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: Commander Peter Fischel, NOAA
Commanding Officer, NOAA Ship *Pisces*

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

SUBJECT: Project Instruction for PC-14-01
SEAMAP Reef Fish

Attached is the final Project Instruction for PC-14-01, SEAMAP Reef Fish, which is scheduled aboard NOAA Ship *Pisces* during the period of 21 April to 11 June, 2014. As of 16 April 2014, the schedule for PC-14-01 is as follows:

DEP: 4/21/2014	Wed	Pascagoula, MS	PC-14-01 Leg 1
ARR:5/9/2014	Fri	Pascagoula, MS	SEAMAP Reef Fish
DEP: 5/12/2014	Mon	Pascagoula, MS	PC-14-01 Leg 2
ARR:5/26/2014	Mon	Tampa, FL	SEAMAP Reef Fish
DEP: 5/28/2014	Wed	Tampa, FL	PC-14-01 Leg 3
ARR:6/11/2014	Wed	Mayport, FL	SEAMAP Reef Fish

Of the 55 DAS scheduled for this project, 55 days 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 St.
Pascagoula, MS 39567

Project Instructions

Date Submitted: 03/17/2014

Platform: NOAA Ship PISCES

Cruise Number: 14-01

Project Title: SEAMAP Reef Fish

Cruise Dates: 04/08/2014 - 06/11/2014

Prepared by: Kevin R. Rademacher
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Date: 2014.03.17 16:27:10 -05'00'
Field Party Chief
Date: 03/17/2014

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Lab Director
Date: 03/18/2014

Approved by: Theo R. Brainerd
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Date: 2014.03.18 10:43:35 -04'00'
Dr. Bonnie Ponwith
Director, SEFSC
Date: 03/18/2014

Approved by:
Captain Anne K. Lynch, NOAA
Commanding Officer
Marine Operations Center - Atlantic
Date: 4/14/2014

I. Overview

A. Brief Summary and Project Period

Conducting SEAMAP Reeffish survey on the U.S. continental shelf in the Gulf of Mexico (GOM) from April 8 to June 11, 2014. The calibration of the Simrad EK60 Echosounder will also be conducted.

B. Days at Sea (DAS)

Of the 60 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 60 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area

The area of operation is the U.S. shelf waters of the GOM (26° 50' N, 96° 50' W; 24° 50' N, 83° 50' W) in depths between 30 and 150 m (Figure 1).

D. Summary of Objectives

NOAA Ship *Pisces* will conduct a survey of reef fish on the U.S. continental shelf of the GOM using a custom built stereo/video camera system and bandit reels. The ship's ME70 multibeam system and Simrad EK60 Echosounder will be used to map predetermined targeted areas on a nightly basis to improve or increase the reef fish sample universe. The calibration of the Simrad EK60 Echosounder will be conducted.

E. Participating Institutions

NOAA/NMFS/SEFSC Mississippi Laboratories, NOAA Fisheries Panama City Lab

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

Name (Last, First)	Title	Leg	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Kevin Rademacher	FPC	1	4/8/2014	4/25/2014	M	NMFS Pascagoula	U.S.
Paul Felts	Fisheries Biologist	1	4/8/2014	4/25/2014	M	NMFS Pascagoula	U.S.
Andre Debose	Fisheries Biologist	1	4/8/2014	4/25/2014	M	NMFS Pascagoula	U.S.
Gary Fitzhugh	Fisheries Biologist	1	4/8/2014	4/25/2014	M	NMFS Panama City	U.S.
Jim Johnson	Electronics Tech.	1	4/8/2014	4/25/2014	M	NMFS Stennis SC	U.S.
Kevin Rademacher	FPC	2	4/27/2014	5/9/2014	M	NMFS Pascagoula	U.S.

John Moser	Fisheries Biologist	2	4/27/2014	5/9/2014	M	NMFS Pascagoula	U.S.
Brandi Noble	Fisheries Biologist	2	4/27/2014	5/9/2014	F	NMFS Pascagoula	U.S.
Ken Wilkinson	Electronics Tech.	2	4/27/2014	5/9/2014	M	NMFS Stennis SC	U.S.
Michael Felts	Fisheries Biologist	2	4/27/2014	5/9/2014	M	Riverside Pascagoula	U.S.
Michael Felts	FPC	3	5/12/2014	5/25/2014	M	Riverside Pascagoula	U.S.
Paul Felts	Fisheries Biologist	3	5/12/2014	5/25/2014	M	NMFS Pascagoula	U.S.
Andre Debose	Fisheries Biologist	3	5/12/2014	5/25/2014	M	NMFS Pascagoula	U.S.
Kevin Rademacher	Fisheries Biologist	3	5/12/2014	5/25/2014	M	NMFS Pascagoula	U.S.
Jim Johnson	Electronics Tech.	3	5/12/2014	5/25/2014	M	NMFS Stennis SC	U.S.
Michael Felts	FPC	4	5/28/2014	6/11/2014	M	Riverside Pascagoula	U.S.
Adam Pollack	Fisheries Biologist	4	5/28/2014	6/11/2014	M	Riverside Pascagoula	U.S.
John Moser	Fisheries Biologist	4	5/28/2014	6/11/2014	M	NMFS Pascagoula	U.S.
Matt Campbell	Fisheries Biologist	4	5/28/2014	6/11/2014	M	NMFS Pascagoula	U.S.
Ken Wilkinson	Electronics Tech	4	5/28/2014	6/11/2014	M	NMFS Stennis SC	U.S.

G. Administrative

1. Points of Contacts:

Field Party Chief: Kevin Rademacher, NMFS, 3209 Frederic St., Pascagoula, MS 39567. 228-549-1635 Kevin.R.Rademacher@noaa.gov

Alternate Contact: Matthew Campbell, NMFS, 3209 Frederic St., Pascagoula, MS 39567. 228-549-1690 Matthew.D.Campbell@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

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

NMFS Highly Migratory Species Division Scientific Research Permit
NMFS Southeast Regional Office
Flower Gardens National Marine Sanctuary
FKNMS Scientific Research Permit: Permit No. FKMS-2012-073
FKNMS ATBA Permit
NMFS Sea Turtle Permit
Texas Scientific Research Permit: SPR-0596-796
Louisiana Saltwater Scientific Collection Permit: Permit No. 1953
Mississippi Saltwater Scientific Collection Permit
Alabama Saltwater Scientific Collection Permit
Florida Special Activity License: Permit No. SAL-14-0135-SR

II. Operations

The Field Party Chief (FPC) is responsible for ensuring 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	04/08/2014 04/25/2014	Depart Pascagoula, MS Arrive Galveston, TX	18
Leg 2	04/27/2014 05/09/2014	Depart Galveston, TX Arrive Pascagoula, MS	12
Leg 3	05/12/2014 05/25/2014	Depart Pascagoula, MS Arrive Pascagoula, MS	14
Leg 4	05/28/2014 06/11/2014	Depart Pascagoula, MS Arrive Mayport, FL	16

B. Staging and Destaging:

Pascagoula, MS and Mayport, FL

C. Operations to be conducted:

NOAA Ship *Pisces* will conduct a survey of reef fish located on the continental shelf and shelf-edge of the GOM from April 8 through June 11, 2014. Forty-four blocks have been selected for sampling with stereo/video cameras, bandit reels and CTD during daylight hours (Figure 1; Table 1). An additional nine blocks have been selected to be mapped at night and then sampled with stereo/video cameras, bandit reels and CTD the following day (Figure 1; Table 1).

Bathymetry mapping will be conducted in and around all selected blocks (53) with the ME70 sonar (Figure 1; Table 1). Mapping will commence at sunset, or when day operations have finished, in the general area of the block sampled that day or the area planned for the next day. Mapping will conclude at sunrise, or whatever time is needed, in order to be on site for operations the next day. A CTD cast or XBT needs to be conducted prior to conducting acoustic transects to obtain speed-of-sound for proper processing of data. All other acoustic systems need to be turned off prior to and during acoustic transects to eliminate acoustic contamination of the mapping data. If other systems are required to ensure safe transit while mapping, ensure that the acoustic signals are offset and not interfering with each other. Transects for mapping will be composed in Hypack by the FPC and made available to the ship's bridge crew in a format the ship's GPS will accept. The mapping goal is to locate features within and outside our current universe to expand the sampling universe as well as improve the ability for site selection by closing gaps created by mapping with inferior systems.

Video cameras will be deployed no earlier than 1 h after sunrise, with the last gear retrieval 1 h prior to sunset. The camera array will be baited with squid and soak on the sea bed for 40 min. A CTD cast will be conducted after the camera array is deployed. Four stations will be randomly selected daily to be sampled with the bandit reels after the site is sampled with the cameras and the CTD. During bandit reel operations, the reels are only to be deployed under the following conditions: 1) a member of the deck department and scientific party are both present at each reel and 2) the FPC has gotten the all clear from the OOD and then given the call for the reels to be baited and deployed.

Three electric (12V) bandit reels will be mounted on the side sampling station, starboard aft quarter, and starboard stern positions on the vessel. The aluminum spool on the bandit reel holds 275 m of 136.08-kg (300-lb) test monofilament line as the mainline. A detachable bandit gear section (backbone) attaches to the terminal end of the main line. The 6-m long backbone is constructed of 136.08-kg (300-lb) test monofilament line. Ten pairs of crimps are placed around every 0.61 m mark from the terminal ends of the backbone to secure the gangions in place. Each end of the backbone was fitted with a black anodized 2/0 swivel snap. Sufficient weight (5 or 10 kg) will be placed at the bottom terminal end of the backbone to anchor the gear to the site. Three sets of 10 gangions, one per reel, (30 cm of 45.4 kg test monofilament line, size 8/0, 11/0, and 15/0 circle hooks, and a 6/0 model 120, 308 stainless 5 in longline clamp with swivel) will be baited with cut Atlantic mackerel and attached to the backbones between the paired crimps.

Gangions with the varying hooks will be rotated through the three bandit reels and stations in an alternating order starting with a hook size that will be randomly selected before deployment. A 3 lb can float will be affixed to the terminal end of the mainline above the backbone as the gear is deployed to the bottom. When the weight reaches the bottom, a surface float will be attached to the mainline. The mainline will be paid out or reeled in to allow the gear to soak unimpeded by the vessel for 5 min from the time the weight hits the bottom to the start of retrieval. At the end of 5 min the mainline will be reeled in, the floats detached and each gangion detached.

All fish captured on the bandit reel will be identified, measured, weighed, and have the sex and maturity determined. Select species will have otoliths and gonads collected for age and reproductive research. Select species may be retained whole for additional research.

Calibration of the ships Simrad EK60 Echosounder will be performed during the survey. The exact date and location will be determined by the FPC and the ship's crew once at sea and when conditions permit. At minimum, two days will be set aside from scientific operations for the completion of the calibration. A CTD will be conducted prior to the execution of the calibration. Following the CTD, three outriggers will be positioned on the weather decks of the 01 level; one on the port side and two on the starboard side. Prior to anchoring, a hogging line will be positioned under the vessel by dropping a weighted line off the bow and walking the ends of the line back to the outrigger locations. Once completed, the ship will set anchor and remain at anchor with the centerboard fully retracted for the duration of calibration operation. The hogging line will be used to pull one outrigger line under the vessel and attached to the other two. The calibration target will then be suspended under the vessel from the three outriggers and collection of calibration data will proceed. The entire execution of this procedure is fully detailed in 'Mississippi Laboratories Standard Operating Procedure for Calibration of Simrad EK60 Echosounder' (Appendix).

Sampling protocol may be altered by the FPC or Watch Leader in order to optimize survey effort.

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: adverse weather conditions

III. Equipment

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

1. Hydrographic winch for deploying CTD to a depth of 500 m.
2. Hydraulic pot hauler.
3. Two SBE9+ CTDs with calibrated sensors.
    a. one Digiquartz depth sensor
    b. two SBE 3 Premium temperature sensors.

c. two SBE 4 conductivity sensors (items b. and c. connected with TC ducts).
d. two SBE 43 dissolved oxygen sensors.
e. two SBE 5T pumps.
f. one WetStar fluorometer.
g. one SBE water sampler.
h. One transmissometer

4. Freezer space for frozen squid, mackerel and biological samples.
5. Scientific Computer System (SCS).
6. Forward articulating crane
7. Mounting for 3 bandit reels: one at side-sampling station, one on starboard aft quarter, and one on starboard stern.
8. ME70 Multibeam and EK60 Simrad Echosounder systems
9. (3) 12V marine batteries and (3) trickle chargers for the (3) bandit reels at side-sampling station, starboard aft quarter, and starboard stern.
10. (3) outrigger poles (for EK60 calibration)
11. (3) downrigger reels (for EK60 calibration)
12. Mounting for three outrigger poles and three downrigger reels: one on port side and two on starboard side

B. Equipment and Capabilities provided by the scientists (itemized)

1. Stereo camera array with buoy retrieval system
2. External 2TB fathom drives (6) for stereo data storage
3. Specialized computer systems for stereo data downloads
4. Digital cameras with Gates underwater housings
5. Blu-ray discs and miniDVs
6. TDRs (Temp/Depth Recorder) with associated software and pen reader.
7. (4) High-Flyers
8. (8) Poly Floats
9. (2) Norwegian balls
10. Buoy line (½") for sets of video arrays at depths between 30 and 150 m.
11. Spare weights (4) for camera array, shock cord, and Magnesium releases for buoy retrieval system
12. 300 lb squid bait
13. 300 lb mackerel bait
14. (6) 12V Electric Bandit Reels, one mounted at side sampling station, one mounted at starboard aft quarter, and one mounted at starboard stern plus three back-ups.
15. (4) Plastic fish baskets
16. (2) Grappling hooks with 10 m of attached rope
17. (1) Rib release hook
18. Hammer locks
19. VCR/monitor/cords
20. Back-up spool for buoy retrieval system
21. 31.8mm-Grade 25 Tungsten-carbide w/ 6% Cobalt binder calibration target (for calibration)

22. 200 ft. lightweight nylon twine (for calibration)
23. (1) 1 lb. weight/shackle (for calibration)
24. (1) 4 lb. weight (for calibration)
25. Spectra fishing line (for calibration)
26. Dishwashing liquid (for calibration)

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 1 gallon		See Below	See Below
Ethanol	1 x 1 gallon		See Below	See Below
Triton X (1%)	1 x 5 L		See Below	See 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 with defer to the ship's spill plan for cleanup. Kitty litter and formalin neutralizing agent will be on board for potential spill cleanups.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

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

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 hours 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 hrs 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 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 FPC. The FPC and CO 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 four 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 ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

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

VIII. Appendices

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

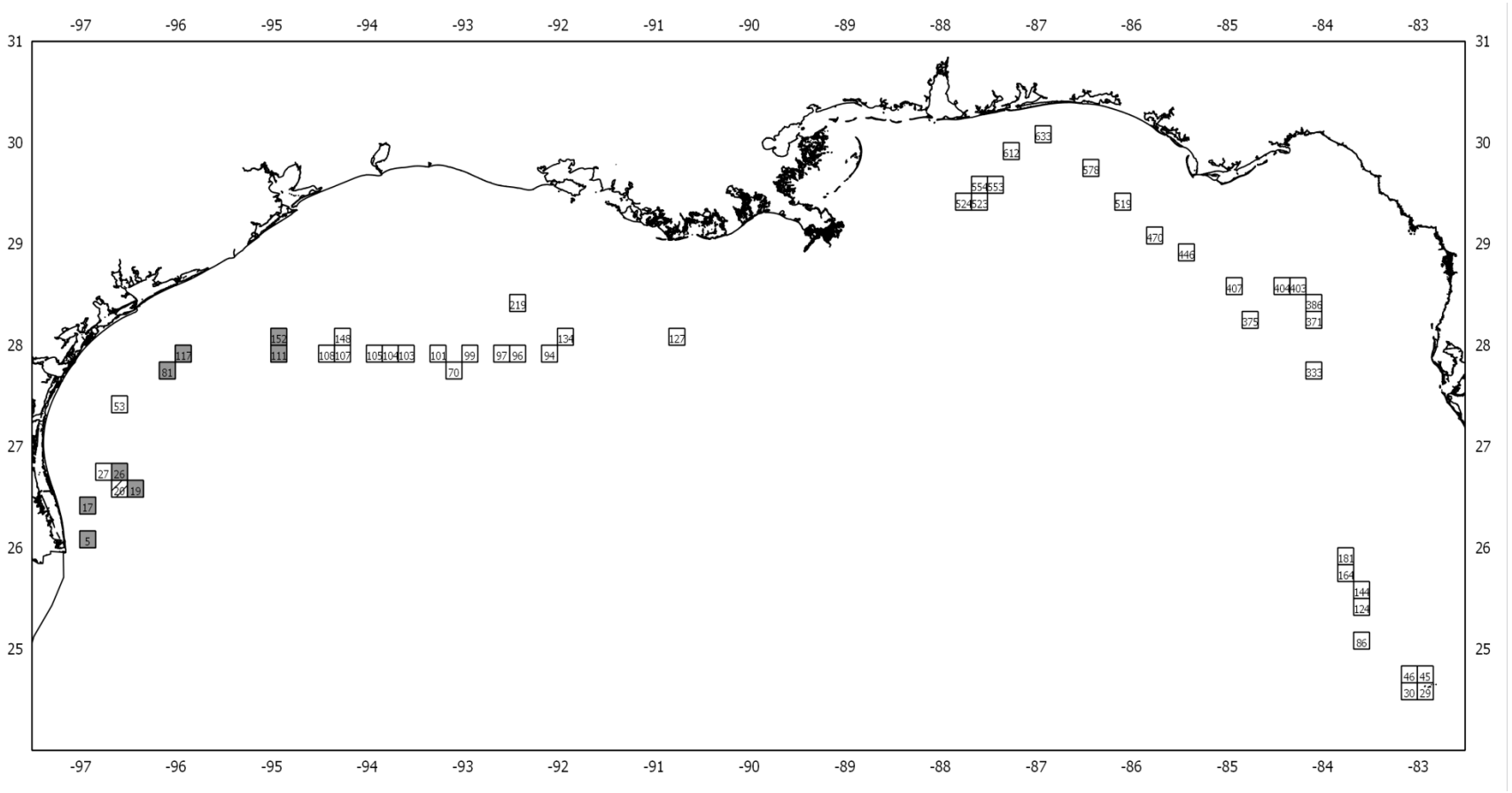

Figure 1. Blocks selected for sampling during the NOAA Ship *Pisces* PC-14-01, SEAMAP reef fish survey. Shaded blocks will have sites selected for sampling at sea following bathymetric mapping operations. Block 20 has predetermined sites as well as sites to be chosen following mapping operations.

2. Station/Waypoint List (coordinates in Latitude, Longitude: degree-minutes)

Table 1. Sites selected for sampling during the NOAA Ship *Pisces* Cruise PC-14-01, SEAMAP reeffish survey. Sites with an (*) will be chosen at sea following mapping operations; those coordinates are listed as approximate based on the center of the blocks.

Block	Site	Region	Name	Latitude		Longitude	
5	1	West	East Bank*	26°	4.08030	96°	54.99480
5	2	West	East Bank*	26°	4.08030	96°	54.99480
5	3	West	East Bank*	26°	4.08030	96°	54.99480
5	4	West	East Bank*	26°	4.08030	96°	54.99480
5	5	West	East Bank*	26°	4.08030	96°	54.99480
5	6	West	East Bank*	26°	4.08030	96°	54.99480
5	7	West	East Bank*	26°	4.08030	96°	54.99480
5	8	West	East Bank*	26°	4.08030	96°	54.99480
5	9	West	East Bank*	26°	4.08030	96°	54.99480
5	10	West	East Bank*	26°	4.08030	96°	54.99480
17	1	West	Seabree*	26°	24.67140	96°	54.91140
17	2	West	Seabree*	26°	24.67140	96°	54.91140
17	3	West	Seabree*	26°	24.67140	96°	54.91140
17	4	West	Seabree*	26°	24.67140	96°	54.91140
17	5	West	Seabree*	26°	24.67140	96°	54.91140
17	6	West	Seabree*	26°	24.67140	96°	54.91140
17	7	West	Seabree*	26°	24.67140	96°	54.91140
17	8	West	Seabree*	26°	24.67140	96°	54.91140
17	9	West	Seabree*	26°	24.67140	96°	54.91140
17	10	West	Seabree*	26°	24.67140	96°	54.91140
19	1	West	Small Bank*	26°	34.77300	96°	25.02540
19	2	West	Small Bank*	26°	34.77300	96°	25.02540
19	3	West	Small Bank*	26°	34.77300	96°	25.02540
19	4	West	Small Bank*	26°	34.77300	96°	25.02540
19	5	West	Small Bank*	26°	34.77300	96°	25.02540
19	6	West	Small Bank*	26°	34.77300	96°	25.02540
19	7	West	Small Bank*	26°	34.77300	96°	25.02540
19	8	West	Small Bank*	26°	34.77300	96°	25.02540
19	9	West	Small Bank*	26°	34.77300	96°	25.02540
19	10	West	Small Bank*	26°	34.77300	96°	25.02540
20	1	West	Harte Bank*	26°	34.91880	96°	35.00160
20	2	West	Harte Bank*	26°	34.91880	96°	35.00160
20	3	West	Harte Bank*	26°	34.91880	96°	35.00160
20	4	West	Harte Bank*	26°	34.91880	96°	35.00160
20	5	West	Harte Bank*	26°	34.91880	96°	35.00160

20	6	West	Harte Bank*	26°	34.91880	96°	35.00160
20	7	West	Harte Bank*	26°	34.91880	96°	35.00160
20	8	West	Harte Bank*	26°	34.91880	96°	35.00160
20	9	West	Harte Bank*	26°	34.91880	96°	35.00160
20	10	West	Harte Bank*	26°	34.91880	96°	35.00160
20	1	West	Harte Bank	26°	39.21004	96°	34.50474
20	2	West	Harte Bank	26°	39.14665	96°	34.10128
20	3	West	Harte Bank	26°	39.24944	96°	34.18694
20	4	West	Harte Bank	26°	39.10724	96°	33.95309
20	5	West	Harte Bank	26°	39.17663	96°	33.65756
20	6	West	Harte Bank	26°	39.25715	96°	33.77063
20	7	West	Harte Bank	26°	39.20918	96°	33.95737
20	8	West	Harte Bank	26°	39.25972	96°	34.39253
20	9	West	Harte Bank	26°	39.19376	96°	34.21007
20	10	West	Harte Bank	26°	39.21860	96°	34.31971
26	1	West	Harte Bank*	26°	44.94000	96°	34.81800
26	2	West	Harte Bank*	26°	44.94000	96°	34.81800
26	3	West	Harte Bank*	26°	44.94000	96°	34.81800
26	4	West	Harte Bank*	26°	44.94000	96°	34.81800
26	5	West	Harte Bank*	26°	44.94000	96°	34.81800
26	6	West	Harte Bank*	26°	44.94000	96°	34.81800
26	7	West	Harte Bank*	26°	44.94000	96°	34.81800
26	8	West	Harte Bank*	26°	44.94000	96°	34.81800
26	9	West	Harte Bank*	26°	44.94000	96°	34.81800
26	10	West	Harte Bank*	26°	44.94000	96°	34.81800
27	1	West	Mysterious Bank	26°	46.48226	96°	43.72111
27	2	West	Mysterious Bank	26°	45.97416	96°	44.15129
27	3	West	Mysterious Bank	26°	46.48226	96°	44.62676
27	4	West	Mysterious Bank	26°	46.94075	96°	43.34753
27	5	West	Mysterious Bank	26°	46.23321	96°	43.03055
27	6	West	Mysterious Bank	26°	46.04642	96°	43.26828
27	7	West	Mysterious Bank	26°	46.01446	96°	42.23244
27	8	West	Mysterious Bank	26°	45.81435	96°	41.38340
27	9	West	Mysterious Bank	26°	46.27849	96°	43.26280
27	10	West	Mysterious Bank	26°	46.87849	96°	44.14563
53	1	West	Southern Bank	27°	26.20050	96°	31.50025
53	4	West	Southern Bank	27°	26.30045	96°	31.50025
53	5	West	Southern Bank	27°	26.30045	96°	31.40030
53	8	West	Southern Bank	27°	26.40040	96°	31.50025
53	18	West	Southern Bank	27°	26.60029	96°	31.60019
53	21	West	Southern Bank	27°	26.60029	96°	31.30035

53	24	West	Southern Bank	27°	26.70024	96°	31.60019
53	25	West	Southern Bank	27°	26.70024	96°	31.50025
53	26	West	Southern Bank	27°	26.70024	96°	31.40030
53	27	West	Southern Bank	27°	26.70024	96°	31.30035
70	113	West	Geyer Bank	27°	47.89855	93°	2.49987
70	281	West	Geyer Bank	27°	48.49983	93°	3.99988
70	313	West	Geyer Bank	27°	48.59940	93°	3.69988
70	333	West	Geyer Bank	27°	48.70026	93°	4.80031
70	363	West	Geyer Bank	27°	48.79983	93°	4.20031
70	419	West	Geyer Bank	27°	49.00026	93°	4.09946
70	492	West	Geyer Bank	27°	49.30026	93°	3.89903
70	505	West	Geyer Bank	27°	49.30154	93°	2.49987
70	557	West	Geyer Bank	27°	49.60026	93°	4.69946
70	596	West	Geyer Bank	27°	49.79814	93°	3.09988
94	94	West	Parker Bank	27°	55.89957	92°	0.10006
94	99	West	Parker Bank	27°	55.90101	92°	1.80262
94	178	West	Parker Bank	27°	56.20073	92°	3.00148
94	188	West	Parker Bank	27°	56.20073	92°	1.59891
94	196	West	Parker Bank	27°	56.29673	92°	2.90080
94	281	West	Parker Bank	27°	56.50044	92°	1.69960
94	449	West	Parker Bank	27°	57.09953	92°	1.90000
94	593	West	Flying Dutchman Bank	27°	57.79999	92°	2.89846
94	655	West	Flying Dutchman Bank	27°	57.99667	92°	2.90314
94	704	West	Flying Dutchman Bank	27°	58.09970	92°	1.50525
96	47	West	Sidner Bank	27°	53.99976	92°	22.59968
96	75	West	Rezak Bank	27°	54.90116	92°	23.20061
96	90	West	Rezak Bank	27°	55.09931	92°	22.99922
96	194	West	Rezak Bank	27°	56.09999	92°	22.19961
96	303	West	Rezak Bank	27°	57.19914	92°	22.79863
96	319	West	Rezak Bank	27°	57.30086	92°	23.10097
96	505	West	Rezak Bank	27°	58.10050	92°	22.60084
96	609	West	Rezak Bank	27°	58.60062	92°	23.49937
96	644	West	Rezak Bank	27°	58.69952	92°	22.40022
96	656	West	Rezak Bank	27°	58.79842	92°	21.59776
97	127	West	McGrail Bank	27°	57.90094	92°	36.29872
97	140	West	McGrail Bank	27°	57.99969	92°	36.29872
97	161	West	McGrail Bank	27°	58.09978	92°	35.79961
97	165	West	McGrail Bank	27°	58.11313	92°	34.84810
97	193	West	McGrail Bank	27°	58.29863	92°	36.50023
97	205	West	McGrail Bank	27°	58.29996	92°	36.79916
97	225	West	McGrail Bank	27°	58.40005	92°	34.79873

97	256	West	McGrail Bank	27°	58.60023	92°	35.40059
97	266	West	McGrail Bank	27°	58.69898	92°	35.49668
97	290	West	McGrail Bank	27°	59.53705	92°	36.79783
99	4	West	Elvers Bank	27°	51.00295	92°	55.30132
99	9	West	Elvers Bank	27°	51.29816	92°	55.20146
99	25	West	Elvers Bank	27°	50.39949	92°	54.30279
99	30	West	Elvers Bank	27°	50.59703	92°	54.10309
99	44	West	Elvers Bank	27°	50.69905	92°	53.40412
99	45	West	Elvers Bank	27°	50.09776	92°	53.40195
99	46	West	Elvers Bank	27°	50.59920	92°	53.40195
99	57	West	Elvers Bank	27°	50.69254	92°	52.80067
99	71	West	Elvers Bank	27°	50.80107	92°	52.09953
99	76	West	Elvers Bank	27°	50.70339	92°	51.90634
101	81	West	Bright Bank	27°	52.20044	93°	17.29917
101	119	West	Bright Bank	27°	52.40006	93°	17.10165
101	138	West	Bright Bank	27°	52.50092	93°	18.40024
101	275	West	Bright Bank	27°	53.00103	93°	16.70031
101	449	West	Bright Bank	27°	53.60200	93°	18.99701
101	464	West	Bright Bank	27°	53.70076	93°	17.79928
101	468	West	Bright Bank	27°	53.70076	93°	17.40003
101	596	West	Bright Bank	27°	54.19876	93°	16.99869
101	636	West	Bright Bank	27°	54.49924	93°	17.69842
101	657	West	Bright Bank	27°	54.70097	93°	17.50510
103	25	West	East Flower Garden Bank	27°	52.94736	93°	37.93261
103	57	West	East Flower Garden Bank	27°	54.69630	93°	37.28517
103	86	West	East Flower Garden Bank	27°	53.20241	93°	36.81150
103	105	West	East Flower Garden Bank	27°	55.59599	93°	36.60129
103	106	West	East Flower Garden Bank	27°	55.10270	93°	36.59848
103	111	West	East Flower Garden Bank	27°	55.99399	93°	36.59848
103	134	West	East Flower Garden Bank	27°	58.58376	93°	35.88938
103	144	West	East Flower Garden Bank	27°	58.30348	93°	35.64554
103	163	West	East Flower Garden Bank	27°	56.69748	93°	35.49699
103	174	West	East Flower Garden Bank	27°	58.60338	93°	35.34564
104	47	West	West Flower Garden	27°	51.05122	93°	47.96988
104	48	West	West Flower Garden	27°	51.07310	93°	47.39922
104	52	West	West Flower Garden	27°	51.39963	93°	49.10063
104	162	West	West Flower Garden	27°	52.20098	93°	48.10291
104	184	West	West Flower Garden	27°	52.60006	93°	48.39747
104	191	West	West Flower Garden	27°	52.70459	93°	49.40153
104	200	West	West Flower Garden	27°	52.89780	93°	48.70154
104	271	West	West Flower Garden	27°	53.39824	93°	48.50516

104	283	West	West Flower Garden	27°	53.49326	93°	48.20426
104	313	West	West Flower Garden	27°	53.80049	93°	48.90108
105	41	West	West Flower Garden	27°	50.77752	93°	52.41680
105	48	West	West Flower Garden	27°	50.08484	93°	52.27016
105	65	West	West Flower Garden	27°	51.50493	93°	51.89777
105	87	West	West Flower Garden	27°	50.49389	93°	51.43856
105	100	West	West Flower Garden	27°	52.39249	93°	51.28420
105	116	West	West Flower Garden	27°	51.59948	93°	50.89831
105	138	West	West Flower Garden	27°	52.57000	93°	50.39665
105	139	West	West Flower Garden	27°	53.43633	93°	50.39665
105	140	West	West Flower Garden	27°	51.09395	93°	50.39279
105	145	West	West Flower Garden	27°	51.77313	93°	50.29246
107	42	West	Applebaum Bank	27°	50.99985	94°	14.40091
107	52	West	Applebaum Bank	27°	51.09944	94°	15.99968
107	81	West	Applebaum Bank	27°	51.20080	94°	15.00022
107	89	West	Applebaum Bank	27°	51.20080	94°	14.10036
107	180	West	Applebaum Bank	27°	51.59916	94°	14.50050
107	208	West	Applebaum Bank	27°	51.70053	94°	14.10036
107	228	West	Applebaum Bank	27°	51.80012	94°	14.60009
107	300	West	Applebaum Bank	27°	52.10067	94°	14.19960
107	334	West	Applebaum Bank	27°	52.29985	94°	15.19905
107	342	West	Applebaum Bank	27°	52.29985	94°	14.39878
108	1	West	Applebaum Bank West	27°	59.60570	94°	25.73351
108	2	West	Applebaum Bank West	27°	59.67584	94°	25.49564
108	3	West	Applebaum Bank West	27°	59.52336	94°	26.82221
108	4	West	Applebaum Bank West	27°	59.46542	94°	27.22475
108	5	West	Applebaum Bank West	27°	59.41663	94°	27.45042
108	6	West	Applebaum Bank West	27°	59.85577	94°	25.42555
108	7	West	Applebaum Bank West	27°	60.15158	94°	24.58687
108	8	West	Applebaum Bank West	27°	59.92591	94°	24.32765
108	9	West	Applebaum Bank West	27°	59.63925	94°	25.57188
108	10	West	Applebaum Bank West	27°	59.48677	94°	28.00849
127	1	West	Diaphus Bank	28°	5.90603	90°	41.86274
127	2	West	Diaphus Bank	28°	6.36441	90°	42.08756
127	3	West	Diaphus Bank	28°	5.16926	90°	40.70979
127	4	West	Diaphus Bank	28°	5.28590	90°	42.03427
127	5	West	Diaphus Bank	28°	5.29098	90°	41.62310
127	6	West	Diaphus Bank	28°	4.64814	90°	42.25438
127	7	West	Diaphus Bank	28°	5.31221	90°	42.98393
127	8	West	Diaphus Bank	28°	5.00823	90°	41.86622
127	9	West	Diaphus Bank	28°	4.00277	90°	41.90364

127	10	West	Diaphus Bank	28°	5.66216	90°	42.04431
134	18	West	Alderice Bank	28°	4.39999	91°	59.90217
134	32	West	Alderice Bank	28°	4.49956	91°	59.40241
134	35	West	Alderice Bank	28°	4.49956	91°	59.09805
134	80	West	Alderice Bank	28°	4.89974	91°	58.90078
134	98	West	Alderice Bank	28°	5.10077	91°	59.90029
134	99	West	Alderice Bank	28°	5.10077	91°	59.80072
134	105	West	Alderice Bank	28°	5.10077	91°	58.89890
134	112	West	Alderice Bank	28°	5.20035	91°	59.59969
134	144	West	Alderice Bank	28°	5.49532	91°	59.09993
134	162	West	Alderice Bank	28°	5.60241	91°	59.90217
148	9	West	Stetson Bank	28°	9.57047	94°	18.24177
148	11	West	Stetson Bank	28°	10.07838	94°	18.20001
148	14	West	Stetson Bank	28°	10.08289	94°	18.09955
148	15	West	Stetson Bank	28°	10.08854	94°	18.00023
148	19	West	Stetson Bank	28°	9.90005	94°	17.80045
148	20	West	Stetson Bank	28°	10.00163	94°	17.79933
148	24	West	Stetson Bank	28°	10.09982	94°	17.70000
148	27	West	Stetson Bank	28°	10.09982	94°	17.59955
148	28	West	Stetson Bank	28°	10.42827	94°	17.50135
148	31	West	Stetson Bank	28°	10.11788	94°	17.23047
219	4	West	Sonnier Bank	28°	21.00415	94°	28.20073
219	9	West	Sonnier Bank	28°	20.18004	92°	27.82691
219	11	West	Sonnier Bank	28°	20.00445	92°	27.69947
219	13	West	Sonnier Bank	28°	19.52867	92°	27.60035
219	19	West	Sonnier Bank	28°	20.50005	92°	27.40211
219	26	West	Sonnier Bank	28°	20.54253	92°	27.22086
219	29	West	Sonnier Bank	28°	20.07242	92°	27.12740
219	30	West	Sonnier Bank	28°	20.94185	92°	27.12457
219	35	West	Sonnier Bank	28°	20.53404	92°	26.98297
219	37	West	Sonnier Bank	28°	20.47457	92°	26.92066
111/152	1	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	2	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	3	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	4	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	5	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	6	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	7	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	8	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	9	West	Carpenter 1967*	28°	0.02760	94°	55.11600
111/152	10	West	Carpenter 1967*	28°	0.02760	94°	55.11600

81/117	1	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	2	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	3	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	4	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	5	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	6	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	7	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	8	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	9	West	Dunn Bank*	27°	50.17680	96°	0.06420
81/117	10	West	Dunn Bank*	27°	50.17680	96°	0.06420
29	3	East	Dry Tortugas	24°	30.39316	82°	53.38675
29	13	East	Dry Tortugas	24°	30.40113	82°	52.30332
29	109	East	Dry Tortugas	24°	31.18980	82°	52.60604
29	225	East	Dry Tortugas	24°	31.69168	82°	52.89283
29	231	East	Dry Tortugas	24°	31.69964	82°	55.72886
29	514	East	Dry Tortugas	24°	35.19688	82°	59.69611
29	666	East	Dry Tortugas	24°	36.40378	82°	59.69611
29	822	East	Dry Tortugas	24°	37.39957	82°	58.50514
29	830	East	Dry Tortugas	24°	37.49517	82°	58.80387
29	969	East	Dry Tortugas	24°	38.30774	82°	58.39361
30	225	East	Riley's Hump	24°	30.99744	83°	7.20687
30	812	East	Tortugas Bank	24°	36.70000	83°	1.30000
30	1661	East	Tortugas Bank	24°	38.10000	83°	3.00000
30	1979	East	Tortugas Bank	24°	38.60000	83°	2.70000
30	2059	East	Tortugas Bank	24°	38.70000	83°	0.90000
30	2072	East	Tortugas Bank	24°	38.80000	83°	5.80000
30	2118	East	Tortugas Bank	24°	38.80000	83°	1.20000
30	2218	East	Tortugas Bank	24°	39.00000	83°	3.30000
30	2360	East	Tortugas Bank	24°	39.20000	83°	1.30000
30	2589	East	Tortugas Bank	24°	39.60000	83°	2.70000
45	215	East	Dry Tortugas	24°	42.60043	82°	54.60987
45	217	East	Dry Tortugas	24°	42.39967	82°	54.60586
45	452	East	Dry Tortugas	24°	40.50000	82°	58.00000
45	455	East	Dry Tortugas	24°	40.80000	82°	58.00000
45	495	East	Dry Tortugas	24°	41.80000	82°	58.10000
45	500	East	Dry Tortugas	24°	42.30000	82°	58.10000
45	525	East	Dry Tortugas	24°	41.80000	82°	58.20000
45	618	East	Dry Tortugas	24°	42.10000	82°	58.50000
45	921	East	Dry Tortugas	24°	42.40000	82°	59.50000
45	1035	East	Dry Tortugas	24°	41.80000	82°	59.90000
46	134	East	Tortugas Bank	24°	40.30000	83°	3.10000

46	153	East	Tortugas Bank	24°	40.30000	83°	1.20000
46	191	East	Tortugas Bank	24°	40.40000	83°	2.40000
46	196	East	Tortugas Bank	24°	40.40000	83°	1.90000
46	276	East	Tortugas Bank	24°	40.60000	83°	4.40000
46	423	East	Dry Tortugas	24°	40.90000	83°	4.80000
46	553	East	Dry Tortugas	24°	41.10000	83°	1.10000
46	768	East	Dry Tortugas	24°	41.60000	83°	2.40000
46	1052	East	Dry Tortugas	24°	42.30000	83°	2.60000
46	1076	East	Dry Tortugas	24°	42.30000	83°	0.20000
86	18	East	Pulley Ridge	25°	9.99974	83°	36.09976
86	27	East	Pulley Ridge	25°	9.29969	83°	35.99939
86	62	East	Pulley Ridge	25°	7.99996	83°	35.70166
86	87	East	Pulley Ridge	25°	7.70054	83°	35.59961
86	92	East	Pulley Ridge	25°	6.09971	83°	35.59876
86	130	East	Pulley Ridge	25°	5.30014	83°	35.30019
86	141	East	Pulley Ridge	25°	4.69962	83°	35.19982
86	266	East	Pulley Ridge	25°	0.70007	83°	34.60014
86	276	East	Pulley Ridge	25°	1.70038	83°	34.60014
86	280	East	Pulley Ridge	25°	0.39981	83°	34.49977
124	5	East	Pulley Ridge	25°	20.70048	83°	37.79958
124	12	East	Pulley Ridge	25°	21.09946	83°	37.49977
124	29	East	Pulley Ridge	25°	21.59760	83°	37.70041
124	30	East	Pulley Ridge	25°	21.50074	83°	37.70041
124	43	East	Pulley Ridge	25°	22.49932	83°	37.79958
124	44	East	Pulley Ridge	25°	22.39785	83°	37.80188
124	60	East	Pulley Ridge	25°	22.99746	83°	37.70041
124	64	East	Pulley Ridge	25°	22.79913	83°	37.70041
124	70	East	Pulley Ridge	25°	22.69766	83°	37.39830
124	73	East	Pulley Ridge	25°	24.19669	83°	37.94948
144	7	East	Pulley Ridge	25°	31.89958	83°	39.29967
144	82	East	Pulley Ridge	25°	33.79614	83°	38.70019
144	88	East	Pulley Ridge	25°	34.00095	83°	38.60206
144	113	East	Pulley Ridge	25°	34.09908	83°	38.49966
144	145	East	Pulley Ridge	25°	35.69911	83°	38.39939
144	146	East	Pulley Ridge	25°	35.79938	83°	38.39939
144	199	East	Pulley Ridge	25°	37.09860	83°	38.19672
144	205	East	Pulley Ridge	25°	36.90446	83°	38.10072
144	213	East	Pulley Ridge	25°	36.80206	83°	38.09858
144	235	East	Pulley Ridge	25°	39.69704	83°	38.09645
164	2	East	Pulley Ridge	25°	41.20230	83°	40.69858
164	4	East	Pulley Ridge	25°	41.63761	83°	40.75528

164	5	East	Pulley Ridge	25°	42.19913	83°	40.75162
164	6	East	Pulley Ridge	25°	42.29789	83°	40.72235
164	7	East	Pulley Ridge	25°	42.39300	83°	40.70040
164	8	East	Pulley Ridge	25°	48.99948	83°	41.90208
164	10	East	Pulley Ridge	25°	49.09824	83°	42.00268
164	11	East	Pulley Ridge	25°	49.14214	83°	41.88196
164	12	East	Pulley Ridge	25°	49.19884	83°	41.79965
164	14	East	Pulley Ridge	25°	49.29761	83°	41.89842
181	1	East	Pulley Ridge	25°	52.00058	83°	42.24289
181	3	East	Pulley Ridge	25°	52.19961	83°	42.36005
181	4	East	Pulley Ridge	25°	56.59937	83°	43.30013
181	8	East	Pulley Ridge	25°	57.00024	83°	43.30013
181	9	East	Pulley Ridge	25°	57.09905	83°	43.30154
181	13	East	Pulley Ridge	25°	57.41100	83°	42.90067
181	14	East	Pulley Ridge	25°	57.49993	83°	43.34671
181	24	East	Pulley Ridge	25°	58.20005	83°	43.33683
181	30	East	Pulley Ridge	25°	58.59951	83°	43.23802
181	36	East	Pulley Ridge	25°	59.18389	83°	43.09969
333	32	East	The Elbow	27°	43.49913	84°	9.19923
333	34	East	The Elbow	27°	43.49913	84°	8.99734
333	76	East	The Elbow	27°	44.00051	84°	10.00009
333	86	East	The Elbow	27°	44.00051	84°	9.00070
333	200	East	The Elbow	27°	45.10085	84°	9.70061
333	396	East	The Elbow	27°	46.79974	84°	9.19916
333	507	East	The Elbow	27°	47.59968	84°	9.70045
333	673	East	The Elbow	27°	48.39961	84°	7.99926
333	770	East	The Elbow	27°	48.89912	84°	8.20013
333	777	East	The Elbow	27°	48.90071	84°	7.60092
371	34	East	Florida Middle Ground	28°	14.40244	84°	7.80030
371	79	East	Florida Middle Ground	28°	15.50398	84°	5.99107
371	175	East	Florida Middle Ground	28°	16.00244	84°	5.80030
371	221	East	Florida Middle Ground	28°	16.29782	84°	6.50799
371	235	East	Florida Middle Ground	28°	16.50089	84°	5.79415
371	236	East	Florida Middle Ground	28°	16.50705	84°	7.00030
371	450	East	Florida Middle Ground	28°	19.30088	84°	7.30184
371	541	East	Florida Middle Ground	28°	19.79934	84°	6.69876
371	565	East	Florida Middle Ground	28°	19.89781	84°	8.29875
371	592	East	Florida Middle Ground	28°	20.00242	84°	6.20030
375	29	East	Steamboat Lumps	28°	15.39286	84°	45.09703
375	109	East	Steamboat Lumps	28°	18.10490	84°	46.79509
375	139	East	Steamboat Lumps	28°	19.19651	84°	48.70177

375	145	East	Steamboat Lumps	28°	19.70108	84°	48.79880
375	167	East	Steamboat Lumps	28°	12.32187	84°	42.99460
375	177	East	Steamboat Lumps	28°	12.21697	84°	43.01191
375	200	East	Steamboat Lumps	28°	12.52047	84°	43.31542
375	225	East	Steamboat Lumps	28°	12.94008	84°	43.43763
375	237	East	Steamboat Lumps	28°	13.26904	84°	43.90409
375	262	East	Steamboat Lumps	28°	13.65017	84°	44.35005
386	101	East	Florida Middle Ground	28°	20.89906	84°	9.39796
386	217	East	Florida Middle Ground	28°	21.50213	84°	6.50223
386	274	East	Florida Middle Ground	28°	22.70329	84°	7.29967
386	277	East	Florida Middle Ground	28°	22.89268	84°	7.39935
386	350	East	Florida Middle Ground	28°	25.00592	84°	6.19820
386	460	East	Florida Middle Ground	28°	28.59942	84°	8.09712
386	472	East	Florida Middle Ground	28°	28.79878	84°	8.79987
386	478	East	Florida Middle Ground	28°	28.79878	84°	8.20179
386	491	East	Florida Middle Ground	28°	28.89846	84°	8.00242
386	521	East	Florida Middle Ground	28°	29.19751	84°	8.70019
403	251	East	Florida Middle Ground	28°	31.19369	84°	14.20164
403	391	East	Florida Middle Ground	28°	31.99912	84°	16.60040
403	841	East	Florida Middle Ground	28°	33.99736	84°	15.90003
403	858	East	Florida Middle Ground	28°	34.09585	84°	15.40102
403	866	East	Florida Middle Ground	28°	34.10023	84°	16.30275
403	1027	East	Florida Middle Ground	28°	35.09607	84°	14.60216
403	1070	East	Florida Middle Ground	28°	35.39592	84°	15.70524
403	1298	East	Florida Middle Ground	28°	37.39854	84°	15.70306
403	1391	East	Florida Middle Ground	28°	37.99823	84°	16.00071
403	1470	East	Florida Middle Ground	28°	38.69860	84°	16.40124
404	129	East	Florida Middle Ground	28°	31.39825	84°	21.20073
404	341	East	Florida Middle Ground	28°	32.90073	84°	20.39968
404	354	East	Florida Middle Ground	28°	33.09998	84°	20.60096
404	412	East	Florida Middle Ground	28°	33.60013	84°	20.80020
404	732	East	Florida Middle Ground	28°	35.60072	84°	20.30005
404	828	East	Florida Middle Ground	28°	36.09570	84°	22.09840
404	1018	East	Florida Middle Ground	28°	36.89992	84°	20.60176
404	1034	East	Florida Middle Ground	28°	37.00090	84°	21.39877
404	1178	East	Florida Middle Ground	28°	37.59928	84°	22.59952
404	1445	East	Florida Middle Ground	28°	39.20138	84°	23.10373
407	41	East	The Edges	28°	31.79345	84°	55.90154
407	100	East	The Edges	28°	33.40285	84°	57.19570
407	103	East	The Edges	28°	33.50240	84°	57.09615
407	113	East	The Edges	28°	33.79276	84°	57.39480

407	124	East	The Edges	28°	34.08311	84°	57.69346
407	158	East	The Edges	28°	35.19476	84°	58.29906
407	202	East	The Edges	28°	36.59677	84°	58.99591
407	232	East	The Edges	28°	37.60057	84°	59.70936
407	241	East	The Edges	28°	37.89922	84°	59.70936
407	259	East	The Edges	28°	38.70393	84°	59.80891
446	1	East	Twin Ridges	28°	59.59988	85°	22.85023
446	45	East	Twin Ridges	28°	59.05012	85°	21.49128
446	55	East	Twin Ridges	28°	58.49967	85°	21.49969
446	105	East	The Edges	28°	58.99848	85°	29.60055
446	112	East	The Edges	28°	59.09902	85°	29.39948
446	121	East	The Edges	28°	59.00067	85°	29.20060
446	137	East	The Edges	28°	59.09683	85°	28.89899
446	184	East	The Edges	28°	58.99848	85°	27.39755
446	188	East	The Edges	28°	59.09902	85°	27.20085
446	204	East	The Edges	28°	59.49897	85°	26.69818
470	8	East	Madison-Swanson	29°	8.24977	85°	47.30128
470	5	East	Madison-Swanson	29°	8.25443	85°	47.39921
470	15	East	Madison-Swanson	29°	8.34956	85°	47.09982
470	27	East	Madison-Swanson	29°	8.35050	85°	46.69970
470	38	East	Madison-Swanson	29°	8.39993	85°	46.35087
470	62	East	Madison-Swanson	29°	9.77666	85°	43.92327
470	75	East	Madison-Swanson	29°	9.80035	85°	43.40119
470	86	East	Madison-Swanson	29°	9.93422	85°	42.89969
470	88	East	Madison-Swanson	29°	9.94966	85°	42.79981
470	93	East	Madison-Swanson	29°	9.99909	85°	42.64946
519	5	East	DeSoto Canyon	29°	20.60110	86°	0.60132
519	11	East	DeSoto Canyon	29°	20.69891	86°	3.10349
519	32	East	DeSoto Canyon	29°	21.00047	86°	0.19652
519	36	East	DeSoto Canyon	29°	21.10099	86°	0.69913
519	52	East	DeSoto Canyon	29°	21.20152	86°	0.40299
519	55	East	DeSoto Canyon	29°	21.29661	86°	3.69847
519	87	East	DeSoto Canyon	29°	23.79878	86°	4.29888
519	144	East	DeSoto Canyon	29°	28.90364	86°	8.49634
519	150	East	DeSoto Canyon	29°	29.50405	86°	8.80062
519	158	East	Coral Trees	29°	29.80290	86°	0.48722
523	3	East	Mobile Pinnacles	29°	27.34405	87°	39.83186
523	7	East	Mobile Pinnacles	29°	27.70202	87°	39.69592
523	11	East	Mobile Pinnacles	29°	27.69296	87°	39.48749
523	29	East	Mobile Pinnacles	29°	27.81077	87°	38.00122
523	42	East	Mobile Pinnacles	29°	27.79718	87°	37.20371

523	46	East	Mobile Pinnacles	29°	26.30638	87°	37.09043
523	47	East	Mobile Pinnacles	29°	26.19763	87°	37.00433
523	51	East	Mobile Pinnacles	29°	26.18857	87°	36.89558
523	85	East	Mobile Pinnacles	29°	26.30185	87°	34.41242
523	161	East	MS/AL Shelf	29°	28.60375	87°	30.48831
524	42	East	Mobile Pinnacles	29°	20.60084	87°	46.79421
524	47	East	Mobile Pinnacles	29°	20.64648	87°	44.47053
524	84	East	Mobile Pinnacles	29°	21.20043	87°	44.80041
524	102	East	Mobile Pinnacles	29°	22.94112	87°	41.39994
524	126	East	MS/AL Shelf	29°	24.09881	87°	46.69878
524	128	East	MS/AL Shelf	29°	24.39342	87°	45.80042
524	135	East	MS/AL Shelf	29°	24.49924	87°	45.10124
524	141	East	MS/AL Shelf	29°	24.59467	87°	45.70291
524	171	East	MS/AL Shelf	29°	25.50755	87°	49.70090
524	210	East	MS/AL Shelf	29°	27.49721	87°	40.00988
553	6	East	MS/AL Shelf	29°	30.69304	87°	28.06360
553	12	East	Mobile Pinnacles	29°	30.90944	87°	24.83280
553	18	East	Mobile Pinnacles	29°	31.03962	87°	24.62147
553	20	East	MS/AL Shelf	29°	31.10893	87°	29.36032
553	24	East	MS/AL Shelf	29°	31.19346	87°	28.79734
553	27	East	MS/AL Shelf	29°	31.54173	87°	28.21576
553	36	East	MS/AL Shelf	29°	33.20025	87°	27.89961
553	52	East	MS/AL Shelf	29°	33.99485	87°	29.13716
553	54	East	MS/AL Shelf	29°	34.24337	87°	28.53698
553	59	East	MS/AL Shelf	29°	35.04135	87°	28.99007
554	26	East	MS/AL Shelf	29°	33.50090	87°	37.58998
554	28	East	MS/AL Shelf	29°	31.59979	87°	37.49772
554	69	East	MS/AL Shelf	29°	33.39876	87°	36.69709
554	80	East	MS/AL Shelf	29°	33.50419	87°	33.58679
554	89	East	MS/AL Shelf	29°	33.78755	87°	33.39569
554	90	East	MS/AL Shelf	29°	33.89957	87°	33.39569
554	101	East	MS/AL Shelf	29°	33.21095	87°	33.09256
554	106	East	MS/AL Shelf	29°	34.69691	87°	32.98713
554	117	East	MS/AL Shelf	29°	33.39876	87°	32.69060
554	153	East	MS/AL Shelf	29°	30.09736	87°	30.69724
578	9	East	DeSoto Canyon Area	29°	48.29951	86°	20.59663
578	88	East	DeSoto Canyon Area	29°	46.79958	86°	21.50213
578	136	East	DeSoto Canyon Area	29°	48.90034	86°	21.90055
578	261	East	DeSoto Canyon Area	29°	48.79977	86°	23.59941
578	380	East	DeSoto Canyon Area	29°	48.89821	86°	24.80241
578	402	East	DeSoto Canyon Area	29°	49.99759	86°	25.29884

578	414	East	DeSoto Canyon Area	29°	48.79594	86°	26.20434
578	519	East	DeSoto Canyon Area	29°	47.89896	86°	27.80229
578	650	East	DeSoto Canyon Area	29°	49.49904	86°	29.30009
578	684	East	DeSoto Canyon Area	29°	49.40103	86°	29.70065
612	22	East	DeSoto Canyon Area	29°	51.39372	87°	18.50142
612	26	East	MS/AL Shelf	29°	51.50198	87°	18.19157
612	74	East	MS/AL Shelf	29°	50.89721	87°	16.80658
612	84	East	MS/AL Shelf	29°	51.80436	87°	16.60500
612	89	East	MS/AL Shelf	29°	50.80015	87°	16.59380
612	140	East	MS/AL Shelf	29°	52.20007	87°	15.20507
612	155	East	MS/AL Shelf	29°	52.39419	87°	14.79070
612	167	East	MS/AL Shelf	29°	53.49546	87°	13.60356
612	222	East	MS/AL Shelf	29°	54.70126	87°	11.89379
612	249	East	MS/AL Shelf	29°	55.39562	87°	11.19197
633	43	East	DeSoto Canyon Area	30°	2.09983	86°	58.40048
633	82	East	DeSoto Canyon Area	30°	2.59819	86°	59.30006
633	127	East	DeSoto Canyon Area	30°	4.19884	86°	59.63793
633	173	East	DeSoto Canyon Area	30°	6.66505	86°	55.19850
633	187	East	DeSoto Canyon Area	30°	7.06606	86°	53.79916
633	205	East	DeSoto Canyon Area	30°	7.40165	86°	52.10012
633	209	East	DeSoto Canyon Area	30°	7.46708	86°	51.69910
633	212	East	DeSoto Canyon Area	30°	7.50085	86°	55.15418
633	275	East	DeSoto Canyon Area	30°	7.89764	86°	50.99838
633	285	East	DeSoto Canyon Area	30°	7.99896	86°	50.79787

3. Mississippi Laboratories Standard Operating Procedures for Calibration of Simrad EK60 Echosounder

I. Required Equipment

- Simrad EK60 Split-beam 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
    - 3 Downrigger reels: Electric remote control reels on *Pisces*, Manual control reels on *Gordon Gunter* and *Oregon II*

    - Downrigger control system: Electric remote control unit on *Pisces*, Manual control reels on *Gordon Gunter* and *Oregon II*
    - 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 50 m 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

II. Ship Requirements

- Calibration will be conducted with *Pisces* centerboard in *Retracted* position.
- Adequate lighting should be provided on weather decks during calibration activities
- Ship will refrain from discharging waste during calibration activities.
- Ship should secure all unnecessary engineering equipment (i.e. drop to one generator)
- All unnecessary acoustic sources will be secured (navigational echosounder, ADCP, Doppler speed log, etc)
- OOD should monitor radars and advise science party of approaching weather

A. For Calibration inshore with vessel anchored

- Prior to anchoring, while drifting, a line will be pulled under the hull to facilitate positioning the calibration target. This line must be in place before anchor chain prevents deployment from the bow.
- Perform CTD cast to provide temperature and salinity for upper 30 m of water column
- Ship will anchor in water at least 30 m deep.
- Anchorage should be in a low traffic area, a safe distance away from nearby rigs

B. For Calibration offshore with vessel drifting

- Perform CTD cast to provide temperature and salinity for upper 50 m of water column
- Location should be chosen so that vessel does not drift into traffic, hazards, or water shallower than 60 m during calibration that can last for 8 h or more
- Ship will drift, without maneuvering, in water at least 60 m deep with wind initially on the port side.
- Ship will be periodically 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 scientist's request and must be done very slowly to prevent fouling the suspended calibration gear.

III. 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
- A survey that plans to calibrate the EK60 echosounder should be prepared to stop other survey operations and calibrate when a weather window of opportunity occurs

IV. Procedures

- A. Preparation
    - Conduct CTD cast to obtain measurements of temperature and salinity for upper part of water column, at least 30 m if anchored and at least 50 m if drifting. CTD can be conducted before or after anchoring.
    - Set *Pisces* centerboard to *Retracted* position
    - ER60 Software settings
        - Set transducer depths to zero
        - Set Ping Control to *Interval* and Ping Interval to 0.5 sec
        - Set echogram ranges to 40 m
        - Set data recording range to 60 m
        - Set bottom detection to detect bottom
        - If drifting in very deep water, bottom detection should be disabled so that echosounder achieves 0.5 second ping interval.
- B. 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 and Downriggers
        - *Pisces* mounting locations
            - Two outriggers are on starboard side, one outrigger on port side
        - *Gunter* mounting locations
        - *Oregon II* mounting locations
    - 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 so that all three lines can be attached together as follows:

        - 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 ~100 ft depth. Continue to lower as cord is pulled from opposite end until all three swivels can be joined on opposite side of vessel
        - Retrieve the cord from the other side and attach swivels of all three lines together
    - Once line is secured it can be reeled taut during vessel anchoring
    - Anchoring of the vessel should take place after the above steps have been completed
    - 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 above and below the calibration target
    - Lift the calibration target out of detergent solution using the line and without touching it lower it and the 4 lb weight into the water
    - Lower 4 lb weight and target until they are suspended from two outriggers
    - Simultaneously lower two outriggers so counters read ~90 ft
    - Reel opposite downrigger up to ~90 ft
    - Adjust downriggers so that echoes from calibration target are observed near center of the beam of the first transducer to be calibrated, at approximately 25 m depth
        - On *Pisces*, target should be near center of transducer beams when reels are set as follows:

Transducer	Starboard-Forward	Starboard-Aft	Port
18 kHz			
38 kHz	65 ft	75 ft	65 ft
120 kHz	69 ft	83 ft	70 ft
200 kHz			

        - Make additional observations to augment this table when possible
- C. Collect Calibration Data
    - Calculate the average temp and salinity for upper 30 m of water column, enter these values in ER60 *Environment* dialog window
    - Calculate sphere target strength at each EK60 frequency using the specific depth, temperature, and salinity of the sphere location
    - Start recording of raw data
    - 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 well distributed echoes in each quadrant of the beam
    - Echoes near the center of the beam are most important for accurate biomass estimation

    - When conducting calibration with vessel drifting, if the downriggers cannot 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
- D. Recover Calibration Target
    - Lower the single outrigger on one side so that the calibration target can be retrieved on the side with two outriggers
    - Rinse the calibration target in fresh water and store it safely
- E. Update Calibration Parameters
    - ....Post calibration data editing
    - …Update calibration parameters in the Transceiver menu dialog
- F. Continue survey operations
    - Return *Pisces* centerboard to lowered position
    - Set transducer depths back to proper values for lowered centerboard position
    - Reset ER60 software for survey data collection
    - Resume survey data collection