it may be redeployed 1 to 2 times. Some assistance in determining the best method of deployment and retrieval is requested from the ship (Bridge, Deck, Survey). Marks should be made at surface (in), EQ, HB, and Surface (out).

General instructions for use of the van Veen grab sampler follow:

The sampling gear used is a 0.11 m^2 , 20 liter capacity modified van Veen grab sampler from Kahl Scientific (model no. 214WB265/SS). The sampler is stainless steel with reinforced arms (8mm stock, model no. 214WB265/TSAO) and jaws (model no 214WB265/SHP). Seafloor area covered is 34 x 32 cm. Total weight without lead weights is 111 lbs, and is 198 lbs with 4 removable lead weights attached to the grab device (2 large machined no. 800144/SSTAEW, 2 small drilled no. 800145/SSTAEW), and 2

removable lead weights (30 lbs each) attached to the arms (these were a custom order specifically designed to fit on the arms of the grab).

A van Veen bottom grab is the most common device used to sample subtidal soft-bottom benthic macroinvertebrates. Penetration depth (i.e., the maximum depth sampled below the sediment surface) can be as great as 15-16 cm when using this device. However, penetration depth varies from sample to sample with sediment properties (sand: 5 cm; finer: #14 cm) and thus frequently misses deeper-dwelling bivalves, including *Spisula*, *Telina*; Myidae, Mactridae. Moreover, if the grab lands at an angle penetration depth can vary within a sample. Also, the sample inevitably is folded by the closing motion and geometry of the device, with resulting loss of information on vertical structure within the sediments.

van Veen deployment:

The sampler should be attached to the hydrowire using a shackle ball-bearing swivel. The swivel will minimize the twisting forces on the sampler during deployment and ensure that proper contact is made with the bottom. For safety, the hydrowire, swivel, and all shackles should have a load capacity at least 3 times greater than the weight of a full sampler (Figure 1)[1] . It is advised to have a safety wire on the shackles in case the shackles loosen over time.

The sampler should be deployed and retrieved with a minimum amount of swinging when out of the water. Excessive swinging can cause the sampler to trigger prematurely upon deployment and can disturb the sediment sample upon retrieval. Swinging can be minimized by keeping the wire vertical and taut, by heading the survey vessel into any waves when the sampler is out of the water and by attaching handling lines to the cable that can then be retrieved by the sampling team.

Control of the sampler is important, especially if strong currents or tidal fluxes are present. To maintain control the sampler should not be lowered too quickly. It is recommended that the lowering speed at sediment entry be no more than 80 m/min (1.33 m/sec or 4.4 ft/sec). Lowering rates through the water column can be much faster (free-fall) until several meters from the bottom, as long as the speed at sediment entry is no greater than 1.33 m/sec. Any faster and the sampler tends to “butterfly”; if slower there tends to not be enough speed for proper penetration at the seabed. Swell and chop can significantly degrade samples due to effects on entry speed (i.e., vertical ship motion alternately adds to and subtracts from entry velocity). These additional factors must therefore be taken into account when they are present. Once again, it is important to keep the hydrowire as near vertical as possible and taut during deployment or retrieval of the sampling device. Repositioning of the vessel may be necessary to maintain the hydrowire’s attitude.

Initially after the sampler has contacted the bottom, the hydrowire should be allowed to slacken in order to rotate the release device and free the suspension chains. The wire should then slowly be made taut, retrieving the sampler

slowly to permit the device to close properly. After the jaws are closed, a constant retrieval speed should be maintained to avoid jerking the sampler and possibly disturbing the sample. When the sampler approaches the water surface (i.e., when first sighted), the winch should be stopped to permit the handling lines to be clipped onto the cable. The sampler can then be raised slowly, and the handling lines can be used to minimize swinging of the device. When brought on board, the sampler should be properly secured as soon as possible. After infauna and sediment samples have been collected, each grab should be thoroughly rinsed with sea-water to avoid cross-contamination between stations.

CTD: Selected stations will be chosen for CTD casts (SOI 3.2.1). At these stations, the CTD cast will follow the 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).

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

3.6 **Station Locations** – See section **11.0 Tables**

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),
- SIMRAD EK60 Scientific Echosounder Monitoring (SOI 3.2.14).
- Beam trawl (SOI 3.2.10)

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),
- Acoustic Doppler Current Profiler (ADCP) Operations (SOI 3.2.16)
- Thermosalinograph Monitoring (SOI 5.3), and
- Fluorometer Monitoring (SOI 5.3).

3.9 **Applicable Restrictions** – Sea lion rookery/haul out protected areas

3.10 **Small Boat Operations** – Conditions permitting, we will use the Munson Launch to deploy the 3-m plumb staff beam trawl in areas more shallow than the NOAA ship MILLER FREEMAN can operate. Deploying the beam trawl will require the Munson's a-frame, electric winch, and depth sounder. We request assistance in determining the best methods for beam trawl launch and retrieval from the Munson.

We request assistance from the Bridge and Deck Dept for these operations.

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,
- Sea-Bird Electronics' SBE-19 SEACAT system,
- Meter block for plankton tows,
- Wire speed indicators and readout for quarterdeck, Rowe winch, Marco winch
- FURUNO unit to be mounted to beam trawl
- Munson launch, A-frame, electric winch, and depth sounder.
- 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,
- Use of Pentium PC in DataPlot for data analyses,
- Scientific Computer System (SCS),
- 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
- Length boards,
- Plastic bags,
- Sieves, jars, squirt bottles, funnels, jar holder
- Miscellaneous scientific sampling and processing equipment,
- Scientific ultra-cold freezer, and
- Cruise Operations Database (COD)
- Beam trawl
- van Veen benthic grab

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 Cast Information/Rosette Log,
- 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 will 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 **NPCREP Seasonal Bioenergetics Project** – Pacific cod, pollock, and *Atheresthes* juveniles will be collected and frozen as part of a BSIERP project

to characterize growth and energy content (for R. Heintz).

6.3.2 **Pacific cod population structure** - Some larval and juvenile Pacific cod will be collected for an otolith microchemistry project. Thomas Hurst and other scientists will conduct the sampling.

6.3.3 **Crab Habitat Use** - Selected crab juveniles <40 mm carapace width will be sorted from beam trawl catches and frozen (for C. Yeung). Samples will be offloaded in Seattle with other samples.

7.0 HAZARDOUS MATERIALS

7.1 Inventory

Chemical	Amount	Neutralizer	Contact
Formaldehyde, 37%	2 x 20-Liter Buckets	Spill Kit	Wilson
Sodium Borate	500-g	Dust Pan/Water	Wilson
Alcohol, Reagent, 95%	2 x 4-Liter containers	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 to Radio Room: Radio.Room@noaa.gov

9.0 Deemed Exports-NAO 207-12

The procedures for foreign nationals are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI), Section 9.0

APPENDICES

10.0 Equipment Inventory

Equipment	Quantity	Weight
Larval Supply Trunk	1	80 lbs
Formaldehyde Containers	2 x 20-Liter	20 lbs
Carboy, Saturated Sodium Borate	1 x 20-Liter	40 lbs
Miscellaneous Gear Trunks	4	80-lbs (ea.)
60-cm Bongo Frame	1	40 lbs
20-cm Bongo Frame	1	40 lbs
Cases, Glass Jars, 32-oz	25 cases	50 lbs
Beam Trawl Array	2	250 lbs
Van Veen Benthic Sampler	1	75 lbs

11.0 Station Locations: These are locations where bongo tows and beam trawl deployment are likely to occur. Stations are not presented in order of operations. Stations may be added or dropped at the discretion of the chief scientist and the commanding officer.

GRID_SN	GRID_EW	N Deg	N Min	W Deg	W Min	Latitude	Longitude
K	7	56	35.9376	160	0.384	56.59896	-160.006
K	10	56	49.1268	160	13.428	56.81878	-160.224
K	13	57	2.3154	160	26.556	57.03859	-160.443
K	16	57	15.5046	160	39.756	57.25841	-160.663
K	19	57	28.6938	160	53.034	57.47823	-160.884
K	22	57	41.883	161	6.396	57.69805	-161.107
K	25	57	55.0722	161	19.836	57.91787	-161.331
K	28	58	8.2608	161	33.36	58.13768	-161.556
K	31	58	21.45	161	46.968	58.3575	-161.783
N	7	56	28.7766	160	24.306	56.47961	-160.405
N	10	56	41.9652	160	37.308	56.69942	-160.622
N	13	56	55.1544	160	50.394	56.91924	-160.84
N	16	57	8.3436	161	3.552	57.13906	-161.059
N	19	57	21.5328	161	16.788	57.35888	-161.28
N	22	57	34.722	161	30.102	57.5787	-161.502
N	25	57	47.9112	161	43.5	57.79852	-161.725
N	28	58	1.0998	161	56.982	58.01833	-161.95
N	31	58	14.289	162	10.542	58.23815	-162.176
Q	4	56	8.4264	160	35.262	56.14044	-160.588
Q	7	56	21.6156	160	48.15	56.36026	-160.803
Q	10	56	34.8042	161	1.116	56.58007	-161.019
Q	13	56	47.9934	161	14.154	56.79989	-161.236
Q	16	57	1.1826	161	27.27	57.01971	-161.455
Q	19	57	14.3718	161	40.464	57.23953	-161.674
Q	22	57	27.561	161	53.742	57.45935	-161.896

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Q	25	57	40.7496	162	7.092	57.67916	-162.118
Q	28	57	53.9388	162	20.526	57.89898	-162.342
Q	31	58	7.128	162	34.044	58.1188	-162.567
T	7	56	14.4546	161	11.922	56.24091	-161.199
T	10	56	27.6432	161	24.846	56.46072	-161.414
T	13	56	40.8324	161	37.842	56.68054	-161.631
T	16	56	54.0216	161	50.916	56.90036	-161.849
W	7	56	7.2936	161	35.622	56.12156	-161.594
W	10	56	20.4822	161	48.504	56.34137	-161.808
W	13	56	33.6714	162	1.458	56.56119	-162.024
W	16	56	46.8606	162	14.496	56.78101	-162.242
Z	7	56	0.132	161	59.244	56.0022	-161.987
Z	10	56	13.3212	162	12.084	56.22202	-162.201
Z	13	56	26.5104	162	25.002	56.44184	-162.417
Z	16	56	39.6996	162	37.998	56.66166	-162.633
AC	7	55	52.971	162	22.794	55.88285	-162.38
AC	10	56	6.1602	162	35.598	56.10267	-162.593
AC	13	56	19.3494	162	48.474	56.32249	-162.808
AC	16	56	32.5386	163	1.428	56.54231	-163.024
AF	4	55	32.6214	162	33.582	55.54369	-162.56
AF	7	55	45.81	162	46.272	55.7635	-162.771
AF	10	55	58.9992	162	59.034	55.98332	-162.984
AF	13	56	12.1884	163	11.874	56.20314	-163.198
AF	16	56	25.3776	163	24.786	56.42296	-163.413
AI	4	55	25.4604	162	57.024	55.42434	-162.95
AI	7	55	38.649	163	9.678	55.64415	-163.161
AI	10	55	51.8382	163	22.404	55.86397	-163.373
AI	13	56	5.0274	163	35.202	56.08379	-163.587
AI	16	56	18.2166	163	48.072	56.30361	-163.801
AL	4	55	18.2994	163	20.4	55.30499	-163.34
AL	7	55	31.488	163	33.018	55.5248	-163.55
AL	10	55	44.6772	163	45.702	55.74462	-163.762
AL	13	55	57.8664	163	58.458	55.96444	-163.974
AL	16	56	11.0556	164	11.292	56.18426	-164.188
AO	4	55	11.1378	163	43.704	55.18563	-163.728
AO	7	55	24.327	163	56.28	55.40545	-163.938
AO	10	55	37.5162	164	8.928	55.62527	-164.149
AO	13	55	50.7054	164	21.648	55.84509	-164.361
AO	16	56	3.8946	164	34.44	56.06491	-164.574
AR	4	55	3.9768	164	6.936	55.06628	-164.116
AR	7	55	17.166	164	19.476	55.2861	-164.325
AR	10	55	30.3552	164	32.088	55.50592	-164.535
AR	13	55	43.5444	164	44.766	55.72574	-164.746
AR	16	55	56.7336	164	57.516	55.94556	-164.959
AU	4	54	56.8158	164	30.096	54.94693	-164.502
AU	7	55	10.005	164	42.6	55.16675	-164.71
AU	10	55	23.1942	164	55.176	55.38657	-164.92
AU	13	55	36.3834	165	7.812	55.60639	-165.13
AU	16	55	49.5726	165	20.526	55.82621	-165.342
AX	4	54	49.6548	164	53.19	54.82758	-164.887

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AX	7	55	2.844	165	5.658	55.0474	-165.094
AX	10	55	16.0332	165	18.192	55.26722	-165.303
AX	13	55	29.2224	165	30.798	55.48704	-165.513
AX	16	55	42.4116	165	43.47	55.70686	-165.725
BA	1	54	29.3046	165	3.852	54.48841	-165.064
BA	4	54	42.4938	165	16.218	54.70823	-165.27
BA	7	54	55.683	165	28.644	54.92805	-165.477
BA	10	55	8.8722	165	41.142	55.14787	-165.686
BA	13	55	22.0614	165	53.706	55.36769	-165.895
BA	16	55	35.2506	166	6.342	55.58751	-166.106
BD	1	54	22.1436	165	26.844	54.36906	-165.447
BD	4	54	35.3328	165	39.174	54.58888	-165.653
BD	7	54	48.522	165	51.564	54.8087	-165.859
BD	10	55	1.7112	166	4.02	55.02852	-166.067
BD	13	55	14.9004	166	16.548	55.24834	-166.276
BD	16	55	28.089	166	29.148	55.46815	-166.486
BG	1	54	14.9826	165	49.77	54.24971	-165.83
BG	4	54	28.1718	166	2.058	54.46953	-166.034
BG	7	54	41.361	166	14.412	54.68935	-166.24
BG	10	54	54.5502	166	26.838	54.90917	-166.447
BG	13	55	7.7394	166	39.33	55.12899	-166.656
BG	16	55	20.928	166	51.888	55.3488	-166.865
BJ	1	54	7.8216	166	12.624	54.13036	-166.21
BJ	4	54	21.0108	166	24.882	54.35018	-166.415
BJ	7	54	34.2	166	37.2	54.57	-166.62
BJ	10	54	47.3892	166	49.584	54.78982	-166.826
BJ	13	55	0.5784	167	2.04	55.00964	-167.034
BJ	16	55	13.767	167	14.562	55.22945	-167.243
BM	1	54	0.6606	166	35.418	54.01101	-166.59
BM	4	54	13.8498	166	47.634	54.23083	-166.794
BM	7	54	27.039	166	59.916	54.45065	-166.999
BM	10	54	40.2282	167	12.27	54.67047	-167.205
BM	13	54	53.4174	167	24.684	54.89029	-167.411
BM	16	55	6.606	167	37.17	55.1101	-167.62
H	7	56	43.0986	159	36.387	56.71831	-159.606
E	7	56	50.2596	159	12.315	56.83766	-159.205
B	7	56	57.4206	158	48.168	56.95701	-158.803
H	10	56	56.2878	159	49.473	56.93813	-159.825
E	10	57	3.4488	159	25.443	57.05748	-159.424
B	10	57	10.6098	159	1.338	57.17683	-159.022
BBA	10	57	17.7708	158	37.158	57.29618	-158.619
BBB	10	57	24.9318	158	12.903	57.41553	-158.215
H	13	57	9.4764	160	2.643	57.15794	-160.044
E	13	57	16.6374	159	38.655	57.27729	-159.644
B	13	57	23.7984	159	14.592	57.39664	-159.243
BBA	13	57	30.9594	158	50.454	57.51599	-158.841
BBB	13	57	38.1204	158	26.241	57.63534	-158.437
BBC	13	57	45.2814	158	1.953	57.75469	-158.033
H	16	57	22.6656	160	15.885	57.37776	-160.265
E	16	57	29.8266	159	51.939	57.49711	-159.866

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B	16	57	36.9876	159	27.918	57.61646	-159.465
BBA	16	57	44.1486	159	3.822	57.73581	-159.064
BBB	16	57	51.3096	158	39.651	57.85516	-158.661
BBC	16	57	58.4706	158	15.405	57.97451	-158.257
BBD	16	58	5.6316	157	51.084	58.09386	-157.851
H	19	57	35.8548	160	29.205	57.59758	-160.487
E	19	57	43.0158	160	5.301	57.71693	-160.088
B	19	57	50.1768	159	41.322	57.83628	-159.689
BBA	19	57	57.3378	159	17.268	57.95563	-159.288
BBB	19	58	4.4988	158	53.139	58.07498	-158.886
BBC	19	58	11.6598	158	28.935	58.19433	-158.482
BBD	19	58	18.8208	158	4.656	58.31368	-158.078
H	22	57	49.044	160	42.615	57.8174	-160.71
E	22	57	56.205	160	18.759	57.93675	-160.313
B	22	58	3.366	159	54.828	58.0561	-159.914
BBA	22	58	10.527	159	30.822	58.17545	-159.514
BBB	22	58	17.688	159	6.741	58.2948	-159.112
H	25	58	2.2332	160	56.097	58.03722	-160.935
E	25	58	9.3942	160	32.283	58.15657	-160.538
B	25	58	16.5552	160	8.394	58.27592	-160.14
BBA	25	58	23.7162	159	44.43	58.39527	-159.741
BBB	25	58	30.8772	159	20.391	58.51462	-159.34
H	28	58	15.4218	161	9.663	58.25703	-161.161
E	28	58	22.5828	160	45.891	58.37638	-160.765
B	28	58	29.7438	160	22.044	58.49573	-160.367
BBA	28	58	36.9048	159	58.122	58.61508	-159.969
BBB	28	58	44.0658	159	34.125	58.73443	-159.569
H	31	58	28.611	161	23.319	58.47685	-161.389

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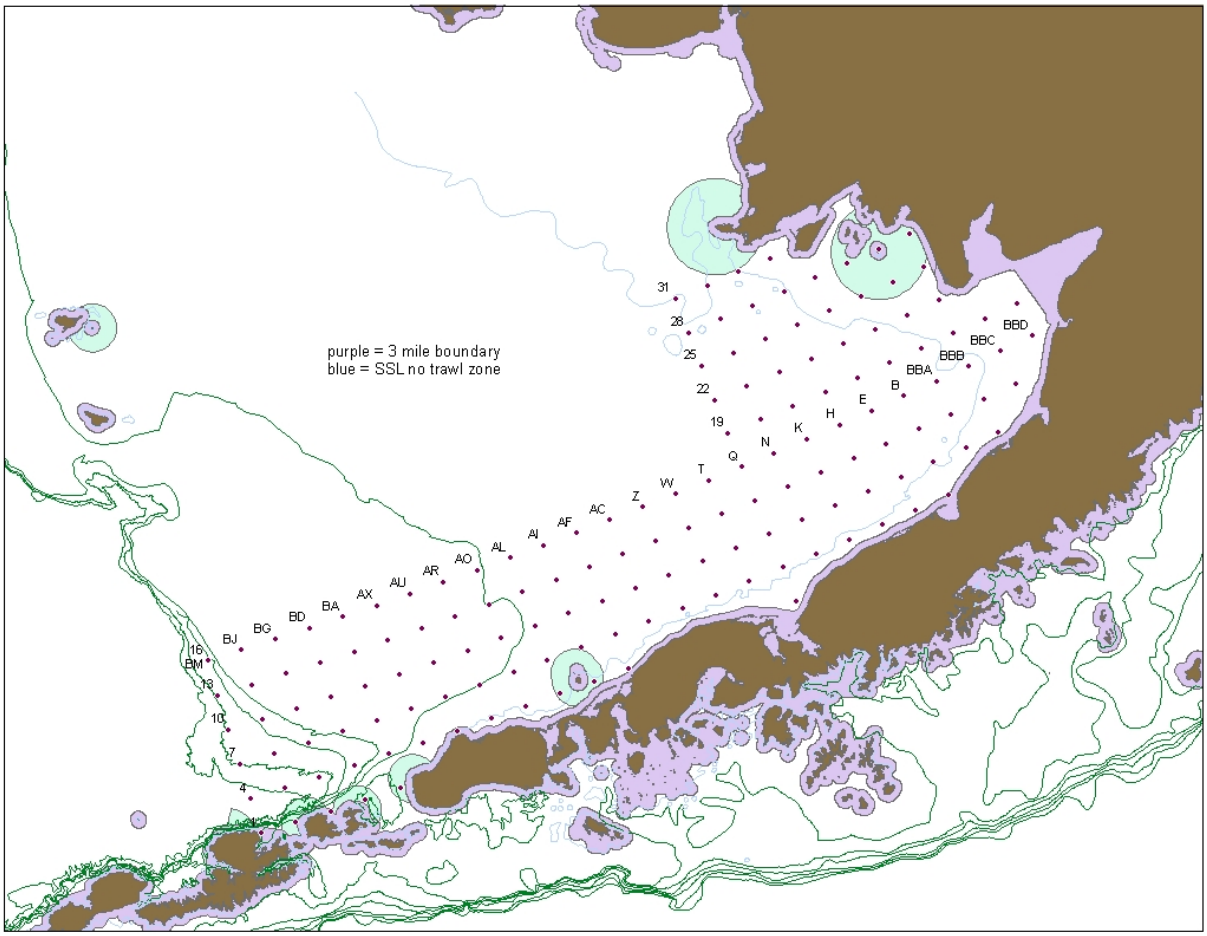
12.0 Cruise Chartlet:



13.0 HAZMAT Inventory:

Chemical	CAS Number	Respondee	Org.	Qty	H	F	R	Storage Code	Hazard Class	Packing Group Number	UN	Reportable Quantity	Response Indices
Formaldehyde, 37%	50-00-0	Duffy-Anderson	AFSC	60-L	3	2	2	Flammable	3 & 8	III	1198	100 LBS	2
Sodium Borate	1330-43-4	Duffy-Anderson	AFSC	500-g	1	0	0	General	Not regulated				3
Sodium Borate Solution, Saturated	mix	Duffy-Anderson	AFSC	20-L	1	0	0	General	Not regulated				3
Alcohol, Reagent, 95%	mix	Duffy-Anderson	AFSC	1 x 20-l	3	3	1	Flammable	3	II	1987	350 Lb	1

Spill Response 1: Ventilate area of leak or spill. Wear appropriate personal protective equipment. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. **Do not flush to sewer!** 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. 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 3: 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.

CAPT Michelle G. Bullock	Dr. Doug DeMaster
Commanding Officer	Science and Research Director
Marine Operations Center,	Alaska Fisheries Science Center
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