

FINAL CRUISE INSTRUCTIONS

Eco-FOCI

NOAA Ship *Oscar Dyson*, DY-09-02
February 21 – March 2, 2009
Chief Scientist: Janet Duffy-Anderson, NOAA/AFSC

1.0 FINAL CRUISE INSTRUCTIONS

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

1.2 **Cruise Numbers:**

1.2.1 **Cruise Number** – DY-09-02

1.2.2 **Eco-FOCI Number** – 1DY09

1.3 **Cruise Dates:**

1.3.1 **Departure** – Depart Dutch Harbor, Alaska, at 1500 on Saturday, February 21, 2009.

1.3.2 **Arrival** – Arrive Dutch Harbor, Alaska, at 0800 on Monday, March 2, 2009.

2.0 CRUISE OVERVIEW

Cruise Objectives – We will conduct bottom trawl sampling in Bering Canyon to collect ripe adult Greenland halibut (*Reinhardtus hippoglossides*), and we will conduct an ichthyoplankton survey in the same vicinity to collect ichthyoplankton. This work is needed to describe Greenland halibut spawning ecology, as well as the distribution of eggs and larvae over the slope and in Bering Canyon in winter. The work will also be used in the study of transport and early life history of this species. Data on physical characteristics of the water column will also be collected. We will also deploy 3 oceanographic instrumentation moorings, one in Bering Canyon, one on the EBS shelf in the vicinity to Unimak Island, and one at the M2 mooring site. Live GH eggs may be transported back to Seattle, WA if sufficient numbers are available for at-sea experiments.

2.1 **Applicability** – These instructions, with **FOCI Standard Operating Instructions for NOAA Ship OSCAR DYSON**, dated December 2008 present complete information for this cruise.

2.2 **Operating Area** – Eastern Bering Sea/Bering Canyon

2.3 **Participating Organizations**

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

2.4 Personnel

2.4.1 Chief Scientist

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

2.4.2 Other Participating Scientists

Name	Gender	Affiliation	E-mail Address	Citizenship
Lisa DeForest	Female	AFSC	Lisa.DeForest@noaa.gov	USA
Daniel Cooper	Male	AFSC	Dan.Cooper@noaa.gov	USA
Chrissy Jump	Female	AFSC	Christina.Jump@noaa.gov	USA
William Floering	Male	AFSC	Bill.Floering@noaa.gov	USA
Morgan Busby	Male	AFSC	Morgan.Busby@noaa.gov	USA
Deborah Blood	Female	AFSC	Debbie.Blood@noaa.gov	USA
*Dongwha Sohn	Female	OSU	dongwhasohn@gmail.com	Republic of Korea
William Flerx	Male	AFSC	Bill.Flerx@noaa.gov	USA

*FNG clearance approved

2.5 Administration

2.5.1 Ship Operations

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

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

2.5.2 Scientific Operations

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

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

3.0 OPERATIONS

Data To Be Collected –

Weather permitting, the first operation will be to deploy a subsurface mooring on the EBS shelf in the vicinity of Unimak Island. (see Section 9.2, station AX7). A CTD cast will be taken following deployment. We will also deploy a subsurface mooring in Bering Canyon (54 32.62N, 166 38.74W (DD)), and one at the M2 mooring site (56 51.99N, 164 03.00W), ice permitting. A CTD cast will be taken following each deployment. These deployments will occur at some point during the cruise in fair weather. Soundings will also be taken to attempt to locate either of 2 missing moorings from the FY08 field season over the southern EBS shelf en route to M2.

We will collect ichthyoplankton samples with 20- and 60-cm Bongo nets (20BON, 60BON + Seacat combination) from a grid of approximately 70 stations in the vicinity of Bering Canyon. In addition, a 1m² Multiple Opening/Closing Net and Environmental Sensing System (MOCNESS) will be used at selected stations to examine depth-discrete distributions of larvae. Deep (400, 600, 800+ m) bongo net samples for ichthyoplankton may also be taken at selected stations. Bottom trawls for spawning condition Greenland halibut will be made with RACE Division poly Nor'Eastern (PNE) bottom trawl rigged with mud sweep gear at selected stations throughout the grid (see section 3.4.1). Exact positions will be determined at sea based on densities of eggs and larvae collected in bongo tows. A standard oceanographic watch is requested for plankton tows, which consists of a winch operator, a member of the deck department, a scientific staff of three and a Survey Technician on deck. Additional assistance may be required from ship's personnel for deploying and landing the MOCNESS gear. A fishing crew will be required to assist with bottom trawls, which will be conducted opportunistically day or night. Assistance with Furuno and/or Simrad trawl sensors is requested. We will also rear eggs and collect data on egg density using the Egg Density Gradient Apparatus (EDGAR) in the controlled environmental room (3 °C). Operations will be conducted 24 hours a day.

We will collect data on the physical environment using the Sea-Bird Electronics SBE-19 SEACAT Profiler to relate larval fish abundance to environmental variables (temperature and salinity). CTDB samples may also be taken at MOCNESS sampling stations to assess microzooplankton and nutrients.

If sufficient numbers of Greenland halibut eggs are available for all on-board activities, eggs may be shipped back to Seattle, WA for use in laboratory rearing experiments.

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

- 3.2 Staging Plan** – Some of the equipment necessary for the cruise will be loaded onto **NOAA Ship OSCAR DYSON** when the ship is in port in Seattle, Washington, in January 2009 (Date TBD by Scientists and Ship's Officers). One set of trawl doors (V doors) will be taken by the ship to Dutch Harbor. The mooring equipment, trawl nets, and scientific equipment will be shipped to Dutch Harbor in early February. Chemicals and limited fragile scientific equipment will be loaded onto the Oscar Dyson in January for transit to Dutch Harbor. We request that we be allowed to set up equipment, including the live tank, MOCNESS (+ termination if necessary), and the EDGAR in the CER, on the day prior to departure. To accomplish this, four scientists (Duffy-Anderson, Jump, Cooper, and Blood) will arrive on Thursday, February 19, 2008, and if possible, will berth overnight on the vessel beginning the night of February 19th. We request that the ET and someone from the Deck Department be available on the morning of February 20th to assist the scientists with craning equipment and setting up the MOCNESS. We request that the person from the Survey Department also assist in setting up the Egg Density Gravimetric Array (EDGAR) if necessary. We request that the CER room be completely empty of any stored gear as it will be used extensively during the cruise for onboard experiments. Please turn the CER on 24 hours prior to the arrival of scientists. We will require dedicated use of the computer lab, dry lab, hydrographic lab (for potential storage of MOCNESS accessories), controlled environment room (2-3 °C), and fish lab for sample and equipment preparation and request as much counter and cabinet space as possible.
- 3.3 De-staging Plan** – We will offload gear and plankton samples when the ship returns to Dutch Harbor, Alaska on March 2nd.
- 3.4 Cruise Plan** – The cruise will depart from Dutch Harbor, Alaska, and occupy a series of approximately 70 stations. Station positions and a map of the working area are located in [Sections 9.2 DY-09-02 – Station Locations](#) and [9.3 DY-09-02 – Cruise Chartlet](#), respectively.
- 3.4.1 Bongo** – 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 will all be mounted together for this tow. On average, bongo tows will be to a depth of 500 meters, or to 10 meters off bottom, whichever is shallowest, but deeper tows (800 m+) may be required to locate the eggs of interest. Modifications will depend on the presence of GH eggs/larvae collected in the sample. Marks should be made at surface (in), at-depth, and surface (out). The sample from Bongo Net 1 will be preserved in its entirety in 1.8% buffered formaldehyde solution (5% formalin) and the sample from Net 2, whenever time allows, will be rough sorted, and the contents identified. If species of interest are found, especially egg or larval GH, they will be preserved in EtOH. The remainder of the sample will be discarded.
- 3.4.2 MOCNESS** – We will opportunistically fish the MOCNESS (0.505 and/or 0.333 mm mesh) at selected stations (approximately 10) in Bering Canyon, over the slope, and on the Bering Sea continental shelf during the survey. Locations for this sampling to be determined at sea at the discretion of the Chief Scientist and the CO. Marks for MOCNESS tows should be surface

(in), at-depth, one mark for each subsequent closed net, and surface (out). Samples will be preserved in formalin.

Associated CTDB (8 bottles) casts will collect water samples for microzooplankton and nutrient data (SOI 3.2.1) after each MOCNESS tow. CTD bottle trips will be made at the same depths as the MOCNESS. Marks for CTD casts should be surface (in), at-depth, each bottle trip, and surface (out).

Collections of water at depth may also be required for egg density experiments. Collections will occur at the discretion of the CS and CO, as necessary.

3.4.3 Trawling Activities – A Poly Nor'eastern bottom trawl (PNE) with mud sweep roller gear will be used. A spare PNE trawl with mud sweep roller gear will serve as a backup. The PNE is a high-opening trawl equipped with roller gear and constructed with stretch mesh sizes that range from 13 cm (5 in) in the forward portion of the net to 8.9 cm (3.5 in) in the codend. The codend will be fitted with a 3.2 cm (1.25 in) nylon mesh liner. The 27.2 m (89.1 ft) headrope holds 21 floats [30 cm (12 in) diameter]. A 24.7 m (81 ft) chain fishing line will be attached to a 24.9 m (81.6 ft) footrope constructed of 1 cm (0.4 in) 6 × 19 wire rope wrapped with polypropylene rope. The trawl will be rigged with triple 54.9 m (180 ft) galvanized wire rope dandylines. The roller gear will be attached to the fishing line using chain toggles [2.9 kg (6.5 lb) each] comprised of five links and one ring. The mud sweep roller gear will be constructed with 20 cm solid rubber disks strung over 16mm high-tensile chain. Two 5.9 m (19.5 ft) wire rope extensions with 10 cm (4 in) and 20 cm (8 in) rubber disks will be used to span the two lower flying wing sections and will be attached to the roller gear. The net will be fished with 1000 kg V-doors rigged with four-point bridles to enhance their stability at slow towing speeds and 55 m bridles between the doors and wingtips. The vertical net opening and depth will be monitored with the OSCAR DYSON's CN-24 Furuno system, using the Simrad system as a backup if necessary. A scanmar system will also be on put board as a backup. After deployment and settling of the net on bottom, the net will be towed for 20 minutes (time is variable depending on conditions) at a speed of 1.5 m/sec. We request that the chief boatswain keep a trawl gear logbook to record any repair or modifications made to trawl gear during the cruise. Opportunistic fishing will then be conducted at depths of approximately 400-800+ m throughout the cruise. Deeper tows may be required depending on availability of spawning condition fish. Whenever ripe, adult Greenland halibut are found, a CTD cast with bottles will be deployed to collect data on the physical properties of water at the bottom and water for holding live eggs. We will then attempt to fertilize eggs from gravid females with sperm from ripe males aboard ship. If insufficient numbers of fishes are collected for successful fertilization, adults may be held in a live holding tank (4 ft x 4 ft x 4ft) temporarily. Live eggs will be held jars placed in the controlled environment room (3 ° C) until the end of the cruise. We anticipate trawling activities at approximately 20 stations.

3.4.4 Subsurface Moorings – We will deploy three subsurface moorings, two on the EBS shelf and one in Bering Canyon. Deployment will be at the discretion of the CO and CS and is weather dependent. The mooring location will be: 56 degrees 51.989 N and 164 degrees 03.002 W. Please contact Bill Floering for questions or concerns regarding mooring deployment (206-526-6480).

3.5 Station Locations – See [Section 9.2 DY-09-02 – 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 OSCAR DYSON*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- Chlorophyll Samples (SOI 3.2.11),
- CTD/Water Sample Operations (SOI 3.2.1),
- MARMAP Bongo Tows (SOI 3.2.2),
- MOCNESS Tows (SOI 3.2.6),
- SIMRAD ER 60 Scientific Echosounder Monitoring (SOI 3.2.14)
- Subsurface mooring deployments

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 OSCAR DYSON*** (SOI). Operations not addressed in the SOI and changes to standard procedures are addressed below.

- Scientific Computer System (SCS) Data Acquisition (SOI 3.2.15.3),
- Acoustic Doppler Current Profiler (ADCP) Operations (SOI 3.2.15.2),
- Radiometer Operations (SOI 3.2.14)
- Fluorometer Monitoring (SOI 5.3), and
- Thermosalinograph monitoring (SOI 5.3).

3.8 Applicable Restrictions – None.

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-19 SEACAT system,
- Sea-Bird Electronics SBE 911plus CTD system with stand, each CTD system should include underwater CTD and weights. There should be one deck unit for the two systems,

- Conductivity and temperature sensor package to provide dual sensors on the CTD (primary),
- Niskin Bottles: 10.0 liter (4 bottles) + any available spares in any volume,
- Wire speed indicators and readout for winches,
- For meteorological observations: 2 anemometers (one R. M. Young system interfaced to the SCS), calibrated air thermometer (wet-and dry-bulb) and a calibrated barometer and/or barograph,
- Freezer space for storage of biological and chemical samples (both blast and storage freezers, -20° C and -80° C) turned on and operating,
- Use of Pentium PC for data analysis,
- Bench space in dry lab (survey office) for computer, monitor, printer for MOCNESS,
- Scientific Computer System (SCS),
- Environmental room (3°C),
- Furuno/Simrad net sounder,
- Laboratory space with exhaust hood, sink, lab tables, and storage space,
- Sea-water hoses and nozzles to wash nets (quarterdeck and aft deck),
- Sea-water hose to supply live tank,
- Adequate deck lighting for night-time operations,
- Navigational equipment including GPS and radar,
- Safety harnesses for working on quarterdeck and fantail
- Ship's crane(s) used for loading and/or deploying gear and supplies.

4.2 Equipment and Capabilities Provided by Scientists – See [Section 9.1 DY-09-02 – Equipment Inventory](#) for weights and dimensions.

- Sea-Bird Electronics SBE 911plus CTD system (backup),
- Sea-Bird Electronics' SBE-19 SEACAT system, (backup),
- PMEL PC with SEASOFT software for CTD data collection and processing,
- Fluorometer and light meter to be mounted on CTD,
- MOCNESS array,
- Live holding tank (to be staged on fantail),
- Plumbing splitter to allow deck hose to be run from same water source as the live tank,
- PNE bottom trawl with mud sweep roller gear with 1000 kg V-doors doors
- CTD stand modified for attachment of fluorometer,
- 6, 10-L Niskin bottles
- Conductivity and temperature sensor package to provide dual sensors on the CTD (backup),
- CTD rosette sampler,
- IAPSO standard water,
- Egg Density and Gravimetric Arrays (EDGAR) x 2
- 20-cm and 60-cm Bongo sampling arrays,
- Spare wire angle indicator,

- Miscellaneous scientific sampling and processing equipment,
- Subsurface moorings, floats and instrumentation
- Scientific freezer (-20 °C),
- Microscope for examining, sorting, and measuring fish eggs and larvae,
- Haul position and catch composition forms,
- Cruise Operations Database (COD) software and forms
- Plastic five-gallon buckets
- Dissection tools
- Microscope for examining, sorting, and measuring fish eggs
- Thermoses and coolers for transporting live eggs

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 (DVD-RW),
- Calibration sheets for all ship's and scientific instruments used
- PMEL CTD weather observation log,
- CTD Cast Information/Rosette Log,
- ADCP set up and operation log
- Scientific Freezer Temperature Daily Log
- Controlled Environmental Room Temperature Log

5.2 **Pre- and Post-cruise Meetings** – Cruise meetings may be held in accordance with **FOCI Standard Operating Instructions for NOAA Ship Oscar Dyson** (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 **Greenland halibut maturity**: Samples from adults Greenland halibut will be saved for a maturity study. Ovaries and sagittal otoliths will be collected from spawning condition females from bottom trawly catches. Ovaries will be removed and stored in a five-gallon bucket half full of the formalin preservative mixture.

6.3.2 **Larval Pacific halibut**: Samples from 60BON Net 2 will be sorted at sea. All

larval Pacific halibut will be preserved in scintillation vials of 95% EtOH.
Lids will be wrapped tightly with paraffin.

7.0 HAZARDOUS MATERIALS

7.1 **Inventory** – See [Section 9.4 DY-09-02 – HAZMAT Inventory](#).

7.2 **Material Safety Data Sheet (MSDS)** – Submitted separately.

8.0 MISCELLANEOUS

8.1 **Communications** – Specific information on how to contact the **NOAA Ship OSCAR DYSON** 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 OSCAR DYSON** – Telephone methods listed in order of increasing expense:

Homeport – Seattle, Washington:

- Numbers yet to be determined

United States Coast Guard – Kodiak, Alaska:

- (907) 487-9752
- (907) 487-9753
- (907) 487-4397
- (907) 487-4398

Cellular:

- (206) 604-7122 (CO)
- (206) 295-0775 (XO)
- (206) 295-0550 (OPS)
- (206) 295-0670 (CME)

Wavetalk

- 1-800-668-04950-toll free

INMARSAT B:

- 011-872-336-995-910 (voice line 1)
- 011-872-336-995-920 (voice line 2)
- 011-872-336-995-911 (fax)

Iridium:

- (808) 659-5684

E-Mail: Noaa.Ship.Oscar.Dyson@noaa.gov (mention the person's name in SUBJECT field.)

8.2.4 Marine Operations Center, Pacific (MOP)

Operations Division (MOP1):

- (206) 553-4548 (voice)
- (206) 553-1109 (facsimile)

E-Mail: FirstName.LastName@noaa.gov

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

9.0 Deemed Exports-NAO 207-12

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

10.0 APPENDICES

10.1 DY-09-02 – Equipment Inventory

Equipment	Quantity	Weight
Larval Supply Trunk	1	80 lbs
Formaldehyde Containers	1 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

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Live tank	1	75 lbs
PNE Trawl + doors	1	
MOCNESS Frame	1	250 lbs
Cases, Glass Jars, 32-oz	25 cases	50 lbs
Cases, Glass Jars, 8-oz	15 cases	8 lbs
75 Khz ADCP in Syntactic foam float	2	800 lbs
300 Khz ADCP in Syntactic foam float	1	600 lbs
Railroad anchor	1	1600 lbs
Railroad anchor	2	2000 lbs
Acoustic releases	3	125 lbs ea

10.2 DY-09-02 – Station Locations:

These are locations where bongo tows will occur. Other activities (MOCNESS, trawling, CTD, drifters) will occur at selected locations pending results of bongo tows. The 300 Khz mooring will be deployed at AX7 (first operation). A 75 Khz mooring will be deployed in Bering Canyon (54 32.62N, 166 38.75W), and a third mooring will be deployed at the M2 mooring site (56 51.60N, 164 03.60W). Additional bongo stations may be added within the grid or along shelf break, weather and time permitting.

GRID_SN	GRID_EW	N Deg	N Min	W Deg	W Min	Latitude	Longitude
AX	07	55	02.84	165	05.66	55.04740	-165.09430
AX	04	54	49.65	164	53.19	54.82758	-164.88650
BA	04	54	42.49	165	16.22	54.70823	-165.27030
BD	04	54	35.33	165	39.17	54.58888	-165.65290
BG	04	54	28.17	166	02.06	54.46953	-166.03430
BJ	04	54	21.01	166	24.88	54.35018	-166.41470
BM	04	54	13.85	166	47.63	54.23083	-166.79390
BP	04	54	06.69	167	10.32	54.11148	-167.17200
BS	04	53	59.53	167	32.94	53.99213	-167.54900
BV	04	53	52.37	167	55.50	53.87278	-167.92500
BV	07	54	05.56	168	07.67	54.09260	-168.12790
BS	07	54	12.72	167	45.16	54.21195	-167.75260
BP	07	54	19.88	167	22.57	54.33130	-167.37620
BM	07	54	27.04	166	59.92	54.45065	-166.99860
BJ	07	54	34.20	166	37.20	54.57000	-166.62000
BG	07	54	41.36	166	14.41	54.68935	-166.24020
BD	07	54	48.52	165	51.56	54.80870	-165.85940
BA	07	54	55.68	165	28.64	54.92805	-165.47740
AX	10	55	16.03	165	18.19	55.26722	-165.30320
BA	10	55	08.87	165	41.14	55.14787	-165.68570
BD	10	55	01.71	166	04.02	55.02852	-166.06700
BG	10	54	54.55	166	26.84	54.90917	-166.44730
BJ	10	54	47.39	166	49.58	54.78982	-166.82640
BM	10	54	40.23	167	12.27	54.67047	-167.20450
BP	10	54	33.07	167	34.88	54.55112	-167.58140
BS	10	54	25.91	167	57.43	54.43177	-167.95720

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BV	10	54	18.75	168	19.92	54.31242	-168.33200
BV	13	54	31.93	168	32.23	54.53223	-168.53710
BS	13	54	39.09	168	09.78	54.65158	-168.16300
BP	13	54	46.26	167	47.26	54.77094	-167.78770
BM	13	54	53.42	167	24.68	54.89029	-167.41140
BJ	13	55	00.58	167	02.04	55.00964	-167.03400
BG	13	55	07.74	166	39.33	55.12899	-166.65550
BD	13	55	14.90	166	16.55	55.24834	-166.27580
BA	13	55	22.06	165	53.71	55.36769	-165.89510
BA	16	55	35.25	166	06.34	55.58751	-166.10570
BD	16	55	28.09	166	29.15	55.46815	-166.48580
BG	16	55	20.93	166	51.89	55.34880	-166.86480
BJ	16	55	13.77	167	14.56	55.22945	-167.24270
BM	16	55	06.61	167	37.17	55.11010	-167.61950
BP	16	54	59.44	167	59.71	54.99075	-167.99520
BS	16	54	52.28	168	22.19	54.87140	-168.36980
BV	16	54	45.12	168	44.60	54.75205	-168.74340
BV	19	54	58.31	168	57.04	54.97187	-168.95070
BS	19	55	05.47	168	34.67	55.09122	-168.57780
BP	19	55	12.63	168	12.23	55.21057	-168.20380
BM	19	55	19.80	167	49.72	55.32992	-167.82870
BJ	19	55	26.96	167	27.16	55.44927	-167.45260
BG	19	55	34.12	167	04.52	55.56862	-167.07530
BD	19	55	41.28	166	41.81	55.68797	-166.69690
BA	19	55	48.44	166	19.05	55.80732	-166.31750

10.3 Biomass Removal Estimates:

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Estimation of Fish Removal

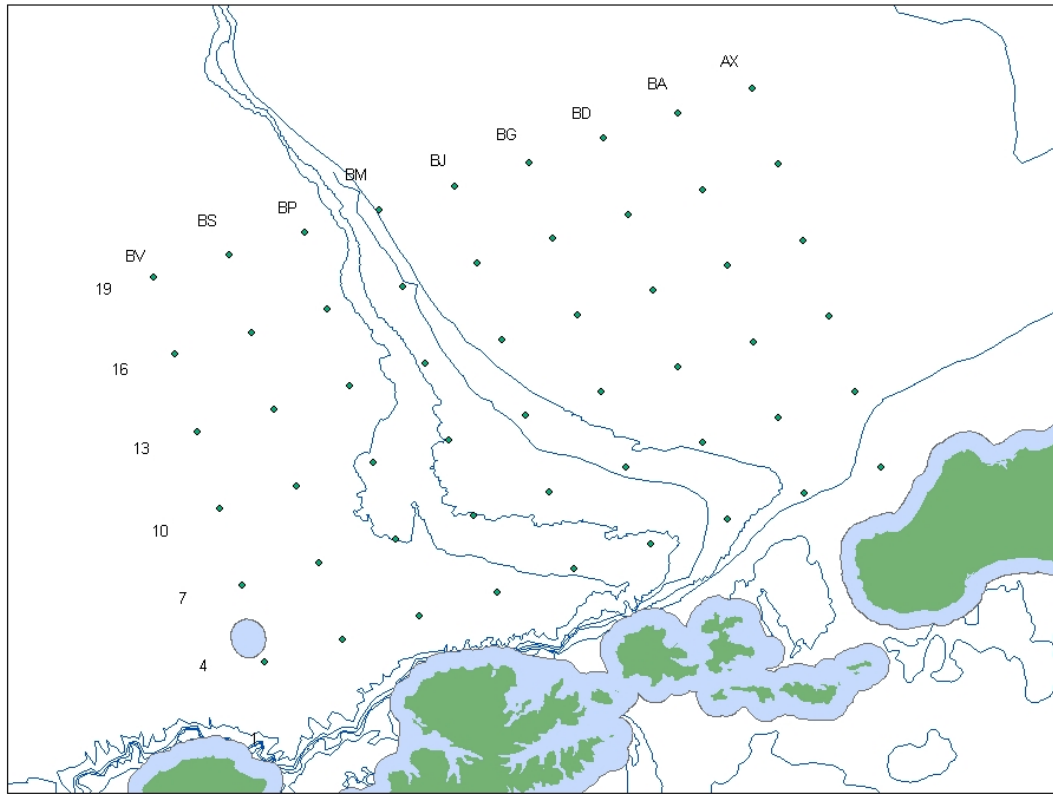
Projected removal of fish biomass per sample:

Sample	# Hauls	Arrowtooth fl.	Rockfishes	Sculpins	Pacific halibut	Greenland turbot
Bongo	70	<0.1 kg	<0.1 kg	<0.1 kg	<0.1 kg	<0.1 kg
MOCNESS	15	<0.1 kg	<0.1 kg	<0.1 kg	<0.1 kg	<0.1 kg
PNE trawl	25	<500 kg	<500 kg	<500 kg	<500 kg	<500 kg

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10.4 DY-09-02 – Cruise Chartlet



10.5 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.

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