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National Oceanic and Atmospheric Administration
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FINAL Project Instructions

Date Submitted:	February 17, 2014
Platform:	NOAA Ship *Hi'ialakai*
Project Number:	HA-14-01 (OMAO)
Project Title:	MARAMP (Mariana RAMP)
Project Dates:	March 5, 2014 to June 5, 2014

Prepared by: _____ Dated: 2/27/14

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Commander Robert A. Kamphaus, NOAA
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I. Overview

A. Brief Summary and Project Period

NOAA Ship *Hi'ialakai* will be engaged as support for the Mariana Reef Assessment and Monitoring Program (MARAMP) from March 5 through June 5, 2014, for a total of 84 days at sea (DAS). These Project Instructions address detail activities occurring on Legs I, II and III. Details for Leg IV will be submitted in an Amendment to these Project Instruction.

MARAMP is a component of an integrated coral reef ecosystem assessment led by the Coral Reef Ecosystem Division (CRED) of the Pacific Island Fisheries Science Center (PIFSC) in some 50 U.S.-affiliated Pacific Islands. This comprehensive, multi-agency research and education effort is sponsored by NOAA's Coral Reef Conservation Program (CRCP), a partnership between the National Marine Fisheries Service, National Ocean Service, and other NOAA agencies with the objective of improving understanding and management of coral reef ecosystems.

Small boats will be deployed from *Hi'ialakai* to reach dive survey areas around Wake Island, Guam, and the Northern Mariana Islands of Rota, Aguijan, Tinian, Saipan, Sarigan, Zealandia Bank, Pagan, Asuncion, Farallon de Pajaros, Supply Reef, Maug, Agrihan, Alamagan, and Guguan. Teams of scuba divers will conduct fine-scale, rapid ecological assessment (REA) surveys of reef fishes, corals, other invertebrates, and algae. Towed-divers will conduct surveys of larger (>50cm) reef fish, benthic cover, and macroinvertebrates. Taxonomic diversity of coral reefs will be evaluated by retrieving autonomous reef monitoring structures (ARMS) previously placed on the seafloor.

Scientists will collect data to monitor nearshore physical and ecological factors associated with ocean acidification and general water quality, including data on water temperature, salinity, and other physical and biological characteristics of the coral reef environment using an assortment of oceanographic sampling and monitoring instruments, including systems deployed from the ship, underwater moored instruments, and shipboard sensors.

Data collected during this mission are pivotal to long-term biological and oceanographic monitoring of coral reef ecosystems at Wake Island and the Mariana Archipelago. The 2014 expedition will add to information collected during previous monitoring and mapping surveys conducted in 2003, 2005, 2007, 2009, and 2011. Data on the abundance and spatial distribution of reef fishes, invertebrates, corals, and algae will allow scientists to evaluate potential changes in the condition and integrity of coral reef ecosystems in these areas and enable federal and jurisdictional resource managers to more effectively conserve these coral reef ecosystems and manage ecosystem services. Data collected during the

project also support monitoring components of the CRCP Coral Reef Ecosystem Integrated Observing System (CREIOS) in the Pacific.

B. Service Level Agreements

Of the 84 DAS scheduled for this project, 84 DAS are funded by an OMAO Allocation. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area

The Operating Area for each leg of HA-14-01 follows:

Leg I: The operating area includes transit across the central and western Pacific Ocean, from Pearl Harbor, Hawaii to Apra Harbor, Guam, with dive operations occurring en route at Wake Island and at Guam (*Appendix 1*).

Leg II: The operating area includes Guam and the Commonwealth of the Northern Mariana Islands (CNMI: Rota, Aguijan, Tinian, and Saipan) (*Appendix 2*).

Leg III: The operating area includes the Commonwealth of the Northern Mariana Islands (CNMI: Saipan, Sarigan, Zealandia Bank, Pagan, Asuncion, Farallon de Pajaros, Supply Reef, Maug, Agrihan, Alamagan, and Guguan) (*Appendix 3*) as well as the return transit across the western and central Pacific Ocean, from Saipan to Pearl Harbor, Hawaii.

Leg IV: The operating area for Leg IV will be submitted in an Amendment to these Project Instructions.

The Station/Waypoint List for Legs I through III of the cruise is presented in *Appendix 4* (attached file). Waypoints for Leg IV will be included in an Amendment to these Project Instructions.

D. Summary of Objectives

The ship will support assessment and monitoring operations in the waters surrounding Wake Island, Guam, and the Commonwealth of the Northern Marianas. The scientific objectives of this project are to:

1. Conduct ecosystem monitoring of the species composition, abundance, percent cover, size distribution, recruitment and general health of the

fishes, corals, other invertebrates, and algae of the shallow water (< 35 m) coral reef ecosystems of Wake Island, Guam and the CNMI.

2. Deploy, retrieve and/or service an array of Subsurface Temperature Recorders (STRs), Sea Surface Temperature (SST) Buoys, Autonomous Reef Monitoring Structures (ARMS), Calcification Accretion Units (CAUs), and Bioerosion Monitoring Units (BMUs) to allow remote long-term monitoring of oceanographic and environmental conditions affecting the coral reef ecosystems of Wake Island, Guam and the CNMI. This effort is in support of the Coral Reef Ecosystem Integrated Observing Systems (CREIOS).

3. Monitor nearshore physical and ecological factors associated with ocean acidification and general water quality, including analysis of seawater for nutrients, chlorophyll concentration, salinity, temperature, dissolved oxygen, transmissivity, total alkalinity and dissolved inorganic carbon. These parameters will be measured via the collection of water in Niskin bottles and conductivity-temperature-depth (CTD) casts. Shallow-water CTDs will be conducted from small boats to a depth of ~30 m. Programmable underwater sample collectors (PUCs) will also be used to remotely collect discrete water samples at times otherwise unachievable through the more traditional, daytime-limited, sampling conducted by RAMP divers.

4. Collect shallow water coral cores to examine calcification/growth rates in recent decades and assess potential early impacts of ocean acidification. Coring operations will be conducted opportunistically (as a scientific dive).

5. Conduct shipboard CTD measurements to a depth of 500 m and shipboard Acoustic Doppler Current Profiler (ADCP) surveys around reef ecosystems to examine physical and biological linkages supporting and maintaining the island ecosystems.

6. Collect oceanographic data utilizing ship-based measurement systems (ADCP, ThermoSalinoGraph - TSG, Partial Pressure of Carbon Dioxide - pCO2, and the Scientific Computer System - SCS) during all transits for the duration of the project.

7. Conduct investigations of marine microbial communities, including the collection of specimens via water sampling, plankton tows, and benthic grab samples.

8. Determine the existence of threats to the health of these coral reef resources from anthropogenic sources, including marine debris.

E. Participating Institutions (Legs I, II and III)

- Joint Institute for Marine and Atmospheric Research (JIMAR)
- NOAA Pacific Islands Fisheries Science Center:
  - Coral Reef Ecosystem Division (CRED)
- NOAA Diving Program (NDP)
- San Diego State University (SDSU)
- NOAA National Centers for Coastal Ocean Science (NCCOS)
- Open Boat Films
- National Marine Fisheries Service, Pacific Islands Regional Office (PIRO)

F. Personnel / Science Party (Legs I, II and III)

Note: A full scientific complement is anticipated for Leg IV. Participating staff will be identified in the Leg IV Amendment.

Name (Last, First)	Title	Embark	Disembark	Gender	Affiliation	Nationality
Abdul, Jesse	Data Manager	4/15/2014	5/8/2014	Male	CRED/JIMAR	USA
Asher, Jacob	Fish REA Diver	3/5/2014	4/1/2014	Male	CRED/JIMAR	USA
Ayotte, Paula	Fish REA Diver	3/5/2014	5/8/2014	Female	CRED/JIMAR	USA
Bailey, Hatsue	Benthic REA Diver	3/5/2014	4/14/2014	Female	CRED/JIMAR	JPN (USA Perm. Resident)
Bostick, James	Chamber Operator / Dive Master	3/5/2014	5/8/2014	Male	NDP	USA
Clark, Jeanette	Instrumentation Diver	4/15/2014	5/8/2014	Female	CRED/JIMAR	USA
Coccagna, Edmund	Fish REA Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
Dunlap, Matthew	Benthic Tow Diver	4/15/2014	5/8/2014	Male	CRED/JIMAR	USA
Ferguson, Marie	Benthic Tow Diver	3/5/2014	5/8/2014	Female	CRED/JIMAR	USA
Garriques, Joao	Benthic REA/Tow Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
George, Emma	Microbial Diver	3/5/2014	4/14/2014	Female	SDSU	USA
Giuseffi, Louise	CTD Specialist	3/5/2014	4/14/2014	Female	PIFSC/SCI-OP	USA
Gordon, Stephani	CTD Specialist	4/15/2014	5/8/2014	Female	Open Boat Films/ Contractor	USA
Gorospe, Kelvin	Fish REA Diver	4/2/2014	5/8/2014	Male	CRED/JIMAR	USA
Gove, Jamison	Instrumentation Diver	3/5/2014	4/1/2014	Male	CRED/JIMAR	USA
Gray, Andrew	Fish REA/Tow Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
Heenan, Adel	Fish REA Diver	3/5/2014	4/1/2014	Female	CRED/JIMAR	ENG
Lino, Kevin	Fish REA/Tow Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
Little, Mark	Microbial Diver	4/15/2014	5/8/2014	Male	SDSU	USA
McCoy, Kaylyn	Fish REA Diver	4/2/2014	4/14/2014	Female	CRED/JIMAR	USA

McKagan, Steve	ARMS/Instrument	4/2/2014	4/14/2014	Male	NMFS/PIRO	USA
Morioka, James	ARMS/Instrument Fish REA Diver	3/5/2014	4/14/2014	Male	CRED/JIMAR	USA
O'Brien, Kevin	Operations Lead / Benthic Tow Diver	3/5/2014	4/1/2014	Male	CRED/JIMAR	USA
Pomeroy, Noah	Instrumentation Diver	4/15/2014	5/8/2014	Male	CRED/JIMAR	USA
Reardon, Kerry	ARMS/Instrument Diver	4/15/2014	5/8/2014	Female	CRED/JIMAR	USA
Reardon, Russell	Operations Lead/ Instrument/ARMS Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
Schumacher, Brett	Benthic Diver	4/15/2014	5/8/2014	Male	CRED/JIMAR	USA
Sudnovsky, Max	ARMS/Instrument Diver	3/5/2014	4/14/2014	Male	CRED/JIMAR	USA
Swanson, Dione	Benthic REA Diver	3/5/2014	4/14/2014	Female	CRED/JIMAR	USA
Timmers, Molly	ARMS/Instrument Diver	3/5/2014	5/8/2014	Female	CRED/JIMAR	USA
Trick, Kevin	Data Manager	3/5/2014	4/14/2014	Male	CRED/JIMAR	USA
Vargas-Ángel, Bernardo	Chief Scientist / Benthic REA Diver	4/2/2014	5/8/2014	Male	CRED/JIMAR	COL (USA Perm. Resident)
Williams, Ivor	Fish REA Diver	4/15/2014	5/8/2014	Male	CRED (FED)	USA
Young, Charles	Instrumentation Diver	3/5/2014	5/8/2014	Male	CRED/JIMAR	USA
Zamzow, Jill	Chief Scientist/Fish Tow Diver	3/5/2014, 4/15/2014	4/1/2014, 5/8/2014	Female	CRED/JIMAR	USA

G. Administrative

1. Points of Contact

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* The Leg I Chief Scientist and Project Operations Lead are the designated program points of contact for all project planning and pre-departure correspondence with the ship.

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This project will be conducted with all the appropriate permits in place. Permit numbers, permit holders and date ranges will be provided via Project Instruction Amendment once the permit approvals are received.

In order to conduct monitoring surveys and sample collections in the waters of Wake Island within the Pacific Remote Islands Marine National Monument, letters of notification and request for support have been submitted to the Base Commander, Wake Island and the Chief, Support Agreements, 15th Airlift Wing.

CRED is currently working through the permitting process for the following agencies/acts in order to conduct all planned scientific operations in the waters of Guam and the CNMI:

a. US National Park Service, Guam: Scientific Research and Collecting Permit
b. US Fish and Wildlife Service, Guam National Wildlife Refuge: Special Use Permit for RAMP in or around Ritidian Point

c. Department of Agriculture and Wildlife Resources, Guam: RAMP collection and monitoring activities within Guam Marine Preserves
d. CNMI Department of Lands and Natural Resources, Division of Fish and Wildlife: Scientific Research License
e. CNMI Division of Environmental Quality, Coastal Resource Management Office: Special Research Permit
f. Department of the Army Nationwide Permit
g. National Environmental Policy Act, Programmatic Environmental Assessment for Research Activities Conducted by the Coral Reef Ecosystem Division, PIFSC, 2010-2015. Finding of No Significant Impact (FONSI) signed May 7, 2010. (http://www.pifsc.noaa.gov/nepa/CRED_Programmatic%20Environmental%20Assessment_Final.pdf)
h. Endangered Species Act: A concurrence with a "may affect, but not likely to adversely affect" determination for the CRED Marine Debris Removal Activities and Pacific RAMP was issued by NOAA Pacific Islands Regional Office – Protected Resources Division on March 28, 2011.

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

Weather, equipment failures, and scheduling problems are unpredictable. As such, the following intended itinerary should be considered as only a guide for survey progression. In particular, the order in which survey areas are worked within a single island area or among islands within close proximity may be altered as appropriate based on weather, sea conditions, or the progress of the survey. Transit estimates have been calculated based on a ship's speed of 9.5 knots westbound, 9.0 knots north and southbound, and 8.4 eastbound.

Pre-Project

February 24	Loading of 10' ARMS Lab container, boat cradle and chest freezer with Navy crane. Small boat fuel (gasoline) and ethanol loading. Fill stainless steel gasoline tank and two drums via pump truck. Load full fuel drums into drum rack. Transfer ethanol from Program drums into ship's stainless steel ethanol tank.

February 28 — Conduct small boat and davit familiarization for all applicable scientific personnel. Conduct station walk-throughs and dive neurological examinations aboard *Hi'ialakai* for scientific personnel involved in Legs II and III.

Leg I:

March 5 — **Depart Pearl Harbor:** Embark all scientific personnel at Pearl Harbor via Ford Island no later than (NLT) 0700. Depart Pearl Harbor NLT 0900 en route to Wake Island (2,000 nmi, 8d, 19h; adjusted to 9d, 17h due to Date Line and time zones). Conduct ship tasks (e.g. Welcome Aboard Brief, magnetic compass calibration, and safety drills.)

March 6-14 — **Transit:** Continue transit to Wake Island. Complete operational briefings, pre-dive neurological assessments, and station walk-throughs.

March 15-19 — **Wake Island:** Arrive Wake Island (NLT 0700) for a full day of operations March 15. Operations to be conducted while at Wake Island include: fish and benthic Rapid Ecological Assessment (REA) surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: 16 STRs, 25 CAUs, 25 BMUs, 12 ARMS; retrieve: 12 STRs, 25 CAUs, nine ARMs, one SST, three anchors), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Order of survey polygons will be dependent on weather and survey progress (*Appendix 5*). Night operations during this period include CTD transects (~20 km in length) radiating in four cardinal directions from Wake Island (West: March15, East: March 16, North: March 17, South: March 18). Each transect will consist of ~6-10 CTD casts (depth: 500 m; Lat/Lon: TBD), with water samples and ADCP data obtained on each transect. Unless otherwise specified, this protocol for CTD, water sampling and ADCP transects will be the standard throughout the project. In order to avoid repetition, the detailed description of this operation will be omitted from the remainder of the itinerary section.

Depart Wake Island (~1800) March 19 and transit to the vicinity of the northern tip of Guam (~1,300 nmi, 5d, 17h; adjusted to 5d, 15h due to time zones). Should all planned operations at Wake be completed in four days, the ship may depart on March 18, allowing an extra day to be utilized for Guam operations.

March 20-24	**Transit:** Continue transit to Guam
March 25-31	**Guam:** Arrive in the vicinity of Guam's northern tip (~0900) March 25, and begin operations. Operations to be conducted while at Guam include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: four STRs, 12 ARMS, 25 CAUs, 25 BMUs; retrieve: four STRs, 12 ARMs, 25 CAUs, one SST, two anchors), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Order of survey polygons will be dependent on weather and survey progress (*Appendix 5*). Night operations during this period include shipboard CTD, water sampling and ADCP transects radiating in four cardinal directions from Guam (North: March 25, West: March 26, South: March 27, East: March 28). Arrive Apra Harbor March 31after a full day of small boat operations. If necessary, small boats may meet the ship at the pier after a full day of operations, with the exception of pier-side davit boat. End of Leg I. Most of the scientific staff will remain onboard for Leg II.
April 1	**Apra Harbor, Guam in-port period:** Disembark departing scientists. Possible ARMS processing on fantail. (No ship support needed, and flexible schedule so as not to interfere with other ship operations/resupply).
April 2	**Apra Harbor, Guam in-port period:** Embark new scientists. Possible ARMS processing on fantail. (No ship support needed, and flexible schedule so as not to interfere with other ship operations/resupply/outreach). Conduct ship tours/outreach event (0900-1600) as follows: VIP Tour (0900 - 1000) Group Tour 1 (1300 - 1400) Group Tour 2 (1500 - 1600)
April 3	**Apra Harbor, Guam in-port period:** Resupply small boat fuel. Conduct small boat familiarization, station walk-throughs and dive neurological examinations for the few scientists who were unable to complete this prior to departure from Honolulu. Possible ARMS processing on fantail. (No ship support needed, and flexible schedule so as not to interfere with other ship operations/resupply).

Leg II:

April 4	**Depart Apra Harbor / Guam (continued):** Depart Apra Harbor ~0800 to continue Guam survey operations as necessary. Departure time could be adjusted based on operational need. Small boats (except pier-side davit boat) may be launched prior to the ship getting underway if working in the vicinity of Apra Harbor. Depart Guam (~1800) and transit to Rota (~50 nmi, 6 h).
April 5-7	**Rota:** Arrive Rota (NLT 0700) April 5. Operations to be conducted while at Rota include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: four STRs, 25 CAUs; retrieve: four STRs, 20 CAUs, 2 ARMS, one SST, two anchors), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Night operations during this period will include shipboard CTD, water sampling and ADCP transects radiating in two cardinal directions (E, W) from Rota. Depart Rota (~1800) April 7, and transit to Aguijan (~50 nmi, 6 h).
April 8	**Aguijan:** Arrive Aguijan (NLT 0700). Operations to be conducted at Aguijan include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: one STR; retrieve: one STR), collection of carbonate chemistry water samples at benthic REA sites, and microbial collections at one to two sites. Depart Aguijan (~1800) and transit to Tinian (~10 nmi, 1.5 h). Night operations: CTD, water sampling and ADCP transect to the south of the Aguijan/Tinian/Saipan complex.
April 9-10	**Tinian:** Arrive Tinian (NLT 0700) April 9. Operations to be conducted at Tinian include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: one STR, 25 CAUs; retrieve: one STR, 25 CAUs, 2 ARMS), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Night operations: CTD, water sampling and ADCP transects radiating in two cardinal directions from the Aguijan/Tinian/Saipan complex (East: April 9, West: April 10). Depart Tinian (~1800) April 10, and transit to Saipan (~20 nmi, 2.5 h) with CTDs en route.

April 11-13 **Saipan:** Arrive Saipan (NLT 0700) April 11. Operations to be conducted at Saipan include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: 16 STRs, 25 CAUs, 25 BMUs, 12 ARMS; retrieve: five STRs, 25 CAUs, nine ARMs, one SST, three anchors), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Order of survey polygons will be dependent on weather and survey progress (*Appendix 6*). Night operations during this period include shipboard CTD, water sampling and ADCP transects in the northerly cardinal direction from the Aguijan/Tinian/Saipan complex. Arrive Saipan Harbor April 13 after a full day of operations. Small boats may meet the ship at the pier after operations, with the exception of pier-side davit boat. End of Leg II. Any unfinished work at Saipan after April 13 will be completed during Leg III.

April 14 **Saipan Harbor in-port period:** Disembark departing scientists. Possible ARMS processing on fantail.

April 15 **Saipan Harbor in-port period:** Resupply small boat fuel. Embark new scientists. Possible ARMS processing on fantail.

April 16 **Saipan Harbor in-port period:** Conduct small boat familiarization, station walk-throughs and dive neurological examinations for the few scientists who were unable to complete this prior to departure from Honolulu. Possible ARMS processing on fantail.
Conduct ship tours/outreach event (0900-1600) as follows:
VIP Tour (0900 - 1000)
Group Tour 1 (1300 - 1400)
Group Tour 2 (1500 - 1600)

Leg III:

April 17-18 **Saipan:** Depart Saipan Harbor ~0800 April 17 to continue Saipan dive operations. Small boats (except pier-side davit boat) may be launched prior to the ship getting underway if working in the vicinity of the harbor. April 18 (~1800) transit to Sarigan (90 nmi, 10 h) after a full day of Saipan operations.

April 19 **Sarigan and Zealandia Bank:** Arrive Sarigan (NLT 0700). Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: two STRs, retrieve: two STRs), collection of carbonate chemistry

water samples at benthic REA sites, and microbial collections at one to two sites. After completing Sarigan instrument deployments and retrievals, the Oceanography Team will transit from Sarigan to Zealandia Bank via small boat (10 nmi) to deploy two STRs and retrieve two STRs. Should conditions or communications prohibit an unaccompanied transit, support from the ship would be needed to facilitate this operation. Location of small boat recovery will depend on weather conditions and survey progress. Night operations: Shipboard CTD, water sampling and ADCP transects en route to Pagan. Depart Sarigan/Zealandia and transit to Pagan (~80 nmi, 9 h).

April 20-23 **Pagan:** Arrive Pagan (NLT 0700) April 20. Operations to be conducted at Pagan include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: 16 STRs, 25 CAUs, 25 BMUs, 12 ARMS; retrieve: five STRs, 25 CAUs, nine ARMs, one SST, one anchor), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Order of survey polygons will be dependent on weather and survey progress (*Appendix 6*). Night operations during this period include shipboard CTD, water sampling and ADCP transects radiating in three cardinal directions from Pagan (West: April 20, East: April 21, North: April 22). Depart Pagan (~1800) April 23 and transit to Asuncion (~95 nmi, 11 h).

April 24-25 **Asuncion:** Arrive Asuncion (NLT 0700) April 24. Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: three STRs, 25 CAUs; retrieve: three STRs, 20 CAUs), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Night operations: Possible shipboard CTD, water sampling and ADCP transects around Asuncion. Depart Asuncion (~1800) April 25 and transit to Farallon de Pajaros (~65 nmi, 7.5 h).

April 26 **Farallon de Pajaros (FDP):** Arrive at Farallon de Pajaros (NLT 0700). Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: six STRs; retrieve: six STRs), collection of carbonate chemistry water samples at benthic REA sites, and microbial collections at one to two sites. Night operations: Possible shipboard CTD, water sampling and ADCP transects around FDP. Depart FDP en route to Supply Reef (~27 nmi, 3 h).

April 27	**Supply Reef/ Rest Day:** Arrive Supply Reef (0700). Launch Instrumentation Team (2 divers) for a single dive to retrieve one STR. Dives will be planned such that the divers involved do not exceed the 10 consecutive dive-day rule. No additional scientific dive operations are scheduled this day. Possible night operations include shipboard CTD, water sampling, and ADCP transects in the vicinity of FDP or Maug.
April 28-May 2	**Maug:** Arrive Maug (NLT 0700). Operations to be conducted at Maug include: fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: 16 STRs, 25 CAUs, 25 BMUs, 12 ARMS; retrieve: six STRs, 30 CAUs, nine ARMs, one SST, and one anchor), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Order of survey polygons will be dependent on weather and survey progress (*Appendix 6*). Night operations during this period include shipboard CTD, water sampling, and ADCP transects radiating in the four cardinal directions from Maug (West: April 28, East: April 29, North: April 30, South: May 1). Depart Maug (~1800) May 2 and transit to Agrihan (~80 nmi, 9 h).
May 3-4	**Agrihan:** Arrive at Agrihan (NLT 0700) May 3. Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: two STRs, 25 CAUs; retrieve: two STRs, 25 CAUs), collection of carbonate chemistry water samples at CAU and benthic REA sites, and microbial collections at one to two sites per day. Night operations: Possible shipboard CTD, water sampling and ADCP transects south of Pagan. Depart Agrihan (~1800) May 4, and transit to Alamagan (~70 nmi, 7.5 h) with CTD's en route.
May 5	**Alamagan:** Arrive at Alamagan (NLT 0700). Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument deployments and retrievals (deploy: two STRs; retrieve: two STRs), collection of carbonate chemistry water samples at benthic REA sites, and microbial collections at one to two sites. Night operations: Possible shipboard CTD, water sampling and ADCP transects en route to Guguan. Depart Alamagan and transit to Guguan (~15 nmi, 2 h).
May 6	**Guguan:** Arrive at Guguan (NLT 0700). Conduct fish and benthic REA surveys, towed-diver surveys, moored instrument

	deployments and retrievals (deploy: one STR; retrieve: one STR), collection of carbonate chemistry water samples at benthic REA sites, and microbial collections at one to two sites. Depart Guguan (~1800) and transit to Saipan (130 nmi, 14.5 h).
May 7	**Saipan Harbor:** Arrive in the vicinity of Saipan Harbor ~0900. If necessary, launch small boats to complete Saipan dive operations before pulling into port. Small boats may meet the ship at the pier after operations, with the exception of pier-side davit boat. End of Leg III.
May 8	**Saipan In-port Period:** Disembark departing scientists. Embark arriving scientists.
May 9	**Saipan In-port Period:** Re-supply small boat fuel. Embark arriving scientists.
May 10	**Saipan In-port Period:** Conduct small boat familiarization, station walk-throughs and dive neurological examinations for scientists unable to attend walkthroughs prior to departure from Pearl Harbor.
Leg IV-	**Complete details of the Leg IV itinerary and operations will be submitted in a Project Instructions Amendment.**
May 11	**Depart Saipan Harbor**: Depart Saipan Harbor May 11 and begin transit to Maug (295 nmi, 1d 9h).
May 12	**Transit to Maug:** Continue transit to Maug.
May 13-18	**Maug / Sarigan:** Operations to be conducted and exact itinerary are TBD. A total of six operational days are possible. Likely scenarios include: six days at Maug or five days at Maug and one day at Sarigan.
May 19	**Transit to Saipan**: Continue transit to Saipan.
May 20	**Arrive vicinity of Saipan Harbor, Transfer Scientists Ashore & Begin Return Transit to Pearl Harbor:** All scientific personnel will be transferred ashore via small boat as operations allow such that *Hi'ialakai* can begin a return transit to Pearl Harbor, Hawaii (~3,235 nmi, 16d 2h; adjusted to15d 6h due to Date Line and time zone crossing).
May 21 - June 4	**Transit:** Continue transit to Pearl Harbor.

June 5 **End of Project:** Arrive Pearl Harbor, Hawaii.

B. Staging and Destaging

Staging: Staging of large scientific gear and equipment will begin the week of February 24, or as otherwise coordinated with the Command. Assistance from the ship's personnel for crane services for large gear, as well as for loading small boat fuel (pumped from truck to ship and into two drums), will be necessary. Ethyl alcohol will be delivered in drums to be transferred to the ship's stainless steel tank. Hand carried items will be loaded in lab areas throughout the week prior to departure. All scientists anticipate embarking the vessel at Ford Island, Pearl Harbor, by 0700, on March 5, 2013.

Mid-project Refueling: Replenishment of unleaded gasoline will be required at Guam and Saipan during scheduled in-ports. Support from ship's personnel is necessary to arrange the logistics of purchase, transport, and transfer of additional unleaded gasoline during in-ports in both Guam and Saipan. CRED will provide a credit card for fuel purchase in both instances. *Hi'ialakai* will be responsible for providing diesel fuel for HI-XX (Metal Shark) and HI-2.

Destaging: Full off-load of all program-provided gear and small boats will occur in Honolulu, in coordination with the Command, once *Hi'ialakai* returns to Pearl Harbor, June 5.

C. Operations to be Conducted

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 Science 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) changes or additions of research operations to those specified in the project instructions, or (3) port calls not specifically identified in the project instructions.

Scientific Operations

The ship will support assessment and monitoring operations within the project Operations Area. Specifically, the ship will support Rapid Ecological Assessments and the continuation of long-term monitoring operations of reef fish, corals, other invertebrates, and algae, and oceanographic monitoring of the coral reef ecosystems of the region.

Research and monitoring efforts will require extensive diving operations (both scuba and snorkeling) to be supported by *Hi'ialakai*. Up to five small boats will be operating simultaneously during daylight hours to maximize productivity. *Hi'ialakai*'s 29-ft Metal Shark (HI-XX), 26-ft Ambar (HI-2), and 17-ft Northwind (HI-3), two program-provided 19-ft SAFE Boats, and either a program-provided 17-ft Avon inflatable or *Hi'ialakai*'s 17-ft Zodiac inflatable (HI-7) will be required to support the REA, towed diver, instrumentation, and microbial survey teams. Both HI-7 and the program Avon are anticipated to be carried deflated and palletized, serving as redundant back-up platforms.

The REA and towed-diver surveys will include monitoring of species composition, abundance, size distribution, and spatial distribution of reef fishes, corals, other invertebrates, and algae of the region and will further ground-truth shallow-water benthic habitat maps. Benthic community structure and demography parameters, including percent cover, taxonomic richness, density, size-class distribution, and health condition, will be assessed along line and belt transects to provide spatial-temporal appraisals of coral reef dynamics in the region. Scientists may also obtain limited specimens of algae, corals, and other invertebrates. All deployments, retrievals, and specimen collections will be conducted as stipulated through pertinent Agency-approved Special Activity Permit guidelines.

A number of Autonomous Reef Monitoring Structures (ARMS) will be recovered and replaced or newly installed at select locations by the Instrumentation Team. These small units are designed to mimic the complexity of the coral reef structure and to attract small invertebrates to recruit within them. ARMS samples will be processed onboard in a program-provided lab space, preserved in ethanol, and stored in the scientific freezer until the ship returns to Honolulu.

Calcification Accretion Units (CAUs) will be recovered and replaced or newly installed at select locations. The CAUs serve as a mechanism to quantify accretion rates of calcifying coralline algae and scleractinian corals; this information will allow for comparisons to determine possible consequences of increased ocean acidity and lowered aragonite saturation states. Additionally, a Bioerosion Monitoring Unit (BMU) will be installed on CAUs at select locations. Each BMU is made of a 1cm x 2cm x 5cm block of calcium carbonate rock mounted on a similarly sized piece of polyvinylchloride plate. The BMUs rest flush on the seafloor and serve as a mechanism to quantify bioerosion rates across

coral reefs experiencing different physical oceanography and local human impacts. BMUs will be retrieved on a subsequent mission and measured for changes in weight and scanned for changes in density using microcomputed tomography.

Approximately 93 STRs, 225 CAUs, 125 BMUs, and 60 ARMS will be deployed and 57 STRs, 220 CAUs, 52 ARMS, six SSTs and 12 anchors will be retrieved. Retrieved anchors will be secured on stackable aluminum pallets for transport back to Honolulu.

As part of CRED's effort to investigate ocean acidification and carbonate chemistry, the Instrumentation Team may also obtain coral cores at several locations, if time and operational conditions allow. Up to three cores may be collected with a diver-held pneumatic drill at each given site. Each core would measure 30-90 cm in length and 3.8 cm in diameter. Locations for coring will not be planned in advance. Coring operations will be conducted opportunistically as appropriate, and as a scientific dive.

Small boat and shipboard CTD casts will be conducted around/over each of the islands/banks to examine oceanographic conditions and water quality. Shipboard CTDs will be conducted to a depth of 500 m at several sites around each island, including but not limited to all of the permanent shipboard CTD sites that can be reached reasonably. Underway shipboard oceanographic measurements (ADCP, TSG, pCO2 with ancillary sensors [if operational], and SCS) will be recorded throughout the duration of the project. During both small boat and shipboard CTD casts, water samples may be collected for nutrient, chlorophyll, salinity and carbonate chemistry analyses.

As part of the ongoing effort to understand the microbial community, two types of water samples will be collected at select REA sites using diver-deployable Niskin bottles (four bottles; two liters per bottle). Two of the Niskin bottles will be filled with water collected from approximately one meter above the benthos, and two will be filled with water from within the reef (pore-water). The pore-water samples will be collected using Niskin bottles with a flexible stainless-steel hose attachment. These water samples will be returned to the ship and processed for dissolved organic carbon (DOC), particulate organic matter (POM), nutrients, microbial (Bacteria and Archaea) and viral abundance (fluorescent microscopy), FACS (heterotrophs vs. autotrophs), and microbial and viral community composition (coarse analysis: 16s rRNA). At two REA sites per island, approximately 60-80 L of reef water will be collected from reef crevices and surfaces for metagenomic analysis of the microbial and viral community associated with the reef benthos.

In addition to understanding water-column microbial dynamics, investigating shifts in the microbial community associated with benthic composition is important as it can serve as an indicator of reef-ecosystem health. If time permits,

six fist-sized samples of rubble (three of these will also contain a handful of the first 5-10 cm of sediment from different sand pockets), and six pieces of the most dominant algae-type will be collected in zip-top bags. Both the algae and the rubble/sediment samples will be frozen at -20°C. These samples will remain on the ship until it returns to Honolulu. The 16s bacterial rRNA genes associated with these samples will be sequenced to characterize the microbial communities associated with the benthos (rubble and algae). The sediment samples will be used to characterize the live/dead assemblage of benthic foraminifera, which can serve as a proxy for changes in water quality related to human impacts. These samples will be saturated with Rose Bengal/EtOH solution, rinsed, and stored dry onboard the ship for microscopic analysis.

Snorkeling Operations

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

Small Boat Operations

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

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

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

CTD Operations

When planning CTD operations, time must be allotted for cable maintenance as required in EEOI-017 which states that the cable shall be sprayed with fresh water during the reeling-in at the end of use each day and the cable shall be pressure lubed at the end of a project, or portion of a project, at least once each week during frequent use.

D. Dive Plan

All dives are to be conducted in accordance with the requirements and regulations of the NOAA Diving Program (http://www.ndc.noaa.gov/dr.html) and require the approval of the ship's Commanding Officer.

The Dive Plans encompassing legs I, II and III of HA-14-01 are presented in *Appendix 7* (attached file).

E. Applicable Restrictions

Conditions which preclude normal operations: Poor weather and sea conditions, equipment failure, safety concerns, and/or unforeseen circumstances, may alter or prohibit operations as planned. At these times, the Chief Scientist and Commanding Officer will determine the appropriate plan of action.

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

1. "Take" of Protected Species

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

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

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

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

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

III. Equipment

A. Equipment and Capabilities Provided by the Ship

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

   J-frame
   A-frame
   Aft deck crane
   30-ft Metal Shark launch, HI-XX
   26-ft Ambar launch, HI-2
   17-ft Northwind launch, HI-3
   17-ft Zodiac inflatable and 50hp motor, HI-7 (deflated)
   SCUBA compressor (Nitrox and Air)
   Recompression chamber
   Dive lockers
   Scientific freezer
   Wet Lab faucets and drains
   Acoustic Doppler Current Profiler (ADCP)
   Scientific Computer System (SCS)

ThermoSalinoGraph (TSG)
Sea Surface Sound Velocity (SSSV)
pCO2 measurement system (if operational)
CTD and rosette with 12 bottle capacity
Adequate fresh water for gear and small boat wash-down
Iridium phone
VHF radios for ship's small boats
Global Positioning System (GPS) for ship's small boats
Depth sounders for ship's small boats
Ethanol and gasoline storage tanks
Rack space for three standard (55-gal) drums (one ethanol waste, two gasoline)
Deck space for up to 8 standard (55-gal) drums, empty.

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

   a. Assistance from the Command and ship's Deck Department in conducting davit hook checkouts for program personnel prior to departure of HA-14-01.

   b. Permission for Scientists to ready scientific work spaces (e.g., set up computer server) during the week prior to departure.

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

   d. Support from the Engineering and Deck departments prior to sailing to transfer 2.84 kL (750 gallons) of program-provided gasoline into the ship's stainless steel fuel tank to be used as outboard engine fuel. The gasoline will be delivered by truck and may be pumped directly into the deck tank. Additionally, support will be required for filling two fuel drums (303 L / 80 gal) to be carried in the drum rack.

   e. Support from the Engineering and Deck departments prior to sailing to transfer two drums (416 L / 110 gal) of program-provided ethyl alcohol into the ship's stainless steel deck tank to support scientific operations. Additional storage capacity for one standard drum of waste ethanol (~150 L / 40 gal) generated during the project is necessary.

   f. *Hi'ialakai*'s HI-XX (Metal Shark), HI-2, and HI-3 will be required to support the program's dive teams on a daily basis. The ship's HI-7 or program's tiller-Avon may be required as a backup should one of the other boats become inoperable or to mitigate unforeseen events. The ship should plan to provide coxswains for the HI-XX

(Metal Shark), HI-2, and HI-3 during all days of diving operations. Should one of these vessels become inoperable, a ship coxswain will be needed for the replacement platform, HI-7 or tiller-Avon (program provided).

g. Support from the medical officer and deck department to conduct neurological exams, boat familiarizations and station walk-throughs for new divers. This may be required up to five times: once in Honolulu prior to departure for all Leg II and III personnel, once during the transit from Honolulu to Wake Island, once during the Guam in-port (minimal new personnel only), and once during each of two Saipan in-ports (minimal new personnel only).

h. Mid-project support will be necessary to assist in arranging the logistics of purchase, delivery, and transfer of additional unleaded gasoline during in-ports in both Guam and Saipan. Such logistics are typically facilitated by the Operations Officer through the ship's Port Agent, and payment for gasoline is made via the ship's DD1149 (Guam) and PO (Saipan), using program accounting codes. *Hi'ialakai* will be responsible for providing diesel fuel for HI-XX and HI-2.

i. An experienced survey technician is requested to conduct nighttime CTDs and to assist the science party with water filtration and sampling operations, including chlorophyll filtration and the fixing of carbonate chemistry samples. Operable Wet Lab facilities are necessary to support water sampling and the cleaning of field equipment. Approximately twelve 0.9 m x 0.6 m totes of the program's glass sample bottles and plastic sample bags filled with seawater will need to be stored onboard in an air conditioned space.

j. To support the ARMS Lab (10-ft container box), power, freshwater, saltwater and compressed air sources and connections on the fantail will be necessary.

k. To support CAU processing, deck power connection for one chest freezer (~ 6 ft x 3 ft x 3 ft) will be necessary. Note: Similar program freezers were carried previously on the bridge deck (starboard rail) and on the boat deck (port side).

l. To be consistent with the mission objectives, the ship and its compliment of small boats will employ all methods feasible to minimize damage to coral reef habitats during any anchoring operations that may be required.

B. Equipment and Capabilities Provided by the Scientists

1. **Equipment**: The program's full equipment list is presented in *Appendix 8* (attached file).

2. **Capabilities**: In addition to scientific expertise, the program will provide the following capabilities:

    a. Coxswains and routine maintenance for program-provided 19' SAFE Boats and 17' Avon (if required).

    b. A scientist to assist on deck with deployment and recovery of the CTD rosette and to perform water filtration and sampling activities.

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 of Hazardous Materials

See *Appendix 9.*

C. Chemical safety and spill response procedures

See *Appendix 10.*

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

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

A. Supplementary ("Piggyback") Projects

1. ***Gambierdiscus* (Microalgae) Sampling**. Wayne Litaker, Ph.D., NOAA National Centers for Coastal Ocean Science (NCCOS).

   This piggyback project will require CRED benthic REA divers to opportunistically collect samples of red or brown macroalgae from the benthos during their normal survey operations. The macroalgae samples will then be transported back to the ship where cells from the microalgae *Gambierdiscus* will be extracted and preserved in a scientific refrigerator for later shipment. *Gambierdiscus* is the microalgae that produce the toxins which cause ciguatera fish poisoning (CFP). Globally CFP is the most common cause of non-bacterial seafood poisoning associated with fish consumption. In addition to adversely affecting human heath it also affects food security in tropical island nations and can adversely affect the development of fisheries resources. The project endeavors to determine the global distribution of these species, in part, to better predict CFP risk.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

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

A. Data Classifications: *Under Development*

1. OMAO Data

2. Program Data - *Under Development.*
   Contact Nori Shoji (noriko.shoji@noaa.gov), PIFSC Directorate - Science Operations Lead, for PIFSC data policy updates.

B. Responsibilities: *Under Development*

Integrated ecosystem observations of coral reefs are collected to characterize the spatial and temporal variability of the distribution, abundance, and diversity of corals, algae, other macroinvertebrates, and fishes in the context of their benthic habitats and oceanographic environments. All data are quality assured, processed, and made available to region managers and stakeholders.

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. This meeting is currently scheduled for February 25 at 1400.

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

C. Post-Project Meeting: The Commanding Officer is responsible for conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the 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 Ship Operation Evaluation form is to be completed by the Chief Scientist. The preferred method of transmittal of this form is via email to omao.customer.satisfaction@noaa.gov. If email is not an option, a hard copy may be forwarded to:

Director, NOAA Marine and Aviation Operations
NOAA Office of Marine and Aviation Operations
8403 Colesville Road, Suite 500
Silver Spring, MD 20910

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

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the 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, Revised: 02 JAN 2012) 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. The

completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan and send via secure e-mail the form using the contact information below; participants should take precautions to protect their Personally Identifiable Information (PII) and medical information. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the 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.

Contact information:

Regional Director of Health Services
Marine Operations Center – Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

Prior to departure, the 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

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats with chin straps are also required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the program when required.

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

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 e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30-day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged at least 30 days in advance.

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

1. Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
2. Installation of the latest critical operating system security patches.
3. No external public Internet Service Provider (ISP) connections.
4. Provide the Electronics Technician with a spreadsheet of the following information:

Device	Name	Operating System	LAN MAC Address	WAN MAC Address
Iphone	*Scientist*	*MAC OS*	*21:34:6K:P8:W6:77*	*21:34:6K:P8:W6:78*
Laptop	*Scientist*	*Windows XP*	*23:34:6K:P8:M6:77*	*23:34:6K:P8:M6:78*

Completion of these requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course prior to embarking. Arrangements to take the Course and/or achieve security clearance for any non-NOAA computers should be coordinated with PIFSC/CRED administration well in advance of the project.

F. Foreign National Guests Access to OMAO Facilities and Platforms

The foreign national participants for project HA-14-01 are Adel Heenan and no others. Chamber Operator James Bostick will serve as the onboard foreign national sponsor for these participants.

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM DeBow's March 16, 2006 memo (http://deemedexports.noaa.gov). National Marine Fisheries Service personnel will use the Foreign National Registration System (FRNS) 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 Deemed Exports 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 e-mail generated by the FRNS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.

2. Escorts – The Chief Scientist is responsible for providing 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 Officer.

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 FRNS or Servicing Security Office e-mail granting approval for the foreign national guest's visit.

5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.

6. Export Control – Eight 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 Officer.

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 Guest) as required by NAO 207-12 Section 5.03.h.

APPENDICES

Appendix 1: Operating Area for HA-14-01 Leg I MARAMP

Appendix 2: Operating Area for HA-14-01 Leg II MARAMP

Appendix 3: Operating Area for HA-14-01 Leg III MARAMP

Appendix 4: Station/Waypoint List (coordinates in Latitude, Longitude: degree-minutes) (attached file)

Appendix 5: Survey Area Maps: Wake Island and Guam

Appendix 6: Survey Area Maps: Saipan, Pagan and Maug

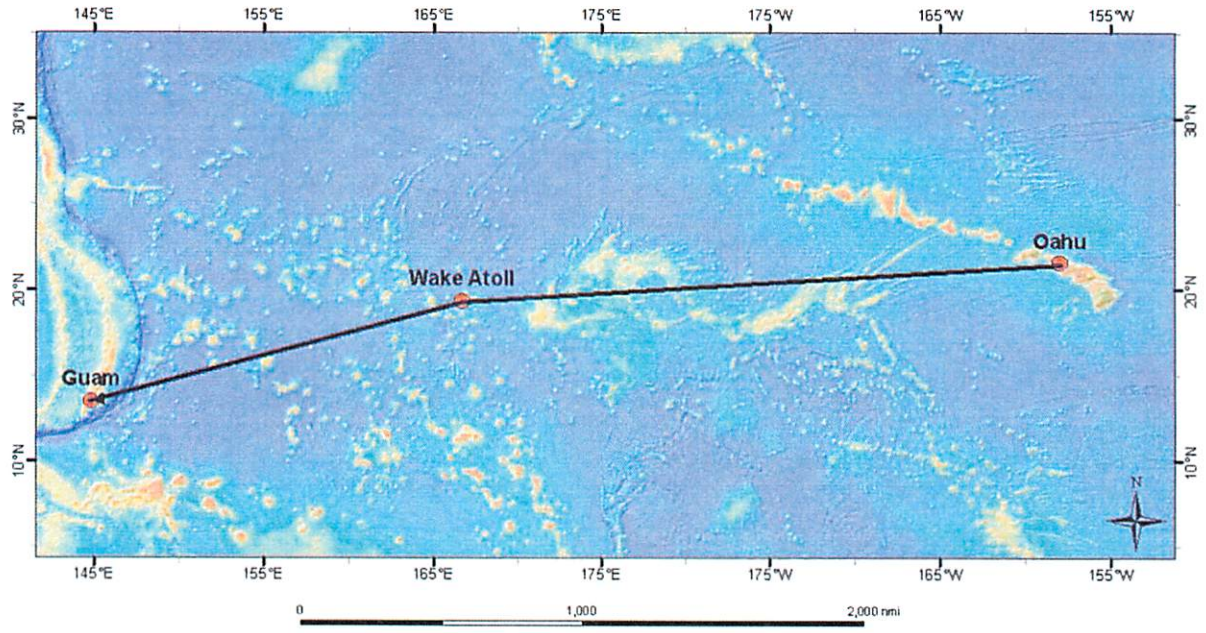
Appendix 7: Dive Plans (attached file)

Appendix 8: Program Equipment List (attached file)

Appendix 9: Section IV.B. Hazardous Materials Inventory

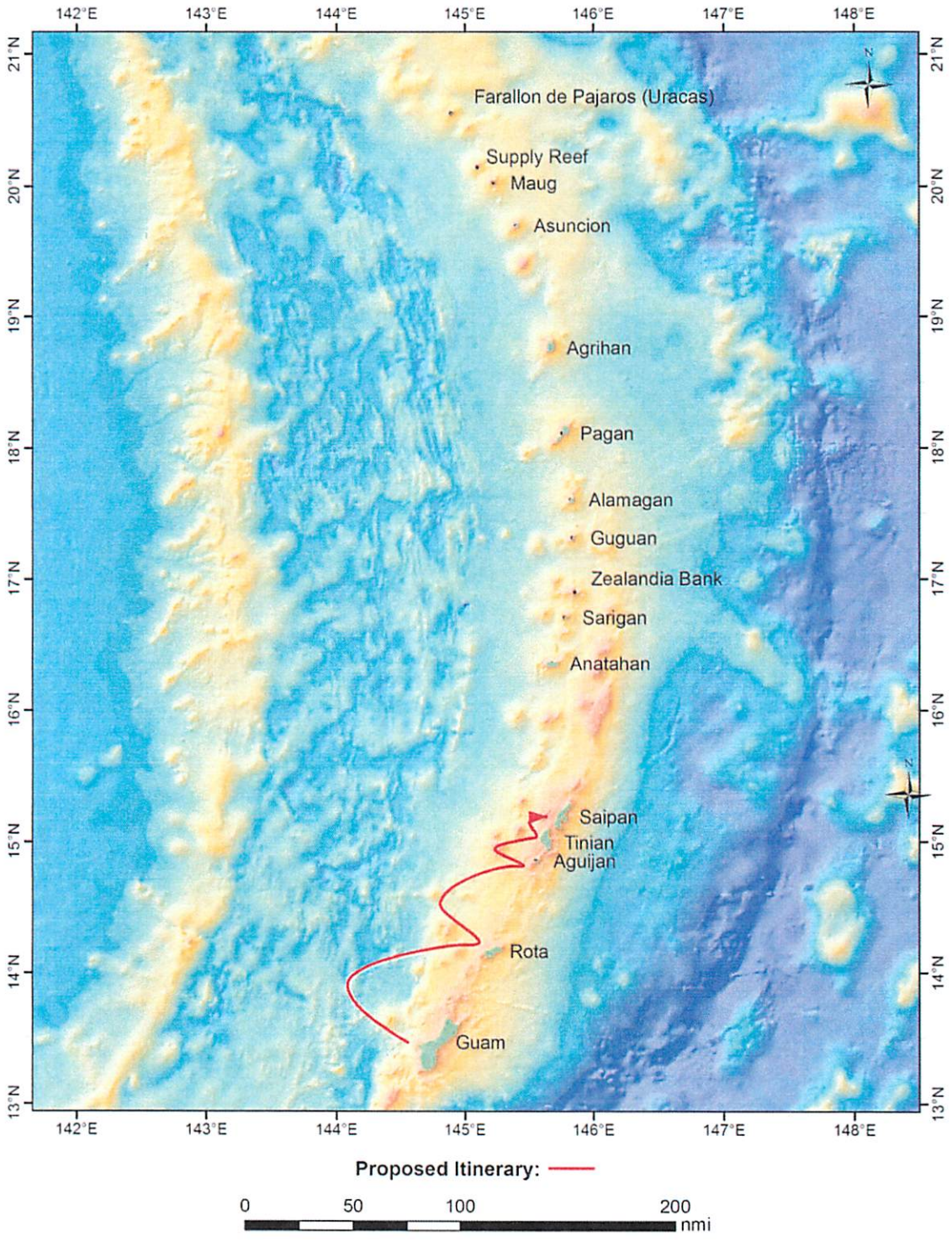
Appendix 10: Section IV.C. Chemical Safety and Spill Response Procedures

Appendix 1: **Operating Area for HA-14-01 Leg I MARAMP**



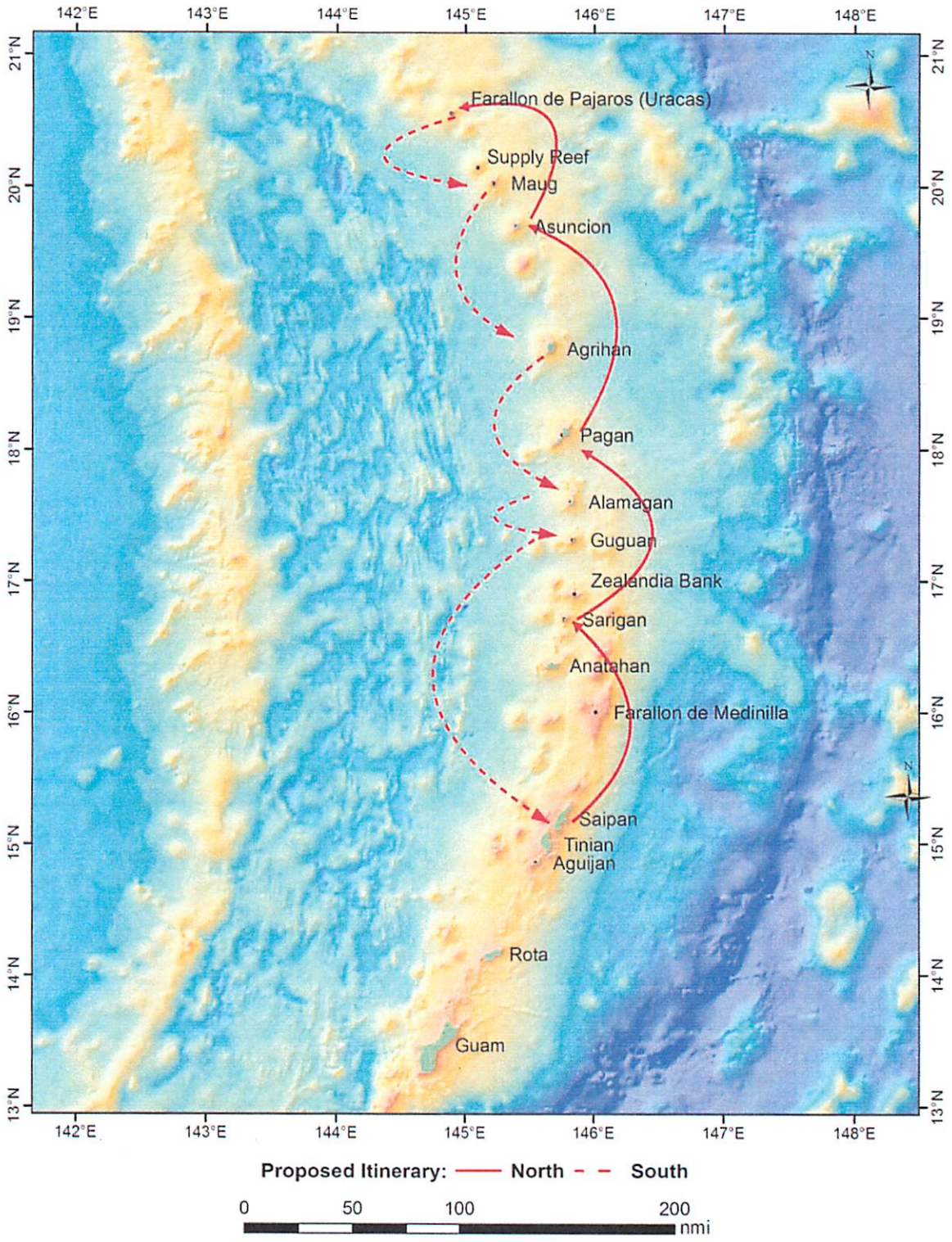
Operating Area for HA-14-01 Leg I MARAMP

Appendix 2: **Operating Area for HA-14-01 Leg II MARAMP**



Operating Area for HA-14-01 Leg II MARAMP

Appendix 3: Operating Area for HA-14-01 Leg III MARAMP

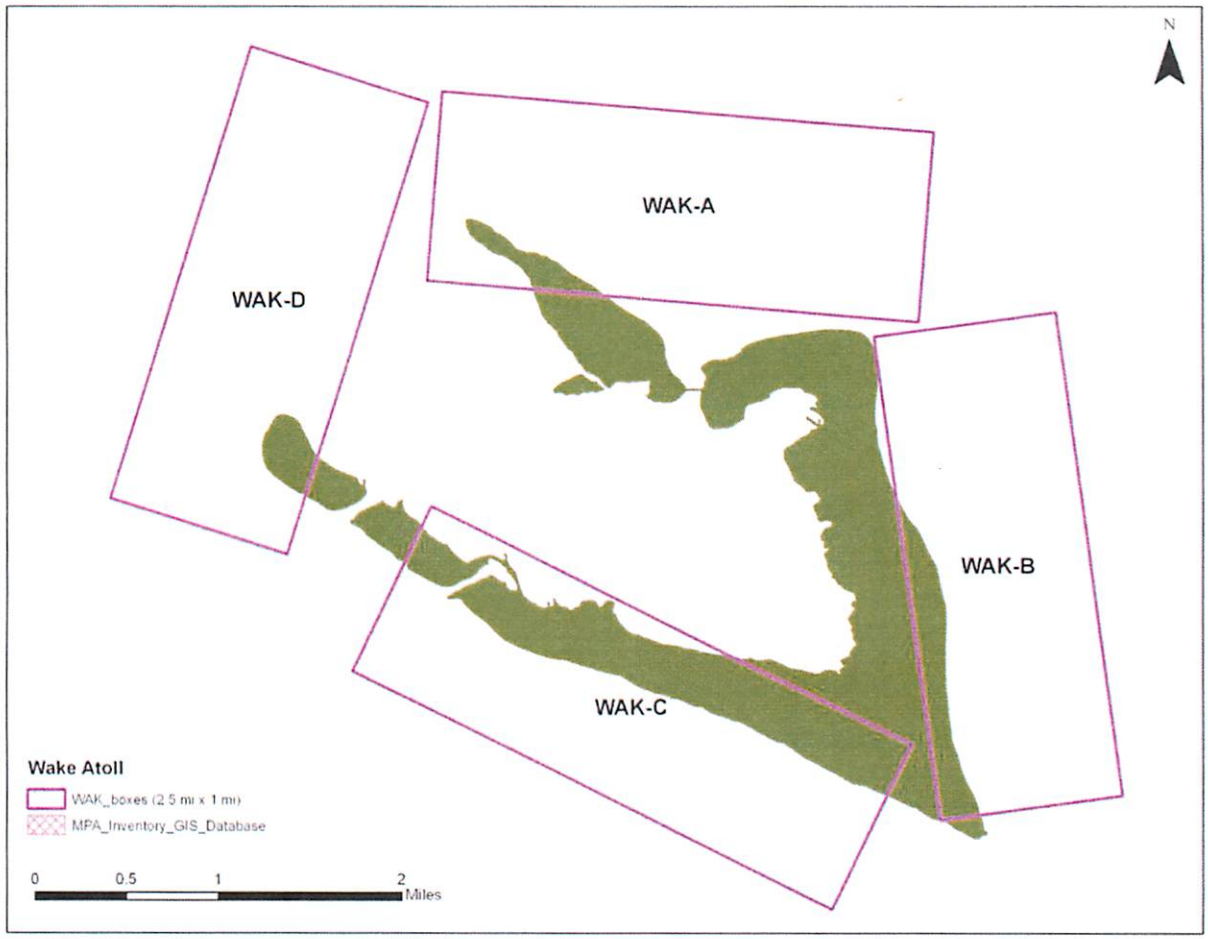


Operating Area for HA-14-01 Leg III MARAMP

Appendix 4: Station/Waypoint List (coordinates in Latitude, Longitude: degree-minutes)

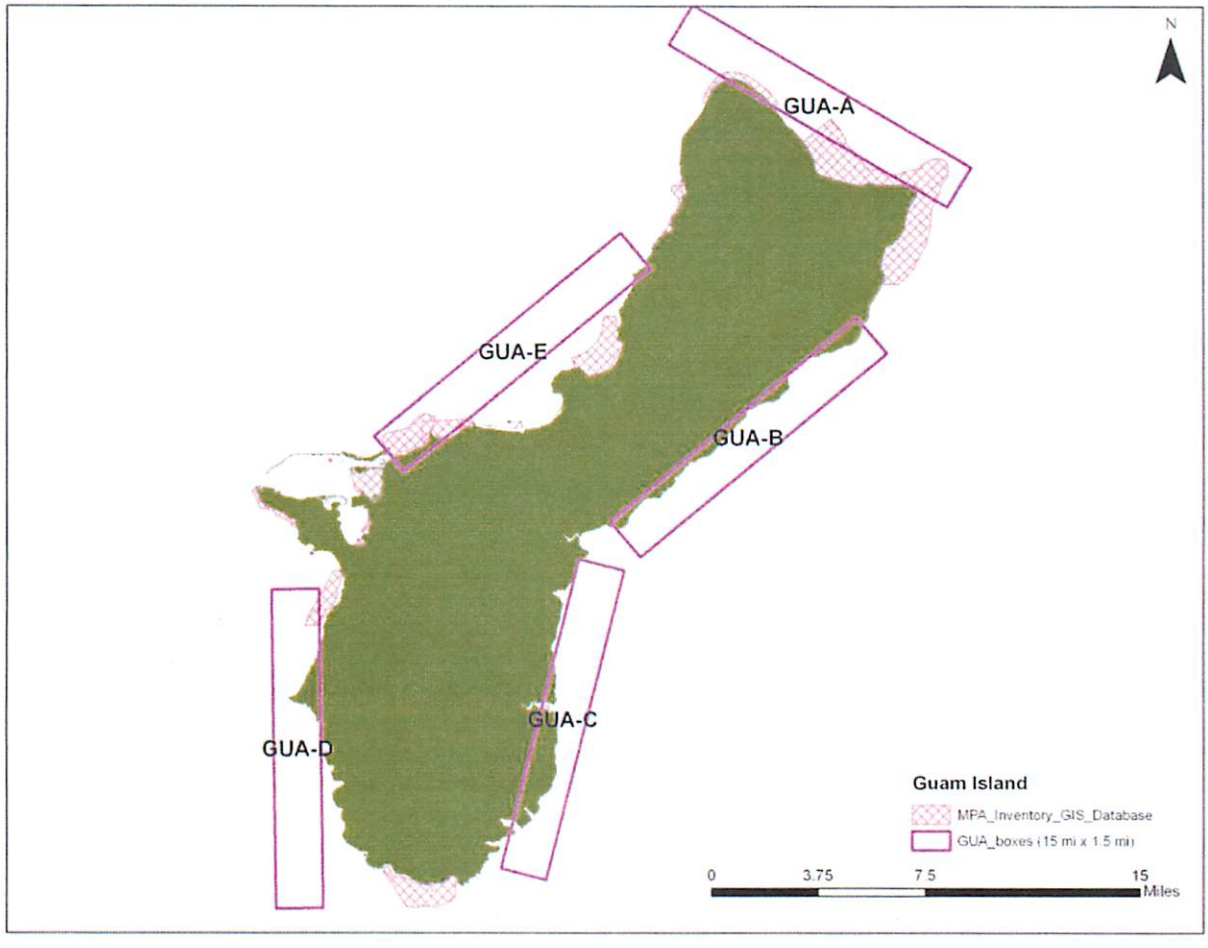
(Attached File)

Appendix 5: Maps of Proposed Survey Polygons: Wake Island and Guam



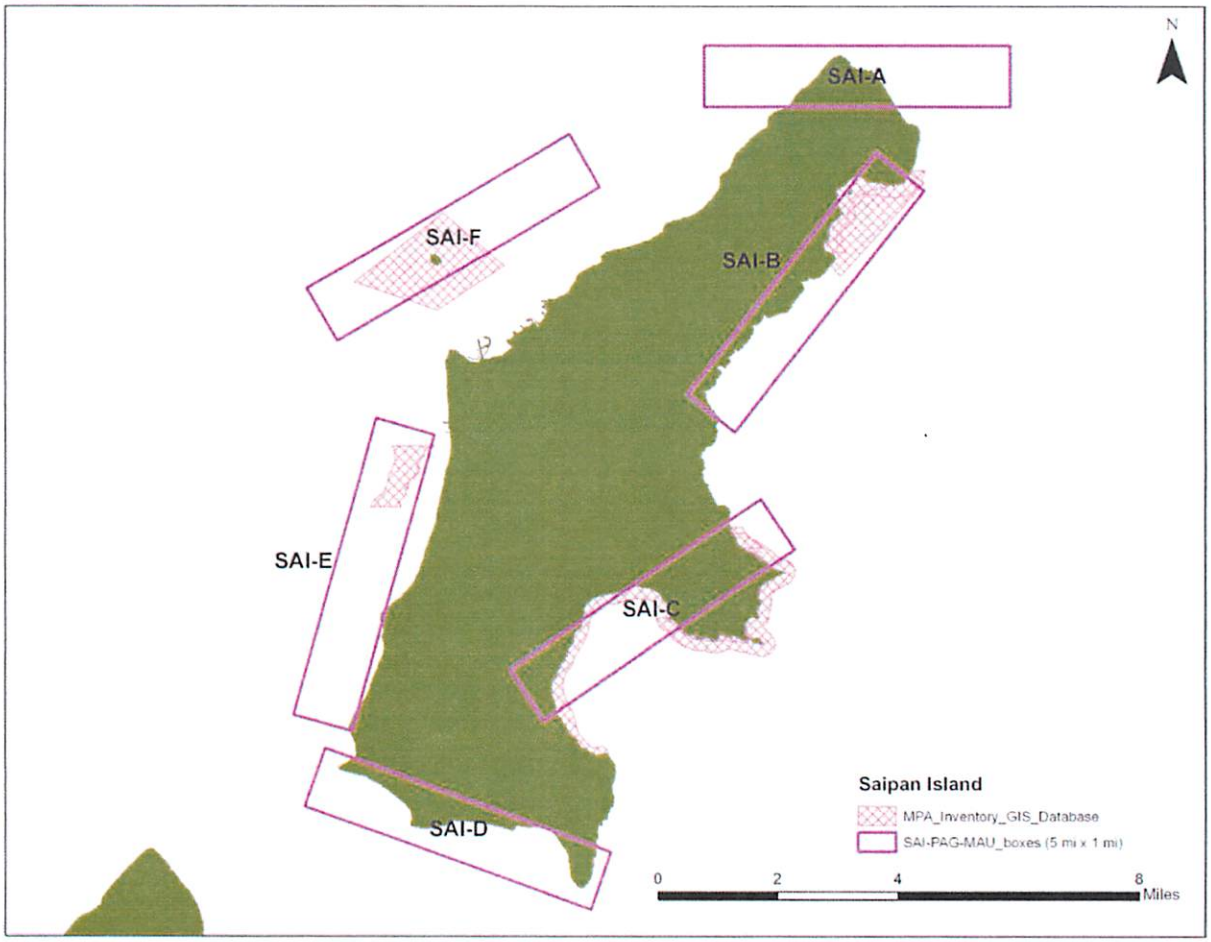
Proposed Survey Polygons: Wake Island

Appendix 5 (Continued):



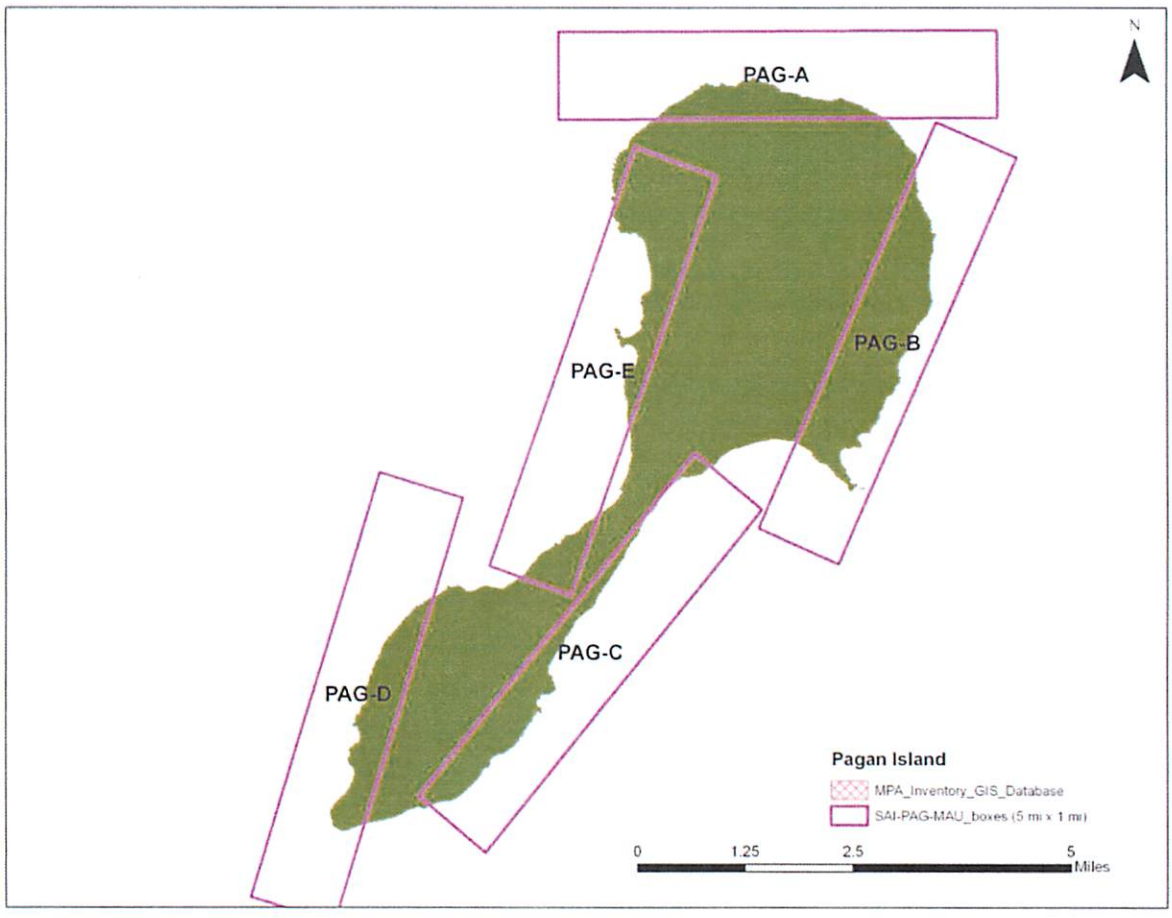
Proposed Survey Polygons: Guam

Appendix 6: **Maps of Proposed Survey Polygons: Saipan, Pagan, and Maug**



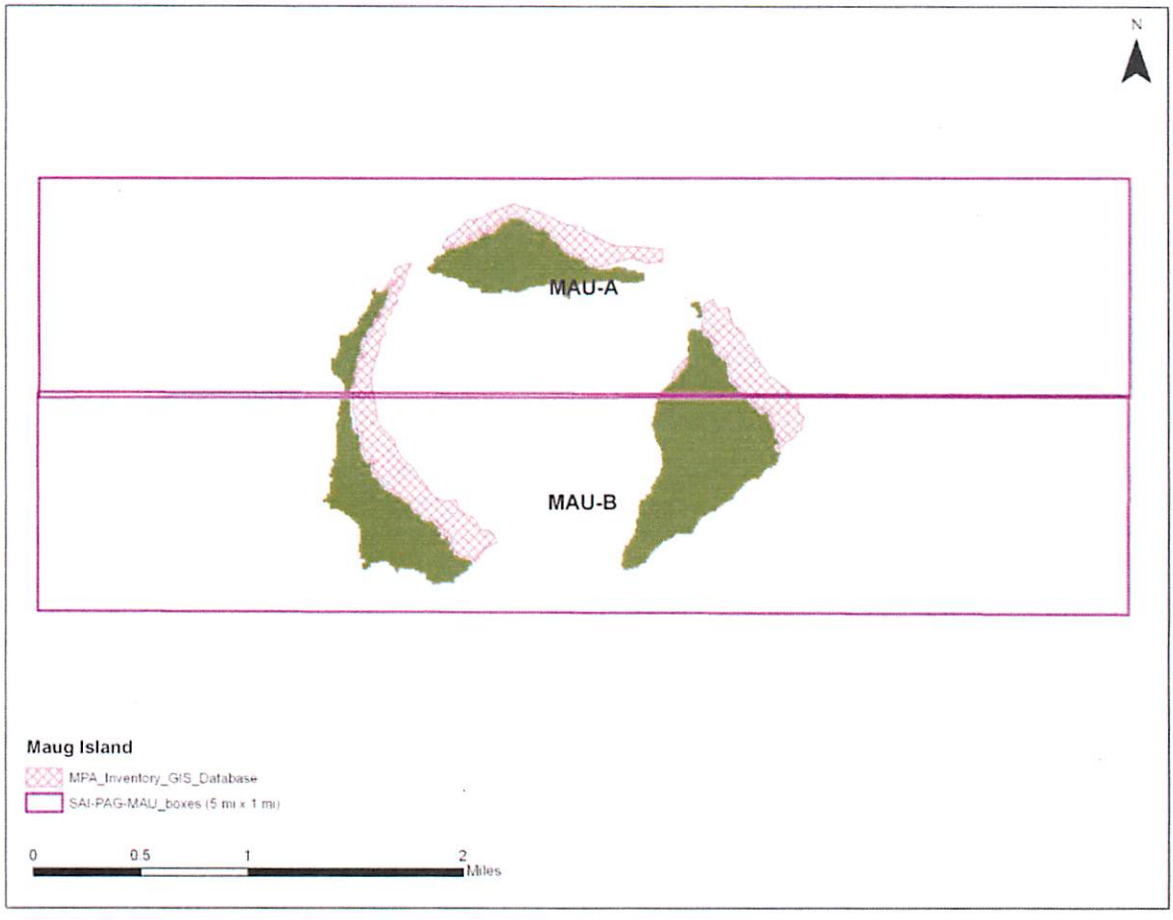
Proposed Survey Polygons: Saipan

Appendix 6 (Continued):



Proposed Survey Polygons: Pagan

Appendix 6 (continued):



Proposed Survey Polygons: Maug

Appendix 7: Dive Plans

(Attached File)

Appendix 8: Program Provided Equipment List

(Attached File)

Appendix 9: Section IV.B. Hazardous Materials Inventory

Inventory of Hazardous Materials

Common Name	Quantity	Notes	Trained Individual	Spill Control*
10,000X SYBR Gold (nucleic acid stain)	1 ml	Stored in sealed container in Scientific refrigerator	Emma George/ Mark Little	NT
5% Hydrochloric Acid	5 L	Stored in sealed plastic bucket in wet-lab	Emma George/ Mark Little	A
Mytomycin (antibiotic)	1mg	Stored in program mini-fridge	Emma George/ Mark Little	P
Chloroform	70 ml	Stored in Hazmat cabinet in wet-lab within sealed metal secondary container and padding	Emma George/ Mark Little	F
Commercial Bleach	7.5 L	Stored in ARMS labs in secondary containment	Molly Timmers and Kerry Reardon	F
DAPI Nucleic Acid Stain	500 µg	Stored in sealed plastic container in Scientific fridge	Emma George/ Mark Little	NT
DMSO Buffer	10 L	Stored in Hazmat cabinet in wetlab	Molly Timmers and Kerry Reardon	F

Common Name	Quantity	Notes	Trained Individual	Spill Control*
Dynamic Descaler (Aqueous Hydrogen Chloride)	76 L	Biodegradable; neutralize with copious amounts of water Inventory stored in ½ pallet tote on fantail In-use quantity held in ½ pallet tote behind ARMS lab	Molly Timmers and Kerry Reardon	A
95% Ethyl Alcohol (190 proof)	416 L	Highly Volatile, Flammable Bulk stored in ship's fantail tank; Daily use quantity (19 L carboy) stored in ARMS lab in secondary containment; Preserved samples stored in secondary containment in Scientific freezer.	Ship's Chief Engineer (Bulk) Molly Timmers and Kerry Reardon (Daily use and sample quantities)	Ship SOP (bulk) AL (Daily use)
Gasoline, unleaded	3.4 kL	Volatile, Flammable Stored in ship's fantail tank & drum rack	Ship's Chief Engineer	Ship SOP
25% Glutaraldehyde (disinfectant/fixative)	10 ml	Stored in sealed plastic container in Scientific refrigerator	Emma George/ Mark Little	F
Liquid Nitrogen	12 L	Stored in wetlab Scientific dewar	Benjamin Knowles	LN

Common Name	Quantity	Notes	Trained Individual	Spill Control*
Lugol's solution	500 ml	Slightly toxic Stored in Hazmat cabinet in wetlab	Bernardo Vargas-Angel	F
Mercuric Chloride (Saturated solution, 7g $HgCl_2$ in 60 ml of deionized water)	60 ml	Scientific samples consist of 200 µl $HgCl_2$ solution in 500 ml of seawater	Charles Young	M
32% Paraformaldehyde (disinfectant/fixative)	10 ml	Stored in Hazmat cabinet in wetlab	Emma George/ Mark Little	F
Pool Time Shock XtraBlue 6 in 1 Pool Shock (primarily Sodium Dichloro-s-Triazinetrione-Dihydrate)	2.3 kg	Corrosive Contained in five 1-lb bags within lidded 5-gal bucket on Grated Deck	Kerry Reardon	P
Sodium Hydroxide (NaOH) pellets	500 g	Highly caustic Stored in Hazmat cabinet in wetlab	Emma George/ Mark Little	B
Z Fix (buffered zinc formalin fixative)	3.8L	Toxic Stored in Hazmat cabinet in wetlab	Bernardo Vargas-Ángel	F
RNAlater	500ml	Stored in undersink cabinet	Emma George/ Mark Little	NT

Appendix 10: **Section IV.C. Chemical Safety and Spill Response Procedure**

***Spill Control Key**

A: Acids

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

AL: Alcohols (daily use quantities)

- Extinguish smoking lamp. Remove all sources of ignition.
- Wear appropriate PPE and clothing during clean-up.
- Ventilate closed spaces before entering them.
- Use absorbent socks to surround spills or to divert fluid flow.
- Use vermiculite or kitty litter to soak up and absorb fluid.
- Do not use combustible materials, such as saw dust.
- Use absorbent pads/diapers to wipe up the spill or a dust pan to sweep up vermiculite/kitty litter.
- Place used absorbents in plastic bag or pail.
- Clean surface thoroughly to remove residual contamination.
- Bags containing used absorbents will be properly disposed of once the ship returns to port.

B: Bases

- Wear appropriate PPE and clothing during clean-up.
- Keep upwind. Keep out of low areas.
- Ventilate closed spaces before entering them.
- Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
- **Large Spills**: Dike ahead of spill for containment. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.

- **Small Spills**: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
- Never return spills to original containers for re-use.
- Neutralize spill area and washings with product such as Grainger Base Eater Spill Kit. Collect in a non-combustible container for prompt disposal.

F: Fixatives/Formalin/Formaldehyde

- Wear appropriate PPE (gloves, goggles, breathing mask).
- Ventilate area of leak or spill. Remove all sources of ignition.
- 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, kitty litter, absorbent pads), and place in a chemical waste container. A dust pan and plastic bags are available to aid in cleanup and disposal.
- Do not use combustible materials, such as saw dust.

LN: Liquid Nitrogen

- Wear appropriate PPE (close-toed shoes, cryogloves, goggles, long-sleeved and long-legged clothes are of particular importance).
- Ventilate area.
- Contain spill where safe to do so.
- Nitrogen is more harmful in its liquid state than in its gaseous state, in a well-ventilated area. Minimally handle or interfere with the spilled LN, and allow it to sublimate off after restricting personnel access to the contained spill area under well maintained ventilation.

M: Mercury

- Wear appropriate PPE and clothing during clean-up (a minimum of nitrile gloves and eyewear).
- Stop the flow of fluid by using absorbent material (e.g. cloth, fleece, paper) to dike and soak up the spilled solution.
- Use Mercury Spill Kit if need be.
- Sprinkle area with sulfur or calcium polysulfide to suppress mercury.
- Contaminated area should be wiped with water dampened absorbent material, until one feels the area is sufficiently clean.
- Pick up used absorbents and place in a suitable container for reclamation or disposal in a method that does not generate dust
- If all the $HgCl_2$ solution from a spill is not wiped up, then potential exists for the $HgCl_2$ to come out of solution, and $HgCl_2$ crystals are more problematic (from a health perspective) than $HgCl_2$ in solution.
- All PPE and absorbent material contaminated with $HgCl_2$ should be contained in a zip-top bag labeled "$HgCl_2$ Waste," kept within the ship's HAZMAT locker, and properly disposed of once the ship returns to port.

- The concentration of $HgCl_2$ in solution, once mixed with copious amounts of fresh/salt water, will rapidly dilute the concentration of $HgCl_2$ relieving concern for further contamination by effluent, as concentrations will be below environmental toxicity, see MSDS for toxicological information.
- Areas of skin contact should be thoroughly rinsed under fresh/salt water for a minimum of 15 minutes.
- $HgCl_2$ solution contact with eyes/ingestion should be immediately addressed by the ship's doctor, rinse eyes for a minimum of 15 minutes.

NT: Non-toxic

- Wear appropriate PPE and clothing during clean-up.
- Ventilate area.
- Contain spill where safe to do so.
- Absorb liquid with paper towel while wearing gloves; place waste in sealed plastic container until processed on land.

P: Powdered Chlorine Salts

- Wear appropriate PPE (gloves, eyewear, dust mask, etc.) and clothing during clean-up.
- Ventilate area.
- Keep upwind. Avoid inhalation of salts, granules or dust.
- **Large Spills**: Sweep or scoop all spilled material, contaminated soil or other materials and place into clean, dry containers for disposal. Do not close containers containing wet or damp material. If wet or damp, container should be left open in a well-ventilated area to disperse any hazardous gases that may form. Once cleaned, neutralize/flood the spill area with large amounts of water as appropriate.
- **Small Spills**: Sweep or scoop up spilled material and add it to dive gear "disinfectant" rinse tote if available and full of water. If dive gear "disinfectant" rinse tote is not available, dispose of collected material into a clean, dry container. Once cleaned, neutralize/flood spill area with large amounts of water as appropriate.
- Never return spills to original containers for re-use.

Inventory of Spill Kit Supplies

Product Name	Amount	Chemicals useful against	Amount of clean up possible
Absorbent pads	20	A, AL, F	~4 L
Base Eater	Large Kit	B	~19 L
Dust pan	1 set	A, F, P	n/a
Goggles	1 pair	A, F	n/a
Kitty litter	5.4 kg	A, AL,F	~4 L
Nitrile gloves	6 pairs	A, F	n/a
NEUTRASORB®	3.2 kg	A	Varies with acid concentration

Plastic bags	5	A, AL, F, P	~4 L (each)
Vermiculite	2.5 kg	AL, F, NT	~6 L of chemical spilled
Vinyl gloves	20 pairs	A, F	n/a