UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Marine and Aviation Operations
Marine Operations Center
439 W. York Street
Norfolk, VA 23510-1114

MEMORANDUM FOR: Master Donn Pratt, NOAA
Commanding Officer, NOAA Ship *Gordon Gunter*

FROM: Captain Anne K. Lynch, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for GU-14-06
Pelagic Acoustic Trawl

Attached is the final Project Instruction for GU-14-06, Pelagic Acoustic Trawl, which is scheduled aboard NOAA Ship *Gordon Gunter* during the period of October 8 to November 21, 2014. Of the 41 DAS scheduled for this project, 41 DAS are funded by a Line Office allocation. This project is estimated to exhibit a High Operational Tempo. Acknowledge receipt of these instructions via e-mail to **OpsMgr.MOA@noaa.gov** at Marine Operations Center-Atlantic.

Attachment

cc:
MOA1

U. S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center

3209 Frederic Street
Pascagoula, MS 39567

Project Instructions

Date Submitted: 09/04/2014

Platform: NOAA Ship GORDON GUNTER

Cruise Number: GU-14-06

Project Title: Pelagic Acoustic Trawl

Cruise Dates: 10/08/2014 - 11/21/2014

Prepared by: Michael Hendon Digitally signed by Michael Hendon DN: cn=Michael Hendon, o, ou, email=michael.hendon@noaa.gov, c=US Date: 2014.09.04 13:06:54 -05'00' Date: 09/04/2014
Field Party Chief

Approved by: DESFOSSE.LISA.L.1365834519 Digitally signed by DESFOSSE.LISA.L.1365834519 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=DESFOSSE.LISA.L.1365834519 Date: 2014.09.08 09:22:48 -05'00' Date: 09/08/2014
Lab Director

Approved by: Theo R. Brainerd Digitally signed by Theo R. Brainerd DN: cn=Theo R. Brainerd, o=NOAA/NMFS, ou=SEFSC, email=theo.brainerd@noaa.gov, c=US Date: 2014.09.08 10:33:49 -04'00' Date: 09/08/2014
Dr. Bonnie Ponwith
Director, SEFSC

Approved by: CAPT/NOAA Date: 10/2/2014
Captain Anne K. Lynch, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. Brief Summary and Project Period

Sample the northern Gulf of Mexico (GOM) with 90 ft high-opening fish trawl to determine the abundance and distribution of pelagic fish species from October 8 to November 21, 2014.

B. Days at Sea (DAS)

Of the 41 DAS scheduled for this project, __ DAS are funded by an OMAO allocation, 41 DAS are funded by a Line Office Allocation, __ DAS are Program Funded, and_ DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area

Northern GOM between 80°00' and 97°00' W in depths of 30 to 275 fm (Figure 1). Approximate station locations will be provided to the Operations Officer on a CD for importing into Nobeltec Visual Navigation Suite software.

D. Summary of Objectives

1. Primary Objectives
   a. Sample the northern GOM with 90-ft high-opening fish trawl to determine the abundance and distribution of pelagic fish species.
   b. Collect length frequency data and biological samples of collected species.
   c. Conduct conductivity/temperature/depth (CTD) casts to profile temperature, salinity, conductivity, transmissivity, dissolved oxygen concentrations, and fluorometry.
   d. Collect ichthyoplankton samples with bongo and neuston samplers to map the distribution of fish eggs and larvae.
   e. Collect benthic infauna with a mini multicorer, Shipek grab and/or box grab at selected trawl stations.
   f. Collect acoustic data with EK60.
   g. Calibration of the EK60.

2. Secondary Objectives
   a. Conduct additional ichthyoplankton samples with bongo and neuston samplers.
   b. Conduct additional trawl sampling.
   c. Conduct additional CTD casts.

E. Participating Institutions

1. National Marine Fisheries Service (NMFS) – Pascagoula Laboratory
2. Troy University
3. University of Rhode Island
4. University of Southern Mississippi

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

Name (Last, First)	Title	Leg	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Adam Pollack	FPC	1	10/8	10/27	M	Riverside, Pascagoula	US
Trey Driggers	Fishery Biologist	1	10/8	10/27	M	NMFS, Pascagoula	US
Kevin Rademacher	Fishery Biologist	1 2	10/8 11/1	10/27 11/21	M	NMFS, Pascagoula	US
Paul Felts	Fishery Biologist	1	10/8	10/27	M	NMFS, Pascagoula	US
Alonzo Hamilton	Fishery Biologist	1	10/8	10/27	M	NMFS, Pascagoula	US
Nick Hopkins	FMES	1	10/8	10/27	M	NMFS, Pascagoula	US
Ashley Marranzino	Volunteer	1	10/8	10/27	F	URI	US
Ceil Martinec	Volunteer	1	10/8	10/27	F	Troy	US
Jonathan Miller	Volunteer	1	10/8	10/27	M	Troy	US
Matthew Lodato	Volunteer	1 2	10/8 11/1	10/27 11/21	M	GCRL	US
Michael Hendon	FPC	2	11/1	11/21	M	NMFS, Pascagoula	US
Mark Grace	Fishery Biologist	2	11/1	11/21	M	NMFS, Pascagoula	US
Kevin Barry	Fishery Biologist	2	11/1	11/21	M	NMFS, Pascagoula	US
John Moser	Fishery Biologist	2	11/1	11/21	M	NMFS, Pascagoula	US
Keith Bates	FMES	2	11/1	11/21	M	Riverside, Pascagoula	US
Lauren Jackson	Fishery Biologist	2	11/1	11/21	F	Riverside, Pascagoula	US
Kenny Wilkinson	Fishery Biologist	2	11/1	11/21	M	NMFS, Pascagoula	US

G. Administrative

1. Points of Contacts:

a. Field Party Chief: Michael Hendon; 3209 Frederic St., Pascagoula, MS 39567; (228) 549-1643; Michael.Hendon@noaa.gov

b. Field Party Chief: Adam Pollack; 3209 Frederic St., Pascagoula, MS 39567; (228) 549-1613; Adam.Pollack@noaa.gov

c. Trawl Unit Leader: Gilmore “Butch” Pellegrin; 3209 Frederic St., Pascagoula, MS 39567; (228) 549-1688; Gilmore.Pellegrin@noaa.gov

d. OPS Officer: Marc Weekley; NOAA Ship Gordon Gunter, 151 Watts Avenue, Pascagoula, MS 39567; (228) 769-7905; OPS.Gordon.Gunter@noaa.gov

2. Diplomatic Clearances: N/A

3. Licenses and Permits

This project will be conducted under the Scientific Research Permits (U.S.) issued by National Marine Fisheries Service on April 23, 2013 to Brandi Noble.

a. NMFS Southeast Regional Office
b. NMFS Sea Turtle Permit
c. Texas Scientific Research Permit: SPR-0596-796
d. Louisiana Saltwater Scientific Collection Permit: Permit No. 1953
e. Mississippi Saltwater Scientific Collection Permit
f. Alabama Saltwater Scientific Collection Permit
g. Florida Special Activity License: Permit No. SAL-14-0135-SR

II. Operations

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

A. Project Itinerary

Leg	Date	Depart/Arrive Location	Sea Days
Leg 1	10/08/2014	Depart Pascagoula, MS	20
	10/27/2014	Arrive Pascagoula, MS	
Leg 2	11/01/2014	Depart Pascagoula, MS	21
	11/21/2014	Arrive Pascagoula, MS	

B. Staging and Destaging:
Pascagoula, MS/Pascagoula, MS

C. Operations to be conducted:
Operational Plans:
Upon departure from Pascagoula on October 8, the ship is requested to conduct scientific operations at preselected stations between 30 and 275 fm from the south Texas coast to the south Florida coast (Figure 1). The 41-day cruise will be conducted in two legs, requiring 24 hr operations with two scientific watches:

12 am - 12 pm, 12 pm - 12 am. The FPC will provide work charts (NOS Coast Survey Chart numbers 11420-Havana to Tampa Bay, 11400-Tampa Bay to Cape San Blas, 11360-Cape St. George to Mississippi Passes, 11300-Galveston to Rio Grande, and 11340-Mississippi River to Galveston) with colored dots representing station locations. Blue dots represent trawling stations and green dots represent ichthyoplankton stations. Hang locations (derived from past surveys) will also be identified on charts with yellow dots to assist OODs in determining non-trawlable bottom.

Operations at trawling stations will consist of CTD casts followed by trawling tows. At selected trawling sites a bottom grab will be attempted. Operations at ichthyoplankton stations will consist of CTD casts followed by bongo and neuston tows. At locations where trawl/ichthyoplankton samplings are combined, operations will consist of CTD casts, bongo tows, neuston tows then trawl tows. The FPC or Watch Leader may alter the order of activities to facilitate catch processing.

Communication between the scientists and the bridge while on station will be accomplished via hand held radios. During rough weather, the watch leader with consultation from the ship's crew will determine which sampling gear can be deployed safely. The FPC should be notified of any delays to sampling due to mechanical, medical, or weather issues as well.

At some point during the cruise we would like to calibrate the EK60. Ideally we would like to anchor the ship in a minimum of 40m of water with minimal wind and waves. If we are not shallow enough to anchor, we would like to conduct the calibration while drifting. We expect this calibration to take 12 to 24 hours to complete.

PRIMARY STATION OPERATIONS

At the Bridge's 10 min warning, scientists and deck personnel will proceed to duty stations and prepare for station. Scientists and deck personnel should be ready and standing by for bridge's call that the ship is on station and ready to proceed. Smoking is not permitted near or while handling any plankton nets due to the likelihood of burning holes in the nets.

CTD profiles and environmental data collection

After the CTD array is overboard, clear of all personnel and being lowered to just below the surface, the watch leader (lab scientist) will turn on the power to the unit and start the CTD recording. The unit must remain at the surface for 3 min to allow the unit to equilibrate to ambient temperature, after which time the unit is lowered to approximately 2 m above the bottom or a max depth of 500 m. After the cast, the CTD should be carefully set on deck, taking care not to jar the sensitive electronics. At least once a week, a water sample will be taken during a

CTD cast. During these casts, the CTD protocol will be as described with the exception that the CTD unit will be held at max depth for 1 min, a water sample collected, and then retrieved. The watch leader will clear the y-connections periodically throughout the cruise. Additional environmental data collected during daylight hours are water color Forel-Ule, percent cloud cover, and sea condition. The CTD will be in use 24 hours/day. Dissolved oxygen concentrations from sensors on the CTD will be verified using an Orion 3 Star Portable D.O. meter made by Thermo Scientific at the beginning of each leg and then every five days by the FPC.

Trawl Sampling

At proposed trawling sites, the ship is asked to survey the bottom along the path of the upcoming tow to check for obstructions that may damage the trawl. If the trawl path is determined to be clear of obstructions, the ship will proceed to conduct one tow with the 90-ft trawl. If the trawl path is determined to be untrawlable, then the ship is requested to move no more than 5 miles from the trawl location and survey again. A maximum of three surveys will be conducted. If after the third survey the trawl path is still untrawlable, then the station will be dropped and the ship will proceed to the next station. Each trawl will be towed for 30 min after the gear has sufficiently settled on the bottom as determined by the ITI net mensuration system, descent rate charts, and/or judgment of the Chief Boatswain. The net will be towed at approximately 3 to 3.5 kt (speed over ground), and exact tow speed will be determined by the behavior of the gear (i.e., the head rope will need to be fished at 8 m from the bottom, and the foot rope will need to remain near the bottom). Tow depth will be kept as close to constant as possible and depend upon the depth at the beginning of the tow. At the end of the 30 min tow, the ship is requested to quickly increase speed to 5 kt for 2-5 min. This pulse will help force fish in the body of the net into the cod end. Upon completing a station, the ship will proceed to the next sampling site. The deck department is requested to shake down the net after each tow to remove all organisms. For larger catches the deck department may be requested to weigh the catch with a crane scale. If the net is damaged during the trawl but there are organisms, the deck crew is requested to remove all organisms before proceeding with net repair if net repair is at all possible. In the case of the loss of a trawl net, the ship will attempt retrieval of net by towing a chain with a large grapple along the trawl track in the opposite direction of the initial tow. The amount of time dedicated to trawl retrieval will be decided by the FPC. At any time that the trawl is not secure by the deck department, the scientific party will don personal protective equipment (PPE), which includes, but not limited to, work vest and hardhat. In case of extreme mud in the net, the deck department, OOD, and watch leader will determine the best way to wash down the gear before the catch is emptied from the net.

Grab Samples

Grab sample operations will be conducted with a mini multicorer, Shipek Grab and/or box corer at designated trawling stations. The grab will be deployed using the bongo winch and cable with an open ocean rated SBE-19 CTD mounted 1-2 m above the grab. The grab will be connected to the cable by a meter of stainless steel chain. The grab will be locked open prior to deployment. When deploying, the deck should zero the wire readout when the SBE-19 is at the surface. The grab sampler will be monitored from the lab as it approaches maximum depth. At approximately 15-20 m from the bottom, we will ask the desk department to stop the winch for 30 sec before running it into the bottom. This will allow the pulse of water associated with the grab to settle down so as not to disturb the top layer of silt before impact. As the grab encounters bottom, the chain slackens which causes the hook to release and allows the grab to close. Payout and retrieval rates should not exceed 40 m/min. If no sample is collected, the watch leader may or may not decide to do another attempt depending on time constraints.

Bongo sampling

The SEAMAP bongo plankton sampler is comprised of two 61 cm diameter collars with two 0.335 mm mesh nets. Prior to deployment of the bongo sampler, the watch leader must run software programs and prepare them for the bongo cast. The watch leader (lab scientist) will inform the deck when to power up the SBE-19 SEACAT, at which time the deck scientist will turn on the magnetic switch at the appropriate time. The bongo sampler is towed in an oblique path from near bottom, or 200 m max, to the surface. The SBE-19 SEACAT which is mounted above the bongo array on the sea cable will be used to monitor the tow path of the bongo net. Vessel speed should be adjusted during the bongo tow to maintain a 45° wire angle in order to uniformly sample throughout the water column. If angle exceeds 55°, falls below 35° or if the combined variation exceeds 15°, then the tow must be repeated (the samples will be saved until a better tow is completed). The net depth will be monitored by the watch leader. The deck scientist (or winch operator) will report wire angles periodically during downcast. On the watch leader's command at max depth, the winch operator will stop payout of cable and immediately start retrieval (do not allow net to settle). At that time, the wire angle and wire out should be reported to the watch leader from the deck. The watch leader will ask the winch operator to slowly retrieve the bongo array at 20 m per min for tow depths of 100 m or deeper; for shallower stations the retrieval rate will be determined at each station based on station depth. The wire angle and remaining wire out should be reported from the deck to the watch leader regularly or as requested (on upcast or downcast).

The deck personnel should report when the bongo array breaks the surface. Time will be recorded to the second (by the lab scientist) when the net breaks

surface and flowmeters stop turning, at which time the winch operator immediately pulls the frame from the water; taking care not to let the bongo array continue to fish once it breaks the surface. When possible, the sample will be rinsed into the cod end of the net with a seawater hose while the net hangs over the side. In high winds, the scientist may request that the net is brought directly on board and rinsed down completely on deck. The bongo frame and net are finally placed on deck.

Great care must be taken not to rest the frame on the nets, scrape the net with the frame against the deck, or walk on the plankton nets. The abrasions can easily cause holes in the nets requiring repair or replacement of these expensive sampling devices.

If bottom sediment is present in both samples, the tow must be repeated. Any marginal sample will be saved until completion of the next tow. If bottom sediment (no more than 2 Tb) is present in only one sample the tow need not be repeated. Right bongo samples will be preserved in 95% Ethyl alcohol (ETOH) and transferred to new 95% ETOH after 24 h. Left bongo samples will be preserved in 10% formalin initially and transferred to 95% ETOH after 36 h.

**Preservation methods subject to change.*

Neuston sampling

The neuston net is a 1 x 2 m frame outfitted with a 0.947 mm mesh net. Each neuston tow will be conducted for 10 min at a vessel speed of approximately 2 kt to keep half the frame submerged in the water (i.e., maintain a sampling depth of 0.5 m). If necessary, the ship will steam forward in a wide arc to keep the neuston net (mouth opening) out of the influence of the prop wash. The duration of a neuston tow may be shortened to no less than 5 min when high concentrations of jellyfish, ctenophores, *Sargassum*, floating weed and/or debris are present in the water, or weather requires it. After retrieval, the sample is rinsed into the cod end with seawater while the net hangs over the side (if windy, deck scientist may request net to be brought directly on board and rinsed on deck). Neuston samples will be preserved in 95% ETOH initially and transferred to new 95% ETOH after 24 h.

**Preservation methods subject to change*

While on board the NOAA ship all spent formalin and ethanol will be kept separate and collected into individual 55 gallon drums for recycling/disposal on land. The lab will be responsible for storing and shipping the spent chemicals.

Acoustics

Required Equipment

- Simrad EK 60 Splitbeam Echosounders operating at
    - 18 kHz

    - 38 kHz
    - 120 kHz
    - 200 kHz
- Transducer layout plan showing location of EK60 transducers relative to ship frame numbers
- Calibration rigging equipment:
    - 3 Outrigger poles, 18 feet long
    - Manual control reels on *Gordon Gunter*
    - Downrigger control system: Manual control reels on *Gordon Gunter*
    - 3 Handheld VHF radios for use on deck
    - 1 VHF radio (Handheld or Fixed) at echosounder workstation in acoustics lab
- CTD to measure temperature and salinity to 50m depth prior to calibration
- Calibration target (Supplied by MS Labs):
    - Material: Tungsten-carbide with 6% Cobalt binder
    - Surface Quality: Grade 25
    - Diameter: 38.1mm
- Other equipment (supplied by MS Labs):
    - 200 feet of lightweight nylon twine
    - 1 lb. weight or shackle
    - 4 lb. weight
    - Spectra fishing line to suspend target
    - Dishwashing liquid

Ship Requirements

- Perform CTD cast to provide temperature and salinity for upper 50m of water column
- Ship will drift, without maneuvering, in water at least 40 m deep with wind initially on the port side.
- Ship will periodically be required to make a slow turn to put wind on opposite side. This maneuver will probably be required once for each of four EK60 transducers.
- Except for emergencies, maneuvering should only occur at scientists request and must be done very slowly to prevent fouling the suspended calibration gear.
- Ship will refrain from discharging waste during calibration activities.

Weather Requirements

- Low (ideally zero) winds and calm (ideally flat) seas are necessary to make calibration successful
- If the ship drifts at a speed through the water of 2 kt or more it is very difficult to control the location of the calibration target and perform a worthwhile calibration of the echosounder system

Procedures

- Preparation
    - Conduct CTD cast to obtain measurements of temperature and salinity for upper 50m of water column
    - ER60 Software settings
        - Set transducer depths to zero
        - Set Ping Control to *Interval* and Rate to 1 sec
        - Set echogram range to 40m

        - Set data recording range to 60m
- Deploying Calibration Target
    - Calibration target must be kept clean and not dropped on deck or banged against hull during deployment. Scratches or other damage and oil or other contaminants on the surface of the sphere will alter its acoustic target strength. Prior to calibration, soak target sphere in a solution of 1-part dishwashing liquid and 4-parts water to discourage entrapment of bubbles on sphere surface when immersed in seawater for calibration. Otherwise calibration target should be kept in its protective case
    - Mount Outriggers
    - Rig snap swivels on ends of downrigger lines through pulleys on outriggers
    - Lower ends of downrigger lines to sea surface and set depth counters to zero; depth counters should not be reset again during calibration
    - Bring ends of the two downrigger lines on one side of ship up to a common point midway between the mounting locations
    - Pull the downrigger line from the other side of the ship under hull to attach to the two lines
        - Position 1 lb weight at midpoint of 200 ft nylon cord
        - Drop weight from bow of vessel and walk the ends of cord back to the single outrigger position on one side and midpoint of outrigger locations on other side
        - Attach end of cord to single downrigger line and lower until counter indicates 150 ft depth
        - Retrieve the cord from the other side and attach swivels of all three lines together
    - Attach monofilament loop on calibration target to spectra fishing line with 4 lb weight attached at lower end and upper end attached to three downrigger lines.
        - Length of line between the target and the weight, and between the target and downrigger swivels must be at least two acoustic pulse lengths.
        - For 1 msec acoustic pulse lengths, 5 m spacing is recommended
    - Lift the calibration target out of detergent solution using the line and without touching it lower it and the 4lb weight into the water
    - Lower 4 lb weight and target until they are suspended from two outriggers
    - Simultaneously lower two outriggers so counters read 115’
    - Return opposite downrigger from 140’ to 115’
    - Adjust downriggers so that echoes from calibration target are observed near center of the beam of the first transducer to be calibrated, at approximately 25m depth
- Collect Calibration Data
    - Calculate the average temp and salinity for upper 30m of water column, enter these values in ER60 *Environment* dialog window
    - Start recording of raw data
    - Calculate sphere target strength at each EK60 frequency using the specific depth, temperature, and salinity of the sphere location

    - Start and follow the Calibration procedure from the EK60 Operations Manual for the first transducer
    - Adjust position of target in transducer beam to collect at least 25 echoes in each quadrant of the beam
    - Echoes near the center of the beam are most important for estimating biomass
    - If the downriggers can't be adjusted to put the target in windward portions of the transducer beam, the ship must be turned to make that the leeward side of the transducer beam
    - When enough target echoes have been collected with the first transducer, Save the results and continue with the other transducers in the same fashion
- Recover Calibration Target
    - Lower the single outrigger on one side so that the calibration target can be retrieved
    - Rinse the calibration target in fresh water and store it safely
- Resume survey data collection

Collection

There are five main considerations for EK60 operation: (1) minimizing the impact on other scientific activities, (2) minimizing the interference from other instruments, (3) settings for data collection, (4) record keeping, and (5) data analysis.

1. The EK60 will operate continuously night and day. The ST or ET on duty will be responsible for turning the EK60 on or off so that the bridge sounders may be operated as determined by the OOD.
2. When the EK60 is running, it should be synchronized with the ES60, and ADCP. The EK60 display should be checked periodically for evidence of interference from other acoustic systems.

   Parameter settings that need to be checked:
   - Ping interval: **2** seconds for all depths. Set via the 'interval' data entry window at the top left of the EK60 Simrad data collection program.
   - The pulse width for 18 kHz, 38 kHz, 120 kHz and 200 kHz will be 1.0 ms.
   - Maximum sample range: 2000m. Set via the pull-down menu: Output->File->Raw Data->Range
   - Bottom Tracking Function: Disabled at 120, and 200 kHz (when doing so does not conflict with the needs of other users). 18 kHz: max set to 6000 m; 38 kHz: max 2000 m. Set for each frequency by right-clicking on the bottom depth display found at the top of each channel's window.
   - **Make sure data recording is on!**

3. Each night, probably during a transect between trawl stations, try to collect 5 min of data with all frequencies set to passive mode and the vessel maintaining survey speed. Set the mode under Operation->Normal to Passive for each frequency. Remember to set the modes back to Active afterwards.

4. It is useful to keep track of all changes made to the operation of the EK60 in the SCS acoustic event log

5. Output directory is set via Output->File->Directory. There will be a folder for the cruise on the portable Seagate hard-drive named F:/HB201303/EK60_Leg## (eg Leg01)

6. Data recording is started by hitting the red arrow button. The display at the bottom of the window will then say '**RECORD ON'**

Modifications to Field Operations

Sampling protocol may be altered by the FPC or watch leader in order to optimize sampling for time conservation. The FPC may alter the project instructions in order to accomplish mission objectives but will do so only after consulting with the CO. If additional time becomes available during a leg, the FPC will provide the ship with further station locations at that time, after consulting with the CO.

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 CO.

Scientific dives are not planned for this project. If the ship must conduct dive ops while at sea the CO will confer with the FPC as to when the dive ops will occur so the dive will have the least impact on the scientific work.

E. Applicable Restrictions

Conditions which preclude normal operations: adverse weather conditions.

III. Equipment

Equipment and Capabilities Provided by the Ship:

1. SCS version 4.7.0
2. Net reel - for spooling the 90 ft HBOT
3. Because of the importance of the CTD equipment package to record environmental data and the need for the Scientific Computing System (SCS), an Electronics Technician is imperative.
4. Trawl winches with sufficient wire to fish in 275 fm depths and meter readouts to determine warp length
5. Hydrographic winch with wire and meter readout to accomplish CTD/bottle casts and bongo tows up to a 200 m depth. Winch speed should be variable to include 50 m/min during pay-out and 20 m/min during haul back (for bongo tows). Spare slip rings for each winch. Fully functional wire readouts for each winch.
6. Winch, crane, and wire for deploying neuston net.
7. One (1) Primary SBE 9plus CTD configured as follows;
   a. Unit should be mounted horizontally and mounted in the water sampling frame. The frame should be examined to ensure it is in good physical condition and there are no breaks present in any of the welds supporting the frame.
   b. The standard 12 position SBE 32 Carousel should be properly mounted in the water

sampler section of the frame and tested to ensure that all 12 bottle positions are working properly and respond to software requests for firing.

c. The internal Digiquartz pressure sensor should be in good working order and have a calibration/service date not to exceed 365 days.

d. The primary sensor suite should be installed and consist of the following (the sensors should have a calibration date as recent as possible, not to exceed 365 days):
   i. One (1) SBE 3 Premium Temperature sensor
   ii. One (1) SBE 4 Conductivity sensor
   iii. One (1) SBE 43 Dissolved Oxygen sensor
   iv. One (1) "Y" air bleeder valve. Valve should be checked to ensure it is not clogged.
   v. One (1) Wetlabs Wetstar pumped fluorometer
   vi. One (1) SBE 5T pump that has been checked by Seabird within the last 365 days for proper operation
   vii. One (1) Wetlabs C-Star transmissometer
   viii. Proper plumbing. Tubing should be checked to ensure it meets Seabird's recommended method of plumbing and is free from cracks and holes. With red end caps for proper storage between stations.

e. The secondary sensor suite should be installed and consist of the following (the sensors should have a calibration date as recent as possible, not to exceed 365 days):
   i. One (1) SBE 3 Premium Temperature sensor
   ii. One (1) SBE 4 Conductivity sensor
   iii. One (1) SBE 43 Dissolved Oxygen sensor
   iv. One (1) "Y" air bleeder valve. Valve should be checked to ensure it is not clogged
   v. One (1) Wetlabs Wetstar pumped fluorometer
   vi. One (1) SBE 5T pump that has been checked by Seabird within the last 365 days for proper operation
   vii. One (1) Wetlabs C-Star transmissometer
   viii. Proper plumbing. Tubing should be checked to ensure it meets Seabird's recommended method of plumbing and is free from cracks and holes.

f. The unit should be properly terminated and connected to a properly functioning SBE 11 Deck Unit. The deck unit should be connected to allow the following:
   i. Proper control of the SBE Water Sampler Carousel via the SEASAVE application
   ii. Integration of a proper NMEA signal from a GPS unit.

6. A second SBE 9plus profiler should be available as well. Unit does not have to be configured as a complete functioning ready-to-install on the sea cable unit; however, it should have the following components available:

a. Sensors for a Primary suite (with a calibration date as recent as possible, not to exceed 365 days):
   i. One (1) SBE 3 Premium Temperature sensor
   ii. One (1) SBE 4 Conductivity sensor
   iii. One (1) SBE 43 Dissolved Oxygen sensor
   iv. One (1) "Y" air bleeder valve. Valve should be checked to ensure it is not clogged.
   v. One (1) Wetlabs Wetstar pumped fluorometer
   vi. One (1) SBE 5T pump that has been checked by Seabird within the last 365 days for proper operation.
   vii. One (1) Wetlabs C-Star transmissometer
   viii. Proper plumbing. Tubing should be checked to ensure it meets Seabird's recommended method of plumbing and is free from cracks and holes.

b. Sensors for a complete Secondary suite (with a calibration date as recent as possible,

not to exceed 365 days):
i. One (1) SBE 3 Premium Temperature sensor
ii. One (1) SBE 4 Conductivity sensor
iii. One (1) SBE 43 Dissolved Oxygen sensor
iv. One (1) "Y" air bleeder valve. Valve should be checked to ensure it is not clogged.
v. One (1) Wetlabs Wetstar pumped fluorometer
vi. One (1) SBE 5T pump that has been checked by Seabird within the last 365 days for proper operation.
vii. One (1) Wetlabs C-Star transmissometer.
viii. Proper plumbing. Tubing should be checked to ensure it meets Seabird's recommended method of plumbing and is free from cracks and holes.

7. A second SBE 11 Deck Unit should be on the ship to be put into service if needed.
8. Two (2) fully operational SBE 19 Seacat profilers should be available. One of the units should be installed on the sea cable. Both units should have calibration dates not to exceed 365 days.
9. Two (2) functional SBE 36 Deck units should be available, 1 for backup, which are configured for the model Seacat being supplied.
10. Two (2) PDIM units should be available for use with the SBE 19 units. One of these PDIM units should be installed on the primary SBE19 on the sea cable. These PDIM units should also be the proper units that are used with the model Seacat being used.
11. A fully functional SBE 45 thermosalinograph should be available for the survey. The unit should have calibrations that do not exceed 365 days. The calibration data must be verified/entered into the SEABIRD-TSB.CAL file in the Ship Directory of SCS.
12. It is highly desirable to have the following additional spare sensors on-board if possible:
    a. One (1) SBE 43 DO Sensor
    b. One (1) SBE 3 Temperature Sensor
    c. One (1) SBE 4 Conductivity Sensor
    d. One (1) Wetlabs Wetstar pumped fluorometer
    e. One (1) Wetlabs C-Star Transmissometer
    f. One (1) SBE 5T Pump
14. Copies of all calibration sheets for CTD profilers, TSG, and spare sensors should be provided to the laboratories' Shipboard System Specialist prior to sailing.
15. CTD capable winch and A-frame for CTD casts, with sufficient electromechanical cable for casts to 500 m.
16. NMEA GPS input to CTD header file.
17. Inside and outside conveyor belts for processing catches.
18. Freezer space for preserving scientific specimens.

<u>SCS data requested</u>:

The SCS system should be fully operational for the duration of the survey. Due to the nature of the survey work, we request that all the events (CTD, Bongo, Neuston, Bottom Grabs, and trawls) be conducted from the dry lab. A listing of any sensors that will not be functional for the survey should be provided prior to sailing to the FPC, taking into consideration that event templates will have to be checked by the Shipboard System Specialists to ensure there will be no impact or an alternative sensor can be selected.

a. SIMRAD - primary
    i. UTC time
    ii. Latitude
    iii. Longitude
    iv. Speed over ground
    v. Course over ground
b. SIMRAD - secondary

i. Latitude
ii. Longitude
iii. Speed over ground
iv. Course over ground

c. Furuno doppler speed log
i. Speed through the water
ii. Speed over ground

c. EQ50 and EK60 depth in meters
d. Gyro-heading
e. Air temperature (°C)
f. Corrected barometric pressure
g. True wind speed
h. True wind direction
i. Information should be passed to the Rotating ET to ensure the following:
i. The Automatic Logger Control on the SCS Server must be enabled anytime ACQ is started and should use the default of 0:00:00 (Midnight GMT).
ii. The contents of the Eventdata folder should be allowed to remain present for the duration of the survey (they should not be deleted between legs). This will ensure that event IDs do not restart for the respective events during the survey.

j. SEASAVE SOFTWARE: Prior to sailing, the proper .CON files should be built in SEASAVE. The software should be set to look for the proper .CON file for the respective instrument.
k. It is also highly desirable that the ASCII Out function be allowed to feed CTD data into SCS via serial cable.

20. DRYLAB REMOTE COMPUTERS - Due to the nature of the work involved with data collection for this survey, it is recommended that all three (3) FSCS Remote units be verified for the following prior to sailing:
a. All 3 computers are 100% operational
b. All 3 computers are properly setup to interface as SCS clients
c. Two (2) of the units have a functioning copy of Microsoft Office XP Professional. The Office suite must provide at minimum the following programs: Word, Excel, PowerPoint and Access.
d. All 3 computers must be able to print to a functioning printer.

B. Equipment and Capabilities Provided by the Scientists:

1. 90-ft HOBT survey trawls (4); and bridles and rigging (3 sets)
2. Winch for deploying bottom grabs
3. 3.5m steel doors (2 sets)
4. Trawl hardware box
5. Spare webbing and net repair materials
6. Simrad ITI Net Mensuration System
7. Three electronic fish measuring boards
8. Three touch screen monitors for the FSCS
9. Five hundred plastic specimen bags
10. Five Marel 1100 electronic weighing scales
    i. Two 30-kg capacity
    ii. Three 6-kg capacity
11. Field data sheets
12. Crane scale
13. Fish baskets, shovels, sorting rakes and trays

14. Mini Multicorer (1)
15. Shipek bottom grab (1)
16. Box corer (1)
17. Two 61-cm bongo frames
18. Two 1×2 m neuston frames
19. Bongo/neuston gear and equipment box
20. Plankton sampling supplies box
21. Plankton preserving jars and lids
22. Chemical transfer pumps
23. 3 Niskin bottles
24. Safety goggles
25. Latex and Nitrile puncture resistant work gloves
26. Grapple and chain for retrieving lost trawl
27. Handheld Orion 3 star meter and equipment box
28. 5 ICOM VHF Marine handheld radios (IC-M72)
29. Various clerical supplies
30. Computer for FPC stateroom
31. Spent chemical collection Drum
32. Dissecting Microscopes 2
33. Plankton Table
34. Fish and Invertebrate Identification Reference Materials
35. Vermiculite or kitty litter (chemical absorbent)
36. Toughbook (hooked to the ships public internet)

IV. Hazardous Materials

A. Policy and Compliance

The FPC 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

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Formaldehyde solution (10%)	1 x 2.5 gal		See C.1 Below	See C.1 Below
Ethanol	1 x 55 gal drum		See C.1 Below	See C.1 Below
Triton X(1%)	1 x 1 pint		See C.1 Below	See C.1 Below
10% buffered formalin	1 x 5 L		See C.1 Below	See C.1 Below
Isopropanol	1 x 1 L		See C.1 Below	See C.1 Below
Glutaraldehyde in sodium cacodylate buffer	1 x 30 cc		See C.1 Below	See C.1 Below

C. Chemical safety and spill response procedures

1. Precaution – all personnel handling chemicals will wear the appropriate PPE. All personnel are trained in handling chemicals.

2. Prevention – all chemicals will be secured before the survey departs. All personnel will be aware of the location of all chemicals. A MSDS for all chemicals brought aboard will be given to the ship before sailing.

3. Response – if a spill occurs scientists will immediately leave the area and alert the bridge. Scientists will defer to the ship's spill plan for a cleanup. Kitty litter and formalin neutralizing agent will be on board for potential spill cleanups. D. Radioactive Materials: N/A

E. Inventory (itemized) of Radioactive Materials: N/A

V. Additional Projects

A. Supplementary ("Piggyback") Projects: N/A

B. NOAA Fleet Ancillary Projects: N/A

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*

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The FPC and CO 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 FPC in arranging this meeting.

B. Vessel Familiarization Meeting: The CO 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 hr of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The CO is responsible for conducting a meeting no earlier than 24 hr~~s.~~ before or no later than seven 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, vessel coordinator, FPC, and members of the scientific party and is normally arranged by the Operations Officer and FPC.

D. Project Evaluation Report

Within seven days of the completion of the project, a Ship Operation Evaluation form is to be completed by the FPC. The preferred method of transmittal of this form is via email to OMAO.Customer.Satisfaction@noaa.gov. If email is not an option, a hard copy may be forwarded to:

Director, NOAA Marine and Aviation Operations
NOAA Office of Marine and Aviation Operations
8403 Colesville Road, Suite 500
Silver Spring, MD 20910

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for up to 15 scientists. Meals will be served three times daily. 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 FPC. The FPC and Operations 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 FPC 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 FPC 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 FPC will ensure that all non NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the FPC 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 CO. 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, Revised: 02 JAN 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the FPC or the NOAA website http://www.corporateservices.noaa.gov/~noaaforms/eforms/nf57-10-01.pdf. The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan and send via secure e-mail the form using the contact information below; participants should take precautions to protect their Personally Identifiable Information (PII) and medical information. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the 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.

Contact information:

Regional Director of Health Services
Marine Operations Center – Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
E-mail MOA.Health.Services@noaa.gov

Prior to departure, the FPC 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's 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 FPC to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the FPC may be relayed to the program office. Sometimes it is necessary for the FPC to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the FPC. 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 vessel 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 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 ships network must complete NOAA's IT Security Awareness Course within three 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.

VIII. Appendices

1. Figures, maps, tables, images, etc.

Figure 1. Operational area for NOAA Ship *Gordon Gunter* GU-14-06.