UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115

Project Instructions

Date Submitted: March 9, 2017

Platform: NOAA Ship *Oscar Dyson*

Project Number: DY-17-06 (OMAO)

Project Title: Acoustic-trawl survey of the Gulf of Alaska Shelf from the Islands of Four Mountains to Yakutat trough including associated bays

Project Dates: 8 June – 14 August, 2017

Prepared by: _____ Dated: March 9, 2017
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AFSC/RACE Division

Approved by: _____ Dated: 3/10/2017
Dr. Jeffrey M. Napp
Division Director
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Approved by: _____ Dated: 3/13/17
Dr. Douglas P. DeMaster,
Science and Research Director
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Approved by: _____ Digitally signed by RHODES.CARL.GEORGE.1288395868 Date: 2017.05.19 14:59:10 -07'00' Dated: _____
Command Brian Parker, NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period: Acoustic-trawl survey, 8 June – 14 August, 2017

B. Days at Sea (DAS): Of the 62 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 62 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area: The Gulf of Alaska from the Islands of Four Mountains to Yakutat Trough and select Bays and Troughs (see Appendix 1).

D. Summary of Objectives: 1) collect acoustic-trawl (AT) data necessary to determine the distribution, biomass, and biological composition of walleye pollock and other midwater fishes; 2) calibrate the EK60 acoustic system using standard sphere calibration techniques; 3) collect target strength data using centerboard-mounted or lowered transducers for use in scaling acoustic data to estimates of absolute abundance; 4) collect physical oceanographic data (temperature and salinity profiles) at selected sites, and continuously collect sea surface temperature and salinity data; 5) conduct trawl hauls (AWT, PNE, Marinovich, and Methot) to ground truth multi-frequency echo integration data collection; 6) deploy a drop-camera system from the hero deck to identify backscatter in areas where trawling is not possible due to rough terrain; 7) collect sea floor topography data at "trawlable" and "untrawlable" sites using the EK60, ME70 multi-beam, and broadband echosounders and deploy a drop-camera system to identify, enumerate, and obtain species and size information for the backscatter; 8) deploy a broadband echosounder package from the hero deck using the aft winch to determine whether detectable acoustic differences exist among fish aggregations as a function of fish size or species composition; 9) at areas identified as emitting bubbles from the seafloor from suspected methane vents collect acoustic sea floor topography data along with possible water samples at the surface, using the ship's flow thru system, and at depth, using the CTD rosette with Niskin bottles; 10) deploy a spar buoy/hydrophone free-drifting vessel radiated noise measurement system; 11) conduct additional Methot trawl hauls to investigate catchability of krill using strobing lights and capture live krill specimens for experiments, and use lowered stereo cameras to observe *in situ* krill orientation.

E. Participating Institutions: Alaska Fisheries Science Center (AFSC), Seattle, WA; NOAA Teacher-At-Sea Program (NOAA-TAS), Silver Spring, MD; University of New Hampshire (UNH), Durham, NH; University of Washington (UW), Seattle, WA; Stony Brook University, Stony Brook, NY.

F. Personnel/Science Party: Subject to change

Leg 1

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Beyer, Ethan	Observer	June 6	June 28	Male	AFSC – contractor	USA
Jones, Darin	Chief Scientist	June 6	June 28	Male	AFSC	USA
Lauffenburger, Nathan	Fish Biologist	June 6	June 28	Male	AFSC	USA
Lenz, Marsha	Teacher	June 6	June 28	Female	NOAA-TAS	USA
Levine, Mike	Fish Biologist	June 6	June 28	Male	AFSC	USA
McCarthy, Abigail	Fish Biologist	June 6	June 28	Female	AFSC	USA
Phillips, Matthew	Observer	June 6	Aug 14	Male	AFSC – contractor	USA
Towler, Rick	IT Specialist	June 6	June 28	Male	AFSC	USA

Leg 2

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Bassett, Chris	Fish Biologist	June 30	July 22	Male	AFSC	USA
Honkalehto, Taina	Chief Scientist	June 30	July 22	Female	AFSC	USA
Levine, Mike	Fish Biologist	June 30	July 22	Male	AFSC	USA
Martin, Michael	RACE Deputy Director	June 30	July 22	Male	AFSC	USA
Padilla, Alexandra	Student	June 30	July 22	Female	UNH	USA
Phillips, Matthew	Observer	June 6	Aug 14	Male	AFSC – contractor	USA
Proctor, Sian	Teacher	June 30	July 22	Female	NOAA-TAS	USA
Stienessen, Sarah	Fish Biologist	June 30	July 22	Female	AFSC	USA
Williams, Kresimir	Fish Biologist	June 30	July 22	Male	AFSC	USA

Leg 3

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Furnish, Scott	IT Specialist	July 24	Aug 14	Male	AFSC	USA
Hulson, Pete	Fish Biologist	July 24	Aug 14	Male	AFSC	USA
Jones, Darin	Fish Biologist	July 24	Aug 14	Male	AFSC	USA
Lucca, Brandyn	Graduate Student	July 24	Aug 14	Male	Stony Brook University	USA
McCarthy, Abigail	Fish Biologist	July 24	Aug 14	Female	AFSC	USA
McKelvey, Denise	Chief Scientist	July 24	Aug 14	Female	AFSC	USA
Phillips, Matthew	Observer	June 6	Aug 14	Male	AFSC – contractor	USA
Ressler, Patrick	Fish Biologist	July 24	Aug 14	Male	AFSC	USA
Warren, Joe	Assistant Professor	July 24	Aug 14	Male	Stony Brook University	USA

G. Administrative

1. Points of Contact: Darin Jones (Chief Scientist, Leg 1), 7600 Sand Point Way NE, Seattle, WA. 98115, 206-526-4166, darin.jones@noaa.gov; Alternate: Chris Wilson (MACE Program manager), 206-526-6435, Chris.Wilson@noaa.gov

   Aras Zygas LT/NOAA; (Operations Officer, NOAA Ship *Oscar Dyson*); NOAA Corps, 2002 SE Marine Science Dr., Newport, OR 97365; ph: (541) 867-8911 (Ship's VOIP), OPS.Oscar.Dyson@NOAA.GOV

3. Licenses and Permits: This Project will be conducted under a Scientific Research Permit issued by the Alaska Regional Office, National Marine Fisheries Service (SRP #2017-B1), and a Fish Resource Permit issued by the State of Alaska (CF-16-010). The Chief Scientist will be included as an authorized participant on both permits.

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

Leg 1

Jun 6	Embark scientists in Kodiak, AK
Jun 7	load survey gear
Jun 8	Depart Kodiak, AK
Jun 9	Sphere calibration in location TBD
Jun 9-10	Transit to survey start south of Samalga Pass
Jun 11-27	AT survey of the GOA shelf, shelf break, and bays
Jun 28	Arrive in port Kodiak, AK
Jun 28-July 1	Inport Kodiak, AK; exchange scientific crew

Leg 2

July 2-21	Continuation of AT survey of the GOA shelf, shelf break and bays
Jul 22	Arrive in port Kodiak, AK
Jul 22-25	Inport Kodiak, AK; exchange scientific crew

Leg 3

Jul 26-Aug 12	Continuation of AT survey of the GOA shelf, shelf break and bays
Aug 13	Sphere calibration in a location TBD
Aug 14	Arrive Kodiak; unload survey gear; disembark scientific party

Note: additional calibrations may be conducted at sites and dates TBD.

B. Staging and Destaging: Scientific gear, including PNE and AWT nets, a Methot frame, CamTrawl frame and several large totes stored in the warehouse in Kodiak, will be loaded aboard the ship during the June 6-7 inport. Destaging will take place in Kodiak, AK; we request that some gear be allowed to remain aboard as has been past practice, but most gear will be offloaded for return shipping to Seattle and/or storage in Kodiak. These operations will be coordinated with the ship's Operations Officer and Commanding Officer.

C. Operations to be conducted

1. Survey operations will be conducted 24-hours per day. Acoustic data will be collected continuously along a series of parallel transects during daylight hours with a Simrad EK60 scientific echo integration system incorporating five centerboard-mounted transducers (18, 38, 70, 120, 200 kHz), a customized wideband transducer spanning frequencies of 10-100 kHz mounted on the centerboard, and a hull mounted ME70 multibeam echosounder. The EK60 transceivers will be synchronized to ping alternately with EK80 transceivers to test the functionality of the new wideband scientific echo integration system. Operating the following equipment will degrade the quality of the acoustic data:

- Other echosounders or acoustic equipment including the Doppler speed log and bridge Furuno depth sounder.
- The bow thruster.

It is requested that this equipment not be operated unless necessary to ensure the safe navigation of the vessel or at the discretion of the command. If the equipment is operated, these times will be noted in the ship's SCS/electronic MOA.

Parallel transects at 25 nmi spacing will extend from Samalga Pass near the Islands of Four Mountains to Yakutat Trough. Transects will not generally extend into waters less than 50 m bottom depth nor greater than 1,000 m depth. Several orthogonal transects may be run at the discretion of the Chief Scientist. Other areas will be surveyed using closer-spaced transects. These areas include Sanak Trough, Morzhovoi Bay, Pavlof Bay, the Shumagin Islands area, Mitrofania Island, Nakchamik Island, Alitak Bay, Barnabas Trough, Chiniak Trough, Marmot Bay, Shelikof Strait, several Kodiak Island and Kenai Peninsula Bays, Prince William Sound, and Yakutat Bay (see Appendix 1). Trackline start and end points will be provided in an electronic file to the Navigation Officer. The ship is expected to maintain an average speed of 11 to 12 knots in favorable conditions; as weather, safe operation, and system load of the vessel allow.

Acoustic trawl survey operations require that an Aleutian wing trawl (AWT) midwater and poly Nor'eastern (PNE) bottom trawl with roller gear be loaded onto the net reels. A spare AWT and PNE will serve as backups. Codend liner mesh size will be 0.5" for both the AWT and the PNE. Fishbuster doors will be used with all trawls. Small fishes or

zooplankton may be sampled using smaller nets (e.g., Marinovich or Methot nets). We request that the Chief Boatswain keep a trawl gear logbook to record any modifications made to trawl gear during the Project.

Trawl hauls will be made to sample fish aggregations and provide pollock samples and other biological data. Haul duration will be kept to the minimum necessary to ensure an adequate sample. We anticipate that on average 2-3 of these tows will be conducted during a 24-hour period. Biological data collected from each haul will include species composition, sex composition, length frequencies, whole fish and ovary weights, maturities, and otoliths. Walleye pollock tissue samples will be collected from selected hauls for aging and fecundity studies.

A CamTrawl camera system will be deployed in the intermediate of the midwater trawl to optically sample fish. Prior to being loaded, the AWT will have been modified with an opening in the starboard side panel allowing the attachment of the camera. When the CamTrawl is not attached, the opening will be sewn shut to prevent fish escapement.

The Scientific Computing System (SCS) will run continuously throughout the Project and will be configured to log data from various sensors at a rate of 1 Hz.

When all trawl operations have been completed for each leg, sufficient time should be allotted for streaming of all trawl nets used during the survey. Trawl nets should be streamed behind the vessel with the codend open to ensure nets are clean and free of fish and other debris for storage. Nets should be visually inspected as they are brought in and any fish, other organisms, or debris still entangled in webbing should be removed.

2. A standard sphere calibration of the scientific acoustic systems (EK60 18, 38, 70, 120, 200 kHz, and ME70) will be conducted at the beginning and near the end of the Project in a location selected by the chief scientist and the Commanding Officer. The calibration requires anchoring the vessel at the bow and stern or holding position using the ship's dynamic positioning system, and suspending a calibration sphere assembly directly beneath the vessel's centerboard. The method used to stabilize the vessel will be discussed and decided upon by the chief scientist and the Commanding Officer after evaluating conditions at the calibration site. A CTD cast will be conducted prior to the calibrations.

3. Target strength data collection will occur on an opportunistic basis. These data are used to validate the relationship between fish length and target strength. Data will be collected when certain conditions (i.e., low fish densities, single species) are encountered. Collecting target strength data typically involves repeated passes over an aggregation of fish at a vessel speed of less than 3 knots. One or two trawl hauls are made to provide species composition and biological data. When calm seas are encountered along with the above-mentioned conditions, a second approach to collecting target strength data may be attempted: with the vessel stopped, a “DropTS” assembly (see Appendix 2) containing a 38-kHz transducer will be lowered to a depth just above the fish sign and held in position for up to an hour.

4. Conductivity-temperature-depth (CTD) data will be collected with the ship's Seabird 911plus system at selected locations both day and night, with assistance from the ship's Survey Technicians. Locations for planned CTD stations will be provided in an electronic file to the Navigation Officer. Temperature and depth profile data may also be collected at select locations using the ship's expendable bathythermograph (XBT) system and probes supplied by the scientific party. Temperature and depth profile data will also be collected with a Seabird SBE39 micro-bathythermograph attached to the trawl headrope. Sea surface temperature and salinity will be collected continuously throughout the Project and logged with the vessel's Scientific Collection System (SCS).

5. If single-species aggregations are encountered (e.g. rockfish, euphausiid, capelin), opportunistic trawl hauls (AWT, PNE, Marinovich, or Methot) may be conducted to ground truth multi-frequency and wideband acoustic data collection.

6. During daytime survey operations, if acoustic backscatter identification using a trawl is impractical (i.e., "untrawlable" bottom) a drop camera system may be deployed. The drop camera will be lowered using a 240-V, 2-phase winch supplied by the scientific party which will be secured to the starboard hero deck using an aluminum frame attached to the hero deck with Baxter bolts (see Appendix 3 for photo of winch). A block for the drop camera winch cable will also be supplied and will need to be secured to the aft end of the starboard "A" frame by ship personnel. Scientific party will operate the winch but deck and survey assistance will be necessary for deploying and retrieving the camera.

7. During nighttime hours, areas of previously identified "trawlable" and "untrawlable" habitat will be surveyed with fine-scale grids using the EK60 and ME70 multibeam system together with camera drops (system described in item 6 above and Appendix 3) for groundtruthing bottom type and identification of species composition and length distribution. In support of ME70 operations this summer, we request that vessel draft measurements (fore/aft and port/stbd) be provided to the Chief Scientist whenever the vessel departs or returns to port.

8. Broadband acoustic backscatter measurements will target fish aggregations composed of small, medium, or large sized pollock, or distinct aggregations of non-pollock fishes, to determine whether detectable acoustic differences exist among these aggregations as a function of fish size or species composition. Data will be collected with a deadweight broadband echosounder package, which will weigh less than 200 kg. The frame is still being designed/constructed but a draft of the current planned dimensions is attached in Appendix 4, along with photos of deployment of a similar system used during DY1608. The approximate size of the frame is 34"(W) x 46"(L) x 30"(H) excluding any structure for the bridle. Within the instrumented frame are three acoustic transducers and one to four hydrophones. These instruments are controlled by two cables connected to an electronics package that will be located in the Chem lab. The broadband package will be lowered to approximately 10 m below the water surface using the aft hero deck winch while the ship is drifting. As the frame is deployed a single individual will be able to manage the cables. It will be necessary to secure the centerboard 18 and 38 kHz

transducers but the 70, 120, and 200 kHz channels can continue operations for bottom tracking. The package will only be deployed in conditions where vessel roll will not hinder deployed/recovery operations or diminish data quality.

9. In areas identified as having bubble seeps emerging from the substrate, a small grid survey of the area will be conducted using the ME70 multibeam system. Surface water samples may be collected using the ship's flow-thru system, and water samples may be collected at multiple targeted depths around the vent area using the CTD rosette and Niskin bottles. Water samples will be preserved on board for later analysis.

10. Deploy a spar buoy/hydrophone drifter developed to monitor radiated noise. The vessel noise drifter (see Appendix 5) has two main parts: a 10 ft spar (roughly 7 ft of which is submerged) and a weighted line down to approximately 300 ft (100 m) that includes three hydrophones. The spar has U-bolts connected near the top and bottom to aid in deployment/recovery. It also has trailing line and float to aid in recovery. The spar is equipped with an orange flag, a light, and a GPS that communicates over the unlicensed 900 MHz band with a shipboard receiver for real-time monitoring of the drifter's location. The radio specifications suggest receipt of the drifter's GPS location should be possible to ranges of greater than 35 nautical miles. The total dry weight is approximately 100 lbs and previous experience deploying the prototype drifter has been used to identify deployment procedures (summarized below). Changes to the deployment and recovery procedures on the Dyson will be determined in collaboration with the command and chief Bosun.

The drifter (spar and downline) will be deployed in an area with water depths > 150m. The vessel will sail to a range of roughly 2 nm before circling back on a constant heading and passing roughly 100 m from the spar at the closest point of approach. At a minimum the vessel should pass the drifter and transit to a range of 2 nm two times. Additional passes would be preferred but may not be possible given time constraints. A laptop computer with connections to a shipboard GPS and the drifter GPS, both provided by the scientific crew, will be provided on the bridge to provide the drifter location throughout this process. When the vessel is within 250 m of the closest point of approach it should maintain 96 RPM and a constant heading, ideally passing the drifter at a range of 100 m off of the beam. After finishing the passes the drifter will be recovered following the recovery procedures.

11. In addition to ground truthing of euphausiid (krill) acoustic backscatter with standard daytime Methot tows described in item #5 above, we wish to conduct: a) additional Methot trawls during night time operations in short shallow deployments to collect live krill specimens for onboard acoustic and laboratory measurements, b) paired oblique Methot deployments with and without a strobe light to measure avoidance of the trawl by krill, and c) measurement of krill in situ with a lowered camera system (see description of system in item #6 and Appendices 3 and 6).

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer.

We request that ship's divers inspect and document hull, acoustic transducers including ME70 and centerboard, and propeller prior to survey, removing biofouling from transducers.

It may be requested to deploy divers during the survey if it is suspected that the propeller has been fouled.

E. Applicable Restrictions:

Conditions which preclude normal operations include: poor weather conditions, equipment failure, safety concerns, and other unforeseen circumstances. The Chief Scientist will confer with the Commanding Officer to mitigate the impacts of these circumstances on the project goals.

III. Equipment

A. Equipment and Capabilities Provided by the Ship (number is 1 unless specified)

1. Acoustic Equipment
   - GPS with NEMA 183 to EK60 (2)
   - 50/200 kHz ES60 Bridge sounder
   - Furuno FE-700 fathometer
2. Trawling Equipment
   - 3rd wire FS-70 net sonar with winch and accessories (2)
   - Simrad ITI net mensuration system (2)
   - Furuno CN24 headrope transducer
3. Oceanographic Equipment
   - Seabird SBE 911plus CTD rosette System with Niskin water collection bottles
4. Biological Sampling Equipment
   - Fish lab conveyor system
   - Catch sorting and weighing table
   - Controlled environment room stable at 4°C
   - -80°C scientific freezer
   - -10°C scientific freezer
5. Computing equipment
   - Scientific Computing System

B. Equipment and Capabilities Provided by the Scientists (number is 1 unless specified)

1. Acoustic Equipment
   - Simrad EK60 system (2)

Simrad ES18 transducer (2)
Simrad ES38B transducer (2)
Simrad ES38DD transducer
Simrad ES70 transducer
Simrad ES120-7C transducer (2)
Simrad ES200-7C transducer (3)
Standard target & suspension assembly
Simrad ME70 system
Simrad EK80 system
Lowered Target Strength (Drop TS) system housing and supplies
Spar buoy and hydrophone system
Customized broadband echosounder and electronics packages

Note that some of this equipment is ship's equipment and some is supplied by the scientists, but the scientific party will operate and troubleshoot the equipment.

2. Trawling Equipment
   - Aleutian wing trawl w/ 0.5" mesh liner installed (2)
   - Poly nor'eastern trawl w/ 0.5" mesh liner installed (2)
   - Marinovich trawl, modified, with accessories (2)
   - Dandylines (bridles) (30 fm x 5/8 in.) for PNE, 83-112, mod Marinovich
   - Dandylines (bridles) (45 fm x 5/8 in.) for AWT
   - Methot net with accessories (2)
   - Fishbuster door with accessories (2 sets) – set with sensor pockets to be used as primary set
   - Spare webbing & twine
   - Spare 0.5" mesh cod end liners (2)
   - Spare hardware
   - 500 lb. tom weights (4)
   - 250 lb. tom weights (4)
   - Cam-Trawl system
   - Drop camera system including winch (2)
   - Miscellaneous supplies*
3. Oceanographic Equipment
   - Seabird SBE39 (2)
   - Seabird SBE 19plus CTD
   - Sippican Deep Blue XBT's (3 cases)
4. Biological Sampling Equipment
   - Dynamometer
   - Marel M60 60 kg scale (2)
   - Marel M60 6 kg scale (2)
   - Fish length measuring boards and accessories (4)
   - Fish baskets (30)
   - Glycerin/Thymol*

Formalin*
Mercuric Chloride*
Misc. biological supplies*

5. Computing equipment
   PCs w/Windows 7 Op. system*
   Dell PowerEdge MACEBASE Server
   Printers*

Note: * indicates amount not specified.

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). 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 quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program.
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of scientific chemicals is not permitted during projects aboard NOAA ships.

B. Inventory: see Appendix 7

C. Chemical safety and spill response procedures: see Appendix 7

D. Radioactive Materials: No Radioactive Isotopes are planned for this project

V. Additional Projects

A. Supplementary ("Piggyback") Projects:

Secondary objectives of the Project include scientific research requested by AFSC and other investigators. Anticipated projects include specimen collections from standard trawl hauls such as ovary collection from pre-spawning walleye pollock and rockfish. Detailed descriptions of additional ancillary projects will be provided as soon as received. Significant changes to these projects that affect vessel operations will be communicated as soon as they are known.

B. NOAA Fleet Ancillary Projects: No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

C. Program Data Request

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 project. Globe software will be available to log operations data as a backup. All times should be recorded as Greenwich Mean Time (GMT)

2. The data sets requested by the Chief Scientist from the ship will include the following: electronic files (MOA) from the SCS of all operations logged during the project, and backup media (e.g., DVDs) with all sensor data logged to the Scientific Computer System (SCS).

3. 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, who in turn will be responsible for distributing data to other investigators desiring copies.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report: Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey and provides a "Submit" button at the end of the form. It is also located at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf.

All NHSQs submitted after March 1, 2014 must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the

Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure email process approved by NOAA is Accellion Secure File Transfer which requires the sender to setup an account. Accellion's Web Users Guide is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide steel-toed boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

Completion of these requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA ship or Federal Facilities is not required for this project.

G. Marine Mammal, Endangered, and Protected Species

During fishing operations, take all proactive steps to avoid deploying the gear in any situation where there is a high likelihood for an incidental take of protected species or marine mammals. This could mean delaying a set or moving to a suitable alternate site. Be on the look for marine mammals or other protected species prior to initiating a tow and also at haul back.

Within 24 hours of any incidental take of, or injuries or mortalities to, marine mammals as a result of operations, the Chief Scientist/Field Party Chief shall report incident to the vessel CO, Jon Kurland (jon.kurland@noaa.gov, 907-586-7638) or Robyn Angliss (robyn.angliss@noaa.gov, 206-526-4032), and Jeff Napp (jeff.napp@noaa.gov; 206-526-4148). This information will be entered into the Protected Species Incidental Take (PSIT) system per instructions below.

Seabirds can be sampled and retained for salvage – if take involves seabird, include Shannon Fitzgerald in notification at shannon.fitzgerald@noaa.gov. If take involves ESA-listed bird,

retain specimen and we will notify FWS (to issue collection authority). Do not retain gulls – except Kittiwakes. Albatross are high priority.

KEY ACTIONS IN RESPONSE TO ALL INCIDENTAL TAKES

1. Prior to the project, communicate and coordinate with vessel crew about established protected species incidental take reporting and handling procedures whether NOAA, charter, or partner project. Ensure regional ESA biologists and pertinent staff are in the PSIT email alert notification list. The Office of Law Enforcement (OLE) will be notified of takes via PSIT email alert system for all non-marine mammal takes including seabirds within 48 hours of the event.
2. Immediately notify bridge if incidental takes occur.
3. Notify the geographically-appropriate Regional Stranding Response Coordinator (numbers in this document) immediately following the incidental take of a marine mammal. Stranding Response Coordinator will contact Office of Law Enforcement (OLE). For live injured/uninjured marine mammals, priority should be to release the animal before notifying stranding response networks. NOTE: If Coordinators are unreachable, collect pertinent PSIT information and release animal and/or retain carcass if logistically feasible.
4. For a sea turtle or protected fish (injured/live/dead), follow the Terms and Conditions stated in your Fisheries Independent Monitoring Biological Opinion regarding reporting and data collection. If you do not have a current Biological Opinion, contact your designated Regional or Science Center Protected Species Point of Contact for instructions.
5. For handling, sampling and salvaging seabirds (ESA and non-ESA listed), contact regional United States Fish and Wildlife Service (USFWS) points of contact or NMFS regional seabird coordinator. If you have a permit, report seabird takes to PSIT.

PRE-PROJECT ACTIONS

1. Prior to the project, communicate and coordinate with vessel crew about established protected species incidental take reporting and handling procedures whether NOAA, charter, or partner project.
2. Ensure regional ESA biologists and pertinent protected resources staff is in the PSIT email alert notification list.
3. The NMFS Chief Scientist or Designee shall contact the appropriate Regional Stranding Network and query about additional numbers or specific contacts to reach in case of an incidental take of a marine mammal.

WHAT TO DO WITH LIVE, INJURED OR UNINJURED MARINE MAMMAL

If a live, injured or uninjured marine mammal is incidentally captured, the animal should be released immediately.

1. Considering human safety, work from the vessel as quickly and carefully as possible to free the animal from the gear. Ensure the animal can continue to breathe while freeing from the gear.
2. If it can be done immediately without further harming the animal, photograph the animal

(dorsal and ventral sides including dorsal fin, flanks, head/jaw) and gear interaction at time of capture and when free from gear prior to release and collect required PSIT information.

3. If animal is NOT brought aboard the vessel and taking photos is not an option, provide a comprehensive summary of the incident following requirements described under 'PSIT narrative' in this document.
4. Notify Regional Stranding Response Coordinator about the incident.
5. Submit take information for submission to PSIT and attach any forms, photos, and narrative to the take record within a week of the event.

Note: Untrained personnel should not attempt to handle live injured/uninjured marine mammals or disentangle large whales. In the event of a large entangled whale, immediately call your regional entanglement response network.

WHAT TO DO WITH DEAD MARINE MAMMAL OR SEA TURTLE?

1. Notify Regional Stranding Network Coordinator about the take of a dead marine mammal.
2. For sea turtle takes, simply report the take/s to PSIT and follow the instructions listed in your Biological Opinion or follow Regional or Science Center Protected Species Point of Contact instructions.
3. Release animal after necessary information is collected as described below.
4. Photos of the carcass should be taken: Dorsal fin, ventral side, and flank for marine mammals, as well as signs of entanglement, scars, and injuries. This also includes collecting required PSIT data.
5. Submit take information for submission to PSIT and attach any forms, photos, and narrative to the take record.

PSIT Reporting

Report [1] Species involved, [2] number dead, number injured and released, or number uninjured and released, [3] date and time, [4] latitude and longitude, [5] any mitigation measures taken, [6] other comments or observations germane to this take. Note if photo was taken.

In addition to the required PSIT information please complete a narrative which includes the following information.

1. Animal Condition (include photos)
   Code 1 – Live Animal
   Code 2 – Fresh Dead
   Code 3 – Moderate Decomposition
   Code 4 – Advanced Decomposition
2. Mention if animal escaped or was released.
3. Indicate if the animal or other marine mammals or sea turtles were seen in the vicinity of the vessel during fisheries operations.
4. Animal condition post-release: Describe any observed injuries, the condition and behavioral state of released or injured animal (e.g., no obvious injuries and animal swam away vigorously, did not swim away vigorously, animal surfaced to breathe, animal sank

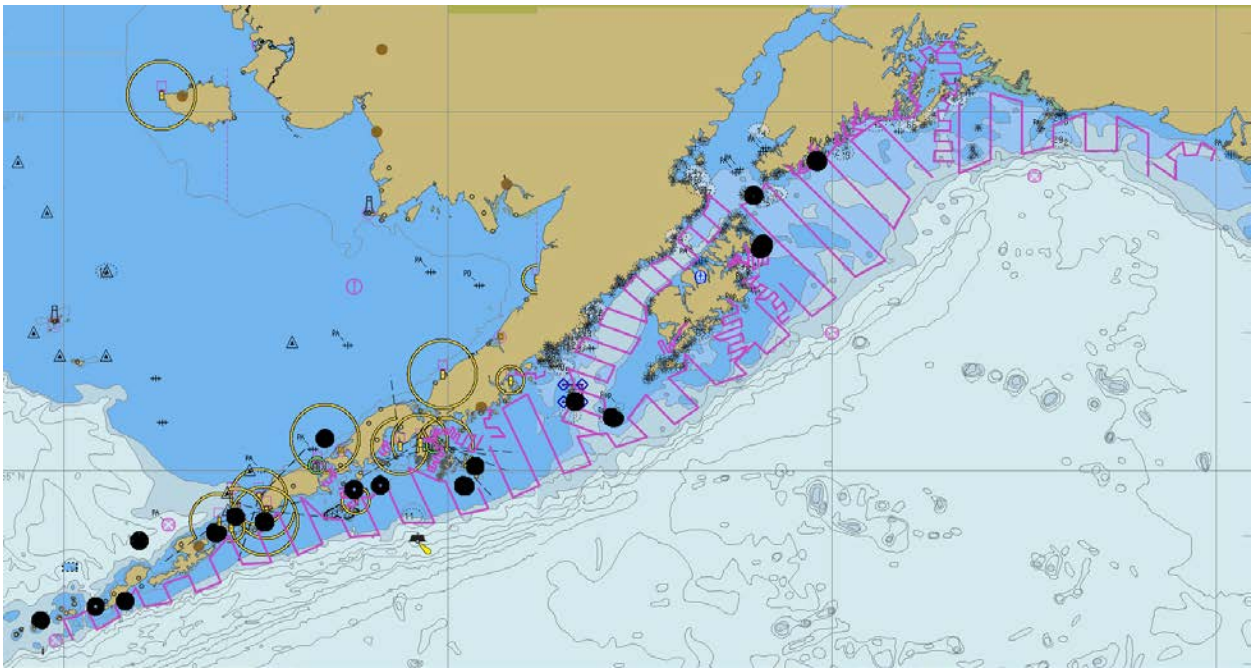
to bottom, or blood in water observed).

5. If gear was still attached to animal after release, describe how the gear was cut and approximately how much gear is left and where it is still entangled/injured.
6. Photos: Provide comprehensive photographic evidence or written description of live/dead or injured animal. Provide pictures (if possible) of how the animal was entangled in the gear, and any gear-related interactions such as wounds or constrictions.
7. Decision-making: Include rationale for any discretionary decisions taken by Chief Scientist/crew.
8. Describe possible causes for incidental capture of the animal and any additional mitigation measures that were taken, or might be taken to prevent similar captures in all subsequent operations.

ENTANGLEMENT RESPONSE NETWORK NUMBER

Alaska Region: 1-877-925-7773

Appendix 1 - Proposed survey areas and tracklines (pink lines) based on 2015 GOA survey area. Black circles indicate Sea Lion critical habitat “no transit zones”.



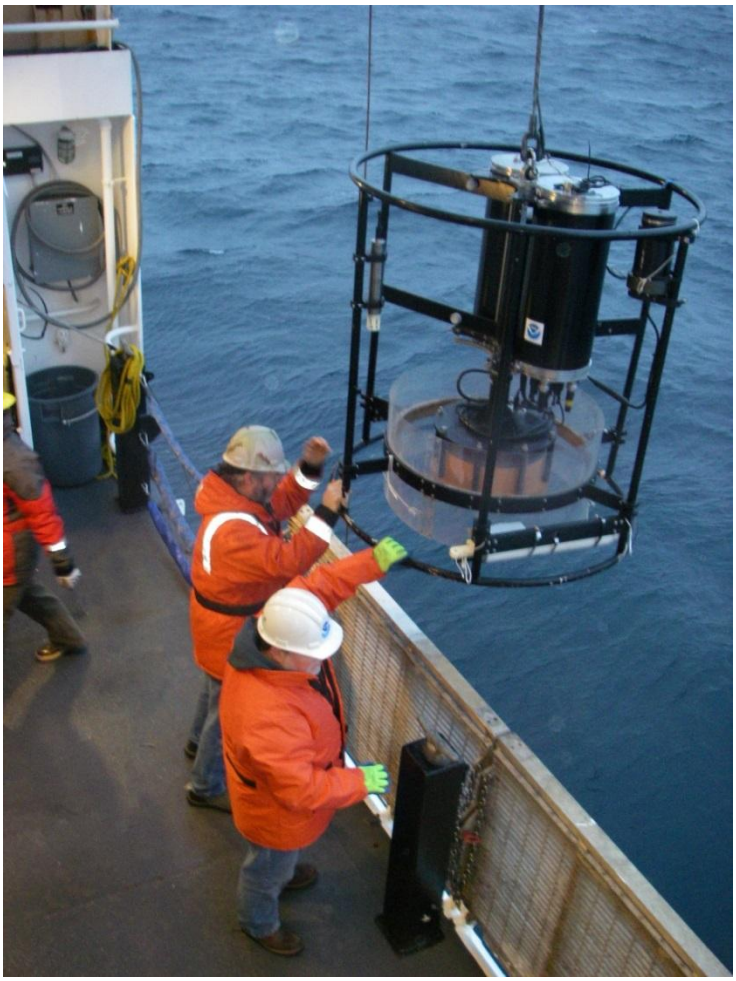
Appendix 2 - DropTS (lowered target strength) echosounder

The DropTS (target strength) is a stand-alone ER60 38 kHz echosounder system mounted in a deployable frame. The system includes a Simrad 38 kHz GPT and 38DD pressure compensated transducer, onboard PC and network communications, frame and transducer tilt sensors, acoustic communications modem, and a battery power system.

Equipment for use of the DropTS system mounted in the ship includes a deck unit for battery charging and network communications, and an acoustic modem for communications with the DropTS system while it is deployed. There is no wired communications with the system while it is deployed; communications is through the acoustic modem system using a software interface on the topside control PC.

A typical DropTS deployment will require the addition of a calibration sphere (suspended about 20 m below the frame) and an SBE 39 bathythermograph.

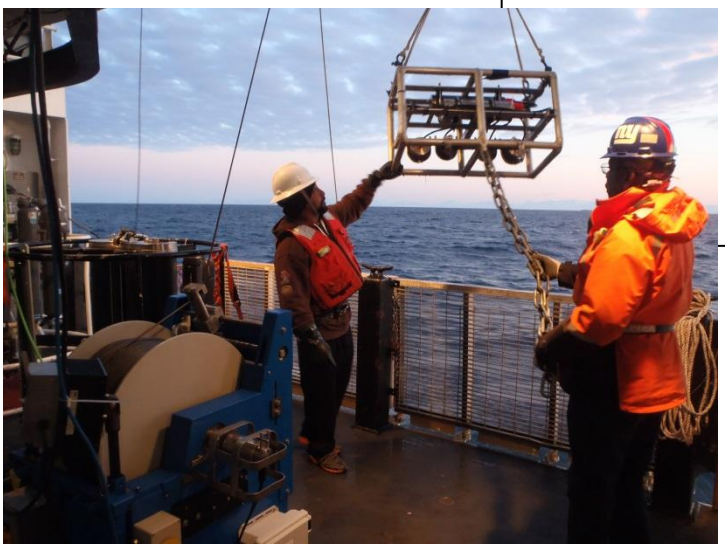
The DropTS is typically attached to the aft hydrographic winch and deployed/lowered with the assistance of the deck department. The vessel should drift or maintain stationary position while the DropTS is deployed.



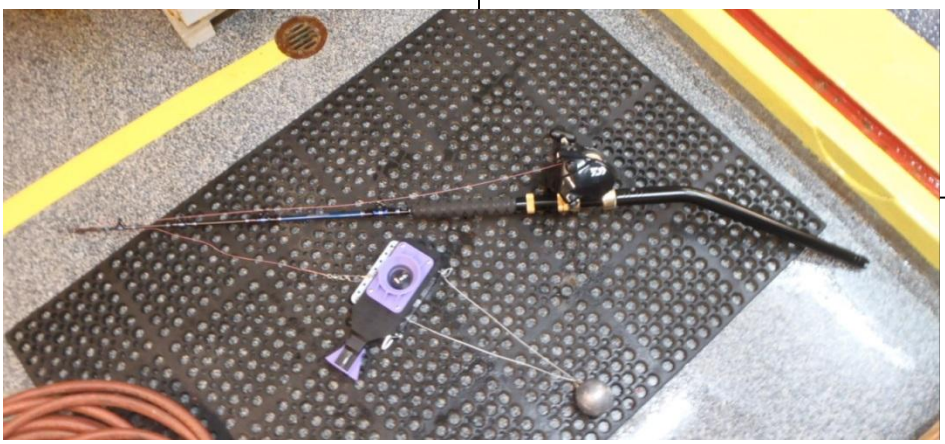
Appendix 3 – Drop cameras and winch.

Drop camera and winch on hero deck.

Recovering drop camera.

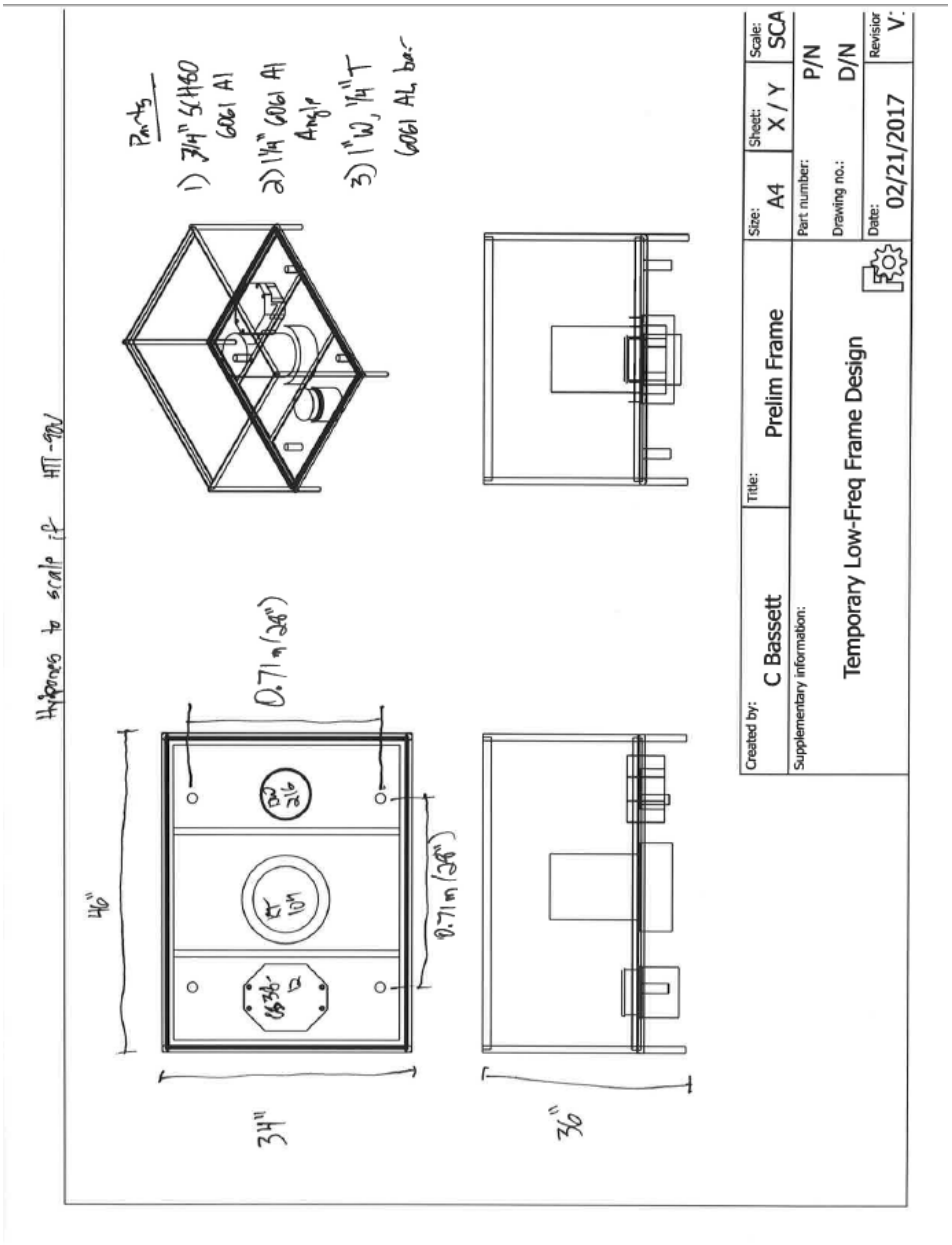


Simple lowered camera that does not require winch

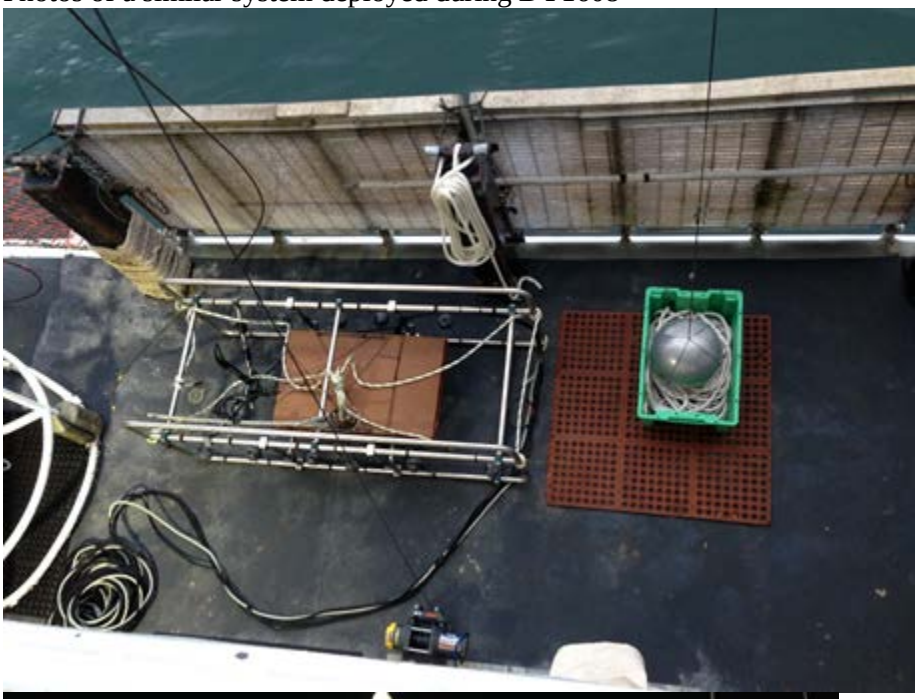


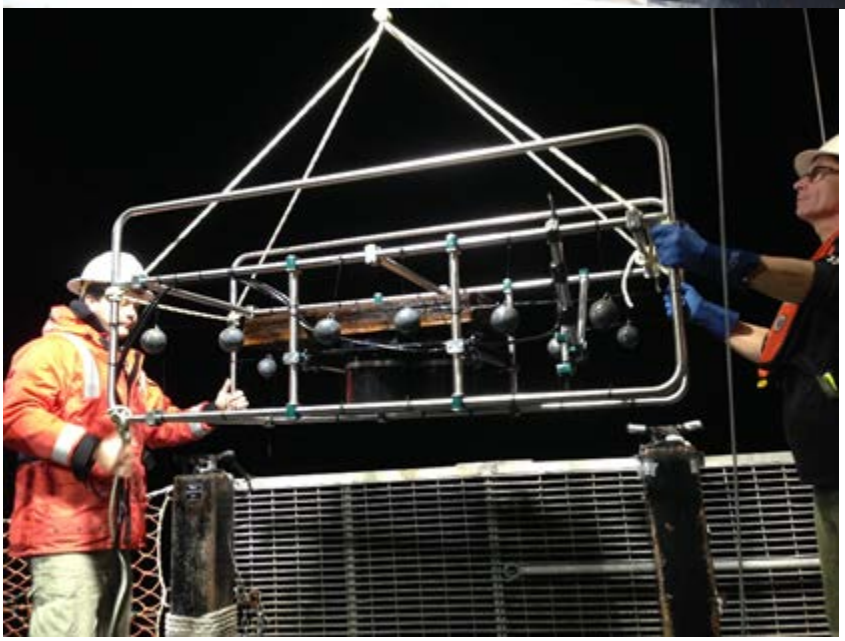
Appendix 4 - Preliminary schematic of broadband echosounder package and photos of deployment

Preliminary description of package—



Photos of a similar system deployed during DY1608--





Appendix 5 - Drifter project to measure underwater radiated vessel noise

Statement of Need

The aim of the drifter project is to develop a portable noise-monitoring system to measure FSV underway underwater radiated noise. This project was undertaken by MACE at the request of OMAO and the Office of S&T to reduce costs for regular monitoring of underwater vessel noise from Dyson-class vessels. We determined from earlier field work, that a hydrophone system in a conventional bottom-anchored mooring can be used to accurately measure FSV radiated noise. The goal of the current project is to adapt this method in a lightweight and easily deployed drifter. Ultimately, the drifter will be transitioned to operations in the FSV fleet.

Drifter Specifications, including weight and dimension

The drifter consists of a surface spar buoy, 3 hydrophones suspended along a 300 ft 5/16" nylon line hanging below the spar buoy. Fifteen feet below the base of the spar there is a 2 ft diameter heave plate. The line terminates with five pounds of lead weights. The spar floats at the sea surface, with the hydrophone packages suspended below.

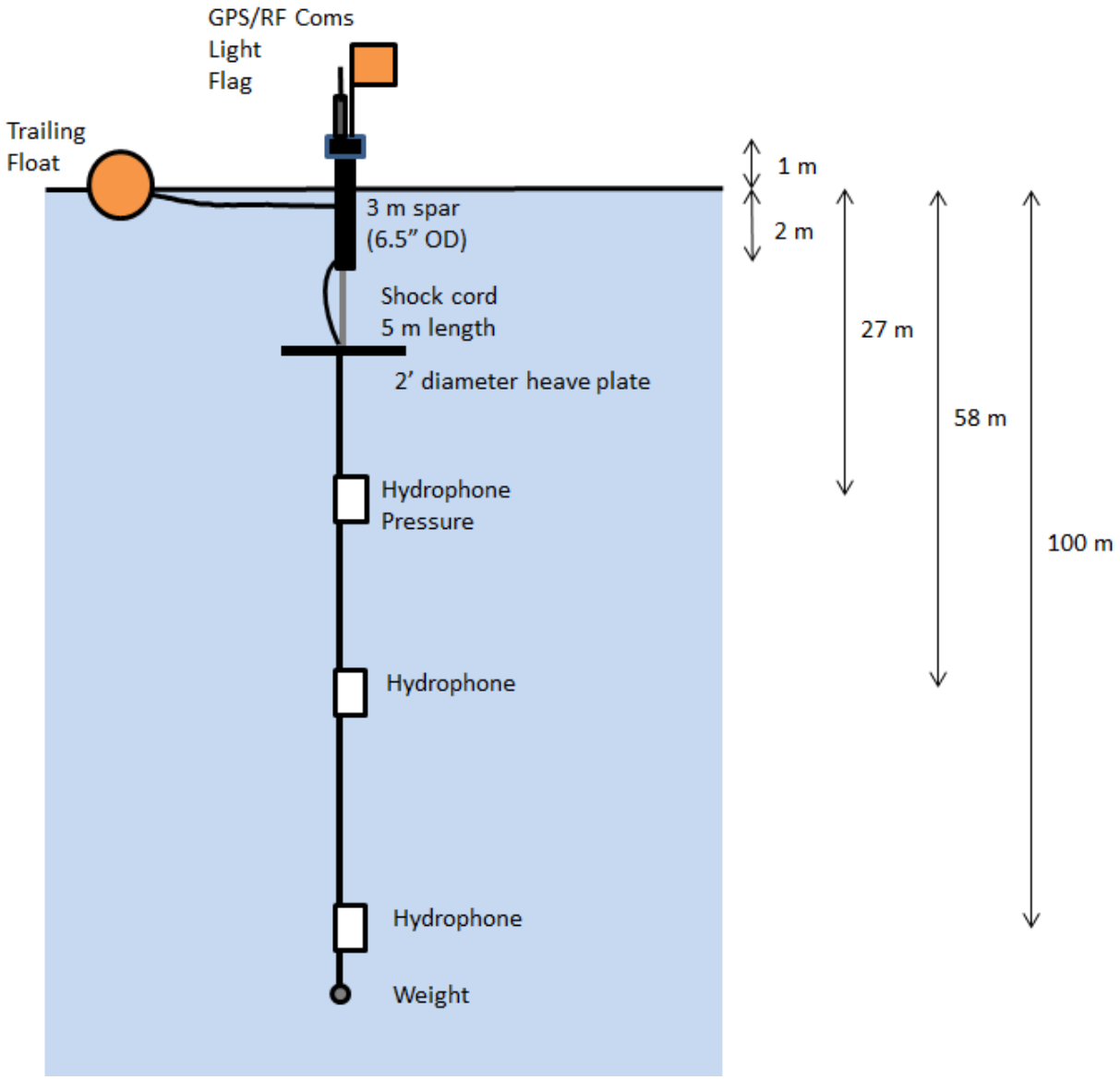
The spar is constructed of schedule 80 PVC pipe 10' long and 6.5" in diameter with a strobe light, GPS receiver, radio antenna, and power switch fixed to the top. The top three feet of the spar is painted yellow and wrapped with SOLAS reflective tape. Fully equipped it weighs approximately 100 lbs. It has four U-bolts which can be used to recover the spar with boat hooks: two near the top and two near the bottom. The deployment/recovery procedures are described below. Three 1 ft by 2 ft hydrophone packages are attached to the lines at depths of 75 ft, 180 ft, and 300 ft. and are sufficiently light (< 10 lbs in air) to be easily deployed by hand. There is also an 18 inch trailing float with line leading back to the spar allowing for recovery using a grappling hook. The trailing float line is equipped with a 3-1/4" stainless steel ring and a small float for recovery. A rough sketch showing the important dimensions is shown below.

Vessel operation when drifter is deployed

Once the drifter is deployed, the Dyson will move about 2 km away from the drifter, and then run in a straight line past the drifter (closest point of approach ~ 100 m) until 2 km past the drifter (i.e., a 4 km long transect). Within 250 m of the drifter it is important to maintain a constant heading. Each transect pass by the drifter will be conducted with a propeller shaft rate of ~ 96 rpm. At a minimum two passes will be made and, depending on time available and discussions with the lead scientist, additional passes should be performed.

It is understood that the ship will determine the operational limits of deployment and recovery operations based on the prevailing conditions.

The equipment was deployed during DY1608 summer EBS AT survey. We only intend to deploy and recovery the spar under good weather conditions (seas less than 3 ft.). Deployment is expected to last < 3 hours.



Dimensions of the drifter (not to scale)

The hydrophone drifter is designed for deployment and recovery from Dyson class FSVs. The following procedures were successfully used aboard the Dyson in July 2016, but could be revised based on additional discussions with the Dyson personnel.

Deployment:
Deployment operations should be performed with the ship underway at a speed no faster than required to maintain steerage (i.e., ca. < 1 kt). The method that could be used to deploy the drifter would involve the following steps (subject to input from the crew). A person will again be positioned at the starboard aft rail.This person will wait at this location anticipating the following steps. The spar buoy would be laid flat on the back deck with a Sea Catch (or other similar toggle/quick release device) attached to one of the upper (near surface) U-bolts and a tag line through the other. The trawl ramp moveable gate should be lowered and the drifter moved to the trawl ramp while slack on the winch is taken in. At this point the buoy is resting entirely on the trawl ramp with no slack in the line. The next step will be to lift the buoy

off the deck while the A-frame is moved to the aft position and the winch line is adjusted to keep the buoy just out of the water. At this point, the hydrophones/heave plate line should be rapidly lowered by hand by the person at the aft rail. Once the hydrophone/heave plate line becomes taut below the buoy, the spar buoy will be lowered until over half its length is submerged, and the quick release is then tripped to release the buoy and begin vessel operations to run passes by the drifter with the ship.

Fig 1. – Deployment of drifter buoy using method 2.

Recovery:

The drifter will be recovered on the starboard side of the vessel. The ship will come alongside the spar buoy at a close enough range to use a grappling hook to catch the floating line between the spar and the trailing float. The spar is drawn in by hand until alongside the vessel. A few feet from the U-bolt along the line leading to the trailing float is a stainless steel ring. Line drawn from the A-frame/winch and passed around the stern of the vessel is quickly clipped to the in-line ring on the drifter line. Then the buoy is released so that it drifts to the stern of vessel. Once behind the vessel, it is brought in using standard winch and A-frame operations. Once the spar buoy is above the waterline a boat hook is used to grab the hydrophone/heave plate line, which extends below the spar buoy. The line with associated instruments is recovered manually over the starboard taffrail as the buoy is recovered up the stern ramp and laid down flat on the back deck.

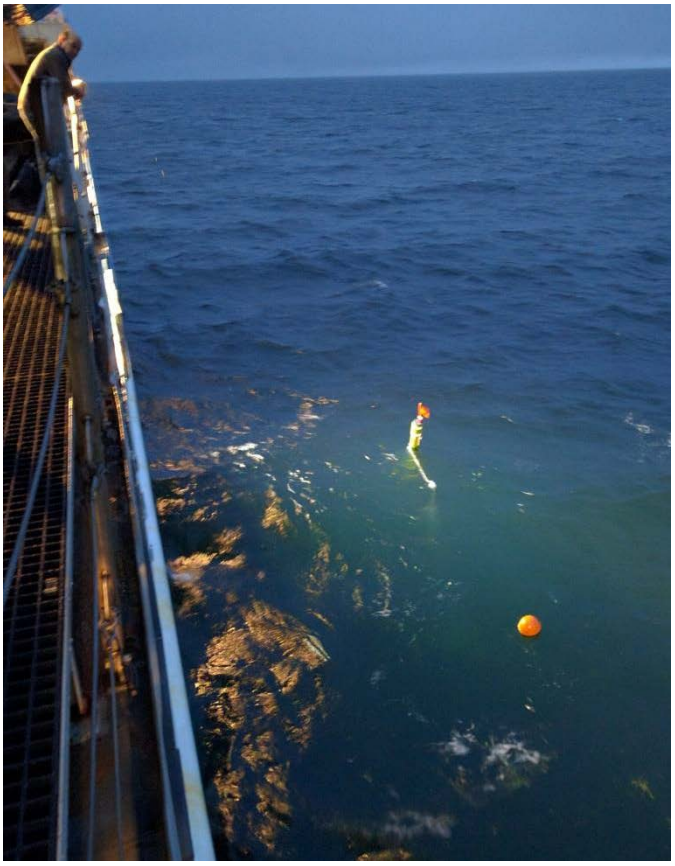


Fig 2. – Drifter buoy in water along starboard side of ship during approach for recovery.

Appendix 6 - Euphausiid (krill) target strength

Target strength (TS) is the echo from a single animal. That's what is needed to convert backscatter we measure with the EK60 to number of animals in the water. We have a good model of this for pollock, but we need better TS information for krill. Research will be conducted to address the following goals (these operations were conducted during DY1608). These operations will mostly take place during DY1706 Leg 3, in coordination with other nighttime projects and daytime survey activities.

Goal 1- measure TS of euphausiids with known length, material properties, and orientation in a controlled setting, compare to modelled TS, evaluate relationship of euphausiid lipid content to TS.

a) Leg 3, nighttime: each night, conduct a short, shallow Methot tow with a modified codend to collect live euphausiids. Sort Methot catch (fish lab), measure target strength (in a plastic trash can on hero deck or other container as discussed with Ops and chief Bosun; App. 6 Fig 1) of live euphausiids, material properties (controlled environment room; App. 6 Fig. 2). Conduct a CTD.
b) Freeze euphausiid samples for determination of lipid content (which may affect TS) subsequent to cruise.

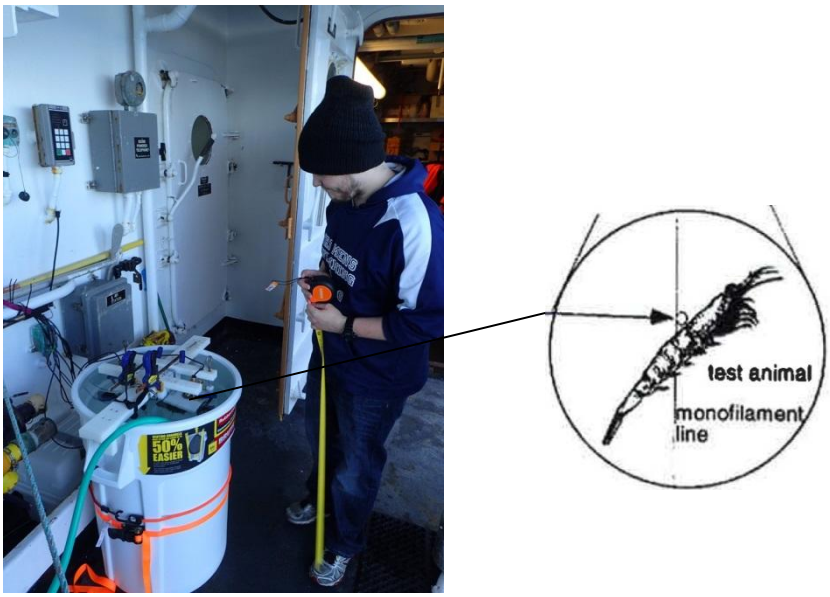
Goal 2- Generate a net-based euphausiid abundance estimate to compare to acoustic estimate and empirically estimate difference in catch rate due to the light (literature indicates the light will increase catch rate due to reduced avoidance; DY1608 results support this).

a) Leg 3, nighttime: conduct two oblique Methot tows from surface to within 10 m of seafloor with a standard cod end, near location where the ship stops transects for night operations. Process and preserve a subsample per usual MACE procedure. Both tows should have the same EQ and tow strategy.
b) Randomly add a flashing strobe to either the first or the second oblique tow (App. 6, Fig. 3).
c) All three legs, daytime: if time allows, conduct a daytime pair (rather than a single tow) of targeted, ground truth Methot tows on euphausiid scattering layers with a flashing strobe light randomly added to one of the pair to evaluate daytime avoidance. Both tows should have the same EQ and tow strategy.

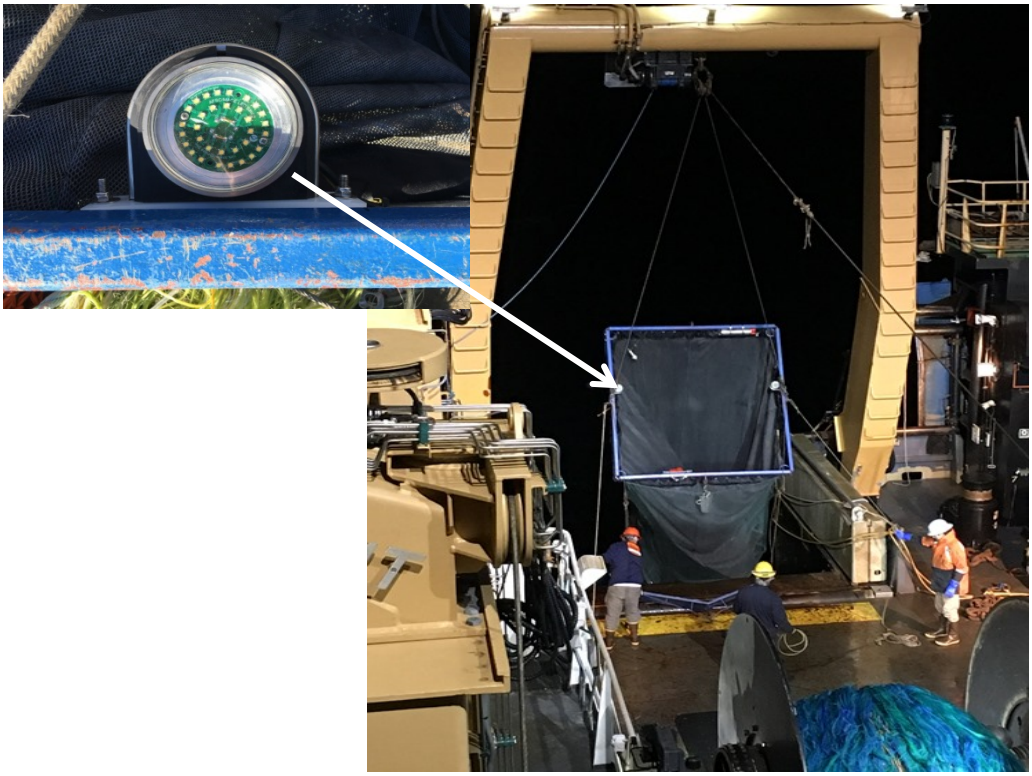
Goal 3- Measure *in situ* orientation (tilt) of krill, which affects TS

a) Nighttime or daytime (Leg 3): if time allows, conduct drop camera deployments to make *in situ* measurements of krill orientation. The instrument can be deployed using dedicated winch secured to the hero deck (App. 6 Fig. 4; see also Appendix 3). If time allows, exchange some daytime Methot tow time for daytime lowered drop camera deployments.

App. 6, Fig 1. – Measuring krill target strength in trash can on hero deck.

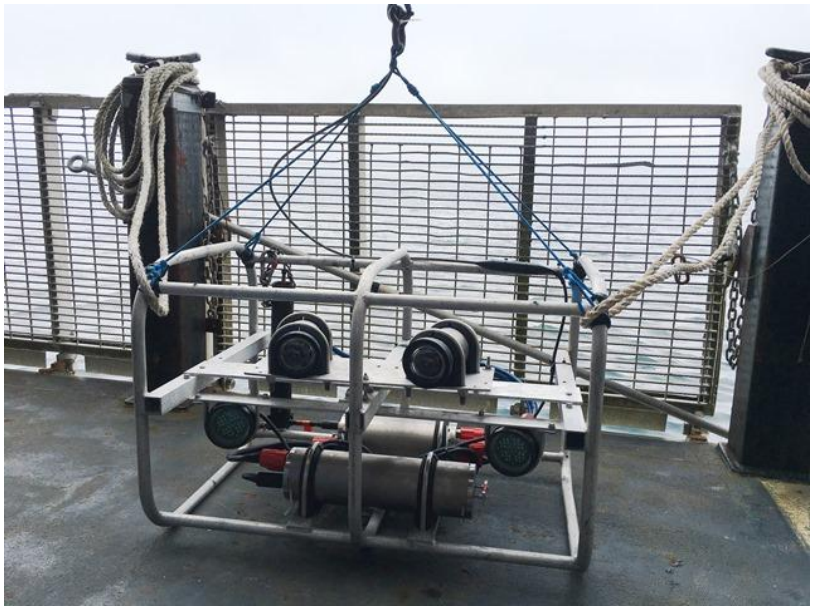


App. 6, Fig 2. – Deploying Methot trawl with flashing strobe.



App. 6, Fig 3. – Measuring krill properties in controlled environment room.

App. 6, Fig 4. – Lowered stereo camera for krill. Winch and deployment are same as in Appendix 3.



Appendix 7 - Hazardous materials sections B (Inventory) and C (Chemical safety spill kit contents and response procedures):

Inventory (itemized)

Dyson was loaded on January 19, 2017 by FOCI and MACE personnel. All chemicals listed will be used for the entire 2017 Dyson field season. Chemical volumes will be reported to the Ops Officer and the designated contact for each survey will be required to report to chemical owners. The name of the group responsible for each of the chemicals is designated after the chemical name in the table. MSDS, chemical hygiene plan, and SOPs will be provided to the Dyson before the loading of the vessel.

Common Name	**Concentration**	**Amount**	**Spill Response (all FOCI/MACE/PMEL/EM A personnel)**	**Notes**
DNA Away	100%	1 – 250 ml	Gloves Paper towels Plastic bag	Not a regulated chemical.
Ethanol Property of FOCI	100%	4 -1 gal. plastic jugs	Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab yellow flammables cabinet.
Ethylene Glycol Property of FOCI	100%	1 – 500 ml	Gloves Paper towels Plastic bag	Not a regulated chemical. Store in Spill Kit.
Formaldehyde Property of FOCI	37%	8 – 2.5 gal. barrels	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bags	Store in Fish Lab flammable cabinets. Will need to place 2-3 in each cabinet.
Formaldehyde Property of Sandi Neidetcher	37%	4 – 1 liter plastic bottles	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bag	Store in Fish Lab flammable cabinet.
Glycerol/Thymol Solution Property of MACE	50 %	2 – 5 gal. buckets	Gloves Paper towels Kitty litter	Not a regulated chemical/solution . Store in Fish Lab under sink.
Lithium 9v Batteries Property of PMEL		8	NA	In SeaBird and Wetlabs instruments
Lithium AA Batteries		96	NA	In SeaBird instruments and

Common Name	Concentration	Amount	Spill Response (all FOCI/MACE/PMEL/EMA personnel)	Notes
Property of PMEL				MicroCats Saft LS14500
Lithium D Cell Batteries Property of PMEL		150	NA	In RCM9 & Peggy Mooring
Lithium DD Cell Batteries Property of PMEL		2 x 12 each	NA	In Argo Floats, stored on aft-deck, outside
Manganese Chloride Property of PMEL	3M	1 liter	Gloves Kitty Litter Plastic bag	Not a regulated chemical/solution. Used for oxygen titrations.
Potassium Iodate Property of PMEL	0.00167 M	1 liter	Spill Control: PI Gloves Plastic bag	Used for oxygen titrations.
Sodium Borate Solution Property of FOCI	5-6%	1 – 5 gal.	Gloves Paper towels Plastic bag	Not a regulated chemical. Working container will be secured on Fish Lab counter.
Sodium Borate Powder Property of FOCI	100%	1 – 500 g	Gloves Wet paper towels Plastic bag	Not a regulated chemical. Stored in Spill Kit.
Sodium Iodide/NaOH Solution Property of PMEL	4 M Nal, 8 M NaOH	1 liter	Spill Control: B	Used for oxygen titrations.
Sodium Thiosulfate Property of PMEL	0.11 M	1 liter	Spill Control: ST	Used for oxygen titrations.
Sulfuric Acid	5 M	1 liter	Spill Control: A	Used for oxygen titrations.

Common Name	**Concentration**	**Amount**	**Spill Response (all FOCI/MACE/PMEL/EM A personnel)**	**Notes**
Property of PMEL				
FOCI Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Formalex	1 – 5 gallon 2 -1 gallon	Formaldehyde cleanup (all concentration s)	1:1 control	Formalex will be used in conjunction with Fan-Pads to reduce spill volume.
Fan-Pads	2 rolls (50 sheets each roll)	Formaldehyde cleanup (all concentration s)	50 sheets = 50 - 150 ml spills	Formalex will be used in conjunction with Fan-Pads to reduce total spill volume.
PolyForm-F	1 – 5 gal. bucket	Formaldehyde cleanup (all concentration s)	1:1 control	Pour onto large spill immediately to deactivate formaldehyde.
3 M Pads	10 pads	Ethanol cleanup	10 pads=10 - 250ml spills	Pads may be reused if dried out under fume hood.
Nitrile Gloves	8 pairs each S,M,L,XL	For all cleanup procedures	N/A	Gloves will be restocked by each survey group.
Eye Protection	4 pairs goggles 1 face shield	Formaldehyde cleanup	N/A	Eye protection will be cleaned before re-use.
Tyvex Lab Coats	2 coats	Formaldehyde cleanup	N/A	Coats will be cleaned with Fan-Pads and Formalex before reuse.
Plastic Bags	2	Formaldehyde cleanup/Fan Pads	N/A	Bags may be packed full and sealed.

PMEL Acid-Base Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**

Spilfyter Acid Neutralizer	1 box	Clean up acid spill—H_2SO_4	1.5l of 5M Sulfuric Acid 5.57l of 10% (1N) HCl	
Spilfyter Base Neutralizer	1 box	Clean up base spill--NaOH	2.0l of Sodium Hydroxide	
Vinyl Gloves	1 box	Protect hands during cleanup	N/A	
Foxtail/Dustpan	1 each	Pick up absorbed neutralizer	N/A	
Rubber apron	1 each	Protect during cleanup	N/A	
Paper Towels	1 roll	Absorb liquids	N/A	
Goggles	2 pair	Protect eyes	N/A	
Chemical absorbent (kitty litter)	1 liter	Absorb liquids	0.5l	
Plastic Bags	2 each	Contain used absorbents/waste	N/A	

SPILL CONTROL

A: ACID

Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.

Ventilate closed spaces before entering them.

Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.

Large Spills: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use.

Neutralize spill area and washings with soda ash or lime. Collect in a non-combustible container for prompt disposal.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

B:Base

Use proper PPE.

Ventilate area.

Neutralize with dilute acid such as HCl if possible.

Absorb with cat litter or vermiculite.

Vacuum or sweep up material and place into suitable disposal container.

Do not breath dust.

Do not get water on spilled substances.

M: Mercury

Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Use Mercury Spill Kit if need be.

F: Formalin/Formaldehyde

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, earth), and place in a chemical waste container.
Do not use combustible materials, such as saw dust.

PI:Potassium Iodate

Avoid Contact with combustibles (wood, paper, clothing …).
Keep substance damp with water spray.
Vacuum or sweep up material and place into suitable disposable container (plastic bag).

ST: Sodium Thiosulfate

Ventilate area of leak or spill.
Wear protective gloves and clean body-covering
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.
Recover liquid or particulate in 5 gallon bucket. Absorb with a kitty litter and place in disposable bag. Do not use combustible materials, such as saw dust to absorb.**W: Water**
Absorb the liquid and wash with water
Wear PPE

E: Ethanol

Eliminate all ignition sources
Wear PPE

Chemical Hygiene Plan and Standard Operating Procedures (SOPs)

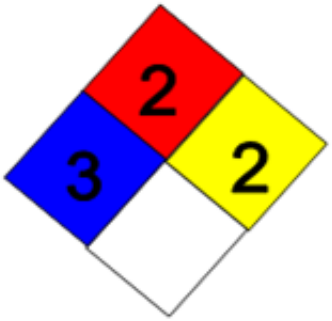
Chemical Hygiene Plan

Previous sections of the Project Instructions include a list of hazardous materials by name and anticipated quantity. Chemicals will be transported, stored and used in a manner that will avoid any spills and adequate containment, absorbents and cleanup materials will be available in the event of a chemical spill.

The scientific chemicals to be used for this project are: (1) ethyl alcohol (100%) and (2) formaldehyde (37%). Other chemicals brought aboard are consumer products in consumer quantities. Dilutions of the scientific chemicals will be used to preserve in faunal organisms collected with benthic grab samplers, as described in the Operations section of these Project Instructions. Use of these chemicals and the specified dilutions will only occur in exterior locations on the ship away from air intakes. Scientific chemicals shall not be disposed over the side.

Standard Operating Procedures and Information Sheets are provided here for the scientific chemicals. Included are details concerning personal protective equipment, work area precautions, special handling and storage requirements, spill and accident procedures/first aid, waste disposal and other pertinent information. Both small and large spills are of particular concern. In both cases, the spill response is intended to first contain the spill and then neutralize it. This may be easily accomplished for small spills depending on the degree of vessel motion and the prevailing environmental conditions. In all cases, the first responder should quickly evaluate the risks of personal exposure versus the potential impacts of a delayed response to the spill and act accordingly. For example, if the spill is small and it is safe to do so, a neutralizing agent should be rapidly applied to encircle/contain the spill and then cover it. However, a large formaldehyde spill (> 1 L) is extremely hazardous and individuals at risk of exposure should immediately leave the area. The CO or OOD should be notified immediately so that a response team with self-contained breathing apparatus (SCBA) can be deployed to complete the cleanup operation or dispense the hazard with a fire hose directed overboard. The vessel's course should be adjusted to minimize exposure of personnel to wind-driven vapors and to limit spread of the spill due to vessel motion. The reportable quantity (RQ) of formaldehyde is 1,000 pounds and the RQ for ethyl alcohol is 5,000 pounds which greatly exceed the quantities brought aboard for this project.

Standard Operating Procedures – Formaldehyde At-Sea



Chemical Name: 37% Formaldehyde

UN Number: 1198

Hazard Ratings: (on a scale of 0 to 4)

Health (blue): 3 Flammability (red): 2

Reactivity (yellow): 2 Special (white):

Personal Protection Gear Needed

*gloves

*goggles or face shield

Special Handling Instructions

* If a ventilation hood is not available, then pouring of chemical must be done outside. At least two people should be involved with large chemical transfers in case of an emergency.

* Chemical must be stored at temperatures above 15^{o} c to prevent polymerization of paraformaldehyde.

First Aid

* If swallowed, give large amounts of drinking water and induce vomiting.

*If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.

* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

Spill Cleanup Procedures

For small spills (500-1000 mls):

Cover spill quickly with a Fan Pad and spray on Formalex to deactivate and absorb chemical. Let material sit for 10 - 15 minutes. Dispose of materials in plastic bag.

For large spills (1000 mls - ?):

Use a combination of Fan Pads and Formalex as quickly as possible to contain spill and deactivate it. Vacate area and try to ventilate room, if possible. Call Bridge immediately.

Deactivation/Disposal Procedures At Sea

*Formalex is a greenish liquid that is to be used to insure proper chemical deactivation. Formalex should also be used in conjunction with Fan Pads. Place used Fan Pad in plastic bag, seal, and put in bottom of Spill Kit.

*Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

Shipping Procedures and Restrictions

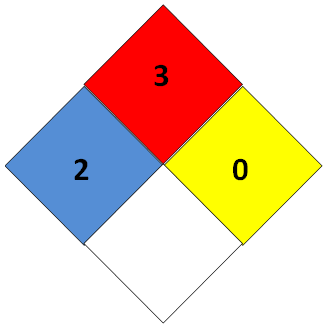
37% formaldehyde cannot be ship by air due to its flammability rating.

All quantities should be over-packed with absorbency material in case the original container is damaged. When shipping by barge or land, labels are not required for quantities under 110 gallons by D.O.T. but the container should have MSDSs and the UN number readily available.

Standard Operating Procedures – Ethanol At-Sea

Chemical Name: 100% Alcohol

UN Number: 1170



Hazard Ratings: (on a scale of 0 to 4)

Health (blue): 2 Flammability (red): 3

Reactivity (yellow): 1 Special (white):

Personal Protection Gear Needed

*gloves

*goggles or face shield when pouring

Special Handling Instructions

* Keep away from heat, flame, and other potential ignition sources.

* Store in a well ventilated area or in a flammable cabinet.

First Aid

* If swallowed, give large amounts of drinking water and induce vomitting.

* If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.

* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

Spill Cleanup Procedures

Absorb ethanol with 3M Sorbent Pads and allow to dry in a well ventilated area away from ignition source.

Deactivation/Disposal Procedures At Sea

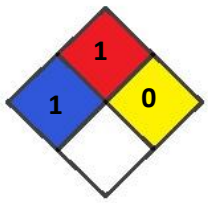
Use 3M Sorbent Pads to absorb the ethanol. Put used pads outside to dry (secure from blowing overboard and exposure to flame). Once dry, the pads may be reused or burned.

Shipping Procedures and Restrictions

Due to the flammability rating of 95% ethanol, this chemical cannot be shipped by air. Transportation by barge or land vehicle will require the ethanol container to be over-packed with absorbent materials such as clumping kitty litter or shredded paper. Include MSDSs and the UN number with the shipment for reference in the event of a spill.

ALASKA FISHERIES SCIENCE CENTER STANDARD OPERATING PROCEDURES
RACE/MACE FOR HAZARDOUS CHEMICALS
Dec 2013

Glycerin (50%)/Thymol(0.3%) solution



#1 Process	General use in the field or on research vessels for otolith preservation
#2 Hazardous Chemicals/Class of Hazardous Chemicals	100% Glycerin may cause eye or skin irritation
#3 Personal Protective Equipment/ Decontamination	Gloves, splash goggles, lab coat or rain gear. For small spills dilute with water and mop up. For larger spills, absorb with inert material. In case of skin/eye contact: flush with running water for at least 15 min. In case of ingestion: Do not induce vomiting. In case of inhalation: move to fresh air.
#4 Engineering/ Ventilation Controls	Provide exhaust venilation to keep airborne concentrations of vapors low.
#5 Special Handling Procedures and Storage Requirements	Store at room temp in tightly closed container.
#6 Waste Disposal	Dispose of waste and residues in accordance with local authority requirements. Incinerate. When released into water, this material is expected to readily biodegrade and is not expected to significantly bioaccumulate.