

## FINAL Project Instructions

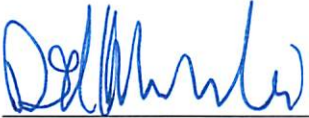
**Date Submitted:** May 15, 2015

**Platform:** NOAA Ship (*Oscar Elton Sette*)

**Project Number:** SE-15-03 Leg I and II (PIFSC)

**Project Title:** Fisheries Oceanography – Commonwealth of the Northern Mariana Islands (CNMI) and Mariana Trench Marine National Monument (MTMNM)

**Project Dates:** June 11, 2015 (CHST) to July 14, 2015 (HST)

Prepared by:  Dated: 5/18/15  
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Approved by:  Dated: 5/19/15  
Michael P. Seki, Ph.D., Director  
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Approved by: \_\_\_\_\_ Dated: \_\_\_\_\_  
Commander Matthew J. Wingate, NOAA  
Commanding Officer  
Marine Operations Center – Pacific Islands

## **I. Overview**

### **A. Brief Summary and Project Period**

Leg I will start on June 11, 2015 and end June 27, 2015. The primary objectives are to support the conduct of the following projects for PIFSC, CNMI, and University of Guam: 1) survey and collection of deep-slope, soft-bottom species of fishes and invertebrates using ship-based and small boat-based operations, 2) survey and collection of pelagic midwater species of fishes and invertebrates using a Cobb (Stauffer) midwater trawl towed from the ship, 3) active acoustics surveys, CTD surveys, plankton surveys (using ring net, drop net, or neuston net), and other oceanographic surveys of productivity, forage, and other water column properties measured with sensors or gear deployed from the ship or small boat. All activities will take place in waters near Uracas (Farallon de Pajaros) and Maug within the Mariana Trench Marine National Monument (MTMNM) and in waters near Agrihan, Pagan, Alamagan, and Sarigan within the Commonwealth of the Northern Marianas (CNMI). Additional operations that will be conducted are bottom grab samples of deep-slope, soft-bottom substrate; optical surveys using GoPro cameras; and the dip-net collection of early life stages of pelagic and juvenile marine organisms attracted to a drifting surface night-light.

These projects are anticipated to provide data and samples to further our understanding of two understudied ecosystems (deep-slope, soft-bottom and pelagic midwater ecosystems) throughout the Mariana Archipelago. Project surveys will provide information on the identification, distribution, and abundance of benthic species residing in deep-slope, soft-bottom ecosystems throughout the archipelago; identifying spatial patterns of pelagic productivity and forage throughout the archipelago; evaluating genetic connectivity, stock ID, and early life-history of fishery resources throughout the archipelago; and further contributions towards understanding biogeography and biodiversity in understudied ecosystems throughout the Mariana Archipelago.

Leg II is a transit from Apra Harbor, GU to Ford Island, HI. PIFSC has no objectives or scientific operations for Leg II.

### **B. Days at Sea (DAS)**

Of the 17 DAS scheduled for Leg I, 0 DAS are funded by the program and 17 DAS are funded by OMAO. This project is estimated to exhibit a High Operational Tempo.

### **C. Operating Area**

The Operating Area for SE-15-03 Leg I is as follows:

The operating area includes Uracas (Farallon de Pajaros) and Maug within the MTMNM, and Agrihan, Pagan, Alamagan, and Sarigan within the Northern Mariana Islands (Figure 1).

The Operating Area for SE-15-03 Leg II is as follows:

There are no operations scheduled for Leg II; the vessel is to transit a route between Guam and Oahu as determined by the Commanding Officer of the Oscar Elton Sette.

#### D. Summary of Objectives

The ship will conduct scientific operations in the waters surrounding the Commonwealth of the Northern Mariana Islands and the Mariana Trench Marine National Monument. The scientific objectives of this project are as follows:

1. Traps will be deployed from the ship and a small boat deployed from the ship. These traps will target both fish and invertebrates over sandy bottoms in coastal areas throughout the archipelago. Samples collections will support CNMI Division of Fish and Wildlife research to characterize biodiversity over sandy bottom habitats within the Mariana Archipelago and the Barcode of Life project. Small boat work will focus on nearshore surveys while the ship will focus on offshore surveys, adjacent to Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.
2. Midwater trawl operations will be conducted in the nighttime and early morning to collect midwater larval and juvenile stages of pelagic and reef fish species as well as pelagic midwater fauna. Samples collections will support CNMI Division of Fish and Wildlife research to evaluate latitudinal shifts in trophic relations via stable isotope analysis of tissue samples and to characterize midwater biodiversity within the Mariana Archipelago. Samples collections will also support a University of Guam research proposal to evaluate genetic connectivity within the Mariana Archipelago and the Barcode of Life project. These trawling operations will take place in offshore waters adjacent to Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan. The gear will be the Cobb (Stauffer) midwater trawl deployed from the stern.
3. Plankton sampling operations will be conducted during the daytime using 2 types of nets ring nets deployed as vertical casts in the upper 100m. These operations will take place in offshore waters adjacent to Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan, as well as a station offshore of the port of Saipan.
4. The ship will collect oceanographic data from routine conductivity-temperature-depth (CTD) casts, continuous acoustic Doppler current profiler (ADCP), and thermosalinograph (TSG) measurements throughout the project. CTD casts will be conducted opportunistically at an offshore location immediately adjacent to Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.
5. Drifting night-light dip-netting operations off the port side longline pit will be conducted in the late evening to collect surface occurring larval and juvenile stages of pelagic and reef fish species. Samples collections may provide support for a University of Guam research proposal to evaluate genetic connectivity within the Mariana Archipelago. The conduct of these operations will be dependent on calm weather and surface current conditions. These operations will take place in offshore waters adjacent to Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.

6. Shallow-water and shore-based collections and surveys of organisms will be conducted at selected islands. Sette small boat will be used to put a small team of 3-4 scientists ashore for day excursions inland for collections and surveys. This operation will take place on a select subset of the islands of Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.

**E. Participating Institutions**

University of Guam (UG)

American Museum of Natural History (AMNH)

University of Hawaii at Manoa, Department of Oceanography (UHM)

University of Hawaii at Manoa, Joint Institute for Marine and Atmospheric Research (UHM JIMAR)

Hawaii Pacific University, Department of Marine Science (HPU)

Micronesian Environmental Services (MEL)

Northern Marianas College (NMC)

Northern Marianas Mayor's Office (NMI Mayor's Office)

NOAA NMFS Office of Science and Technology (NOAA-ST)

NOAA NMFS Pacific Islands Fisheries Science Center (NOAA-PIFSC)

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

#	Name (Last, First)	Title	Date Aboard	Date Disembark	Sex	Affiliation	Nationality
1.	Kobayashi, Donald	Chief Scientist	6/11/2015	6/27/2015	M	NOAA-PIFSC	USA
2.	Mooney, Eric	Operations Lead and Sette Trapping Lead	6/11/2015	6/27/2015	M	NOAA-PIFSC	USA
3.	Barlow, James	Small Boat Trapping Lead	6/11/2015	6/27/2015	M	NOAA-PIFSC	USA
4.	Shimada, Allen	Trawl Support	6/11/2015	6/27/2015	M	NOAA-ST	USA
5.	Cruz, Eric	Sette Trapping	6/11/2015	6/27/2015	M	NOAA-PIFSC	USA

		Support					
6.	Kawamoto, Erin	Trawl Support and Small Boat Trapping Support	6/11/2015	6/27/2015	F	UHM JIMAR	USA
7.	Denton, John	Trawl Lead	6/11/2015	6/27/2015	M	AMNH	USA
8.	Pardee, Cassandra	Sette Trapping Support	6/11/2015	6/27/2015	F	HPU	USA
9.	Van Heukelem, Lauren	Small Boat Trapping Support and Trawl Support	6/11/2015	6/27/2015	F	UHM	USA
10.	Miller, Allison	Trawl Support	6/11/2015	6/27/2015	F	UG	USA
11.	Drake, Diona	Sette Trapping Support	6/11/2015	6/27/2015	F	UG	USA
12.	Cabrera, Don	Sette Trapping Support	6/11/2015	6/27/2015	M	NMC	USA
13.	Flores, Anthony	Small Boat Trapping Support	6/11/2015	6/27/2015	M	MES	USA
14.	Taitano, Shirley Ann	Sette Trapping Support	6/11/2015	6/27/2015	F	MES	USA
15.	Wells, Brad	Small Boat Trapping Support	6/11/2015	6/27/2015	M	UG	USA

G. Administrative

1. Points of Contacts:

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Agent – for Port of Saipan; to be determined

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

The Chief Scientist will oversee the submission of required permit applications with federal and CNMI (CRMO and DFW) agencies in order to obtain approval to conduct all planned scientific operations in the waters of CNMI and the MTMNM prior to the start of the project.

## **II. Operations**

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

A. Project Itinerary:

The following operational plans can be considered only a guide as to how the Chief Scientist intends the surveys to progress without being able to predict the weather, operational and scheduling problems, and equipment failures. In particular, it should be noted that the transit time is approximate and may be altered based on weather or the progress of the survey. The specific order of islands is subject to change based on sampling success, weather, bottom habitat, and project needs. In particular, islands may be skipped or added, operations eliminated, or operations shortened to accommodate specific needs and conditions as they arise during the project. The following itinerary is based on a ship transit speed of 9.0 knots:

11 June -- All scientific party aboard in the morning. Anticipated morning departure from the Port of Saipan, begin transit to Pagan. Begin Leg I.

12 June -- Anticipated morning arrival at Pagan on the 12th. Launch small boat (Steel Toe) to conduct abbreviated habitat survey of the area in conjunction with the Sette to find location for kona crab trap gear testing (ring nets only) to work out survey protocol and familiarize science party and ship staff with this protocol. Small boat commences gear testing with kona crab ring nets. Sette commences gear testing with kona crab ring nets. Sette recovers small boat. Depart Pagan and begin transit to Uracas (Farallon de Pajaros).

13 June -- Anticipated evening arrival at Uracas (Farallon de Pajaros) on the 13th. Perform Cobb trawl testing if time allows and if this activity is deemed important. Sette commences habitat survey with bridge acoustics.

14-15 June -- At Uracas (Farallon de Pajaros) morning of 14th. Begin routine scientific operations spanning Day-1, Night-1, Day-2, and Night-2 as follows:

Day-1: Launch small boat (Steel Toe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-1: Conduct single Cobb midwater trawl in offshore area. Sette continues habitat survey with bridge acoustics if time allows.

Day-2: Launch small boat (Steel Toe) for full day of kona crab ring net trapping operations. Sette picks up enclosure traps in morning. Sette commences kona crab ring net trapping survey. Sette recovers small boat.

Night-2: Depending on conditions, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing. Depart Uracas (Farallon de Pajaros) and begin transit to Maug.

16-17 June -- Anticipated morning arrival at Maug on the 16th.

Day-1: Launch small boat (Steel Toe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-1: Conduct single Cobb midwater trawl in offshore area. Sette continues habitat survey with bridge acoustics if time allows.

Day-2: Launch small boat (Steel Toe) for full day of kona crab ring net trapping operations. Sette picks up enclosure traps in morning. Sette commences kona crab ring net trapping survey. Sette recovers small boat.

Night-2: Depending on conditions, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing. Depart Maug and begin transit to Agrihan.

18-19 June -- Anticipated morning arrival at Agrihan on the 18th.

Day-1: Launch small boat (Steel Toe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-1: Conduct single Cobb midwater trawl in offshore area. Sette continues habitat survey with bridge acoustics if time allows.

Day-2: Launch small boat (Steel Toe) for full day of kona crab ring net trapping operations. Sette picks



up enclosure traps in morning. Sette commences kona crab ring net trapping survey. Sette recovers small boat.

Night-2: Depending on conditions, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing. Depart Agrihan and begin transit to Pagan.

20-22 June -- Anticipated morning arrival at Pagan on the 20th. This location will have a 3 day and 3 night suite of operations.

Day-1: Launch small boat (Steel Toe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-1: Conduct single Cobb midwater trawl in offshore area. Sette continues habitat survey with bridge acoustics if time allows.

Day-2: Launch small boat (Steel Toe) for full day of kona crab ring net trapping operations. Sette picks up enclosure traps in morning. Sette commences kona crab ring net trapping survey. Sette deploys replicate 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-2: Depending on conditions and staffing, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing, or replicate Cobb midwater trawl.

Day-3: Launch small boat (Steel Toe) for full day of kona crab ring net trapping operations. Sette picks up enclosure traps in morning. Sette commences kona crab ring net trapping survey. Sette recovers small boat.

Night-3: Depending on conditions and staffing, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing, or replicate Cobb midwater trawl. Depart Pagan and begin transit to Alamagan.

23-24 June -- Anticipated morning arrival at Alamagan on the 23rd. This location will have an abbreviated 1 day and 1 night suite of operations.

Day-1: Launch small boat (Steel Toe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-1: Conduct single Cobb midwater trawl in offshore area.

Day-2: Sette picks up enclosure traps in morning. Depart Alamagan and begin transit to Sarigan.

24-26 June -- Anticipated evening arrival at Sarigan on the 24th.

Night-1: Conduct single Cobb midwater trawl in offshore area. Sette continues habitat survey with bridge

acoustics if time allows.

Day-1: Launch small boat (SteelToe) to conduct habitat survey of the area in conjunction with the Sette using acoustics and bottom sampling devices. Small boat commences trapping with kona crab ring nets if time allows. Sette conducts CTD and surveys anticipated Cobb trawl track-line. Sette commences trapping with kona crab ring nets and optionally coupled with optical equipment deployments if time allows. Sette deploys 2 strings of enclosure traps and stand-alone colossal trap for overnight soak. Sette recovers small boat.

Night-2: Depending on conditions, some choice or combination of nightlighting, dipnetting, squid jigging, bottomfishing.

Day-2: Launch small boat (Steel Toe) for partial day of kona crab ring net trapping operations. Sette picks up enclosure traps in morning. Sette commences kona crab ring net trapping survey if time allows.

Recover small boat and secure operations by midday; depart Sarigan transit to Saipan. Arrive at Saipan; disembark scientific field party via small boat. Depart Saipan; commence transit to Apra Harbor Guam.

27 June -- Arrive Apra Harbor Guam; end of Leg I.

## **B. Staging and Destaging:**

### **1. Staging**

Prior to departure from Ford Island:

Assistance from the ship's personnel will be required to crane aboard small boat fuel, small boat cradle, and small boat; and to set up and connect scientific party electronics.

Prior to sailing from Ford Island on 20 April 2015, the ship's crew will inspect the port- and starboard-side J-frames and associated oceanographic winches, the hydraulic pot-hauler, conducting cable and DESH-5 winch for CTD operations, the RD Instruments ADCP and associated computer and software, 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 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 EK60 transducer faces). The SeaBird 9/11+CTD system and frame, and the SEACAT portable CTD will be installed and inspected ensuring 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 scientific small boats will be operational and ready to be deployed prior to sailing. The Program requests that the Chief Electronics Technician and any other knowledgeable ship staff ensure that the submersible night-light in the wet lab be checked for functionality. The wet lab central table sink and garbage disposal should be checked for full functionality including running seawater in that sink, and functional drains in both wet lab sinks. The Program requests that the Survey Technician be available for CTD casts with exact schedule to be determined but might include morning (0700-0800) and evening (1800-1900) casts. The Program requests that the 3 port-side

hydraulic fishing reels and connections be checked for leaks and full functionality for handline fishing/jigging to depths of up to 1000m. All power to critical electronic components such as the Simrad GPTs should be checked for clean power signals using the appropriate electronic testing apparatus. If the power is not adequately clean, a separate power cleaning device for the GPTs will be installed.

Six fuel drums will be fueled prior to the project to re-supply fuel daily to the three NOAA small boats (SE-4, SE-6, and SE-2) during trapping and other small boat operations planned to be conducted on this project. Alternative fuel storage and delivery means may be explored and utilized as deemed necessary.

Prior to departing Ford Island on 20 April, scientists and crew will load the PIFSC SE-6.

Dates and equipment/personnel needed for loading of scientific equipment will be provided to the ship no later than 30 days prior to sailing.

## **2. Destaging**

Dates and equipment/personnel needed for off-loading scientific equipment will be provided to the ship no later than 30 days prior to sailing.

### **C. Operations to be Conducted:**

The following operational plans can be considered only a guide as to how the Chief Scientist expects the surveys to progress without being able to predict the weather, operational and scheduling problems, and equipment failures. In particular, it should be noted that the amount of time required at each of the working areas is approximate and may be altered based on weather or the progress of the survey.

The Chief Scientist has the authority to revise or alter the technical portion of the instructions as work progresses, provided that, after consultation with the Commanding Officer, it is ascertained that the proposed changes will not (1) jeopardize the safety of personnel or the ship, (2) exceed the overall time allotted for the project, (3) result in undue additional expenses, and (4) alter the general intent of the project instructions. In addition, the Chief Scientist must notify the Office of the Director of the Pacific Islands Fisheries Science Center at the earliest opportunity prior to making: (1) deviations from the general project track or area of operations noted in the project instructions, (2) significant changes or additions of research operations to those specified in the project instructions, or (3) port calls not specifically identified in the project instructions.

## **1. Station Operations**

**a.) Daily small boat launches:** The conduct of all small boat operations will require the use of at least one and possibly two of the NOAA small boats daily while on station. Small boat operations will use SE-

4, SE-6, and SE-2; operations will be conducted when weather permits and in adhering to GAR assessments. A daily meeting will be held to discuss that day's small boat operations for the NOAA small boats and to assess the conditions likely to be encountered on the water that day. Small boat deployments are tentatively scheduled to start at 0800 daily while working at MTMNM and CNMI island locations and return to the Sette approximately at 1630 daily.

a.1.) **Small boat based trapping surveys:** Conduct small boat based trapping surveys aboard SE-6 for benthic fauna in the nearshore soft-bottom waters of each island. Trapping survey operations include deployment and recovery of kona crab ring net traps attached to a length of line. Trapping survey operations will use Program-provided coxswain. Trapping survey operations will commence around each island, potentially resulting in loss of radio contact between the ship and SE-6. Satellite phone communication will be maintained on a designated schedule when radio communication is not possible. Trapping survey operations will continue until approximately 1630 unless weather or other shipboard operations require earlier return to Sette. Depending on catch magnitude and processing burden there may be routine touch-and-go transfers of small containers of ring nets and catch between SE-6 and Sette. These transfers will be coordinated with Sette trapping activities.

**Ship Equipment Required:** The ship will provide the crane, hard hats, and PFDs necessary for small boat operations.

**Ship Personnel Requirements:** Ship personnel are required for launching/recovering SE-6 and for participating in introductory small boat briefing.

a.2.) **Snorkel surveys, biosampling, and shore based surveys via SE-4 and/or SE-2.** This team will deploy opportunistically as time, staffing, and small boat fuel allows. This activity is particularly likely to occur at Pagan and Alamagan.

**Ship Equipment Required:** Snorkel survey and biosampling team will be deployed and recovered using SE-4 and/or SE-2. The ship will provide the crane, hard hats, and PFDs necessary for small boat operations and loading gear onto the small boat.

**Ship Personnel Requirements:** Ship personnel are required for launching the small boat(s) and for participating in introductory small boat briefing. Snorkel survey and biosampling operations will require ship coxswain and one crew member.

**b.) Ship based trapping surveys:** Conduct ship based trapping surveys for benthic fauna in the offshore soft-bottom waters of each island. Ship based trapping survey operations include deployment and recovery of several types of traps alternating on a length of line. Ship based trapping survey operations will continue until approximately 1600 unless weather or other shipboard operations require earlier termination. This operation will deploy gear from the longline pit area on the port side, and will require use of the port J-frame with a hydraulic line-hauler or pot-hauler to recover the gear. Depending on equipment availability and depth, some of the gear will be set with optical recording devices.

**c.) Cobb midwater trawling:** Net sampling of midwater fauna will be conducted at a single station along each of the 6 surveyed islands of the Mariana Archipelago using the dual warp Cobb (Stauffer) trawls. A single stern Cobb trawl will be conducted on 6-7 selected nights at approximately 2100. Oblique

sampling (stepped at 4 intervals) will be accomplished from the surface to ~600m depths with 1600m maximum wire out and 30 minute duration at each depth following EQ (depth equilibrium assumed 15 minutes after wire adjustments completed). Trawl duration will be approximately 4h in total length, with net depth monitored using TDRs. Bioacoustic data from the Simrad EK60 will be collected during all trawl operations.

**d.) Plankton sampling:** Net sampling of plankton will be conducted at a single station along each of the 6 surveyed islands of the Mariana Archipelago using 2 types of plankton nets deployed as vertical casts from the surface to ~100m depths. This activity will also take place at a station offshore of the port of Saipan. Nets will be deployed from the longline pit, allowed to sink vertically to ~100m and then retrieved by hand or with the hydraulic pot-hauler. Three replicates with each type of net will be conducted at each of the stations.

**e.) Oceanographic operations:** Conduct an early evening shipboard CTD cast in offshore waters adjacent to each area worked within the MTMNM and CNMI during the project. The CTD will be equipped with both a WetLab profiling and Seapoint flow-through fluorometer (for comparison between flow-through and non-flow-through sensors), redundant dissolved oxygen sensors, and a 12-Niskin water bottle carousel rosette sampler (no water samples are planned to be taken on this project however).

Ship Speed, Order of Operations: All casts are to be engaged to a depth range of 1000 m, where bottom depths permit. When bottom depths are too shallow for the 1000-m cast, the Chief Scientist and ship's Survey Technician will determine a safe depth for the cast and notify the bridge prior to operations. Cast descent rates will be 30 m/min for the first 100 m of the cast, then 60 m/min after that, including the upcast between bottles. Cast times are subject to change given daily small boat and other operations schedules. Additional CTD stations may be requested by the Chief Scientist in areas of special interest.

Ship Equipment Required: The ship will provide the Sea-Bird CTD system, which will be maintained and operated by the ship's Survey Technician. The crew of the vessel will operate the winch and other deck equipment and will be responsible for the termination (and any necessary reterminations) of the CTD cable pigtail to the conducting cable of the winch. All instruments, their spares, and spare parts provided by the ship must be maintained in working order and, if applicable, have current calibrations (within the previous 12 months). The PIFSC will provide a set of sensors to be used on all casts; conducting CTD casts with dual sensors provides immediate feedback about the performance of the sensors and the validity of the data. To ensure longevity of the CTD and bottles, the CTD must be rinsed completely with fresh water after every cast, and the CTD and rosette must then be covered and secured.

Ship Personnel Requirements: The ship's Survey Technician will be responsible for the CTD operations and maintenance. Designated scientists can assist with sample collection and analysis. The Deck Department will provide the needed personnel to assist with CTD deployment.

**f.) Gurdy fishing/squid jigging:** Conduct hydraulic gurdu fishing or pole fishing off the port side of the ship in the late evening or night as time permits. Mandatory safety meeting will be conducted prior to any gurdu fishing operations.

**g.) Night-light dipnetting:** Conduct a nightly drifting night-light operation while working within the MTMNM and CNMI. On a time and weather available basis, a late evening drifting night-light operation

will be conducted alongside the port side longline pit at each island visited during the project. The light attracted larval and early juvenile stages fish and invertebrates will be sampled using dip-nets and traps.

## **2. Underway Operations**

Current velocity will be continuously monitored with an ADCP, while surface temperature, salinity, and chlorophyll-a will be monitored with a hull-mounted thermosalinograph and flow-through fluorometer throughout the duration of the project.

### **a.) Oceanography:**

Ship Speed, Order of Operations: A chronological record of oceanographic stations (CTD, XBT, and surface water samples) will be kept by the ship with locations, dates, and times in GMT using SCS. The ship will provide a copy of SCS data and the Weather Log to the Chief Scientist at the completion of the project.

Ship Personnel Requirements: The collection of oceanographic samples and their processing will be conducted by the ship's Survey Technician and other designated scientists with assistance from the Deck Department as required.

a.1.) Acoustics: The scientific EK60 depth sounder will be operated continuously at 38, 70, 120, and 200 KHz.

Ship Speed, Order of Operations: The vessel's navigational depth sounder may be used at the discretion of the Commanding Officer, but will normally remain off while underway in deep waters. The navigational depth sounder aboard NOAA Ship *Sette* is known to interfere with the EK60 scientific sounder. Since synchronization may not be possible, the navigational sounder should remain off when not in shallow water. The ship's navigational depth sounders will be on when the ship is inshore in depths of 30 fathoms or less. The command will inform the Chief Scientist or Shipboard Operations Lead at any time the navigational depth sounders are used. The Chief Scientist or an acoustic technician may secure one or more channels of the EK60 to obtain higher quality passive acoustic recordings. The science party will request permission from the bridge in advance of securing an EK60 channel(s), and will notify the bridge when the channel(s) has been turned back on.

Ship Equipment Required: The EK60 will be interfaced to a data acquisition system to estimate micronekton biomass between 0 and 1,000 m.

Ship Personnel Requirements: Needle gunning creates interference within the passive and active acoustics systems and is therefore generally not permitted during the project. Specific requests for needle gunning in specific spaces that are less likely to impact acoustics operations will be considered and discussed by the Chief Scientist, acoustics team, and Operations Officer.

### **3. Mitigation Measures for Protected Species during Scientific Operations**

#### **3.1. Monitoring methods**

The officer on watch, Chief Scientist (CS) (or other designated member of the Scientific Party), and small boat crew will visually scan for marine mammals, sea turtles, and other ESA-listed species (protected species) during all fishing and over-the-side operations. The member of the crew designated to stand watch for marine mammals is dedicated to that function and visually scans the waters surrounding the vessel prior to the planned start of putting CTD, Cobb trawl, IK trawl, traps, or night-light into the water.

#### **3.2. Operational procedures**

“Move-On” Rule. If any marine mammals or sea turtles are sighted anywhere around the vessel in the 30 minutes before setting any gear, the vessel may be moved away from the animals to a different section of the sampling area if the animals appear to be at risk of interaction with the gear at the discretion of the officer on watch in consultation with the CS. Small moves within the sampling area can be accomplished without leaving the sample station. After moving on, if marine mammals or sea turtles are still visible from the vessel and appear to be at risk, the officer on watch may decide, in consultation with the CS, to move again or to skip the station. The officer on watch will first consult with the CS or other designated scientist and other experienced crew as necessary to determine the best strategy to avoid potential takes of these species based on those encountered, their numbers and behavior, position and vector relative to the vessel, and other factors. For instance, a whale transiting through the area and heading away from the vessel might not require any move or only require a short move from the initial sampling site while a pod of dolphins gathered around the vessel may require a longer move from the initial sampling site or possibly cancellation of the station if they follow the vessel. In most cases, trawl gear is not deployed if marine mammals have been sighted from the ship in the previous 30 minutes unless those animals do not appear to be in danger of interactions with the trawl, as determined by the judgment of the CS and officer on watch. The efficacy of the “move-on” rule is limited during night time or other periods of limited visibility; although operational lighting from the vessel illuminates the water in the immediate vicinity of the vessel during gear setting and retrieval.

#### **D. Dive Plan**

No SCUBA diving will be conducted for this project. Snorkeling may occur from the Sette SE-2 and SE-4 for snorkel surveys/biosampling. It is requested that the OPS officer perform snorkel certifications for all personnel engaging in this activity.

#### **E. Applicable Restrictions**

## I. "Take" of Protected Species

- a. Under the Marine Mammal Protection Act and Endangered Species Act 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 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. Photos of the incidentally caught animal should be taken to properly identify the species, but the process of taking the photos must not contribute to the further injury of the animal. These photos are for the purposes of internal NMFS verification only, and must not be shared outside of PIFSC or the Office of Protected Resources (i.e., do not post the photos on the internet).
- c. As described at II. C. 3. (above), PIFSC has developed mitigation measures for our fisheries and ecosystem research projects to avoid take and comply with the Lecky, Murawski, and Merrick guidance. A copy of these documents is also 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.

## III. Equipment

### A. Equipment and Capabilities Provided by the Ship

- CTD system and heavy duty cage assembly
- 12 complete Niskin bottles, with at least enough spare parts to replace 4 bottles
- Port J-frame and open block for tows
- Port J-frame and hydraulic line-hauler for trapping operations
- Starboard J-frame and block for CTD
- Oceanographic winches and cables (port and starboard)
- SEACAT portable CTD with backup
- Deck cranes with 600-lb static-lift block (for SafeBoat deployment/recovery)
- Thermosalinograph
- RD Instruments ADCP and associated computer and software
- EK60 and ES60 echosounder system at the frequencies of 38 kHz, 70 kHz, 120 kHz, and 200 kHz
- GPS navigational system
- Depth sounders and recorders
- Scientific freezer, kept between -30° and -20°C at all times
- Two-way radios for communication from the electronics lab to the winch operator
- Operational Scientific Computing System (SCS)



- Navigational equipment and course plotter
- Supplies necessary for at least two re-terminations of the J-frame conducting cable
- Adequate fresh water for gear wash down
- Iridium phone
- A minimum of 2 terabyte shared network space
- Sette hydraulic handling gurdies (3) for day and/or night bottomfish sampling
- Small boat SE-4 and SE-2, including spare parts
- One hip tank and fuel racks to hold 6 55 gallon drums
- Refrigerator and freezer space for biological and oceanographic samples and satellite tags
- Copy machine
- Network access to a printer
- Internet access, with notification if privileges are removed

Capabilities: It is requested that the ship provide the following:

- Permission for the scientific party to ready scientific spaces (e.g. set up computer server, acoustic array work station and battery bank, etc.) the 2 days prior to departure from Guam
- Assistance from the ship's deck department with the crane for staging and destaging.
- Daily lunches provided from the stewards department for small boat operations.

#### **B. Equipment and Capabilities Provided by the Scientists**

- Weight scales and measuring calipers
- Water filtration equipment (vacuum pump, filtering ring, filters, forceps, etc.)
- WetLabs profiling and SeaPoint flow-through fluorometers
- Redundant dissolved oxygen sensors
- Sample collection jars
- Turner 10-AU Fluorometer
- Two laboratory dissecting microscopes
- Laboratory glassware (e.g., Erlenmeyer flasks, graduated cylinders)
- External hard drives (1-2 TB) for data common storage and backup.
- PIFSC SafeBoat and cradle
- Electric handline gurdies and line-hauler for SafeBoat
- Traps and supplies for SafeBoat and Sette trapping operations
- Frozen bait (40 cases sardines, squid, and saury)
- Fuel (6-55 gal barrels) for SafeBoats
- Cobb trawl, nets, cod-ends, and bridles; other plankton/neuston survey gear
- Dipnets, handline, and jigging gear for gurdies
- Two dissecting microscopes, trays, trawl processing equipment
- Four computers for forward E-lab and wet lab.
- Knives and other tools for processing and measuring trap catch
- Six handheld radios
- Permits for specimen collection

- Computers data storage media (external hard drives)
- Two external hard drives for EK60 data storage
- Oceanographic gear
- Two pallet tubs (one full-sized and one half-sized) containing parts and equipment for *Steel Toe*
- Two pallet tubs (both full-sized) containing trawling and trapping equipment.

#### **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	Concentration	Amount	Notes
Formalin	10%	5-gal	Stored in Wet Lab HazMat cabinet
Ethanol	95%	20-gal	Stored in Wet Lab and Hydro Lab HazMat cabinets
Acetone	100%	2-gal	Stored in Wet Lab and Hydro Lab HazMat cabinets
Gasoline, unleaded		300-gal	Stored in 6 drums in quick release rack on boat deck

#### 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.

##### M: Mercury

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

**F: Formalin/Formaldehyde**

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

**D. Radioactive Materials**

No Radioactive Isotopes are planned for this project.

**V. Additional Projects**

**A. Supplementary (“Piggyback”) Projects**

No Supplementary Projects are planned.

**B. NOAA Fleet Ancillary Projects**

Ancillary tasks will be accomplished in accordance with the NOAA Fleet Standing Ancillary instructions as long as they do not interfere with primary mission objectives.

**VI. Disposition of Data and Reports**

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

**A. Data Classifications: *Under Development***

**a. OMAO Data**

**b. Program Data**

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

**VII. Meetings, Vessel Familiarization, and Project Evaluations**

- A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer 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 <http://www.oma.noaa.gov/fleeteval.html> and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

## **VIII. Miscellaneous**

### **A. 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](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](mailto: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: Include only the Pacific OR Atlantic Office as applicable.

Regional Director of Health Services  
Marine Operations Center – Atlantic  
439 W. York Street  
Norfolk, VA 23510  
Telephone 757-441-6320  
Fax 757-441-3760  
Email [MOA.Health.Services@noaa.gov](mailto:MOA.Health.Services@noaa.gov)

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](mailto: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

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

### VIII. Appendices

**Table 1 - Island and station locations for SE-15-03 Leg I (June 11 – June 27, 2015). Island location and location of presumptive scientific operation stations are given for Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.**

**Fig. 1 - Project map for SE-15-03 Leg I (June 11 – June 27, 2015). Stars denote potential locations of scientific operations at Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.**



**Table 1 - Island and station locations for SE-15-03 Leg I (June 11 – June 27, 2015). Island location and location of presumptive scientific operation stations are given for Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.**

<b>Island</b>	<b>Latitude</b>	<b>Longitude (island)</b>	<b>Longitude (station)</b>
<b>Uracas (Farallon de Pajaros)</b>	<b>20.54° N</b>	<b>144.90° E</b>	<b>144.80° E</b>
<b>Maug</b>	<b>20.02° N</b>	<b>145.22° E</b>	<b>145.12° E</b>
<b>Agrihan</b>	<b>18.77° N</b>	<b>145.67° E</b>	<b>145.57° E</b>
<b>Pagan</b>	<b>18.13° N</b>	<b>145.80° E</b>	<b>145.70° E</b>
<b>Alamagan</b>	<b>17.60° N</b>	<b>145.83° E</b>	<b>145.73° E</b>
<b>Sarigan</b>	<b>16.71° N</b>	<b>145.78° E</b>	<b>145.68° E</b>

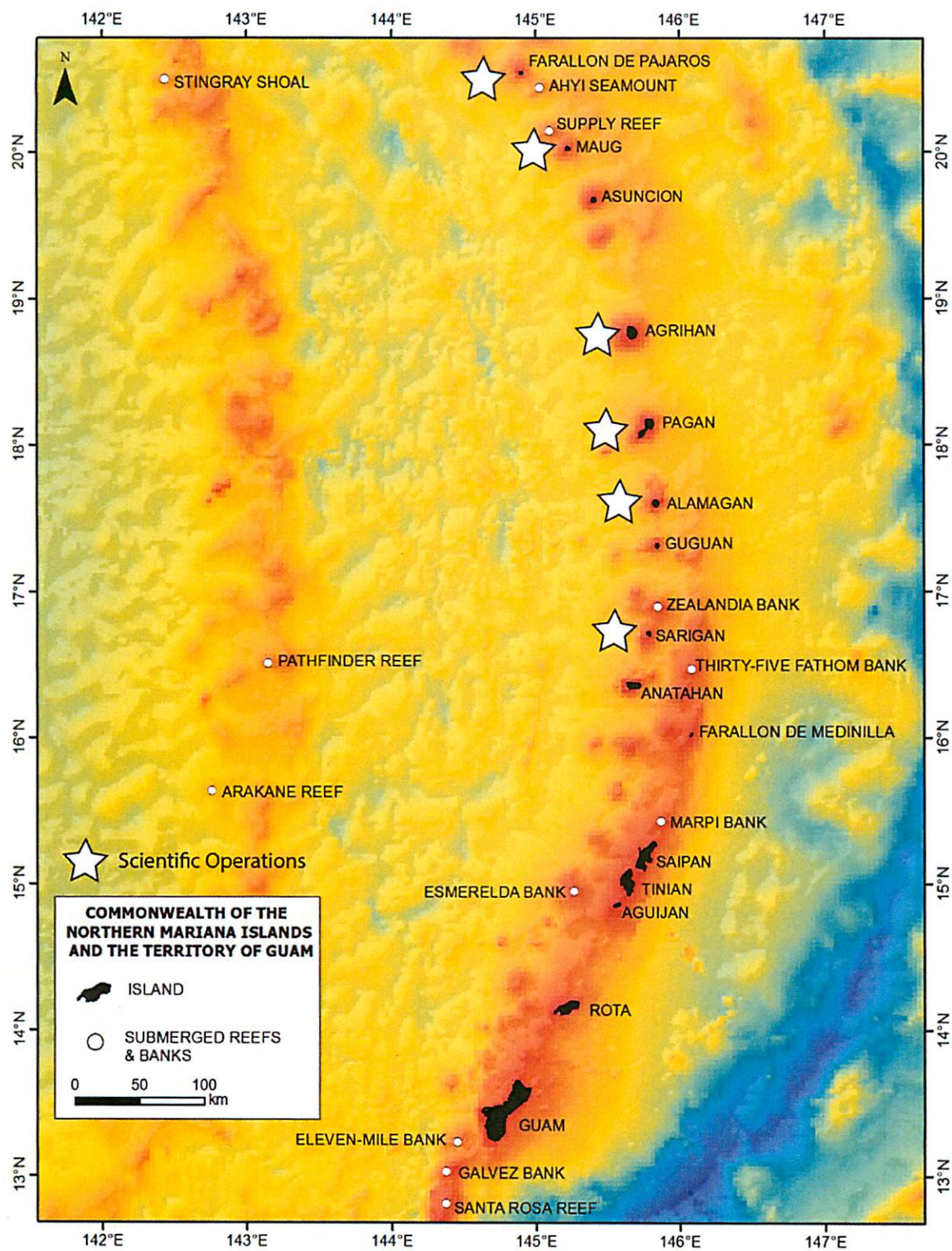


Fig. 1 - Project map for SE-15-03 Leg I (June 11 – June 27, 2015). Stars denote approximate locations of scientific operations at Uracas (Farallon de Pajaros), Maug, Agrihan, Pagan, Alamagan, and Sarigan.