



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: Lieutenant Commander Jeffrey Shoup, NOAA
Commanding Officer, NOAA Ship *Nancy Foster*

FROM: Captain Scott M. Sirois, NOAA
Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT: Project Instruction for NF-16-04
Southeast Regional Ecosystem Assessment

Attached is the final Project Instruction for NF-16-04 Southeast Regional Ecosystem Assessment, which is scheduled aboard NOAA Ship *Nancy Foster* during the period of July 7, – July 16, 2016. Of the 10 DAS scheduled for this project, 10 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.





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Office of National Marine Sanctuaries
Gray's Reef National Marine Sanctuary
10 Ocean Science Circle
Savannah, Georgia 31411

DRAFT Project Instructions

Date Submitted: June 20, 2016

Platform: NOAA Ship *Nancy Foster*

Project Number: NF-16-04

Project Title: Southeast Regional Ecosystem Assessment

Project Dates: July 7, 2016 to July 16, 2016

Prepared by: FANGMAN.MARY.SARAH.13658717
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Sarah Fangman
Chief Scientist & Superintendent
Gray's Reef National Marine Sanctuary

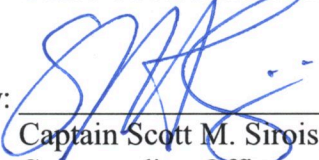
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Approved by: Billy D Causey
Billy Causey
Regional Director
Southeast, Gulf of Mexico and Caribbean Region
Office Of National Marine Sanctuaries

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Approved by: 
Captain Scott M. Sirois, NOAA
Commanding Officer
Marine Operations Center - Atlantic

Dated: 6/30/16



I. Overview

A. Brief Summary and Project Period

Gray's Reef National Marine Sanctuary has a variety of ongoing research and monitoring projects that will be continued during this research expedition. Projects will investigate questions related to fish and invertebrate abundance and distribution, and habitat and human impacts.

Mobilization: July 6, 2016 – Charleston, SC

Departure: July 7, 2016

Return/Demobilization: July 16, 2016 – Savannah, GA

Open House: July 17, 2016 – Savannah, GA

B. Days at Sea (DAS): 10

Of the 10 DAS scheduled for this project, 10 DAS are funded by a Line Office Allocation. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area

Diving and sampling will be conducted in waters within Gray's Reef National Marine Sanctuary (GRNMS). Exact locations of these sites will be determined while at sea based on a variety of factors and will be provided to the ship's navigation crew the night before a site is to be visited. A list of sites is provided in Tables 1-2 at the end of this document. Multibeam mapping activities will occur outside of the boundaries of Gray's Reef NMS.

D. Summary of Objectives

Objective 1: Ship based mapping and characterization of benthic habitats in the waters around Gray's Reef National Marine Sanctuary. Collected data will need to include backscatter.

Objective 2: Assess spatial variation in distribution of prey and associated predators both on and off reefs (i.e., along a gradient of distance from edges of undercut ledges), using acoustic survey methods, over diel periods.

Objective 3: Continue collecting data on the abundance, diversity and distribution of fish and invertebrates both inside and outside the Research Area in Gray's Reef. This project will include diving to assess fish and invertebrate populations around the sanctuary.

E. Participating Institutions

NOAA Gray's Reef National Marine Sanctuary

Georgia Southern University

Valdosta State University

National Center for Coastal Ocean Science

National Marine Fisheries Service Beaufort Laboratory

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Fangman, Sarah*	Chief Scientist	July 6, 2016	July 16, 2016	F	GRNMS	USA
Munoz, Roldan*	Scientist	July 6, 2016	July 16, 2016	M	NMFS	USA
Johnson, Alissa	Scientist	July 6, 2016	July 16, 2016	F	GRNMS	USA
Gleason, Daniel*	Scientist	July 6, 2016	July 16, 2016	M	Georgia Southern University	USA
Henkel, Tim*	Scientist	July 6, 2016	July 16, 2016	M	Valdosta State University	USA
O'Cain, Elijah*	Scientist	July 6, 2016	July 16, 2016	M	Georgia Southern University	USA
Campanella, Fabio	Scientist	July 6, 2016	July 16, 2016	M	NMFS	Italy
Degan, Brian*	Scientist	July 6, 2016	July 16, 2016	M	NCCOS	USA
Stefaniak, Lauren*	Scientist	July 6, 2016	July 16, 2016	F	Georgia Southern University	USA
Halonen, LTJG Jared*	Scientist and Divemaster	July 6, 2016	July 16, 2016	M	NOAA/GRNMS	USA
Gimble, Samantha*	Scientist	July 6, 2016	July 16, 2016	F	Valdosta State University	USA
Varnerin, Brianne*	Scientist	July 6, 2016	July 16, 2016	F	Georgia Southern University	USA

* Denotes Diver

G. Administrative

1. Points of Contacts:

Sarah Fangman, *Chief Scientist*
Gray's Reef NMS
10 Ocean Science Circle
Savannah, GA 31411
912-598-2428
Sarah.Fangman@noaa.gov

LT Linh Nguyen, Operations Officer
NOAA Ship *Nancy Foster*
1050 Register St., North Charleston, SC 29405
843-991-6326

ops.nancy.foster@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 NOAA's Office of National Marine Sanctuaries on 1 January 2014, effective until December 31, 2018 and issued to the Superintendent of Gray's Reef National Marine Sanctuary (Sarah Fangman).

II. Operations

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

A. Project Itinerary:

July 6: 1300 mobilize project gear and supplies
July 7: Depart Charleston
July 16: Return to Savannah, demobilize project gear and supplies
July 17: Open House

B. Staging and Destaging:

Mobilization activities will occur in Charleston, SC on July 6. Demobilization will occur in Savannah, GA on July 16. Ship's crew and equipment will be requested to assist with loading/offloading all miscellaneous equipment and SCUBA bottles.

C. Operations to be Conducted:

Multibeam Mapping

Use Reson 7125 (or mid-water) multi-beam system aboard NOAA Ship *Nancy Foster* to collect acoustic and backscatter data for preparation of maps of habitats around GRNMS. Multibeam operations will occur primarily at night at locations outside the sanctuary.

Picivore Ecology

Conduct simultaneous split-beam (EK-60) and multibeam sonar surveys along lines delineated for specific study reefs both inside and outside the research area (as performed previously starting in 2011). Surveys will be conducted early morning, mid-day, late afternoon, post-sunset, sometime during middle night time hours and prior to sunrise (with actual timing determined by time of sunset and sunrise). Surveys will focus on one reef each day, from a set of 10 reefs previously surveyed (Appendix I, Table 1 and Figure 1).

Invertebrate Abundance and Diversity Assessment:

1. Document the abundance and diversity of sessile invertebrate populations which will be quantified in 0.5 x 0.5 m (0.25 m²) quadrats placed along ledges found within the GRNMS. At each ledge, quadrats will be placed at 3 points: a) on the ledge immediately adjacent to the scarp,

b) 2 m away from the scarp on the sandy portion of the ledge and c) 5 m away from the scarp on the sandy portion of the ledge. Quadrats will be placed in these positions to take into account gradations in community composition. A minimum of 10 quadrats will be completed at each of the 3 positions on a ledge.

2. A total of 20 sites will be monitored: 10 inside and 10 outside the no-take research zone. It is estimated that 2 sites per day (2 dives of 35-40 minutes at each site for 4 dives per person per day) can be completed with 4 divers available.

3. Complete photographic monitoring of 30 permanent plots established at the GRNMS Monitoring Site Station 20 in summer 2010. It is estimated that it will take 2-3 dives for 2 divers to complete these photographs.

Gray's Reef Hardbottom Community Survey

1. Conspicuous fish survey - 50 m underwater visual census (UVC) transects with an estimated width of 5m on each side targeting mobile conspicuous fishes. Area surveyed = 500 m.

2. Prey fish survey - 30 m UVC transects with an estimated width of 1m on each side that only targeted the cryptic (or juvenile) prey species 10 cm and less in length. Area surveyed = 60 m.

3. Habitat structure quantification - At fixed intervals along the fish survey transects (5, 15, 25, 35 and 45 m) two ledge measurements will be collected: total ledge height and undercut height. Time permitting, at each ledge measurement location, macroalgae and invertebrate height will be recorded. Maximum height of an individual will be recorded to the nearest centimeter.

D. Dive Plan

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

Diving operations will be conducted as required to support invertebrate studies, fish surveys, and recovery of lost gear (if necessary). Two small boats will be needed simultaneously to support these projects. Each small boat will carry 4-5 divers and will conduct 2-4 dives before returning to the ship. Individuals who will function as divers are identified above in the list of scientific crew and all are Nitrox certified. Ship's divers are invited to assist with dive operations as other duties allow (ship's divers will be included in the project dive plan submitted to the NOAA Diving Center). A NOAA Divemaster (LTJG Jared Halonen) will be on board for all dive operations on this project and will follow all NOAA diving policies and regulations. A minimum of two divers will work together on all dives. Dives may be conducted in teams of two, three or four people. Each team will dive between one and six times daily as allowed under "No Decompression" limits of 36% NITROX except if working dives are necessary (none are planned), which requires the use of air. The presence and use of a qualified technician or crewmember to assist with the mixing of NITROX is respectfully requested.

The Dive Plans encompassing all legs of NF-16-04 are presented in Appendix 2.

E. Applicable Restrictions

Conditions which preclude normal operations: Poor weather, equipment failure, poor underwater visibility, safety concerns or unforeseen circumstances. Regular safety and planning meetings will be held to consider and address these potential events.

III. Equipment

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

- A trained technician / crew member to assist with mixing breathing gas
- 15 NITROX scuba tanks and means of refilling tanks at sea to support dive operations
- 1 small boat for deployment of up to 6 divers **AND**
- 1 small boat for deployment of 4 divers
- 2 portable emergency oxygen delivery kits
- One operator for each of the small boats (projects require two small boats to be operated simultaneously)
- Storage Area – Dry storage for the scientific party's supplies
- Icemaker
- 1 Freezer (minimum of $0 \pm 5^\circ$ F) – For sample storage
- 1 Refrigerator for sample storage
- Wet Lab and Dry Lab work space
- Electronic feed into dry lab of ship's GPS and fathometer
- CTD
- Crane and operator for mobilizing and demobilizing equipment and gear and for launching boats
- Clean 110v power from the wet lab
- EK-60 Split Beam Sonar System
- Reson 7125 Multibeam Sonar
- One technician to acquire and process multibeam imagery
- Scientific Computer System (SCS) – Data-logging capability; centralized location in dry lab for optimal use by scientific party; sensors to include: DGPS, depth, wind speed/direction, vessel speed

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

- 21 NITROX Tanks
- 1 portable emergency oxygen delivery kit
- Sample containers and miscellaneous sampling supplies
- Various redundant diving equipment
- Various lab supplies and equipment
- Sample containers and miscellaneous sampling supplies
- Any small tools and hardware necessary for scientific objectives.
- Dive sites will be entered into small boat GPS units by science party.

IV. Hazardous Materials

A. Policy and Compliance

No Hazardous Materials are being brought aboard the ship for this project.

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

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

C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the

overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's Commanding Officer, Operations Officer, and the Chief Scientist, and is arranged by the Operations Officer and Chief Scientist.

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

VIII. Miscellaneous

A. Meals and Berthing

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

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

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

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

Special dietary requests: will be provided prior to the cruise.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-16)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website <http://www.oma.noaa.gov/learn/marine-operations/about/project-planning/health-screening>.

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

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

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

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

Contact information:

Regional Director of Health Services
Marine Operations Center – 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 Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

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

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

D. Communications

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

E. IT Security

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

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

Completion of 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.

IX. Appendix 1. Tables, Maps and Figures.

Table 1. Picivore Ecology Stations

Site	Longitude	Latitude	I/O	2011	2012	2013
02OUT	-80.879	31.3881	OUT	yes	yes	yes
41OUT	-80.8903	31.39652	OUT	yes	yes	yes
19OUT	-80.8424	31.3972	OUT	no	yes	yes
01OUT	-80.894	31.3963	OUT	yes	no	no
wofmon	-80.908	31.397	OUT	yes	no	no
6NOF	-80.8665	31.3897	OUT	No	yes	no
15IN	-80.8463	31.37808	IN	yes	yes	yes
05IN	-80.895	31.36749	IN	yes	yes	yes
06IN	-80.8666	31.3732	IN	no	yes	yes
41IN	-80.8912	31.37538	IN	yes	no	yes
02IN	-80.8913	31.36438	IN	no	yes	no
Tag array	-80.838483	31.376483	IN			

Figure 1. Map of Picivore Ecology Stations

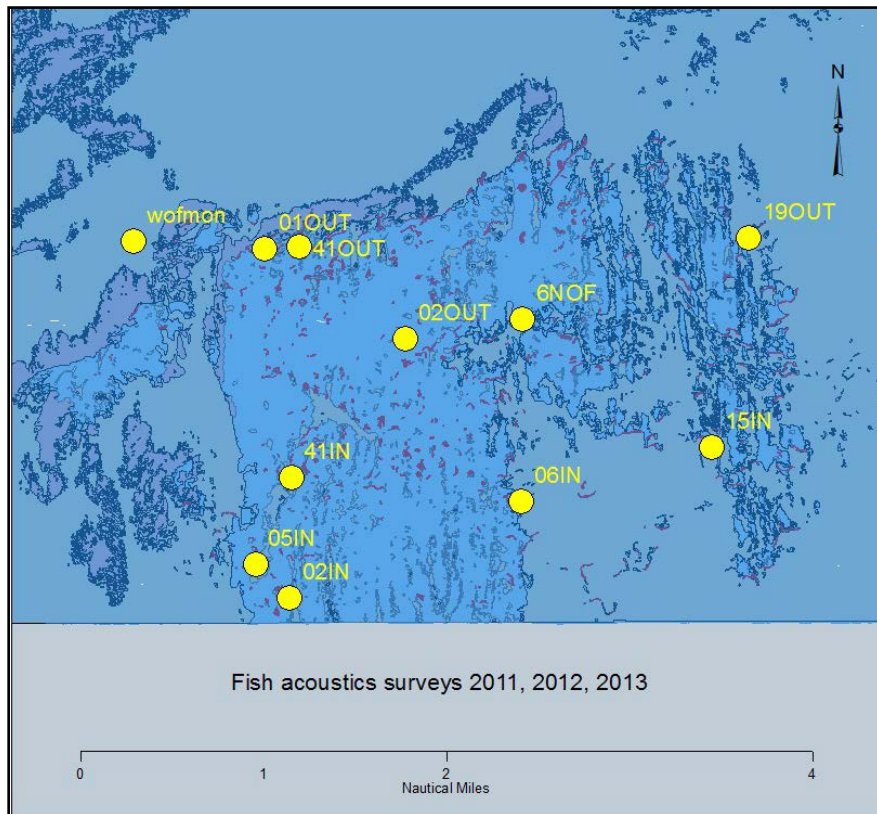


Table 2. FISH & INVERTEBRATE ABUNDANCE & DIVERSITY ASSESSMENT SITES:

Site	LONG_DD	LAT_DD
01ALTIN	-80.8791	31.37791
01ALTOUT	-80.8628	31.40024
01IN	-80.8881	31.37854
01OUT	-80.894	31.3963
02ALTIN	-80.8687	31.38328
02ALTOUT	-80.8384	31.38887
02IN	-80.8913	31.36438
02OUT	-80.879	31.3881
03ALTIN	-80.8479	31.38296
03ALTOUT	-80.858	31.40167
03IN	-80.8913	31.37542
03OUT	-80.8778	31.39066
04ALTIN	-80.8815	31.38084
04ALTOUT	-80.8983	31.39313
04IN	-80.8751	31.37697
04OUT	-80.8617	31.40042
05ALTIN	-80.8859	31.37475
05ALTOUT	-80.852	31.40431
05IN	-80.895	31.36749
05OUT	-80.8396	31.38955
06ALTIN	-80.8876	31.38295
06ALTOUT	-80.8869	31.39465
06IN	-80.8666	31.3732
06OUT	-80.8885	31.3939
07ALTIN	-80.8395	31.37649
07ALTOUT	-80.8402	31.38678
07IN	-80.8431	31.36613
07OUT	-80.8379	31.38586
08ALTIN	-80.8397	31.38257
08ALTOUT	-80.8749	31.38621
08IN	-80.8428	31.38106
08OUT	-80.8573	31.40373
09ALTIN	-80.8774	31.37667
09ALTOUT	-80.8443	31.38894
09IN	-80.8676	31.36621
09OUT	-80.8778	31.39653
10ALTIN	-80.8849	31.38366

10IN	-80.8709	31.37424
10OUT	-80.8636	31.40216
11ALTIN	-80.871	31.38252
11IN	-80.8923	31.36547
11OUT	-80.845	31.38846
12ALTIN	-80.8667	31.36869
12ALTOUT	-80.8792	31.38618
12IN	-80.8819	31.37883
12OUT	-80.878	31.39902
13ALTIN	-80.869	31.37564
13ALTOUT	-80.8836	31.397
13IN	-80.8718	31.36398
13OUT	-80.8862	31.39769
14ALTIN	-80.8737	31.37583
14ALTOUT	-80.8382	31.39142
14IN	-80.8389	31.37047
14OUT	-80.8885	31.3962
15ALTIN	-80.8677	31.37711
15ALTOUT	-80.862	31.40561
15IN	-80.8463	31.37808
15OUT	-80.8964	31.39117
16ALTIN	-80.853	31.36766
16ALTOUT	-80.849	31.39281
16IN	-80.8452	31.37522
16OUT	-80.8636	31.40489
17ALTIN	-80.8802	31.38221
17ALTOUT	-80.8766	31.39905
17IN	-80.8832	31.38011
17OUT	-80.8601	31.39741
18ALTIN	-80.868	31.3827
18ALTOUT	-80.8702	31.39806
18IN	-80.8707	31.37491
18OUT	-80.8429	31.3876
19ALTOUT	-80.8789	31.39819
19IN	-80.894	31.36421
19OUT	-80.8424	31.3972
20IN	-80.8773	31.36425
20OUT	-80.8818	31.3981
21ALTOUT	-80.8383	31.38482
21IN	-80.8924	31.36884
21OUT	-80.884	31.39741

22ALTOUT	-80.8771	31.38722
22IN	-80.8521	31.37805
22OUT	-80.8932	31.39739
23ALTOUT	-80.8938	31.39143
23IN	-80.89	31.37658
23OUT	-80.9026	31.39849
24IN	-80.8912	31.37728
24OUT	-80.8829	31.39419
25ALTOUT	-80.8706	31.40317
25IN	-80.8546	31.37958
25OUT	-80.8509	31.39552
26ALTOUT	-80.8526	31.39835
26IN	-80.8676	31.37005
26OUT	-80.8856	31.39786
27ALTOUT	-80.8722	31.40165
27IN	-80.8858	31.3822
27OUT	-80.8666	31.39726
28ALTOUT	-80.8914	31.39667
28IN	-80.8415	31.37682
28OUT	-80.8617	31.38824
29ALTOUT	-80.8867	31.39625
29IN	-80.8529	31.37921
29OUT	-80.8511	31.40263
30ALTOUT	-80.88	31.39547
30IN	-80.8709	31.3641
30OUT	-80.8738	31.38731
31ALTOUT	-80.8455	31.40002
31IN	-80.8656	31.37
31OUT	-80.8865	31.3955
32ALTOUT	-80.8522	31.4064
32IN	-80.8886	31.38373
32OUT	-80.8529	31.40375
33ALTOUT	-80.8751	31.39438
33IN	-80.8408	31.36716
33OUT	-80.8902	31.39121
34ALTOUT	-80.8848	31.39692
34IN	-80.8803	31.38007
34OUT	-80.8651	31.40107
35ALTOUT	-80.8605	31.40157
35IN	-80.8871	31.37734
35OUT	-80.845	31.39352

36ALTOUT	-80.8939	31.39684
36IN	-80.8888	31.37709
36OUT	-80.8668	31.40481
37ALTOUT	-80.8886	31.39456
37IN	-80.8831	31.37454
37OUT	-80.866	31.38629
38ALTOUT	-80.8662	31.40562
38IN	-80.8898	31.36838
38OUT	-80.8769	31.38662
39ALTOUT	-80.8764	31.39355
39IN	-80.8981	31.3723
39OUT	-80.8591	31.40393
40IN	-80.872	31.38213
40OUT	-80.8409	31.3925
41OUT	-80.8903	31.39652

Appendix 2. Dive Plan

To be sent separately.