



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Pacific Islands Fisheries Science Center
1845 Wasp Blvd. Bldg. 176 • Honolulu, Hawaii 96818
(808) 725-5300

FINAL Project Instructions

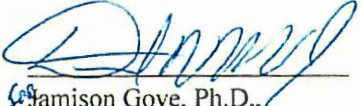
Date Submitted: July 28, 2016

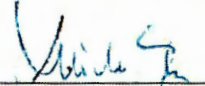
Platform: NOAA Ship *Oscar Elton Sette*

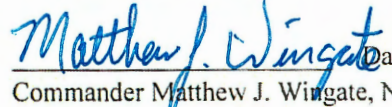
Project Number: SE-16-06 (OMAO)

Project Title: West Hawaii Integrated Ecosystem Assessment

Project Dates: September 06, 2016 to September 25, 2016

Prepared by:  Dated: 01 AUG 2016
Jamison Gove, Ph.D.,
Chief Scientist
Ecosystems and Oceanography Program

Approved by:  Dated: 8/2/2016
Michael P. Seki, Ph.D.,
Science Director
Pacific Islands Fisheries Science Center

Approved by:  Dated: 15 AUG 2016
Commander Matthew J. Wingate, NOAA
Commanding Officer
Marine Operations Center – Pacific Islands

I. Overview

A. Brief Summary and Project Period

The West Hawaii IEA survey will gather data on the physical, biological and chemical oceanography of West Hawaii's Marine ecosystem, with a particular emphasis on understanding the deep-water micronekton community and the ecological importance of surface slicks. The project will span 06 – 25 September 2016 for a total of 20 sea days.

B. Days at Sea (DAS)

Of the 20 DAS scheduled for this project, all days are funded by an OMAO allocation, 0 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a HIGH Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

The operation area will be on the leeward, or western coast of Hawaii Island (see Appendix 1, Fig. 1)

D. Summary of Objectives

The NOAA Ship *Oscar Elton Sette* will be engaged as support for the Pacific Islands Fisheries Science Center (PIFSC), National Marine fisheries Service (NMFS), NOAA West Hawaii Integrated Ecosystem Assessment (IEA) program. The ship will conduct oceanographic operations off the west coast of the island of Hawaii.

The scientific objectives of this cruise are to collect information to describe the physical, chemical, and biological oceanographic environment with a particular emphasis on the deep-sea micronekton community and ocean surface slicks. Operations are proposed as follows:

1. Collect oceanographic data from routine conductivity-temperature-depth (CTD) casts, continuous acoustic Doppler current profiler (ADCP) (N/A, ADCP is inoperable), and thermosalinograph (TSG) measurements along a predefined grid off the west coast of Hawaii.
2. Perform CTD-mounted fluorometer measurements and laboratory determination of nutrients and chlorophyll, and size structure of the phytoplankton and zooplankton community from water samples collected during CTD operations. These data will be used to assess the influence of the physical dynamics on the biological productivity of the region.

3. Assess biological backscatter during along-and cross-shore transects and during trawl operations using the Simrad EK60 echosounder system. This will be used to help characterize the micronekton faunal composition and densities as the forage base for larger pelagic nekton.
4. Conduct stern deep-water (400 – 600 m) and shallow-water (150 – 200 m) trawl operations at select stations with real-time depth tracking via the Marport net mensuration system, targeting the depths of high sound scattering layers to better our understanding of echosounder signals collected by the EK60 echosounder.
5. Conduct daytime, small-boat surveys of surface slicks. Surveys will primarily utilize stern-towed surface plankton nets of varying mesh size to assess the slick-associated plankton community and to collect samples for microplastics. A small, gas powered water pump will be used to collect subsurface (3 – 15 m) samples while snorkeling operations will occur to select gelatinous organisms at select locations.
6. Conduct daytime, small-boat active acoustic surveys of surface slicks in concert with plankton net sampling surveys. An over-the-side pole with a suite of Simrad EK60 portable transducers of varying frequencies (200, 120, 70, and 38 kHz) will be utilized to support the plankton net surveys and to assess the presence of higher, more mobile trophic groups near surface slicks.
7. Conduct daytime, small-boat physical and chemical sampling of surface slicks in concert with plankton and acoustic surveys. A hand-held CTD will be hand lowered over the side to collect vertical profiles of temperature, salinity, and water clarity. Grab samples will also be collected for nutrient and chlorophyll concentrations.
8. Conduct daytime, areal surveys of surface slicks using a NMFS Unmanned Aerial System (UAS), specifically an APH-22 hexacopter. The APH-22 is a small, vertical takeoff and landing (VTOL) UAS that will be utilized from both the Sette and small-boats, providing high-resolution areal imagery of surface slicks in the region.
9. Conduct acoustic operations in conjunction with PIFSC Bigeye Thresher Shark tagging operations in the vicinity of South Kona
10. Deploy a University of Hawaii imaging sonar (Didson) to collect high-resolution information on the density of high sonic scattering layers.
11. Recover and Deploy 1 High-Frequency Acoustic Recording Package (HARP)

E. Participating Institutions

The Pacific Islands Fisheries Science Center is leading this project. In addition, individuals from the University of Hawaii will also be participating.

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Gove, Jamison	Chief Scientist	6-Sep-16	25-Sep-16	Male	NMFS	USA
Kobayashi, Donald	Research Fishery Biologist	6-Sep-16	25-Sep-16	Male	NMFS	USA
Whitney, Jonathan	Cooperating Scientist	6-Sep-16	25-Sep-16	Male	JIMAR	USA
McVay, David	NOAA CORPS	6-Sep-16	25-Sep-16	Male	NOAA	USA
Copeland, Adrienne	Cooperating Scientist	6-Sep-16	25-Sep-16	Female	JIMAR	USA
Miller, Dianna	Cooperating Scientist	6-Sep-16	25-Sep-16	Female	JIMAR	USA
Panilo, Jazmine	Visiting Scientist	6-Sep-16	25-Sep-16	Female	UH	USA
Ingram, Rebecca	Visiting Scientist	6-Sep-16	25-Sep-16	Female	UH	USA
Woodworth-Jefcoats, Phoebe	Research Oceanographer	6-Sep-16	25-Sep-16	Female	NMFS	USA
Driskell, Rory	Bio-Science Technician	6-Sep-16	25-Sep-16	Male	NMFS	USA
Francis, Beth	Visiting Scientist	6-Sep-16	25-Sep-16	Female	Bangor University	UK
Phipps, Janna	Visiting Scientist	6-Sep-16	25-Sep-16	Female	UH	USA
Chen, Jessica	Visiting Scientist	6-Sep-16	14-Sep-16	Female	UH	USA
Wong-Ala, Jennifer	Visiting Scientist	6-Sep-16	14-Sep-16	Female	UH	USA
Drazen, Jeffrey	Visiting Scientist	6-Sep-16	14-Sep-16	Male	UH	USA
Wren, Johanna	Cooperating Scientist	14-Sep-16	25-Sep-16	Female	JIMAR	USA
Littnan, Charles	Research Scientist	14-Sep-16	25-Sep-16	Male	NMFS	USA
Lecky, Joey	Cooperating Scientist	14-Sep-16	25-Sep-16	Male	JIMAR	USA
Giorli, Giacomo	Visiting Scientist	14-Sep-16	25-Sep-16	Male	UH	Italy

G. Administrative

1. Points of Contacts:

Jamison Gove, Chief Scientist
 Pacific Islands Fisheries Science Center
 1845 Wasp Blvd, Building 130
 Honolulu, Hawaii, 96818
jamison.gove@noaa.gov

David McVay, Operations Lead
 Pacific Islands Fisheries Science Center
 1845 Wasp Blvd, Building 130

Honolulu, Hawaii, 96818
david.a.mcvay@noaa.gov

Anthony Imberi, NOAA Operation Officer
NOAA Ship *Oscar Elton Sette*
1897 Ranger loop, Building 184
Honolulu, HI 96818
(808) 725-5790
OPS.Sette@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

The Chief Scientist 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 216-6A, Environmental Review Procedures, Sections 5.05 and 603c.3(a) for Categorical Exclusions (CE) for Research Programs (PIFSC-20160057 - CE in process).

ESA: Section 7 consultation for operation of active acoustics, trawls, deployment and recovery of the HARP, small boat operations and UAS is currently in process.

Essential Fish Habitat: Consultation for deployment and recovery of the HARP and trawl operations is currently in process.

State of Hawaii: (working in state waters?).

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:

Based on a ship speed of 8.5 knots.

6 Sep Embark Jamison Gove, Donald Kobayashi, Jonathan Whitney, Phoebe Woodworth-Jefcoats, David McVay, Adrienne Copeland, Dianna Miller, Jazmine Panilo, Jessica

Chen, Rebecca Ingram, Jennifer Wong-Ala, Janna Phipps, Jeffrey Drazen, Beth Francis, and TBDs. Depart Pearl Harbor and proceed to Station C on the cruise survey grid (See Appendix 1, Fig.1). Distance = ~170 nm. Travel Time = ~20 hrs.

- 7 Sep 0500. Arrive near station C. Conduct CTD at sunrise (~0600). Conduct small-boat familiarity briefing. Launch small boats (TBD) and conduct coxswain and crew familiarization training. Conduct daytime acoustic operations. Recover small boats. 1730 commence CTD operations. 1900 commence first deep (400 – 600 m) trawl and acoustics. 2230 Commence second deep trawl and acoustics (trawl starttime determined by the completion of the first deep trawl).
- 8-13 Sep Conduct CTD at sunrise (~0600). Launch small boats SE-4 and program boat Iwa for surface slick operations (launch time and recovery time TBD based on trawling operations). Conduct daytime acoustic operations. Recover small boats. 1730 commence CTD operations. 1900 commence first deep (400 – 600 m) trawl and acoustics. 2230 Commence second deep trawl and acoustics (trawl starttime determined by the completion of the first deep trawl).
- 14 Sep Arrive near Honokohau Harbor. Conduct CTD at sunrise (~0600). Launch small-boat Iwa for surface slick operations. Launch small-boat SE-4 and transfer disembarking scientists Jeffrey Drazen, Jennifer Wong-Ala and TBDs to Honokohau Harbor and pick up embarking scientists Johanna Wren, Charles Littnan, Joey Lecky, Giacomo Giorli, and TBD to transfer back to the Sette. Conduct daytime acoustic operations. Recover small-boats. 17:30 commence CTD operations along with imaging sonar. 19:00 Commence acoustics and shallow (150 – 200 m) trawling.
- 15-23 Sep Conduct CTD at sunrise (0600) with imaging sonar. 0730 Small boat briefing and launch small boats SE-4 and program boat Iwa for surface slick operations. Conduct UAS operations. Conduct daytime acoustic operations. Recover small boats no later than 1645. 1730 commence CTD operations along with imaging sonar. 1900 Commence acoustics and shallow (150 – 200 m) trawling. Conduct acoustic operations in conjunction with Big-eye Thresher Shark tagging project.
- 24 Sep Conduct CTD at sunrise (0600) with imaging sonar. 0730 Small boat briefing and launch small boats SE-4 and program boat Iwa for surface slick operations. Drop disembarking scientists Donald Kobayashi and TBD at Honokohau Harbor. Conduct UAS operations. Conduct daytime acoustic operations. Recover small boats. All operations complete. Depart for Pearl Harbor
- 25 Sep Arrive Pearl Harbor. Disembark All Scientists

B. Staging and Destaging:

Prior to sailing from Ford Island on 6 September 2016, the ship's crew will inspect the port- and starboard side J-frames and associated oceanographic winches, conducting cable, DESH-5 winch for CTD operations, ensure the trawl mensuration system is functioning, check the

RD Instruments ADCP and associated computer and software (N/A - ADCP is not functioning), the thermosalinograph, the flow-through Turner 10-AU fluorometer, the Simrad EK60 echosounder, the Scientific Computing System (SCS), the Global Positioning System (GPS) navigational systems, and the scientific freezer to ensure that they are in proper working order. All Simrad EK60 transducer faces and propellers should be inspected and cleaned of marine life no sooner than 1 week prior to sailing using methods recommended by manufacturers (e.g., using a soft wood block to clean the Simrad EK-60 transducer faces). The SeaBird 9/11+CTD system, carousel rosette water bottle sampler, a full set of Niskin bottles with spare parts, and the SEACAT portable CTD will be installed and inspected to ensure that they are fully operational. Electrical continuity of the J-frame conducting cable, the winch's slip ring assembly, and connections to the electronic laboratory will be confirmed by the Chief Electronics Technician before sailing. The Program requests that the Survey Technician be available operations, including CTD casts with exact schedule to be determined, but will likely include morning (0600) and evening (1730) casts.

The Ship's scientific small boats, specifically SE-4 (Northwind), will be operational and ready to be deployed prior to sailing. An additional program boat (Iwa) with cradle will be loaded prior to sailing. The Program requests a minimum of one coxswain be provided to operate the Ship's scientific small boat on a daily basis. The Program will have two coxswains to operate the program's boat Iwa. The Program will provide 6 55 gallon drums of fuel and requests that SE-4 will be fuelled prior to departure and that re-supply of fuel will occur daily to the small boats (SE-4 Northwind and Iwa). The activity is tentatively planned to be daily, with a maximum of 18 full days of small boat use planned. Alternative fuel storage and delivery means may be explored and utilized as deemed necessary.

The Program requests a minimum of 2 terabytes of shared network space for scientists to communally store and access oceanographic data collected during the cruise. This could be either accessed through the temporary shared network disk space provided by the ship or by the ability to network an external hard drive provided by the science party into the full or a sandboxed local area network. We also request to make nightly backups of this network drive using external hard drives provided by the science party. This would provide the ability for scientists to store and access one common data set from all science computers on either the complete or a subset of the local area network.

Dates and equipment/personnel needed for loading of scientific equipment will be provided to the ship no later than 21 days prior to sailing.

C. Operations to be Conducted:

Ship-Based Operations

- a) Net sampling of the sound scattering layers will be conducted at selected stations (see Appendix A) using the dual warp Cobb (Stauffer) trawls. Stern Cobb trawls will be conducted in duplicate at night. Trawls will be conducted each night of trawling operations (Operations for estimated layer times). Oblique sampling will either be done through the deep sound scattering layer (approximately 400 – 600m) or the shallow sound scattering layer (150 – 200m), with the target depth and specific geographic area

determined by active acoustic data prior to trawling. Target trawl deployment and recovery times will occur as rapidly as possible to minimize trawl sample contamination with material from shallower depths. Trawl duration at depth will be approximately 60 minutes. Net depth will be monitored in real-time using the Marport net mensuration system and time-depth recorders (TDRs). Acoustic data will be collected during all trawl operations.

- b) A CTD equipped with both a WetLab profiling and Seapoint flowthrough fluorometer (for inter-sensor comparison), redundant dissolved oxygen sensors, and a 12-Niskin water bottle carousel rosette sampler will be used to collect vertical profiles of the water column at select stations (Appendix A). CTD casts will be conducted in the morning (approximately 0600) and the evening (approximately 1730) each day, with additional casts as the operational schedule permits. CTD casts will go down to 600 m, or as operations dictate or the depth appropriate in the geographic area being surveyed. Water samples will be collected to sample chlorophyll-a. All chlorophyll-a and will be filtered at sea. Chlorophyll-a and phytoplankton size structure samples will be analyzed at sea, post-filtration.
- c) Surface temperature, salinity, and chlorophyll-a will be monitored with the hull-mounted thermosalinograph and flow-through fluorometer throughout the duration of the cruise. When not running acoustics, current velocity will be monitored with the hull-mounted ADCP (N/A - ADCP is inoperable).
- d) Active acoustic scattering measurements will be continuously collected with the hull-mounted split beam Simrad EK60 echosounder and the frequencies of 38, 70, 120, and 200 kHz. While active acoustic scattering measurements are being collected, the ship will maintain a speed of approximately 4 kts, adjusted as necessary to ensure clean data. In the event that bioacoustic data cannot be cleanly collected during trawling operations, an acoustic transect through the station area will be done between the two scheduled trawls.
- e) In collaboration with Dr. Melanie Hutchinson of the International Fisheries Program at PIFSC, active acoustic scattering measurements will be collected along transects in the vicinity of a recently tagged Big-Eye Thresher Shark. Operations will involve coordination via VHF with Dr. Hutchinson and the fishing vessel *Fire Hatt*, a 43' Cape Hatterous out of Honokohau Harbor (<http://www.firehattsportfishing.com/about>). Operations will occur over a 24 – 48 hr time period; however, primary mission objectives (above) may supersede this operation.
- f) In collaboration with Dr. Giacomo Giorli of the Hawaii Institute of Marine Biology, imaging sonar casts will be conducted in conjunction with CTD casts at select stations. During the upcast portion of the CTD, the imaging sonar will hold position at the deep scattering layer depth (~400 - 600 m) for 20 minutes. The same will occur at the shallow scattering layer. Total estimated time for imaging sonar CTD casts is approximately 1.5 hrs.
- g) In collaboration with Protected Species Division (PSD) Cetacean Research Program, a High-frequency Acoustic Recording Package (HARP) will be recovered and deployed off

West Hawaii. Recovery will be accomplished by acoustically releasing the HARP during day-time hours. Once the package is spotted at the surface, recovery will be done directly by the ship using the aft crane or by small boat. HARP location is 19 34.985 N, 156 00.939 W. Deployment can occur during day or night-time operations.

Small-Boat Operations

- a) Stern-towed plankton nets will be used to sample surface slicks, collecting material of various sizes ranging from microplastics to juvenile fish. Operations will primarily be conducted with the program owned small-boat *Iwa* and a program-provided coxswain. The plankton net is ~1 m in length and will be deployed 30 - 50 m behind the small-boat, maintaining a speed of 0.5 – 2 knots. Samples will be extracted from the plankton nets, put in small containers and stored on the small-boat and later transferred to the *Sette* upon completion of day operations.
- b) Subsurface, depth-specific sampling of material associated with surface slicks will be conducted using a 1HP Honda 25cc Water Pump. A 1-inch hose will be lowered to the desired depth (between 3 – 10 m) and sample water for ~15 minutes. Sampling efforts will occur following and in the vicinity of stern-towed plankton surveys.
- c) Opportunistic snorkeling operations in conjunction with surface slick will be conducted to sample gelatinous organisms that are otherwise unable to be sampled via stern-towed plankton nets. Operations consist of a pair of snorkelers, on the surface, searching for specific organisms to collect.
- d) Active acoustic and ocean current information will be collected adjacent to and in concert with plankton net operations using the *Oscar Elton Sette* small-boat *SE-4* (i.e. 17 ft Northwind). Acoustic data will be collected using 38, 70, 120 and 200 kHz sensors. Sensors will be attached to an over-the-side pole. Please see Appendix C for more detail.

UAS Operations

- a) Daytime areal surveys will be conducted using a small vertical takeoff and landing (VTOL) hexacopter – APH-22 – equipped with a digital Canon EOS M camera (see Appendix B). The goal of these surveys is to collect high resolution aerial imagery of the ocean surface across space and through time, enabling the following: identification of surface slicks to target for small boat sampling; retrospective assessment of small-boat slick sampling assessment of surface slick visual characteristics, such as average width, length, orientation, and total area; assessment slick horizontal propagation and general movement patterns.
The APH-22 will be operated by a three-person team. Charles Littnan will fulfill the role of the Person In Charge (PIC). This person will lead the flight and operate the UAS with the RC unit. The second individual will monitor the video feed and battery status. A third person will be the Visual Observer (VO) and will observe the UAS and surrounding airspace throughout each flight and provide the PIC information on the UAS's flight path

and proximity to all aviation hazards necessary to prevent collision. The VO will also monitor altitude and orientation relative to the PIC.

Operations will be conducted either from the Oscar Elton Sette or small-boats, with factors such as ocean and weather conditions and short-term forecast, UAS status, mission objectives, and safety concerns ultimately dictating which platform the UAS will operate from. For a detailed description of this mission's operational plan, please see the attached Operational Procedures and Risk Management Assessment document.

D. Dive Plan

No diving will occur on this project.

E. Applicable Restrictions

During acoustic transect operations and while acoustics are being collected while underway, the EK60 acoustics system will be used to monitor bottom depth, and the ES60 and Furuno systems will remain secured to avoid mission-compromising interference. If the EK60 does not provide reliable bottom measurements in shallow, nearshore waters, the ES60 will be turned on to be used as the depth sensor. If the ADCP interferes with the EK60, the ADCP will be secured. Additionally, no activities that produce noise substantial enough to compromise the data gathered by the EK60 acoustic system may be carried out during acoustic data collection. Such activities include, but are not limited to, needle gunning. While underway acoustic transects are conducted, the ship will maintain a speed of 4 kts and adjust speed as necessary to ensure clean data collection.

Conditions that preclude normal operations: Conditions that exceed the ship's operating capabilities, such as high winds or seas; equipment failure; safety concerns; and unforeseen circumstances as identified by the Chief Scientist and/or Commanding Officer. Every effort will be made to mitigate the conditions listed above, including but not limited to: moving operations to alternate locations, postponing or reordering operations, or using alternate equipment.

1. "Take" of Protected Species

- a. Under the Marine Mammal Protection Act (MMPA) and Endangered
- b. Species Act (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, or collect". The ESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct". An incidental take is one that is incidental to, but not the purpose of, otherwise lawful activities.
- c. In the event of an incidental take of a marine mammal or federally listed threatened or endangered species during the cruise, the chief scientist will report the incident to 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.

- d. PIFSC has developed mitigation measures for our 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/nepapermits/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.
 - c. Please reference the complete list of prohibited activities and boundary maps at <https://sites.google.com/a/noaa.gov/pifsc-science-operations/hom/nepapermits/protected-species-mitigation-measures>.

III. Equipment

- A. Equipment and Capabilities provided by the ship (itemized)
 - CTD system and heavy-duty cage assembly
 - 12 complete Niskin bottles, with at least enough spare parts to replace 3 bottles
 - J-frames and blocks for CTD
 - Stern trawl winches
 - Oceanographic winches and cables (port and starboard)
 - SEACAT portable CTD
 - Deck crane
 - Thermosalinograph
 - RD Instruments ADCP and associated computer and software
 - EK60 echosounder system at the frequencies of 38, 70, 120, and 200 kHz
 - Net mensuration system
 - Turner 10AU flow-through fluorometer
 - SE-4 Northwind small boat, adequate spare parts, and ship provided coxswain.
 - GPS navigational system
 - Depth sounders and recorders
 - Scientific freezer, kept between -30° and - 20°C at all times
 - Two-way radios for communications from the electronics lab to the winch operator
 - Operational Scientific Computing System (SCS)
 - Navigational equipment and course plotter
 - Supplies necessary for at least two reterminations of the J-frame conducting cable
 - A minimum of two terabyte shared network space
 - Canopy on flying bridge
 - Copy machine
 - Network access to a printer
 - Space on the aft deck for the acoustic winch

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

- Water filtration equipment (vacuum pump, filtering ring, filters, forceps, etc.)
- WetLabs profiling and SeaPoint flow-through fluorometers
- Redundant dissolved oxygen sensors
- Cobb (Stauffer) trawls and bridles
- 5 ft x 7 ft “V” doors
- Time-depth recorders for alternative net monitoring
- Sample collection jars
- Trays and other supplies for sorting tow catches
- Sample scale
- Turner 10-AU fluorometer
- Two laboratory microscopes
- All laboratory glassware (e.g., Erlenmeyer flasks, graduated cylinders)
- External hard drives (1 – 2 TB) for common data storage and backup
- Imaging sonar unit and associated batteries, housing, and frame
- Acoustics recording equipment, including mixer and recording rack, desktop computers (2).
- Small-boat (Iwa), associated spare parts and cradle.
- UAS and associated equipment
- Over-the-side pole with portable acoustic and ADCP units
- Powermate 1 HP Honda Engine Water Pump and associated equipment
- SEACAT portable CTD
- Plankton nets of varying mesh sizes
- Small-boat plankton towing bridle and frame
- Bio-degradable fluorescent dye

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

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Acetone, 95%	4 x 4 L	Flammable	Phoebe Woodworth-Jefcoats, Don Kobayashi	F
Hydrochloric Acid, 10%	500 mL	Acid	Phoebe Woodworth-Jefcoats, Don Kobayashi	A
Ethanol, 95%	4 x 5 g	Flammable	Phoebe Woodworth-Jefcoats, Don Kobayashi	FL
Formalin, 10%	4 L		Phoebe Woodworth-	F

			Jefcoats, Don Kobayashi	
--	--	--	----------------------------	--

This inventory is tentative. A complete HAZMAT inventory and associated MSDS will be sent to the Operations Officer no later than seven days prior to sailing.

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.

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.

FL: Flammable Liquids

- 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 sawdust.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
3M Chemical Folded Sorbent Spill Kit	1	Acetone, Hydrochloric Acid, Ethanol	31 g

C. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. **Additional Projects**

A. Supplementary (“Piggyback”) Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. **Disposition of Data and Reports**

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information*. To guide the implementation of these NAOs, NOAA’s Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

Data Disposition: The Chief Scientist will be considered to be the representative of the NMFS PIFSC Science Director for the purpose of data disposition. A single copy of all data gathered by the vessel will be delivered to the Chief Scientist upon request for forwarding to the Science Director, who in turn will be responsible for distribution of data to other investigators desiring copies.

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 hours 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 ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project,

and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

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

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

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

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:

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

C. Shipboard Safety

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

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

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via 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.

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.

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

APPENDIX A: Acoustic and Trawling Locations

Trawling and acoustic operations will primarily occur either directly at or in the vicinity of previously performed locations. Below is a map and specific geographic positions of these locations.

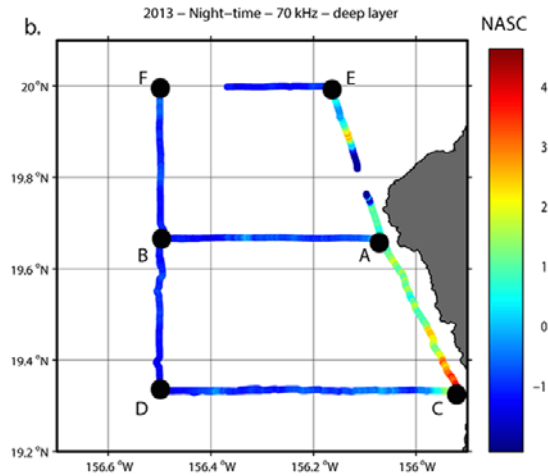


Figure A1. Map of Acoustic transects (colored lines) and trawling locations (black circles) to be conducted during SE-16-06. Additional operations beyond those locations identified in this map will also occur as determined by the acoustic strength and the overall objectives of the project.

Table A1: Station information for acoustic and trawling locations (Station) and acoustic transects (Transect). Latitude and Longitude are in degree-minutes. Survey time for each transect is based on the recommended 4 knot acoustic sampling speed for the Sette.

Station	Latitude	Longitude	Operation
A	19° 40' N	156° 04' W	Shallow/Deep Trawling and Acoustics
B	19° 40' N	156° 30' W	Shallow/Deep Trawling and Acoustics
C	19° 20' N	155° 55' W	Shallow/Deep Trawling and Acoustics
D	19° 20' N	156° 30' W	Shallow/Deep Trawling and Acoustics
E	20° 00' N	156° 10' W	Shallow/Deep Trawling and Acoustics
F	20° 00' N	156° 30' W	Shallow/Deep Trawling and Acoustics

Transect	Distance (nm)	Survey Time (hrs)	Operation
A to B	24	5.5	Acoustic Survey
A to C	35	8.75	Acoustic Survey
C to D	20	5	Acoustic Survey
B to D	20	5	Acoustic Survey
B to F	20	5	Acoustic Survey
F to E	20	5	Acoustic Survey
E to A	20	5	Acoustic Survey

APPENDIX B: Over-the-side-pole

An over-the-side-pole temporarily mounted to a small-boat (SE-4) will be used to acoustically sample surface slicks. See Figure B1 for an example of the mounting and configuration of instrumentation. The small-boat will be stationary during sampling efforts.



Figure B1: Example of an over-the-side-pole for small-boat acoustics operations.

APPENDIX C: UAS Description and Map

APH-22 VTOL: The APH-22 hexacopter is designed and built by Aerial Imaging Solutions, Old Lyme, CT. The APH-22 is a small vertical takeoff and landing (VTOL) UAS that will be used to collect digital images with its Canon EOS M camera payload. Specifications and Performance details are listed below.

Template Date: 03JUN2016

The APH-22's attitude, altitude, and heading are stabilized by an electronic control system that incorporates 3 gyros, 3 accelerometers, a magnetic compass, a barometric pressure sensor, a GPS receiver, and 8 microprocessors. The radial arms and core of the aircraft are aluminum, the electronic support chassis and landing struts are carbon fiber, and the landing support struts are ABS. Foam landing pads are attached to the skids to dampen the impact of landing and increase surface area in contact with the ground. These landing pads also provide floatation to the UAS in the unlikely event of a water landing.



Figure C1. APH-22 in the Aleutians before flight, June 2014.

Specifications:

Manufacturer: Aerial Imaging Solutions

Model: APH-22

Diameter: 32.4 inches from prop tip to prop tip

Height: 11.3 inches

Empty weight: 3.8 pounds

Max Take-off weight: 4.5 pounds

Engine type: 6 x flat core brushless motors

Engine Power: 48.2 N

Battery: Custom 4 cell Lithium Polymer

Battery Capacity: 16.8 volts / 6200 mAH

Performance:

Max Cruise Speed: 30 knots

Min Cruise Speed: Hover

Max Range: 1 nautical mile

Endurance: 25 – 35 minutes

Max Altitude: 400 feet under COA 2013-WSA-50

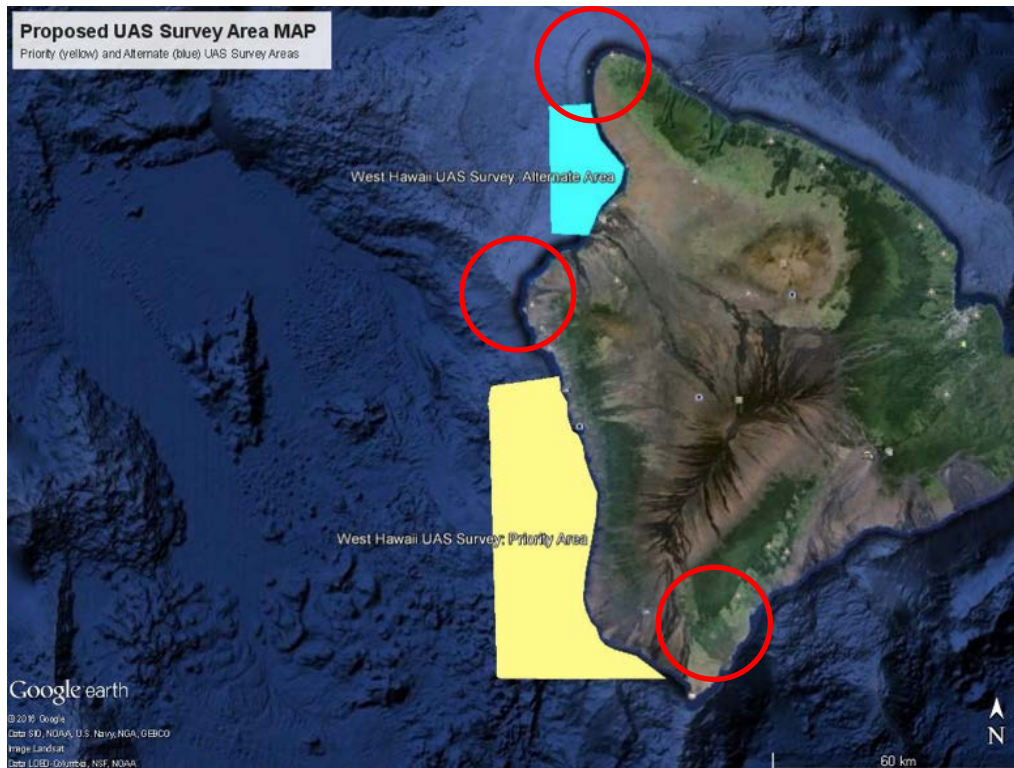


Figure C2: Proposed UAS survey areas for project SE-16-06. The region in yellow is the primary targeted survey area. The blue region is the alternate survey area. Both regions are a minimum distance of 5 nm from all airports in the region (identified by red 5 nm radius circles).