Alaska Fisheries Science Center
7600 Sand Point Way Northeast
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Seattle, Washington 98115-0070

1/23/2008

Commanding Officer

NOAA Ship *Oscar Dyson*

CRUISE INSTRUCTIONS: DY0802, ECHO INTEGRATION-TRAWL SURVEY OF WALLEYE POLLOCK IN THE CENTRAL ALEUTIAN ISLANDS

Chief Scientist: Elizabeth (Libby) Logerwell
NOAA/AFSC
Resource Ecology and Fisheries Management
Status of Stocks and Multispecies Assessment (SSMA)

1.0 SCHEDULE - AREA OF OPERATIONS

Scientists from the Alaska Fisheries Science Center (AFSC), REFM Division, SSMA Program will conduct an echo integration-trawl (EIT) survey of walleye pollock (*Theragra chalcogramma*) in the central Aleutian Islands from Seguam Pass to the Tanaga Island area (extending to Delarof Islands if time permits)aboard the NOAA ship *Oscar Dyson* from 16 February to 3 March for a total of 16 sea days (see figure in Appendix 1). The cruise will begin in Dutch Harbor and end in Kodiak, Alaska.

2.0 VESSEL ITINERARY

Feb 16	Embark scientists in Dutch Harbor.
Feb 16-17	Transit to survey start Seguam Pass.
Feb 17-27	Echo integration-trawl survey of the central Aleutian Islands. Survey end at Tanaga Island (or Delarof Islands if time permits).
Feb 28-Mar 1	Transit to Dutch Harbor. Scientists debark.
March 2-3	Transit to Kodiak.

3.0 SCIENTIFIC OBJECTIVES

The primary objectives of the cruise are to:

3.1 collect echo integration data and trawl data necessary to determine the distribution, biomass, and biological composition of walleye pollock in the central Aleutian Islands between Seguam Pass and the Tanaga Island area (if time permits the survey will be extended to the Delarof Islands);

3.2 conduct Methot tows to groundtruth multi-frequency acoustic data on euphausiid distribution;

3.3 collect physical oceanographic data (temperature and salinity profiles) at selected sites (Appendix 2) with Niskin bottle water samples, and continuously collect sea surface temperature, salinity, oxygen, nitrate and fluorescence data;

3.4. conduct Bongo zooplankton tows at selected sites to collect samples of ichthyoplankton and zooplankton;

3.5 conduct midwater and bottom trawls to collect stomach specimens and gonads from selected species to elucidate key predator-prey relationships and spawning behavior in the Aleutian Islands;

3.6 conduct a seabird census survey. A U.S. Fish and Wildlife Service scientist will conduct this work (Appendix 3);

3.7 conduct marine mammal census surveys (killer whales and Steller sea lions). NMML scientist(s) will conduct this work (Appendix 4);

Secondary objectives of the cruise include scientific research 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 Seattle.

4.0 OPERATIONAL PLANS

To reduce vessel motion and thus improve the quality of the acoustic data, we request that the vessel use the roll tank when sea conditions warrant.

4.1 Survey operations will be conducted 24 hours per day. The primary EIT survey operations will be conducted during nighttime hours (approximately 12 hours per day), requiring participation of the deck crew and Survey Technician. Acoustic data will be collected continuously along a series of parallel transects with a Simrad ER60 echo integration system incorporating centerboard-mounted transducers at 18, 38, 70, 120, and 200 kHz. The vessel must not operate other echo sounders or acoustic equipment that interfere with collection of scientific acoustic data. The ADCP will be secured and not operated for

this cruise. The bow thrusters, Doppler speed log and bridge Furuno depth sounder should all be secured, as they degrade the quality of acoustic data. Transect spacing will be 2.5 nm, except in areas of anticipated high pollock biomass where transect spacing will be smaller, at 1.25 nm. Trackline waypoints are provided in Appendix 1. Trackline endpoints will be provided in an electronic file to the Field Operations Officer. On occasion, transects may be extended in the offshore direction, to assess the extent of the distribution of bathypelagic fishes (such as myctophids). The nearshore waypoints are as close as 0.75 nm to shore in some areas. The Chief Scientist will confer with Ship's command before the start of the cruise to discuss whether it will be feasible to occupy those waypoints. Ship speed is expected to average 11.0 to 12.0 knots in favorable conditions.

Daytime operations will occur regularly requiring participation of the deck crew and Survey Technician. These will include additional trawling, CTD casts, Bongo net tows, Methot net tows and other requested special scientific projects.

EIT survey operations require that an Aleutian wing trawl (AWT) and Poly Nor'eastern (PNE) bottom trawl with roller gear are loaded onto the net reels. Codend liner mesh size will be 0.5 in for the AWT and 1.25 in. for the bottom trawl. A second AWT and PNE will be stowed on board the vessel as backup gear. The backup AWT will be equipped with a 1.25-inch liner. Fishbuster doors will be used with all trawls. We request that the chief boatswain keep a trawl gear logbook to record any modifications made to trawl gear during the cruise. Small fishes and macrozooplankton will be sampled using the Methot trawl.

Midwater and bottom trawl hauls will be made to identify echo sign and provide pollock samples and other biological data. An average of 3-4 trawl hauls per 24 hrs is anticipated. On occasion, trawling will occur more frequently. Haul duration will be kept to the minimum necessary to ensure an adequate sample. A MOA button should be set up to mark trawl number, date, time, position and water depth at the following events: doors in, EQ, haul back, and doors up. Biological data collected from each haul will include species composition by weight and number, sex composition, length frequencies, whole fish and ovary weights, maturities, otoliths, stomachs and fin clips.

4.2 Midwater and bottom trawl hauls will also be made to collect stomachs for a detailed feeding ecology study and gonads for a reproductive biology study. Species to be targeted include walleye pollock and Pacific cod. The estimated average of 3-4 hauls per 24 hrs includes these hauls.

4.3 Methot trawls will be conducted to sample small fishes and macrozooplankton. The Methot trawl is deployed off the stern of the vessel. A Simrad ITI depth sensor will be used to receive real-time depth information. Where and when the trawl will be conducted depends on

the acoustic sign, most likely during daytime. Tows will likely be conducted from near bottom to the surface, although particular depth layers may be targeted. A MOA button should be set up to mark Methot number and the at-depth position, date, time, and bottom depth. See FOCI Standard Operating Instructions (SOI) for NOAA Ship Miller Freeman (attached) section 3.2.8 for specific requirements.

4.4 Conductivity-temperature-depth (CTD) data will be collected with the vessel's CTD/rosette system. CTDs will be deployed opportunistically throughout the survey, primarily during the day, at water depths from 100 to 200 meters. Additional CTD casts will be made at selected passes, shown on the figure in Appendix 2. In these areas, CTDs will be deployed at water depths around 100 to 200 meters and around 500 meters. CTD casts and Bongo tows will be made at the same stations whenever possible. Water samples will be collected from Niskin bottles deployed at the surface, 200 m and 500 m (for the deeper casts). Small Niskin bottles (<10-liters) may be used for this purpose. The samples will be filtered for chlorophyll and frozen for nutrients. In addition, water samples from the surface and bottom (one each in alternation from cast to cast) will be bottled for calibrating the conductivity/salinity sensor. All water samples (including salinity samples) will be transported back to AFSC for analysis. A MOA button should be set up to mark CTD number and the at-depth position, date, time, and bottom depth. A standard oceanographic watch is requested for CTD casts, which consists of a winch operator, a scientific staff of three and a Survey Tech on deck. See FOCI Standard Operating Instructions (SOI) for NOAA Ship Miller Freeman (attached) section 3.2.1 for specific requirements.

4.5 Temperature and depth profile data will be collected with a Seabird SBE39 micro-bathythermograph attached to the trawl headrope.

4.6 The Scientific Computing System (SCS) is configured to log data from various sensors during the cruise. Navigational and meteorological data will collected. Data on surface seawater temperature, salinity, oxygen, nitrate and fluorescence will also be collected from seachest sensors and sent to the SCS system. It is requested that collection of the oceanographic sensors data be synchronized with the navigational data so that the temperature, salinity, fluorescence, etc. data can be assigned the date, time and position it was collected. This can be accomplished by configuring the ship's SCS ASCII-logger feature to log one-minute averaged data including: GPS time, GPS position, water depth (m), seawater temperature, seawater salinity, fluorometer voltage, nitrate sensor data (ISI) and oxygen sensor data. See FOCI Standard Operating Instructions (SOI) for NOAA Ship Miller (attached) section 5.2 for specific requirements. AFSC scientists will collect water samples periodically to calibrate fluorescence, nutrient and oxygen sensors. Oxygen calibration samples will be analyzed on board by AFSC scientists using a titrator belonging to PMEL. The fluorescence and nutrient samples will be transported back to AFSC for analysis.

4.7 A 60-cm aluminum Bongo frame with 333-µm mesh nets, flow meters, hard plastic cod-ends, and a 40-kg lead weight for a depressor will be used to sample zooplankton and ichthyoplankton at selected locations. A 20-cm Bongo with 505-µm mesh nets will be deployed above the 60-cm frame on the same cable. Tows will be conducted to 400 m, or 10 meters off the bottom, whichever is shallowest. Three Bongo tows will be conducted each day, if possible, at three different depths: shallower than 200 m water depth, between 200 m and approx. 400 m water depth, and offshore of 400 m water depth. Bongo tows and CTD casts will be made at the same stations whenever possible. A MOA button should be set up to mark Bongo tow number, position, date, time and bottom depth when net is at surface, at-depth, and has returned to surface. A standard oceanographic watch is requested for plankton towing, which consists of a winch operator, a scientific staff of three and a Survey Tech on deck. See FOCI Standard Operating Instructions (SOI) for NOAA Ship Miller Freeman (attached) section 3.2.2 for specific requirements.

5.0 SCIENTIFIC PERSONNEL

5.1 The Chief Scientist is Libby Logerwell phone (206) 526-4231, email Libby.Logerwell@noaa.gov FAX 206-526-6723, AFSC, Seattle, WA.

5.2 The Chief Scientist has the authority to revise or alter the technical portions of the instructions provided that, after consultation with the Commanding Officer, it is ascertained that the proposed changes will not: 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 completed NOAA Health Services questionnaire aboard before embarking. Clearances are valid for 2 years for scientists under age 50 and 1 year for age 50 and over.

5.4 Scientific Staff:

Name	Sex/ Nationality	Position	Organization
Libby Logerwell	F/USA	Chief Scientist	AFSC
Steve Barbeaux	M/USA	Fish. Biologist	AFSC
Sandi Neidetcher	F/USA	Fish. Biologist	AFSC
Kim Rand	F/USA	Fish. Biologist	AFSC
Liz Conners	F/USA	Fish. Biologist	AFSC
Darin Jones	M/USA	Fish. Biologist	AFSC

Tamara Mills	F/USA	Seabird observer	USFW
Holly Fearnbach	F/USA	Mammal observer	NMML

AFSC - Alaska Fisheries Science Center, Seattle, WA
NMML – National Marine Mammal Laboratory
USFWS – U.S. Fish and Wildlife Service

6.0 EQUIPMENT

6.1 Scientific gear will be loaded and mounted onto the vessel prior to its departure from Seattle on 26 January 2008. The exact loading schedule will be arranged with the Field Operations Officer.

6.2 Acoustic Equipment	Quantity	Vessel	Project
Simrad ER60 system	1	--	X
Backup Simrad ER60 system	1	--	X
Simrad ES18 transducer	1	--	X
Simrad ES38B transducer	1	--	X
Simrad ES70 transducer	1	--	X
Simrad ES120-7C transducer	1	--	X
Simrad ES200-7C transducer	1	--	X
GPS (with NEMA 183 to ER60)	2	X	--
ES60 Bridge sounder (50/200 kHz)	1	X	--
Furuno FE-700 fathometer	1	X	--

6.3 Trawling Equipment[1]	Quantity	Vessel	Project
Aleutian wing trawl with accessories (e.g., 1.25" and 0.5" mesh liners)	2	--	X
Poly Nor'eastern bottom trawl with roller gear	2	--	X
Dandylines (10 fm x ½ in.)	*	--	X
Dandylines (30 fm x 5/8 in.)	*	--	X
Fishbuster door with accessories	2 set	--	X
Spare webbing & twine	*	--	X
Spare hardware	*	--	X
3rd wire Simrad FS-70 net sonar w/ winch and accessories	2	X	--
Simrad ITI net mensuration system	2	X	--
Furuno CN24-40 headrope transducer	1	X	--

Tom weights (500 lbs. each)	4 items	--	X
Tom weights (250 lbs. each)	4 items	--	X
Methot net with accessories	1	--	X
Miscellaneous supplies	*	--	X

6.4 Oceanographic Equipment	Quantity	Vessel	Project
Seabird CTD System	2	X	X
Seabird SBE39	2	--	X

6.5 Zooplankton Sampling Equip.	Quantity	Vessel	Project
60-cm Bongo Frame	1	--	X
20-cm Bongo Frame	1	--	X
Formaldehyde Containers, 20-l	1	--	X
Carboy, Saturated Sodium Borate	1	--	X
Glass Jars, 32-oz, cases	5	--	X
Glass Jars, 8-oz	5	--	X

6.5 Fish Sampling Equip.	Quantity	Vessel	Project
Fish lab conveyor system	1	X	--
Catch sorting and weighing table	1	X	--
Dynamometer (5000 kg scale)	2	--	X
Marel M60 60 kg scale (electr.)	2	--	X
Marel M60 6 kg scale (electr.)	2	--	X
Platform scale (mechanical)	2	--	X
Fish baskets	30	--	X
Storage freezer (-20°C)	1	X	--
Blast freezer (-80°C)	1	X	--
Buckets for stomach samples	12	--	X
Buckets for ovary samples	15	--	X
Biological supplies (misc.)	*	--	X
Formaldehyde (liters)	23	--	X

6.6 Computing equipment	Quantity	Vessel	Project
IBM compatibles (w/XP Op.System)	*	--	X
Dell PowerEdge MACEBASE Server	1	--	X
Printers	*	--	X
Scientific Computing System (SCS)	1	X	--

Fisheries Scientific Computer System (FSCS)	1	X	X

Note: "*" indicates amount not specified.

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

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

http://205.156.48.106/

By federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name, and the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, and/or absorbents in amounts adequate to address spills of a size equal to the amount of chemicals brought aboard, and a chemical hygiene plan. The Chief Scientist shall account for the amount of hazardous material arriving and leaving the vessel. See Appendix 5 for HAZMAT Inventory.

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 REFM scientists. An appropriate logging interval (possibly every 30 seconds) will be used for automated track position data. Events to be recorded are described above for specific operations. Additional events to be logged will be decided at the beginning of the cruise. Globe software will be available to log operations data as a backup. All times should be recorded as Greenwich Mean Time (GMT).

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

7.2.1 Electronic files (MOA) from the SCS of all operations logged during the cruise.

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

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

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

7.5 Additional Reporting: Any injuries or fatalities to, or incidental catch of, marine mammals as a result of activities of this project, shall be reported within 24 hours to Robyn Angliss, Deputy Director, National Marine Mammal Laboratory, at 206-526-4032, e-mail robyn.angliss@noaa.gov.

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 the AFSC and the ***Oscar Dyson***. Radio contact will be maintained when possible. A scientific progress report will be sent to AFSC via email or other means when requested by the Chief Scientist. 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 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 ***Oscar Dyson*** is equipped with Iridium, Wavetalk, INMARSAT (a telephone/ teletype satellite communication system), and Rapifax. The scientific staff will be obligated to pay for any incoming or outgoing calls on these systems. Iridium is estimated at about $0.34/minute. INMARSAT is estimated at $6.02 per minute for voice and $4. per minute for telex. Rapifax will be available to scientists at the estimated $6.02 voice rate. Because the Rapifax is often used by scientific personnel, it is considered essential for successful operations.

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

The ***Oscar Dyson's*** home port is Kodiak, Alaska. The telephone numbers for contacting the vessel are as follows:

Wavetalk:
1-800-668-4950 – toll free

IRIDIUM voice 011-881-676-310-050
INMARSAT B 011-872-336 995 910 (Voice Line 1)

INMARSAT B 011-872-336 995 920 (Voice Line 2)
INMARSAT B 011-872-336 995 911 (Fax)

While the ship is at sea, email (text only) to scientific personnel should be addressed to ChiefSci.Oscar.Dyson@noaa.gov

For further vessel specifications, please visit the Oscar Dyson website http://www.moc.noaa.gov/od/

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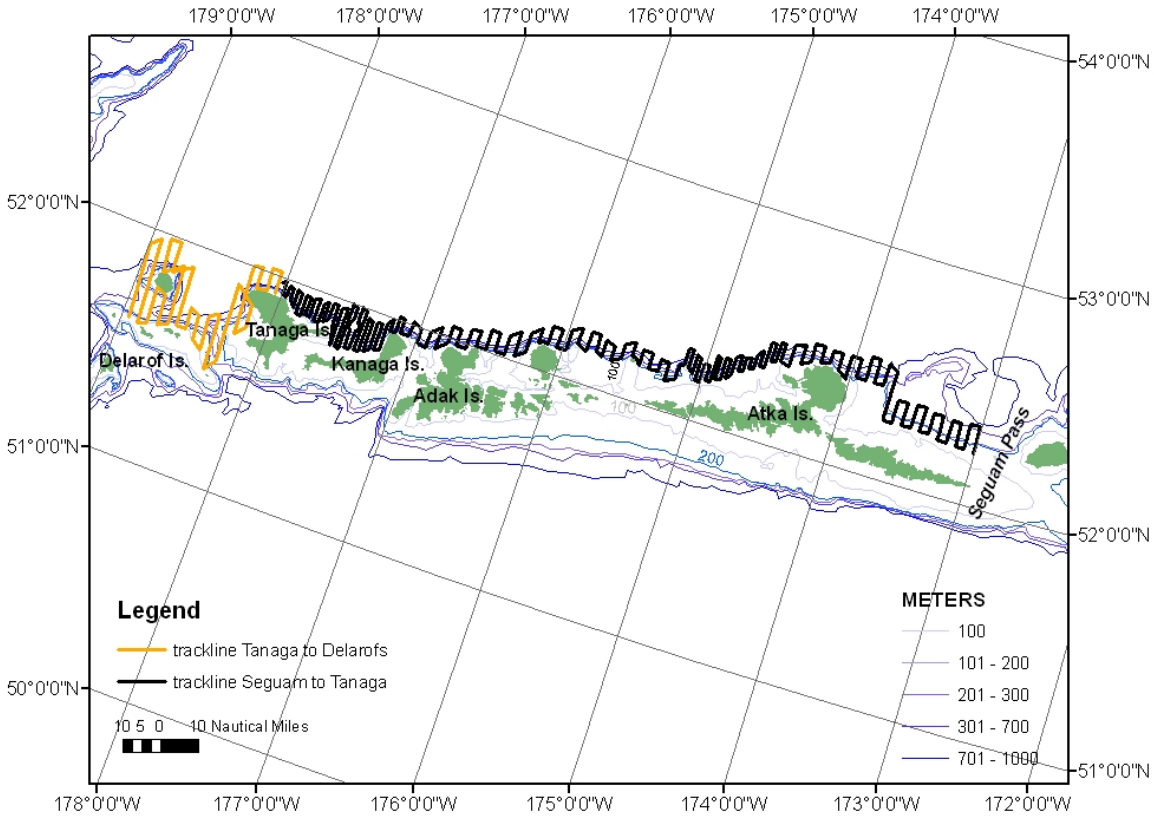
CAPT Michele G. Bullock, NOAA	Dr. Doug DeMaster
Commanding Officer	Science and Research Director
Marine Operations Center, Pacific	Alaska Fisheries Science Center
	206-526-4000

APPENDIX 1

Survey Tracklines



Survey transects for DY0802. Black lines show primary transects from Seguam Pass to Tanaga Island. Orange lines show additional transects to the Delarof Islands (if time permits). Depth contours in meters are also shown.

Trackline waypoints for DY0802, Seguam Pass to Tanaga Island. Latitude and Longitude in decimal degrees. Cells in orange indicates waypoints to extend survey to the Delarof Islands, if time allows. See figure above.

WAYPOINT	Latitude	Longitude
1	53.86818	-166.597
2	54.02228	-166.509
3	54.06702	-166.881
4	53.8481	-167.624
5	53.5663	-167.624
6	53.64947	-168.181
7	53.27433	-169.264
8	52.94858	-169.265
9	53.20325	-169.766
10	52.0984	-172.611
11	52.23272	-173.008
12	52.27005	-173.008
13	52.35343	-173.008
14	52.3534	-173.076
15	52.2573	-173.076
16	52.2403	-173.076
17	52.24027	-173.144
18	52.26202	-173.144
19	52.3454	-173.144
20	52.3454	-173.212
21	52.26058	-173.212
22	52.24395	-173.212
23	52.24395	-173.28
24	52.27002	-173.28
25	52.35343	-173.28
26	52.35342	-173.348
27	52.27448	-173.348
28	52.25785	-173.348
29	52.25782	-173.416
30	52.28332	-173.416
31	52.36747	-173.416
32	52.36748	-173.484
33	52.27877	-173.484
34	52.26207	-173.484
35	52.26203	-173.552
36	52.27787	-173.552
37	52.36173	-173.552
38	52.36175	-173.619
39	52.28013	-173.619
40	52.25865	-173.619
41	52.25862	-173.687
42	52.27438	-173.687
43	52.48023	-173.687
44	52.50532	-173.755
45	52.42232	-173.755
46	52.40565	-173.755

WAYPOINT	Latitude	Longitude
47	52.4056	-173.823
48	52.42982	-173.823
49	52.51353	-173.823
50	52.51352	-173.892
51	52.42137	-173.891
52	52.4047	-173.891
53	52.40472	-173.959
54	52.48818	-173.959
55	52.48818	-174.028
56	52.39278	-174.028
57	52.37985	-174.028
58	52.39963	-174.058
59	52.41268	-174.096
60	52.48825	-174.096
61	52.48825	-174.164
62	52.43032	-174.164
63	52.42687	-174.201
64	52.42023	-174.232
65	52.49235	-174.232
66	52.49235	-174.3
67	52.40942	-174.3
68	52.38788	-174.368
69	52.47297	-174.368
70	52.46175	-174.437
71	52.36382	-174.437
72	52.37182	-174.504
73	52.38727	-174.504
74	52.45348	-174.504
75	52.45347	-174.538
76	52.36625	-174.538
77	52.35777	-174.572
78	52.4406	-174.572
79	52.44058	-174.606
80	52.32428	-174.606
81	52.32167	-174.641
82	52.3926	-174.641
83	52.36867	-174.674
84	52.3023	-174.675
85	52.2969	-174.708
86	52.3491	-174.708
87	52.33877	-174.742
88	52.27802	-174.742
89	52.27163	-174.776
90	52.34273	-174.776
91	52.3325	-174.81
92	52.24957	-174.81
93	52.23777	-174.826
94	52.22657	-174.844
95	52.31278	-174.844
96	52.31278	-174.878
97	52.2141	-174.878

WAYPOINT	Latitude	Longitude
98	52.20947	-174.912
99	52.30833	-174.912
100	52.30833	-174.946
101	52.19145	-174.946
102	52.18915	-174.979
103	52.25947	-174.98
104	52.25947	-175.013
105	52.17907	-175.013
106	52.17305	-175.047
107	52.27445	-175.047
108	52.28888	-175.081
109	52.20188	-175.081
110	52.2224	-175.115
111	52.3037	-175.115
112	52.3037	-175.149
113	52.22433	-175.149
114	52.22433	-175.183
115	52.15323	-175.183
116	52.13102	-175.251
117	52.2154	-175.251
118	52.21538	-175.318
119	52.16405	-175.318
120	52.15928	-175.386
121	52.23305	-175.386
122	52.23305	-175.454
123	52.16117	-175.454
124	52.18805	-175.485
125	52.191	-175.521
126	52.255	-175.521
127	52.23073	-175.589
128	52.16475	-175.589
129	52.14292	-175.656
130	52.20933	-175.656
131	52.2208	-175.724
132	52.14358	-175.724
133	52.1612	-175.776
134	52.23668	-175.776
135	52.23668	-175.844
136	52.14473	-175.844
137	52.16307	-175.911
138	52.23678	-175.911
139	52.21628	-175.978
140	52.12442	-175.978
141	52.11762	-176.046
142	52.20385	-176.046
143	52.20387	-176.114
144	52.12177	-176.114
145	52.12562	-176.151
146	52.11288	-176.181
147	52.18105	-176.181
148	52.14332	-176.249

WAYPOINT	Latitude	Longitude
149	52.05655	-176.249
150	52.02038	-176.316
151	52.13307	-176.316
152	52.1006	-176.384
153	52.01623	-176.384
154	52.01618	-176.451
155	52.0978	-176.451
156	52.09768	-176.519
157	52.00627	-176.519
158	52.00627	-176.586
159	52.08228	-176.586
160	52.07258	-176.654
161	51.98118	-176.654
162	51.98107	-176.721
163	52.05535	-176.721
164	52.05535	-176.789
165	51.9813	-176.789
166	51.93827	-176.856
167	52.03427	-176.856
168	51.99968	-176.923
169	51.9269	-176.923
170	51.93327	-176.991
171	51.99968	-176.991
172	52.0188	-177.058
173	51.95168	-177.058
174	51.94975	-177.125
175	52.01727	-177.125
176	52.01728	-177.159
177	51.94637	-177.159
178	51.9417	-177.193
179	52.00197	-177.193
180	51.96842	-177.227
181	51.8487	-177.227
182	51.84127	-177.26
183	51.96033	-177.26
184	51.96033	-177.294
185	51.83057	-177.294
186	51.81805	-177.328
187	51.95745	-177.328
188	51.96685	-177.362
189	51.80998	-177.362
190	51.81	-177.395
191	51.9852	-177.395
192	52.00038	-177.429
193	51.93027	-177.429
194	51.92645	-177.42
195	51.92287	-177.41
196	51.89803	-177.41
197	51.89527	-177.419
198	51.89277	-177.429
199	51.8059	-177.429

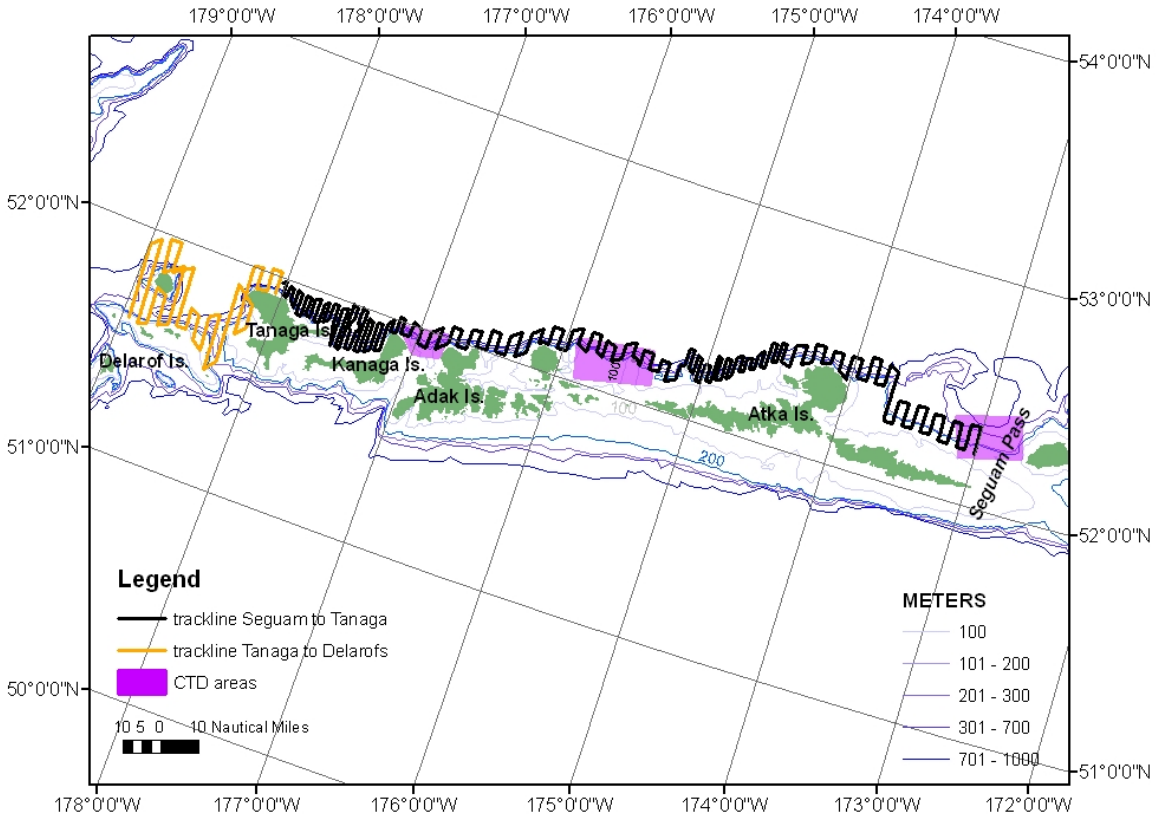
WAYPOINT	Latitude	Longitude
200	51.8059	-177.462
201	51.88288	-177.462
202	51.8984	-177.479
203	51.924	-177.479
204	51.93695	-177.463
205	51.99275	-177.463
206	52.00028	-177.496
207	51.79265	-177.496
208	51.79267	-177.53
209	51.9739	-177.53
210	51.96325	-177.563
211	51.88653	-177.563
212	51.79137	-177.563
213	51.89297	-177.597
214	51.97107	-177.597
215	51.97107	-177.63
216	51.8985	-177.63
217	51.8819	-177.664
218	51.96625	-177.664
219	51.95797	-177.698
220	51.86818	-177.698
221	51.86818	-177.731
222	51.96805	-177.731
223	51.96185	-177.765
224	51.87957	-177.765
225	51.87957	-177.799
226	51.96198	-177.799
227	51.96548	-177.832
228	51.87087	-177.832
229	51.87087	-177.866
230	51.95877	-177.866
231	51.97327	-177.899
232	51.89138	-177.899
233	51.92038	-177.933
234	51.97518	-177.933
235	51.97517	-177.967
236	51.92692	-177.967
237	51.92692	-178
238	51.98832	-178
239	51.9883	-178.068
240	51.92585	-178.068
241	51.9258	-178.135
242	51.9898	-178.135
243	51.98975	-178.203
244	51.91098	-178.203
245	51.97042	-178.27
246	51.8443	-178.27
247	51.8086	-178.136
248	51.72383	-178.136
249	51.59712	-178.203
250	51.84458	-178.203

WAYPOINT	Latitude	Longitude
251	51.84458	-178.27
252	51.59707	-178.271
253	51.59707	-178.338
254	51.77515	-178.338
255	51.73928	-178.405
256	51.60428	-178.405
257	51.60428	-178.472
258	51.72708	-178.472
259	51.72708	-178.539
260	51.63445	-178.539
261	51.63445	-178.606
262	51.71552	-178.606
263	51.78508	-178.673
264	51.62867	-178.674
265	51.61883	-178.741
266	51.74903	-178.741
267	51.73538	-178.808
268	51.59713	-178.808
269	51.59708	-178.875
270	51.75728	-178.875
271	51.7871	-178.943
272	51.59652	-178.943
273	51.59647	-179.01
274	51.84682	-179.01
275	51.87295	-178.943
276	51.7878	-178.943
277	51.82047	-178.876
278	51.88113	-178.876
279	51.90195	-178.808
280	51.85137	-178.808
281	51.84448	-178.768
282	51.81687	-178.741
283	51.90283	-178.741
284	51.90277	-178.673
285	51.78505	-178.673

APPENDIX 2

CTD Sampling Locations

CTDs will be deployed opportunistically throughout the survey, primarily during the day, at water depths from 100 to 200 meters. Additional CTD casts will be made at selected passes, shown on the figure below, at depths around 200 meters and 500 meters.



Areas at selected passes for additional CTD casts (at 200 m and 500 m water depth), shown in pink. Black lines show primary transects from Seguam Pass to Tanaga Island. Orange lines show additional transects to the Delarof Islands (if time permits). Depth contours from 100 to 1000 m are also shown.

APPENDIX 3

Seabird Operations

United States Department of the Interior
FISH AND WILDLIFE SERVICE
1011 E. Tudor Road
Anchorage, Alaska 99503-6199

IN REPLY REFER TO: 29 November, 2007

Kathy Kuletz, Ph.D.
Migratory Bird Management

To: Dr. Logerwell,

Thank you for the opportunity to include a seabird observer on board the Oscar Dyson during the 2008 SSMA survey in the central Aleutians. The extensive coverage of the shelf areas from Seguam Pass to Tanaga during winter (3 – 29 February), with associated oceanographic and biological data, will provide valuable data on seabird distribution and abundance during a period for which we have little information. The seabird data that we collect will be archived in the North Pacific Pelagic Seabird Database (NPPSD) and will be available to NOAA.

It is the goal of the U. S. Fish and Wildlife Service (USFWS) to update the data in the NPPSD. The NPPSD, in conjunction with associated oceanographic and biological data, will provide a long-term dataset for researchers and managers investigating ecosystem changes in the Bering Sea. With support from the North Pacific Research Board, the USFWS has initiated an at-sea seabird monitoring program that relies on vessels of opportunity. We appreciate the support of the NOAA-Fisheries program, which has made space available on research cruises.

A USFWS seabird observer will conduct observations when the vessel is underway. The observer will be equipped with all necessary field gear, including a laptop computer with integrated GPS for data recording. On the Oscar Dyson, we have been able to connect directly to the ship's GPS. Typically the observer operates from the bridge (generally port side) for several hours at a time during daylight hours. The observer will scan the water ahead of the ship using hand-held 10X binoculars and record all birds and mammals within a 300-m arc, extending 90^0 from the bow to the beam. We use strip transects with three distance bins extending from the vessel: 0–100 m, 101–200 m, 201–300 m. We determine the distance to bird sightings using geometric and laser hand-held rangefinders. Birds on the water are counted continuously, but flying birds are counted during 'scans' at intervals that vary with ship speed, typically about every minute. We note the bird or mammal behavior (flying, on water, on ice, feeding, following the ship), and only record ship-following individuals when first encountered. Unusual sightings beyond the 300-m strip transect are recorded as 'off transect'; this is used for rare birds, large forage flocks, for mammals, and presence of other vessels, particularly fishing vessels.

We enter observations directly into a laptop computer using the DLOG2 program (R.G. Ford Consulting Co.) with a GPS interface to the ship's system. For each observation, the program provides latitude/longitude, time, and associated environmental conditions. Location data are automatically written to the program at 20 sec intervals, which allows us to map and determine effort (km surveyed) and record changing weather conditions, Beaufort Sea State, ice type and coverage, and glare. We record other environmental variables at the beginning of each transect, including wind speed and direction, air temperature, and sea surface temperature.

The seabird observation files will be proofed and entered into the NPPSD following the cruise. A preliminary report will be provided to the NOAA Chief Scientist, and will include observation effort,

maps of seabird transects, and number of sightings by species.

Sincerely,

Kathy Kuletz

APPENDIX 4

Marine Mammal Operations

Primary operations

Visual sighting surveys

Visual surveys will be conducted during daylight hours by a two-person observer rotation. Typically, this will involve a primary observer using hand-held 7x binoculars from inside the bridge deck, but will also utilize fixed-mount 25x magnification "big-eye" binoculars mounted on top of the wheelhouse when weather conditions allow. A second observer with 7x binoculars will remain on the bridge deck and serve as a data-recorder to enter marine mammal sightings and weather conditions into the real-time data logging program WinCRUZ. The observers will communicate using hand-held VHF radios when the primary observer is outside. When killer whale sightings are made, the primary observer will use the big-eyes (where possible) to assess ecotype and group size, and the second observer will take photographs to document ecotype and individual identity if the group is sufficiently close to the ship.

Secondary operations

Photo-identification

Where opportunity allows, marine mammal groups will be approached for photo-identification. This will specifically occur during transit legs, or when transect lines have been completed, and the primary target species will be killer whales. Digital SLR cameras equipped with telephoto lenses and telephoto extenders will be used to take high quality photographs to document species occurrence, ecotype (for killer whales), and individual identity based on natural markings. Images were shot as Nikon Electronic Format (NEF) files, allowing later conversion to high-resolution TIF files for storage. Inert laser-pointers were also used to project two beams at a fixed distance apart onto the body of killer whales, and photographs of these laser dots will be taken to allow morphometric measurements.

Biopsy sampling

Should close-approaches be possible, then tissue samples will be collected using remote biopsy techniques using cartridge-powered air rifles. Small, lightweight darts will be retrieved using a tether. Skim samples will be frozen in glass vials for stable isotope and fatty acid analyses of diet, persistent organic pollutant analyses, and molecular genetic examination of population identity.

APPENDIX 5

Hazardous Material Inventory

Chemicals for specimen preparations

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	Logerwell	AFSC	43-L	3	2	2	Flammable	3 & 8	III	1198	100 LBS	2
Sodium Borate	1330-43-4	Logerwell	AFSC	500-g	1	0	0	General	Not regulated				3
Sodium Borate Solution, Saturated	mix	Logerwell	AFSC	20-L	1	0	0	General	Not regulated				3
Alcohol, Reagent, 95%	mix	Logerwell	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.

Chemicals for oxygen titration.

Chemical name	Chemical formula	Health	Flamm-ability	Instability	Special Hazard	Hazard Class	Packing Group Number	UN	Spill response	Quantity (each container)	Number of containers
Manganese Chloride	$MnCl_2$-$4H_2O$	2	0	0		not regulated			A	600 g	2
Sodium Hydroxide	NaOH	3	0	1		8	II	1823	B	320 g	2
Sodium Iodide	NaI	1	0	0		not available			B	600 g	2
Sulfuric Acid	H_2SO_4	3	0	2	-W- footnote 1	8	II	1830	C	0.5 l	2
Sodium Thiosulfate	$Na_2S_2O_3$-$5H_2O$	1	0	0		not regulated			A	0.5 g	2

Footnote 1**: Danger!** Causes eye and skin burns. Causes digestive and respiratory tract burns. May be fatal if mist inhaled. Strong inorganic acid mists containing sulfuric acid may cause cancer. Concentrated sulfuric acid reacts violently with water and many other substances under certain conditions. May cause lung damage. Hygroscopic (absorbs moisture from the air). Corrosive to metal.

Spill responses

A: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions. Provide ventilation.

B: Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation. Do not get water on spilled substances or inside containers.

C: Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Carefully scoop up and place into appropriate disposal container. Provide ventilation. Do not get water inside containers. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.