Final Project Instructions

Date Submitted: April 24, 2015

Platform: NOAA Ship *Bell M. Shimada*

Project Number: SH-15-05 (MBNMS)

Project Title: Characterization of Davidson Seamount: mammals, seabirds, midwater fishes and invertebrates

Project Dates: MAY 05, 2015 to MAY 13, 2015

Prepared by: _____ Dated: 4-24-2015
Dr. Andrew DeVogelaere
Chief Scientist
Monterey Bay National Marine Sanctuary

Approved by: _____ for Dated: 4/25/15
Paul Michel
Superintendent
Monterey Bay National Marine Sanctuary

Approved by: _____ Dated: 27 April 2015
Captain Douglas D. Baird, Jr., NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period

Brief Summary:

Marine mammal and seabird surveys will be conducted above and adjacent to Davidson Seamount. Media Day will be held off the wharf in Santa Cruz. Mesopelagic fish and invertebrate trawl surveys will be conducted within Sanctuary Ecologically Significant Areas (SESAs), including Davidson Seamount Management Zone (DSMZ). Additional research includes Puma drone survey to observe marine mammals at DSMZ, recording of marine mammal and ocean noise (hydrophones), oceanographic data and water sampling (CTD), collection of water samples for environmental DNA analysis (CTD), and filming for video production of NOAA research and collaborative Marine Biodiversity Observatory Network (MBON). The main goals to be addressed by this project include: 1) characterization of Davidson Seamount; 2) characterization of SESAs; 3) assessing the impacts of a seamount on the distribution of sanctuary resources; 4) evaluating strengths and weaknesses of different marine mammal sampling techniques; and 5) development of a Marine Biodiversity Observatory Network.

B. Days at Sea (DAS)

Of the _11_ DAS scheduled for this project, _1_ DAS is funded by an OMAO allocation, _10_ DAS are funded by a Line Office Allocation (NOS), _0_ DAS are Program Funded, and _0_DAS are Other Agency funded.

Project Period:

- May 4, 2015 – staging day
- May 5 – 13, 2015 – underway on project, ends in San Francisco, CA
- May 14 – 17, 2015 – ship transits from San Francisco, CA to Newport, OR (1 NOS DAS for transit, 1 OMAO DAS for transit, 2 OMAO DAS for acoustic testing)

C. Operating Area

1. Davidson Seamount Management Zone (DSMZ) within MBNMS (see Fig. 1)

2. Sanctuary Ecologically Significant Areas (SESAs) within MBNMS (see Fig. 2)

D. Summary of Objectives

1. Segment 1 (May 5 – May 8)

   a. Marine mammal and seabird survey above and adjacent to Davidson Seamount Management Zone (DSMZ; daytime)

b. Puma™ AE (All Environmental) Small Unmanned Aircraft System (UAS) survey above and adjacent to DSMZ to observe marine mammals (daytime)
c. Soundscape survey above and adjacent to DSMZ (daytime): Deploy and retrieve three drifting hydrophones to record marine mammal and ocean noise
d. Collection of oceanographic data and water samples (CTD) above and adjacent to DSMZ (nighttime)
e. Use shipboard seawater flow-through system to collect water samples for environmental DNA
f. Filming for video production on NOAA research and collaborative Marine Biodiversity Observatory Network (MBON)

2. Segment 2 (May 9): Media Day and Transfer of Scientific Party, Santa Cruz, CA

a. Media day (morning) to promote MBNMS research, NOAA's largest visitor center on the West Coast (Sanctuary Exploration Center), and NOAA ship operations; held on the ship anchored off Santa Cruz and Sanctuary Exploration Center
b. Unload Segment 1 Science party; Load Segment 3 Science party; ship anchored off Santa Cruz (harbor or wharf), CA
c. Highlight ONMS small boat operations by using R/V 4107 for transfers

3. Segment 3 (May 10 – May 13)

a. Mesopelagic fish and invertebrate trawl survey above and adjacent to DSMZ, and within Sanctuary Ecologically Significant Areas (SESAs) during transit to/from DSMZ (daytime/nighttime; Tucker trawl).
b. Collection of oceanographic data and water samples (CTD) above and adjacent to DSMZ (daytime/nighttime); water samples for environmental DNA analysis

E. Participating Institutions

1. Monterey Bay National Marine Sanctuary (MBNMS)
2. Moss Landing Marine Laboratories (MLML)
3. University of California Santa Cruz (UCSC)
4. California Academy of Sciences (CAS)
5. Monterey Bay Aquarium Research Institute (MBARI)
6. Office of National Marine Sanctuaries (ONMS)
7. Office of Marine and Aviation Operations (OMAO)
8. National Ocean Service (NOS)
9. National Marine Fisheries Service (NMFS)
10. Stanford University
11. Local media outlets (e.g., Santa Cruz Sentinel, *Your Sanctuary* TV)
12. Sanctuary Exploration Center
13. Save the Earth Foundation
14. California State University, Montery Bay (CSUMB)

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Benson, Scott	Mammal Observer (4)	5/5/15	5/9/15	Male	NMFS	United States
Beraha, Lori	Mammal Observer (3)	5/5/15	5/9/15	Female	Independent	United States
Borker, Abraham	Seabird Observer (1)	5/5/15	5/9/15	Male	UCSC	United States
Burton, Erica	Fish Biologist (1)	5/5/15	5/13/15	Female	MBNMS	United States
Cade, David	Bioacoustician/Hydrophone	5/5/15	5/9/15	Male	Stanford University	United States
Chetirkin, Paul	Videographer	5/5/15	5/9/15	Male	ONMS	United States
DeVogelaere, Andrew	Chief Scientist	5/5/15	5/13/15	Male	MBNMS	United States
Garrett, John	Seabird Observer (2)	5/5/15	5/9/15	Male	UCSC	United States
Keiper, Carol	Mammal Observer (2)	5/5/15	5/9/15	Female	Independent	United States
King, Chad	Drone operator (3); Social Media/Videographer	5/5/15	5/13/15	Male	MBNMS	United States
Mackie, Elizabeth	Drone operator (1)	5/5/15	5/9/15	Female	OMAO	United States
Newton, Kelly	Mammal Observer (1)	5/5/15	5/9/15	Female	UCSC	United States
Rogers, Mark	Drone operator (2)	5/5/15	5/9/15	Male	OMAO	United States
Scales, Kylie	Oceanographer/CTD (1)	5/5/15	5/13/15	Female	NMFS/ERD	United States
Searcy, Adam	Mammal Observer (6)	5/5/15	5/9/15	Male	Independent	United States
Spatz, Dena	Mammal Observer (5)	5/5/15	5/9/15	Female	UCSC	United States
Brennan, Jim	Fish Biologist (5)	5/9/15	5/13/15	Male	Independent	United States
Fields, Ryan	Fish Biologist (3)	5/9/15	5/13/15	Male	MLML	United States
King, Aaron	Fish Biologist (6)	5/9/15	5/13/15	Male	Independent	United States
Lea, Robert	Fish Biologist (2)	5/9/15	5/13/15	Male	CAS	United States
Martone, Rebecca G.	Geneticist/eDNA sampler (2)	5/9/15	5/13/15	Female	Stanford University	United States
Michel, Paul	Social Media/ Videographer	5/9/15	5/13/15	Male	MBNMS	United States
Pien, Catarina	Fish Biologist (4)	5/9/15	5/13/15	Female	MLML	United States

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Port, Jesse	Geneticist/eDNA sampler (1)	5/9/15	5/13/15	Male	Stanford University	United States
Taatjes, Jessica	Oceanographer/CTD (2); Fish Biologist (7)	5/9/15	5/13/15	Female	CSUMB	United States

Segment 1 (May 5 – May 9)

1. Andrew DeVogelaere, Marine Scientist, MBNMS (Chief Scientist)
2. Erica Burton, Fish Biologist, MBNMS
3. Chad King, Drone Operator/Social Media/Videographer, MBNMS
4. Kylie Scales, Oceanographer/CTD, NMFS/ERD
5. Kelly Newton, Marine Mammal Observer, UCSC
6. Carol Keiper, Marine Mammal Observer, Independent
7. Lori Beraha, Marine Mammal Observer, Independent
8. Scott Benson, Marine Mammal Observer, NMFS
9. Dena Spatz, Marine Mammal Observer, UCSC
10. Adam Searcy, Marine Mammal Observer, Independent
11. Abraham Borker, Seabird Observer, UCSC
12. John Garrett, Seabird Observer, UCSC
13. Elizabeth Mackie, Drone Operator, OMAO
14. Mark Rogers, Drone Operator, OMAO
15. David Cade, Bioacoustician/Hydrophone, Stanford University
16. Paul Chetirkin, Videographer, ONMS

SCIENTIST DUTY HOURS (DRAFT):
Daytime (Marine Mammal survey; drone; hydrophone): 0700-1900
Nighttime (CTD): 1900-0700

Segment 3 (May 10 - May 13)

1. Andrew DeVogelaere, Marine Scientist, MBNMS (Chief Scientist)
2. Erica Burton, Fish Biologist, MBNMS
3. Chad King, Social Media/Videographer, MBNMS
4. Kylie Scales, Oceanographer/CTD, NMFS/ERD
5. Robert Lea, Fish Biologist, CAS
6. Ryan Fields, Fish Biologist, MLML
7. Catarina Pien, Fish Biologist, MLML
8. Jim Brennan, Fish Biologist, Independent
9. Aaron King, Fish Biologist, Independent
10. Jessica Taatjes, Oceanographer/CTD, Fish Biologist, CSUMB
11. Jesse Port, Geneticist/eDNA, Stanford University
12. Rebecca Martone, Geneticist/eDNA, Stanford University
13. Paul Michel, Social Media/Videographer, MBNMS

SCIENTIST DUTY HOURS (DRAFT):
Daytime (fishes trawl survey, CTD): 0700-1900
Nighttime (fishes trawl survey, CTD): 1900-0700

G. Administrative

1. Points of Contacts:

Project Operation Lead and Chief Scientist
Dr. Andrew DeVogelaere
Monterey Bay National Marine Sanctuary
99 Pacific Street, Bldg 455A
Monterey, CA 93940
Office 831-647-4213; cell 831-236-6793; FAX: 831-647-4257
Andrew.DeVogelaere@noaa.gov

Project Operation – Alternate
Erica Burton
Monterey Bay National Marine Sanctuary
99 Pacific Street, Bldg 455A
Monterey, CA 93940
Office 831-647-4246; FAX: 831-647-4257
Erica.Burton@noaa.gov

Operations Officer
NOAA Ship *Bell M. Shimada*
LT Zachary Cress
206-427-2374
Ops.bell.shimada@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

a. MBNMS Research Permit (MBNMS-2014-001_Michel) for discharge and recovery of hydrophone, and Puma drone.

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:

Date	Proposed Operation	Location
May 4	Staging/Mobilization	San Francisco
May 5	Staging/Mobilization/Transit	San Francisco
May 6	Marine mammal survey	
May 7	Marine mammal survey	
May 8	Marine mammal survey	

Date	Proposed Operation	Location
May 9	Media Day/Transfers	Santa Cruz wharf
May 10	Mesopelagic fish trawls	
May 11	Mesopelagic fish trawls	
May 12	Mesopelagic fish trawls	
May 13	Destaging/Demobilization	San Francisco

B. Staging and Destaging:

1. Staging will take place on May 4th in San Francisco, and will require NOAA crew assistance as follows:

    a. Deck department: Crane operations and equipment storage (big eye binoculars-2 yokes-2, and stands-2; Tucker trawls-2; Puma drone equipment; hydrophones)

    b. Electronics Tech: Assistance with computer connections

2. Destaging will take place on May 13th in San Francisco. The scientific party will offload their equipment as soon as possible after docking.

    a. Deck department: Crane operations will be necessary to offload equipment (big eye binoculars-2 yokes-2, and stands-2; Tucker trawls-2; Puma drone equipment; hydrophones)

C. Operations to be Conducted:

1. Segment 1: May 5 – 8

    a. Marine Mammal and Seabird Survey at Davidson Seamount (daytime ops)

        i. Visual Line Transect Surveys: Line transect survey methods will be used to collect cetacean abundance data. A daily watch for cetaceans will be maintained on the flying bridge during daylight hours (approximately 0700 – 1900) by six (6) mammal observers. Each observer will work in 2-hour rotations, manning each of the following three stations on the flying bridge for 40 minutes: a port side 7x 50 or 25x150 binocular station, a center-line data recorder position, and a starboard 7 x 50 or 25x150 binocular station. The center-line data recorder position might be split into two separate stations: data recorder and center "naked-eye" observer. An "independent observer" may keep a separate watch of animals sighted during the cetacean survey operations, to be compared later with the observer team's data.

        Visual surveys of seabirds will be conducted from the flying bridge during daylight hours by two seabird observers. Seabird observers will use handheld and 25x150 binoculars.

        Ship Speed, Order of Operations: At the beginning of each day search effort should start on the eastern waypoint of the trackline. The ship should travel at 10kt (through the water) along the designated trackline. While on search effort,

if the ship's speed through the water should deviate from this by more than 1kt, the bridge personnel will notify the mammal team on watch or the Project Leader.

On sighting a marine mammal school or other feature of biological interest, the Project Leader or marine mammal observer team on watch may request that the vessel be maneuvered to approach the school or feature for investigation. When the ship approaches a school of dolphins, the observers will make independent estimates of school size. Photography operations may commence from the bow, based on directions from the Project Leader or Senior Marine Mammal Observers. Harassment of marine mammals in the wild is prohibited by regulations enacted under the Marine Mammal Protection Act (http://www.nmfs.noaa.gov/pr/dontfeedorharass.htm). The ship shall remain at least 100 yards away from large whales, and 50 yards from dolphins, porpoises, and seals; unless animals actively approach the vessel (e.g., bow riding).

It may occasionally be necessary to divert the ship's course from the established trackline during regular effort due to glare or adverse sea conditions. Under these circumstances, the ship may divert up to 30 degrees from the established course. This deviation may continue until the ship is 3nm from the trackline, at which point the ship should turn back toward the trackline.

When the observers have completed scientific operations for the sighting, the ship will resume the same course and speed as prior to the sighting. If the pursuit of the sighting has taken the ship more than 3nm from the trackline, the observers should be notified. The Project Leader or Senior Marine Mammal Observers may request that, rather than proceed directly toward the next waypoint, the ship may take a heading of 20 degrees back toward the trackline or return to the position at which the ship diverted before resuming effort.

Ship Equipment Required: Observation computers (mammal and seabirds) will be hooked up to the ship's GPS (for course, speed and position information). A log of observation conditions, watch effort, sightings and other required information will be entered into a computer which needs to be linked to the ship's GPS (for course, speed and position information). Please note that it is very important that all science computers be connected to the same ship GPS.

Ship Personnel Requirements: Weather permitting, observer teams on the flying bridge will conduct visual watches for marine mammals and seabirds during all daylight hours (from 0700 to 1900). The Commanding Officer, in consultation with the Project Leader, will agree upon a course that mitigates any stack exhaust blowing across the flying bridge.

ii. Photography: Photographs of marine mammals will be taken on an opportunistic basis. These will be used to study social behavior and movement patterns of identified individuals, and to study geographic variation. Necessary permits will be present on the vessel.

Ship Speed, Order of Operations: The animals to be sampled will be approached by the research vessel during normal survey operations (100 yards away), or will approach the vessel on their own.

Ship Equipment Required: N/A

Ship Personnel Requirements: N/A

iii. Puma™ AE (All Environmental) Small Unmanned Aircraft System (UAS) Survey (daytime ops)

The Puma™ UAS drone will be used to identify and count marine mammals as a methods comparison to shipboard surveys (adhering to "NOAA Shipboard Operations Guide for the Puma AE"). The drone will be launched on an opportunistic basis, based on the presence of marine mammals. The Puma's electric motor powers a propeller in the nose of the plane and is launched by hand by one of the pilots off the deck of a moving ship. At the end of the survey, the Puma lands in the water and will have to be retrieved by the Shimada fast rescue boat (FRB).

The Puma UAS is an all-environment and fully waterproof aircraft system, has a wing span of 2.8 meters, a length of 1.4 meters, and weighs 6.1 kg. An enhanced precision navigation system with secondary GPS provides great positional accuracy and reliability. The Puma is capable of flying to an altitude of 10,000 feet and has a 15 kilometer range, but due to FAA regulations, it was limited to a 1,000 foot ceiling and a radius of 1.6 km around the vessel for the duration of this project. The drone flies at a speed between 20 to 45 knots (37 to 83 km/hr). The gimbaled camera is capable of 360 degree continuous pan, +10 to -90 tilt, and includes an infrared camera.

iv. Oceanography

Ship Speed, Order of Operations: A chronological record of oceanographic and net tow stations will be kept by the ship (Marine Operations Log) with dates and times in GMT. The ship will provide a copy of the electronic marine operations log (with the project Weather Log and SCS data) 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 oceanographer, ship's Survey Technician, and other designated scientists with assistance from the Deck Department as required.

b. CTD Sampling:

i. Pressure Test: A deck pressure test is required at the beginning of the project.

Ship Speed, Order of Operations: The test takes approximately 30 minutes to complete

Ship Equipment Requirement: See above

Ship Personnel Requirements: The Oceanographer and the ship's Survey Technician should conduct the test before leaving the dock; the CTD should be in its normal at-sea position on the ship.

ii. CTD Stations (also occurring during Segment 3):
Weather permitting, up to four CTD Stations will be occupied each night after the end of the marine mammal and seabird observations (approximately 1900) at the designated CTD stations for the evening. CTD data will be collected using the SeaBird 9/11+ CTD. The ship's Survey Technician will be responsible for the CTD operations and maintenance.

Ship Speed, Order of Operations: All casts are to 1000m, where bottom depths permit. When bottom depths are too shallow for the 1000m cast, the oceanographer 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 30m per minute for the first 100m of the cast, then 60m/min after that. Each CTD cast will be conducted at the designated station locations for the evening. The exact time will be determined by the Deck Officer (by 1800 local ship time that day). Cast times are subject to change and the schedule may be modified by the Oceanographer. Additional CTD stations may be requested by the Project Leader in areas of special interest.

Ship Equipment Required: The main Sea-Bird CTD system will be provided, maintained, and operated by the ship's Survey Technician. Scientific personnel will be trained to operate the A-frame; the crew of the vessel will operate winch and other deck equipment, and will be responsible for the termination (and any necessary reterminations) of the CTD cable pigtail to 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). To ensure longevity of the CTD, the CTD must be rinsed completely with fresh water after every cast, and the CTD must then be covered and secured.

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

End of Operations (Transit at Night): When scientific operations are complete for the night, the ship will transit to the inshore waypoint of the transect line for the following morning. It is estimated that the ship will need to transit between 50 and 60 nmi per night.

c. Hydrophone deployment and recovery:

i. We will be releasing up to three DSG hydrophones (DSG-ST Ocean acoustic recorder) over Davidson Seamount. After a soak time of 8-36 hours (depending on currents), they will be relocated using science team tracking devices, and need to be picked up by a hook from the back of

the deck; a grappling hook may be needed on recovery if the boat hooks aren't long enough.

Each hydrophone is a simple two-part design with the weight of the DSG on a fender float and a satellite line to a man overboard pole with the trackers attached. The ~neutrally buoyant DSGs will be attached at the bottom of a 20" fender float with 10' of 1/2" line attached to a mounting bracket and 80' of 3/16" U/V resistant bungee cord. 15' of 7/16" line will be attached from the float to a 10' man-overboard pole with a GPS transmitter and a VHF transmitter attached. The man overboard poles are supplemented with "torpedo" floats for added buoyancy and ballasted with weight on the bottom to keep them floating upright. The DSG itself is a 25" x4.5" diameter tube and weighs ~17 pounds. Each of the three systems can be transported in a container the size of a standard 18-gallon office recycling bin.

2. Segment 2: May 9
    a. Media Day at Santa Cruz, CA
    b. Transfer of Scientific Party
    c. Request light refreshments on deck for visitors, if possible

3. Segment 3: May 10 - 13
    a. Mesopelagic fish and invertebrate trawl Survey (daytime/nighttime ops)
        i. We will be bringing two different Tucker trawls (primary, and back-up).

The primary Tucker trawl has the following specs:

- pipe width: ~8 ft
- Open net when fishing: ~9 ft tall
- Weight: ~200 lbs (without wooden storage cradle; see image: 100170_pic2.jpg)
- Wooden cradle for storage/handling
- Dimensions in cradle storage: ~8 ft x 5 ft
- Single opening net
- Bridle: wire

Back-up Tucker trawl (smaller; we will only use as back-up, if primary Tucker fails).

- pipe width: ~1.5 meter
- Open net when fishing: ~1.5 meter tall
- Weight: unknown
- Wooden cradle for storage/handling
- Dimensions in cradle storage: unknown (smaller than primary tucker)
- Multi-opening net (if used, we will operate as single opening net)

ii. Set net, using an approximate warp:depth ratio of 1.2:1, to reach desired depth (~500 m); in water for ~60 minutes; tow at 1-2 knots
    a. Open net, oblique tow (0-500-0 m)

b. Approx. wire out at ~30 meters/minute
c. ~20 minutes to 500 meters depth
d. ~20 minutes at depth
e. ~20 minutes up

iii. Retrieve the trawl, sample after ~20 min at depth
iv. Rough and then fine sort sample from tucker trawl
v. Analyze depth-at-time data from trawl
f. Approx. 1-hour between tows
g. Continue sorting; preserving samples
h. Set-up next tow
vi. Approximately 3-4 tows per shift (12-hour period)

SMALL BOAT OPERATIONS:

1. Segment 1: May 5 – 8
    a. Shimada fast rescue boat (FRB) will be needed for the following activities:
        i. Retrieve Puma drone after completed transects and water landings.

    NOTE: MOC-P has granted conditional approval to use Shimada fast rescue boat (FRB) for Puma retrieval, with the following stipulations:
    1. *The FRB will always be within one nautical mile of the ship and within visual sight from the ship at all times.*
    2. *The FRB will be able to respond to any man-over-board situations within 5 minutes of notification.*

2. Segment 2: May 9
    a. R/V *4107* will be used for the following activities:
        i. Transfer Media personnel and VIPs to/from Santa Cruz Wharf
        ii. Transfer scientific party to/from Santa Cruz Wharf

3. Segment 3: May 10 – 13
    a. NONE

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

Puma UAS Drone Operations:

- Operates in less than 25 knot winds
- Needs 1,000 foot ceiling of visibility

Media Day/Transfer of Scientists

- Although the area by Santa Cruz Wharf is historically well-protected and calm, weather from the south may preclude transfer of media and scientists. If conditions are unsafe, there will be no media boarding the ship. An alternate location for transferring scientists, with protection from southerly winds and swells, is Monterey Harbor. If no sea transfer is safe, we will shorten segment 3 and transfer scientists at San Francisco.

III. Equipment

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

Observation computers (mammal and seabirds) will be hooked up to the ship's GPS (for course, speed and position information). A log of observation conditions, watch effort, sightings and other required information will be entered into a computer which needs to be linked to the ship's GPS (for course, speed and position information). Please note that it is very important that all science computers be connected to the same ship GPS.

We request the following systems and their associated support services, sufficient consumables, back-up units, and on-site spares. All measurement instruments are assumed to have current calibrations and we request that all pertinent calibration information be included in the data package.

- Power and ship's GPS connections (2) to the flying bridge (Please note that it is very important that all science computers be connected to the same ship's GPS.
- Three handheld radios (as spares)
- SeaBird 9/11+ CTD system
- Hydrographic winch with minimum 500m of .375" conducting wire, terminated to CTD.
- Hydrographic winch with minimum 2500m cable (3/8" minimum diameter) for net tows.
- SeaBird thermosalinograph (SBE45) and connection to SCS.
- Connection of SBE38 to SCS (secondary temperature sensor for TSG).
- Scientific Computing System for data collection.
- During mobilization, ships crew will be requested to assist in: using the crane to load heavy equipment (two big eye binoculars, yokes/stands; two Tucker Trawls); installation of binoculars stands; and network the computers.
- Three observer chairs for flying bridge
- CTD Sensors, rosette and bottles
- CTD hydro wire and winch
- Continuously flowing seawater in lab and on deck
- Continuous underway meteorological and sea surface monitoring system
- In the lab: fume hood, regular freezer, -80degree C freezer, and refrigerator space for water and organism samples
- During mobilization, ships crew will be requested to assist in: using the crane to (un)load heavy equipment (max load < 5,600 lbs); brace and secure equipment to deck; and network the computers.
- Winch (with conductive cable) for Tucker trawls
- Inclinometer for Tucker trawls
- Three handheld radios

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

- Puma UAS Drone (duplicate systems: primary, back-up) and associated equipment (6 large pelican cases)
- Three Hydrophones
- Six 7x50 hand-held binoculars (4 UCSC – 2 MLML)
- Two 25x150 binoculars, yokes, and stands (MLML)
- One laptop computer for scientific party email use (MBNMS), one laptop for the Project Leader (UCSC)
- Two laptop computers to be used on the flying bridge for marine mammal and seabird data collection (MBNMS or UCSC)
- Portable GPS component (MBNMS or UCSC)
- Computer data storage media (CDs & hard-drives) (MBNMS)
- External hard-drive for EK60 data (MBNMS)
- Digital SLR camera (10 MP & 300mm telephoto lens) (MBNMS or MLML)
- Videography equipment (4 pelican cases)
- Seven 5-gallon cubitainers for water collection and associated milk crates
- Tucker Trawls (2) and associated nets
- Jars (gallon, quart, 12oz, 6oz) for pickled specimens
- Ziploc bags or whirl packs for freezing tissues
- Formaldehyde solution (10% Formalin, neutral buffered; see chemicals list)
- Ethanol (95%, non-denatured; see chemicals list)
- Spill kit (see chemicals list)
- Nitrile Gloves
- Protective eyewear
- Secondary containers for chemicals
- Waterproof labels, sharpies, india ink pens, pencils
- Buckets for sorting
- Ice packs or dry ice, and coolers for transporting frozen samples from San Francisco to MLML or CalAcad Museum Collections
- Dissecting Microscopes
- Small glass or plastic dishes (to view under scope)
- Dissecting kit (probes, tweezers to use under scope)
- Guidebooks, keys

IV. Hazardous Materials

A. Policy and Compliance

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

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

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

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

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

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

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

B. Inventory

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Ethanol (95% non-denatured)	2 gallons	Alcohol; store in chemical hood; store away from oxidizers (bleach), acids, bases	Burton, Erica	Et
Formaldehyde solution (10% Formalin, neutral buffered)	10 gallons	Alde-hyde; store in chemical hood	Burton, Erica	Form
Isopropyl Alcohol	1.3 cups	Alcohol; store in dry, well-ventilated area; store away from oxidizers (bleach), acids, bases	Burton, Erica; Port, Jesse;	Isopr
Bleach (sodium hypochlorite)	1 quart	Bleach; store in well-ventilated area. Do not store near acids	Burton, Erica; Port, Jesse;	Bleach
Borax (sodium borate)	1 pound box	Alkaline mineral salt (household); no special storage required	Burton, Erica	SB

C. Chemical safety and spill response procedures

Et: Ethanol

- 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., absorbent pads and SPILL-X-S), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

Form: 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., SPILL-X-FP; followed by SPILL-X-S for any remaining liquid residue), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

Isopr: Isopropyl Alcohol

- 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., absorbent pads and SPILL-X-S), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

Bleach: Sodium hypochlorite

- Ventilate area of leak or spill.
- Wear appropriate personal protective equipment.
- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Soak up with inert absorbent material; keep in closed container for disposal. Small spill (<gallon) can be wiped or mopped up

SB: Sodium tetraborate decahydrate (Borax)

- Wear appropriate personal protective equipment.
- Shovel material into waste disposal container.
- Clean area with water.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
SPILL-X-FP	Six, 1.85 pound containers	Formaldehyde solutions	>10 gallons formalin (10% neutral buffered)
SPILL-X-S	Six, 1 pound containers	Ethanol; Isopropyl Alcohol; or any remaining liquid residue after formalin polymerization using SPILL-X-FP	>2 gallon
No name	1 bucket w/broom, dustpan, plastic bags, absorbent pads/boom, goggles, gloves	Formaldehyde solutions; Ethanol	Multiple spills

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

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

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

A. Data Classifications: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and

vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.

C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings 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.omao.noaa.gov/fleeteval.html and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

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

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

that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

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

B. Medical Forms and Emergency Contacts

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

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

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

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

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

Contact information:

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

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.

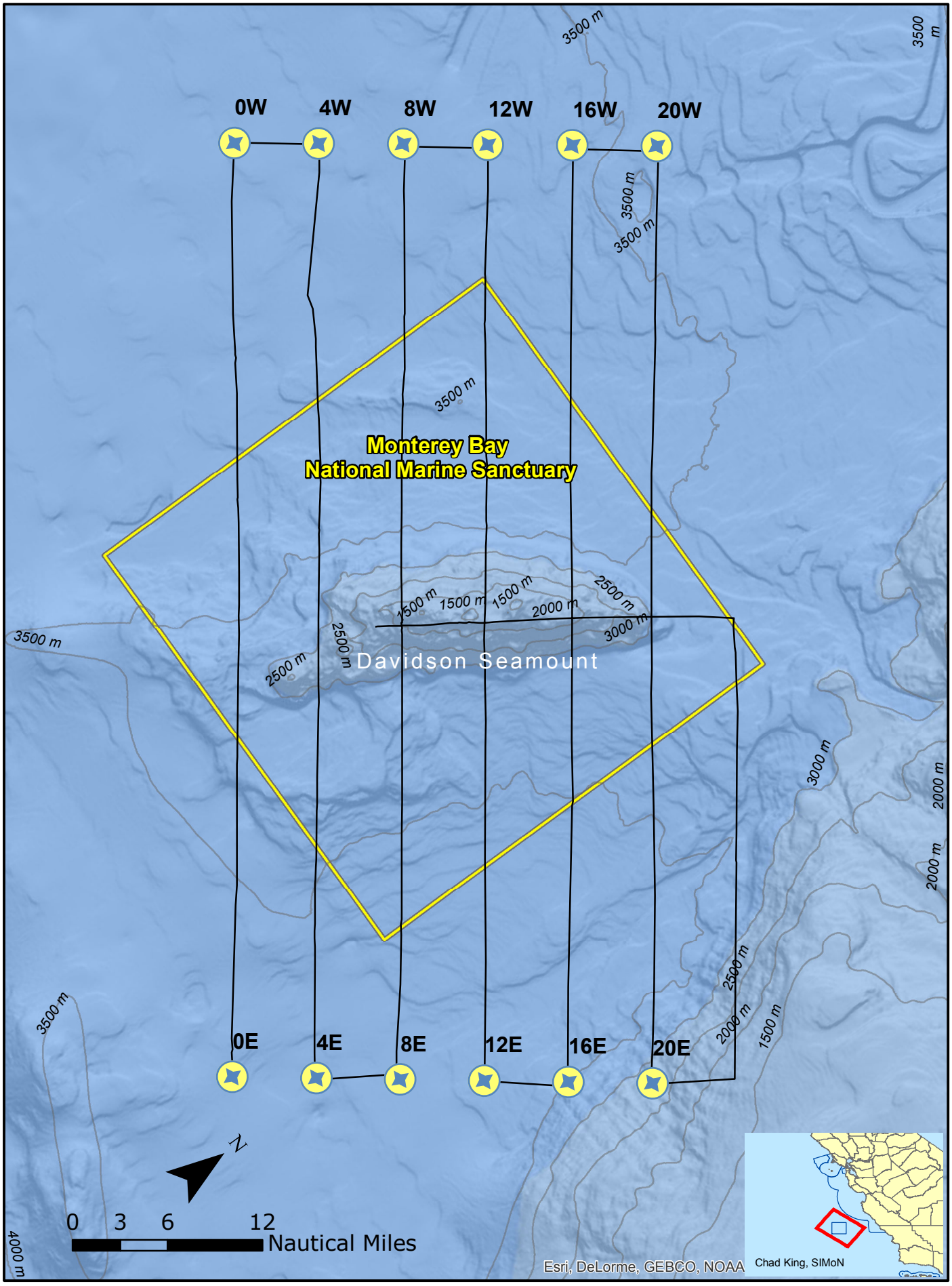
VIII. Appendices

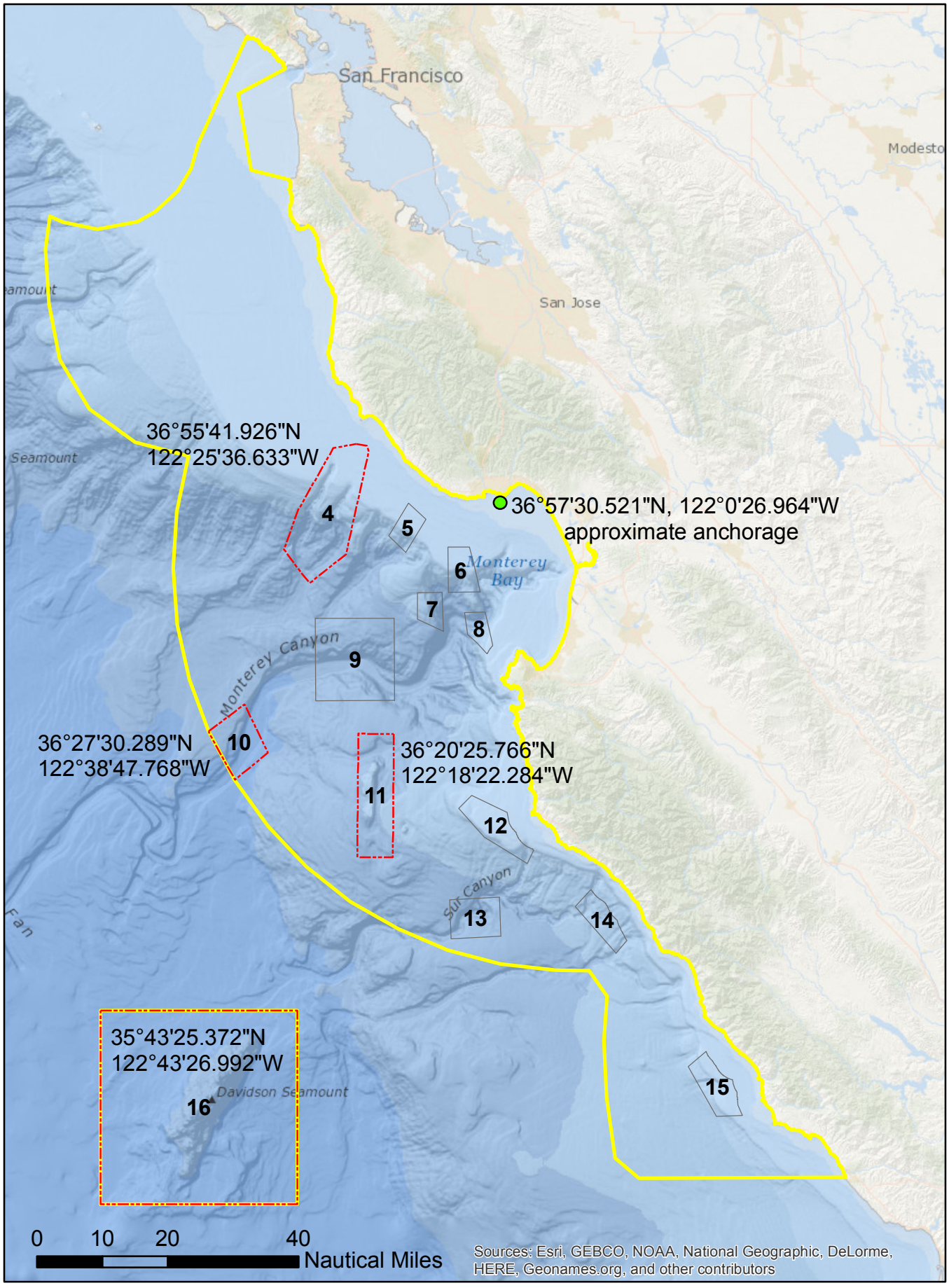
Table 1. Waypoints for marine mammal survey transects at Davidson Seamount Management Zone.

Transect ID	Longitude	Latitude
0E	-122.476788	35.325387
4E	-122.423762	35.382972
8E	-122.370661	35.440533
12E	-122.317483	35.498069
16E	-122.264230	35.555580
20E	-122.210900	35.613066
0W	-123.269639	35.797350
4W	-123.216869	35.855279
8W	-123.164023	35.913185
12W	-123.111100	35.971067
16W	-123.058100	36.028926
20W	-123.005022	36.086760

Figure 1. Marine Mammal survey transects (Segment 1) at Davidson Seamount Management Zone (DSMZ).

Figure 2. Survey extent including anchorage off Santa Cruz, California; Davidson Seamount Management Zone (DSMZ); and Sanctuary Ecologically Significant Areas (SESAs), #4, #10, and #11. Latitude and Longitude coordinates are approximate centers of SESAs and DSMZ.


0W
4W
8W
12W
16W
20W
0E
4E
8E
12E
16E
20E
Monterey Bay
National Marine Sanctuary
Davidson Seamount
3500 m
2500 m
1500 m
2000 m
3000 m
N
0 3 6 12
Nautical Miles
Esri, DeLorme, GEBCO, NOAA
Chad King, SIMoN


San Francisco
Modesto
San Jose
Seamount
36°55'41.926"N
122°25'36.633"W
4
5
36°57'30.521"N, 122°0'26.964"W
approximate anchorage
6
Monterey Bay
7
8
9
Monterey Canyon
36°27'30.289"N
122°38'47.768"W
10
11
36°20'25.766"N
122°18'22.284"W
12
Sur Canyon
13
14
15
35°43'25.372"N
122°43'26.992"W
16
Davidson Seamount
0 10 20 40
Nautical Miles
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, HERE, Geonames.org, and other contributors