UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Alaska Fisheries Science Center
Resource Assessment and Conservation Engineering
7600 Sand Point Way NE
Seattle, WA 98115

FINAL Project Instructions

Date Submitted: March 28, 2016

Platform: NOAA Ship *Oscar Dyson*

Project Number: DY-16-07 (AFSC)

Project Title: FOCI/EMA Spring Ichthyoplankton

Project Dates: May 17, 2016 to June 8, 2016

Prepared by: _____ Dated: 3/28/16
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Chief Scientist
AFSC/RACE

Approved by: _____ Dated: _____
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RACE Division Director
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Approved by: _____ Dated: _____
Douglas P. DeMaster, Director
Science and Research
AFSC

Approved by: _____ Dated: _____
Captain Douglas D. Baird Jr., NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

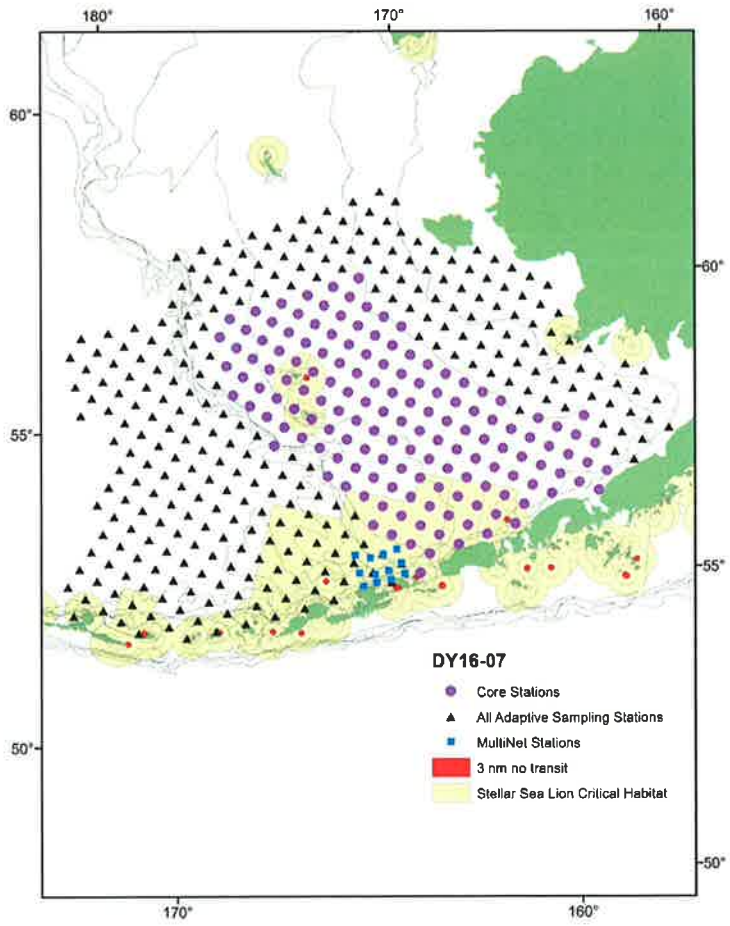
A. Brief Summary and Project Period

FOCI/EMA Spring Ichthyoplankton survey in the eastern Bering Sea, May 17 - June 8, 2016.

B. Days at Sea (DAS)

Of the 23 DAS scheduled for this project, 0 days are funded by an OMAO allocation, 23 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 – eastern Bering Sea



D. Summary of Objectives

The primary objective is to conduct an assessment of eggs and larvae of Walleye Pollock (*Gadus chalcogrammus*) over the eastern Bering Sea shelf. We will also examine the interactions among climate, weather, and ichthyoplankton distribution and abundance. This work is needed to describe larval fish assemblages and determine how physical and biological factors affect the transport and survival of fish larvae.

E. Participating Institutions

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

NOAA – Alaska Fisheries Science Center (AFSC)
TSMRI

17109 Point Lena Loop Road, Juneau, AK, 99801

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Porter, Steven	Chief Sci.	May 15	June 9	M	AFSC/FOCI	USA
Harpold, Colleen	Scientist	May 15	June 8	F	AFSC/FOCI	USA
Lamb, Jesse	Scientist	May 15	June 9	M	AFSC/FOCI	USA
Nicolls, David	Scientist	May 15	June 8	M	AFSC/EMA	USA
Randall, Jessica	Scientist	May 15	June 9	F	AFSC/FOCI	USA

G. Administrative

1. Points of Contact:
Steven Porter (Chief Scientist)
NOAA – Fisheries, Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115
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Janet Duffy-Anderson, AFSC, EcoFOCI Supervisor
7600 Sand Point Way NE, Bldg 4
Seattle WA 98115
Ph: (206) 526-6465, Janet.Duffy-Anderson@noaa.gov

Ed Farley, EMA Supervisor
TSMRI / 17109 Point Lena Loop Road
Juneau, AK, 99801
Ph: 907-789-6085, Ed.Farley@noaa.gov

Oscar Dyson
CO cell: 206-403-8433
XO cell: 206-295-0775
CME cell: 206-295-0670
Iridium: 808-659-0050
Underway VIOP: 301-713-7778
INMARSAT: 011-870-336-995-920 (voice)

Field Operations Officer, LT Carl Rhodes
ops.oscar.dyson@noaa.gov

2. Diplomatic Clearances - N/A

3. Licenses and Permits
This project will be conducted under the Blanket Scientific Research Permit #2016-B1 issued by the U.S. on January 22, 2016 effective January 30 – October 6, 2016 to AFSC research personnel and NOAA Ship *Oscar Dyson.* In addition, the State of Alaska Fish Resource Permit CF-16-010(1) has been granted and is effective January 1, 2016 to December 31, 2018.

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:

Departure: May 17, 2016 Dutch Harbor, AK
Arrival: June 8, 2016 Dutch Harbor, AK

B. Staging and Destaging

The equipment necessary for the project will have already been loaded aboard *Oscar Dyson* on the prior FOCI Spring Mooring Project. However additional gear may be loaded prior to the beginning of this project, and we request ship's assistance with loading on May 16, 2016, including use of the ship's crane and a crane operator. We will require dedicated use of the chemistry, hydrographic, wet, dry, and fish processing labs for sample and equipment preparation and request as much counter and cabinet space as possible. We will use the Dry lab for FASTCAT operations. Samples and gear will be offloaded on June 8 and also possibly on June 9, 2016 in Dutch Harbor, AK, and we request ship's assistance with this operation, including use of the ship's crane and a crane operator.

C. Operations to be Conducted: Operations for this survey will be conducted 24/7.

1. Underway Operations

The ship's Scientific Computer System (SCS) shall operate throughout the project, acquiring and logging data from navigation, meteorological, and oceanographic sensors. See FOCI Standard Operating Instructions (**SOI 5.2** and **SOI 5.3**) for specific requirements. We request that the centerboard be LOWERED for the duration of the project.

2. Station Operations

Please advise the science party if 2 survey technicians will not be available for the survey.

Spring ichthypolankton survey: The project will begin upon departure from Dutch Harbor, AK on 17 May 2016. Sampling will occur at pre-determined stations in a grid array encompassing the Unimak Island and Alaska Peninsula vicinity and potentially covering the area as far north as Zhemchug Canyon (see Operating Area – eastern Bering Sea, Appendix 1). All stations of the core sampling grid have priority to be occupied, and selected stations outside of the core grid (adaptive sampling stations) may be occupied to determine the spatial extent of Walleye Pollock larvae distribution (time and ice permitting; see Operating Area – eastern Bering Sea, Appendix 1). At each grid location plankton samples will be taken using 20/60-cm diameter bongo array equipped with a FASTCAT data recorder (temperature, salinity, depth).

CTD

The CTD (SOI 3.2.1) will be deployed at selected stations during the project determined at the discretion of the Chief Scientist and Commanding Officer. The purpose of this operation is to confirm accurate temperature and salinity measurements of the FASTCAT, and measure temperature and salinity profiles of the water column for physical oceanography. Niskin bottles may be used to sample discrete depths for chlorophyll and microzooplankton. The survey department will be given 24 hours notice when this operation will take place. One SCS button is needed to mark:

1) CTD at depth

At each station, the following should be input into the SCS before button pushes: station number, haul number, and FOCI grid designation. When the "CTD at depth" button is pushed, the following information should be displayed on the SCS screen in the survey office: depth, lat and lon (degrees and decimal minutes), wire out, date, time (GMT).

Bongo

The 20/60-cm bongo net (SOI 3.2.2) will be deployed to a depth of 300 meters, or 10 meters off the bottom, whichever is shallowest. 60-cm net mesh will be 0.505 mm for both nets, and 0.153 mm for both 20-cm bongo nets. The sample collected in Net 1 of the 60-cm bongo will be used to quantify ichthyoplankton and invertebrate zooplankton population density; it will be preserved in a 1.8% formaldehyde-seawater solution buffered with sodium borate (2%). The sample collected in Net 2 will be used to estimate Walleye Pollock larvae density and sorted for larval fish taxa of interest. Special interest taxa will be preserved in 100% EtOH in scintillation vials. Walleye Pollock larvae for condition analysis will also be taken from that net and frozen at -80°C. A subsample of zooplankton taken from that net will also be used to quantify real-time zooplankton abundance. The sample collected in Net 1 of the 20-cm bongo will be used to quantify invertebrate zooplankton population density; it will be preserved in a 1.8% formaldehyde-seawater solution buffered with sodium borate (2%). Net 2 will be used as a back-up to Net 1, and a subsample taken from it will also be used to quantify real-time zooplankton abundance. A FASTCAT profiler (with FASTCAT profiler as back-up as per Section III Equipment) will be used to position the net in real time and to obtain profiles of water temperature and salinity. Three SCS buttons are needed to mark:

1) Bongo at surface (deploy)
2) Bongo at depth
3) Bongo at surface (retrieve)

At each station, the following should be input into the SCS before button pushes: station number, haul number, and FOCI grid designation. When the bongo at depth button is pushed, the following information from the time of the "bongo at depth" button push should be displayed on the SCS screen in the survey office: depth, lat and lon (degrees and decimal minutes), wire out, date, time (GMT).

CalVET

The CalVET net (with 53-micrometer mesh) (SOI 3.2.6) for collecting Walleye Pollock larvae prey will be deployed at select stations where feeding-stage Walleye Pollock larvae are present, at the discretion of the Chief Scientist and Commanding Officer. We anticipate this operation to be conducted at approximately 30 stations. To deploy the CalVET net, the bongo array needs to be removed, and the bongo weight attached to a shackle on the FASTCAT. The CalVET needs to be attached above the FASTCAT. Standard tow depth for this operation is 60 m. The CalVET depth should be monitored by the FASTCAT and files should be saved. The net should be lowered and retrieved at a rate of 45 - 60 m/min. The tow should be vertical with the ship maneuvering only to maintain zero wire angle. If wire angle is 10° from zero (vertical) for more than 30 seconds during the tow, performance will be recorded as "questionable", and the tow may need to be redone. One SCS button is needed to mark:

1) CalVET at depth

At each station, the following should be input into the SCS before button pushes: Station number, haul number, and FOCI grid designation. When the "CalVET at depth" button is pushed, the following information should be displayed on the SCS screen in the survey office: depth, lat and lon (degrees and decimal minutes), wire out, date, time (GMT).

MultiNet

The Multi Plankton Sampler MultiNet Type Midi may be deployed to determine vertical distribution of fish larvae and zooplankton (0.333 or 0.505-mm mesh). Up to 12 stations may be sampled will be over Bering Canyon (see Operating Area – eastern Bering Sea, Appendix 1), the exact number and locations will be determined at the discretion of the Chief Scientist and Commanding Officer, and by the amount of time available. We request assistance from the ship's Electronics Technician, Survey Technician and / or Deck Department as needed to help set up the electronic and physical termination, rig the MultiNet for fishing, and help trouble shoot the MultiNet . We also request help switching between the Bongo and MultiNet on the aft oceanographic winch as needed during the project.

The MultiNet has a steel frame with a square mouth opening of .5 x .5 m that can be used with up to 5 nets to sample different water depths. This net requires a conducting cable and will be deployed off the aft oceanographic winch that the Bongo array is usually attached to. Before deployment of the Multinet, the FASTCAT and Bongo array will be detached and the MultiNet will be electronically and physically terminated to that conducting wire. For the stations over Bering Canyon the MultiNet will be used in place of the Bongo (after a CTD). If we have gear problems with the Multinet, the Bongo will be used as a backup. When we are done using the MultiNet, the FASTCAT and Bongo Array will be re-connected to continue the rest of our sampling. The MultiNet plankton samples will be processed in a similar manner as those from the Bongo, filtered and preserved in 1.8% Buffered Formaldehyde.

Winch / Fishing Rates

-Ship Speed: ~2.5-3 knots (may need to be adjusted based on conditions)

-Wire Payout Rate: 20 m per. min.
-Wire Retrieval Rate: no more than 10 m per min., possibly slower depending on how much water is being filtered.
-Target Wire Angle 55° (acceptable range 50°-60°)
-Maximum Gear Depth: ~ 300 m or 10m off bottom

Eight SCS buttons are needed to mark:

1) In the water (surface)
2) At depth
3) Net 1
4) Net 2
5) Net 3
6) Net 4
7) Net 5
8) Out of the water (surface)

Approximate sampling intervals (may change depending on bottom depth and sampling needs):
0-25 m
25-50 m
50-100 m
100-200 m
200-300 m

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 wayne.palsson@noaa.gov and jeff.napp@noaa.gov with cc to john.c.clary@noaa.gov. 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. 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.

3. 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.

4. 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) If logistically feasible, the animal should be hauled aboard the vessel and retained for pick up by the local Stranding Network. Develop a plan with Stranding Network Coordinator or regional ESA biologist and/or relevant Center scientist for carcass pickup and subsequent necropsy.

4) If the animal cannot be hauled aboard due to human safety consideration or there is no feasible way for carcass retention onboard, release animal after necessary information is collected as described below.

5) 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.

6) 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

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which can preclude normal operations: poor weather and equipment failure. Poor weather may be waited out in a sheltered area until operations can be resumed and modifications may be made to the sampling grid. Sheltered areas are of scientific interest; therefore, while waiting out poor weather, the Chief Scientist may

request sampling operations to assess local physical conditions, zooplankton, and fish populations. Equipment failure would have to be addressed immediately for the project to continue.

III. Equipment

A. Equipment and Capabilities provided by the ship (itemized)

1. Acoustic Equipment
   - GPS with NEMA 183 to ER60 (2)
   - 50/200 kHz EK60 Bridge sounder
   - Furuno FE-700 fathometer
   - Acoustic echosounders (5)

2. Oceanographic Equipment
   - Both starboard oceanographic winches with conducting cable, slip rings and blocks. Forward winch terminated for CTD/rosette; aft winch terminated for FastCat.
   - Seabird SBE 911+CTD System
   - Seabird SBE19+CTD and PDIM for real time data on zooplankton tows
   - Niskin Bottles 10 L (need 10 total+ spares)
   - SBE45 thermosalinograph with fluorometer
   - Wire speed indicators and readout for both hydrographic winches visible in dry lab or where SEACAT operations occur
   - Weather instruments for above surface PAR, wind speed/direction

3. Computing equipment
   - Scientific Computing System (SCS)
   - Computers with internet and e-mail access

4. Sample storage equipment
   - Ultracold freezer (-80C)
   - Walk in freezer (-10C)
   - Stand up freezer (-20C)
   - Hazmat storage cabinets

5. Laboratory and exterior working space
   - Use of Pentium PC in dry and/or computer lab for data analysis,
   - Remote access in the computer lab to FastCat data stored in the survey lab.
   - Video monitors in dry, chemistry, and wet labs for viewing SCS output
   - Laboratory space with exhaust hood, sink, lab tables, and storage space
   - Sea-water hoses and spray nozzles to wash nets (quarterdeck and wet lab)
   - Adequate deck lighting for night-time operations
   - Navigational equipment including GPS and radar
   - Safety harnesses for working on starboard sampling station/hero platform and fantail
   - Ship's crane(s) used for loading/unloading supplies and/or deploying gear

B. Equipment and Capabilities Provided by the Scientists (itemized)

1. Plankton Equipment
   - 60 cm bongo frames (2)
   - 20 cm bongo frames (2)
   - 60 cm bongo nets and cod-ends
   - 20 cm bongo nets and cod-ends
   - CalVET net and accessories
   - 50 kg bongo weights (2)
   - Flow meters (14)
   - Wire angle indicators (2)
   - Miscellaneous supplies

3. Oceanographic Equipment (500lbs)

- Biospherical QSP2300 PAR sensor
- SBE 43 dissolved oxygen sensor (2)
- Secondary TC sensors for SBE 911+
- FastCat (2)
- Deck unit for FastCat
- Filter racks and pumps (2)

4. Biological Sampling Equipment (500lbs)
    - 5-gal buckets (5)
    - Sieves, jar holder, funnels, squirt bottles
    - 9 cases of 32-oz jars in each of 9 wooden shipping crates
    - Jar closures, and labels
    - Preservative-dispenser equipment
    - Hazardous materials spill kit
5. Computing equipment (50lbs)
    - Desktop computers (2)
    - Cruise Operations Database (COD) software
    - Electronic and COD paper forms

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 hazardous materials is not permitted aboard NOAA ships.

B. Inventory (itemized)

Dyson loaded 28 January, 2016 by FOCI and MACE personnel. All chemicals listed will be used for the entire 2016 *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 *Dyson* before the loading of the vessel.

Common Name	**Concentration**	**Amount**	**Spill Response (all FOCI/MACE/PMEL/EMA personnel)**	**Notes**
Dihydrogen Oxide Property of PMEL		20 liters	Spill Control: W Gloves Paper towels	Not a regulated chemical/solution. Used for oxygen titrations.
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%	5 – 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%	8 – 1 liter plastic bottles	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bag	Store in Fish Lab flammable cabinet.
Formaldehyde Property of Troy Buckley	37%	16 – 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.

Hydrochloric Acid Property of PMEL		1 – 500 ml	Gloves 1-1 Spilfyter Acid Neutralizer	Stored in over-pack bucket.
Lithium 3v Batteries Property of FOCI		9	NA	Store in Survey Office for Spring Mooring Multi-Net use
Lithium 9v Batteries Property of PMEL		8	NA	In SeaBird and Wetlabs instruments
Lithium AA Batteries Property of PMEL		96	NA	In SeaBird instruments and MicroCats Saft LS14500
Lithium D Cell Batteries Property of PMEL		150	NA	In RCM9 & Peggy Mooring
Manganese Chloride Property of PMEL	3M	1 liter		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	0.11M	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 Property of	5 M	1 liter	Spill Control: A	Used for oxygen titrations.

PMEL				
FOCI Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Formalex	1 – 5 gallon 2 -1 gallon	Formaldehyde cleanup (all concentrations)	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 concentrations)	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 concentrations)	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.

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	1 liter	Absorb liquids	0.5l	
Plastic Bags	2 each	Contain used absorbents/waste	N/A	

C. Chemical safety and spill response procedures

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

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

E. Inventory (itemized) of Radioactive Materials

N/A

V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

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 conducted 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 http://www.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. 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 safety-toed shoes/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 email 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 the above 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.

E. 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.

Appendices

1. Station List (not in order of occupation, and number of stations occupied may vary).

Station Type	ID	Latitude (N)	Longitude (W)
Core	BD1	54.369	165.447
Core	BA4	54.708	165.270
Core	AX7	55.047	165.094
Core	AU4	54.947	164.502
Core	AR7	55.286	164.325
Core	AO4	55.186	163.728
Core	AL7	55.525	163.550
Core	AI4	55.424	162.950
Core	AF7	55.764	162.771
Core	Z7	56.002	161.987
Core	T7	56.241	161.199
Core	Q4	56.140	160.588
Core	N7	56.480	160.405
Core	Q10	56.580	161.019
Core	W10	56.341	161.808
Core	AC10	56.103	162.593
Core	AI10	55.864	163.373
Core	AO10	55.625	164.149
Core	AU10	55.387	164.920
Core	BA10	55.148	165.686
Core	BD7	54.809	165.859
Core	BG10	54.909	166.447
Core	BJ13	55.010	167.034
Core	BD13	55.248	166.276
Core	AX13	55.487	165.513
Core	AR13	55.726	164.746
Core	AL13	55.964	163.974
Core	AF13	56.203	163.198
Core	Z13	56.442	162.417
Core	T13	56.681	161.631
Core	N13	56.919	160.840
Core	N19	57.359	161.280
Core	Q16	57.020	161.455
Core	T19	57.120	162.068
Core	W16	56.781	162.242
Core	Z19	56.881	162.851
Core	AC16	56.542	163.024
Core	AF19	56.643	163.630
Core	AI16	56.304	163.801
Core	AL19	56.404	164.403
Core	AO16	56.065	164.574
Core	AR19	56.165	165.172
Core	AU16	55.826	165.342
Core	AX19	55.927	165.937
Core	BA16	55.588	166.106

Core	BD19	55.688	166.697
Core	BG16	55.349	166.865
Core	BJ19	55.449	167.453
Core	BM22	55.550	168.039
Core	BG22	55.788	167.287
Core	BA22	56.027	166.530
Core	AU22	56.266	165.769
Core	AO22	56.505	165.004
Core	AI22	56.743	164.234
Core	AC22	56.982	163.459
Core	W22	57.221	162.680
Core	AF25	57.082	164.066
Core	AL25	56.844	164.837
Core	AR25	56.605	165.604
Core	AX25	56.366	166.365
Core	BD25	56.128	167.123
Core	BJ25	55.889	167.876
Core	BP25	55.650	168.625
Core	BM28	55.989	168.464
Core	BG28	56.228	167.714
Core	BA28	56.467	166.960
Core	AU28	56.705	166.202
Core	AO28	56.944	165.439
Core	AI28	57.183	164.672
Core	AC28	57.422	163.900
Core	AF31	57.522	164.508
Core	AI34	57.623	165.115
Core	AL31	57.283	165.276
Core	AO34	57.384	165.879
Core	AR31	57.045	166.040
Core	AU34	57.145	166.639
Core	AX31	56.806	166.799
Core	BA34	56.906	167.395
Core	BD31	56.567	167.554
Core	BG34	56.668	168.146
Core	BJ31	56.329	168.304
Core	BM34	56.429	168.893
Core	BP31	56.090	169.050
Core	BS34	56.190	169.635
Core	BY34	55.952	170.374
Core	BV37	56.291	170.219
Core	BP37	56.529	169.480
Core	BJ37	56.768	168.737
Core	BD37	57.007	167.989
Core	AX37	57.246	167.238
Core	AR37	57.484	166.481
Core	AL37	57.723	165.720
Core	AO40	57.823	166.325
Core	AU40	57.585	167.082
Core	BA40	57.346	167.834
Core	BG40	57.107	168.583

Core	BM40	56.869	169.327
Core	BS40	56.630	170.067
Core	BY40	56.391	170.802
Core	CB43	56.492	171.384
Core	BV43	56.730	170.652
Core	BP43	56.969	169.916
Core	BJ43	57.208	169.175
Core	BD43	57.447	168.430
Core	AX43	57.685	167.681
Core	AR43	57.924	166.928
Core	AU46	58.024	167.530
Core	BA46	57.786	168.280
Core	BG46	57.547	169.025
Core	BM46	57.308	169.766
Core	BS46	57.070	170.503
Core	BY46	56.831	171.236
Core	CE46	56.592	171.965
Core	CB49	56.931	171.819
Core	BV49	57.170	171.090
Core	BP49	57.409	170.356
Core	BJ49	57.647	169.619
Core	BD49	57.886	168.877
Core	AX49	58.125	168.131
Core	AR49	58.364	167.380
Core	AU52	58.464	167.983
Core	BA52	58.225	168.730
Core	BG52	57.987	169.473
Core	BM52	57.748	170.211
Core	BS52	57.509	170.945
Core	BY52	57.271	171.675
Core	CE52	57.032	172.401
Core	CB55	57.371	172.259
Core	BV55	57.610	171.533
Core	BP55	57.848	170.802
Core	BJ55	58.087	170.067
Core	BD55	58.326	169.328
Core	AX55	58.564	168.585
Core	BA58	58.665	169.186
Core	BG58	58.426	169.926
Core	BM58	58.188	170.661
Core	BS58	57.949	171.392
Core	BY58	57.710	172.119
Core	CE58	57.471	172.843
Core	CB61	57.811	172.705
Core	BV61	58.049	171.981
Core	BP61	58.288	171.253
Core	BJ61	58.527	170.522
Core	BD61	58.765	169.786
Core	AX61	59.004	169.046
Adaptive	H7	56.719	159.626
Adaptive	E10	57.059	159.418

Adaptive	K10	56.819	160.224
Adaptive	ZY10	57.297	158.630
Adaptive	H13	57.155	160.064
Adaptive	B13	57.399	159.260
Adaptive	E16	57.494	159.850
Adaptive	K16	57.258	160.663
Adaptive	ZY16	57.739	159.069
Adaptive	H19	57.607	160.516
Adaptive	B19	57.858	159.720
Adaptive	K22	57.698	161.107
Adaptive	Q22	57.459	161.896
Adaptive	E22	57.950	160.338
Adaptive	ZY22	58.200	159.532
Adaptive	N25	57.799	161.725
Adaptive	T25	57.560	162.510
Adaptive	Z25	57.321	163.291
Adaptive	H25	58.045	160.955
Adaptive	B25	58.294	160.157
Adaptive	K28	58.138	161.556
Adaptive	Q28	57.899	162.342
Adaptive	W28	57.660	163.123
Adaptive	N31	58.238	162.176
Adaptive	T31	57.999	162.958
Adaptive	Z31	57.761	163.735
Adaptive	H31	58.488	161.383
Adaptive	K34	58.577	162.011
Adaptive	Q34	58.339	162.794
Adaptive	W34	58.100	163.572
Adaptive	AC34	57.861	164.346
Adaptive	N37	58.678	162.632
Adaptive	T37	58.439	163.411
Adaptive	Z37	58.200	164.185
Adaptive	AF37	57.962	164.955
Adaptive	K40	59.017	162.472
Adaptive	Q40	58.778	163.252
Adaptive	W40	58.540	164.027
Adaptive	AC40	58.301	164.797
Adaptive	AI40	58.062	165.563
Adaptive	N43	59.117	163.094
Adaptive	T43	58.879	163.870
Adaptive	Z43	58.640	164.641
Adaptive	AF43	58.401	165.408
Adaptive	AL43	58.163	166.170
Adaptive	K46	59.457	162.939
Adaptive	Q46	59.218	163.715
Adaptive	W46	58.979	164.487
Adaptive	AC46	58.740	165.255
Adaptive	AI46	58.502	166.017
Adaptive	AO46	58.263	166.776
Adaptive	N49	59.557	163.562
Adaptive	T49	59.318	164.335

Adaptive	Z49	59.080	165.103
Adaptive	AF49	58.841	165.867
Adaptive	AL49	58.602	166.626
Adaptive	Q52	59.658	164.185
Adaptive	W52	59.419	164.953
Adaptive	AC52	59.180	165.718
Adaptive	AI52	58.941	166.477
Adaptive	AO52	58.703	167.232
Adaptive	T55	59.758	164.806
Adaptive	Z55	59.519	165.571
Adaptive	AF55	59.281	166.331
Adaptive	AL55	59.042	167.087
Adaptive	AR55	58.803	167.838
Adaptive	W58	59.858	165.426
Adaptive	AC58	59.620	166.186
Adaptive	AI58	59.381	166.943
Adaptive	AO58	59.142	167.695
Adaptive	AU58	58.904	168.443
Adaptive	AF61	59.720	166.801
Adaptive	AL61	59.482	167.554
Adaptive	AR61	59.243	168.302
Adaptive	AI64	59.821	167.415
Adaptive	AO64	59.582	168.163
Adaptive	AU64	59.343	168.908
Adaptive	BJ1	54.130	166.210
Adaptive	BV1	53.653	167.723
Adaptive	CB1	53.414	168.473
Adaptive	CH1	53.176	169.218
Adaptive	CN1	52.937	169.960
Adaptive	CT1	52.698	170.697
Adaptive	CZ1	52.459	171.430
Adaptive	BG4	54.470	166.034
Adaptive	BM4	54.231	166.794
Adaptive	BS4	53.992	167.549
Adaptive	BY4	53.753	168.300
Adaptive	CE4	53.515	169.046
Adaptive	CK4	53.276	169.789
Adaptive	CQ4	53.037	170.527
Adaptive	CW4	52.799	171.261
Adaptive	DC4	52.560	171.991
Adaptive	DI4	52.321	172.716
Adaptive	BJ7	54.570	166.620
Adaptive	BP7	54.331	167.376
Adaptive	BV7	54.093	168.128
Adaptive	CB7	53.854	168.875
Adaptive	CH7	53.615	169.619
Adaptive	CN7	53.377	170.358
Adaptive	CT7	53.138	171.093
Adaptive	CZ7	52.899	171.823
Adaptive	DF7	52.660	172.550
Adaptive	DL7	52.422	173.273

Adaptive	BM10	54.670	167.205
Adaptive	BS10	54.432	167.957
Adaptive	BY10	54.193	168.706
Adaptive	CE10	53.954	169.450
Adaptive	CK10	53.716	170.190
Adaptive	CQ10	53.477	170.926
Adaptive	CW10	53.238	171.657
Adaptive	DC10	53.000	172.385
Adaptive	DI10	52.761	173.109
Adaptive	DO10	52.522	173.829
Adaptive	DU10	52.283	174.545
Adaptive	BP13	54.771	167.788
Adaptive	BV13	54.532	168.537
Adaptive	CB13	54.294	169.282
Adaptive	CH13	54.055	170.023
Adaptive	CN13	53.816	170.760
Adaptive	CT13	53.577	171.493
Adaptive	CZ13	53.339	172.221
Adaptive	DF13	53.100	172.946
Adaptive	DL13	52.861	173.667
Adaptive	DR13	52.623	174.383
Adaptive	BM16	55.110	167.619
Adaptive	BS16	54.871	168.370
Adaptive	BY16	54.633	169.116
Adaptive	CE16	54.394	169.858
Adaptive	CK16	54.155	170.595
Adaptive	CQ16	53.917	171.329
Adaptive	CW16	53.678	172.058
Adaptive	DC16	53.439	172.784
Adaptive	DI16	53.200	173.505
Adaptive	DO16	52.962	174.223
Adaptive	DU16	52.723	174.937
Adaptive	BP19	55.211	168.204
Adaptive	BV19	54.972	168.951
Adaptive	CB19	54.733	169.693
Adaptive	CH19	54.494	170.432
Adaptive	CN19	54.256	171.166
Adaptive	CT19	54.017	171.897
Adaptive	CZ19	53.778	172.623
Adaptive	DF19	53.540	173.345
Adaptive	DL19	53.301	174.064
Adaptive	DR19	53.062	174.779
Adaptive	BS22	55.311	168.787
Adaptive	BY22	55.072	169.530
Adaptive	CE22	54.834	170.270
Adaptive	CK22	54.595	171.005
Adaptive	CQ22	54.356	171.736
Adaptive	CW22	54.118	172.464
Adaptive	DC22	53.879	173.187
Adaptive	DI22	53.640	173.906
Adaptive	DO22	53.401	174.621

Adaptive	BV25	55.412	169.369
Adaptive	CB25	55.173	170.109
Adaptive	CH25	54.934	170.845
Adaptive	CN25	54.695	171.577
Adaptive	CT25	54.457	172.305
Adaptive	CZ25	54.218	173.029
Adaptive	DF25	53.979	173.749
Adaptive	DL25	53.741	174.465
Adaptive	BS28	55.751	169.209
Adaptive	BY28	55.512	169.950
Adaptive	CE28	55.273	170.687
Adaptive	CK28	55.035	171.419
Adaptive	CQ28	54.796	172.148
Adaptive	CW28	54.557	172.873
Adaptive	DC28	54.318	173.594
Adaptive	DI28	54.080	174.311
Adaptive	BV31	55.851	169.792
Adaptive	CB31	55.612	170.529
Adaptive	CH31	55.374	171.263
Adaptive	CN31	55.135	171.993
Adaptive	CT31	54.896	172.718
Adaptive	CZ31	54.658	173.440
Adaptive	DF31	54.419	174.157
Adaptive	DL31	54.180	174.871
Adaptive	CE34	55.713	171.108
Adaptive	CK34	55.474	171.838
Adaptive	CQ34	55.236	172.565
Adaptive	CW34	54.997	173.287
Adaptive	DC34	54.758	174.005
Adaptive	DI34	54.519	174.720
Adaptive	CB37	56.052	170.954
Adaptive	CH37	55.813	171.685
Adaptive	CN37	55.575	172.412
Adaptive	CT37	55.336	173.135
Adaptive	CZ37	55.097	173.854
Adaptive	DF37	54.859	174.570
Adaptive	CE40	56.153	171.534
Adaptive	CK40	55.914	172.262
Adaptive	CQ40	55.675	172.985
Adaptive	CW40	55.436	173.705
Adaptive	DC40	55.198	174.421
Adaptive	CH43	56.253	172.113
Adaptive	CN43	56.014	172.837
Adaptive	CT43	55.776	173.557
Adaptive	CZ43	55.537	174.274
Adaptive	DF43	55.298	174.987
Adaptive	CK46	56.353	172.690
Adaptive	CQ46	56.115	173.411
Adaptive	CW46	55.876	174.128
Adaptive	DC46	55.637	174.842
Adaptive	CN49	56.454	173.267

Adaptive	CT49	56.215	173.984
Adaptive	CZ49	55.977	174.698
Adaptive	CH49	56.693	172.545
Adaptive	DF49	55.752	175.425
Adaptive	DL49	55.517	176.138
Adaptive	CQ52	56.554	173.842
Adaptive	CW52	56.316	174.556
Adaptive	CK52	56.793	173.123
Adaptive	DC52	56.087	175.288
Adaptive	DI52	55.853	176.001
Adaptive	CN55	56.894	173.701
Adaptive	CT55	56.655	174.416
Adaptive	CH55	57.132	172.982
Adaptive	CZ55	56.410	175.138
Adaptive	DF55	56.178	175.855
Adaptive	DL55	55.944	176.571
Adaptive	CQ58	56.994	174.277
Adaptive	CW58	56.755	174.989
Adaptive	CK58	57.233	173.562
Adaptive	DC58	56.527	175.725
Adaptive	DI58	56.289	176.441
Adaptive	CN61	57.333	174.141
Adaptive	CT61	57.095	174.853
Adaptive	CH61	57.572	173.425
Adaptive	CZ61	56.853	175.584
Adaptive	DF61	56.618	176.301
Adaptive	DL61	56.387	177.018
Adaptive	CQ64	57.434	174.718
Adaptive	CK64	57.672	174.006
Adaptive	BA64	59.105	169.648
Adaptive	BG64	58.866	170.384
Adaptive	BM64	58.627	171.117
Adaptive	BS64	58.388	171.845
Adaptive	BY64	58.150	172.569
Adaptive	CE64	57.911	173.289
Adaptive	AU64	59.349	168.912
Adaptive	CW64	57.204	175.457
Adaptive	DC64	56.970	176.181
Adaptive	DI64	56.742	176.894
Adaptive	AL67	59.921	168.027
Adaptive	AR67	59.682	168.772
Adaptive	AX67	59.444	169.513
Adaptive	CN67	57.773	174.586
Adaptive	CB67	58.250	173.156
Adaptive	BV67	58.489	172.435
Adaptive	BP67	58.728	171.710
Adaptive	BJ67	58.966	170.982
Adaptive	BD67	59.205	170.249
Adaptive	CH67	58.012	173.872
Adaptive	AU70	59.783	169.379
Adaptive	AO70	60.049	168.560

Adaptive	CK70	58.112	174.455
Adaptive	BA70	59.544	170.116
Adaptive	BG70	59.306	170.849
Adaptive	BM70	59.067	171.578
Adaptive	BS70	58.828	172.303
Adaptive	BY70	58.589	173.024
Adaptive	CE70	58.351	173.741
Adaptive	AR73	60.135	169.195
Adaptive	AL73	60.402	168.416
Adaptive	CB73	58.690	173.612
Adaptive	BV73	58.929	172.895
Adaptive	BP73	59.167	172.173
Adaptive	BJ73	59.406	171.448
Adaptive	BD73	59.645	170.718
Adaptive	AX73	59.883	169.985
Adaptive	CH73	58.451	174.326
Adaptive	AU76	60.236	169.820
Adaptive	AO76	60.502	169.019
Adaptive	CK76	58.552	174.909
Adaptive	BA76	59.984	170.590
Adaptive	BG76	59.745	171.320
Adaptive	BM76	59.506	172.045
Adaptive	BS76	59.268	172.767
Adaptive	BY76	59.029	173.485
Adaptive	CE76	58.790	174.199
MultiNet	UT5	53.970	166.970
MultiNet	UT3	54.175	167.150
MultiNet	UT1	54.452	167.380
MultiNet	AW5	54.458	166.938
MultiNet	AW3	54.205	166.710
MultiNet	AW1	54.072	166.620
MultiNet	AE1	54.168	166.233
MultiNet	AE3	54.305	166.350
MultiNet	AE5	54.562	166.593
MultiNet	UBW4	54.688	166.237
MultiNet	UBW2	54.472	166.039
MultiNet	UBW0	54.310	165.883

HYDRO-BIOS

MultiNet®

Multi Plankton Sampler

Features:

- Combined online/offline use (standard)
- Bi-directional communication
- Standard depth range 3000 m
- Long distance FSK-telemetry (> 10000m)
- Low power consumption
- Battery operated Underwater Unit, max. voltage of 5 V at the conductor cable
- Electronics operate from -40°C up to +85°
- EC-conformity (CE) EN 50081-1, EN 50082-1
- expandable range of sensors

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The System

Sampling sea and ocean at its best - with the improved MultiNet® generation of the Multiple Plankton Sampler, the worlds leading sampling system for horizontal and vertical collections in successive water layers.

New: for combined online/offline use

Equipped with 5 resp. 9 net bags the MultiNet® can be delivered in 4 sizes (apertures) : Mini (0.125 m²), Midi (0.25 m²), Maxi (0.5 m²) and Mammoth (1 m²).

The system consists of a mains powered Deck Command Unit and a stainless steel frame with canvas part to which 5 (9) net bags are attached by means of zip fasteners. The net bags are opened and closed by means of an arrangement of levers which are triggered by a battery powered Motor Unit. The commands for actuation of the net bags are given via single or multi-conductor cable (not included in our scope of delivery) between the Underwater Unit and the Deck Command Unit.

A wide selection of mesh sizes for the net bags is available to meet the requirements of all standard and non-standard applications. For common horizontal collections a mesh size of 300 microns (mesh sizes from 100 to 500 microns available) is recommended, for vertical collections mesh sizes from 55 to 500 micron are applicable.

An integrated Pressure Sensor (measuring range according to customer´s requirements) allows continuous supervision of the actual operating depth which is indicated together with all relevant system data at the LCD-display of the Deck Command Unit.

Two Electronic Flow Meters with automatic angle compensation are mounted to the Underwater Unit: one inside the opening of the Underwater Unit for the determination of the amount of water passing through the opened nets, one outside the opening for the determination of clogging effects.

For horizontal collections the MultiNet® is used with a V-Fin Depth Depressor, to carry out vertical collections, a stainless steel support is securely attached to the bucket holder and enables a quick lowering to depth.

Operation

In its initial position the MultiNet® is brought to water with all net bags closed. The water flows freely through the frame allowing to lower it to the greatest desired depth with high paying out speed where the first net bag is opened by push button control from the Deck Command Unit. At the end of the desired period of horizontal collection resp. after passing the desired depth interval in case of vertical operation, the first net bag is closed by a second command. The second net is opened simultaneously. This procedure is repeated for the remaining net bags, while the Deck Command Unit indicates the number of the active net bag. During operations of Mini and Midi versions the last net (no. 5) remains open, it collects plankton from the smallest desired depth up to the water surface.

During operations of the Maxi and Mammoth versions the last net (no. 9) can be closed before reaching the water surface.

The Specialties

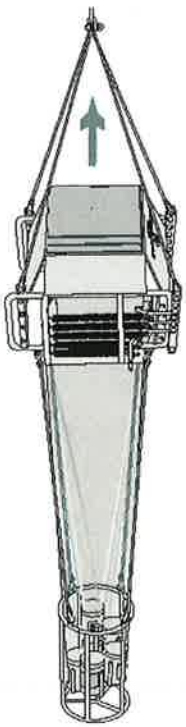
Offline Use
In case that a conducting cable is not available on board of the vessel, the required sampling depth can be pre-programmed via personal computer. During offline use the activation of the net bags is carried out automatically according to the pre-selected depth intervals. All measuring data are stored inside the internal data memory of 16 MByte during the operation and can be read by a PC when the MultiNet® is back on board.

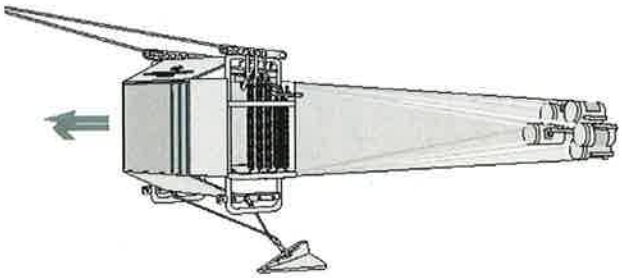
Options

CT-Set
Together with the optional CT-Set the system offers the full capability of a state-of-the-art oceanographic Multi Parameter Probe. The CT-Set consists of one conductivity sensor, one temperature sensor and an additional electronics board which are completely integrated into the Motor Unit of the MultiNet®. From the CTD data the system computes salinity, density and sound velocity according to UNESCO formulas.

CT-Set for MultiNet®
Conductivity sensor: 0 ... 65 ± 0.01 mS/cm,
Temperature sensor: -2 ... +32 ± 0.005 °C
Data rate : 1 Hz (1 data set per second)

No. 450 500





./ Additional sensors of various parameters
./ Special version for operational depths down to 6000 metres
./ Pitch and Roll sensor (standard for the Mammoth)

Technical Data

Underwater Unit:	Type Mini No. 438 120	Type Midi No. 438 130	Type Maxi No. 438 140	Type Mammoth No. 438 180
Dimensions (w x l x h):	65 cm x 90 cm x 80 cm	80 cm x 90 cm x 95 cm	120 cm x 110 cm x 135 cm	150 cm x 120 cm x 160 cm
Net opening:	35.5 cm x 35.5 cm = 0.125 m²	50 cm x 50 cm = 0.25 m²	71 cm x 71 cm = 0.5 m²	100 cm x 100 cm = 1 m²
Net Bags:	5 pcs., length: 160 cm	5 pcs., length: 250 cm	9 pcs., length: 365 cm	9 pcs., length: 550 cm
Standard mesh size:	300 microns	300 microns	300 microns	300 microns
Net Buckets:	5 pcs., 11 cm dia.	5 pcs., 11 cm dia.	9 pcs., 11 cm dia.	9 pcs., 11 cm dia.
	5 pcs. Soft Net Bucket	5 pcs. Soft Net Bucket	9 pcs. Soft Net Bucket	9 pcs. Soft Net Bucket
Weights:				
Net Frame:	approx. 75 kg	approx. 100 kg	approx. 260 kg	approx. 390 kg
Stainless Steel Support:	approx. 30 kg	approx. 50 kg	approx. 70 kg	approx. 100 kg
V-Fin Depth Depressor:	approx. 22 kg	approx. 22 kg	approx. 70 kg	approx. 70 kg
Overall length ready for operation (from bridle to net bucket):	470 cm	560 cm	800 cm	1000 cm
Materials:				
Net frame:	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
Motor Unit and Battery Housing:	Titanium	Titanium	Titanium	Titanium
Net Bags:	Polyamide	Polyamide	Polyamide	Polyamide
Net Buckets:	PVC/ Canvas	PVC/ Canvas	PVC/ Canvas	PVC/ Canvas
V-Fin Depth Depressor:	Aluminium, lead-weighted	Aluminium, lead-weighted	Aluminium, lead-weighted	Aluminium, lead-weighted
Operational Depth:	Standard 3000 metres	Standard 3000 metres	Standard 3000 metres	Standard 3000 metres
Pressure Sensor:	Standard 3000.0 dbar ± 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar ± 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar ± 0.1% f.s. (other ranges on request)	Standard 3000.0 dbar ± 0.1% f.s. (other ranges on request)
Connection Plug:	SUBCONN BH 2 M	SUBCONN BH 2 M	SUBCONN BH 2 M	SUBCONN BH 2 M
Cable Counter Plug:	SUBCONN IL 2 F	SUBCONN IL 2 F	SUBCONN IL 2 F	SUBCONN IL 2 F
Cable connection:	Single- or multi-conductor cable, one pole can be in contact with sea water			
Breaking load:				
for shallow water applications (up to 500 m):	approx. 1500 kg	approx. 2000 kg	approx. 4000 kg	approx. 8000 kg
for deep sea applications (from 500 m up to 3000 m):	approx. 5000 kg	approx. 8000 kg	approx. 12000 kg	approx. 18000 kg
Max. cable resistance (go-and-return line):	1000 Ohms	1000 Ohms	1000 Ohms	1000 Ohms
Deck Command Unit:	Metal housing for use in 19" rack or as table housing, not for use on deck; push button control for net changing; indication of net number, pressure, battery status, ... Supertwist LCD-display with LED backlight; Interface for Personal Computer (RS 232)			
Power Supply:				
Underwater Unit:	3 Lithium Batteries DL 123 A/3V, sufficient for approx. 100 hours operation			
Deck Command Unit:	85 - 260 VAC	85 - 260 VAC	85 - 260 VAC	85 - 260 VAC
Towing Speed:				
Recommended for nets with 300 microns standard mesh size:				
Horizontal Collections:	max. 4 knots	max. 4 knots	max. 4 knots	max. 4 knots
Vertical Collections	max. 1 m per sec.	max. 1 m per sec.	max. 1 m per sec.	max. 1 m per sec.

The single- or multi-conductor cable is not included in our scope of delivery.