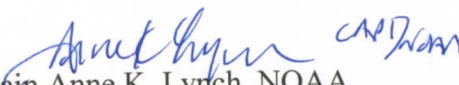


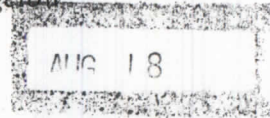


UNITED STATES DEPARTMENT OF COMMERCE

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

MEMORANDUM FOR: Commander G. Mark Miller, NOAA
Commanding Officer, NOAA Ship *Henry B. Bigelow*

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



SUBJECT: Project Instruction for HB-15-06
Autumn Bottom Trawl Survey

Attached is the final Project Instruction for HB-15-06, Autumn Bottom Trawl Survey, which is scheduled aboard NOAA Ship *Henry B. Bigelow* during the period of August 31 to November 7, 2015. Of the 63 DAS scheduled for this project, 63 days are funded by Line Office Allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to OpsMgr.MOA@noaa.gov at Marine Operations Center-Atlantic.

Attachment

cc:
Nathan Keith





UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

Final Project Instruction

Date Submitted: 12 August, 2015

Platform: NOAA Ship *Henry B. Bigelow*

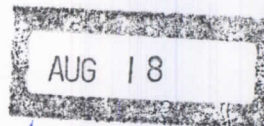
Project Number: HB 15-06

Project Title: Autumn Multispecies Bottom Trawl Survey

Project Dates: August 26-28th Calibration, 31 August – 07 November 2015 Trawl Survey

Approved by: Russell W. Berry
William A. Karp, Ph.D.
Science and Research Director
Northeast Fisheries Science Center

Date: 8-12-2015



Approved by: Anne K. Lynch
Captain Anne K. Lynch, NOAA
Commanding Officer
Marine Operations Center – Atlantic

Date: 8/17/2015

I. Overview

A. HB 15-06 Autumn Multispecies Bottom Trawl Survey, 31 August – 7 November 2015

B. Days at Sea (DAS):

Of the 63 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 63 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 Medium Operational Tempo.

C. Operating Area:

The continental shelf and upper continental slope from north of Cape Lookout, NC, including Georges Bank and the Gulf of Maine, to the Nova Scotia Shelf (including stations in Canada's Exclusive Economic Zone). Stations will be occupied in waters with depths ranging between 15 and 500 meters.

D. Objectives:

The objectives are to: 1) determine the autumn distribution and relative abundance of fish and invertebrate species found on the continental shelf and upper slope, including the collection of additional biological information following the pre-established sampling plan at the direction of the Chief Scientist; 2) opportunistically evaluate survey gear efficiency, methods, or survey related equipment that may benefit the trawl survey and fish stock assessments; 3) collect oceanographic data including CTD casts and bongo tows at selected stations; 4) opportunistically collect acoustic data along cruise tracks with the EK-60 and ME-70 acoustic systems.

E. Participating Institutions:

National Marine Fisheries Service, Northeast Fisheries Science Center

F. Science Party:

Name	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Galbraith, John	Chief Scientist	31 Aug	17 Sep	M	NMFS	USA
Cook, Heath	Chief Scientist	21 Sep	03 Oct	M	NMFS	Australia
Galbraith, John	Chief Scientist	7 Oct	22 Oct	M	NMFS	USA
Kircun, Jakub	Chief Scientist	26 Oct	07 Nov	M	NMFS	USA

An addendum will be sent with entire cruise roster prior to the survey.

G. Administrative:

I. Points of Contact

Email Contact: The following should be included as recipients of the daily e-mail message:

nmfs.nec.survey.branch@noaa.gov	{Ecosystem Surveys Branch}
Wendy.Gabriel@noaa.gov	{FEMAD Division Chief}
Bill.Karp@noaa.gov	{NEFSC Science and Research Director}
Russel.Brown@noaa.gov	{NEFSC Deputy Science and Research Director}
Jack.Moakley@noaa.gov	{OMI Chief}
Nathan.Keith@noaa.gov	{NEFSC Vessel Coordinator}
Jon.Hare@noaa.gov	{Oceanography Branch Chief}
Tamara.Holzwarth-Davis@noaa.gov	{Oceanography Branch}
Paul.Rago@noaa.gov	{Population Dynamics Branch Chief}
Richard.McBride@noaa.gov	{Population Biology Branch Chief}
CO.Henry.Bigelow@noaa.gov	{Commanding Officer – <i>Henry B. Bigelow</i> }
Michael.S.Abbott@noaa.gov	{NEFSC Port Captain}

2. Diplomatic Clearances:

This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Consent will be received from Canada prior to sailing.

3. Licenses and Permits:

Canada's Foreign Fishing Vessel License was provided with a diplomatic note.

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.

Key Changes and Points of Emphasis:

- 1. The vessel's autotrawl winch system will be calibrated prior to the start of the autumn bottom trawl survey. Ecosystems Surveys Branch, Bottom Trawl Group representatives and a technical representative from Rapp-Hydema will be present during the winch system calibration. This effort is estimated to take approximately 12 – 24 hours of vessel time prior to the beginning of the survey.**
- 2. The Ecosystems Surveys Branch, Bottom Trawl Survey Group intends to collect underwater video observations of the survey trawl gear during the autotrawl calibration tows. The effort will focus primarily on evaluating bottom contact of the groundgear in relation to the Scanmar Trawleye bottom contact signal. Conducting the autotrawl calibration tows during daylight hours will greatly benefit the video**

quality, however, if logistics do not allow for daylight tows underwater lights may be used.

A. Project Itinerary:

The cruise will be divided into four parts:

24 – 25 Aug. Load scientific equipment and supplies.

Part I: Calibrations

26 Aug – 28 Aug: Depart Newport Naval Station, Newport, RI to conduct vessel systems calibrations; return to Newport Naval Station, Newport, RI.

Part I, continued: Mid-Atlantic to Cape Lookout Sector, 31 August – 17 September

31 Aug: Load scientific gear, embark scientific personnel and depart Newport Naval Station, Newport, RI.

31 Aug – 17 Sept: Begin the autumn bottom trawl survey.

17 Sept: Arrive Newport Naval Station, Newport, RI, offload scientific collections and disembark scientific personnel.

Part II: Mid-Atlantic - Southern New England Sector, 21 Sept – 3 Oct

21 Sept: Load scientific gear, embark scientific personnel and depart Newport Naval Station, Newport, RI.

21 Sept – 3 Oct: Continue the autumn bottom trawl survey.

3 Oct: Arrive Newport Naval Station, Newport, RI, offload scientific collections and disembark scientific personnel.

Part III: Southern New England - Georges Bank Sector, 7 – 22 Oct

7 Oct: Load scientific gear, embark scientific personnel and depart Newport Naval Station, Newport, RI.

7 – 22 Oct: Continue the autumn bottom trawl survey.

22 Oct: Arrive Newport Naval Station, Newport, RI, offload scientific collections and disembark scientific personnel.

Part IV: Georges Bank - Gulf of Maine Sector, 26 Oct – 7 Nov

- 26 Oct: On-load scientific gear, embark scientific personnel and depart Newport Naval Station, Newport, RI.
- 26 Oct – 7 Nov: Continue and complete the autumn bottom trawl survey.
- 7 Nov: Arrive Newport Naval Station, Newport, RI, offload gear, scientific collections and disembark scientific personnel.

B. Staging and Destaging:

Ecosystems Surveys Branch personnel will coordinate directly with the vessel command and deck department regarding specific staging and destaging activities. These efforts will require the use of the vessel's cranes to onload and offload equipment.

C. Operations to be conducted:

Survey operations will be conducted 24 hours. A standard 20-minute tow will be made at the approximately 377 randomly pre-selected stations indicated on cruise charts which will be provided to the Commanding Officer prior to departure. It is requested that the vessel's Navigation Officer plot and examine stations, and identify any stations that are problematic for the vessel in terms of depth, obstructions or other issues in advance of the cruise. Specific sampling problems and requirements may necessitate the planning of additional stations during the actual operation of the cruise (e.g., special deep-water stations). Figure 1 shows the general area of operations. All survey tows will adhere to the NEFSC Bottom Trawl Survey Protocols for the NOAA Ship *Henry B. Bigelow* (accessible online: <http://nefsc.noaa.gov/publications/crd/crd1406/>). Sampling will be conducted using the NEFSC standardized, 3 bridle, 4 seam, bottom survey trawl, equipped with a rockhopper sweep. The trawl will be fished using 2.2 m² Poly-Ice oval trawl doors and 36.6 meter (20 fathom) bridles. In addition, net mensuration equipment will be used to monitor and validate trawl performance at all stations.

Vessel Sensor and Logging Requirements: *Henry B. Bigelow's* SCS system is a PC-based server, which continuously collects and distributes scientific data from various navigational, oceanographic, meteorological, and sampling sensors throughout the cruise. Date and time for data collections from computers, instrumentation, and log sheet recordings will be synchronized using the vessel's GPS master clock. The ESB is responsible for setting up FSCS hardware and software, and the ESB and *Henry B. Bigelow's* ET are responsible for ensuring data collection.

The ship's Scientific Computer System (SCS) will be required for logging data on a routine basis and data requirements will be coordinated with the Commanding Officer and Electronics Technician at the beginning of the cruise. **Any changes to the settings in the SCS system during the cruise should be immediately communicated to the Chief Scientist. Bridge officers will be requested to execute a new "Trawl Event" using FSCS 2.0 Operation Event Logger to capture SCS data streams during trawling operations. FSCS 2.0 will be set up**

and utilized to process catches from all tows. Documentation and support will be provided for each survey leg. Collection of ship sensor data via trawl events is a critical requirement to support this work. It is requested that the time server/time date be imbedded into the SCS files. Global Positioning System (DGPS or P-code GPS) provides data on vessel towing speed and direction to be recorded at a frequency of 1.0 Hz. A list of the requested SCS sensors is provided in Table 1. It is requested that the sensors be operational, calibrated and that logging capabilities be enabled.

Net Mensuration Integration Software: **The Bottom Trawl Survey will utilize Scanmar net mensuration sensors and hydrophones as the primary net mensuration system that is logged to SCS.** We request that all net mensuration data to be logged by SCS at a frequency of 1.0 Hz. Also, where possible, tows with *Henry B. Bigelow's* Simrad ITI sensors may be requested to test the accuracy of the ITI trawl positioning system and its interface with the Olex software.

Trawl Winches and Towing Warps: *Henry B. Bigelow's* auto-trawl system will be used during all survey trawling operations in tension based mode. National bottom trawl survey standards require redundant measurement of tension during all survey bottom trawling operations. The Ecosystems Surveys Branch requests the vessel calibrate the auto-trawl system prior to each bottom trawl survey cruise season according to the document "Rapp Hydema Auto-Trawl Winch System and Block Load Cell Calibration Procedure" prepared by vessel crew, ESB staff and Rapp Hydema technicians. Both the winch calculated tensions, based on system pressures, and turning block load cells must be calibrated simultaneously to ensure each measuring device is calibrated to an equal magnitude. ESB requires that ship power be available during calibrations so that the system can be operated in "AUTOTRAWL MODE". ESB also requires that the settings of all programmable winch parameters be reported to the ESB after each calibration procedure. Per the current national protocol for trawl surveys, physical markings need not be inserted into the warps if an auto-trawl system is employed. However, the protocols do require redundant measurement of warp length. *Henry B. Bigelow's* trawl warp measuring systems are required to be operational during all NEFSC bottom trawl survey operations.

Gear repair/inventory: A list of the survey sampling gear put aboard will be presented to the Chief Bosun along with detailed sampling gear plans prior to sailing. All sampling gear provided to the vessel shall be in standard condition and configuration as certified by the detailed ESB survey gear inspection process. Sampling gear will be maintained and repaired by the vessel's deck crew, as practical, during the course of the survey. If repairs are not able to be performed, the gear should be labeled detailing the specific damage. The Chief Bosun and Lead Fisherman are requested to follow trawl tagging procedures previously developed jointly with net loft staff involving Green, White and Red waterproof tags. All bottom trawls delivered to the vessel should have Green tags indicating that gear has been certified by ESB staff. Bottom trawls that are used but not damaged (deemed to be in acceptable condition by the Chief Bosun at the time of bundling) should be tagged with a white tag indicating the last date of use. Bottom trawls that are used and are known to have damage or other issues should be tagged with a Red tag with a description of the damage or issues with sufficient detail to allow gear specialists to make a reasonable estimate of repair time and required materials without unbundling the gear.

Prior to the end of each cruise leg, the Chief Bosun should communicate all gear related supply needs to the NEFSC Net Loft and arrange the offload of damaged gear and delivery of new gear supplies for the following leg. All gear supply related communications should be communicated to the NEFSC Net Loft (NMFS.NEC.net_loft@noaa.gov).

EK60 Data Acquisition: The Simrad EK60 echo sounder, (18-, 38-, 70-, 120-, and 200-kHz with split-beam transducers mounted on the retractable center-board) will acquire data continuously throughout the survey. The EK60 will be interfaced to the SCS to record bottom depth and vessel log values. The EK60 will be interfaced to the POSMV motion sensor. When operational, the EK60 will be synchronized with the Simrad ES60 Bridge sounder, Simrad ME70 multibeam, and the ship's ADCP. The EK60 is not synchronized with the other sounders and Doppler speed log on the vessel. To minimize acoustic and electrical interference, whenever possible we request deactivating other sounders on the vessel. The survey technicians will be responsible for EK60 data acquisition and storage.

Fisheries Scientific Computer System (FSCS): Catches will be sorted to species. The catch of each species will then be weighed and a length frequency obtained. In addition to these basic catch data, biological samples and data will be collected for age and growth, feeding ecology and special studies. Both station and biological data will be recorded using the Fisheries Scientific Computer System (FSCS 2.0). Whole fish and parts of fish will be collected, and either preserved or frozen. Standard bottom trawl procedures will be used to collect these samples throughout the survey.

Ancillary Sampling:

1. At a subset of the preselected stations, plankton sampling will be conducted using a bongo net following standard NEFSC protocols.
2. Physical oceanographic parameters will be continually monitored through the ship's flow-through thermosalinograph and fluorometer instruments. Weather observations, surface salinity samples and bottom salinity samples will be collected at selected stations.
3. There will be a continuation of the collection of specific samples requested by other NEFSC programs as well as separate academic and scientific organizations.
4. Throughout the cruise, particularly during transit to and from operations areas and between bottom trawl stations, a hydroacoustic survey using the ship's Simrad EK60 system (concurrent use of 18, 38, 120 and 200 kHz frequencies) will be conducted. Transducer calibrations may be required.
5. Conductivity, Temperature and Depth (CTD) sampling will occur at all stations. CTD operators will be trained and certified by the NEFSC Oceanography Branch. CTD operator training requires two hours and must be completed prior to the beginning of the cruise unless a trainer is included in the scientific complement. In the event that CTD difficulties are encountered during the cruise, shore based support is available. Requests for support should be forwarded NEFSC.CTDHelp@noaa.gov which is monitored daily. Once contact has been established via email, to assure continuous support, the CTD help address above should be copied on all email communications.

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.

Dives are not planned for this project.

E. Applicable Restrictions Conditions which preclude normal operations:

(List restrictions such as poor weather conditions, equipment failure, safety concerns, unforeseen circumstances, as well as mitigation strategies that might be used). Refer to the Northeast Fisheries Science Center Bottom Trawl Survey Protocols for the NOAA Ship *Henry B. Bigelow* available online at: <http://nefsc.noaa.gov/publications/crd/crd1406/>.

III. Equipment

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

ITEM	QUANTITY	FURNISHED BY
1. Trawl Wires	1 set	<i>Henry B. Bigelow</i>
2. Pentagon AutoTrawl System	1	“ “
3. Simrad EK60 Scientific Sounder	1	“ “
4. Simrad ME70 Echo Sounder	1	“ “
5. Appleton Cranes	2	“ “
6. NOAA Shipboard Computer System (SCS) 1	“	“

B. Equipment and Capabilities provided by the science crew (itemized)

Equipment and Supply List: The following sampling and scientific equipment will be placed aboard *Henry B. Bigelow* prior to departure:

ITEM	QUANTITY	FURNISHED BY
1. NEFSC 4 seam, 3 bridle trawls	4	NMFS, NEFSC, Woods Hole, MA
2. 22.2 m ² PolyIce oval trawl doors	2 pairs	" " " " "
3. Mending twine	Ample	NMFS, NEFSC, Woods Hole, MA
4. Spare trawl and liner sections	Ample	" " " " "
5. Chain backstraps and idlers	4	" " " " "
6. Age and growth supplies (various)	ample	" " " " "
7. Feeding ecology supplies (various)	ample	" " " " "
8. Special sampling supplies (various)	ample	" " " " "
9. Plastic fish baskets, 2 bushel	24	" " " " "
10. Plastic 5 gal buckets	24	" " " " "
11. Marel electronic scales & backups	4	<i>Henry B. Bigelow</i>
12. CTDs	3	NMFS, NEFSC, Woods Hole, MA
13. Electronic Fish measuring boards	4	<i>Henry B. Bigelow</i>
14. Polyethylene specimen bags	1,000	NMFS, NEFSC, Woods Hole, MA
15. Gloves, rubberized fish	ample	" " " " "
16. Specimen jars	ample	" " " " "

17. Clerical supplies (various)	ample	"	"	"	"	"
18. Reference books (various)	ample	"	"	"	"	"
19. 60 centimeter bongo net gear	2	"	"	"	"	"
20. Salinity bottles	ample	"	"	"	"	"
21. Computer	1	"	"	"	"	"
22. FSCS system components	ample	"	"	"	"	"
23. (Electronic measuring boards, barcode readers, label printers, touch monitors, computers & backups, etc)						
24. Scanmar Distance Master Sensors	6	NMFS, NEFSC, Woods Hole, MA				
25. Scanmar Distance Remote Sensors	6	"	"	"	"	"
26. Scanmar Depth Sensors	3	"	"	"	"	"
27. Scanmar Trawl Sounders	3	"	"	"	"	"
28. Scanmar Height Sensors	1	"	"	"	"	"
29. Scanmar Trawl Speed Sensors	2	"	"	"	"	"
30. Scanmar Trawleye	1	"	"	"	"	"
31. Scanmar SS4 Door Sensor	2	"	"	"	"	"

IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. . Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request. Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

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

Upon embarkation and prior to loading hazardous materials aboard the vessel, the Chief Scientist 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, the Chief Scientist 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

The following chemicals will be placed aboard *Henry B. Bigelow* prior to departure:

Common Name of Material	Qty	Notes	Trained Individual(s)	Spill control
10% Formalin	30.3 l	Alkalinity	Chief Scientist/Watch Chiefs	F
Formaldehyde solution (37%)	40 l	Alkalinity	Chief Scientist/Watch Chiefs	F
Ethanol (95%)	150 x 3 ml	Flammable	Chief Scientist/Watch Chiefs	E

C. Chemical safety and spill response procedures:

F: Formalin/Formaldehyde

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

E: Ethanol

- Small Spill:
 - Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
- Large Spill:
 - Contain spill
 - Flammable liquid. Ventilate area of leak or spill. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk.

- Absorb with dry earth, sand or other non-combustible material. Do not touch spilled material.
- Use proper personal protective equipment
- Dike if needed.

D. Radioactive Materials:

No Radioactive Isotopes are planned for this project.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Spill-X-FP	4.2 kg	Formalin, Formaldehyde	36.6 l
Spill-X-FP	3.4 kg	Formalin, Formaldehyde	29.6 l
Kitty litter	44 kg	liquids	

V. Additional Projects

A. Supplementary Projects

Project 1 - Evaluation of the NOAA Ship *Henry B. Bigelow's* Autotrawl Winch System

Overview

The NOAA Ship *Henry B. Bigelow* is equipped with a Rapp Hydema autotrawl winch system operated in tension-controlled mode during all Northeast Fisheries Science Center Bottom Trawl Survey tows. These trawl winches automatically equalize port and starboard warp tension by hauling in or paying out cable to equalize system pressure in the hydraulic motors of each winch. Equalizing port and starboard warp tensions minimizes the effects of environmental forces acting on the trawl while in tow helping to maintain consistent physical performance by the survey trawl. This limits skewing of the trawl to one side, distortion of the trawl mouth opening, loss of bottom contact and surging of the trawl, all of which may alter the fish capture process (references?). From the evaluation of the Scanmar trawl speed data, and other net mensuration sensors, we are confident that the autotrawl system improves the consistency of survey trawl performance. We do not currently have data that allow us to estimate catch differences between the use and non-use of the autotrawl system.

To improve our understanding of the Bigelow's autotrawl system and to demonstrate the benefits of the system at maintaining consistent trawl performance, we propose a series of direct comparison tows with and without the autotrawl system engaged under identical environmental conditions. This work is planned to begin during the Fall 2015 bottom trawl survey at a subset of 12 stations. Due to the limited available vessel time, this research may continue over several survey seasons. In addition, we plan to continue this experimentation if time is available at the end of the survey. The objectives of this work are:

1. Evaluate the physical performance of the survey trawl with and without the use of the autotrawl winch system.
2. Determine the relationship between port and starboard tension differences and water flow relative to the trawl.
3. Evaluate catch differences with and without the use of an autotrawl system under various environmental conditions.

Methods

Beginning with the Fall 2015 bottom trawl survey, a set of 12 standard survey tows will be preselected to conduct paired tows with and without the autotrawl system. At each of these 12 stations the standard survey tow will occur first, following standard NEFSC bottom trawl survey protocols, with the autotrawl system engaged. The standard survey tow must be conducted first to avoid any potential influence on the catch rate which may bias survey results. At each of these tows a MAVS-3 acoustic current meter will be mounted at the top center of the trawl, aft of the Scanmar trawl speed sensor to collect higher resolution and more accurate water flow measurements. At the completion of the standard survey tow, the vessel will maneuver back to the beginning of the survey tow track line and re-tow the trawl parallel, but not overlapping, the original tow path, in the same direction, offset no greater than 0.25nm. The repeat tow will follow all NEFSC bottom trawl survey towing protocols with the exception of engaging the autotrawl system. The catch from each tow will be retained and worked up by the scientific party. It is important to set the second tow quickly so that environmental conditions remain as similar as possible at each tow. The MAVS-3 acoustic current meter will be removed following the completion of the experimental tow. The experimental work should be carried out in all weather conditions at which the survey trawl would normally be fished to allow the simultaneous collection of sea-state and vessel motion data. If time permits at the completion of the bottom trawl survey, additional comparison tows will be conducted. During these operations, the order of the tows will be randomized, rather than always completing the first tow with the autotrawl engaged. The location of this additional work will be determined in consultation with the vessel command and will be contingent on time and logistics. Conducting this work in an area with reasonably good bottom, high density of fish and measurable bottom currents would be ideal.

Logistic Concerns

We understand that conducting the experimental tows will increase the time required to complete the survey and increase responsibilities of the vessel's officers and deck crew. The proposed additional tows will be spread out between legs 1-3, with 4 stations per leg planned for this work. At this time, no experimental tows are planned for leg 4 since the Gulf of Maine tows typically present their own unique set of challenges. The experimental work will only be carried out if the cruise is progressing at a normal pace with minimal delay at the discretion of the Chief Scientist and vessel command. Table 1 defines the expected progress per cruise leg and the number of tows at which this work should be terminated to ensure the survey is completed on schedule. The preselected stations will be planned in areas where, historically, we have been able to tow with minimal chance of hanging up. At any preselected stations where a hang or other damage occurs, the experimental tow will be cancelled. The Chief Scientist may opportunistically propose an additional, nearby station to conduct the experiment in consultation with the vessel command and Chief Bosun.

Table 1. Expected progress per cruise leg to aid in the decision making process for continuing the experimental autotrawl work.

	Date	Avg. # Tows/Day	Cum. Leg total	Cum. Survey Total	Min. #Tows
Leg 1	31-Aug	0	0	0	0
	1-Sep	8	8	8	0
	2-Sep	8	16	16	8
	3-Sep	8	24	24	16
	4-Sep	8	32	32	24
	5-Sep	8	40	40	32
	6-Sep	8	48	48	40
	7-Sep	8	56	56	48
	8-Sep	8	64	64	56
	9-Sep	8	72	72	64
	10-Sep	8	80	80	72
	11-Sep	8	88	88	80
	12-Sep	8	96	96	88
	13-Sep	8	104	104	96
	14-Sep	8	112	112	104
	15-Sep	8	120	120	112
	16-Sep	8	128	128	120
17-Sep	0	128	128	128	120
Leg 2	21-Sep	0	0	128	120
	22-Sep	8	8	136	128
	23-Sep	8	16	144	136
	24-Sep	8	24	152	144
	25-Sep	8	32	160	152
	26-Sep	8	40	168	160
	27-Sep	8	48	176	168
	28-Sep	8	56	184	176
	29-Sep	8	64	192	184
	30-Sep	8	72	200	192
	1-Oct	8	80	208	200
	2-Oct	8	88	216	208
3-Oct	0	88	216	216	208

Table 1 continued.

	Date	Avg. #Tows/Day	Cum. Leg total	Cum. Survey Total	Min. #Tows
Leg 3	7-Oct	0	0	216	208
	8-Oct	7	7	223	215
	9-Oct	7	14	230	222
	10-Oct	7	21	237	229
	11-Oct	7	28	244	236
	12-Oct	7	35	251	243
	13-Oct	7	42	258	250
	14-Oct	7	49	265	257
	15-Oct	7	56	272	264
	16-Oct	7	63	279	271
	17-Oct	7	70	286	278
	18-Oct	7	77	293	285
	19-Oct	7	84	300	292
	20-Oct	7	91	307	299
21-Oct	7	98	314	306	
22-Oct	0	98	314	306	
Leg 4	26-Oct	0	0	314	306
	27-Oct	6	6	320	312
	28-Oct	6	12	326	318
	29-Oct	6	18	332	324
	30-Oct	6	24	338	330
	31-Oct	6	30	344	336
	1-Nov	6	36	350	342
	2-Nov	6	42	356	348
	3-Nov	6	48	362	354
	4-Nov	6	54	368	360
	5-Nov	6	60	374	366
6-Nov	6	66	380	372	
7-Nov	0	66	380	372	

Project 2 - Trawl Advisory Panel – Introduction to NEFSC Bottom Trawl Survey Techniques

The Mid-Atlantic Fisheries Management Council and the New England Fisheries management Council, in collaboration with the Northeast Fisheries Science Center and the Atlantic States Marine Fisheries Commission have recently formed the Trawl Survey Advisory Panel with three primary goals:

1. Understand the existing NOAA/NEFSC trawl survey gear performance and methodology
2. Evaluate the potential to complement/supplement this and other regional research surveys
3. Improving understanding and acceptance of NOAA/NEFSC trawl survey data quality and results.

It is our belief that the best way to accomplish goal 1 is to see the NEFSC bottom trawl survey in action first hand. To achieve this, we hope to bring out interested Advisory Panel members to allow them to participate in bottom trawl survey tows aboard the Bigelow. It is anticipated that they would depart aboard the ship at the beginning of leg 3 and be transported back to land at the end of the day via small boat transfer. During the period aboard the ship, the Bigelow will perform survey tows (or similar tows if logistics dictates) and the Advisory Panel members will be able to observe operations, ask questions of the scientific and vessel crew, and experience what bottom trawl survey tows aboard the Bigelow actually consist of. It is our hope that those attending will gain a basic understanding of how bottom trawl surveys are conducted and provide them with a basis on which to better serve their roles on the Advisory Panel. The completion of this project may require some flexibility in the timing and logistics as we respond to panel members availability, weather, and survey progress.

D. 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 Management:

Trawl Catches: Trawl catches will be processed on shipboard as specified in the Operational Plans. All station and biological data will be electronically recorded. At the completion of the cruise, all data will be electronically transmitted to the NEFSC data management system based in Woods Hole, MA. Samples and data collected for specific individuals, agencies or organizations will be processed by same. Plankton samples will be processed through the NEFSC laboratory in Narragansett, RI. Data from the CTD will be processed at the NEFSC Woods Hole Laboratory.

Protected Resources:

North Atlantic right whale protection: The vessel is requested to adhere to right whale protection regulations. Information on Seasonal Management Area (SMA) and Dynamic Management Area (DMA) regulations and information for protecting right whales from collisions with vessels are provided through the NOAA Protected Resources website (<http://www.nmfs.noaa.gov/pr/shipstrike/>), Right Whale Sighting Advisory System (SAS) website (<http://www.nefsc.noaa.gov/psb/surveys/>), the U.S. Coast Guard's "Notices To Mariners" and NOAA weather radio.

Mariners are urged to use caution and proceed at safe speeds in areas where right whales occur. U.S. Law (50 CFR 224.105) prohibits operating vessels 65 feet (19.8 meters) or greater in excess of 10 knots in Seasonal Management Areas (SMAs) along the U.S. east coast. Mariners are also requested to route around voluntary speed restriction zones, Dynamic Management Areas (DMAs) or transit through them at 10 knots or less. Approaching within 500 yards of right whales is prohibited, unless the Chief Scientist is in possession of an ESA/MMPA permit allowing such approaches.

Whale sightings: Sightings of right whales, or dead or entangled whales of any species, are extremely valuable and reports are urgently requested. Please report all right whale sightings north of the Virginia-North Carolina border to 866-755-6622; right whale sightings south of that border should be reported to 877-WHALE HELP. Right whale sightings in any location may be reported to the U.S. Coast Guard via VHF channel 16. Protocols for reporting sightings are described in the Guide to Reporting Whale Sightings placard. The placard is available online

(http://www.nefsc.noaa.gov/psb/surveys/documents/20120919_Report_a_Right_Whale.pdf) and laminated copies will be provided by the Protected Species Branch upon request. It is requested that this placard be kept on the bridge for quick reference and to facilitate rapid reporting (via satellite phone if necessary). Opportunistic sightings of other marine mammal species that are live and well may be reported using the Platforms of Opportunity (POP) forms and protocols. To information regarding the WhaleALERT application <http://stellwagen.noaa.gov/protect/whalealert.html>. For information on reporting a dead whale

http://www.nefsc.noaa.gov/psb/surveys/documents/20120919_Report_a_Dead_Whale.pdf.

Endangered Species Act and Marine Mammal Protection Act reporting requirements:

This reporting is required and is in addition to the reports in the above two sections. If the ship has an interaction with a sturgeon, Atlantic salmon, whale, dolphin, porpoise, marine turtle, or seal (e.g., collision with a whale or bycatch of a sea turtle), the NMFS Greater Atlantic Regional Fisheries Office must be notified within 24 hours of the interaction. All e-mail correspondences should be made to the following e-mail address: incidental.take@noaa.gov. Please indicate in the subject line which protected species was encountered. If the take involves a marine mammal, or sea turtle that is alive, injured and in need of assistance or monitoring, please call the NOAA Northeast Region marine animal hotline at: [866-755-6622](tel:866-755-6622). The chief scientist will be notified

before reports are made. If the vessel's company notices an animal that is entangled, injured, in distress, or dead, outside the scope of scientific operations, they should contact the Northeast Regional Office's 24-hour hotline at 866-755-6622 to report the incident and receive further instructions.

Marine turtle, Sturgeon and Atlantic salmon bycatch: All marine turtles, sturgeon and Atlantic salmon taken incidental to fishing activities must be handled, resuscitated (turtles only) and documented according to established procedures in the Endangered Species Act Section 7 Consultation Biological Opinion issued on November 30, 2012. All marine turtles taken incidental to fishing activities must 1) be handled and resuscitated according to established procedures, 2) be clearly photographed (multiple views if possible, including at least one photograph of the head scutes), 3) be identified to the species level, 4) have width and length (carapace notch to notch, and notch to tip) measured in centimeters, 5) have supporting data recorded including GPS or Loran coordinates recorded describing the location of the interaction; time of interaction; date of interaction; condition of the animal upon retrieval (alive uninjured, alive injured, fresh dead, decomposed, comatose or unresponsive); the condition of the animal upon return to the water; GPS or Loran coordinates of the location at which it was released; and a description of the care or handling provided. Live animals shall then be returned to the sea. Dead turtles shall, if feasible, be frozen and returned to the Woods Hole Laboratory.

Marine mammal bycatch: All marine mammals taken incidental to fishing activities must 1) be completely disentangled from gear; 2) take photographs, document any injuries, and returned to the sea immediately; 3) for dead specimens, be clearly photographed (multiple views if possible, including at least one photograph of the head; 4) be identified to the species level; 5) weigh (kg) and measure (cm) if possible (snout to tail (seals), beak to the notch in the fluke/tail (whales, dolphins and porpoises)); 6) attached a carcass tag; 7) have supporting data recorded including GPS or Loran coordinates describing the location of the interaction; time of interaction; date of interaction; 8) condition of the animal upon retrieval (alive uninjured, alive injured, fresh dead, decomposed, comatose or unresponsive).

Stellwagen Bank: Any artifacts brought aboard the vessel due to fishing in the Stellwagen Bank National Marine Sanctuary must be immediately returned, as near as possible, to the location of interception. An artifact is defined as anything of man-made origin with the exception of modern fishing gear. Stations located within Stellwagen Bank will be identified prior to the cruise and reported to the chief scientist.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting:

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

preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting:

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

C. Post-leg Meeting:

Upon completion of each cruise leg, a post-cruise meeting will be held (unless prior alternate arrangements are made) and attended by the ship's officers, the Chief Scientist, members of the scientific party, the Vessel Coordinator and the Port Captain to review the cruise. Concerns regarding safety, efficiency, and suggestions for improvements for future cruises should be discussed. Minutes of the post-cruise meeting will be distributed to all participants via email and to the CO.MOC.Atlantic@noaa.gov and ChiefOps.MOA@noaa.gov. The Port Captain, if attending, is responsible for the recording and distributing the minutes. In his/her absence, the Operations Officer shall be responsible for the minutes.

D. Post-Project Meeting:

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

E. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <http://www.oma.noaa.gov/fleeteval.html> and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Watches:

Vessel operations will be conducted 24 hours per day. The scientific watch schedule will be determined and submitted as part of the Addendum one week prior to sailing. Scientific personnel will stand 12 hour watches.

B. 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.

C. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website <http://www.corporateservices.noaa.gov/noaforms/eforms/nf57-10-01.pdf>. All NHSQs submitted after March 1, 2014 must be accompanied by [NOAA Form \(NF\) 57-10-02](#) - Tuberculosis Screening Document in compliance with [OMAO Policy 1008](#) (Tuberculosis Protection Program). The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the

participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ. The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance

(http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

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

Contact information:

Regional Director of Health
Services
Marine Operations Center –
Atlantic
439 W. York Street
Norfolk, VA 23510
Telephone 757-441-6320
Fax 757-441-3760
Email
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.

D. 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.

E. 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 at least 30 days in advance.

F. 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.

G. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (<http://deemedexports.noaa.gov>). National Marine Fisheries Service personnel will use the Foreign National Registration System (FNRS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated Line Office Deemed Export point of contact to assist with the process.

Foreign National access must be sought not only for access to the ship involved in the project but also for any Federal Facility access (NOAA Marine Operations Centers,

NOAA port offices, USCG Bases) that foreign nationals might have to traverse to gain access to and from the ship. The following are basic requirements. Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the e-mail generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this e-mail will be transmitted by FNRS.) This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.
4. Export Control - Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written approval from the Director of the Office of Marine and Aviation Operations and compliance with export and sanction regulations.
3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FNRS or Servicing Security Office e-mail granting approval for the foreign national guest's visit.
5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
6. Export Control - 8 weeks in advance of the project, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access

controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

7. Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.

Responsibilities of the Foreign National Sponsor:

1. Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.
2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen and a NOAA or DOC employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

VIII. Appendices

A. Figures, maps, tables, images, etc.

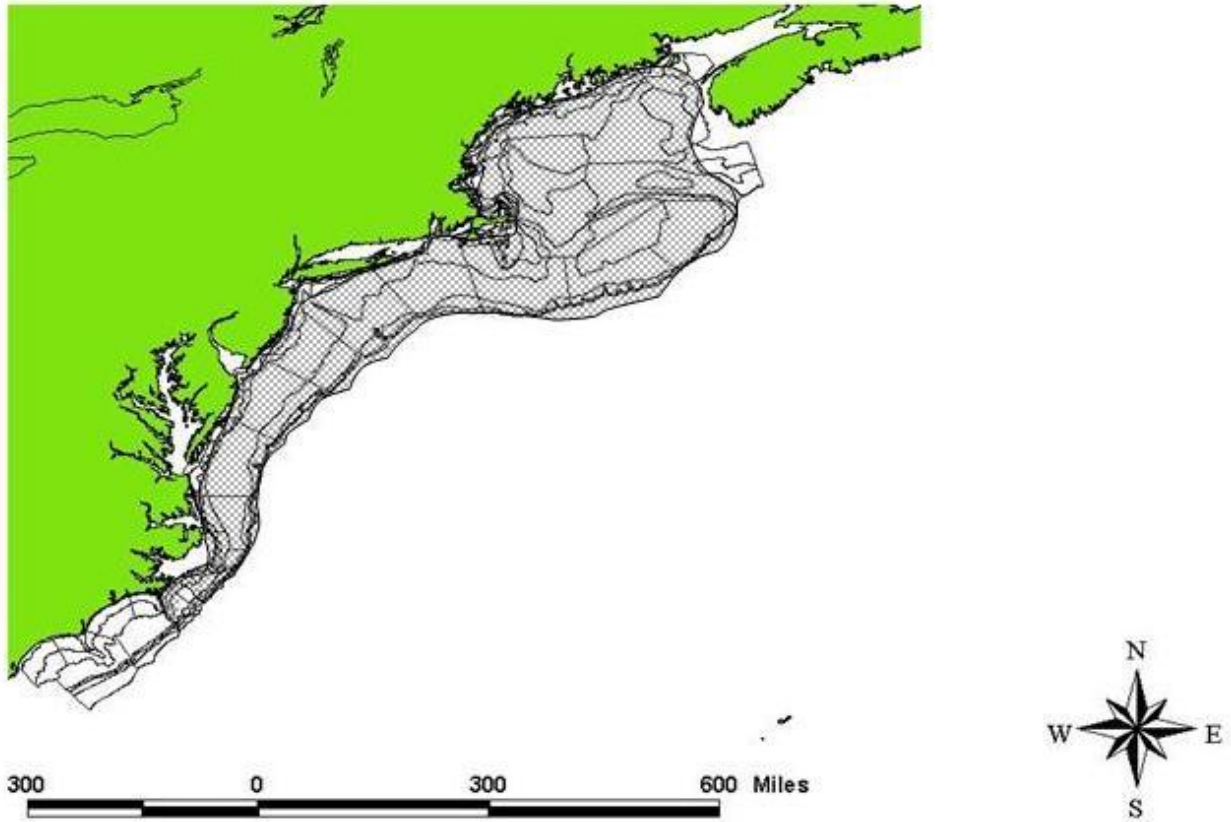


Figure 1. General planned area of operations for *Henry B. Bigelow*, Cruise 15-06 (Parts I-IV), Autumn Bottom Trawl Survey.

Table 1. Scientific Computer Sensors, and logging rates of those sensors, required during *Henry B. Bigelow* cruise 15-06, Autumn Bottom Trawl Survey. Additional sensors may be requested.

Sensor Name	Units	Log Rate (secs)
ADCP-Depth	(Meters)	1
ADCP-F/A-GroundSpeed	(Knots)	1
ADCP-F/A-WaterSpeed	(Knots)	1
ADCP-P/S-GroundSpeed	(Knots)	1
ADCP-P/S-WaterSpeed	(Knots)	1
Air-Temp	(Deg C)	1
Baro-Press	(Millibars)	1
CenterBoardPos-Value	(Position)	1
Date	(Date)	1
Doppler-Depth	(Meters)	1
Doppler-KeelOffset	(Meters)	1
Doppler-P/S-BottomSpeed	(Knots)	1
Doppler-P/S-WaterSpeed	(Knots)	1
EK60-18kHz-Depth	(Meters)	1
EK60-38kHz-Depth	(Meters)	1
ES60-200hz-Depth	(Meters)	1
ES60-50hz-Depth	(Meters)	1
GYRO	(Degrees)	1
ITI-BearingToTarget	(Degrees)	1
ITI-Depth	(Meters)	1
ITI-DoorSpread	(Meters)	1
ITI-HdRopeBottomDist	(Meters)	1
ITI-HdRopeFtRopeDist	(Meters)	1
ITI-HorizRange	(Meters)	1
ITI-RangeToTarget	(Meters)	1
ITI-SlantRange	(Meters)	1
ITI-Time	(Time)	1
ITI-TrawlDepth	(Meters)	1
ITI-TrawlWaterTemp	(Deg C)	1
ME70-Depth	(Meters)	1
Mid-SeaTemp-C	(Deg C)	1
MX420-COG	(Degrees)	1
MX420-Lat	(DEGMIN)	1
MX420-Lon	(DEGMIN)	1
MX420-SOG	(Knots)	1
MX420-Time	(Time)	1

Sensor Name	Units	Log Rate (secs)
PASHR-Hdg-Qual	(Value)	1
PASHR-Hdg-True	(Degrees)	1
PASHR-Heave	(Centimeters)	1
PASHR-Pitch	(Degrees)	1
PASHR-Pitch-Qual	(Value)	1
PASHR-Roll	(Degrees)	1
PASHR-Roll-Qual	(Value)	1
PASHR-Time	(Time)	1
PI32-Depth1000-VAL	(Meters)	1
PI32-DEPTH300-VAL	(Meters)	1
PI32-DS-VAL	(Meters)	1
PI32-HR-VAL	(Meters)	1
PI32-WS-VAL	(Meters)	1
PORTTrawlWinchLineOut	(Meters)	1
PORTTrawlWinchLinespeed	(Meters/sec)	1
PORTTrawlWinchTension	(Kilos)	1
POSMV-COG	(Degrees)	1
POSMV-Elevation	(Value)	1
POSMV-hdops	(Value)	1
POSMV-Heading	(Degrees)	1
POSMV-Lat	(DEGMIN)	1
POSMV-Lon	(DEGMIN)	1
POSMV-Quality	(Value)	1
POSMV-Sats	(Value)	1
POSMV-SOG	(Knots)	1
POSMV-Time	(Time)	1
SAMOS-AirTemp-Value	(Degrees C)	1
SAMOS-TRUE-WIND-DIR-Value	(Degrees)	1
SAMOS-TRUE-WIND-Spd-Value	(Knots)	1
SCANMAR-DEPTH-VAL	(Meters)	1
SCANMAR-DOOR-SPREAD	(Meters)	1
SCANMAR-Height	(Meters)	1
SCANMAR-WING-SPREAD	(Meters)	1
SCANMAR-TRAWLSOUNDER	(Meters)	1
SCANMAR-TRAWLEYE	(Meters)	1
Shaft-RPM-Value	(Value)	1
STBDTrawlWinchLineOut	(Meters)	1
YOUNG-TWIND-Speed	(Knots)	1