U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Pacific Islands Fisheries Science Center
1845 Wasp Blvd. Bldg. 176 • Honolulu, Hawaii 96818

FINAL Project Instructions

Date Submitted: September 27, 2015

Platform: NOAA Ship *Hi'ialakai*

Project Number: HA-16-01 (OMAO)

Project Title: Fall Insular Bottom Fish Survey

Project Dates: October 14 – 26, 2015

Prepared by: _____ Dated: 9/27/15
Russell Reardon, Project Leader
Ecosystem Sciences Division
Pacific Islands Fisheries Science Center

_____ Dated: 9/28/15
Benjamin Richards, Ph.D., Science Advisor
Fisheries Research and Monitoring Division
Pacific Islands Fisheries Science Center

Approved by: _____ Dated: 10/1/15
Michael Seki, Ph.D., Director for
Pacific Islands Fisheries Science Center

Approved by: Matt Wingate Dated: 10/1/15
Commander Matthew J. Wingate, NOAA
Commanding Officer
Marine Operations Center – Pacific Islands

I. Overview

A. Brief Summary and Project Period

NOAA Ship *Hi'ialakai* will be engaged as support for a Pacific Islands Fisheries Science Center (PIFSC), National Marine Fisheries Service (NMFS), project from October 14 - 26, 2015, for a total of 13 days at sea (DAS).

The focus of this mission is to test and operationalize the Modular Optical Underwater Survey System (MOUSS) fishery-independent gear for sampling the Main Hawaiian Islands Deep-7 bottomfish assemblage. The MOUSS builds and improves upon previous efforts with the Baited Stereo-Video Bottom Camera System (BotCam), which has been effectively used to collect fishery-independent species-specific size-structured abundance data on bottomfish in the Main Hawaiian Islands.[1,2]

Both the MOUSS and the BotCam-MOUSS Tandem System gears will be utilized during this mission. The MOUSS will be deployed and recovered from PIFSC 19' SAFE Boats launched from *Hi'ialakai.* The BotCam-MOUSS Tandem System will be deployed and recovered using the *Hi'ialakai* deck equipment.

B. Days at Sea (DAS)

Of the 13 DAS scheduled for this project, 13 DAS are funded by a Line Office Allocation. This project is estimated to exhibit a Low Operational Tempo.

C. Operating Area

The area of scientific operations encompasses waters off the islands of Maui, Lāna'i, and Kaho'olawe.

The project will initially target specific areas (grid cells) where density of Hawaiian 'Deep-7' bottomfish species is expected to be high based on previous surveys (*Appendix 1*). If progress allows, the area will be expanded following a stratified-random sampling approach in an effort to best characterize bottomfish abundance across the survey domain (*Appendix 2*).

Daily site selection will be largely weather dependent. The Station/Waypoint List for these grids is presented as an attached spreadsheet file (*Appendix 3*). A file format suitable for direct upload to the ship's Nobletec will be provided to the Command prior to departure.

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[1] Moore, C. H., Drazen, J. C., Kelley, C. D., Misa, W. F. X. E. (2013) Deepwater marine protected areas of the main Hawaiian Islands: establishing baselines for commercially valuable bottomfish populations. Marine Ecology Progress Series, 476: 167-183.

[2] Sackett, D. K., J. C. Drazen, V. N. Moriwake, C. D. Kelley, B. D. Schumacher, and W. F. X. E. Misa. (2014) Marine protected areas for deepwater fish populations: an evaluation of their effects in Hawai'i. Marine Biology 161:411-425.

D. Summary of Objectives

The MOUSS platform will be evaluated for its suitability as an effective and efficient sampling gear for use in operational fishery-independent surveys of the Main Hawaiian Islands Deep-7 bottomfish assemblage.

The objectives of the project are twofold:

1. Operationalize the MOUSS, particularly in terms of small boat operations (deployment/recovery methodology), operational tempo, and data handling; and

2. Collect data to compare BotCam and MOUSS camera heads utilizing the BotCam-MOUSS Tandem System (aka Frankenframe).

E. Participating Institutions

- NOAA Pacific Islands Fisheries Science Center:
  - Ecosystem Sciences Division (ESD)
  - Fisheries Research and Monitoring Division (FRMD)
  - Science Operations Division (SOD)
- Joint Institute for Marine and Atmospheric Research (JIMAR)

F. Personnel / Science Party

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Asher, Jacob	Coxswain / Gear Specialist	10/14/15	10/26/15	M	JIMAR/ESD	USA
Barlow, James	Coxswain / Gear Specialist	10/14/15	10/26/15	M	NOAA/SOD	USA
Bliss, LT Kelli-Ann	Gear Specialist	10/14/15	10/26/15	F	NOAA/ESD	USA
Demarke, Christopher	Gear Specialist	10/14/15	10/26/15	M	JIMAR/SOD	USA
Giuseffi, Louise	Gear Specialist	10/14/15	10/26/15	F	NOAA/SOD	USA
Lindsay, Christopher*	Gear Specialist	10/23/15	10/26/15	M	PIFSC Volunteer	USA
Miller, Dianna	Gear Specialist	10/14/15	10/26/15	F	JIMAR/SOD	USA
Raja, LTJG Kristin	Gear Specialist	10/14/15	10/26/15	F	NOAA/SOD	USA
Reardon, Russell	Project Leader	10/14/15	10/26/15	M	JIMAR/ESD	USA
Richards, Benjamin	Science Advisor / Data Manager	10/14/15	10/26/15	M	NOAA/FRMD	USA

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Richards, Benjamin	Science Advisor / Data Manager	10/14/15	10/26/15	M	NOAA/FRMD	USA

Taylor, Jeremy	Gear Specialist	10/14/15	10/26/15	M	JIMAR/SOD	USA
Castro, Joseph	Science Writer	10/23/26	10/26/15	M	PIRO	USA

* It is anticipated Scientist Christopher Lindsay and Joseph Castro will require a shore-to-ship transfer by *Hi'ialakai* small boat (most likely from Maalaea Small Boat Harbor, Maui).

G. Administrative

1. Points of Contact

Project Leader:
Russell Reardon
Russell.Reardon@noaa.gov
NOAA IRC
Attn: NMFS / PIFSC / ESD
1845 Wasp Blvd, Building 176, Honolulu, HI 96818
808-725-5404

Science Advisor:
Dr. Benjamin Richards
Benjamin.Richards@noaa.gov
NOAA IRC
Attn: NMFS / PIFSC / FRMD
1845 Wasp Blvd, Building 176, Honolulu, HI 96818
808-725-5320

Ship Operations Officer:
LT Faith O. Knighton
OPS.Hiialakai@noaa.gov
Faith.Knighton@noaa.gov
NOAA Ship *Hi'ialakai*
1897 Ranger Loop, Building 184, Honolulu, HI 96818
In-Port: 808-725-5780
At Sea: 808-684-3235

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

The Science Advisor will ensure the appropriate authorizations are secured for all planned scientific operations prior to the start of the project. These authorizations include:

NEPA: This project meets the requirements of NOAA Administrative Order (NAO) Series 216-6, Environmental Review Procedures, Sections 5.05 and 6.03c.3(a) for Categorical Exclusions (CE) for Research Programs. (PIFSC-201600xx--Memo for the Record in process).

ESA: Section 7 consultation for deployment and operation of survey equipment currently in process.

Essential Fish Habitat: Consultation for deployment and operation of survey equipment currently in process.

State of Hawaii: Research fishing for regulated deep-seven bottomfish and jacks in state waters (HAR Chapter 11-200) has been approved by a DLNR Special Activity Permit, SAP 2016-19 (valid through May 20, 2016).

A copy of necessary research permits will be provided to the Command prior to commencing scientific operations.

II. Operations

The Project Leader is responsible for ensuring the scientific staff is trained in planned operations. The Science Advisor is responsible for ensuring that the scientific staff is 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

Weather, equipment failures, and scheduling problems are unpredictable. As such, the following intended itinerary should be considered as only a guide for survey progression. Operations may be altered as appropriate based on weather, sea conditions, or the progress of the survey. Transit estimates to and from the Maui Nui survey area have been estimated based on a ship speed of 9.0 knots.

14 OCT	**Depart Pearl Harbor:** Embark scientific complement (10 of 12 scientists; last two scientists to embark 23 OCT in Maui) at Ford Island ~0700. Depart *Hi'ialakai*'s home pier for Navy fuel pier. Fuel ship. Depart Pearl Harbor and transit to the Maui Nui survey area (~96 nmi; 11h). Conduct Welcome Aboard Brief, safety drills and operational planning.
15-25 OCT	**Conduct Maui Nui Scientific Operations:** Standard daily operations within this period consist of MOUSS

deployments/recoveries from small boats and BotCam-MOUSS (Frankenframe) deployments/recoveries from *Hi'ialakai* in the waters off Maui, Lāna'i, and Kaho'olawe. On most days (9 out of 11), two 19' SAFE Boats will be launched to conduct small boat MOUSS operations, and *Hi'ialakai* will deploy and recover two Frankenframe units. This routine may be adjusted on two mid-project days (~Oct 20 & 21) such that only a single SAFE Boat will be launched to conduct MOUSS operations, but additional Frankenframe evolutions (~3-5 total) will be conducted from *Hi'ialakai*. Small boats will need to be fueled daily aboard *Hi'ialakai*.

23 OCT ***Personnel Transfer (Shore to Ship):*** *In addition to routine scientific operations on this day, a shore-to-ship personnel transfer (preferably using a Hi'ialakai jet boat) will be needed to retrieve two incoming scientis, (Lindsay and Castro) to join HA-16-01 for the remainder of the project. Pick-up location will likely be Maalaea Small Boat Harbor on the south shore of Maui. Time of arrival on Maui is TBD.*

25 OCT **Overnight Transit:** Upon conclusion of small boat operations (~1700) on October 25, depart for Pearl Harbor (~96 nmi; 11h).

26 OCT **Arrive Pearl Harbor:** Disembark scientific personnel. Offload equipment. End of project.

B. Staging and Destaging

Staging: Due to the ship's Fleet Inspection immediately preceding this project, pier-side staging of large scientific equipment will not begin until 7 October, to be loaded at the convenience of the Command. Delivery of small boat fuel is anticipated for 9 October. The PMNM 10' container and boat cradle from HA-15-06 will remain on board for this project. Assistance from ship personnel for craning aboard all large scientific gear (including three stainless steel deck-cabinets) and for loading small boat fuel will be necessary. Hand carried items will be loaded 12-13 October. Operational walk-throughs of MOUSS and Frankenframe deployments/recoveries will occur 13 October with involved personnel from the science party and *Hi'ialakai* prior to loading the small boats aboard. Pierside testing and calibration of the ship-provided Trackpoint II transducer/hydrophone and Command/Display Module may be necessary.

Destaging: Full off-load of all program-provided gear and small boats will begin in coordination with the Command upon return to Pearl Harbor, 26 October. The PMNM 10' container and boat cradle will remain on board for the following project, HA-16-02.

depicted in *Appendices 1 & 2* and listed in *Appendix 3*. Specific grid cells will be chosen daily based on weather conditions and prior sampling effort.

Research efforts will require routine small boat operations from *Hi'ialakai*. Two program-provided 19-ft SAFE Boats (F1913 *Steel Toe* and F1921 *Rubber Duck*) will be required to support the daily MOUSS operations. A *Hi'ialakai* small boat coxswain will be needed to operate one of these vessels (namely *Rubber Duck*).

Each SAFE Boat will be launched with two MOUSS units for daylong, replicate deployment and retrieval operations. On most (9 out of 11) operational days, both small boats will be launched for MOUSS operations. It is anticipated, however, that for two mid-project days, a single boat will be launched for these operations. Though there are no set replicate or spatial coverage requirements for the operational methods testing phase of MOUSS, the initial planned tempo is estimated at eight drops per boat per day. This may be adjusted as the project progresses based on underway efforts and experience. The optimal tempo for a fully operational survey is to cover as many grid cells as possible, with two MOUSS drops per individual grid cell. The standard operating procedures for deployment and recovery of the MOUSS from a 19' SAFE Boat is attached (*Appendix 4*).

In support of paired BotCam and MOUSS gear comparisons, *Hi'ialakai* will conduct direct deployments and recoveries of untethered BotCam-MOUSS tandem systems (Frankenframes) using the aft deck crane or other equipment at the discretion of the Command in consultation with the Project Leader. A single, untethered Frankenframe – equipped with an acoustic release and expendable concrete anchors – will be deployed from the ship at identified sampling locations using the ship's aft crane equipped with a SeaCatch Toggle Release (or similar). The unit will be left to sit on the seafloor for 45 minutes followed by acoustic release (triggered from a dunking transducer) and retrieval. A transponder on the unit paired with the ship's Trackpoint II Ultrashort Baseline system may aid in relocating the equipment for retrieval. The general deployment tempo for the Frankenframe will be two drops per day. This tempo may be increased to 3-5 drops per day during two mid-project days, should a single SAFE Boat be launched for MOUSS operations. The standard operating procedure for deployment and recovery of an untethered BotCam-MOUSS Tandem System using a crane is attached (*Appendix 5*).

During HA-16-01, *Hi'ialakai* will be working the Maui Nui area concurrently with four Pacific Islands Fisheries Group (PIFG) research fishing vessels operating within a sampling design developed in cooperation with scientists from PIFSC. Though these efforts are not linked operationally (as they have been in previous years), data from the PIFG research fishers will be used as part of the survey to estimate deepwater bottomfish abundance. PIFG fishers will be operating in an area that includes but exceeds the operating area of *Hi'ialakai* (*Appendix 6*).

As necessary, project personnel aboard *Hi'ialakai* will communicate with PIFG cooperative fishing vessels, ensuring survey efforts are coordinated in a manner which minimizes any operational interference. While not expected, *Hi'ialakai* may be called upon to offer logistical assistance to the PIFG vessels in terms of bait or sample transfer, etc. Such request for assistance should not impact *Hi'ialakai* operations and should be responded to at the discretion of the Commanding officer in consultation with the Project Leader and Science Advisor.

Snorkeling Operations

All snorkeling shall be conducted in accordance with the NOAA Scientific Diving Manual (Section 4.13).

Snorkeling operations are not planned for this project.

Small Boat Operations

Per OMAO Supplement to the NOAA Small Boat Standards and Procedures Manual, March 2010, Section 4.03a2, a program certified Operator in Charge (OIC) must "earn the full confidence of both the Commanding Officer (CO) and Designated Examiner (DE) and has successfully completed the shipboard training requirements." As part of any OIC evaluation, it is understood that a small boat OIC will be designated to accompany and evaluate an OIC-in-training. This may limit the number of small boats the ship can deploy during this evaluation period, but every effort will be made to limit any impact to operations. An OIC-in-training is not guaranteed to be qualified by the CO and DE during a project.

Small boat deployment and recovery operations from a ship at sea are inherently dangerous. Experience levels of all personnel involved and environmental conditions are limiting factors regarding the decision to proceed with said operations. Proficiency levels of deck officers, deck department, or small boat crews may impact operations. All small boat crewmembers must have the full confidence of the CO and DE. At any time, the CO may call for a halt to boat deployment and recovery operations. If indicated, a Safety Stand Down, extra training or practice may be required to begin operations again. This is especially true when the ship has been in port or when program personnel have not been aboard for an extended period of time, as well as when boat operations are called for within 48 hours of departure.

While minimizing impact to science operations, ship's diver/coxswain training and proficiency regulations may require the use of a ship's small boat during an extended project. The CO will work with the Project Leader to plan and minimize impacts to fulfill such requirements.

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: Poor weather and sea conditions, equipment failure, safety concerns, and/or unforeseen circumstances, may alter or prohibit operations as planned. At these times, the Project Leader and Commanding Officer will determine the appropriate plan of action, consulting with the Science Advisor as necessary.

NMFS employees are not exempt from the requirements of the Marine Mammal Protection Act (MMPA) or the Endangered Species Act (ESA). PIFSC has developed mitigation measures for its fisheries and ecosystem research projects to avoid take and to comply with the Lecky, Murawski, and Merrick guidance. A copy of these documents is available at https://sites.google.com/a/noaa.gov/pifsc-science-operations/nepa-permits/protected-species-mitigation-measures and on the ship's bridge.

1. "Take" of Protected Species

    a. Under the MMPA and ESA it is unlawful to take a protected species. The MMPA defines take as "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." An incidental take is one that is incidental to, but not the purpose of, otherwise lawful activities.

    b. In the event of an incidental take of a marine mammal or federally listed threatened or endangered species during the project, the Project Leader will report the incident to the ship's Commanding Officer then the PIFSC Director and Deputy Director IMMEDIATELY via IRIDIUM, INMARSAT, and email. Samples should not be collected from any incidentally taken marine mammals, sea turtles, or seabirds.

    c. PIFSC has developed mitigation measures for its fisheries and ecosystem research cruises to avoid take and comply with the Lecky, Murawski, and Merrick guidance. A copy of these documents is available

at https://sites.google.com/a/noaa.gov/pifsc-science-operations/home/nepa-permits/protected-species-mitigation-measures and on the ship's bridge.

2. Activities in the Hawaiian Islands Humpback Whale National Marine Sanctuary

   a. The humpback whale season in Hawaii is November through May.

   b. Unless otherwise authorized under the MMPA and ESA, it is unlawful to approach, or cause a vessel or other object to approach, within 100 yards of any humpback whale within the Sanctuary. Please reference the complete list of prohibited activities and boundary maps at https://sites.google.com/a/noaa.gov/pifsc-science-operations/nepa-permits/protected-species-mitigation-measures. A copy of these materials will also be available on the ship's bridge.

III. Equipment

A. Equipment and Capabilities Provided by the Ship

1. **Equipment:** To successfully meet the project objectives, the scientific compliment aboard will need the ship to provide the items listed below. Prior to sailing, the ship's crew will inspect these items to ensure they are in proper working order for the project:

   - Operational Scientific Computing System (SCS)
   - Acoustic Doppler Current Profiler (ADCP)
   - ThermoSalinoGraph (TSG)
   - Sea Surface Sound Velocity (SSSV)
   - 30-ft Metal Shark launch (HI-1) or 26-ft Ambar launch (HI-2)
   - Adequate fresh water for gear and small boat wash-down
   - Aft deck crane
   - A-frame (for small boat cradle access)
   - J-frame (starboard), block, winch/capstan (as secondary gear recovery option)
   - Stainless steel deck-cabinets (4)
   - Scientific freezer, with or without shelving, (-30°C to -20°C)
   - Wet Lab faucets and drains
   - Iridium phone
   - Coolers and ice for food and water on small boats
   - GPS navigational system
   - Depth sounders and recorders

- Wet Lab faucets and drains
- Gasoline storage tank
- Sea Catch Toggle Release (or similar)
- Grapple and heaving line for recovering survey equipment
- Trackpoint II Ultrashort Baseline Acoustic Tracking System

2. **Capabilities:** It is requested that the ship provide the following:

   a. A calibrated and fully operational Trackpoint II Ultrashort Baseline Acoustic Tracking System. (If possible.)

   b. A Survey Technician that is available 8 hours per day to conduct Frankenframe deployments/recoveries and operate the Trackpoint II Ultrashort Baseline Acoustic Tracking System.

   c. A coxswain for one of the program SAFE Boats to support daily MOUSS operations.

   d. A jet boat coxswain to support a single shore-to-ship transfer for two scientists joining in Maui, as well as to potentially support unforeseen operational needs of the MOUSS boats in the field (not anticipated).

   e. Permission for Scientists to ready scientific work spaces (e.g., set up data computers) prior to departure.

   f. Assistance from the ship's Deck Department in craning and staging large gear during loading and off-loading.

   g. Support from the Engineering and Deck departments prior to sailing to transfer 1.5 kL (400 gallons) of program-provided gasoline into the ship's stainless steel fuel tank to be used as outboard engine fuel. The gasoline will be delivered by truck to be pumped directly into the deck tank.

   h. Support from the Engineering department to fuel small boats daily after operations.

B. Equipment and Capabilities Provided by the Scientists

1. **Equipment**: The program's full equipment list is presented in *Appendix 7* (attached file).

2. **Capabilities**: In addition to scientific expertise, the program will provide an experienced coxswain for at least one SAFE Boat and routine boat and outboard engine maintenance.

IV. Hazardous Materials

A. Policy and Compliance

The Project Leader 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 of Hazardous Materials

See *Appendix 8*.

C. Chemical Safety and Spill Response Procedures

See *Appendix 9*.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

Supplementary (piggyback) and ancillary projects are secondary to the objectives of the project and should be treated as additional investigations. The difference between the two types of secondary projects is that an ancillary project does not have representation aboard and is accomplished by the ship's force.

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***

1. OMAO Data

2. Program Data - *Under Development*
The project will follow the current PIFSC data management plans, which comply with NOAA requirements. Contact Nori Shoji (noriko.shoji@noaa.gov), PIFSC Science Operations Division Lead, for PIFSC data policy updates.

B. **Responsibilities:** ***Under Development***

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. **Pre-Project Meeting:** The Project Leader, Science Advisor 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 Project Leader 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 conducting 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 Project Leader, Science Advisor and members of the scientific party and is normally arranged by the Operations Officer and Project Leader.

D. **Project Evaluation Report:** Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Project Leader. The form is available at http://www.omao.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 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 three times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Packed lunches will be required for scientists on all full-day small boat operations. 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 Project Leader. The Project Leader 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 Project Leader 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 Project Leader 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 Project Leader will ensure that all non NOAA or non Federal scientists aboard also have proper orders. It is the responsibility of the Project Leader 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 (03-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Project Leader 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 form should be sent to the Regional Director of Health Services at Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information 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 – Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

Prior to departure, the Project Leader 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

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. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats with chin straps are also 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 program when required.

All scientists will comply with standing safety regulations of PIFSC and that of the vessel's standing orders from the Commanding Officer:

NOAA Ship* Hi'ialakai *Working Rules (01 August 2015):

1.20 FOOTWEAR
For the purpose of promoting safety, proper footwear shall be worn at all times outside an individual's own stateroom except when in the immediate process of changing shoes (such as changing from dive boots to other suitable footwear when exiting one of the small boats).

Closed-toe footwear with a heel retainer shall be worn on the weather decks during all operations including loading and unloading small boats as addressed in Ship Specific Instruction 1701-06-HA Personal Protection Equipment. Use common sense regarding the wearing of sandals and "flip-flops" aboard ship under any circumstances, underway or in port. This style of footwear is substantially less suitable and less safe aboard ship than more protective styles.

Inside the house of the ship:
Open-toed shoes may be worn by program personnel and off-duty ship's personnel in the lounge (except during meal hours), passageways, and to, at, and from smoking areas. Open-toed shoes include flip flops in good repair, which fit properly, have good traction, and provide coverage for the sole of the foot.

Outside the house of the ship and on weather decks:
Open-toed shoes are not permitted except when the wearer is in the immediate process of embarking or disembarking the ship via the gangway. Sandals such as certain varieties of Keen brand shoes are popular among ship's personnel are permitted as they provide (1) very significant coverage of the toes, (2) a heel retainer, (3) traction on a wet platform, and (4) lateral stability for the foot. Flip-flops, Birkenstocks, Crocs, etc., which do not provide significant coverage of the toes, traction

when wet, or much lateral stability are not suitable for wear outside the house of the ship and on weather decks. Dive boots are acceptable. Shoes will be in reasonable repair, fit properly, and provide coverage for the sole of the foot. No flip-flops will be worn by crew or scientific personnel while alongside and loading or unloading gear.

D. Communications

A progress report on operations prepared by the Project Leader may be relayed to the program office. Sometimes it is necessary for the Project Leader to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Project Leader. 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.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO 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.

4. Provide the Electronics Technician with a spreadsheet of the following information:

Device	Name	Operating System	LAN MAC Address
Laptop	*Scientist*	*Windows 7*	*23:34:6K:P8:M6:77*

Completion of these 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 prior to embarking. Arrangements to take the Course and/or achieve

security clearance for any non-NOAA computers should be coordinated with PIFSC administration well in advance of the project.

F. Foreign National Guests Access to OMAO Facilities and Platforms

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

IX. APPENDICES

Appendix 1: Operating Area for HA-16-01: MOUSS Testing Locations

Appendix 2: Operating Area for HA-16-01: Potential MOUSS Sampling Locations

Appendix 3: Station/Waypoint List (Latitude, Longitude: Degree-Minutes) *(Attached File)*

Appendix 4: Standard Operating Procedures for the Deployment and Recovery of a Modular Optical Underwater Survey System (MOUSS) from a 19' SAFE Boat *(Attached File)*

Appendix 5: Standard Operating Procedures for the Deployment and Recovery of an Untethered BotCam-MOUSS Tandem System (Frankenframe) Using a Crane *(Attached File)*

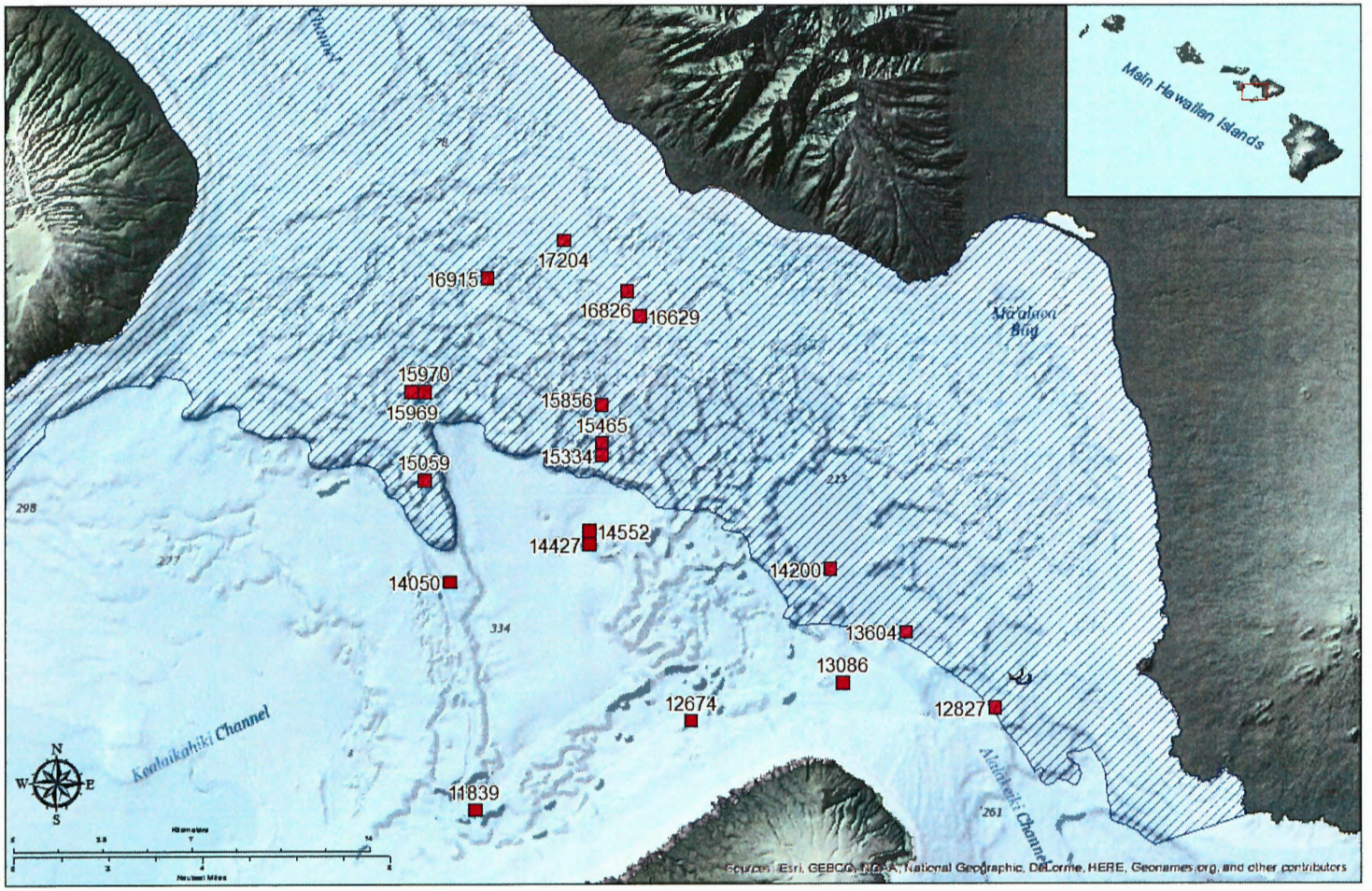
Appendix 6: Operating Area for Concurrent PIFG Fishing Efforts

Appendix 7: Program Equipment List *(Attached File)*

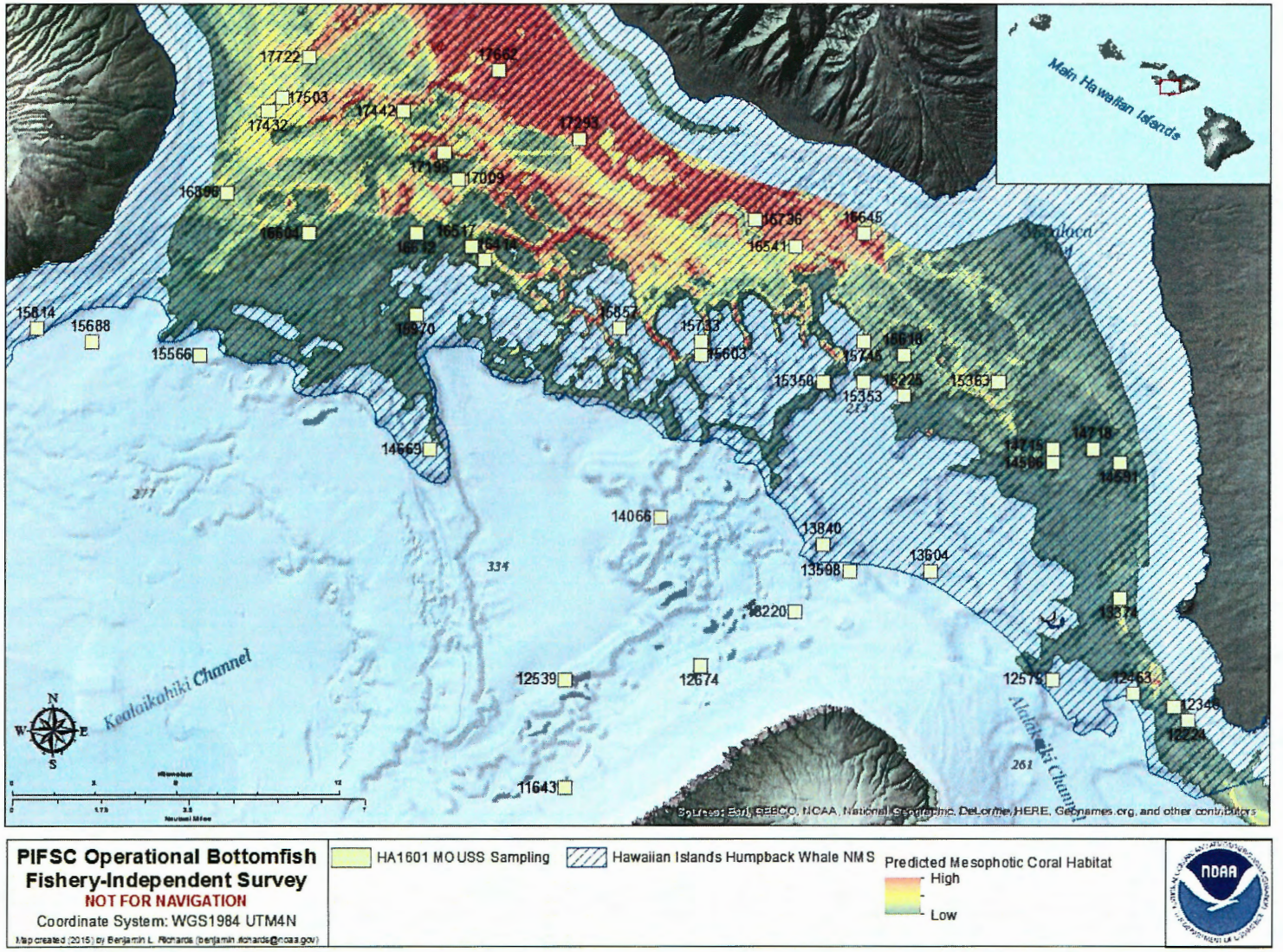
Appendix 8: Section IV.B. Hazardous Materials Inventory

Appendix 9: Section IV.C. Chemical Safety and Spill Response Procedures

Appendix 1: **Operating Area for HA-16-01: MOUSS Testing Locations**



Appendix 2: **Operating Area for HA-16-01: Potential MOUSS Sampling Locations**



Appendix 3: Station/Waypoint List (Latitude, Longitude: Degree-Minutes)

(Attached File)

HA-16-01 MOUSS Testing Sites

Island	Cell_ID	hab	Depth_m	Strata	utm_x	utm_y	lat_deg	lon_deg	LAT-d m.mm	LONG-d m.mm	Rank
Maui Nui	14427	HB_H	-199.3	HB_H_S	743797.1	2288857	20.6832987	-156.65959	20 40.9979220	-157 39.5751539	1
Maui Nui	16629	HB_L	-85.42	HB_L_S	745797.1	2297857	20.7642911	-156.63914	20 45.8574660	-157 38.3483219	2
Maui Nui	15465	HB_H	-145.24	HB_H_S	744297.1	2292857	20.7193469	-156.65423	20 43.1608140	-157 39.2539979	3
Maui Nui	15856	HB_H	-154.52	HB_H_S	744297.1	2294357	20.7328894	-156.65402	20 43.9733640	-157 39.2414760	4
Maui Nui	12827	HB_L	-164.1	HB_L_S	759797.1	2282357	20.6224669	-156.50705	20 37.3480139	-157 30.4231199	5
Maui Nui	14552	HB_H	-228.11	HB_H_M	743797.1	2289357	20.6878129	-156.65952	20 41.2687740	-157 39.5709959	6
Maui Nui	14200	HB_L	-226.34	HB_L_M	753297.1	2287857	20.6730087	-156.56859	20 40.380522	-157 34.1155140	7
Maui Nui	14050	HB_H	-239.84	HB_H_M	738297.1	2287357	20.6704643	-156.71256	20 40.2278579	-157 42.7533600	8
Maui Nui	13086	SB_L	-132.73	SB_L_S	753797.1	2283357	20.6323158	-156.56444	20 37.938948	-157 33.866592	9
Maui Nui	15970	HB_H	-148.62	HB_H_S	737297.1	2294857	20.7383072	-156.72114	20 44.2984320	-157 43.2682259	10
Maui Nui	15059	HB_H	-161.92	HB_H_S	737297.1	2291357	20.7067066	-156.72161	20 42.402396	-157 43.2965999	11
Maui Nui	15969	HB_L	-115.68	HB_L_S	736797.1	2294857	20.7383708	-156.72594	20 44.3022479	-157 43.5561539	12
Maui Nui	16826	SB_L	-77.96	SB_L_S	745297.1	2298857	20.7733852	-156.6438	20 46.403112	-157 38.6278859	13
Maui Nui	16915	HB_L	-104.17	HB_L_S	739797.1	2299357	20.778616	-156.69653	20 46.71696	-157 41.7916380	13
Maui Nui	12674	HB_L	-118.41	HB_L_S	747797.1	2281857	20.6195757	-156.62219	20 37.1745419	-157 37.3316819	15
Maui Nui	17204	HB_L	-77.77	HB_L_S	742797.1	2300857	20.7917696	-156.66752	20 47.5061759	-157 40.0511580	15
Maui Nui	13604	HB_L	-187.9	HB_L_S	756297.1	2285357	20.6500312	-156.54018	20 39.001872	-157 32.4106920	17
Maui Nui	15334	HB_H	-152.09	HB_H_S	744297.1	2292357	20.7148327	-156.6543	20 42.8899619	-157 39.2581680	17
Maui Nui	11839	HB_H	-224.39	HB_H_M	739297.1	2278357	20.589078	-156.70418	20 35.34468	-157 42.2509319	19

HA-16-01 MOUSS Sampling Sites

Island	Cell_ID	hab	Depth_m	Strata	utm_x	utm_y	lat_deg	lon_deg	LAT-d m.mm	LONG-d m.mm	Rank
Maui Nui	11643	HB_L	-119.83	HB_L_S	742797.1	2277357	20.5796007	-156.67076	20 34.776042	-157 40.2456599	*
Maui Nui	12224	SB_H	-57.35	SB_H_S	765797.1	2279857	20.5990591	-156.4499	20 35.9435460	-157 26.9937480	*
Maui Nui	12346	SB_L	-75.75	SB_L_S	765297.1	2280357	20.6036433	-156.45461	20 36.2185980	-157 27.2768580	*
Maui Nui	12463	SB_H	-181.23	SB_H_S	763797.1	2280857	20.6083682	-156.46892	20 36.5020920	-157 28.135254	*
Maui Nui	12539	HB_H	-211.73	HB_H_M	742797.1	2281357	20.615715	-156.67021	20 36.9429000	-157 40.2127259	*
Maui Nui	12575	SB_H	-176.93	SB_H_S	760797.1	2281357	20.6133009	-156.49761	20 36.7980539	-157 29.8566419	*
Maui Nui	12674	HB_L	-118.41	HB_L_S	747797.1	2281857	20.6195757	-156.62219	20 37.1745419	-157 37.3316819	*
Maui Nui	13220	SB_H	-210.08	SB_H_M	751297.1	2283857	20.6371664	-156.58835	20 38.2299840	-157 35.3008319	*
Maui Nui	13374	SB_L	-70.08	SB_L_S	763297.1	2284357	20.6400336	-156.47319	20 38.4020159	-157 28.3915860	*
Maui Nui	13598	HB_L	-172.01	HB_L_S	753297.1	2285357	20.6504391	-156.56895	20 39.026346	-157 34.1370719	*
Maui Nui	13604	HB_L	-187.9	HB_L_S	756297.1	2285357	20.6500312	-156.54018	20 39.001872	-157 32.4106920	*
Maui Nui	13840	HB_L	-175.27	HB_L_S	752297.1	2286357	20.6596019	-156.5784	20 39.5761139	-157 34.7039520	*
Maui Nui	14066	HB_H	-182.96	HB_H_S	746297.1	2287357	20.6694288	-156.63581	20 40.1657279	-157 38.1486839	*
Maui Nui	14586	HB_L	-90.09	HB_L_S	760797.1	2289357	20.6855197	-156.49643	20 41.131182	-157 29.7856800	*
Maui Nui	14591	SB_L	-72.78	SB_L_S	763297.1	2289357	20.6851694	-156.47245	20 41.110164	-157 28.3467780	*
Maui Nui	14669	SB_L	-154.69	SB_L_S	737797.1	2289857	20.6930998	-156.71702	20 41.5859879	-157 43.0209000	*
Maui Nui	14715	SB_L	-87.75	SB_L_S	760797.1	2289857	20.6900333	-156.49635	20 41.401998	-157 29.7812340	*
Maui Nui	14718	SB_L	-90.52	SB_L_S	762297.1	2289857	20.6898235	-156.48196	20 41.38941	-157 28.9178640	*
Maui Nui	15225	HB_H	-147.81	HB_H_S	755297.1	2291857	20.7088476	-156.54883	20 42.5308559	-157 32.9296020	*
Maui Nui	15350	HB_L	-144.99	HB_L_S	752297.1	2292357	20.7137691	-156.57754	20 42.826146	-157 34.6523519	*
Maui Nui	15353	HB_H	-179.88	HB_H_S	753797.1	2292357	20.7135659	-156.56315	20 42.8139539	-157 33.7887899	*
Maui Nui	15363	HB_L	-93.5	HB_L_S	758797.1	2292357	20.7128797	-156.51517	20 42.7727819	-157 30.9103379	*
Maui Nui	15566	HB_L	-216.2	HB_L_M	729297.1	2293357	20.7257641	-156.79812	20 43.545846	-157 47.8870139	*
Maui Nui	15603	HB_H	-162.07	HB_H_S	747797.1	2293357	20.7233997	-156.62058	20 43.4039820	-157 37.2346259	*
Maui Nui	15618	HB_L	-112.78	HB_L_S	755297.1	2293357	20.7223891	-156.54861	20 43.3433460	-157 32.9165219	*
Maui Nui	15688	SB_L	-218.22	SB_L_M	725297.1	2293857	20.730766	-156.83644	20 43.8459599	-157 50.1865740	*
Maui Nui	15733	HB_H	-180.85	HB_H_S	747797.1	2293857	20.7279137	-156.62051	20 43.6748219	-157 37.2303900	*
Maui Nui	15745	HB_H	-147.09	HB_H_S	753797.1	2293857	20.7271075	-156.56293	20 43.6264499	-157 33.7757880	*
Maui Nui	15814	HB_H	-142.14	HB_H_S	723297.1	2294357	20.7355212	-156.85558	20 44.1312720	-157 51.3345179	*
Maui Nui	15857	HB_L	-184.02	HB_L_S	744797.1	2294357	20.7328238	-156.64923	20 43.9694279	-157 38.9535719	*
Maui Nui	15970	HB_H	-148.62	HB_H_S	737297.1	2294857	20.7383072	-156.72114	20 44.2984320	-157 43.2682259	*
Maui Nui	16414	HB_L	-119.45	HB_L_S	739797.1	2296857	20.7560446	-156.69687	20 45.362676	-157 41.8121760	*
Maui Nui	16517	HB_L	-118.07	HB_L_S	739297.1	2297357	20.7606232	-156.7016	20 45.6373920	-157 42.0960360	*
Maui Nui	16541	SB_L	-75.15	SB_L_S	751297.1	2297357	20.7590433	-156.58642	20 45.5425979	-157 35.1850979	*
Maui Nui	16604	HB_L	-114.31	HB_L_S	733297.1	2297857	20.7658987	-156.75913	20 45.9539220	-157 45.5477519	*
Maui Nui	16612	HB_H	-107.84	HB_H_S	737297.1	2297857	20.7653934	-156.72073	20 45.923604	-157 43.24386	*
Maui Nui	16645	HB_L	-74	HB_L_S	753797.1	2297857	20.7632183	-156.56235	20 45.7930979	-157 33.7410600	*
Maui Nui	16736	HB_L	-69.26	HB_L_S	749797.1	2298357	20.7682729	-156.60067	20 46.096374	-157 36.04038	*
Maui Nui	16896	HB_L	-79.57	HB_L_S	730297.1	2299357	20.7798158	-156.78773	20 46.7889480	-157 47.2638779	*
Maui Nui	17009	HB_L	-107.14	HB_L_S	738797.1	2299857	20.7832589	-156.70606	20 46.995534	-157 42.3635519	*
Maui Nui	17195	HB_H	-91.96	HB_H_S	738297.1	2300857	20.7923516	-156.71072	20 47.541096	-157 42.6433919	*
Maui Nui	17293	HB_L	-69.31	HB_L_S	743297.1	2301357	20.7962184	-156.66265	20 47.773104	-157 39.7589639	*
Maui Nui	17432	HB_L	-64.77	HB_L_S	731797.1	2302357	20.8067166	-156.77293	20 48.4029960	-157 46.3759559	*
Maui Nui	17442	HB_H	-80.62	HB_H_S	736797.1	2302357	20.8060863	-156.72492	20 48.365178	-157 43.4953020	*
Maui Nui	17503	HB_L	-65.37	HB_L_S	732297.1	2302857	20.8111687	-156.76806	20 48.670122	-157 46.0838940	*
Maui Nui	17662	HB_L	-61.6	HB_L_S	740297.1	2303857	20.8191797	-156.69111	20 49.150782	-157 41.4665279	*
Maui Nui	17722	HB_L	-68.57	HB_L_S	733297.1	2304357	20.8245867	-156.75826	20 49.4752020	-157 45.4957200	*

Appendix 4: **Standard Operating Procedures for the Deployment and Recovery of a Modular Optical Underwater Survey System (MOUSS) from a 19' SAFE Boat.**

(Attached File)

Appendix 5: **Standard Operating Procedures for the Deployment and Recovery of an Untethered BotCam-MOUSS Tandem System (Frankenframe) Using a Crane.**

(Attahced File)

Standard Operating Procedures for the Deployment and Recovery of a Modular Optical Underwater Survey System (MOUSS) from a 19' SAFE Boat

Background

The Modular Optical Underwater Survey System (MOUSS) was developed for *in-situ* visual sampling of fish assemblages as an amelioration to the Bottomfish Camera (BotCam) and to continue the collaboration between the NOAA Pacific Islands Fisheries Science Center (PIFSC), NOAA Office of Science and Technology and the University of Hawai'i. The self-contained stereo-video camera module is rated to 500 m and allows for identification, enumeration, and measurement of individual fish and habitat at a range of 0.5-10 m. In Hawaiian waters, the system can effectively identify individuals to a depth of 250 m using only ambient light.

Project Overview

The NOAA PIFSC Science Operations Division (SOD) Advanced Sampling Technologies and Survey Program will conduct baited MOUSS deployments/recoveries from two 19' SAFE Boats, each crewed with four personnel. Acceptable working conditions are limited by small boat capabilities, so work will be contingent upon day-to-day weather conditions and review of the Operational Risk Assessment (GAR evaluation). To avoid potential risks due to operating during rough weather we will restrict acceptable working conditions to swells <7 feet, seas <3 feet, wind <20 knots, and current <1.5 knots.

Eight to ten (15 minute bottom-time) MOUSS deployments per SAFEBOAT per day are planned. The actual number of MOUSS deployments possible will vary each day with weather conditions and distance traveled to reach the deployment sites. It is anticipated that these expectations may be adjusted somewhat as the MOUSS project becomes fully operational. Additionally, sufficient time for daily downloading of video data between SAFEBOAT excursions is required; however, overnight downloads are anticipated to be adequate.

MOUSS Equipment Overview

The MOUSS system will be deployed ~4 m above the bottom using the weight and buoy system (Figure 1). The complete set-up consists of the MOUSS unit (Figure 2) with stereo-video camera system (2 cameras, 1 DVR bottle, 1 battery bottle, and power cables), 2 sub-surface buoys (Figure 3), bait arm with cage (Figure 4), surface line with 2 surface buoys (Figure 5), weight, and bottom line with weak link (Figure 6). The system is tethered to the bottom using a weight sufficient to counteract the floatation of the buoys above and to maintain the intended deployment position. Two sub-surface buoys are attached above the system giving enough positive floatation to counteract the weight of the MOUSS unit but not more than the weight. The system is deployed such that the weight is the only point of contact with the bottom habitat and the cameras float above the bottom oriented with the current. Should the weight become entrapped, the weak link on the bottom line between the weight and MOUSS unit should break and allow for recovery of the MOUSS system.

Deployment/recovery of the MOUSS system will utilize a high-speed electric pinch puller (Waterman Industries Trap Hauler, 1hp; 228 lbs deadlift – 3/16" line) mounted on the davit on

the forward starboard side of the SAFE Boat. (Note: A different placement of the davit would require significant changes to this SOP.) The pinch puller is controlled with a foot switch, and can be operated in two directions –either forward (pulling line in) or reverse (pushing line out). While operating the pinch puller, care must be taken to avoid entangling equipment or personal items (i.e. clothing hair, etc.) in the line or wrapping the line around the hand or fingers. Step-by-step instructions for deployment and recovery of the MOUSS system are found beginning on page 7.

To deploy the MOUSS system, the weight (~70 lbs) with attached bottom line is lifted overboard and secured alongside the SAFE Boat (in the water). Next, the sub-surface buoys, surface line, and surface buoys are attached to the MOUSS unit. The MOUSS package (~75 lbs) is lifted using the pinch puller and all is transferred over the side. The weight is then attached to the MOUSS unit using the bottom line. Finally the entire package is released.

After a minimum 15 minute bottom-time, the MOUSS system is recovered. First, the surface buoys are grappled using a boat hook; the surface line is pulled in using the pinch puller, eventually lifting the MOUSS up onto the davit. The weight is then secured alongside the SAFE Boat, the MOUSS unit brought onboard, and finally the weight is recovered using the pinch puller.

The equipment required for MOUSS deployment/recovery includes:

1) The MOUSS unit
2) The accessories that are attached to the MOUSS during deployment (i.e. bait arm, weight, bottom line with hardware, sub- surface buoys, and surface line with surface buoys)
3) The equipment on the boat that is required to deploy and recover the MOUSS (i.e. davit and pinch puller, release and retrieval lines, boat hook with clip)

MOUSS Unit

- MOUSS frame
- DVR bottle
- (2) Cameras with lens covers
- Battery bottle
- Power cables to connect cameras to DVR (2), and DVR to battery (1)
- Harness

MOUSS Accessories (attached during deployment)

- Bait arm (PVC) with plastic bait cage and metal clip
- (2) Sub-surface buoys
- Bottom line with weak link and hardware (blue clip, yellow ring, green loop) for connecting MOUSS unit to weight
- 60-70 lb. weight
- (2) Surface floats –large red and small yellow

- Surface line (450ft, 800ft, and 1200ft lengths) in line bins –with surface floats connected
- Optional Conductivity, Temperature, Depth (CTD) Sensors (i.e. SeaBirds, Aquadopp, etc.)

Boat Equipment (for MOUSS deployment/recovery)

- Davit arm with pinch puller and two-way foot switch
- Battery bank (2 batteries) in waterproof box
- Black line with quick-release clip for deploying MOUSS unit
- Blue weight release line
- Green weight retrieval line
- Boat hook with clip and yellow line for weight retrieval

Other Equipment Onboard

- Cooler with bait
- Bucket to hold bait arms
- Rubber mats to protect deck and sponsons

Table 1. Dimensions and weight of equipment onboard each SAFE Boat.

Equipment	Dimensions (inches)	Weight (lbs)	# Onboard	Total weight
MOUSS frame	18.5 x 8.5 x 40.4	20.5	2	41
DVR bottle	5.25 diameter x 14 long	13	2	26
Camera	3.5 diameter x 8 long	5.2	4	20.8
Battery bottle	4 diameter x 17 long	16	2	32
Sub-surface buoy	11 diameter	7	4	28
Surface buoy -large	14 diameter x 30 long	7	2	14
Surface buoy -small	11.5 diameter x 24 long	5.5	2	11
Surface line -450ft	21 x 15.5 x 16.5 height	15.5	2	31
Surface line -800ft	20 diameter x 22.5 height	25.5	2	51
Surface line -1200ft	20 diameter x 22.5 height	37	2	74
Bait cage	4.5 diameter x 12 long	n/a	6	n/a
Bait arm (w/ cage)	1 diameter x 35 long	1	6	6
Bait Cooler	17 x 12 x 13	20	1	20
Weight	17 x 10 x 3.5	variable 60-70	5	325
Davit arm	3.5 diameter x 52 long	58	1	58
Pinch puller	16 x 24 x 9	76	1	76
Battery bank in box	25 x 33 x 19	270	1	270
Misc. lines	n/a	10	n/a	10
Boat hook	48 long	3	1	3
Estimated total weight for all gear onboard (per SAFE Boat)				1,097 lbs.

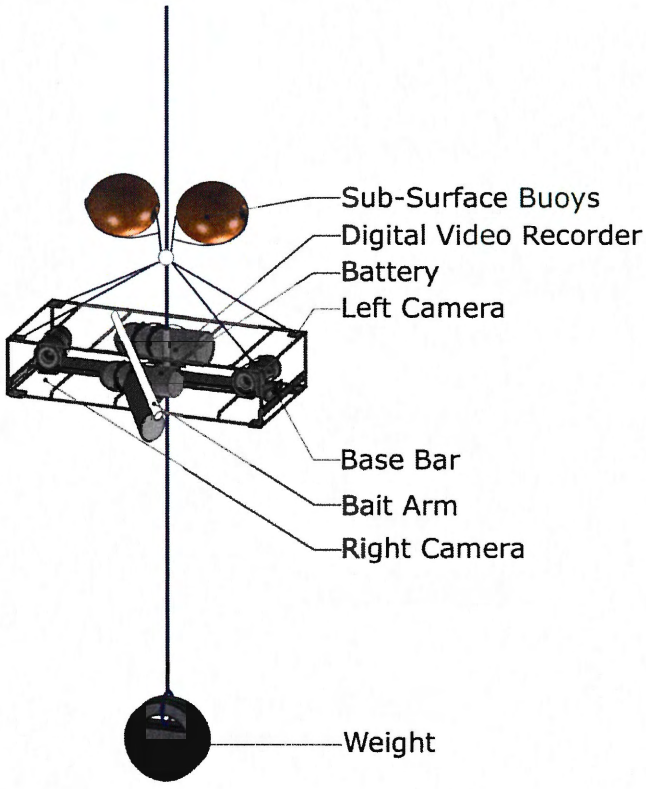


Figure 1. Diagram of the MOUSS stereo-video camera system showing the MOUSS components mounted on the base bar and a visualization of a midwater deployment with weight and sub-surface buoys.

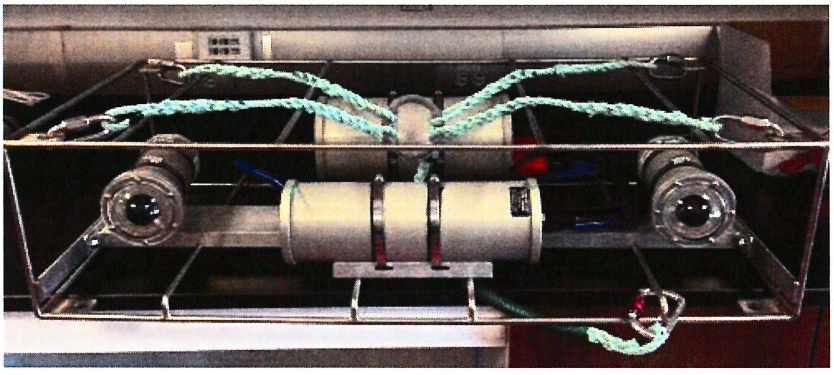


Figure 2. MOUSS unit showing frame, harness, DVR bottle (top center), battery bottle (bottom center), power cables, and two cameras.

Figure 3. Sub-surface buoys, clipped onto the MOUSS harness during deployment.

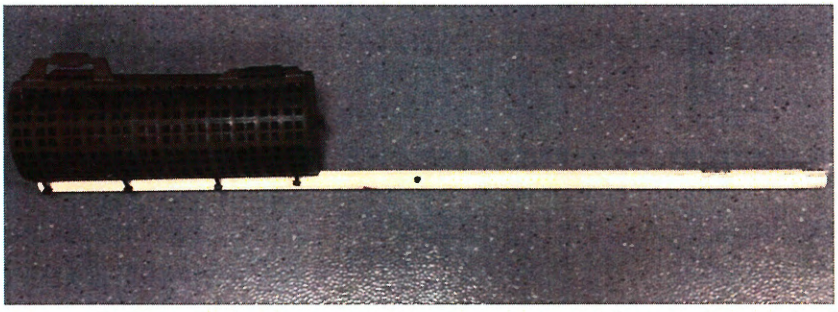


Figure 4. Bait arm with cage, clipped to MOUSS frame during deployment.

Figure 5. Surface line at lengths of 450 ft, 800 ft, and 1200 ft, stored in and deployed from line bins. One large red surface buoy and one smaller yellow surface buoy are attached to the surface line during deployment.

Figure 6. Bottom line set-up with blue clip (attaches to weight), green loop (for green line), and yellow ring (for yellow line to clip onto). The top hardware (with weak link) attaches to the bottom of the MOUSS harness (underneath the MOUSS) during deployment.

SAFE Boat SOP

We will use the same procedures for deploying and recovering the MOUSS from both SAFE Boats, *Steel Toe* and *Rubber Duck*, as detailed below. These vessels have met NOAA Small Boat Program requirements for use of load-bearing equipment (*Steel Toe* davit SWL: 350 lbs., as configured; *Rubber Duck* davit SWL: 300 lbs., as configured). The deck configurations of the two small boats are similar, with the davit arm positioned forward on the starboard bow (Figure 7). This allows the davit operator to maneuver clear of the davit arm, and the coxswain to maintain full view of the deck. The line bins containing surface lines and the surface and sub-surface buoys are secured to the port rail (Figure 8), the bait cooler and bucket with bait arms are stowed just forward of the davit (Figure 9), and the weights are positioned near the cutout. The MOUSS units are stowed on top of the battery box (Figure 10). To help avoid injury, all staff must wear appropriate PPE (i.e. PFDs, gloves, eye protection) while conducting small boat MOUSS operations.

Maintaining stability of the SAFE Boats at all times is critical to the safety and success of the project, so steps will be taken to mitigate potential risks. To control boat stability during MOUSS deployment/recovery the coxswain will keep the bow positioned into – and avoid going "beam-to" – the prevailing seas. During MOUSS recovery, there is potential for the MOUSS unit (or the weight or line) to become "hung up" on the substrate (i.e. rock overhangs or outcroppings). If this were to occur while hauling in line on the pinch puller, there is a chance the small boat could overturn (e.g. submerging the starboard rail/flipping the port rail over). In the event that the "hang-up" occurs at the weight, we anticipate that the weak link on the bottom line should break and free the MOUSS unit. However, if it is the MOUSS frame that becomes stuck, quick action will be required to avoid a dangerous tipping/overturning scenario. The davit operator must be prepared to quickly reverse directions with the foot switch (Figure 11) when retrieving the line using the pinch puller, or, as a last resort, the line may be cut with a safety knife. To help mitigate the likelihood of such a scenario, the coxswain should be careful

to maintain the boat position and line angle least-likely to cause "hang-ups" and the davit operator should maintain awareness of line tension or labored pinch puller noise during MOUSS recovery.

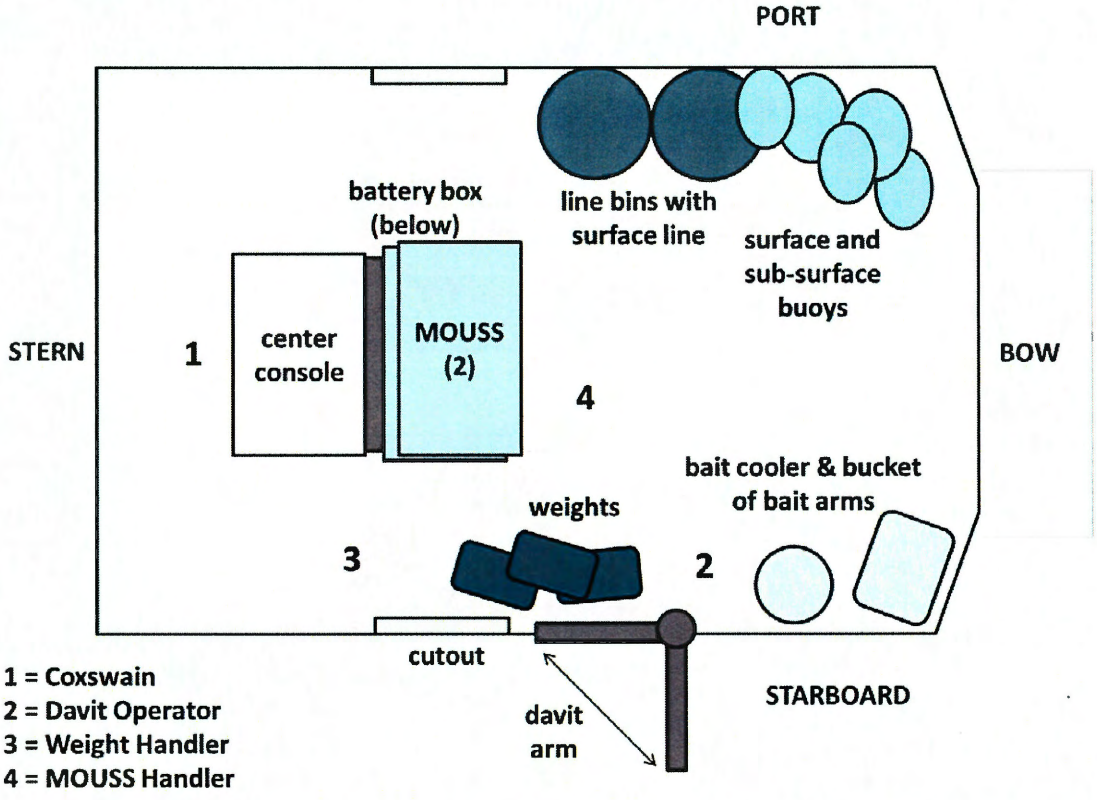


Figure 7. Diagram showing arrangement of equipment on the deck and positions of the four staff aboard the SAFE Boat.

Figure 8. The line bins containing the surface lines and surface buoys secured along the port rail.

Figure 9. The bait cooler and bucket of bait arms.

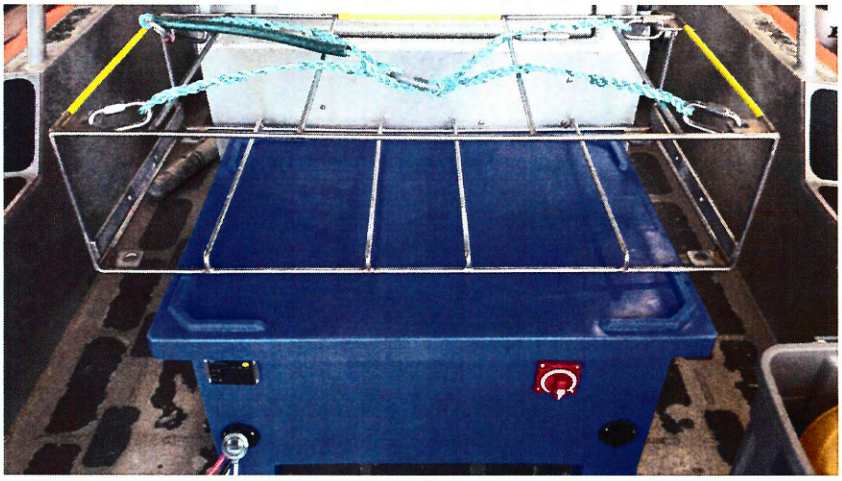


Figure 10. The battery box with MOUSS frame on top (two MOUSS units will be stacked on the box during actual operations).

Figure 11. The foot switch for the pinch puller with buttons for UP (right side) and DOWN (left side).

Staff Roles

Teams of ***four*** staff are required to deploy and recover the MOUSS from a 19' SAFE Boat. The four roles are 1) **Coxswain**, 2) **Davit Operator**, 3) **Weight Handler**, and 4) **MOUSS Handler**.

1. The **Coxswain** operates the boat with few other duties besides communicating with the team to properly time the accurate release and safe recovery of the MOUSS.
2. The **Davit Operator** controls the pinch puller using the foot switch and handles the initial release of the MOUSS using the quick release during deployment. The Davit Operator also handles the line during MOUSS recovery and retrieves the weight using the pinch puller. The Davit Operator also secures the surface buoys during MOUSS recovery.
3. The **Weight Handler** lifts the weight overboard and controls the release of the weight during MOUSS deployment. The Weight Handler also helps moves the MOUSS into the cutout during MOUSS deployment. During MOUSS recovery, the Weight Handler transfers the weight back to the boat with the boat hook and line with clip, and transfers the weight onto the line for the pinch puller to lift. The Weight Handler also records the data for each deployment.
4. The **MOUSS Handler** attaches the bait arm, the sub-surface buoys and surface line (with surface buoys) to the MOUSS and connects the battery to the DVR to start the cameras before MOUSS deployment. The MOUSS Handler also helps moves the MOUSS into the cutout during deployment, and picks up the line and surface buoys during MOUSS recovery.

Staff Responsibilities

Successfully deploying and recovering the MOUSS will require ***careful coordination and communication*** between each of the four staff.

MOUSS Deployment:

1. Upon locating the desired deployment site, the **Coxswain** moves the boat to within an appropriate distance of the deployment site given conditions (example: calm – close to the site; rough –at least 500 ft upcurrent) and holds position while the rest of the team readies the MOUSS for deployment.
2. The **MOUSS Handler** checks to make sure the circuit breaker and switch on the battery box are on. Then the **MOUSS Handler** connects 1) two sub-surface buoys, 2) the surface line (with attached surface buoys) and 3) the black line with quick-release clip to the MOUSS harness center ring. The **Davit Operator** feeds the tail end of the black line through the pinch puller, taking up any slack.
3. The **Weight Handler** connects the bottom line to the weight with the blue clip and feeds the blue weight release line through the blue clip.
4. The **Weight Handler** cleats off the blue weight release line, then manually lifts and pushes the weight overboard at the cutout (a rubber mat is attached to the boat to protect the sponsons from chaffing), "hanging the weight" from the blue weight release line. The other end of the bottom line stays on the boat.
5. The **MOUSS Handler** removes the lens covers from the cameras and starts camera recording by removing the dummy plugs and connecting the DVR bottle and battery

bottle with the battery cord. The **MOUSS Handler** checks for the blinking green light to make sure the cameras are recording, then performs a hand signal in front of the cameras as a "sync" action.

6. The **MOUSS Handler** and **Weight Handler** manually lift the MOUSS into the cutout with the **Davit Operator** taking up any slack in the line with the pinch puller.
7. While the **MOUSS Handler** holds the MOUSS steady, the **Weight Handler** attaches the other end of the bottom line to the MOUSS harness (on the clip underneath the MOUSS). The **MOUSS Handler** also attaches the pre-baited bait arm to the MOUSS, securing it with the bait clip.
8. While communicating actions with the team, the **Coxswain** moves the boat closer to the deployment site (example: 100 ft, then countdown 80 ft, 60 ft, etc.). The **Davit Operator** uses the pinch puller to lift the MOUSS up off the cutout and swings the davit arm out so that the MOUSS is suspended over the water.
9. The **MOUSS Handler** moves the line bin of surface line close to the cutout, and the **Davit Operator** lower the MOUSS unit to the water line.
10. The **Coxswain** alerts the **Davit Operator** that the boat is over the deployment site (within 30 ft) and the **Davit Operator** communicates with the team to ensure that everyone is ready, and upon hearing an affirmative response, pulls the quick release clip to deploy the MOUSS. Note: The buoyed MOUSS package is buoyant. The **Coxswain** takes a GPS point to mark the deployment site.
11. The **Weight Handler** lets out the blue line to release the weight and the MOUSS begins to sink. The **MOUSS Handler** ensures that the surface line feeds freely into the water as the MOUSS sinks and the **Coxswain** moves the boat away from the deployment site. When all the surface line is out, the **MOUSS Handler** tosses the surface floats overboard, completing MOUSS deployment. The **Weight Handler** changes the mark in the GPS (deployment # and grid #) and records all data for the deployment.

MOUSS Recovery:

1. After the minimum 15 minute bottom-time has passed, the **Coxswain** returns to the deployment site and drives the boat by the surface buoys close enough that the **MOUSS Handler** can snag the surface line with the boat hook.
2. The **MOUSS Handler** pulls the surface buoys onboard and pulls in enough line that the **Davit Operator** can safely feed the slack line through the pinch puller. If there is a lot of slack line on the surface, the **MOUSS Handler** may hand-haul in the line, with the **Davit Operator** helping to feed the line into the line bin.
3. The **Davit Operator** takes the surface buoys and secures them with gear ties on the port bow (Note: DO NOT secure the buoys until after the surface line is in the pinch puller).
4. The **Davit Operator** uses the pinch puller to retrieve the surface line, feeding the line directly into the line bin placed below the pinch puller (if needed, the **MOUSS Handler** may assist). This may take several minutes depending on the length of the line deployed. Meanwhile, the **Coxswain** adjusts the position of the boat to facilitate

safe recovery of the line and MOUSS at a good angle, depending on wave and current conditions and bottom topography.

5. When the MOUSS is spotted, the **Davit Operator** slows the speed of the pinch puller, and the **Weight Handler** gets in position with the boat hook with clip and yellow line.
6. The MOUSS is lifted as high as possible out of the water without pulling the MOUSS harness into the block. As the **MOUSS Handler** steadies the MOUSS, the **Weight Handler** uses the boat hook with clip to attach the yellow line to the yellow ring on the bottom line. Then the other side of the yellow line is cleated off.
7. The **Weight Handler** pulls up the yellow line to transfer the weight's load to the boat, and unclips the bottom line from the MOUSS harness. The **MOUSS Handler** removes the bait arm and sub-surface buoys and hands them to the **Davit Operator** to stow along the port bow.
8. The **Davit Operator** then slacks the line and the **MOUSS Handler** pulls the MOUSS onboard through the cutout. Once the MOUSS is fully aboard, the **MOUSS Handler** disconnects the battery cord (stopping the cameras from recording) and replaces the dummy plugs. The surface line can also be safely disconnected at this time.
9. The **Weight Handler** feeds the green weight retrieval line through the green loop on the bottom line and hands the end of the green weight retrieval line to the **Davit Operator** to feed through the pinch puller.
10. The **Davit Operator** uses the pinch puller to lift the weight (slacking the bottom line) and the **Weight Handler** disconnects the bottom line from the weight. The **Davit Operator** uses the pinch puller to lift the weight above the cutout, then swings the davit arm inward and slowly reverses the line to bring the weight safely onboard.

Standard Operating Procedures for the Deployment and Recovery of an Untethered BotCam-MOUSS Tandem System (Frankenframe) Using a Crane (ver 092415)

1. Overview

This document describes the standard operating procedures for the deployment and recovery of an untethered BotCam-MOUSS Tandem System (Frankenframe) using a cargo crane. These procedures were developed in consultation with the Chief Boatswain of NOAA Ship *Hi'ialakai* for operations using equipment aboard that particular ship. Though many of the photos in this document were from operations aboard NOAA Ship *Oscar Elton Sette*, they depict similar/related methods to help illustrate general concepts.

2015 BotCam-MOUSS Tandem System (Frankenframe)
Size: 48" x 22" x 18" / Dry Weight 157lbs
Not pictured: Frame floats and rigging (40lbs), Acoustic Release (20lbs) and Concrete Anchors (3 x 85lbs), surface line a float/flag (8lbs)

2. Scope

This document covers deployment and recovery procedures for a BotCam-MOUSS Tandem System (Frankenframe) rigged with an expendable anchor on an acoustic release and deployed without a surface signature. The specific procedures described here for *Hi'ialakai* should be modified as appropriate when using a different platform.

3. Preparation and Deployment of Frankenframe

3.1. As necessary, shipboard echosounding and ADCP operations will be conducted concurrent with the Frankenframe pre-deployment preparations to provide reconnaissance of the target deployment site and water column currents. Note: Deployment sites should be clear of slopes

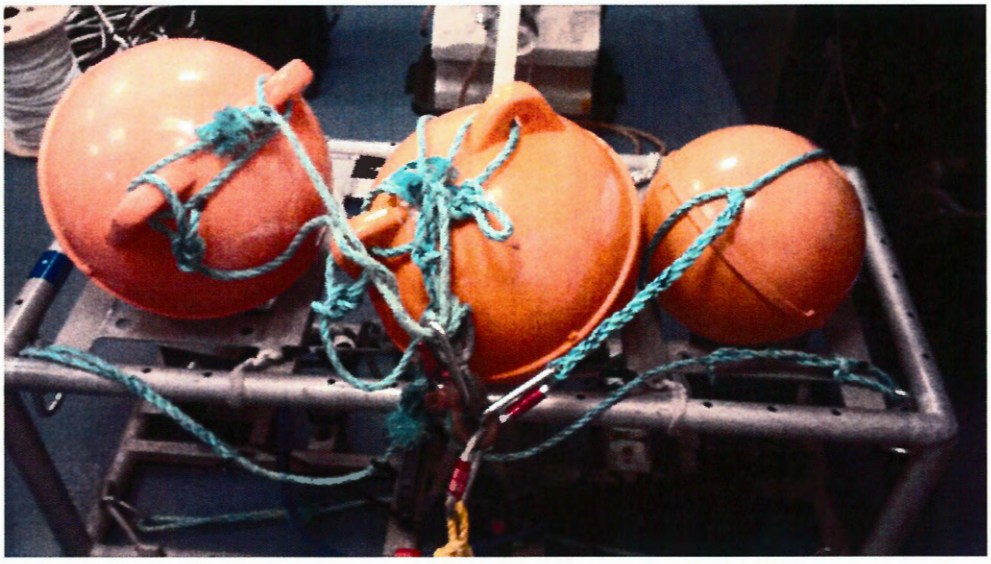
and ledges. The Frankenframe should NOT be deployed in areas where there is a chance that it would land/drag deeper than 300 meters.

3.2. Prior to staging equipment for deployment, the Survey Technician (ST) and/or participating scientist(s) will ensure that all BotCam and MOUSS batteries are charged and pressure housings are sealed for all components. (An operational checklist has been developed and should be used to assist in equipment preparation.)

3.3. The entire package (Frankenframe with floats, bait arm, concrete anchors, acoustic release, recovery line with float and flag, SeaCatch Toggle Release with lanyard, tag lines) should be staged in the vicinity of the cutout doors, ensuring there is enough room to swing the doors open for deployment.

3.4. On deck, the expendable anchor (3 concrete blocks) will be attached to the Frankenframe's acoustic release (AR) unit.

3 Concrete Blocks (2 blocks pictured here for demonstration) are attached to an Acoustic Release (AR) using manila rope with a 2-inch ring. The finished rope is 6-7ft deck-to-ring. The AR is attached to the bottom bridle (4-point attachment) of the frame itself using a carabineer to an eye-to-eye swivel.

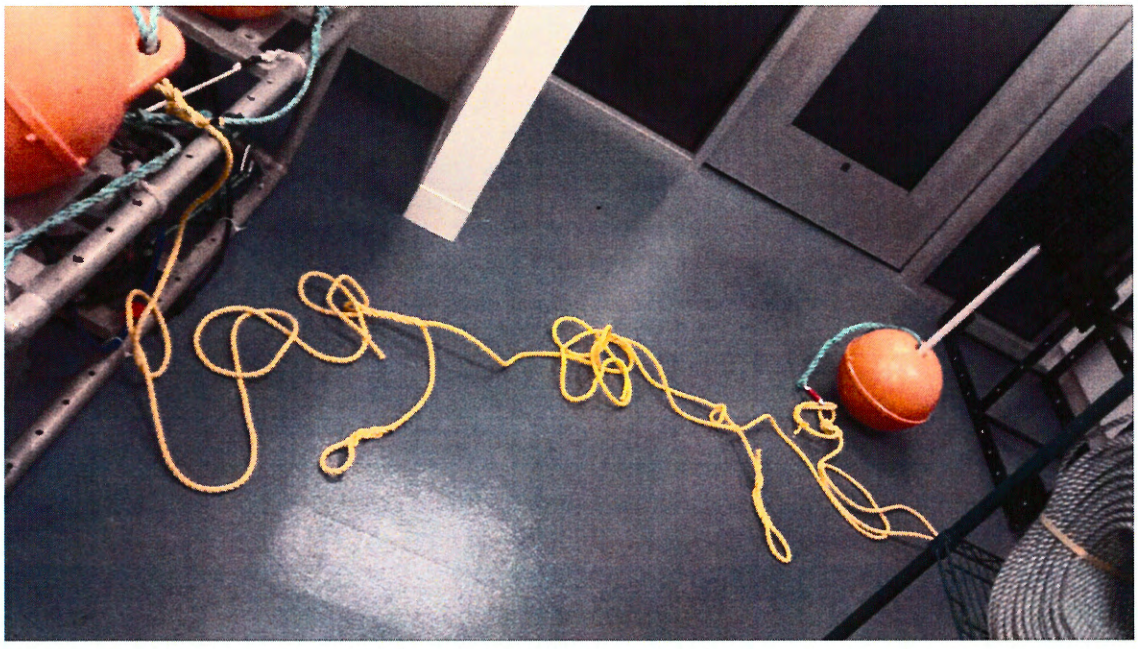


Frankenframe Floats

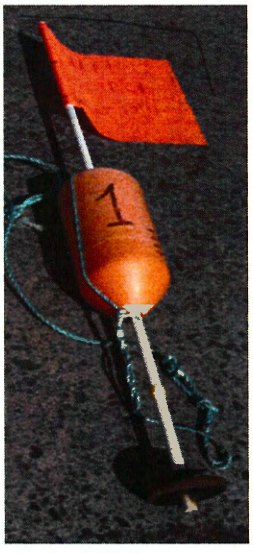
3.5. On deck, the three (3) frame floats (pictured above) will be attached with carabineers to the shackle (pictured below) on the top bridle of the frame.

Top bridle of frame (3 point attachment) with eye-to-eye swivel, shackle, and 4-inch ring. The 3 Frame Floats attach directly to the shackle with carabineers. The 30ft Recovery Line (with its component Float/Flag Line) attach to the 4-inch ring, as does the SeaCatch Toggle Release for deployment of the entire package (described below)

3.6. On deck, the 30ft Recovery Line (with Float/Flag Line) will be attached to the 4-inch ring of the Frankenframe's top bridle.



Mockup of Recovery Line with two integral lifting loops. A Float/Flag Line is attached with a carabineer to the terminal end of the Recovery Line to enhance the surface signature.



The Float/Flag attached to Recovery Line may also be similar to the one pictured here.

3.7. On deck, the scientist(s) will load the bait canister.

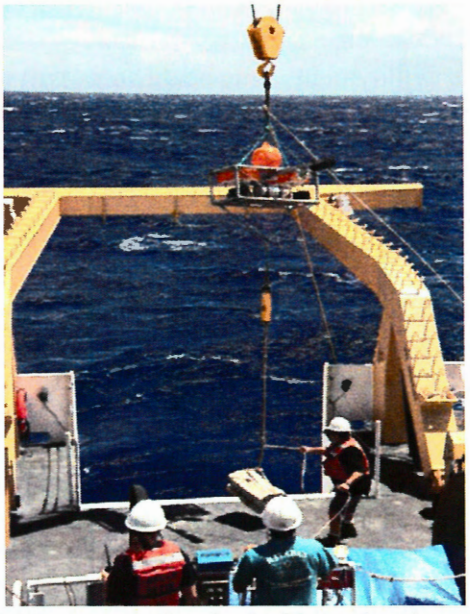
3.8. Prior to deployment, ST/scientist will activate the video sync diode array on the bait arm.

3.9. Immediately preceding deployment, ST/scientist will insert a plug into a shorting socket on the BotCam which will start the video recorder. For the MOUSS, the battery cable will be connected to the electronics bottle to start the recording. Rapid blinking lights visible from the port holes of the BotCam and MOUSS electronics bottles will indicate that the BotCam DVR and MOUSS computers are currently recording.

3.10. Attach the hook of the crane to the ring of the top bridle of the Frankenframe using a SeaCatch Toggle Release (or similar) with a lanyard to allow the entire package to be quickly deployed.

SeaCatch Toggle Release

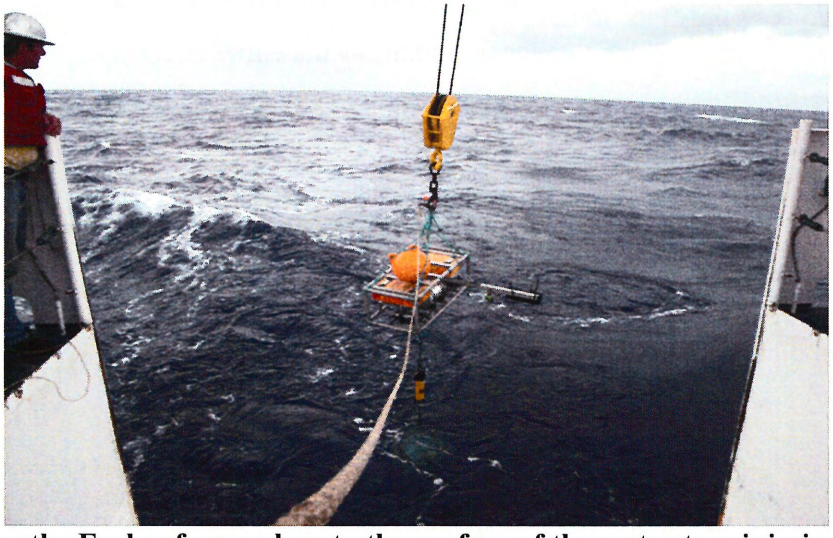
3.11. When the ship is near the drop location, the crane operator will use the crane to lift the package through the open cutout doors, suspending the entire package (Frankenframe, recovery line, and anchors) over the side of the ship. Tag lines may be used to stabilize swing.



Craning the assembled package across the deck. Note the three (3) concrete anchor blocks.

3.12. Upon arrival at the target deployment site, the ship should come to a complete stop, orientated to wind and seas such that the ship drifts away from the package after deployment. Should conditions preclude dead in the water, there should be as little way on as prudent.

3.13. The package will be lowered so that the Frankenframe itself is in/near the water to minimize any free-fall through the air.



Actively lowering the Frakenframe close to the surface of the water to minimize free-fall before triggering the release.

3.14. When given the signal from the bridge that the ship is on station, the ST will release the SeaCatch and the package will be deployed to sink to the bottom.

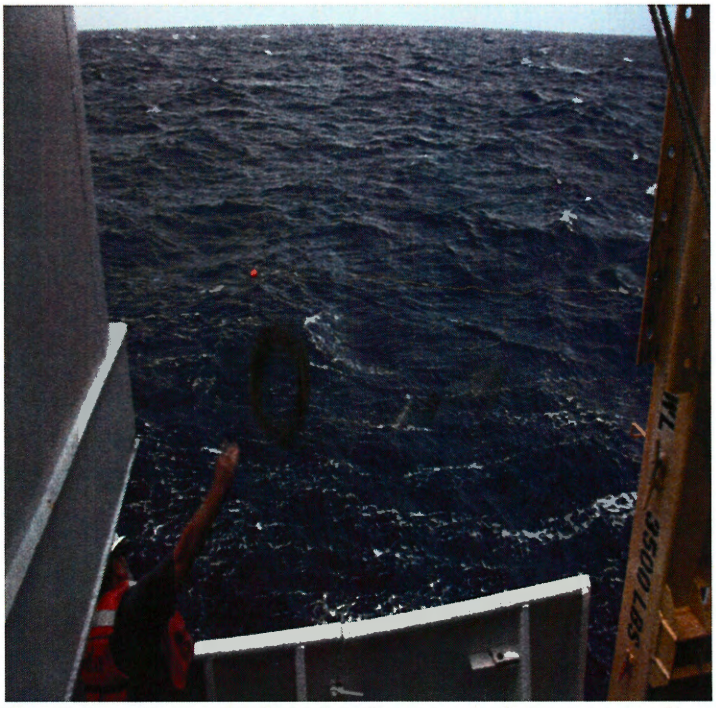
3.15. For each Frankenframe deployment, a metadata sheet will be completed to record deployment data and weather conditions (Frankenframe #, location, time in, time out, weather conditions, etc.).

4. Direct Recovery of Frankenframe to Ship

4.1. When in the vicinity of the deployment site, the ST/scientists will use a dunking transducer and battery powered deck box to send an acoustic signal to the Frankenframe's Acoustic Release (AR) unit. This will trigger the AR to release the anchors and enable the Frankenframe instrument package to float to the surface.

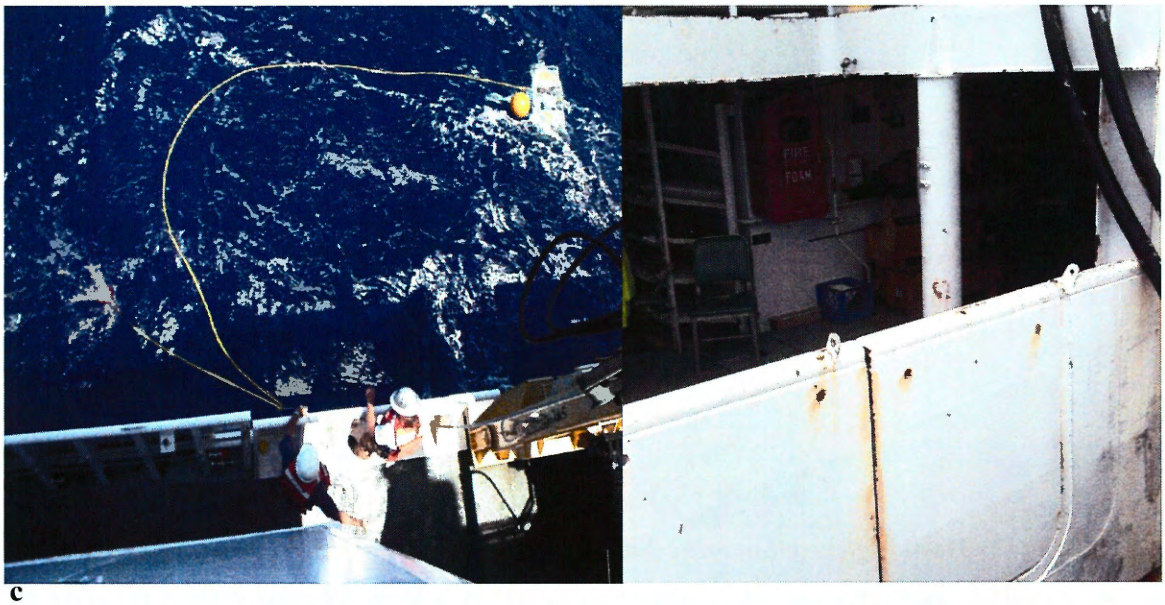
Dunking transducer and deck box for signaling the Acoustic Release.

4.2. When the package reaches the surface and the Frankenframe's recovery line (buoy, flag) is visually located, the ship will maneuver alongside to within a distance where the recovery lines can be reached via grappling hook thrown from the cutout of the grated deck.



Throwing the grappling hook to snag the recovery line.

4.3. The recovery line will be pulled into the cutout of the grated deck with the grappling hook (or boat hook as appropriate). A wrap will be taken on the nearby cleat (attached to post on grated deck) to relieve the strain until a lifting loop can be placed on the hook of the crane.



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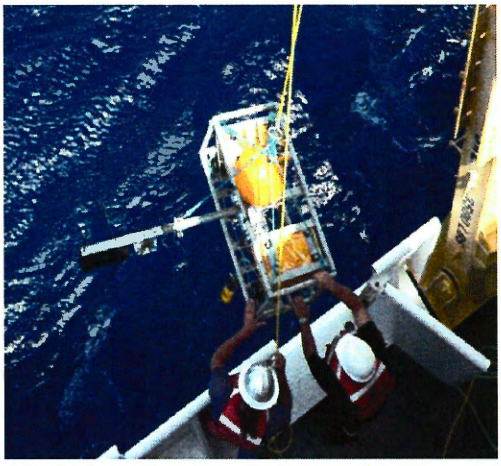
The Recovery Line is brought aboard with the grapple. The cleat on the vertical post may be utilized to temporary hold the load for hooking up to the crane. Note: The Recovery Line depicted in the image is ~50ft. The current configuration is 30ft (with two lifting-loop eye splices ~15ft and ~25ft from the frame itself).

4.4. Once a lifting loop is attached to the crane, the Frankenframe may be hoisted out of the water and lowered onto the deck. If necessary, prior to retrieving from the water, the hook may be repositioned to the lower lifting loop for recovery to the deck. One or more tag lines may be attached with a telescoping boat hook with clip to the lifting harness of the Frankenframe to help control swing.



Bringing the frame aboard.

4.5. On deck, the ST/scientist will unplug the battery cable for the MOUSS component of the Frankenframe to end recording. Note: The BotCam component automatically stops recording after a pre-set duration. Dummy plugs will then be replaced for both components.

5. Recovery of Frankenframe via Small Boat (Optional)

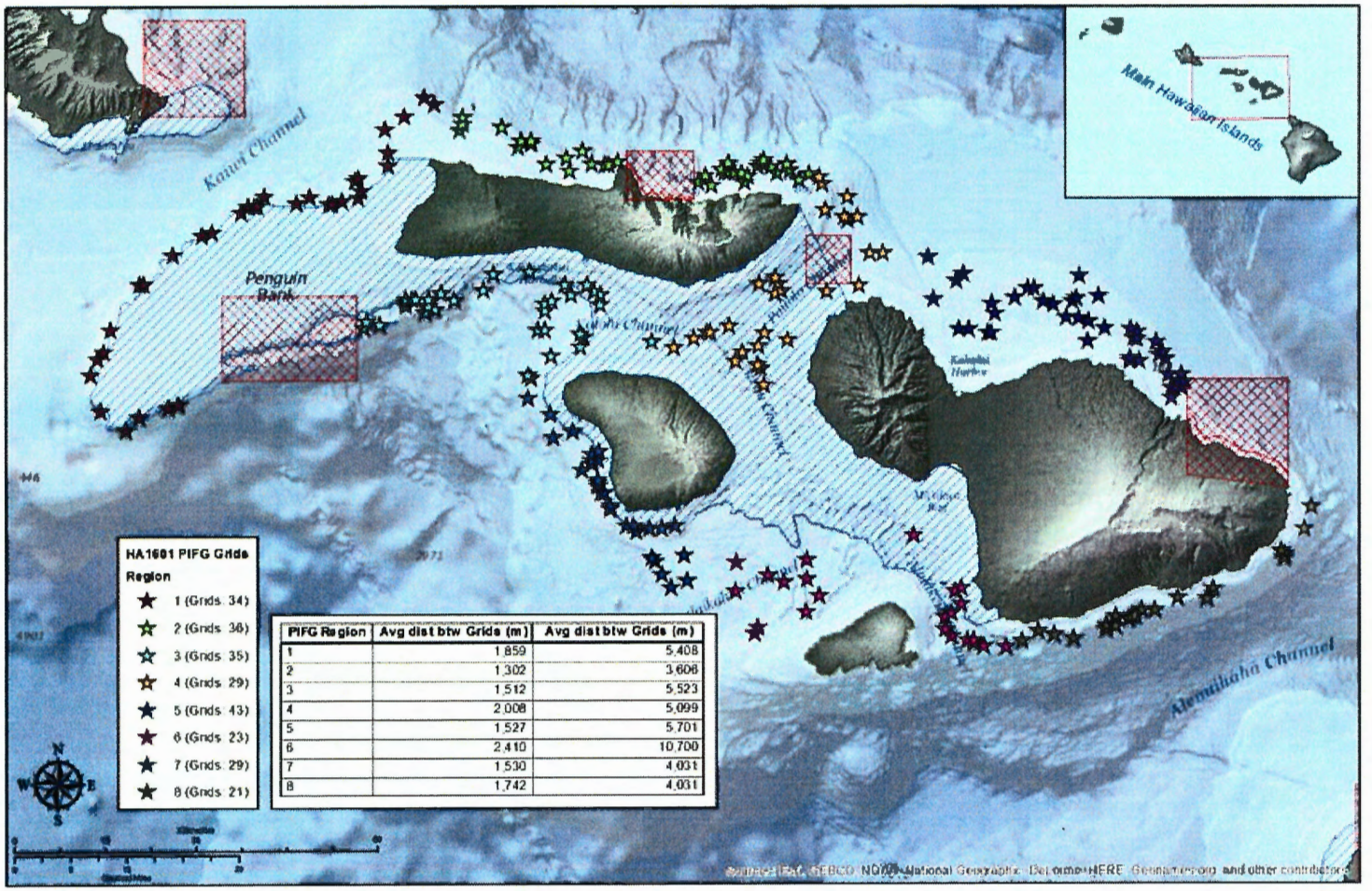
5.1. Once the Frankenframe's acoustic release has been triggered and the package has been located on the surface, a small boat can be launched with ship's coxswain and at least two (2) crewmembers/scientists.

5.2. Small boat will secure Frankenframe alongside for tow or alternatively the unit may be brought aboard the small boat if safe and feasible to do so. Note: The package has a dry weight of 157 lbs plus an acoustic release (20 lbs).

5.3. If small boat tows Frankenframe to mother ship, the recovery line will be passed off and the ship's crane will be used to pick the Frankenframe as outlined above in Sections 4.3 - 4.4.

5.4. Small boat recovery may follow per ship SOP.

Appendix 6: **Operating Area for Concurrent PIFG Fishing Efforts**



PIFG Region	Avg dist btw Grids (m)	Avg dist btw Grids (m)
1	1,859	5,408
2	1,302	3,608
3	1,512	5,523
4	2,008	5,099
5	1,527	5,701
6	2,410	10,700
7	1,530	4,031
8	1,742	4,031

PIFSC Operational Bottomfish Fishery-Independent Survey

NOT FOR NAVIGATION

Coordinate System: WGS1984 UTM4N

Map created (2015) by Benjamin L. Richards (benjamin.richards@noaa.gov)

BRFAs

Hawaiian Islands Humpback Whale NMS

Appendix 7: Program Provided Equipment List

(Attached File)

MHI RAMP HA-10-08 LOAD PLAN

Qty	Description	Dim, inches	Unit weight (lbs)	Total weight	Special accommodations/ preferred destination
	BOATS AND SUPPORT EQUIPMENT				
4	Stainless Steel Storage Cabinets (Small Boat; 3 for MOUSS and other gear)	40x30x72	300	1,200	**3 Fan Tail/ 1Winch Deck**
1	19-ft Safeboat (Rubber Duck) with all necessary navigation and safety equipment		4,000	4,000	fantail cradle above 10' Box
1	19-ft Safeboat (Steel Toe) with all necessary navigation and safety equipment		4,000	4,000	cradle over Oceano Winch
1	Aft "chopped" Boat Cradle - PMNM (carried in additon to cradle over winch that is HA standard equipment provided by PMNM)		1,800	1,800	fantail above above 10' Box
1	10' container under boat cradle (PMNM)	10' x 8'	4,000	4,000	fantail; weight estimated
1	Spare Honda 90 HP Engine (long shaft) & Lower Unit (extra long shaft) - in aluminum framed wooden box	6' x 3' x 4'	650	650	Boat deck
2	Pallet tote with Honda engine parts	49x45x31	300	600	
2	1/2 Pallet tote with general boat support equipment	43x30x29	300	600	
1	Large Action Packer (24gal) spare Boat Electronics	~27x20x18	40	40	Wet Lab shelves
2	Spare VHF antennas		3	6	Corner of Dry Lab
400	Unleaded Gasoline (gal) Small Boat Fuel for SS hip tank		6.2	2,480	
	MOUSS OPERATIONS EQUIPMENT				
1	Rubber Duck davit assembly		100	100	On RD
1	Steel Toe davit assembly		100	100	On ST
3	Auxiliary Battery Box (w/ two batteries) for small boat winch		270	810	One on each SAFE Boat, plus one extra on ship
6	MOUSS Frames (w/ 2 cameras, 1 DRV & 1 battery)	18.5 x 8.5 x 40.4	60	360	Two on each SAFE Boat, plus two extra on ship
6	Extra MOUSS batteries	4 diameter x 17	16	96	Dry lab
4	Tubs of line- 450 ft	21 x 15.5 x 16.5	16	62	fantail in 10' box
4	Bins of line- 800 ft	20 diameter x 22.5	26	102	fantail in 10' box
4	Bins of line- 1200 ft	20 diameter x 22.5	37	148	fantail in 10' box
8	Sub-surface buoys	11 diameter	7	56	fantail in 10' box
4	Surface buoy -small	11.5 diameter x 24	6	22	fantail in 10' box
4	Surface buoy -large	14 diameter x 30	7	28	fantail in 10' box
2	Rubber Mat for cutout	3' X 3'	13	26	One each in SAFE Boat
4	Rubber Mats for boat deck	3' x 5'	9	36	Two each in SAFE Boats
12	Bait arms (in 2 bucket)	12 diameter x 18	1	12	Six bait arm in each of two buckets in SAFE Boat
2	Electronics (battery chargers, etc.) in totes	21 x 15 x 12	15	30	Dry lab
2	Misc. lines in totes	21 x 15 x 12	10	20	One each in SAFE Boat
2	Boat hook	4'	3	6	One each in SAFE Boat
	FRANKENFRAME OPERATIONS EQUIPMENT				
3	Camera frames	48"x22"x18"	160	480	fantail in 10' box
5	Buoys for frame in a tub	22"x20"	40	200	fantail in 10' box
3	Lines/bridles/flags in tub	22"x20"	25	75	fantail in 10' box
3	Acoustic Releases in a case	34"x16"x17"	20	60	fantail in 10' box
1	Deck Box/Transducers in same case with acoustic releases		15	15	fantail in 10' box
2	Electonics in totes	22"x16"x13"	30	60	Dry lab
1	Spare Parts in tote	22"x16"x13"	30	30	Dry lab
	ANCHORS				
2	DEPLOY Pallets of concrete Keystone Compac Units, 85lbs each, 45 per wooden block pallet = ~90 total will be carried; aluminum pallets will serve as base	40x48	3,825	7,650	Weather Deck
	1" ratchet straps for securing load				
1	Pallet of steel anchor links, 65lbs each, per wooden block pallet = 11 total will be carried	40x48	715	715	Weather Deck
	BAIT				
1	Cooler of ~90 frozen pre-made baits, ~2 lbs each ground squid and anchovies	32"x15"x17"	180	140	Scientific Freezer - Wet Lab
14	Totes of ~15 frozen pre-made baits, ~2 lbs each ground squid and anchovies	18"x12"x9"	15	420	Scientific Freezer - Wet Lab

MHI RAMP HA-10-08 LOAD PLAN

Qty	Description	Dim, inches	Unit weight (lbs)	Total weight	Special accommodations/ preferred destination
	SAFETY EQUIPMENT				
3	Small-boat trauma kit	orange pelican case	26	78	boats & wetlab - under shelving
3	Small-boat first aid kit	small blue/clear			
1	Pallet Tote full of Type III PFD work vests and Hardhats	49x45x30	360	360	assigned to dive lockers, extras remain in pallet tote
	DATA MANAGEMENT				

Appendix 8: Section IV.B. Hazardous Materials Inventory

Inventory of Hazardous Materials

Common Name	Quantity	Notes	Trained Individual	Spill Control*
Commercial Bleach	3.8 L (1 gal)	Stored in Wet Lab corrosives locker	Russell Reardon	B
Gasoline, unleaded	1.5 kL (400 gal)	Volatile, Flammable Stored in ship's fantail tank & drum rack	Ship's Chief Engineer	Ship SOP
NiMH Battery Packs (Comprised of Rechargeable Tenergy D-cell Batteries)	20	14.4v, 16Ah battery packs Sealed non-spillable. Under normal operating conditions, the materials sealed inside should not be a health hazard. Only when these materials are exposed (e.g. case broken) may they pose a hazardous condition.	Christopher Demarke	BAT (NiMH)
Pool Time Shock XtraBlue 6 in 1 Pool Shock	0.5 kg (1 lb)	Corrosive; Contained in one 1-lb bag within lidded 5-gal bucket on Grated Deck	Russell Reardon	P
12V Deep Cycle AGM Battery (SlimLine Compressed AGM 12/185)	6	200Ah, 900A CCA, (22x5x11inches; 119lb) ea. Sealed non-spillable. Under normal operating conditions, the materials sealed inside should not be a health hazard. Only when these materials are exposed (e.g. case broken) may they pose a hazardous condition.	Christopher Demarke	BAT (LA)

* Spill Control Key is presented in *Appendix 8*.

B: Bases

- Wear appropriate PPE 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.
- Never mix with an unknown liquid or residue or any compound incompatible with oxidizers.
- **Large Spills**: Dike ahead of spill for containment. 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 to original containers for re-use.
- Neutralize spill area and washings with product such as Grainger Base Eater Spill Kit. Collect in a non-combustible container for prompt disposal.

BAT (LA): Batteries (Lead Acid)

No hazards occur during the normal operation of a Lead Acid Battery. Lead Acid Batteries have three significant characteristics:

-They contain an electrolyte in a sealed case which contains diluted sulphuric acid which acts corrosively and may cause severe chemical burns.

-During the charging process or during operation they might develop hydrogen gas and oxygen, which under certain circumstances may result in an explosive mixture.

-They can contain a considerable amount of energy, which may be a source of high electrical current and a severe electrical shock in the event of a short circuit.

Spill or Leak Procedures:

- Wear protective goggles, rubber or PVC gloves, acid-resistant clothing, safety boots.
- Stop flow of material: Contain/absorb small spills with a bonding agent such as dry sand, earth, or vermiculite.
- Do not allow discharge of unneutralized acid to sewer, overboard, etc.
- Carefully neutralize spilled electrolyte with soda ash, sodium bicarbonate, lime, etc.
- Collect neutralized material in sealed container and handle as hazardous waste as applicable.

Direct contact with the ingredients:

- Skin contact: Rinse with soap and water, remove and wash wetted clothing.
- Inhalation of acid mist may damage respiratory tract: Inhale fresh air, seek advice of a medical doctor. If breathing is difficult, give oxygen.
- After contact with the eyes: Rinse under running water for several minutes; seek advice of a medical doctor
- After swallowing: Drink lot of water immediately; swallow activated carbon, do not induce vomiting; seek advice of a medical doctor.

BAT (NiMH): Batteries (Nickel-Metal Hydride)

No hazards occur during the normal operation of Nickel-Metal Hydride Batteries. The battery cell is contained in a hermetically-sealed case. Concentrations of hazardous chemicals vary depending on the state of charge. They contain a caustic electrolyte which includes nickel hydroxide, sodium hydroxide and lithium hydroxide.

Spill or Leak Procedures:

- Wear protective goggles, rubber or PVC gloves, acid-resistant clothing, safety boots.
- Stop flow of material: Contain/absorb small spills with a bonding agent such as dry sand, earth, or vermiculite.
- Avoid contact of internal battery components with acids, aldehydes, and carbamate compounds.
- Do not allow discharge of unneutralized acid to sewer, overboard, etc.
- Carefully neutralize spilled electrolyte with soda ash, sodium bicarbonate, lime, etc.
- Collect neutralized material in sealed container and handle as hazardous waste as applicable.

Direct contact with the ingredients:

- Skin contact: Rinse with soap and water continuously for 15 minutes, remove and wash wetted clothing.
- Inhalation of acid mist may damage respiratory tract: Inhale fresh air, seek advice of a medical doctor. If breathing is difficult, give oxygen.
- After contact with the eyes: Rinse under running water continuously for at least 15 minutes; seek advice of a medical doctor
- After swallowing: Drink lot of water immediately; swallow activated carbon, do not induce vomiting; seek advice of a medical doctor.

P: Powdered Chlorine Salts

- Wear appropriate PPE (gloves, eyewear, dust mask, etc.) and clothing during clean-up.
- Ventilate area.
- Keep upwind. Avoid inhalation of salts, granules or dust.
- **Large Spills**: Sweep or scoop all spilled material, contaminated soil or other materials and place into clean, dry containers for disposal. Do not close containers containing wet or damp material. If wet or damp, container should be

left open in a well-ventilated area to disperse any hazardous gases that may form. Once cleaned, neutralize/flood the spill area with large amounts of water as appropriate.

- **Small Spills**: Sweep or scoop up spilled material and add it to dive gear "disinfectant" rinse tote if available and full of water. If dive gear "disinfectant" rinse tote is not available, dispose of collected material into a clean, dry container. Once cleaned, neutralize/flood spill area with large amounts of water as appropriate.
- Never return spills to original containers for re-use.

Inventory of Spill Kit Supplies

Product Name	Amount	Chemicals useful against	Amount of clean up possible
Absorbent pads	20	B, BAT	~4 L
Base Eater	Large Kit	B	~19 L
Dust pan	1 set	B, BAT, P	n/a
Goggles	3 pair	B, BAT, P	n/a
Kitty litter	5.4 kg	B, BAT	~4 L
Nitrile gloves	6 pairs	B, BAT, P	n/a
Plastic bags	5	B, BAT, P	~4 L (each)
Vermiculite	2.5 kg	B, BAT	~6 L of chemical spilled
Vinyl gloves	20 pairs	B, BAT, GNF	n/a