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 Jeffrey Taylor, NOAA
Commanding Officer, NOAA Ship *Henry B. Bigelow*

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

SUBJECT: Project Instruction for HB-17-04
AMAPPS- Cetacean and Turtle Survey

Attached is the final Project Instruction for HB-17-04, AMAPPS- Cetacean and Turtle Survey, which is scheduled aboard NOAA Ship *Henry B. Bigelow* during the period of July 6 – August 9, 2017. Of the 32 DAS scheduled for this project, 32 days are funded by a 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.

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 Instructions

Date Submitted:	June 15, 2017
Platform:	NOAA Ship *Henry B. Bigelow*
Project Number:	HB - 17 - 04
Project Title:	AMAPPS – Cetacean and Turtle Survey
Project Dates:	Leg 1 July 06, 2017 to July 20, 2017 Leg 2 July 24, 2017 to August 9, 2017

Prepared by: _____
Heather L Haas
Chief Scientist Leg 1
Northeast Fisheries Science Center

Prepared by: _____
Danielle Cholewiak
Chief Scientist Leg 2
Northeast Fisheries Science Center

Approved by: _____ Dated: 19 June 2017
Jonathan Hare
Science and Research Director
Northeast Fisheries Science Center

Approved by: _____ Dated: 6/29/17
Captain Scott M. Sirois, NOAA
Commanding Officer
Marine Operations Center - Atlantic

I. Overview

A. Brief Summary and Project Period

The first leg of HB - 17-04 will focus on sea turtle ecology. The ship is requested to leave as early as possible on July 6th, and return as late as possible on July 20th.

The second leg of HB - 17-04 will focus on beaked whale ecology. The ship is requested to leave the dock as early as possible on July 24th, as an EK60 calibration will have to take place that day. Two scientists from NEFSC will board the vessel to assist with the EK60 calibration, and will have to be shuttled back to shore before we begin our transit to the survey area. This would be the same protocol as conducted in previous years. Additionally, it would be preferable to conduct a launch and recovery practice operation with the NEFSC RHIB, during or after conducting the EK60 calibration, if possible.

B. Days at Sea (DAS)

Of the 33 DAS scheduled for this project, 33 DAS are funded by an OMAO allocation, and one day will be used on June 30 for small boat launch and recovery operations. This project is estimated to exhibit a Medium Operational Tempo.

C. Operating Area (Figure 1)

The Leg 1 survey will differ from a survey with fixed transects or fixed sampling point locations. Because our main goal is to capture and tag sea turtles, we will try to move to where the highest density of turtles are within the region northeast of Long Island. Our most likely path will be along the shelf break up to the Scotian shelf. We hope to sample in both US and Canadian waters, but we will limit the northeast extent of our travel to the extent we can, based on turtle distribution. We plan to do transects along the southern flank of Georges Bank, starting at roughly 40°N & 69°W, then move northeast by zig-zagging across the shelf break, from approximately 200m to 2500 m depth. We will want to track patterns in sea surface temperatures (SST) and target the edges of the warm areas. Ideally we will also transit out of US EEZ to work in Canadian waters, perhaps across Northeast Channel to work the shelf break of Browns Bank and the Scotian Shelf, depending on turtle distribution.

Leg 2 will similarly operate along the shelf break and offshore waters, primarily along Georges Bank and up across the Northeast Channel, but not as far as Leg 1. The starting location for the survey will be in the vicinity of Bear Seamount. Initially, transects will be surveyed until aggregations of beaked whales are found. Once a suitable aggregation is encountered, the survey will switch into focal-follow mode (more details below). Transect coordinates will be provided to the ship 2 weeks prior to sailing.

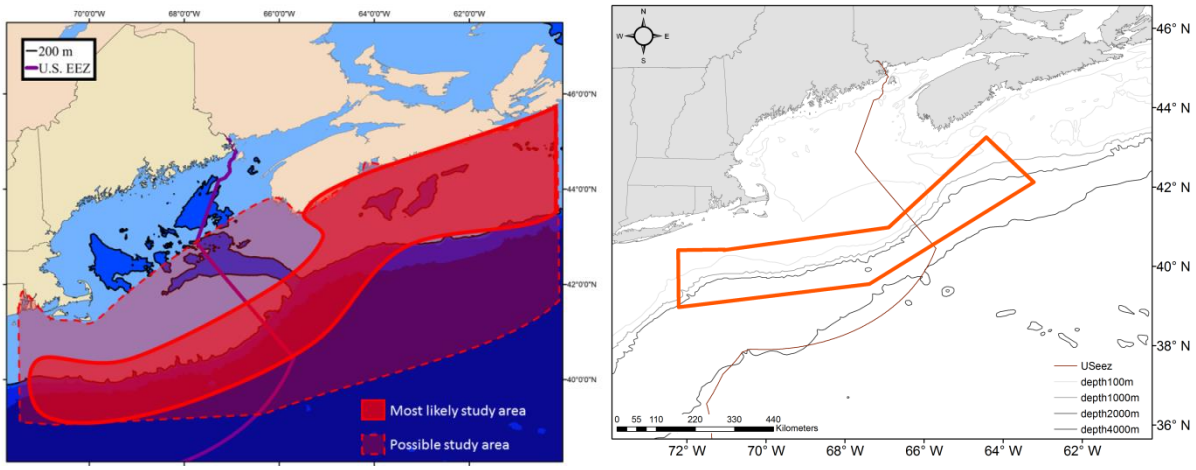


Figure 1. Left panel: Operating area for Leg 1. Right panel: Operating area for Leg 2.

D. Summary of Objectives

Leg 1: Main Objectives

Leg 1 will primarily focus on sea turtle ecology, with the following main objectives:
1.1) Locate and capture loggerhead sea turtles. Collect loggerhead morphometric (length, width, body depth, weight, tail length) data, tissue samples (e.g., blood, skin, parasites); and apply tags (Passive Integrated Transponders, Inconel, acoustic, and satellite linked data loggers) to loggerhead turtles.

1.2) Collect oceanographic data (primarily related to temperature, salinity, acoustic reflectance, and zooplankton abundance) and do lab measurements using gelatinous zooplankton.

The secondary objectives of Leg 1 are:

1.3) Observe in-situ turtle behavior, sometimes with support of a remotely operated vehicle.

1.4) Opportunistically do #1 above, as appropriate, for other turtle species, primarily Kemp's ridley and leatherbacks. Leatherbacks would NOT be captured, which limits our ability to take direct measurements and apply certain types of tags.

1.5) Opportunistically collect images for photo-ID of North Atlantic Right Whales. All images will be submitted to the New England Aquarium for inclusion in the North Atlantic Right Whale Catalog.

1.6) Opportunistically collect biopsy sample from any North Atlantic right whale that is individually recognized as previously unsampled or recognized as needing to be re-sampled. Biopsy sample consists of skin or skin and blubber.

Leg 2: Main Objectives

1) Locate and document occurrence of mesoplodon beaked whales (*Mesoplodon spp*), including

deployment of suction-cup digital recording tags (DTAGs) on at least 6 individuals. Deployments may last up to 8 hrs at a time, during which time the vessel will track the animal. Collect passive acoustic recordings, identification photographs, biopsy samples.

2) Collect water samples for eDNA testing in the vicinity of beaked whales
3) Collect mid-water prey samples in regions where beaked whales are found

The secondary objectives of leg 2 are:

5) Collect information on the distribution and occurrence of all cetacean and sea turtle species sighted during the survey

6) Collect oceanographic data (primarily related to temperature, salinity, acoustic reflectance, and zooplankton abundance)

7) Opportunistically locate and capture loggerhead or other turtle species, as in Leg 1 of this survey, to collect morphometric measurements and tissue samples.

8) Opportunistically collect images for photo-ID of North Atlantic Right Whales. All images will be submitted to the New England Aquarium for inclusion in the North Atlantic Right Whale Catalog.

9) Opportunistically collect biopsy sample from any North Atlantic right whale that is individually recognized as previously unsampled or recognized as needing to be re-sampled. Biopsy sample consists of skin or skin and blubber.

See Addendum (pg 28 & 29) in Appendices relating to Recovery/Deployment of Acoustic Recorders.

E. Participating Institutions

Northeast Fisheries Science Center, Woods Hole (NEFSC)
Integrated Statistics, Inc., Woods Hole, MA (IS)
Coonamessett Farm Foundation (CFF)
Fisheries and Oceans Canada (DFO)
Stony Brook University (SBU)

F. Personnel/Science Party: name, title, gender, affiliation, and nationality
The shipboard Foreign National Sponsor for Leg 1 is Dr. Heather Haas.
The shipboard Foreign National Sponsor for Leg 2 is Dr. Danielle Cholewiak

**We would like to discuss options for one or two *Bigelow* survey techs on Leg 1. Based on our last cruise, the biggest unmet need is to be able to access real time SST data from the bridge, so that the ship's location and turtle sightings and capture locations can be viewed from the bridge and the ship's course can be plotted in relation to SST gradients. The other potential **

One survey tech will be required to assist with nighttime prey sampling on Leg 2. A second survey tech may be needed for daytime operations. We request that this be determined ASAP.

Leg 1 Personnel

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Haas, Heather	CS	5-Jul	20-Jul	F	NEFSC	US
Matzen, Eric			20-Jul	M	IS	US
Milliken, Henry			20-Jul	M	NEFSC	US
James, Michael		5-Jul	20-Jul	M	DFO	Canada
Patel, Samir			20-Jul	M	CFF	US
Warren, Joe	Lead ZP		20-Jul	M	SBU	US
Conger, Lisa			20-Jul	F	NEFSC	US
Crowe, Leah			20-Jul	F	IS	US
Broughton, Elisabeth			20-Jul	F	NEFSC	US
Cholewiak, Danielle			20-Jul	F	NEFSC	US
Seimens, Liese			20-Jul	F	CFF	US
Blair, Hannah			20-Jul	F	SBU	US
Stony Brook Student #2			20-Jul		SBU	
Tentative Ellen Keane			20-Jul		GARFO	US
TBD - Oceans & Climate?						

Leg 2 Personnel

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Cholewiak, Danielle	CS	24 July	9 August	F	NEFSC	US
Cerchio, Salvatore		24 July	9 Aug	M	IS	US
Conger, Lisa	Small boat Lead	24 July	9 Aug	F	NEFSC	US
Davis, Genevieve		24 July	9 Aug	F	IS	US
Duley, Peter*		24 July	9 Aug	M	NEFSC	US
Dunn, Charlotte		24 July	9 Aug	F	IS	UK/Bahamas
Force, Michael		24 July	9 Aug	M	IS	Canada
Hickmott, Leigh	Tagging Lead	24 July	9 Aug	M	IS	UK
Izzi DeAngelis, Annamaria		24 July	9 Aug	F	IS	US
Jech, Mike	Prey	24 July	9 Aug	M	NEFSC	US

	Sampling Lead					
Metheny, Nick		24 July	9 Aug	M	IS	US
Orphanides, Chris		24 July	9 Aug	M	NEFSC	US
Stanistreet, Joy		24 July	9 Aug	F	IS	US
Tremblay, Christopher		24 July	9 Aug	M	IS	US
Yin, Suzanne	Visual Team Lead	24 July	9 Aug	F	IS	US
One more scientist may participate in survey; name pending						
Joe Godlewski**		24 July	24 July			
Jennifer Johnson**		24 July	24 July			

* attendance currently unconfirmed;
** will board only for calibration of EK60 and will need transport back to shore

G. Administrative

1. Points of Contacts:

Chief Scientist Leg 1: Dr. Heather Haas; NEFSC, 166 Water St., Woods Hole, MA 02543; 508-495-2315; heather.haas@noaa.gov

Chief Scientist Leg 2: Dr. Danielle Cholewiak; NEFSC, 166 Water St., Woods Hole, MA 02543; 508-495-2010; Danielle.cholewiak@noaa.gov

Protected Species Branch Chief: Dr. Sean Hayes, Branch Chief; NEFSC, 166 Water St., Woods Hole, MA 02543; 508-495-2358; michael.simpkins@noaa.gov

Vessel Operations Coordinator: Nathan J. Keith; NEFSC, 166 Water St, Woods Hole, MA 02543; 508-495-2224; Nathan.Keith@noaa.gov

Commanding Officer *Henry B. Bigelow* : CDR Jeff Taylor Ship Cell 774-487-7585: VOIP 301-713-7770: Iridium 808-684-1194; CO.Henry.Bigelow@noaa.gov

Ops Officer *Henry B. Bigelow*: LT Justin Ellis Ship Cell 217-418-3875: VOIP 301-713-7770: Iridium 808-684-1194; OPS.Henry.Bigelow@noaa.gov

2. Diplomatic Clearances

This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Diplomatic clearance (RATS) has been requested. Foreign national clearance has been requested for Michael James (Leg 1), Mike Force, Leigh Hickmott and Charlotte Dunn (Leg 2).

3. Licenses and Permits

Both Legs 1 & 2 will be conducted under ESA/MMPA Permit 17355 (CI=Conger, Cholewiak, valid through June 30, 2018) in US waters. For marine mammal research in Canadian waters, we will operate under SARA permit (DFO-MAR-2016-02, valid from April 14, 2016 to December 31, 2018; Cholewiak is permit holder, awaiting Conger to be added as Permit Holder).

Leg 1 will also be conducted under the Scientific Research Permit (U.S.) ESA Permit #16556 (PI=Haas, valid through April 15, 2018). For sea turtle research in Canadian waters we will primarily operate under the authority of Dr. Michael James: Fisheries Research Notice (FRN) for research (all sea turtle species): #M16-10, valid May 20, 2016 to December 31, 2021; Fisheries and Oceans Canada Animal Use Protocol (loggerhead and leatherback): #17-17, valid May 2017 to December 2019; SARA Section 73 Research permit: DFO-MAR-2015-15, valid from June 05, 2015 to December 31, 2019, awaiting issuance of a new permit to address newly listed loggerheads). Pursuant to 50 CFR 600.745 a Scientific Research Permit exempts this vessel from federal fishing regulations.

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: The cruise will consist of two distinct legs, with a port call between the legs.

Leg I

06 July: Depart Naval Station Newport, RI and depart Narragansett Bay to commence survey.

20 July: Complete cruise operations for Leg 1 and dock at Naval Station Newport, RI.

Leg II

24 July: Depart Naval Station Newport, RI and commence operations for Leg 2.

09 Aug: Return to Naval Station Newport, RI for end of Leg 2.

B. Staging and Destaging:

Leg 1 Staging - June 26-28. I'm assuming crane ops will be possible during at least the morning (9am to noon) of June 26, 27, and 28. If that is not the case, please let me know as soon as

possible.

Leg 1 Destaging – We are requesting some crane assisted destaging after Leg 1, in order to make room for equipment used for Leg 2. We request that this destaging occur on the day of return to port (July 20) or the following day (July 21). We plan to fully clean, pack, and unload as much gear as possible from Leg 1 as soon as we dock . This may take a few hours. We can hand carry much of the gear off the ship, but will need crane assist with a few things. (The chief scientist will not be available the week of July 24 to 28.)

Leg 2 Staging – While some gear for Leg 2 may be staged during June 26-28, we will require the use of the crane on July 20th to load the NEFSC RHIB and potentially other gear.

Leg 2 Destaging – Expected to take place upon return on August 9th.

C. Operations to be Conducted:

1. Leg 1

1a. Searching for sea turtles

We plan to search for sea turtles during daylight hours (immediately following breakfast to approximately 1830 local time with a staggered half hour lunch break). In contrast to line transects used for density estimation, we will set and adjust our lines frequently to optimize our searching ability in any given wind, wave, sun scenario. This will take close coordination between the bridge and the CS. Typical survey speeds will be about 5 knots but will be adjusted up or down to accommodate variable sighting conditions. If the sea state exceeds the limits for safe small boat operations, and information about turtle distribution is not needed in a particular area, then the sighting team will stand down.

The pacing of this cruise will be more erratic than typical line transect survey cruises, where visual teams tend to have scheduled on and off times during the day. In contrast, during the turtle sighting cruises, the entire visual team will be on duty during the entire period where sighting conditions are good, and the entire team will be off in poor weather conditions.

Most or all of the visual sighting team will be stationed on the fly bridge and will use binoculars or naked eyes. We might possibly put people on the roll tank deck but the disadvantage to that is that if the ship passes a turtle target, then the team on the roll tank cannot aid the work boat in locating the turtle target.

An initial starting location and heading will be determined the previous night during a meeting between key science and vessel crew. Because we are attempting to maximize the probability of seeing a turtle (as opposed to sampling in an unbiased fashion) we expect to alter track lines multiple times throughout the day. Except in emergency situations, the bridge officers are requested to discuss with the CS any navigation concerns or changes (for example, to avoid active fishing grounds). The bridge officers and the CS together will try to establish course directions that optimize sightings conditions and also keep the vessel in prime "turtle friendly" SST zones. As noted earlier, we hope the ship can provide SST images to be used in conjunction with navigation software.

During daylight hours when the visual line-transect surveys are being conducted, we request that the jack-staff be lowered so that the observers have a clear view of the waters in front of the ship. We request that the sun shields over the fly bridge be either installed or ready for installation. We are grateful that the Ops Officer has offered to pad the rail on the fly bridge to provide a padded support for observers needing to rest their elbows on a surface to steady their grip. We are planning to load and use the normal 2-chair and wooden desk system onto the fly bridge. In addition, we have purchased an additional 2 chairs and are planning to also mount those (in consultation with the Chief Boatswain) on the fly bridge.

We are not yet certain whether sightings and effort data will be entered by the scientists using a hand held data entry system. The data entry computers may be connected with the ship's SCS system to record latitude, longitude, depth, and sea surface temperature into the scientist's data entry computers. Thus, power may be needed at the bridge station, on the flying bridge and on the bridge wings. We may request assistance from the ship's ET and survey techs so that we can load ship's SCS data directly into the data collection computers on the two visual sighting platforms and also into the acoustic team's computer.

1b. Launch, use, and recovery of the work boat

In contrast to line transect surveys where zero observations can be nearly as important as positive observations, the entirety of our sea turtle ecology mission relies on us catching and sampling turtles. Hence, we rely very heavily on efficient work boat operations. We plan to use the work boat to collect animals and possibly other material. Because the success of our mission depends on having a properly working small boat, we would prefer to have the *Bigelow* work boat plus a spare boat (in addition to the FRB). If this is not possible, we request that sufficient extra parts are available to repair the *Bigelow* work boat while at sea. Because we typically capture turtles from a position at the bow of the small boat, we request that the bow be as free as possible from all equipment and obstructions. If obstructions cannot be removed, we would appreciate if they could be padded.

The work boat will be deployed on all fair weather days at the discretion of the CO, sometimes even before any animals are sighted. We hope that during our June 29 and 30 preparation days, we will be able to establish a morning routine that will set the foundation for safe and efficient boat deployments throughout the day. Depending on weather conditions the work boat may be deployed multiple times per day or for long deployments throughout the day. We plan to use a Protected Species Branch small boat operator and have 1-3 additional science staff in the work boat. Ideally the work boat will be able to be deployed quickly, when needed. If deployment of the work boat is slow and if we fail to catch turtles because of slow deployments, then we will have to consider keeping the work boat in water for long deployments. This is suboptimal because it means that 2-4 sets of eyes are moved from a prime searching location on the fly bridge to a sub-prime searching location very close to the water's surface.

The primary mission of the small boat crew will be to capture loggerhead sea turtle using a dip net. When a sea turtle is sighted, observers will notify the bridge of the sighting. Observers will strive to keep multiple sets of eyes on the turtle as the small boat will need to be directed to the turtle's location (because it will be very difficult to see from the low vantage point of the work boat). Ideally the ship will keep the turtle in front of the ship (where visual observers can continue to monitor the turtle) while it simultaneously positions the ship to give a lee for the work boat launch. Because turtles are often sighted close to the ship, these simultaneous operations

may take great skill to accomplish. Ideally the ship shall make way slowly towards the sea turtle so that visual observers can determine which direction the turtle is facing. Most successful turtle captures occur when the small boat approaches from directly behind the turtles. A visual observer will then direct the small boat to come up behind the turtle and attempt to capture the turtle in a dip net. When a turtle is caught the small boat, work boat crew will pull the turtle into the small boat, and put in on its plastron (with carapace facing up). Both the small boat and the ship will then prepare to have the turtle brought aboard the ship.

Secondary goals of small boat crew include attaching suction cup tags to leatherback sea turtles, tracking animals using acoustic and/or VHF transmitters, deploying the ROV, getting marine mammal photo ID and biopsy samples, and collecting gelatinous zooplankton near the surface.

1c. Onboard sampling of loggerhead sea turtles

When a sea turtle is captured by the small boat, both the small boat and the ship begin to prepare to bring the turtle onboard the ship. The small boat crew will put the turtle into lifting gear so that it can be brought aboard the ship using the side sample station A-frame. Once the turtle is on the Bigelow, the chief scientist will direct several scientific crew to begin sampling the turtle, and the ship can continue along a transect, searching for more turtles. Sampling takes approximately an hour, and multiple turtles may be aboard at the same time. Unless many turtles are onboard at the same time, some crew will continue to search for additional turtles to sample. When sampling is complete, the Chief Scientist will request the ship to stop so that the turtle can be returned to sea via the A-frame. Blood samples from the turtles will be processed, which begins by transferring the blood to vacutainers and centrifuging. Centrifuge will be provided by scientific party. Fully processed samples will be frozen.

1d. Oceanographic Data Collection

Oceanographic operations will be conducted to collect hydrographic, plankton, and mesopelagic data.

Continuous Operations: Position, date, time, ship's speed and course, water depth, surface temperature, salinity, and chlorophyll, weather characteristics, along with other variables will be obtained from the ship's sensors and logged into the Science Computer System (SCS), as is normally done for all surveys. EK60 data will be collected continuously on. Unless the EK60 can be calibrated during the June 29 and 30 cruise preparation sea days (which is unlikely), the EK60 will be uncalibrated for the first leg, and a correction will be applied retroactively after the calibration occurs at the beginning of Leg 2.

Vessel Sensor and Logging Requirements: 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. It is requested that the sensors be operational, calibrated and that logging capabilities be enabled. In addition, a subset of these data will be routinely collected and recorded at least once a second during survey operations and will be logged into an SCS event file that may be used by scientists on a daily basis. At the end of the visual survey day (after 18:00) the data in the SCS event file will be made available to the Chief Scientist.

Daytime Opportunistic Operations
On days when weather conditions preclude turtle operations, oceanographic operations may be

conducted. Depending on the length of time available and the ship's location sampling may include: 1) CTD transects across interesting oceanographic features such as the shelf front or warm core rings. 2) Additional bongo and neuston plankton sampling targeting gelatinous zooplankton or larval bluefin tuna. 3) Bongo and CTD sampling of Oceans and Climate Branch fixed ECOMON station (42.2250 N 65.7667 W) in the Northeast Channel.

Night-Time Operations:
Systematic and opportunistic night-time sampling of gelatinous zooplankton will be conducted using, a 1x2m weighted neuston, a 6 foot Isaacs-Kidd Midwater Trawl (IKMT), a Video Plankton Recorder (VPR) and a gelatinous zooplankton camera that will probably be mounted on one of the plankton nets.

Gelatinous Zooplankton net sampling at night:
The 6-ft IKMT will be deployed to target depth-specific layers that are observed on the higher frequencies of the EK60 that are consistent with mesopelagic fish and gelatinous zooplankton. The 6-ft IKMT will be deployed off the starboard side using the ship's side gantry and the forward hydro winch. A Seacat 19+ CTD will be mounted on the wire above the gear to monitor the depth of the net in real time. To maximize the sampling depth in relation to tow duration, the IKMT can be lowered below its target depth with the ship maintaining minimal speed without sacrificing steerage. The ship can increase speed to 2 – 3 kts (speed over the ground, SOG) when the net reaches maximum tow depth. As the IKMT rises through the water with the increased SOG, the IKMT trawl depth will be maintained in the target depth-specific layer for 15-20 minutes by adjusting the amount of wire out. After the target layer is sampled, the net will be retrieved as fast as is safely possible. Upon retrieval, samples will be rinsed from the net using seawater. Gelatinous zooplankton will be taken into the fish lab for sorting, identification, and weighing. The large Marel scale and the smaller scales at sampling station #1 will be used to collect weights. The FSCS system will not be used. A gelatinous zooplankton subsample of approximately 1 quart will be preserved in 10% buffered formaldehyde. Unique individuals may be preserved or frozen for further study and genetics. Samples will be transported to SUNY, Stonybrook for further processing. If the mesh size or the sample size caught be the IKMT is deemed too large or quantitative sampling is desired, gelatinous zooplankton sampling may be conducted with a 1x2m weighted Neuston net with .333mm mesh nets. Tows will be conducted from the forward hydro winch with a seacat 19+ CTD mounted on the wire above the net.

Live Zooplankton Experiments:
Healthy zooplankton individuals will be selected for a variety live experiments which will most likely also be set up in the fish lab or the dry lab. Measurements of morphology, density, and sound speed will be performed on animals collected by net tow when feasible. Morphological measurements will be taken using digital photos of animals with a scale bar using a small photo tray (roughly 20 cm by 40 cm in size). Density measurements on individual animals will be conducted by titrating a seawater-glycerin mix into containers containing anesthetized (via dissolved sodium bicarbonate tablets) animals. The equipment for this experiment would occupy roughly 1 m x 30 cm of space preferably on a lab bench of some sorts. Soundspeed measurements will take place in a small rubbermaid tote (~ 40 L) containing seawater and the measurement device. Small volumes (~ 40 ml) of gelatinous zooplankton (or other animals) will be placed in the device which is connected to a power amplifier, digitizing oscilloscope, and laptop computer. The electronics equipment would be set up somewhere dry (roughly 60 cm by 40 cm of bench space) and then cables run to the tote which is placed on the floor. Measurements would take place for up to 2 hrs after the animals were collected, but do not need to remain set-up

at other times.

Imaging Sampling:
The black and white V-fin VPR (DAVPR05) will be used opportunistically while gelatinous samples are being processed or if weather precludes the use of the larger net samplers. The VPR will be lowered to 10m with the ship at a full stop and then the ship will be brought up to 4-5 knots speed for the remainder of the tow. The VPR will be towed 30mins to 1.5 hours from the aft hydro winch and a seacat 19+ will be mounted on the wire above the V-fin. Tows will be of two varieties: a tow-yo to classify the water column and multiple layers seen on the EK60 or at a single depth to target a distinct EK60 layer. A simpler camera system, probably go-pro based, is being designed by Conamessett Farm Foundataion to be mounted on either the IKMT or the 1x2m Neuston net to image larger gelatinous zooplankton. This system will be deployed each time the net gear is deployed. Cameras will be downloaded between tows. Configuration of this system may change as cruise preparation progresses.

1e. Other notes or Leg 1

The CS is trying to make optimal use of ship time. This means juggling many priorities, and at the discretion of the Chief Scientist, survey lines may be temporarily broken to conduct other operations, such as, but not limited to, CTD casts or plankton tows, photographing species of interest, deploying the ROV, distance training.

Note that the CS is currently having conversations with NEFSC's Oceans and Climate Branch to see if additional oceanographic sampling could occur on days that are too rough, too foggy, or otherwise unsuitable for sea turtle capture.

CTD Support: CTD operators will be trained and certified by the Center's 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 to 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.

In 2015, the CS had to carry 3 radios and the small boat operators had to carry 2 radios. The first "walky-talky" set was for communication within just the science team. The second set was for communication between the science team and the ship (while on the ship), and the third set was for communication between the small boat and the vessel and science teams. We'd like to discuss these communication issues to see if this system could be simplified (perhaps by using different channels?). The science party has several standard marine VHF radios and headsets that we can bring.

2. Leg 2

2a. Searching for beaked whales

<u>Visual Marine Mammal-Sea Turtle Sighting Teams</u>
A visual survey to locate aggregations of beaked whales will be conducted during daylight hours (approximately 0600-1800 or 1900 local time), surveying at speeds of 6-10 kts. Two teams of

observers will scan for cetaceans: one team will operate on the flying bridge, and the other on the anti-roll tank platform. Both teams will use two 25x150 powered binoculars to detect animal groups, and sightings and effort data will be entered into laptop computers connected with the ship's SCS system to record latitude, longitude, depth, and sea surface temperature. As usual, power will be needed at the bridge station, on the flying bridge and on the bridge wings. Data collected by the visual teams will be displayed for the acoustic team to see (who will be located in the dry lab) using the ship's intranet system. Both visual teams will be in radio contact with one another and the acoustic team, as well as with the personnel on the bridge.

Surveying effort will change and dedicated operations (photo-ID, biopsy, tag deployment, or acoustic recording) will be conducted once an aggregation of beaked whales is identified. The Chief Scientist and visual observation team will decide on specific data collection priorities, depending on weather, number of animals observed in a group, and their behavior. The ship may be requested to approach specific groups for photo-ID/biopsy data collection, or to launch the NEFSC RHIB if weather conditions allows. The Chief Scientist will communicate with the bridge about feasible options.

At the discretion of the Chief Scientist, when the ship breaks to investigate a group of cetaceans, biopsy samples may be collected from the bow of *Bigelow*. Biopsy samples will be collected using crossbows. The bolts have hollow stainless steel tips with tines inside to retain the samples. The tips themselves are 5mm in diameter and 25-40m in length. Molded foam near the bolts' tip is used to keep the tip floating so they can be retrieved after the shot made from the RHIB. A "Game Tracker" line dispensing system will be used to retrieve bolts when sampling from the bow of *Bigelow*.

Biopsy samples will be processed in the ship's wet lab at the end of each day. Each sample will be placed in a vial containing dimethyl sulfoxide (DMSO).

During daylight hours when the visual line-transect surveys are being conducted, we request that the jack-staff be lowered so that the observers have a clear view of the waters in front of the ship.

Bridge officers are requested to give a couple minutes' notice before the ship will be starting and ending each transect line or if they need to make minor diversions from the track line to, for example, go around fishing boats.

Acoustic Detection Team

The passive acoustic team will be on-effort during daylight hours, and occasionally at night. The acoustic team will be monitoring the towed hydrophone array, which is deployed out to 300m behind the ship. Typically, the array is deployed at 05:45h, so that the visual team can start effort at 06:00; this schedule may be modified during the survey, particularly when working in areas with beaked whales.

When deploying and recovering the array, the ship will be requested to slow to 2-3 kts. While the array is in the water, the ship will be requested not to make turns greater than 60°, so as to minimize strain on the electrical wires inside the array. Therefore, maneuvers at the end of the

tracklines or to follow animals will require a broad turn radius. In addition, when the ship is operating in waters less than 100m depth, maneuvering may be restricted while the array is in the water. In these situations, the visual team and the bridge should communicate with the acoustics team to determine whether the array should be retrieved before the ship breaks track.

The acoustic team will be stationed inside the dry lab. Recordings of acoustic detections will be made onto several desktop computers, utilizing two ship's computers if possible. The acoustic team will require 3-4 GPS feeds from the ship. The main passive acoustic hydrophone array consists of a 400m cable with 8 hydrophone elements. The array should be mounted onto the starboard side net reel, and will be deployed off the stern with the assistance of several members of the deck crew and the acoustic team. A wooden casing was built to accommodate the array in 2007, and was used until 2011, after which time it was replaced by steel pipes. A removable deck cable will connect the hydrophone tow cable to the computers in the lab.

During daylight hours, when the visual sighting team is on-effort, the acoustic detection team will work in coordination with them. The acoustic team will maintain contact with the visual team to be notified of each cetacean sighting; this information may be transmitted via the visual team's data stream using the ship's intranet system and also via handheld walkie-talkie. In prior surveys, a protocol has been established between the acoustic and visual teams to facilitate data collection when the ship breaks survey track to investigate a group of animals. This protocol will include the following: a) before the ship breaks from the track line, notify the acoustic team when the ship will break track (so that the recording equipment settings can be adjusted to compensate for the increase in noise experienced during maneuvering); b) and once the visual team is satisfied with species identification and collection of photographs, etc., the ship may be asked to maintain a straight-line transit to facilitate the collection of high quality acoustic recordings.

In areas of high beaked whale density, standard survey protocol will change to facilitate the collection of dedicated acoustic and visual data. These changes will be communicated to the bridge by the Chief Scientist.

Seabird Sighting Team

One person will be collecting seabird sightings data, whenever the marine mammal-sea turtle sighting team is on effort, and at other times when feasible. The person will be located on the flying bridge, and will search for seabirds using the naked eye and hand held binoculars to confirm the species identification and group size. The seabird team members will follow standard 300m strip-transect protocols for seabirds. Seabird sightings and effort data will be entered by the scientists using a hand held, at sea, data entry system. This computer needs to be hooked up to the ship's intranet via a serial port.

There will be times, particularly in Beaufort sea state 5 or worst conditions when the ship is transiting on a track line and the seabird team will be on-effort collecting data even though the visual marine mammal-turtle team will not be on-effort.

Cetacean photograph collection from the ship

At the discretion of the Chief Scientist, the ship will break effort from the track line and travel to investigate groups of cetaceans. At this time, and perhaps at other times, several scientists will be responsible to photograph the animals to confirm the species identification. Most photographs will be taken from the bow of the ship. Photographs will be collected using a 6.3 digital SLR camera (Canon EOS D10) equipped with a 100-300 mm zoom lens. A 500 mm 4.5 power lens will also be available for taking pictures. Time stamped JPEG images will be saved onto the cameras' compact flash cards and downloaded onto a computer at the end of each day. All images will be kept in the NEFSC Protected Species Branch digital archives. Copies of all humpback whale fluke and dorsal fin images will be sent to the North Atlantic Humpback Whale Catalogue at College of the Atlantic, Bar Harbor, ME, and to the Center for Coastal Studies in Provincetown, MA.

2b. Launching the NEFSC RHIB for tagging

When aggregations of beaked whales are found, the NEFSC RHIB will be deployed on all fair weather days at the discretion of the CO. Depending on weather conditions, the RHIB may be deployed multiple times per day or for long deployments throughout the day. We plan to use a Protected Species Branch small boat operator and have 1-3 additional science staff in the work boat. Ideally the work boat will be able to be deployed quickly, when needed.

The primary mission of the small boat crew will be to deploy suction-cup recording tags on beaked whales, collect identification photographs, and biopsy samples. When beaked whales are sighted, the CS will discuss options for small boat deployment with the bridge. Observers will strive to keep multiple sets of eyes on the beaked whales, as the small boat will need to be directed to their location (because it will be very difficult to see from the low vantage point of the work boat). Ideally the ship will keep the beaked whales in front of the ship (where visual observers can continue to monitor them) while it simultaneously positions the ship to give a lee for the work boat launch. Once the RHIB is launched, the visual observation team will communicate with the small boat and direct them to the target animals. The RHIB will stay out as long as possible or necessary to deploy a tag, and will coordinate return to the ship with the bridge.

2c. Radio-tracking tagged beaked whales

Once a tag is deployed on the beaked whale, observers will need to begin operations for radio-tracking. During daylight hours, the small boat team may be able to conduct the tracking while collecting additional focal follow data. However, tracking operations will continue throughout the night, with the goal of keeping the ship within range of the tagged animal. The observer team will rotate through the tracking station, which will ideally be located within the bridge, in 1-2 hour shifts throughout the night. The ship will continue to track the whale until the tag is released, at which point it must be recovered from the water. More details on these operations will be provided shortly.

2d. Oceanographic / prey sampling operations

Oceanographic operations will be conducted to collect hydrographic, plankton, and mesopelagic

data during four types of operations: continuous, fixed-time, night-time, and fixed-location. However, prior to the collection of these data, the ship's EK60 will be calibrated on the day of departure.

EK60 Calibrations

The multi-frequency EK60 will be calibrated on the day of departure in the Newport naval anchorage in Narragansett Bay across the channel from the Newport Navy base. Calibrations are required for each survey to ensure data quality and verify that the instrumentation is operating properly. The EK60 is calibrated by suspending standard calibration spheres of known target strength under each transducer from three monofilament lines. The calibration sphere is centered in the far field of the transducer and moved throughout the acoustical beams beneath the vessel using remotely controlled downriggers. Given mild weather and tidal conditions, centering the sphere and mapping the beam patterns requires about 2-4 hours for all frequencies. The 70-, 38-, 120-, and 200-kHz split-beam transducers require 15 m or greater water depth, and the 18-kHz split-beam transducer requires about 25 m or greater water depth.

We will require an additional two personnel to assist with calibrations (Joe Godlewski and Jennifer Johnson), who will only be on board for the calibration and will depart the vessel at the conclusion of the calibrations. Transport of these personnel can be via small boat back to the Navy pier or other means as determined by the vessel command.

Continuous Operations

Position, date, time, ship's speed and course, water depth, surface temperature, salinity, and chlorophyll, weather characteristics, along with other variables will be obtained from the ship's sensors and logged into the Science Computer System (SCS), as is normally done for all surveys (e.g., see Table 4). The EK60 will be operated in passive mode during the day and at night until prey sampling activities take place.

Fixed-Time Operations

CTD and plankton sampling may be conducted two or more times daily: schedule TBD. A 61cm Bongo plankton net, equipped with two333 μm mesh nets and a CTD mounted on the wire 1m above the nets will be used. The bongo will be towed in a double oblique profile using standard ECOMON protocols. The ship's speed through the water will be approximately 1.5 knots. Wire out speed will be a maximum of 50m/min and wire in speed will be a maximum of 20m/min, both of which depend on water depth. Tows will be a minimum of 5 minutes in duration. Tows will be to within 5 m of the bottom or 200 m if the bottom depth exceeds 205 m. Upon retrieval, samples will be rinsed from the nets using seawater and preserved in 5% formaldehyde and seawater. At the end of the cruise samples will be transported to the NMFS lab at Narragansett, RI for future processing. A Laser In-Situ Scattering Transmissometer (LISST) may be mounted alongside the CTD to collect particle size distribution and abundance data in the water column. XBT's may be deployed during the survey daytime periods, in between the CTD deployments, during at least some of the track lines, in particular those transiting across warm/cold core rings and the shelf break.

Nighttime Operations

Systematic and opportunistic nighttime sampling of small prey layers will be conducted using a small mid-water trawl, with the goal of sampling areas where beaked whales are present. The Chief Scientist and Oceanography team will make decisions jointly as to which nights to sample prey.

Pelagic Trawl Description

A shallow-water mid-water trawl (Fig. X) will be used as the primary mid-water trawl and a polytron mid-water rope trawl (Fig. X) will be brought as a backup to collect biological samples and verify species composition of acoustic backscatter. The shallow-water mid-water trawl will use 3.5 m superkrub doors and 100-lb tom weights, and the polytron trawl will use 3.5-m superkrub and 600-lb tom weights. The trawls will be rigged similarly (Fig. 7). The midwater trawls are designed to be fished at speeds of about 4 knots. The midwater trawls will be deployed during survey operations, and targeted on acoustic backscatter to a maximum depth of about 1000 m. The duration and depth of the trawls are not standardized, thus it is incumbent upon the Chief Scientist or Watch Chief to communicate with the bridge officers the haul duration and depths.

Simrad FS70 Trawl Monitoring and Third-wire Winch System

The Simrad FS70 trawl monitoring system is required for pelagic trawling. It is a third-wire device that provides real-time trawl performance information through its sonar images of the trawl opening. The scientific party will record measurements at specified intervals during each deployment.

The Simrad FS70 will be deployed with every haul. Typically, the trawl will be fished obliquely. Officers will record the time, date, navigational, and station data in FSCS, while the scientists will record the catch data for each station deployment. Catch data will be recorded using the FSCS on-board entry system.

Trawl Catch Processing

Trawl catch will processed at a sorting table on the back deck. The sorting table will be located where the fish "hopper" is currently, i.e., the "hopper" needs to be taken off the boat. Fish will be sorted by species and weighed en masse. Fish length will be measured for up to 150 individuals of each species. The complete fish handling system will not be used. We will use only the "watch chief" station to process the fish. The bottom-trawl SCS event will be used and completed by the watch chief during the trawl.

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

For both legs, oceanographic sampling during the day or night may have to be altered if there are fixed gear and multiple vessels in the region of the sampling station.

Leg1. Sea state or weather conditions may preclude the use of small boats. When this happens, visual sightings may still continue if the CS thinks that turtle sighting information will be useful. If not, the visual and turtle ecology teams will stand down and rest for future opportunities. We are in discussion with the Oceans and Climate Branch to identify possible oceanographic sampling opportunities for intermediary weather conditions that preclude small boat work but for which CTD or net tows would be appropriate.

Protected Resource Requirements:

The NEFSC is fully permitted under the MMPA and ESA to conduct research data collection activities. Active permits are effective September 12, 2016 through September 9, 2021. Permits and applicable information are available online at: http://www.nmfs.noaa.gov/pr/permits/incidental/research.htm#nefsc

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

III. Equipment (Hazardous materials are not to be listed here. They should be included in Hazardous Materials Section.)

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

ITEM	QTY
Scientific Computer System	
Flow-through and meteorology sensors	
Deck equipment to deploy CTD & bongo	
Deck equipment to deploy VPR, IKMT, and Neuston	
Stands to support big eye binoculars	*5*
Steel pipes for acoustic array	
Simard EK60 Scientific Sounder	*1*
ME70	*1*
Hydro winches on starboard 02 deck to deploy the CTD, bongo, neuston, IKMT and VPR	*2*
Deck and lab seawater systems	*1*
Movable platforms at the bow to allow a photographer or biopsier to see over the ship's bow	*2*
FS70 trawl monitor	*2*
Constant tension winch	*1*

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

LEG 1 ITEM	QTY
Laptop computers	several
Hand held binoculars	several
Data logs, computerized and paper	ample
Photographic and video equipment	ample
1 Desk with 2 chairs station for sighting stations	
2 chairs for sighting stations	
CTD computer and GPS	1
CTDs	2
Bongo plankton net equipment and supplies	2
Video Plankton Recorder	1
sample jars and vials	ample
6-ft Isaacs-Kidd mid-water trawl	1
1x2m weighted neuston net	1
Turtle capture, sampling, and tagging equipment	Ample
Remotely operated vehicle, Deep Trekker and (small) cable	*1*

LEG 2 ITEM	QTY

Passive acoustic data collection equipment	Ample

IV. Hazardous Materials

A. Policy and Compliance

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

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

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

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will

maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

B. Inventory

Leg 1 Inventory

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Ethanol (97%)	1 x5 gal	Flammability, stored in ship's chemical lkr	Elisabeth Broughton,	
Formaldehyde solution (10%)	1 x 4 gal	Alkalinity, stored in fume hood	Elisabeth Broughton,	F
Formaldehyde solution (37%)	2 x 20 L	Alkalinity, Stored in ship chem. lkr	Elisabeth Broughton,	F
Acetone	8 x 32 oz	Flammability, stored in ship's chemical lkr	Elisabeth Broughton	
Isopropyl Alcohol	4 x 16 oz	Flammability, stored in ship's chemical lkr	Elisabeth Broughton	
Sika Anchofix1	45 x 10.1 oz	Strong adhesive	Elisabeth Broughton	
Sodium Heparin	95 USP units * 60	Stored in 60 sealed 6ml vacutainers	*TBD*	

Leg 2 Inventory

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Ethanol (97%)	1 x3 gal	Flammability, stored in fume hood		
Formaldehyde solution (37%)	1 x 4 gal	Alkalinity, stored in fume hood		F
Formaldehyde solution (37%)	2 x 20 L	Alkalinity, Stored in ship chem. lkr		F
Dimethyl	30 x	Tubes will be kept sealed in		F

sulfoxide (DMSO)	2oz.	a box under the fume hood		
Chlorox bleach	1 gal	Stored under the fume hood		A

C. Chemical safety and spill response procedures

A: ACID

- Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
- Ventilate closed spaces before entering them.
- Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
- **Large Spills**: Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.
- **Small Spills**: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
- Never return spills in original containers for re-use.
- Neutralize spill area and washings with soda ash or lime. Collect in a non-combustible container for prompt disposal.
- J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

M: Mercury

- Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Use Mercury Spill Kit if need be.

F: Formalin/Formaldehyde

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

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Spill-X-FP	1.68 kg	Formaldehyde	10 gallons
Mercury Tamer	250 gm	Mercuric Chloride	2 Liters

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

E. Inventory (itemized) of Radioactive Materials - None

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 - At the end of each leg of the cruise the ship will provide the chief scientist with a copy of data from the EK60 transducer, the ADCP unit and the SCS system. A copy of the SCS data should also be provided to DMS personnel in Woods Hole.

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 usually is delegated to assist the Chief Scientist in arranging this meeting.

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

presented by the ship's Operations Officer.

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

D. Project Evaluation Report
Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at 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 ship, 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 makeup of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief

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

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

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

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

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

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

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

Contact information:

Regional Director of Health Services
Marine Operations Center – 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.

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.

Please let us know if safety-toes shoes/boots will be required for either leg 1 or leg 2.

D. Communications

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

*Leg 1 will require reliable internet access to monitor the position of satellite relay data loggers on sea turtles in relation to sea surface temperature gradients. Please let us know if species arrangements need to be made to accommodate this research need.

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

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 email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.) This email 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 email 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 (all that apply)

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

Appendix Table 1. Scientific Computer Sensors, and logging rates of those sensors, required during *Henry Bigelow HB 17-04*, AMAPPS Cetacean and Turtle Abundance Survey. Additional sensors may be requested.

Sensor Name	Units	Log Rate (secs)		Sensor Name	Units	Log Rate (secs)
ADCP-Depth	(Meters)	1		MX420-COG	(Degrees)	1
ADCP-F/A-GroundSpeed	(Knots)	1		MX420-Lat	(DEGMIN)	1
ADCP-F/A-WaterSpeed	(Knots)	1		POSMV-COG	(Degrees)	1
ADCP-P/S-GroundSpeed	(Knots)	1		POSMV-Elevation	(Value)	1
ADCP-P/S-WaterSpeed	(Knots)	1		POSMV-hdops	(Value)	1
Air-Temp	(Degrees C)	1		POSMV-Heading	(Degrees)	1
Baro-Press	(Millibars)	1		POSMV-Lat	(DEGMIN)	1
CenterBoardPos-Value	(Position)	1		POSMV-Lon	(DEGMIN)	1
Date	(Date)	1		POSMV-Quality	(Value)	1
Doppler-Depth	(Meters)	1		POSMV-Sats	(Value)	1
Doppler-KeelOffset	(Meters)	1		POSMV-SOG	(Knots)	1
Doppler-P/S-BottomSpeed	(Knots)	1		POSMV-Time	(Time)	1
Doppler-P/S-WaterSpeed	(Knots)	1		SAMOS-AirTemp-Value	(Degrees C)	1
EK60-18kHz-Depth	(Meters)	1		SAMOS-TRUE-WIND-DIR-Value	(Degrees)	1
EK60-38kHz-Depth	(Meters)	1		SAMOS-TRUE-WIND-Spd-Value	(Knots)	1
ES60-200hz-Depth	(Meters)	1		YOUNG-TWIND-Speed	(Knots)	1
ES60-50hz-Depth	(Meters)	1		Fluorometer data		
GYRO	(Degrees)	1		MX420-Lon	(DEGMIN)	1
ME70-Depth	(Meters)	1		MX420-SOG	(Knots)	1
Mid-SeaTemp-C	(Degrees C)	1		MX420-Time	(Time)	1

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

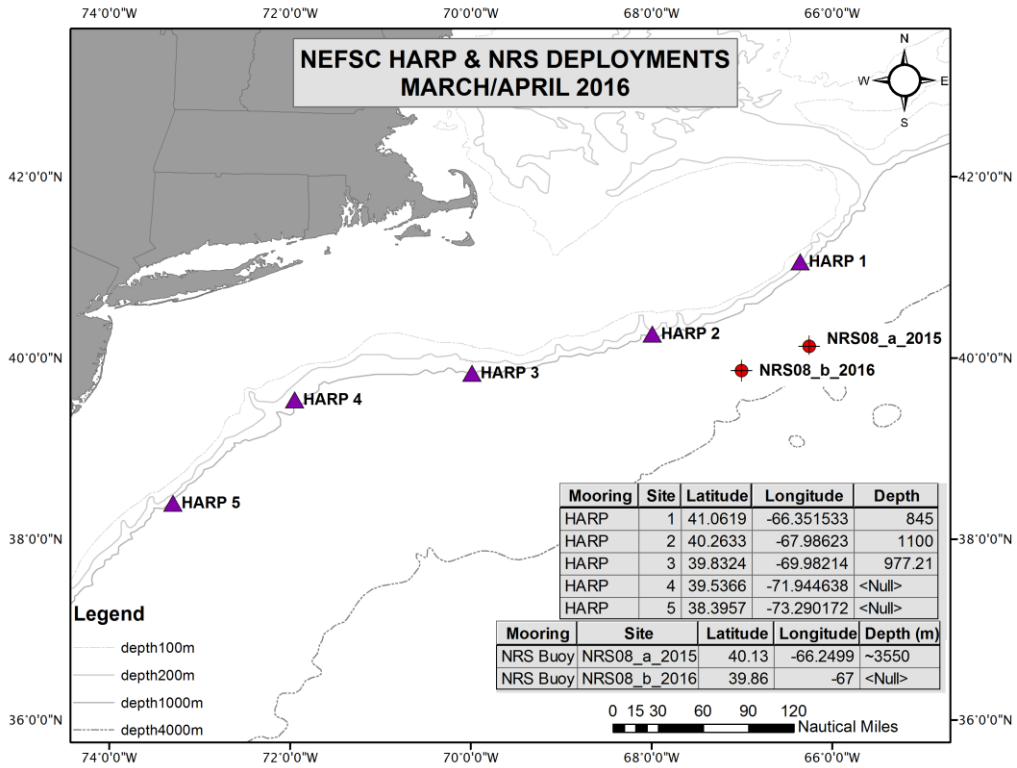
Addendum to HB17-04 Cruise Instructions
Recovery/Deployment of Acoustic Recorders
D. Cholewiak
19 June 2017

POC:
Leg 1: Eric Matzen, Heather Haas
Leg 2: Danielle Cholewiak

The PSB has an active research program investigating how marine animals use sound and the impacts from human-made noise on protected and/or endangered marine mammals and other acoustically-sensitive marine animals (e.g. fishes). These acoustic recorders are part of the long-term monitoring of movements and distribution of cetaceans, focused on understanding current and expected changes in their occurrence throughout biologically important areas.

High-frequency acoustic recording packages (HARPs) will be recovered and deployed at three sites (HARP 01, HARP 02, HARP 03) during Legs 1 and 2 of the survey (Figure 1). Several of these recorders were deployed from the *Henry Bigelow* in 2015.

We will load two HARPs on the ship for Leg 1, with the goal of recovering/deploying at sites 1 and 2 if possible. We will load the third HARP on the ship for Leg 2, with the goal of recovering/deploying at site 3 and sites 1 or 2 if needed.



Mooring	Site	Latitude	Longitude	Depth
HARP	1	41.0619	-66.351533	845
HARP	2	40.2633	-67.98623	1100
HARP	3	39.8324	-69.98214	977.21
HARP	4	39.5366	-71.944638	<Null>
HARP	5	38.3957	-73.290172	<Null>

Mooring	Site	Latitude	Longitude	Depth (m)
NRS Buoy	NRS08_a_2015	40.13	-66.2499	~3550
NRS Buoy	NRS08_b_2016	39.86	-67	<Null>

Figure 1: Map of acoustic recorder locations as of April 2016. Recorders at sites HARP 1, 2, 3 will be recovered and deployed during HB17-04.

HARP Mooring Design (Figure 2)
Mooring design is 21m long and weighs a total of 650lb consist: of:

- Mclane glass floats
- HARP Hydrophone Recorder
- Float Cage, 400 lbs weight
- Dual ORE PORT acoustic release system, 30 lbs
- 200lb anchor weights

Recovery & Redeployment Procedures

At each site, the currently deployed HARP should be recovered before the replacement unit is deployed. Recovery and deployment procedures should be discussed with the vessel crew and POC prior to arrival on site. Prior to starting the deployment procedure, all equipment must be turned on and tested. Therefore, adequate notice must be given to the science crew for preparations.

Recovery:
HARP recovery must be attempted during daylight hours, with good visibility, and sea state 4 or less. Waypoints for the HARP deployments will be provided to the CO. The vessel should be positioned over the waypoint, and the science crew will deploy a hydrophone transducer to communicate with the HARP on the seafloor. Once contact has been established and the range of the HARP is determined, the science crew will release the HARP from the seafloor. All available crew will visually search for the HARP on the surface. Once the HARP has been located on the surface, the ship will approach the HARP within reach of a mooring hook or boat hook to attach a lifting line. The HARP can be brought on board via many methods, i.e. a-frame, boom, crane, winch, etc. but care must be taken not so cause any impact to the unit. The glass floats and hydrophone unit can be lifted onboard by hand.

Deployment:
After the HARP is recovered, the ship will deploy the replacement unit at the same site. The vessel should re-maneuver to within 500m of deployment position, upstream from the intended deployment location and maintain position. One suggested procedure is as follows: using a SeaCatch TR-7 or similar quick release mechanism, the float should be lifted over the stern or side of the vessel to the waterline and released. The float and HARP will drift away from the vessel. If the deployment is done over the side of the vessel, use pass-through taglines attached to the vessel and HARP to control the mooring, using enough slack to allow the mooring to drift with the vessel until the anchor, release and glass sphere floats are ready to be deployed. Attach pass-through tag-lines to the shackle above the glass balls and have two deck hands manage/minimize movement on the deck of the ship. Lift the anchor assembly via anchor stem post; the acoustic release assembly and glass spheres are in-line and will be lifted over the side (or aft) of the vessel. Slowly lower to just above the surface of the water. The anchor should be submerged just below the waterline to ensure shock loading during deployment is minimized. Release the tether lines holding the float and HARP and let drift astern of the vessel. When deployment position confirmed with vessel master and the complete mooring assembly has drifted downstream with just the anchor assembly at the waterline, the quick release can be

activated and the anchor will fall to the seafloor (Figure 3). **A GPS position must be recorded upon release of the HARP.**

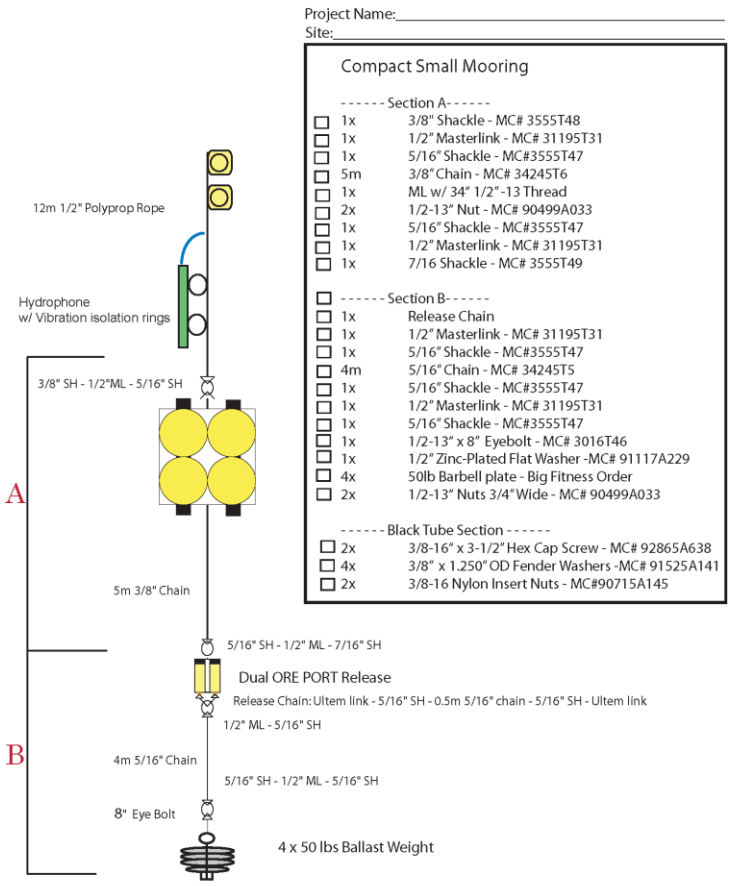


Figure 2: HARP Acoustic Mooring Diagram.

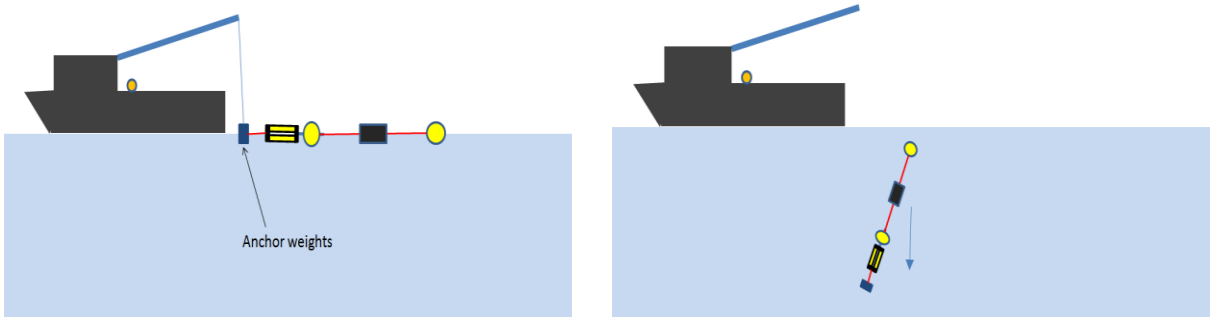


Figure 3: HARP deployment schematic.