Project Instructions

Date Submitted: December 2, 2016
Platform: NOAA Ship *Bell M. Shimada*
Project Number: SH-16-01 (OMAO)
Project Title: 2016 Pacific Hake Spawning Biomass
Project Dates: January 9 – February 9, 2016

Prepared by: _____ Date: 12/1/15
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Title: Fisheries Engineering and Acoustic Technologies (FEAT) Research Fishery Biologist
Affiliation (Program or Lab): Northwest Fisheries Science Center (NWFSC)/Fishery Resource Analysis and Monitoring (FRAM) Division/Groundfish Monitoring Program/FEAT

Approved by: _____ Date: 12-1-15
Team Lead Name: Lawrence Hufnagle
Title: FEAT Team Lead
Affiliation (Program or Lab): NWFSC/FRAM Division/Groundfish Monitoring Program/FEAT

Approved by: _____ Date: 12-2-15
Program Director Name: Michelle McClure
Title: Division Director
Affiliation (Program or Lab): NWFSC/FRAM Division

Approved by: _____ Date: 12/2/2015
Lab Director Name: John Stein
Title: Science and Research Director
Affiliation (Program or Lab): NWFSC

Approved by: _____ Digitally signed by PARKER.BRIAN.W.1076514042 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=NOAA, cn=PARKER.BRIAN.W.1076514042 Date: 2015.12.08 15:23:39 -08'00' Date: 12/8/2015
Commander Brian W. Parker, NOAA
Title: Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period: The 2016 Pacific Hake (*Merluccius productus*) Spawning Biomass (hereafter "winter hake") acoustic and trawl survey will characterize the distribution of spawning hake, the spawning hake aggregations, and the fish within those aggregations, in order to evaluate the feasibility of a future winter biomass survey of spawning Pacific hake. This is a research survey. The survey period is January 9 through February 9, 2016.

B. Days at Sea (DAS): Of the 30 DAS scheduled for this project, 0 DAS are funded by an OMAO allocation, 30 DAS are funded by a Line Office allocation and 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area: The 2016 winter hake survey will span the west coast of the U.S. from approximately latitude 31.6°N (south of San Diego, CA along U.S. EEZ) to approximately latitude 44.6°N (Newport, OR) (**Appendix 1**, **Fig.1**; waypoints are listed in **Appendix 2**, **Table 1**). Eastern and western extents will ordinarily range from the ≥30 m isobath to either the 3,000 or 4,500 m isobaths, but not to exceed the 6,000 m isobath.

D. Summary of Objectives: The primary goal of the survey is to characterize the distribution of spawning hake, the spawning hake aggregations, and the fish within those aggregations in order to evaluate the feasibility of a future winter spawning hake biomass survey. The project will use data from an integrated acoustic and trawl survey off the west coast of the U.S. from approximately south of San Diego, CA (latitude 31.6°N along the U.S. EEZ) to approximately Newport, OR (latitude 44.6°N). Our objectives are to:

- Conduct 24-hour acoustic, trawl, oceanographic, and zooplankton operations.
- Continuously sample multi-frequency acoustic backscatter data using the ship's Simrad EK60 scientific echosounders (18, 38, 70, 120, and 200 kHz) system. If the source of noise observed on the EK80 during summer 2015 is identified and mitigated, Simrad EK80 broadband echosounders will operate at 70 and/or 200 kHz. The Simrad ME70 may also be used at the discretion of the Chief Scientist. Collectively, the acoustic data will be used to characterize the distribution of spawning hake and describe spawning hake aggregations.
    - Collect acoustic data along pre-planned nearshore and offshore coarse diagonal transects along the coast (hereafter "nearshore diagonals", "offshore diagonals", "coarse transects").
    - Collect acoustic data over spawning hake aggregations, where the design will be determined based on the observed aggregation (hereafter "adaptive transects"). If scheduling allows it, adaptive transects may be repeated over time to evaluate changes and/or movement of the aggregation.

- Collect stationary acoustic data 1 hour before sunrise/sunset to 1 hour after sunrise/sunset to evaluate migration (vertical and/or horizontal) of spawning hake aggregations.
- Conduct daytime and nighttime trawling to verify spawning hake aggregations and obtain specimens for biological data (length, sex, maturity, age, ovaries, diet, genetics, etc.).
    - Multiple trawl samples may be taken on a single hake aggregation to evaluate heterogeneity in sex, maturity, etc.
- Optically verify the presence of non-hake scatterers during trawling using a video camera and light attached to the upper panel of the midwater trawl approximately 20-30 meters forward of the codend.
- Conduct vertical casts with the ships's CTD rosette, outfitted with a dissolved oxygen sensor and Niskin bottles, at pre-planned stations along coarse and/or adaptive transects. These data will be used to describe the vertical and horizontal distributions of spawning hake relative to oceanographic conditions. Niskin water collections will be used by the Northwest Fisheries Science Center for the analysis and identification of Harmful Algal Blooms (HABs) and for the collection of bacteria. Pacific Marine Environmental Laboratory may use the water to evaluate ocean acidification.
- Continuously collect Acoustic Doppler Current Profiler (ADCP) data along coarse and adaptive transects. These data will be used to describe the distribution of spawning hake relative to currents.
- Conduct vertical ring net zooplankton tows at pre-planned stations along coarse transects (**Appendix 1**, **Fig.1**; stations are listed in **Appendix 2**, **Table 2**). These data will be used to describe the winter distribution of zooplankton species in an El Niño year, and will be compared to samples collected during the 2015 SaKe survey.
- Conduct vertical ring net tows at CTD stations for analysis of the presence and identity of HABs.
- Use the ship's flow-through system to collect water for analysis of the presence and identity of HABs.
- Continuously sample sea-surface temperature, salinity, and chlorophyll-a using the ship's thermosalinograph and fluorometer. These data will be used to estimate the physical oceanographic habitats for spawning hake.
- Continuously sample air temperature, barometric pressure, and wind speed and direction using the ship's integrated weather station.
- Continuously sample multi-frequency acoustic backscatter data using the ship's Simrad ME70 multibeam echosounder system, synchronized and configured to not interfere with the EK60s.
- Collect broadband acoustic data with EK80 echosounders operating at central frequencies of 70 and 200 kHz. The use of the EK80s will require temporary modification to the ship's EK60 and were tested during SH-15-07.

E. Participating Institutions:

NOAA/NMFS/NWFSC, 2725 Montlake Blvd. E, Seattle, WA 98112

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

Leg I: 1/9/2016 to 1/23/2016

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Sandy Parker-Stetter	Acoustician/Chief Scientist (CS)	1/4/2016		F	NWFSC	U.S.
Steve de Blois	Acoustician/Field Party Chief (FPC)	1/4/2016		M	NWFSC	U.S.
Dezhang Chu	Acoustician	1/4/2016	1/23/2016	M	NWFSC	U.S.
Peter Frey	Lead Biologist	1/8/2016	1/23/2016	M	NWFSC	U.S.
Victor Simon	Lead Biologist	1/8/2016	1/23/2016	M	NWFSC	U.S.
Aaron Chappell	Biologist	1/8/2016	1/23/2016	M	NWFSC	U.S.
Cassandra Donovan	Biologist	1/8/2016	1/23/2016	F	NWFSC	U.S.
Kayleigh Somers	Biologist	1/8/2016	1/23/2016	F	NWFSC	U.S.
Nick Tolimieri	Biologist	1/8/2016	1/23/2016	M	NWFSC	U.S.
Anthony Odell	HABs Biologist	1/8/2016		M	University of Washington	U.S.
Ben Simpson	HABs Biologist	1/8/2016		M	Highline College	U.S.

Leg II: 1/26/2016 to 2/9/2016

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Sandy Parker-Stetter	Acoustician/Chief Scientist (CS)		2/11/2016	F	NWFSC	U.S.
Steve de Blois	Acoustician/Field Party Chief (FPC)		2/11/2016	M	NWFSC	U.S.
Rebecca Thomas	Acoustician	1/25/2016	2/11/2016	F	NWFSC	U.S.
Doug Draper	Lead Biologist	1/25/2016	2/10/2016	M	NWFSC	U.S.

Tom Holland	Lead Biologist	1/25/2016	2/10/2016	M	NWFSC	U.S.
Mike Gallagher	Biologist	1/25/2016	2/10/2016	M	NWFSC	U.S.
Carlos Godinez Perez	Biologist	1/25/2016	2/10/2016	M	Centro Interdisciplinario en Ciencias Marinas	Mexico
Jenni Hood	Biologist	1/25/2016	2/10/2016	F	AK Observers, Inc.	U.S.
Jason Jannot	Biologist	1/25/2016	2/10/2016	M	NWFSC	U.S.
Allen Shimada	Biologist	1/25/2016	2/10/2016	M	NWFSC	U.S.
Anthony Odell	HABs Biologist		2/10/2016	M	University of Washington	U.S.
Ben Simpson	HABs Biologist		2/10/2016	M	Highline College	U.S.

Note, if approved by the Chief Scientist and the Commanding Officer, personnel transfers via a chartered small craft, to be arranged by the Northwest Fisheries Science Center, may occur during any or all of the project legs.

G. Administrative

1. Points of Contacts:

NWFSC:

Sandra Parker-Stetter, Survey Lead, 2725 Montlake Boulevard E, Seattle, WA 98112, (206) 861-1250, sandy.parker-stetter@noaa.gov

Alternate: Alicia Billings, 2032 Marine Science Drive, Newport, OR 97365, (541) 867-0507, alicia.billings@noaa.gov

Alternate: Steve de Blois, 2725 Montlake Boulevard E, Seattle, WA 98112, (206) 860-3478, steve.deblois@noaa.gov

Ops Officer *Bell M. Shimada*:

LT Timothy Sinquefield, 2002 SE Marine Science Drive, Newport, OR 97365, (541) 867-8775, ops.bell.shimada@noaa.gov

2. Diplomatic Clearances:

   None needed as all work will occur in U.S. waters.

3. Licenses and Permits:

   This project will be conducted under the Scientific Research Permits (U.S.) issued by:

   a. NMFS/WCR on May 7, 2015 to Larry Hufnagle (SRP XX-2016) (in process, to be provided upon receipt)

   b. NOAA/ONMS, April 2015 to John Stein (MULTI-2015-002)

   c. CDFW, April 2013 to John Stein (SC-11678)

   d. ODFW on XXX, 2015 to Larry Hufnagle (STP #XXXXX) (in process, to be provided upon receipt)

   e. NMFS/NWR to the NWFSC (ESA Section 10(a)(1)(A), #16337-2M) (in process, to be provided upon receipt)

II. Operations

A. Project Itinerary

The 2016 winter hake survey will be conducted January 9, 2016 through February 9, 2016, aboard the NOAA Ship *Bell M. Shimada*. The survey will collect data that will be used to evaluate the feasibility of a future winter biomass survey of spawning Pacific hake.

Due to a potential loss of survey days should weather and sea state deteriorate, and because where/when hake will be found is unknown, the survey design is modular, with components that can be done in alternate orders. At-sea planning decisions will be made jointly by the Chief Scientist, Field Party Chief, Operations Officer, and the Commanding Officer. Presented below is an optimal survey sequence.

Leg I of the project will start in Newport, OR where the ship will commence running the coarse transects (**Appendix 1**, **Fig.1**; stations are listed in **Appendix 2**, **Table 1)** and conducting pre-planned CTD casts (with Niskin bottle water collections, (**Appendix 1**, **Fig.1**; stations are listed in **Appendix 2**, **Table 2**), zooplankton vertical net tows, and HABs vertical net tows.

When a potential spawning hake aggregation is observed on the EK60 echosounders, the ship will break transect and perform a midwater trawl to verify the composition of the aggregation. If the trawl confirms that the aggregation is

spawning hake, an adaptive transect design (on the order of 10 nmi of distance) will be performed to determine the size and spatial extent of the aggregation. At the discretion of the Chief Scientist and/or Field Party Chief, additional midwater trawls may be conducted on the aggregation. If the sampled aggregation is between planned CTD stations, a CTD cast may be conducted. At the discretion of the Chief Scientist and/or Field Party Chief, EK80 data will be collected during midwater trawling and/or CTD operations. Upon completion of sampling, the ship will resume running the coarse transects, and subsequent spawning hake aggregations may be sampled in the manner described. If spawning hake are observed at the western end of transects, the Chief Scientist and/or Field Party Chief, in consultation with the Commanding Offer and Operations Officer, may extend those transects offshore to a bottom depth not to exceed 6,000 m or a distance not to exceed the U.S. EEZ.

A calibration of the EK60 echosounders will occur at the end of Leg 1. If possible, the calibration will occur at Pier 30/32 in San Francisco, but if a good calibration cannot be obtained due to tidal conditions, noise from nearby vessels, etc., the ship will calibrate in a deeper portion of San Francisco Bay (e.g., SW of Angel Island) or to Drake's Bay just outside of the entrance to San Francisco Bay. A decision to conduct the calibration at Drake's Bay (which is deeper than Pier 30/32) may be made by the Chief Scientist and Commanding Officer, prior to entry into San Francisco Bay, if weather conditions are favorable.

Leg II of the project will start in San Francisco, CA where the ship will resume running the coarse transects and conducting pre-planned CTD casts and zooplankton vertical net tows at the Leg I break point. The same procedure for shifting into adaptive transects when spawning hake aggregations are observed, as described above, applies to Leg II operations.

If the planned operations will be completed ahead of schedule, due to unused weather days and/or low catches of hake, the Chief Science and/or Field Party Chief may request that nearshore and/or offshore diagonals be added to the design or that portions of the acoustic trackline be resurveyed to provide a before/after comparison or to conduct additional oceanographic and/or trawl sampling. All additions or modifications will be made in consultation with the Commanding Officer and Operations Officer.

Leg	Mission	Days	Date start	Date end
Staging	Staging in Newport, OR		1/4/2016	1/8/2016
I	Begin coarse transects at Newport, OR, conduct trawling		1/9/2016	1/21/2016

Leg	Mission	Days	Date start	Date end
	and adaptive transects of spawning hake aggregations, plus 4 weather days			
	Calibration at Pier 30/32 in San Francisco or nearby location		1/21/2016	1/23/2016
Inport	San Francisco, CA		1/23/2016	1/26/2016
II	Resume coarse transects at San Francisco, CA, conduct trawling and adaptive transects of spawning hake aggregations, plus 4 weather days		1/26/2016	2/9/2016
Inport	Newport, OR		2/9/2016	
Destaging	Newport, OR		2/9/2016	2/10/2016

B. Staging and Destaging

Staging will be in Newport, OR on approximately January 4-8, 2016 and destaging will be in Newport, OR on February 9-10, 2016. As the Shimada is scheduled for a Fleet Inspection immediately prior to SH-16-01, coordination of staging operations with Ops, including loading of gear and time to set up the ship with required personnel, will occur to ensure these operations do not interfere.

C. Operations

The following list of survey priorities includes detailed descriptions of the planned activities.

Priorities:

1. Daytime and nighttime: EK60/EK80 coarse acoustic transects, adaptive transects when hake aggregations are observed, midwater trawling to sample hake aggregations, CTD rosette casts, vertical zooplankton tows, vertical HABs tows, ADCP data collection, and ME70 data collection.

2. Crepuscular periods (± 1 hour from sunrise and sunset) when no hake aggregation is observed: EK60 coarse acoustic transects, CTD rosette casts, vertical zooplankton tows, vertical HABs tows, ADCP data collection, ME70 data collection, and EK80 data collection.

3. Crepuscular periods (± 1 hour from sunrise and sunset) when hake aggregation is observed: stationary EK60 and/or EK80 data collection.

The ship's echosounders and Doppler velocity log (DVL) should be secured as much as possible. When their use is necessary, the crew shall inform the Chief Scientist of any use of the vessel's sounders or DVL. They interfere with the signals received on the EK60s.

a. Acoustic data collection:

The EK60 echosounder data collection and calibration take priority over all other daytime operations. Acoustic backscatter data will be collected with EK60s operating at 18, 38, 70, 120, and 200 kHz. If the source of noise observed on the EK80 during summer 2015 is identified and mitigated, the EK80s at 70 and/or 200 kHz will also be a priority data collection.

The split-beam transducers are mounted on the ship's retractable centerboard. During the survey, the centerboard will be extended to lowered depth, which extends the transducers to ~9.15 m below the surface, to reduce interference from bubbles. Any changes to the centerboard depth will be reported to the Chief Scientist and recorded in the SCS.

The ADCP will be run continuously during all coarse and adaptive transects. CTDs will occur on all coarse transects and, if conditions and time permit, at the location of each midwater trawl deployment. Zooplankton nets and HABs nets will be deployed at pre-planned stations on coarse transects.

i. *Transducer inspection & cleaning:* Prior to the start of Leg I, the transducers must be visually inspected and cleaned, if necessary, by the Survey Technicians. The transducers must also be visually inspected and cleaned, if necessary, prior to the start of Leg II operations.

ii. *Calibration*: A calibration of the EK60s will be conducted in or near San Francisco, CA at the end of Leg 1. Prior to the calibration, if conditions allow, the transducers will be inspected and cleaned, if necessary. Before and

after the calibration, CTD casts will be required to determine local sound speed and absorption values. During the calibration, if the vessel is not at a pier, the vessel should be anchored from the bow, and the water beneath the ship should be preferably 20-40 m deep and devoid of fish and other marine life. A tungsten carbide sphere with a known backscattering cross section will be positioned below the transducers and the acoustic returns will be measured.

iii. *Coarse Transects*: The survey design is modular to allow flexibility if weather conditions are unfavorable and to allow planning around where/when spawning hake are found. The survey will occur between Newport, OR and south of San Diego, CA, with four paired offshore diagonals, spaced roughly 100 nmi at the inshore side (**Appendix 1**, **Fig. 1**). The offshore diagonals extend from ≥30 m to 3,000 or 4,500 m bottom depth. The offshore diagonals are connected via smaller nearshore diagonals, extending from the ≥30 m contour to ~2,000 m contour (**Appendix 1**, **Fig. 1**). Acoustic data will be collected along the coarse transects 24 hours per day. Vessel speed will be standard survey speed as weather allows for the offshore and nearshore diagonals. If spawning hake aggregations are detected acoustically at the offshore end of an offshore diagonal, that diagonal will be extended farther offshore until the ship reaches the end of the aggregations, plus an additional 0.5 nmi, with bottom depth not to exceed 6,000 m and distance not to exceed the U.S. EEZ. The Chief Scientist and/or Field Party Chief may extend the nearshore diagonals further offshore, in consultation with the Officer on Duty, if spawning hake aggregations were observed on the preceding coarse diagonal.

If weather days have been unused, or spawning hake have not been located, nearshore diagonals may be replaced with offshore diagonals during Leg I or II and/or additional diagonals may be added to the design. If poor weather compromises completion of the survey at the planned time, or if modifications are necessary as spawning hake have not been observed, provisions will be made by the Chief Scientist and Field Party Chief to adapt the remaining portion of the survey, by removing coarse transects, increasing the spacing of coarse transects, or by adjusting coarse transect placement. These changes will be made in consultation with the Commanding Offer and Operations Officer. Planned waypoints defining the offshore and nearshore diagonals (listed in **Appendix 2**, **Table 1**) will be provided to the ship in Nobeltec format.

iv. Adaptive Transects: When spawning hake aggregations are confirmed by midwater trawling (see Biological data collection below), a short series of adaptive transects (total length ~10 nmi) will be determined by the Chief Scientist and/or Field Party Chief and the Officer on Duty. These transects will be used to determine the spatial extent and size of the spawning aggregation. Upon completion of the adaptive transects, and any biological data collection associated with the spawning hake aggregation, the ship shall resume surveying along the coarse transects.

v. *Acoustic Data Collection*: Kongsberg Simrad has agreed to loan us a KSync unit to synchronize the pulse sequence from our instruments. The KSync is necessary as the current "Trigger Jigger' on the Shimada is unstable and does not meet our data collection requirements. Assistance from the ET will be required to set up this system and troubleshoot the vessel noise which degraded the quality of the EK80 data during summer 2015.

If there is no acoustic cross-talk with the EK60s, the following acoustic instruments will be run and their data collected:

ME70: The ME70 will be operated continuously throughout the survey. Data will be stored in raw format.

ADCP: Data from the ship's ADCP will be recorded continuously during the project. Operation of the ADCP should be synchronized with the trigger pulse from the Simrad EK60. Assistance of a Survey Tech will be needed for daytime and nighttime operations of the ADCP.

Simard EK80: The EK80s, with central frequencies of 70 and 200 kHz, will be operated at the discretion of the Chief Scientist and/or Field Party Chief. If the noise observed on the EK80s during summer 2015 is identified and mitigated, then the 70 and/or 200 kHz EK80 will operate continuously during the survey. The Bridge shall be notified of the status of EK80 operations. Assistance from the ET will be needed to install the EK80 WBT boxes near the EK60 GPT boxes before the start of Leg I.

b. Biological data collection:

Biological data are important to provide information for interpreting acoustic data and data on hake spawning status, maturity stage, sex, age, length, etc. A single type of biological sampling method will be used during both daytime and nighttime operations.

i. *Trawl Sampling*: Trawl samples will provide the primary information for interpreting the acoustic data. During the day and night, four to six times over a 24-hour period, midwater and near-bottom sound scatterers will be sampled using an Aleutian Wing Trawl 24/20 (AWT). Trawl gear performance will be monitored for depth, net opening, and other parameters with a Simrad FS70 third-wire trawl sonar attached to the headrope and a Simrad ITI sensor. A temperature-depth recorder (Sea-Bird SBE 39) will also be deployed. The AWT will be deployed with a digital video camera system mounted in the net 20-30 meters forward of the codend on the top panel of the intermediate.

Trawl catches will be sorted and weighed completely, and total numbers will be determined for most species. Hake will be sub-sampled to estimate their length distributions by sex, and other biological parameters. For age determination, hake otoliths will be preserved in 50% ethanol. Stomach and ovary samples will be collected and preserved in 10% neutral-buffered

formalin. Samples will be collected and stored dry for genetic analysis. Fish specimens for various groups will be frozen in the walk-in freezer in the Wet Lab.

ii. *Marine Mammal Protocols*: Before deploying gear/nets that have a potential to cause a marine mammal "take", the Chief Scientist or Field Party Chief must ascertain if any marine mammals are within 500 m of the planned deployment.

The Chief Scientist or Field Party Chief must confirm with the Captain or the Bridge Watch that no marine mammals have been seen within 500 m for ten (10) minutes prior to deployment of any gear. This can be accomplished by either: 1) Having designated scientists and the Captain (and/or designated ship's crew) make observations for a minimum of 10 min prior to a deployment to determine if any marine mammals have been observed; or 2) asking the Bridge Watch to make similar observations for 10 min while the vessel searches for an appropriate area to deploy gear or while motoring on-station prior to deploying gear.

If there are marine mammals in the vicinity, the vessel will remain on site for 10 minutes to see if they leave the vicinity. If the marine mammals leave, another 10-minute watch will be conducted (restarting the clock at the end of the first 10-minute watch). If no additional marine mammals are sighted, the gear/nets may be deployed. If the marine mammals do not leave the vicinity or if they reappear during the second 10-minute watch, the site may be abandoned and the vessel may proceed to an alternate site.

A log documenting the marine mammal watches is required to be maintained by the Chief Science and Field Party Chief. The log should contain: 1) Confirmation that the watch was completed prior to deployment of gear; 2) A record of any stations dropped because of the presence of marine mammals; and 3) Species or types of marine mammals observed (if any), and wait times.

Should a marine mammal take occur, the Chief Scientist will notify Larry Hufnagle, Michelle McClure, Kurt Fresh, and/or their designate at the FRAM Division.

Kyle Byers, (512) 787-7436, kyle.byers@noaa.gov
Kurt Fresh, (206) 229-6331, kurt.fresh@noaa.gov
Lawrence Hufnagle, (206) 310-6817, lawrence.c.hufnagle@noaa.gov
Michelle McClure, (206) 910-2270, michelle.mcclure@noaa.gov

The marine mammal will be processed in accordance with Appendix D in the "Draft Programmatic Environmental Assessment for Fisheries Research Conducted and Funded by the Northwest Fisheries Science Center" (dated August 2015).

A marine mammal excluder device (MMED) will be present on board as a back-up mitigation device in the event of a take if authorized by the West Coast Region.

Underway observations: During daylight hours, the science party will conduct visual observations for marine birds and mammals from the Bridge on a regular schedule (e.g. 5 minutes every hour, TBD). Results of each observation period will be recorded on a log to be kept on the Bridge. When a member of the science party is not on the Bridge during daylight hours, we request that the Bridge alert the Chief Scientist or Field Party Chief of large aggregations of marine birds and mammals (>5 large whales, >10 small marine mammals, >20 marine birds in flocks) and record the observation on the same log sheet. Protocols (distance from vessel, other details) and data sheet will be provided to Bridge before sailing.

iii. *Vertical Ring Net (zooplankton net)*: This plankton net is a 0.5-m single ring net. It is towed vertically while the vessel holds station to a target depth of 100 m when the water column is deeper than 100 m, or 2-5 meters off the bottom at nearshore stations. The wire rates for descent and ascent are 50 and 30 m/min, respectively, with the goal of keeping the wire as vertical as possible during the tow, especially during the descent. If the wire angle is greater than 10-15 degrees, more hydro wire will need to be deployed to achieve a depth of 100 m. The Science Party will process the samples upon retrieval in the CTD garage and fume hood area.

iv. *Vertical net for Harmful Algal Bloom (HABs) collections*: A 25-cm diameter, 2' long, 20-micron mesh net will be deployed by hand at CTD stations. No hydraulics are required for this operation. The HABs volunteer will do the collection, while coordinating the Survey Technicians and the Deck Crew to ensure proper procedures and safety precautions are taken. Samples will be processed in the CTD garage and fume hood.

c. <u>Oceanographic data collection</u>:

i. *ADCP*: Data from the ship's ADCP will be recorded continuously throughout the survey and during all trawl operations. Operation of the ADCP should be synchronized with the trigger pulse from the Simrad EK60, which will be accomplished during SH-16-01 using a Simrad KSync loaned to us by Kongsberg Simrad. The KSync is necessary as the Shimada's Trigger Jigger is unstable and does not meet our data collection needs. Assistance of a Survey Technician will be needed for daytime and nighttime operations of the ADCP. Assistance from the ET may be needed to troubleshoot synchronization of instruments.

ii. *CTD rosette deployments*: The ship's CTD rosette will be cast at stations during day or night operations and will be used to collect water at up to 6 discrete depths. The ship's Survey Technician is needed to install the oxygen sensor and Niskin bottles and assist with the operation/maintenance of this equipment. The ship's Survey Technician may be needed to assist with obtaining water from the Niskin bottles and to assist with stowing the water to allow the HABs volunteer to fill bottles, filter, etc off the oceanographic side deck.

iii. *Flow-through water collection for Harmful Algal Blooms (HABs)*: The ship's flow-through system will be used to collect water for analysis of the presence and identify of HABs. This work will occur in the Chemistry lab. The -80˚ freezer is required for this work. Once the functioning of the flow-through system and vacuum filtration system is verified by the Survey Technician, no further assistance is needed for this operation.

iv. *Thermosalinograph and meteorological sensors*: TSG and SCS data will be recorded continuously during the survey. These data will be logged to the ship's computers, and copied to media hard disk drive (HDD) provided. The ship's station and position information (MOA log) will also be copied to this HDD. During the pre-project meeting, parameters to include in the MOA will be specified, as well as how the bridge and survey departments wish to number stations and transects.

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.

No dives are planned during this survey.

E. Applicable Restrictions

Conditions which preclude normal operations: If sea conditions and vessel ride deteriorate to a point where the quality of collected acoustic data is compromised, the vessel may need to break from running acoustic transects and seek shelter until conditions improve enough for satisfactory collection of acoustic data.

III. Equipment

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

	Item Name

1	CTD (main unit plus spare), rosette, carousel, water sampling bottles, computer/deck unit, hydrographic winch
2	ADCP computer/deck unit
3	Underway sensors (SCS) and computer/deck unit
4	FSCS computer system
5	Trawl winch, net mensuration (e.g., Simrad third wire)
6	Ship's computer network (at least 4 static IP addresses on SH)
7	Centerboard-mounted transducers
8	Spaces needed: Fish Processing Lab, Chem Lab, Dry Lab, Hydro Lab, Constant Environment Room, and Preservation Alcove
9	Email, telephones, intercom system, handheld radios
10	VHF Radios with NOAA F-Channels
11	Simrad EK60: 18-, 38-, 70-, 120-, and 200-kHz GPTs
12	Simrad ME70 Multibeam echosounder system
13	FS70 third-wire trawl sounder
14	Trigger jigger controller (to serve as a back-up only as unstable and does not meet our data collection requirements)
15	Simrad ITI trawl sounder
16	Applanix POS MV position and attitude sensor system
17	Large Marel fish lab scale that includes an output to FSCS machines

B. Equipment and Capabilities provided by NWFSC (itemized)

	Category	**Brand & Quantity**
1	Computers	5 laptops
2	Networking	2 16-port and 1 4-port Netgear switches, TBD based on discussions with ET
3	External hard drives	A number of assorted 250-GB, 750-GB, and 1-TB Western Digital drives with cables
4	EK80 WBT	Simrad EK80 WBTs, with center frequency of 70 and 200 kHz
5	Software	Software media
		2 midwater (AWT) nets

6	Trawl gear	2 sets of Fishbuster 4-m^2 doors
		700 lb tom weights
		Necessary spare components of trawling gear
7	Zooplankton vertical net	0.5 m vertical net, flowmeter
8	Video camera	1 digital video recorder with light array, battery pack, and pressure housing, components TBD
9	Temperature-depth recorders	3 Sea-Bird SBE 39s
10	Biological sampling gear	20 fish baskets and 12 tubs
		3 Scantrol fish measuring boards
		2 large and 2 small Marel motion-compensating scales
11	Calibration gear	Calibration spheres
		Ultrasonic cleaner
		4 downriggers (with clamps) and 4 battery packs
12	Ping control for EK60, EK80, ME70, and ADCP	Simrad KSync (being loaned to us by Kongsberg Simrad)
13	Vertical net for HABs sampling	0.25 m net
14	Marine mammal excluder device	Back-up mitigation device

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 the anticipated quantity brought aboard, MSDS and appropriate neutralizing agents, buffers, or absorbents in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and a chemical hygiene plan. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per FEC 07, the scientific party will include with their project instructions and provide to the Commanding Officer of the respective ship 60 to 90 days before departure:

- A list of hazardous materials by name and anticipated quantity.
- Include a chemical spill plan the addresses all of the chemicals the program is bringing aboard. This shall include:
  - Procedures on how the spilled chemicals will be contained and cleaned up.
  - A complete inventory (including volumes/amounts) of the chemical spill supplies and equipment brought aboard by the program. This must be sufficient to clean and neutralize all of the chemicals brought aboard by the program.
  - A list of the trained personnel who will be accompanying the project and the training they've completed.

Common Name of Material	**Quantity**	**Notes**	**Trained Individual**	**Spill control**
Formaldehyde solution (37%)	5 liters	3 liters diluted to 10% formalin solution in 5-gallon buckets (making 10 liters of solution/ bucket) in wet lab, 2 liters diluted in sample jars, and any undiluted stored under fume hood	Alicia Billings, Steve de Blois	F
Ethanol (95%)	5 gallons	5-gallon carboy, stored in appropriate chemical locker	Alicia Billings, Steve de Blois	E

SPILL CONTROL

F: Formalin/Formaldehyde

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

E: 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. Absorb spill with inert material, then place in suitable container.

Inventory of Spill Kit supplies

Product Name	**Amount**	**Chemicals it is used for**	**Amount it can clean up**
Spill-X-FP	11.1 lbs	formalin/formaldehyde	8.1 liters (37%)/32 liters (10%)
Polyform F	2 gallon	formaldehyde	2 gallons
absorbent pads	5	formalin/formaldehyde/ethanol	10x its weight
goggles and saline solution	1	formalin/formaldehyde/ethanol	to protect and wash in case of spill
garbage bags	2	formalin/formaldehyde/ethanol	to contain waste pads (double bagged)
chemical and waste labels	Various	formalin/formaldehyde/ethanol	to denote chemicals and waste on containers

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the Commanding Officer 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 and are sufficient to contain and clean up all of the hazardous material brought aboard by the program.

Upon departure from the ship, scientific parties will provide the Commanding Officer (or designee) an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. An 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 scientific chemicals is not permitted during projects aboard NOAA ships.

B. Radioactive Isotopes

The Chief Scientist is responsible for complying with OMAO 0701-10 Radioactive Material aboard NOAA Ships. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

At least three months in advance of a domestic project and eight months in advance of a foreign project start date the Survey Lead shall submit required documentation to MOC-CO, including:

1. NOAA Form 57-07-02, Request to Use Radioactive Material aboard a NOAA Ship
2. Draft Project Instructions
3. Nuclear Regulatory Commission (NRC) Materials License (NRC Form 374) or a state license for each state the ship will operate in with RAM on board the ship.
4. Report of Proposed Activities in Non-Agreement States, Areas of Exclusive Federal Jurisdiction, or Offshore Waters (NRC Form 241), if only state license(s) are submitted).
5. MSDS
6. Experiment or usage protocols, including spill cleanup procedures.

Scientific parties will follow responsibilities as outlined in the procedure, including requirements for storage and use, routine wipe tests, signage, and material disposal as outline in OMAO 0701-10.

All radioisotope work will be conducted by NRC or State licensed investigators only, and copies of these licenses shall be provided per OMAO 0701-10 at least three months prior to the start date of domestic projects and eight months in advance of foreign project start dates.

C. Inventory (itemized) of Radioactive Materials

Common Name Radioactive Material	**Concentration**	**Amount**	**Notes**
None			

V. Additional Projects

A. Supplementary ("Piggyback") Projects

B. NOAA Fleet Ancillary Projects

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. Data Responsibilities

The Chief Scientist will be responsible for disposition of data, feedback on data quality, and archiving of data and specimens collected for the primary project while on board the ship. The Chief Scientist will also be responsible for the dissemination of copies of these data to participants in each leg of the project. The Survey Lead (Parker-Stetter) will be responsible for overall dissemination of these data to requesters and for archiving data and specimens post-project. The ship may assist in copying data and reports insofar as facilities allow. The Survey Lead will also be responsible for pre- and post-project meetings and the ship operation evaluation report, with assistance and input from the Chief Scientist and Field Party Chief.

The Chief Scientist will receive all original data gathered by the ship for the primary project. Individuals in charge of supplementary projects conducted during the project have the same responsibilities for their project's data as the Chief Scientist has for the primary project's data. All requests for data onboard the ship should be made through the Chief Scientist for that leg, and post-project through the Survey Lead.

Data Requirements:

The ship's SCS system should default to logging all possible parameters. The list of parameters to be logged can be modified by request from the Field Party Chiefs, the Chief Scientist, or Survey Lead.

The ship will also provide the Chief Scientist with conductivity, temperature, and depth data from each CTD cast.

VII. Meetings, Vessel Familiarization, and Project Evaluations

A. A pre-project meeting among the Commanding Officer, Operations Officer, Chief Boatswain, Executive Officer, Survey Tech, Chief Scientist, and the Field Party Chief will be conducted either the day before (preferred) or the day of departure. The objective of this meeting is to identify day-to-day project requirements in order to best use

shipboard resources and identify overtime needs. The Chief Scientist will provide the Commanding Officer and Operations Officer with information on Scientific Party watches as operations will be conducted 24 hours per day. In addition, the Chief Scientist and Operations Officer will conduct a meeting of the scientific party prior to departure or soon thereafter to train them in sample collection and inform them of project objectives. Vessel protocols (e.g., meals, watches, etiquette) will be presented by the ship's Operations Officer.

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. The Chief Scientist shall give a pre-project, all-hands mission objective meeting/presentation. This presentation will be provided for all scientific personnel as well as crew and can be 5–10 minutes long. Topics to include: mission objective, history of the project, survey protocol, how the data collected will be used and by whom, social and economic importance of the targeted resource, future plans, as well as how the crew and scientists aboard will aid in this data recovery.

D. Post-Project Meeting: Upon completion of the project, a meeting will normally be held at 0830 (unless prior alternate arrangements are made) and attended by the ship's officers, the Chief Scientist, the Field Party Chief, and members of the scientific party to review the project. Concerns regarding safety, efficiency, and suggestions for improvements for future projects should be discussed. Minutes of the post-project meeting will be distributed by the Chief Scientist to all participants by email, and to the Commanding Officer and Chief of Operations, Marine Operations Center.

E. 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. Quantity and quality of food for the night shift must be maintained throughout the survey. The Chief Scientist will alert the Commanding Officer and Operations Officer of the Scientific Party watch schedule before departure. 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 Operations 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 Commanding Officer, 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 128 kbs is shared by all vessels staff and the Science Party at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

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

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
(2) Installation of the latest critical operating system security patches.
(3) No external public Internet Service Provider (ISP) connections.

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

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

F. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (http://deemedexports.noaa.gov). National Marine Fisheries Service personnel will use the Foreign National Registration System (FNRS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated Line Office Deemed Export point of contact to assist with the process.

Foreign National access must be sought not only for access to the ship involved in the project but also for any Federal Facility access (NOAA Marine Operations Centers, NOAA port offices, USCG Bases) that foreign nationals might have to traverse to gain access to and from the ship. The following are basic requirements.

Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

1. Provide the Commanding Officer with the email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.) This email will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
2. Escorts – The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.
4. Export Control - Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written approval from the Director of the Office of Marine and Aviation Operations and compliance with export and sanction regulations.

3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
4. Ensure receipt from the Chief Scientist or the DSN of the FNRS or Servicing Security Office email granting approval for the foreign national guest's visit.
5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
6. Export Control - 8 weeks in advance of the project, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.
7. Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.

Responsibilities of the Foreign National Sponsor:

1. Export Control - The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.
2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen and a NOAA or DOC employee. According to DOC/OSY, this requirement cannot be altered.
3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

Appendices

1. Figures, maps, tables, images, etc.

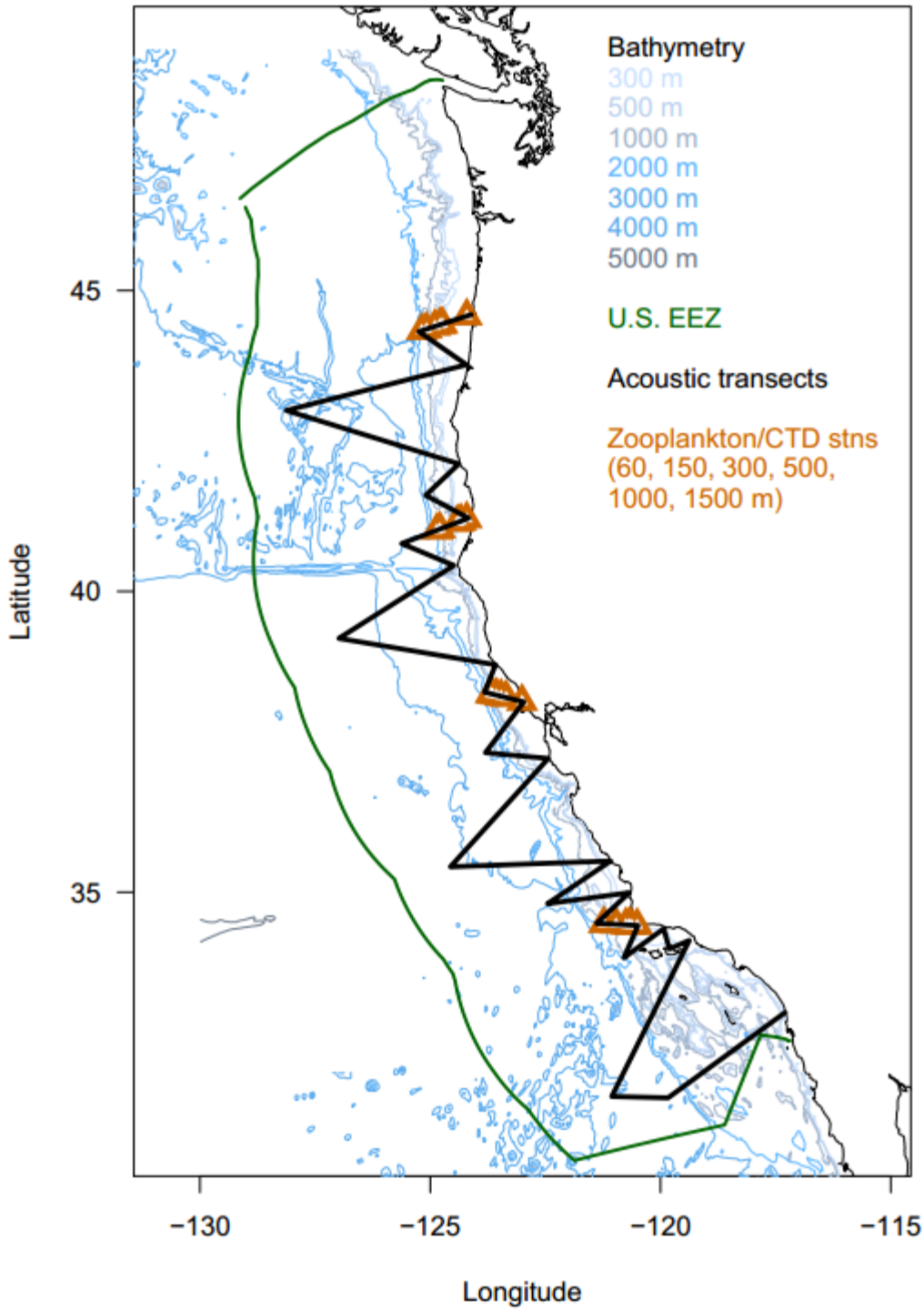

Figure 1. Proposed coarse survey transect design (showing nearshore and offshore diagonals) for the 2016 Pacific Hake Spawning Biomass integrated acoustic-trawl survey aboard the NOAA Ship *Bell M. Shimada*.

2. Station/Waypoint List (coordinates in Latitude, Longitude: degrees-minutes)

Table 1. Proposed waypoints for the 2016 Pacific Hake Spawning Biomass integrated acoustic-trawl survey aboard the NOAA Ship *Bell M. Shimada*.

Waypoint	Latitude	Longitude
1	44° 36.00′N	124° 06.58′W
2	44° 19.08′N	125° 14.84′W
3	43° 46.00′N	124° 12.79′W
4	43° 00.40′N	128° 07.60′W
5	42° 07.14′N	124° 22.72′W
6	41° 35.81′N	125° 06.02′W
7	41° 13.02′N	124° 10.04′W
8	40° 47.68′N	125° 37.25′W
9	40° 25.83′N	124° 29.20′W
10	39° 13.14′N	126° 58.99′W
11	38° 46.82′N	123° 34.97′W
12	38° 19.49′N	123° 49.35′W
13	38° 09.74′N	122° 58.14′W
14	37° 19.13′N	123° 48.13′W
15	37° 13.36′N	122° 26.33′W
16	35° 25.38′N	124° 33.70′W
17	35° 31.13′N	121° 05.02′W
18	34° 48.54′N	122° 27.20′W
19	34° 59.54′N	120° 40.83′W
20	34° 28.98′N	121° 23.34′W

21	34° 26.85′N	120° 29.34′W
22	33° 54.57′N	120° 47.78′W
23	34° 23.58′N	119° 55.94′W
24	34° 03.47′N	119° 48.39′W
25	34° 11.94′N	119° 22.57′W
26	31° 36.33′N	121° 03.52′W
27	31° 34.93′N	119° 50.24′W
28	33° 00.45′N	117° 17.92′W

Table 2. Proposed station coordinates for planned zooplankton and CTD rosette stations during the 2016 Pacific Hake Spawning Biomass integrated acoustic-trawl survey aboard the NOAA Ship *Bell M. Shimada*.

Station	Latitude	Longitude
NHL60	44° 34.56′N	124° 12.39′W
NHL150	44° 26.66′N	124° 44.29′W
NHL300	44° 25.92′N	124° 47.28′W
NHL500	44° 24.28′N	124° 53.87′W
NHL1000	44° 21.55′N	125° 04.87′W
NHL1500	44° 20.01′N	125° 11.07′W
T60	41° 12.29′N	124° 12.55′W
T150	41° 10.11′N	124° 20.08′W
T300	41° 09.25′N	124° 23.05′W
T500	41° 08.71′N	124° 24.92′W
T1000	41° 02.18′N	124° 47.39′W
T1500	41° 01.04′N	124° 51.33′W
BB60	38° 10.17′N	123° 00.40′W
BB150	38° 14.12′N	123° 21.14′W
BB300	38° 15.38′N	123° 27.78′W
BB500	38° 16.49′N	123° 33.60′W
BB1000	38° 17.49′N	123° 38.85′W
BB1500	38° 17.95′N	123° 41.27′W
PC60	34° 26.89′N	120° 30.42′W
PC150	34° 27.18′N	120° 37.76′W
PC300	34° 27.31′N	120° 41.19′W

PC500	34° 27.47′N	120° 45.15′W
PC1000	34° 27.98′N	120° 58.11′W
PC1500	34° 28.61′N	121° 13.88′W