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Seattle, Washington 98115-0070

August 9, 2004 F/AKC2: mg

**Commanding Officer**  
**NOAA Ship *Miller Freeman***

**CRUISE INSTRUCTIONS: MF2004-09, FISHERY INTERACTION STUDY: ACOUSTIC-TRAWL SURVEY OF WALLEYE POLLOCK OFF THE EAST SIDE OF KODIAK ISLAND, GULF OF ALASKA**

1.0 SCHEDULE - AREA OF OPERATIONS

1.1 Scientists from the Alaska Fisheries Science Center (AFSC) will conduct an echo integration-trawl (EIT) survey of walleye pollock (*Theragra chalcogramma*) off the east side of Kodiak Island. The cruise will begin and end in Kodiak, Alaska. The work will be conducted while aboard the NOAA ship *Miller Freeman* during August 13-September 6, 2004, for a total of 24 sea days. However, if a sphere calibration is not conducted at the end of mf0408, one will be conducted at the start of mf0408 and an additional sea day will be added to the cruise. Survey efforts will begin in Chiniak Trough and continue in Barnabas Trough. Commercial trawling operations will be excluded from these troughs during Leg 1 and occur in only Barnabas Trough during Leg 2. Depending on commercial fleet timing, the break between legs could range from a personnel transfer to an inport.

1.2 The area of operation is in Chiniak and Barnabas Troughs in the Gulf of Alaska (Fig. 1).

2.0 VESSEL ITINERARY<sup>1</sup>

Aug 13	Embark scientists; depart at 0800
Aug 13	Sphere calibration in a site TBD (e.g. Kalsin Bay or Izhut Bay) if a calibration is not performed at the end of mf0408
Aug 14-24	EIT surveys of Chiniak and Barnabas Troughs
Aug 24	Arrive Kodiak, AK; end of leg 1
Aug 26-Sep 5	Depart Kodiak; EIT surveys of Chiniak and Barnabas Troughs;
Sep 5	Sphere calibration in Ugak Bay
Sep 6	Arrive Kodiak at 0900; disembark scientists; end of cruise

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<sup>1</sup>Dates are tentative based on the following: (1) whether a sphere calibration is conducted at the beginning of Leg 1; and (2) the duration of the mid-leg break, which is dependent upon the timing to the commercial pollock fishery.

### 3.0 SCIENTIFIC OBJECTIVES

The principal objectives of the cruise are to:

- 3.1 Collect echo integration data and midwater and demersal trawl data necessary to determine the distribution, biomass, and biological composition of walleye pollock in Chiniak and Barnabas Troughs;
- 3.2 collect pollock target strength data using hull-mounted and lowered transducers for use in scaling echo integration data to estimates of absolute abundance;
- 3.3 calibrate the 18-kHz, 38-kHz, 120-kHz, and 200-kHz scientific acoustic systems using standard sphere techniques;
- 3.4 collect physical oceanographic data including temperature and salinity profiles at selected sites, and conduct continuous monitoring of sea surface parameters (e.g. temperature, salinity);
- 3.5 conduct field tests of an acoustically controlled opening and closing device installed on a frame fixed in the mouth of a trawl codend.

Secondary objectives of the cruise include acoustic data collection with a drifting buoy to determine the distribution and behavioral response of walleye pollock to ship and possibly trawl noise. Additional scientific research may be requested by AFSC and other investigators. Detailed descriptions of ancillary projects associated with this cruise will be provided as soon as possible. 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 EIT survey will take place during daylight hours which occur about 14-15 hours per day. During the remaining 9-10 hours, operations may include running portions of the EIT trackline during darkness, additional trawling, target strength data collection, sampling small fishes or zooplankton using fine mesh nets (e.g. Marinovich, Methot, or bongo nets), acoustic buoy deployments, physical oceanographic data collections, and ancillary scientific project activities. A plan-of-the-night describing the ensuing nighttime schedule of scientific operations will be submitted to the Field Operations Officer at the end of each day during the cruise.

4.2 Acoustic data will be collected along a series of parallel transects with the EK60 and EK500 echo integration system incorporating three centerboard-mounted transducers operating at 18, 38, 120, and 200 kHz. The vessel must not operate echo sounders and other acoustic instrumentation 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. If the 38-kHz transducer fails, it needs to be replaced with a backup unit. This may require the assistance of divers aboard the vessel although they will not be solely responsible for the job.

4.3 Parallel transect spacing for the survey area will be 3.0 nautical miles (nmi; Fig. 1). An electronic file of trackline endpoints (Table 1) will be provided to the Field Operations Officer. Ship speed is expected to average 11.5-12.0 knots in favorable weather conditions. Two complete passes will be conducted through each trough during Leg 1. During Leg 2, one complete pass will be conducted in Chiniak Trough, and 2 passes will be conducted in Barnabas Trough. Coordinates of trackline endpoints will be provided to the Field Operations Officer. Trackline modifications may be made based on observed distribution patterns. During leg 2, commercial fishing vessels will be conducting trawling operations in portions of Barnabas Trough. Course and speed will be maintained as much as possible through these areas. It may be necessary to conduct tows in these areas. The commercial fleet will be notified of the research survey plans prior to mf0409.

4.4 Standard survey operations require that an Aleutian wing trawl (AWT) with a 0.5 inch mesh codend liner (AWT) and poly Nor'eastern bottom (PNE) trawl with roller gear be loaded onto the net reels. Marinovich and Methot trawls may also be deployed and should be readily available. A restrictor cable will be used with the Marinovich trawl. Fishbuster doors will be used with all trawls. Trawl hauls will be conducted at any time based on occurrence of echosign. About 2-3 trawl hauls per 24-hour period are anticipated, although more frequent trawl sampling may occasionally be required.

4.5 Midwater and bottom trawl hauls will be made to identify selected echosign and provide biological data and samples of pollock. The scientist in charge will meet with the fishing officer prior to each trawl haul to discuss haul plans. Haul durations will be long enough to collect an adequate sample. Biological data collected from each haul will usually include species and sex compositions, length frequencies, whole fish and ovary weights, gonad maturities, and otoliths from selected species. Upon completion of the survey, the trawls will be removed from the net reels and stacked unless directed otherwise by the Chief Scientist.

4.6 Conductivity-temperature-depth (CTD) data will be collected with the vessel's Seabird SBE system at trawl locations and at other selected locations. Vertical temperature profiles may be collected at selected locations along transects by using expendable bathythermographs (XBT) and expendable CTDs. Profiles of tow depth and water temperature will be obtained at all haul sites using a small, retrievable micro bathythermograph (Sea-Bird SBE39 temperature and pressure recorder) attached to the trawl headrope. Temperature/salinity/depth data will be collected at calibration (and other selected) sites with the ship's Seabird CTD system.

4.7 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.

4.8 Target strength data for several species will be collected on an opportunistic basis. Certain conditions (i.e., low fish densities, single species, and unimodal size composition) are required for this work to be successful. Collection of target strength data typically involves repeated passes over an aggregation of fish at a vessel speed of approximately 3-5 knots. One or two trawl hauls are made to provide species composition and biological data. Whenever calm seas are encountered along with the above-mentioned conditions, a second approach at collecting target strength data may be attempted. With the vessel stopped, a 38-kHz transducer will be lowered to a depth just above the fish sign for data collection using the lowered-transducer winch assembly.

4.9 A standard sphere calibration of the centerboard-mounted and lowered scientific acoustic systems will be conducted at the end of the cruise at a location to be determined. This work requires anchoring the vessel at the stern and bow, then suspending a calibration sphere assembly directly beneath the vessel's centerboard. A CTD cast will be conducted at this site immediately after the vessel has anchored. Also, if a sphere calibration is not conducted at the end of mf0408, one will be conducted at the start of mf0408 at a location to be determined.

4.10 A buoy filled with echosounding equipment may be deployed and recovered during the survey on an opportunistic basis. The duration that the buoy is at liberty will vary between 2-6 hours. Detailed discussions of each buoy deployment will occur between the scientist in charge and the field operations officer immediately before each deployment. After the buoy is released and the buoy trajectory is determined, the vessel will steam 1-2 nmi from the buoy and maintain that distance. The scientist in charge will then notify the bridge to begin free-running or possibly trawling operations along a course that will take the vessel as close as possible past the buoy and perpendicular to the buoy trajectory. The vessel will continue steaming until 1-2 nmi past the buoy. During each event, the estimated distance at the closest point of approach (CPA) between the buoy and vessel, time of CPA, and vessel speed will be recorded by a scientist stationed on the bridge to assist where needed. Time and location of the buoy deployment/recovery, as well as bottom depths at these locations will need to be recorded in the MOA. Nearly continuous visual and radar fixes will be taken on the buoy after it is deployed. Because the acoustic buoy operates at 38 kHz, the vessel must not operate other echo sounders or acoustic equipment, which may interfere with collection of scientific acoustic data (e.g., the Furuno net sonde should not be used on the trawl).

## 5.0 SCIENTIFIC PERSONNEL

5.1 The principal investigator is Dr. Chris Wilson and can be contacted at (206) 526-6435 by phone, [Chris.Wilson@noaa.gov](mailto:Chris.Wilson@noaa.gov) by email, or (206) 526-6723 by FAX.

5.2 The Chief Scientist has authority to revise or alter technical portions of the instructions provided that after consultation with the Commanding Officer, it is ascertained that the proposed changes will not: 1)

jeopardize the safety of personnel on the ship; 2) exceed the time allotted for the project; 3) result in undue additional expense; or 4) alter the general intent of the cruise instructions.

5.3 All scientific personnel are required to have a 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:

<u>Name</u>	<u>Sex/ Nationality</u>	<u>Position</u>	<u>Organization</u>
<u>Leg 1:</u>			
Chris Wilson	M/USA	Chief Scientist	AFSC
Michael Guttormsen	M/USA	Fish. Biologist	AFSC
Libby Logerwell	F/USA	Fish. Biologist	AFSC
Tyler Yasenak	M/USA	Fish. Biologist	AFSC
Sandi Neidetcher	F/USA	Fish. Biologist	AFSC
Renata Delellis	F/USA	Teacher at Sea	OLA
Torrie Richardson	M/USA	Student Intern	UW
Robyn Redekopp	F/USA	Student Intern	UW
Kathryn Sweeney	F/USA	Student Intern	UW

Leg 2:

Chris Wilson	M/USA	Chief Scientist	AFSC
Michael Guttormsen	M/USA	Fish. Biologist	AFSC
Libby Logerwell	F/USA	Fish. Biologist	AFSC
Anne Hollowed	F/USA	Fish. Biologist	AFSC
Tyler Yasenak	M/USA	Fish. Biologist	AFSC
Sandi Neidetcher	F/USA	Fish. Biologist	AFSC
Bill Floering	M/USA	Fish. Biologist	AFSC
Alex de Robertis	M/USA	Fish. Biologist	AFSC
Steve Barbeaux	M/USA	Fish. Biologist	AFSC

AFSC - Alaska Fisheries Science Center, Seattle, WA

OLA - NOAA Office of Legislative Affairs, Teachers at Sea Program, Wash DC

UW - University of Washington, Seattle, WA

6.0 EQUIPMENT

6.1 All gear is already aboard the ship with the exception of 2 poly nor'eastern trawls and the acoustic buoy. The loading schedule of these items will be arranged with the Field Operations Officer.

6.2 Acoustic Equipment	Quantity	Vessel	Project
Acoustic system in lab	1	--	X
Simrad EK60 system	1	--	X
Backup EK500 system	1	--	X
Simrad ES18 transducer	2	--	X
Simrad ES38 transducer	2	--	X
Simrad ES38D transducer	1	--	X
Simrad ES120 transducer	1	--	X
Simrad ES200 transducer	1	--	X

Standard target & suspension assembly	*	--	X
Winch, cable & block	*	--	X
Acoustic buoy equipment	*	--	X
GPS (with NEMA 183 to EK500)	2	X	--
<b>6.3 Trawling Equipment<sup>1</sup></b>	<b>Quantity</b>	<b>Vessel</b>	<b>Project</b>
Aleutian wing trawl with accessories (e.g., 1.25" and 0.5" mesh liners)	2	--	X
Marinovich trawl w/restrictor	1	--	X
Poly nor'eastern trawl w/roller gear	2	--	X
Dandylines (10 fm x ½ in.)	*	--	X
Dandylines (30 fm x 5/8 in.)	*	--	X
Fishbuster doors with accessories	2 sets	--	X
Methot net with accessories	1	--	X
Scanmar depth sensor	2	--	X
Spare webbing & twine	*	--	X
Spare hardware	*	--	X
Opening/closing codend and accessories	1	--	X
3rd wire Wes Mar net sonar w/winch and accessories	1	X	--
Furuno headrope transducer	3	X	--
Tom weights (500 lbs. each)	4	--	X
Tom weights (250 lbs. each)	4	--	X
EQ50 Bridge sounder (50/38 kHz)	1	X	--
Miscellaneous supplies	*	--	X
<b>6.4 Oceanographic Equipment</b>	<b>Quantity</b>	<b>Vessel</b>	<b>Project</b>
Seabird CTD System	3	--	X
ADCP with PC computer	*	X	--
Seabird SBE39	2	--	X
<b>6.5 Biological Sampling Equip.</b>	<b>Quantity</b>	<b>Vessel</b>	<b>Project</b>
Catch sorting and weighing table	1	X	--
Dynamometer	1	--	X
Marel M60 60 kg scale (electr.)	2	--	X
Fish baskets	30	--	X
Marel M60 6kg scale (electr.)	2	--	X
Ethanol (gallons)	*	--	X
Formalin (gallons)	*	--	X
Biological supplies (misc.)	*	--	X
<b>6.6 Computing equipment</b>	<b>Quantity</b>	<b>Vessel</b>	<b>Project</b>
IBM compatibles (w/NT Op.System)	*	--	X
SUN workstations	3	--	X
Printers	*	--	X
Iomega JAZ drive	1	--	X
QD2120 magnetic tapes	6	--	X
Trawl house computer monitor	1	--	X

Magnetic tapes (8mm)	2	--	X
Scientific Computing System (SCS)	1	X	--
Fisheries Scientific Computer System (FSCS)	1	X	--

Note: "\*" indicates amount not specified.

<sup>2</sup> Trawling equipment specifications may be updated prior to the cruise.

6.7 The Chief Scientist shall be responsible for complying with NC Instruction 6280B, Hazardous Materials and Hazardous Waste Policy, Guidance, and Training, dated May 8, 1991. By federal law, the ship may not sail without a complete inventory of 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. When loading the materials, the chief scientist is required to provide an inventory of those materials actually brought aboard.

## 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 MACE. 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 Fisheries Scientific Collection System (FSCS) operates using the ships computers (i.e., workstation and servers) to record SCS and biological sample data. Access to the workstation and servers by MACE staff is requested to update working files and to download data.

7.3 The data set requested by the Chief Scientist from the ship's officers will include the following:

- 7.3.1 ASCII files from the SCS of all operations logged during the cruise.
- 7.3.2 Backup media (e.g., compact disks) with all sensor data logged to the Scientific Computer System (SCS).
- 7.3.3 ADCP daily log forms and ASCII files of daily thermosalinograph data; Compact disks containing ADCP configuration file and pingdata files.

7.4 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 who desire copies.

7.5 Operational Reports: Pertinent reports per PMC 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 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 AFSC and the *Miller Freeman*. Radio contact will be maintained when possible. A scientific progress report will be sent to AFSC via email, the marine operator, Rapifax, JFT, or other means when requested by the Chief Scientist. An AFSC cellular telephone will be used for scientific communications where possible.

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 (both single side band and VHF) 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 INMARSAT (a telephone/teletype satellite communication system) cellular telephone service 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 \$4.00 per minute for telex. Cellular telephone calls cost an

estimated \$0.90 per minute for air time, plus any applicable long-distance charges billed to the ship's number. Rapifax will be available to scientists at the estimated \$6.02 voice rate. The Rapifax is used quite often by scientific personnel and 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 the Marine Operations Center, Pacific, Seattle, Washington, a ship base supporting the west coast vessel operations of the NOAA corp. The INMARSAT telephone numbers for contacting the vessel at sea are as follows:

INMARSAT B voice 011-872-330-394-120  
INMARSAT B fax 011-872-330-394-121  
INMARSAT M voice 011-872-761-267-346 &347  
INMARSAT M fax 011-872-761-267-348  
Irridium 011-8816-7631-5684

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

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Rear Adm. Nicholas A. Prahl  
Director, Marine Operations  
Center

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Dr. Doug DeMaster  
Science and Research Director  
Alaska Region  
206-526-4000

List of potential species to be sampled (based on results from the August-September 2002 acoustic-trawl survey of Chiniak and Barnabas Troughs off Kodiak Island).

Species	Numbers	Species	Numbers
Capelin	88,575	Smooth lumpsucker	9
Walleye pollock	70,775	Chum salmon	9
Arrowtooth flounder	4,905	Sun sea star	8
Shrimp unident.	4,818	Starry flounder	8
Eulachon	1,880	Wattled eelpout	7
Pandalus borealis	1,795	Sea anemone unident.	7
Flathead sole	1,401	Hermit crab unident.	7
Jellyfish unident.	631	Blackmouth eelpout	6
Pacific cod	354	Pacific ocean perch	5
Sidestripe shrimp	286	Fusitriton oregonensis	5
Sculpin unident.	286	Bering skate	5
Chionoecetes bairdi	252	Snail unident.	4
Rex sole	230	Shortraker rockfish	4
Pacific halibut	178	Scallop unident.	4
Loligo opalescens	153	Daubed shanny	4
Sturgeon poacher	145	Starfish unident.	3
Chinook salmon	142	Pygmy poacher	3
Squid unident.	137	Crangon sp.	3
Northern shrimp	112	Careproctus sp.	3
Ctenodiscus crispatus	91	Bigmouth sculpin	3
Butter sole	86	Sea cucumber unident.	2
Isopod unident.	76	Scissortail sculpin	2
Ctenodiscus sp.	69	Light dusky rockfish	2
Dover sole	59	Fish larvae unident.	2
Snailfish unident.	56	English sole	2
Flatfish larvae	42	Coho salmon	2
Pacific herring	41	Weathervane scallop	1
Rougheye rockfish	34	Triglops pingeli	1
Yellow Irish lord	31	Shortspine thornyhead	1
Pacific sandfish	31	Sea pen unident.	1
Eelpout unident.	30	Sawback poacher	1
Rock sole sp.	29	Pycnopodia helianthoides	1
Pacific sand lance	28	Octopus unident.	1
Longnose skate	22	Natica sp.	1
Dasyctotus setiger	21	Hyas lyratus	1
Gastropod unident.	20	Great sculpin	1
Myoxocephalus polyacanthocephæ	17	Darkfin sculpin	1
Spinyhead sculpin	13	Berryteuthis magister	1
Sablefish	12	Bathyraja parmifera	1
Shortfin eelpout	10	Aleutian skate	1
Prowfish	10	Alaska skate	1

Table 1. MF0409 waypoints.

**Chiniak Trough**

Latitude	Longitude	Waypoint
57° 44.642 N	152° 21.120 W	1.0
57° 42.901 N	152° 24.164 W	1.1
57° 40.996 N	152° 19.818 W	2.0
57° 47.995 N	152° 07.570 W	2.1
57° 48.509 N	151° 59.036 W	3.0
57° 39.654 N	152° 14.472 W	3.1
57° 40.497 N	152° 05.336 W	4.0
57° 47.334 N	151° 53.366 W	4.1
57° 43.897 N	151° 51.686 W	5.0
57° 34.670 N	152° 07.662 W	5.1
57° 32.727 N	152° 03.803 W	6.0
57° 40.929 N	151° 49.229 W	6.1
57° 40.526 N	151° 42.244 W	7.0
57° 31.806 N	151° 57.423 W	7.1
57° 29.869 N	151° 53.400 W	8.0
57° 38.628 N	151° 37.901 W	8.1
57° 37.945 N	151° 31.435 W	9.0
57° 28.546 N	151° 47.840 W	9.1
57° 26.955 N	151° 43.303 W	10.0
57° 34.503 N	151° 29.763 W	10.1
57° 33.383 N	151° 24.053 W	11.0
57° 25.258 N	151° 38.211 W	11.1
57° 23.202 N	151° 34.244 W	12.0
57° 30.369 N	151° 21.661 W	12.1
57° 28.739 N	151° 16.921 W	13.0
57° 20.913 N	151° 30.440 W	13.1
57° 17.767 N	151° 28.929 W	14.0
57° 24.956 N	151° 13.253 W	14.1
57° 22.655 N	151° 09.679 W	15.0
57° 15.671 N	151° 25.109 W	15.1
57° 11.673 N	151° 25.455 W	16.0
57° 17.617 N	151° 12.253 W	16.1
57° 15.280 N	151° 08.701 W	17.0
57° 09.035 N	151° 22.350 W	17.1

Table 1. Continued.

**Barnabas Trough**

Latitude	Longitude	Waypoint
56° 49.468 N	151° 59.969 W	201.0
56° 39.911 N	152° 43.477 W	201.1
56° 43.298 N	152° 42.870 W	202.0
56° 49.630 N	152° 14.578 W	202.1
56° 52.404 N	152° 16.100 W	203.0
56° 46.061 N	152° 45.094 W	203.1
56° 48.835 N	152° 47.136 W	204.0
56° 55.148 N	152° 17.192 W	204.1
56° 58.180 N	152° 19.406 W	205.0
56° 51.211 N	152° 51.238 W	205.1
56° 53.595 N	152° 55.320 W	206.0
57° 01.507 N	152° 19.308 W	206.1
57° 04.680 N	152° 19.300 W	207.0
56° 53.963 N	153° 08.204 W	207.1
56° 56.146 N	153° 13.287 W	208.0
57° 07.735 N	152° 20.440 W	208.1
57° 10.733 N	152° 21.095 W	209.0
57° 03.864 N	152° 52.580 W	209.1
57° 07.191 N	152° 52.313 W	210.0
57° 14.173 N	152° 20.727 W	210.1
57° 17.093 N	152° 22.263 W	211.0
57° 11.086 N	152° 49.479 W	211.1
57° 13.450 N	152° 50.250 W	tp
57° 13.010 N	152° 55.365 W	212.0
57° 20.627 N	152° 20.343 W	212.1
57° 23.419 N	152° 22.371 W	213.0
57° 20.541 N	152° 35.524 W	213.1
57° 24.916 N	152° 30.299 W	214.0
57° 23.689 N	152° 35.919 W	214.1
57° 24.897 N	152° 37.458 W	tp
57° 25.584 N	152° 42.220 W	215.0
57° 26.648 N	152° 37.344 W	215.1

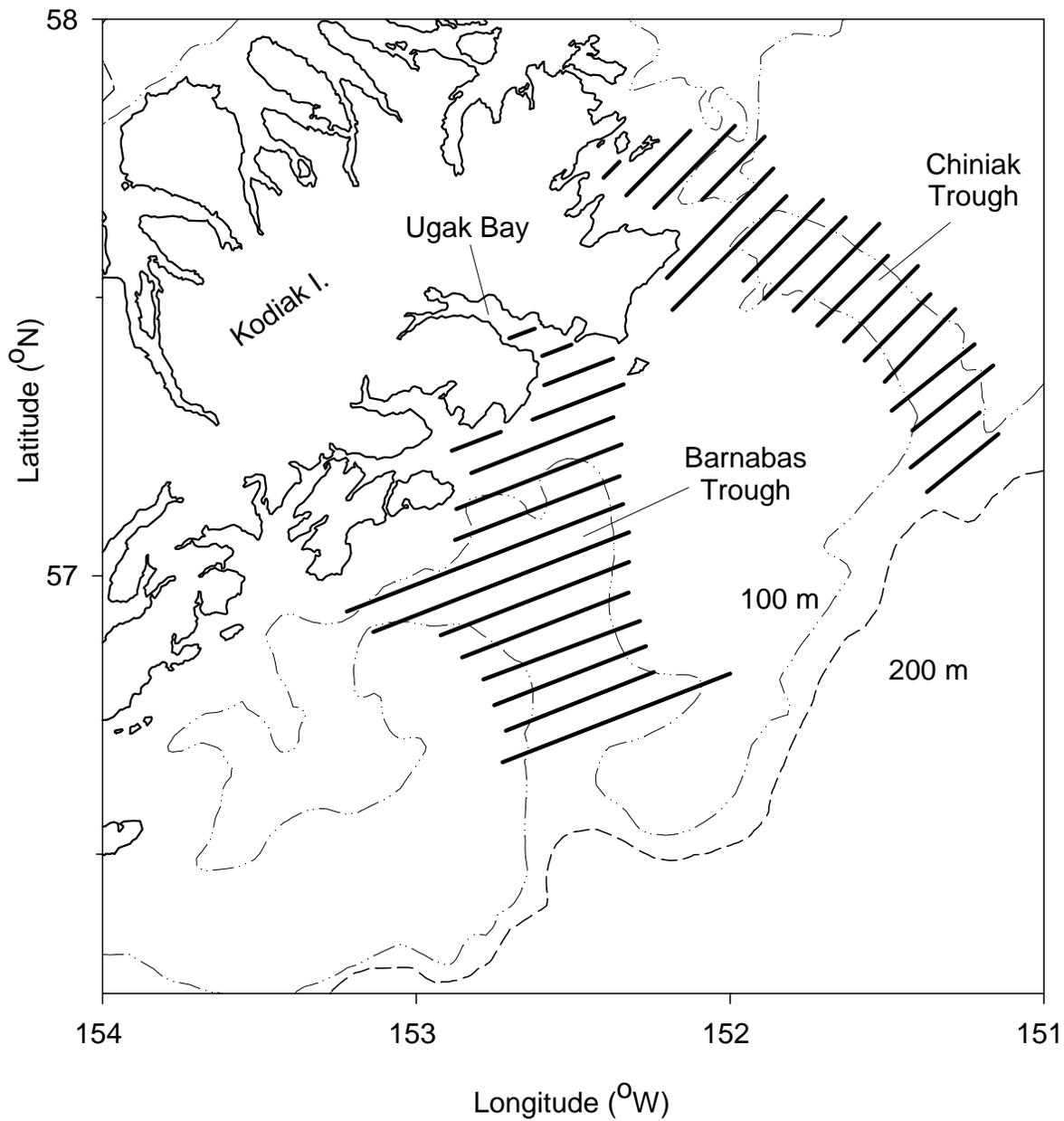


Figure 1. Proposed trackline for the August-September 2004 acoustic-trawl survey of walleye pollock off the east coast of Kodiak Island.