FINAL CRUISE INSTRUCTIONS
FOCI

NOAA Ship *MILLER FREEMAN*, MF-02-06
May 12 – May 21, 2002
Chief Scientist: Morgan Busby

1.0 DRAFT CRUISE INSTRUCTIONS

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

1.2 Cruise Numbers:

1.2.1 Cruise Number – MF-02-06

1.2.2 FOCI Number – 3MF02

1.3 Cruise Dates:

1.3.1 Departure – Depart Dutch Harbor, Alaska, at 1500 on Sunday, May 12, 2002.

1.3.2 Arrival – Arrive Dutch Harbor, Alaska, at 0800 on Tuesday, May 21, 2002.

2.0 CRUISE OVERVIEW

2.1 Cruise Objectives – We will be conducting an ichthyoplankton survey in the Bering Sea in the vicinity of Unimak Island, Alaska. This work is needed to describe larval fish assemblages in the Bering Sea (slope, outer shelf, and middle shelf) in spring. Zooplankton data and data on physical characteristics of the water column will also be collected.

2.2 Applicability – These instructions, with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN***, dated February 4, 2002, present complete information for this cruise.

2.3 Operating Area – Southeastern 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
Morgan Busby (206) 526-4113	Male	AFSC	Morgan.Busby@noaa.gov

2.5.2 Participating Scientists

Name	Gender	Affiliation	E-mail Address
Morgan Busby	Male	AFSC	Morgan.Busby@noaa.gov
Debbie Blood	Female	AFSC	Debbie.Blood@noaa.gov
Christina Deliyanides	Female	AFSC	Christina.Deliyanides@noaa.gov
Ann Matarese	Female	AFSC	Ann.Matarese@noaa.gov
Kathy Mier	Female	AFSC	Kathy.Mier@noaa.gov
Susan Picquelle	Female	AFSC	Susan.Picquelle@noaa.gov

2.6 Administrative

2.6.1 Ship Operations

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1801 Fairview Avenue East, Seattle, Washington 98102-3767
Telephone: (206) 553-4548, Fax: (206) 553-1109

Commander Timothy B. Wright, NOAA
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2.6.2 Scientific Operations

Dr. Phyllis J. Stabeno, PMEL
Telephone: (206) 526-6453
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Dr. Jeffrey Napp, AFSC
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3.0 OPERATIONS

3.1 Data To Be Collected – A goal of the 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), a Neuston net, and CalVET nets. Rough counts from 60BON Net 2 will be

used to provide immediate estimates of larval walleye pollock distribution and abundance in the survey area. 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* CTD casts will collect physical data as well as data on nutrients, microzooplankton, and chlorophyll. This cruise will provide new information on larval fish assemblages on the Bering Sea shelf in the spring. Samples will be collected from a grid of approximately 75 stations.

Note: It is possible that not all stations from this grid will be occupied.

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 MILLER FREEMAN*** (SOI 5.2) for specific requirements.

3.2 **Staging Plan** – The majority of the equipment necessary for the cruise will be loaded onto the **NOAA ship *MILLER FREEMAN*** before the ship's departure from Seattle, Washington, on April 21, 2002. We will use the chemistry lab, the rough lab, and the slime lab for sample and equipment preparation and request as much counter and cabinet space as possible. We will use DataPlot for CTD and SEACAT operations.

3.3 **De-staging Plan** – Samples and gear will remain on board the ship until the completion of cruise MF-02-07 where the samples will be offloaded in Kodiak, Alaska, on Saturday, June 1, 2002. Sampling equipment will remain on board, in the hold, for use during cruise MF-02-11.

3.4 **Cruise Plan** – The cruise will depart from Dutch Harbor, Alaska, at 1500 on Sunday, May 12, 2002, and occupy a series of approximately 75 stations on the Bering Sea FOCI grid. The first station is located immediately outside of Dutch Harbor, Alaska. Station positions and a chartlet of the working area are located in Sections **9.2 Tables** and **9.3 Figures**, respectively.

At every station, a Neuston net will be deployed first to collect fish larvae in the surface layer. Samples from the Neuston net gear will be preserved in 1.8% buffered Formaldehyde.

Following completion of the Neuston tow, a MARMAP Bongo tow (SOI 3.2.2) will be conducted. The SBE 19 SEACAT, the 20-cm Bongo net with 0.150-mm mesh netting and the 60-cm Bongo net with 0.505-mm mesh netting will all be mounted together for this tow. Bongo tows will be to a depth of 300 meters, or to 10 meters off bottom, whichever is shallower. The sample from 60BON Net 1 will be preserved in its entirety in 1.8% buffered Formaldehyde, and the sample from Net 2 will be sorted for walleye pollock and other ichthyoplankton and the stored fraction will be preserved in 95% Reagent Alcohol. The sample from 20BON Net 1 will be preserved in its entirety in 1.8% buffered Formaldehyde; the sample from Net 2 will be discarded.

Selected stations have been chosen for CTD casts to collect water samples for microzooplankton, chlorophyll, and nutrient data (SOI 3.2.1). At these stations, the CTD cast will precede the MARMAP Bongo tow. CTD casts will be made to 300 meters, or to 10 meters off bottom, whichever is shallower.

Selected stations have also been chosen for CalVET tows (SOI 3.2.6). At these stations, the CalVET tow with 0.053-mm mesh netting will follow the MARMAP Bongo tow. The CalVET tows, both nets combined, will be preserved in 1.8% buffered Formaldehyde.

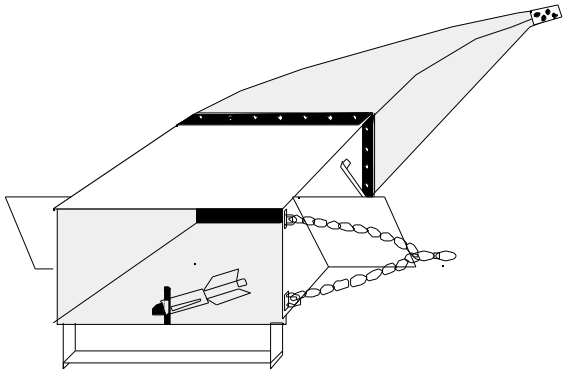
3.5 Station Locations – See Section **9.2 Tables**.

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 are addressed below.

- CTD/Water Samples Operations (SOI 3.2.1),
- MARMAP Bongo Tows (SOI 3.2.2),
- CalVET Net Tows (SOL 3.2.6), and
- Chlorophyll Sampling Operations (SOI 3.2.10).

3.6.1 Neuston Net Tows

3.6.1.1 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.



Sameoto Neuston Sampler

3.6.1.2 Assembly – If the frame is not already put together, some assembly will be required. There are two wings that need to be matched up to the holes on the frame and bolted on. Then bolt on the struts that reinforce the wings. There are a series of holes on the aft end of the frame that the net attaches to with metal straps and bolts. If the net does not already have holes, make them. Slide the net over the frame in the position to be used and use a marking pen to indicate where holes are to be made. Remove and cut holes using scissors, reattach the net, and secure with the metal straps and bolts. The Sameoto sampler is designed to be towed from the side to provide an unobstructed mouth opening. Make sure the towing chain (bridle) is connected to the proper side of the frame, depending on which side of the ship you are sampling from. Some repositioning of the swivel on the tow chain may be required to provide a proper attitude of the frame, ideally it should fish half in and half out of the water. The flow meter is attached with a special bolt to the bottom of the frame, just back from the mouth opening. Remove the lanyard pin from behind the nosecone of the flow meter by unscrewing the nosecone and backing off the screw that is holding the pin in place. Place

flow meter on pin, making sure the window for reading the revolutions is facing up, and attach.

Note – It may prove helpful, and safer, to attach a long tagline to the frame to assist in getting the frame on board. In heavy winds, the sampler tends to act as a kite.

3.6.1.3 Rates/Fishing – The vessel should be moving ahead slowly, 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 10-15 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 ten minutes, unless otherwise instructed. Advise winch operator when time is nearly up and retrieve when ready. Read and record flow meter revolutions, time of tow, and any comments.

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

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

3.7 Underway Operations – The following underway operations are to be conducted during this cruise. The procedures for these operations are listed in the ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI).

- Scientific Computer System (SCS) Data Acquisition (SOI 5.2),
- 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

Equipment and Capabilities Provided by Ship

- Oceanographic winch with slip rings and 3-conductor cable terminated for CTD,
- Manual wire angle indicator
- Oceanographic winch with slip rings and 3-conductor cable terminated for the SBE SEACAT, for net tow operations,
- Sea-Bird Electronics' SBE 911*plus* CTD system with stand, each CTD system should include underwater CTD, weights, and pinger. There should be one deck unit and tape recorder for the two systems,
- 10-liter Niskin sampling bottles for use with rosette (10 plus 4 spares),
- 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 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 (blast freezer -20°C),
- Bench space in DataPlot for PCs, monitor, printer,
- Use of Pentium PC in DataPlot for data analysis,
- Scientific Computer System (SCS),
- Laboratory space with exhaust hood, sink, lab tables, and storage space,
- Sea-water hoses and nozzles to wash nets on 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.

4.1 Equipment and Capabilities Provided by Scientists

- Sea-Bird Electronics' SBE 911*plus* CTD system to be used with PMEL stand (**primary system**),
- 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,
- IAPSO standard water,
- 60-cm Bongo sampling arrays,
- 20-cm Bongo arrays,
- Neuston net array
- CalVET net array,
- Spare wire angle indicator,
- Scientific ultra-cold freezer (-80°C),
- Miscellaneous sampling processing equipment, and
- Cruise Operations Database (COD) and forms.

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 (SCS, TSGF, and ASCII) – recordable compact diskette (CD-RW),
- Calibration Sheets for all ship's instruments used,
- CTD Cast Information/Rosette Log,
- CTD VHS videocassettes
- Autosalinometer logs,
- Electronic Navigation suite's export files on diskette, and
- Ultra-cold Freezer Temperature Daily Log (SOI 5.4).

5.2 Pre- and Post-cruise Meetings – Cruise meetings may be held in accordance with ***FOCI Standard Operating Instructions for NOAA Ship MILLER FREEMAN*** (SOI 5.5).

6.0 ADDITIONAL PROJECTS

6.1 **Definition** – Ancillary and piggyback projects are secondary to the objectives of the cruise and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force.

6.2 **Ancillary Projects** – Any ancillary work done during this project will be accomplished with the concurrence of the Chief Scientist and on a not-to-interfere basis with the programs described in these instructions and in accordance with the ***NOAA Fleet Standing Ancillary Instructions***.

6.3 **Piggyback Projects** – None

7.0 HAZARDOUS MATERIALS

HAZARDOUS MATERIALS – All scientific staff on board **NOAA Ship *MILLER FREEMAN*** for this cruise have been properly trained for spill response and may be contacted in the event of an accidental spill.

7.1 **Inventory**

Chemical	Number of Vials	Total Amount	Neutralizer	Respondee
Formaldehyde, 37%	3 x 20-l Buckets	60-l	Spill Kit	Busby
Sodium Borate	1 x 500.0-g	500.0-g	Dust Pan/Water	Busby
Reagent Alcohol, 95%	1 x 20-l Carboy	20-l	3-M Sorbent Pads	Busby
Saturated Sodium Borate Solution	1 x 20-l Carboy	20-l	See Note	Busby

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.pmc.noaa.gov/phone.htm

8.2 Important Telephone and Facsimile Numbers and E-mail Addresses

8.2.1 Pacific Marine Environmental Laboratory (PMEL):

FOCI – Ocean Environmental Research Division (OERD2):
- (206) 526-4700 (voice)
- (206) 526-6485 (fax)

Administration:
- (206) 526-6810 (voice)
- (206) 526-6815 (fax)

E-Mail: FirstName.LastName@noaa.gov

8.2.2 Alaska Fisheries Science Center (AFSC):

FOCI – Resource Assessment and Conservation Engineering (RACE):
- (206) 526-4171 (voice)
- (206) 526-6723 (fax)

E-Mail: FirstName.LastName@noaa.gov

8.2.3 NOAA Ship *MILLER FREEMAN* – Telephone methods listed in order of increasing expense:

Homeport – Seattle, Washington:
- (206) 553-4589
- (206) 553-4581
- (206) 553-8344

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: FirstName.LastName@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"	
20-cm Bongo Frame	1	8" x 14" x 16"	
CalVET Frame	1	24" x 18" x 18"	5-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

9.2 Tables

MF-02-06 Station Locations

Operations	Station Number	Latitude	Longitude	Decimal Latitude	Decimal Longitude
Depart Dutch Harbor, Alaska		53° 54.498' N	166° 30.900' W	53.90830	-166.51500
BM1	1	54° 00.661' N	166° 35.418' W	54.01101	-166.59030
BM4	2	54° 13.850' N	166° 47.634' W	54.23083	-166.79390
BJ4	3	54° 21.011' N	166° 24.882' W	54.35018	-166.41470
BJ1	4	54° 07.822' N	166° 12.624' W	54.13036	-166.21040
BG1	5	54° 14.983' N	165° 49.770' W	54.24971	-165.82950
BG4	6	54° 28.172' N	166° 02.058' W	54.46953	-166.03430
BD4	7	54° 35.333' N	165° 39.174' W	54.58888	-165.65290
BD1	8	54° 22.144' N	165° 26.844' W	54.36906	-165.44740
Unimak Pass A	9	54° 19.782' N	165° 24.432' W	54.32970	-165.40720
Unimak Pass B	10	54° 20.952' N	165° 20.952' W	54.34920	-165.34920

Operations	Station Number	Latitude	Longitude	Decimal Latitude	Decimal Longitude
Unimak Pass C	11	54° 22.290' N	165° 17.058' W	54.37150	-165.28430
Unimak Pass D	12	54° 23.778' N	165° 13.122' W	54.39630	-165.21870
Unimak Pass E	13	54° 24.900' N	165° 09.012' W	54.41500	-165.15020
Unimak Pass F	14	54° 26.142' N	165° 05.292' W	54.43570	-165.08820
Unimak Pass G	15	54° 27.642' N	165° 00.828' W	54.46070	-165.01380
BA1	16	54° 29.305' N	165° 03.852' W	54.48841	-165.06420
BA4	17	54° 42.494' N	165° 16.218' W	54.70823	-165.27030
AX4	18	54° 49.655' N	164° 53.190' W	54.82758	-164.88650
AU4	19	54° 56.816' N	164° 30.096' W	54.94693	-164.50160
AR4	20	55° 03.977' N	164° 06.936' W	55.06628	-164.11560
AO4	21	55° 11.138' N	163° 43.704' W	55.18563	-163.72840
AL4	22	55° 18.299' N	163° 20.400' W	55.30499	-163.34000
AI4	23	55° 25.460' N	162° 57.024' W	55.42434	-162.95040
AF4	24	55° 32.621' N	162° 33.582' W	55.54369	-162.55970
AC7	25	55° 52.971' N	162° 22.794' W	55.88285	-162.37990
AF7	26	55° 45.810' N	162° 46.272' W	55.76350	-162.77120
AI7	27	55° 38.649' N	163° 09.678' W	55.64415	-163.16130
AL7	28	55° 31.488' N	163° 33.018' W	55.52480	-163.55030
AO7	29	55° 24.327' N	163° 56.280' W	55.40545	-163.93800
AR7	30	55° 17.166' N	164° 19.476' W	55.28610	-164.32460
AU7	31	55° 10.005' N	164° 42.600' W	55.16675	-164.71000
AX7	32	55° 02.844' N	165° 05.658' W	55.04740	-165.09430
BA7	33	54° 55.683' N	165° 28.644' W	54.92805	-165.47740
BD7	34	54° 48.522' N	165° 51.564' W	54.80870	-165.85940
BG7	35	54° 41.361' N	166° 14.412' W	54.68935	-166.24020
BJ7	36	54° 34.200' N	166° 37.200' W	54.57000	-166.62000
BM7	37	54° 27.039' N	166° 59.916' W	54.45065	-166.99860
BM10	38	54° 40.228' N	167° 12.270' W	54.67047	-167.20450
BJ10	39	54° 47.389' N	166° 49.584' W	54.78982	-166.82640
BG10	40	54° 54.550' N	166° 26.838' W	54.90917	-166.44730
BD10	41	55° 01.711' N	166° 04.020' W	55.02852	-166.06700
BA10	42	55° 08.872' N	165° 41.142' W	55.14787	-165.68570
AX10	43	55° 16.033' N	165° 18.192' W	55.26722	-165.30320
AU10	44	55° 23.194' N	164° 55.176' W	55.38657	-164.91960
AR10	45	55° 30.355' N	164° 32.088' W	55.50592	-164.53480
AO10	46	55° 37.516' N	164° 08.928' W	55.62527	-164.14880
AL10	47	55° 44.677' N	163° 45.702' W	55.74462	-163.76170
AI10	48	55° 51.838' N	163° 22.404' W	55.86397	-163.37340
AF10	49	55° 58.999' N	162° 59.034' W	55.98332	-162.98390

Operations	Station Number	Latitude	Longitude	Decimal Latitude	Decimal Longitude
AC10	50	56° 06.160' N	162° 35.598' W	56.10267	-162.59330
AC13	51	56° 19.349' N	162° 48.474' W	56.32249	-162.80790
AC16	52	56° 32.539' N	163° 01.428' W	56.54231	-163.02380
AC19	53	56° 45.728' N	163° 14.454' W	56.76213	-163.24090
AI19	54	56° 31.406' N	164° 01.020' W	56.52343	-164.01700
AO19	55	56° 17.084' N	164° 47.304' W	56.28473	-164.78840
AU19	56	56° 02.761' N	165° 33.312' W	56.04602	-165.55520
AX16	57	55° 42.412' N	165° 43.470' W	55.70686	-165.72450
AR16	58	55° 56.734' N	164° 57.516' W	55.94556	-164.95860
AL16	59	56° 11.056' N	164° 11.056' W	56.18426	-164.18426
AF16	60	56° 25.378' N	163° 24.786' W	56.42296	-163.41310
AF13	61	56° 12.188' N	163° 11.874' W	56.20314	-163.19790
AI13	62	56° 05.027' N	163° 35.202' W	56.08379	-163.58670
AL13	63	55° 57.866' N	163° 58.458' W	55.96444	-163.97430
AO13	64	55° 50.705' N	164° 21.648' W	55.84509	-164.36080
AR13	65	55° 43.544' N	164° 44.766' W	55.72574	-164.74610
AU13	66	55° 36.383' N	165° 07.812' W	55.60639	-165.13020
AX13	67	55° 29.222' N	165° 30.798' W	55.48704	-165.51330
BA13	68	55° 22.061' N	165° 53.706' W	55.36769	-165.89510
BD13	69	55° 14.900' N	166° 16.548' W	55.24834	-166.27580
BG13	70	55° 07.739' N	166° 39.330' W	55.12899	-166.65550
BJ13	71	55° 00.578' N	167° 02.040' W	55.00964	-167.03400
BM13	72	54° 53.417' N	167° 24.684' W	54.89029	-167.41140
BP13	73	54° 46.256' N	167° 47.262' W	54.77094	-167.78770
BP10	74	54° 33.067' N	167° 34.884' W	54.55112	-167.58140
BP7	75	54° 19.878' N	167° 22.572' W	54.33130	-167.37620
BP4	76	54° 06.689' N	167° 10.320' W	54.11148	-167.17200
Arrive Dutch Harbor, Alaska		53° 54.498' N	166° 30.900' W	53.90830	-166.51500

9.3 Figures

MF02-06
Copy Date: 3/25/02
Chief Scientist: Morgan Busby