



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Fisheries Science Center
Seattle, WA

May 13, 2015

Project Instructions

Date Submitted: May 13, 2015
Platform: *R/V Bell M. Shimada*
Project Number: SH - 15 - 06
Project Title: Rockfish Recruitment and Ecosystem Assessment
Project Dates: May 27 – June 10, 2015

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Commanding Officer
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I. OVERVIEW

- A. Brief Summary and Project Period – Project will conduct a pre-recruit survey for juvenile fish and ecosystem survey of the Northern California Current.

Project Period: May 27 – June 10, 2015

- B. Days at Sea (DAS)
Of the 15 DAS scheduled for this project, 15 DAS are funded by an OMAO allocation, This project is estimated to exhibit a Medium Operational Tempo.

- C. Operating Area: Flint Rock Head, CA to Grays Harbor, WA (see Appendix I and II for specifics)

- D. Summary of Objectives

1. Sample for pelagic juvenile rockfish (*Sebastes* spp.) and other epi-pelagic micronekton.
2. Characterize prevailing ocean conditions and examine prominent hydrographic features.
3. Collect acoustic data for mapping distribution of fish and krill.
4. Observe seabird and marine mammal distribution and abundance.
5. Conduct paired trawls with Charter Ship *Ocean Starr* (May 27-29)
6. Collect surface neuston and CUFES plankton samples.
7. Collections for stable and radio isotope analysis.
9. Bottom grab collections along the Oregon and Washington Coast.
10. Collect plankton and conduct CTD casts to characterize ocean conditions.

- E. Participating Organizations

NOAA NMFS NWFSC FED
NOAA Teacher-at-sea Program (TAS)
Oregon State University (OSU)
University of Oregon (UO)
Pacific States Marine Fisheries Commission (PSMFC)
Ocean Associates (OA)
Yale University

F. Personnel/Science Party:

Richard Brodeur, Fishery Biologist, (M) NMFS NWFSC (Chief Scientist), USA
Curtis Roegner, Fishery Biologist, (M) NMFS NWFSC, USA
Paul Chittaro, Fishery Biologist, (M) OA, USA
Jason Phillips, Fishery Biologist, (M) OSU, USA
Toby Auth, Fishery Biologist, (M) PSMFC, USA
Will Fennie, Graduate Student, (M) OSU, USA
Tyler Jackson, Graduate Student, (M) OSU, USA
Delvan Neville, Graduate Student, (M) OSU, USA
Sam Zeman, Graduate Student, (F) UO, USA
Amanda Gladics, Ornithologist, (F) OSU, USA
Emily Boring, (F) Yale University, USA
Brittney Honisch, (F) OSU, USA
Alexandra Miller, (F) NOAA TAS, USA

G. Administrative

1. Points of Contacts:

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Hatfield Marine Science Center
Newport, OR 97365
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Hammond, OR 97121
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LT Zachary Cress, Operations Officer
NOAA Ship *Bell M. Shimada*
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2. Diplomatic Clearances
None Required.

3. Licenses and Permits

The sampling will be conducted under an Oregon Department of Fish and Wildlife 2015 Scientific Taking Permit # 19527 and NOAA Scientific Research Permit (SRP-19). No sampling will take place in any sanctuaries so no permit is required.

If hook and line fishing is permitted, the fisher must be in compliance with all local/regional fishing regulations. While off OR and WA, you must have a valid state recreational fishing license in order to be allowed to retain any catch and all daily bag limits and prohibited closed area restrictions must be followed. No fish or invertebrates taken with scientific sampling gear may be sold, or bartered, although consumption of captured species aboard the vessel is allowed if regulations (area/species/bag limits) are followed.

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:

May 27 – June 10

Embark scientists and depart MOC-P on May 27 and proceed to Brookings transect at maximum cruising speed. Beginning the first night and ending the morning of the last day, conduct nighttime mid-water trawls, CTD deployments, various oceanographic sampling, bongo tows, and neuston tows between Flint Rock Head, CA and Grays Harbor, WA. The daily transect plan is listed in Appendix I and is subject to change. There may be a transfer of scientific personnel with a short port stop in Newport (MOC-P dock) on approximately June 2, but this stop is weather dependent and will be decided by the officers and chief scientist as the date approaches. Arrive in port in Newport, OR, upon the completion of operations on June 10.

B. Staging and Destaging:

On May 25-26, scientific survey equipment from NOAA NMFS NWFSC FED will be loaded and secured aboard the ship while in port in Newport. Scientists traveling from out of town request the ability to stay aboard the ship the night of May 26 and during all in port periods. Frozen specimens will be offloaded and miscellaneous gear will be loaded and offloaded during each in port. All scientists will be disembarked on June 10 and the gear will be demobilized on June 10 or 11. The modified Cobb midwater trawl will need to be rinsed/cleaned, removed from the net reel, and packed for storage. All associated cables and hardware should be cleaned and

stowed.

C. Operations to be Conducted:

1. Sample for pelagic juvenile rockfish and other epi-pelagic micronekton

Four to seven midwater trawls of 15 minute duration will be conducted each night along the designated transects. A modified-Cobb midwater trawl with a 26 m (86') headrope and a 9.5 mm (3/8") codend liner will be used. Trawling operations will commence just after dusk and conclude just before dawn. Target headrope depths is 30 m except in areas with shallow bottom depths, in which case the target headrope depth is 10 m. We will start with 25 and 85 m of wire out, with adjustments made if target depths are not obtained, as determined from depth recordings collected from time depth recorders (TDRs) and the ship's acoustic trawl net monitoring system. The TDR and acoustic sensors will be attached to the net during each tow. Ship speed during trawling should be ~2.0 knots. Ship's speed will be adjusted while trawling to maintain target headrope depth (using the acoustic trawl net monitoring system) while the amount of wire out will remain fixed. Two STM Products Dolphin Dissuasive Device (DDD 03) acoustic pingers will be attached to the trawl to mitigate encounters with marine mammals. Fish and select invertebrates from each trawl will be sorted, identified and enumerated. Length measurements will be taken on adult northern anchovy (*Engraulis mordax*), Pacific sardine (*Sardinops sagax*), Pacific herring (*Clupea pallasii*) and Pacific whiting (*Merluccius productus*), as well as pelagic juvenile Pacific whiting, lingcod (*Ophiodon elongatus*), Pacific sanddab, speckled sanddab (*Citharichthys stigmaeus*), and sablefish (*Anaplopoma fimbria*) and Humboldt squid, and market squid (*Doryteuthis opalescens*). Length measurements will also be taken on a subsample of mesopelagics including California headlightfish (*Diaphus theta*), *Nannobranchium* spp., California lanternfish (*Symbolophorus californiensis*), northern lampfish (*Stenobranchius leucopsarus*), blue lanternfish (*Tarletonbeania crenularis*), California smoothtongue (*Leuroglossus stilbius*), and blacksmelts (Bathylagidae). Size information will also be recorded for *Chrysaora* spp., *Aurelia* spp., *Pyrosoma* spp., *Thetys* spp., and *Carinaria* spp. All pelagic juvenile rockfish will be frozen for later laboratory analyses.

2. Characterize prevailing ocean conditions and examine prominent hydrographic features

CTD casts will be conducted throughout the day at pre-determined stations in the vicinity of the trawl transects and at each trawl station during the day. The scientific party may exclude some CTD casts during daytime and/or nighttime operations in order to complete the planned mid-water trawls. A Seabird Electronics CTD and water sampling system with conductivity, temperature, depth, fluorometer, transmissometer, photosynthetically active radiation (PAR), and dissolved oxygen sensors will be used. The CTD will be lowered to a maximum depth of 500 meters, as bottom depth allows. Deployment rate: soak for 2 minutes at 10 meters depth, then beginning at the surface - 45 meters/minute on the downcast, and 60 meters/minute for the upcast. Oceanographic data will also be collected while underway by a Turner Designs fluorometer and SeaBird thermosalinometer. The Simrad EK60 echosounder will be used to

acoustically characterize the distribution and abundance of macrozooplankton and micronekton, meroplankton and zooplankton associated at prominent oceanographic features and locations.

3. Collect acoustic data for mapping distribution of fish and krill.

A series of daytime transects will be run, during which the Simrad EK60 echosounder will be used to record and geo-reference the presence and abundance of fish and krill. The EK-60 will be operated at 38, 70, 120 and 200 kHz and interfaced to a data acquisition system to estimate small pelagic and krill biomass between 10 and a maximum of 750 m. The vessel's ES-60 depth sounder may be used minimally at the discretion of the captain, but will normally remain off while underway. The ship shall inform the chief scientist/project leader of any use of the vessel's sounders, as it interferes with the signals received on the EK-60 that will be used continuously. Each night prior to the first mid-water trawl, a discrete depth bongo tow (0.333 mm mesh nets) will be conducted in order to capture small/early life stages of krill. Towing depth and duration should be similar to the first planned nighttime mid-water trawl at that station (e.g. first trawl target headrope depth is 30 m then the bongo net will be towed at 30 m). Contents of the two codends will be preserved, one in formalin and a subsample from the other frozen for stable isotope analysis. Additional bongo tows may be conducted at night depending upon krill catches and time constraints.

4. Observe Seabird and marine mammal distribution and abundance

Ornithologists/marine mammal biologists from Oregon State University will visually survey and estimate abundance and distribution of seabirds and marine mammals from the ship's flying bridge during daylight hours while underway. In inclement weather, the ornithologist/marine mammal biologist may request to observe from the bridge, pending approval from the officer on duty. If species of particular interest are encountered, the ship may be asked to alter course accordingly. If possible during the transit south on the first day of the project, the ship is requested to conduct a zig-zag transect through the WindFloat Pacific test site (map and shapefile attached).

5. Conduct paired trawls with Chartered Ship *Ocean Starr* (May 27-29)

We will conduct paired (side-by-side operations, distance between ships to be determined based on discussions with respective ship captains and weather conditions) trawls in order to estimate real or potential ship effects on catchability of juvenile rockfish and/or other micronekton. This paired trawling will likely take place on the transect lines off Flint Rock Head transect off Northern California, Brookings and perhaps Gold Beach off Oregon, but is subject to change based on relative catch rates in these areas (a range of variable, but generally high, catch rates will provide the best information for making comparisons). We will suspend nighttime CTD cast and other activities during paired trawling operation at night in order to maximize the number of trawls that can be conducted (likely conducting trawls at both the fixed stations for each line as well as ad-hoc locations between/en-route to the fixed stations). Daytime CTD

operations should revisit the fixed stations that were sampled previous night to obtain hydrographic data for that area. These operations will require close coordination with both the officers and the science crew onboard the charter ship *Ocean Starr*.

6. Collect surface neuston and CUFES plankton samples.

As time allows, surface neuston tows will be conducted from side of the vessel using a Manta net (1.0 × 0.4 m mouth; 300 μm mesh). Tows will be done at inbound (day or night) stations along each transect and a few outbound stations (night) as time allows (e.g., stations 3, 5, 7). If ship arrives at inshore station prior to outbound leg of transect, conduct time series tows during dusk (all at inner-most station). Ship's survey techs will be responsible for deployment but scientists will assist as needed and directed by the crew. Tows will be for 5 min @ 2 knots (through water), depending on jellyfish concentrations.

7. Collections for stable and radio isotope analysis

We will collect samples of zooplankton, krill and other micronekton to provide baseline samples at multiple trophic levels to explore the potential for developing an “isoscape” analysis of the California Current and for monitoring radioisotopes from the Fukushima release in our coastal waters. This will include saving samples (frozen) from one cod-end for each of the bongo tows (ideally with 333 μm mesh) conducted and tissue samples from krill, market squid (ideally in 50 to 100 mm size range, with larger preferred over smaller), adult northern anchovy, Pacific sardine, adult (age 1+) Pacific hake, adult (age 1+) shortbelly rockfish, adult (age 1+) Pacific sand dab, adult northern lampfish and adult California headlightfish. Tissue samples should also be collected from a small number of opportunistic samples from jellyfish (*Chrysaora* spp.) and salps (*Thetys* spp.) several times over the course of the survey. For larger fish, samples can be taken from muscle tissue and combined in a single bag (as five individual pieces), smaller individuals can simply be frozen whole. We will develop a spreadsheet with stations and species listed with the ability to “check” when a given sample has been collected to track collections. Tissue from pelagic juvenile rockfish species will be sampled during routine analysis of those specimens following completion of the project. While underway if not impacting other operations during the daylight hours, attempts will be made to catch albacore for OSU radioecology work. Ideal vessel speed is 6 knots with SST over 15° C. Hand lines will be deployed by scientists and/or crew with a valid sport fishing license. Any albacore captured will be euthanized by an IACUC designated person (Jason Phillips) with training under ACUP4547.

8. Bottom grab collections along the Oregon and Washington Coast

A target of 5 box core samples will be taken along sampling transects during daylight hours. The box core is a 0.1 m² modified Gray-O'Hare box corer. The unit is deployed from a winch capable of hoisting 500 lbs+. Two scientists will assist a winch operator with deployment and retrieval of the core one deck. The corer is lowered vertically until it impacts with the seabed. At this point the instrument is triggered by a tripping mechanism as the main coring stem passes

through its frame. While pulling the corer out of the sediment a spade swings underneath the sample to prevent loss. When hauled back on board, the spade is placed under the box, and the box is returned to the cradle. Upon landing the corer in the cradle, a subsample of sediment from the undisturbed surface will be collected and preserved for grain size and total organic carbon analysis. The sample will then be sieved onboard through a 1 mm mesh screen; samples will be stained and preserved for later identification and enumeration.

9. Collect plankton and conduct CTD casts to characterize ocean conditions

Bongos will be conducted at many of the locations where night trawling occurred during the night. Plankton samples will be collected using a bongo net with a 60-cm diameter mouth opening and 333- μm mesh nets. The bongo will be fished as a continuous oblique tow from ~100 m (or within 5 m of the bottom at stations <100 m) to the surface at a retrieval rate of 33 m min^{-1} and a ship speed of 1.0-1.5 m s^{-1} . A depth recorder and flowmeter will be placed in the net during each tow to determine tow depth and volume of water filtered. Special collections of near surface jellyfish will be made using long-handled dip nets to examine their diets off Oregon and Washington. These collections will be accompanied by plankton collections with a bongo net or underway CUFES collections. These will be made at the CTD stations or some other locations at the discretion of the day watch chief.

D. Dive Plan

Dives are not planned for this project.

Mitigating interaction with marine mammals

The scientists will visually scan the area for marine mammals for a period of no less than 10 minutes before setting the trawl gear. If marine mammals are observed within one nautical mile of the planned set location during the initial visual scan and determined to be at risk of interaction, then the vessel will relocate to a distance one nautical mile away and another visual scan will be conducted at the new location. If marine mammals are still observed after the vessel has moved two times from the original station location, then trawl operations for that particular station will be cancelled and the vessel will proceed to the next planned trawl station.

Whenever the trawl is in the water, the project leader and/or scientists will continue to monitor the waters around the vessel and maintain a lookout for marine mammal presence as far away as environmental conditions allow. The chief scientist/project leader should be notified if any marine mammals are observed by the captain, deckhands, and scientists. If the midwater trawl is deployed (but not yet fishing) after an "all clear" visual scan and marine mammals are then observed by the captain, deckhands, or scientists during the trawl deployment then the gear will immediately be retrieved to avoid further interaction with the animals. The vessel will relocate to a distance one nautical mile away and follow the visual scanning protocols noted in the previous paragraph. If the midwater trawl is fishing and marine mammals are observed, then the appropriate action should be taken based upon the individual circumstances with consultation between the scientists and captain (in some cases the net will be immediately retrieved, while in others it may be kept at depth to avoid marine mammals at the surface).

Every effort should be made to deploy and retrieve the trawl net as quickly as possible (following all safety measures) to avoid possible interactions with marine mammals, which tend to aggregate at the surface.

If a marine mammal is inadvertently captured in the trawl net, it will be of the highest priority to release the animal back into the water as soon as is safely possible. The chief scientist/project leader will be responsible for recording the event in the data books, noting the status of the animal (e.g. healthy and alive, injured slightly, etc.), the species, and if possible other details such as sex and relative size. If a marine mammal is captured in the midwater trawl net, the chief scientist/project leader should immediately notify the CO of the ship and a NOAA NMFS NWFSC representative on shore via telephone or email and convey all the pertinent information regarding the event.

A further measure to mitigate marine mammal encounters is to install acoustic pingers on the midwater trawl net. Two STM Products Dolphin Dissuasive Device (DDD 03) acoustic pingers will be attached to the trawl net whenever it is deployed to mitigate marine mammal encounters.

See Appendix 3 for NWFSC Standard Operating Procedures to minimize Marine Mammal interactions

III. Equipment

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

Trawl winches, and gantries with trawl blocks
Net reel for modified-Cobb mid-water trawl net
Cowbells for securing codend of trawl net
Winch and conductive cable for CTD deployments
Feed for conducting cable into the lab space
Winch for bongo tows
18 kHz depth recorder or comparable
Multifrequency transducers providing 38, 70, 120, 200 kHz frequencies for the EK-60
Regular freezer, -80°C freezer, and refrigerator space for water and organism samples
GPS feeds into lab spaces
Acoustic trawl net sounder system with display monitor
CUFES set up flow through system
Chair on the flying bridge for ornithologists/marine mammal biologists
Long-handled dipnet for jellyfish
Constant temperature room set at 22°C ± 1°C (71.5°F ± 2°F)
Seabird CTD interfaced with deck units and PC
Inclinometer for bongo tows
Bongo weights (75 lbs)
Turner 10-AU fluorometer and flow through seawater system

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

Modified-Cobb mid-water trawl nets (2)

1.5 m x 2.1 m (5' x 7') steel V-doors, mounted (1 pair)
12.7 mm (1/2") x 55 m (180') midwater trawl bridle cables (4)
Transfer cables, door legs, and rigging hardware for midwater trawl net
STM Products DDD 03 acoustic pingers
Bongo net frame, nets, and codends
Flowmeters
Specimen sorting, enumeration, and preservation equipment
Simrad EK-60 GPTs and software
TDRs
PC laptop computers running Windows OS
Microscopes, dissecting equipment, and field guides
Nekton sorting and enumeration equipment
Large coolers
Mustang float coats and foul weather gear
Quart and gallon jars
MSDS sheets for all chemicals
Long-handled Dip Net
Box corer
250# lead weight (should be attached to box core)
Frame on triangular plate
Cotter pin
Shackle & Swivel
Sieve box
Manta neuston net - (1.5 x 0.5 m mouth) with flow meters
5-gallon buckets and lids
Large square sieve
Bucket with holes
Squeeze bottles for seawater
Long-handled dipnets for jellyfish
Go-Pro video cameras and housings

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
Buffered Formaldehyde solution (37%)	3 x 1L	Alkalinity, Stored in ship chem. lkr	Toby Auth	F/E
Ethanol (95%)	26 gal.	Stored in ship chem. lkr	Toby Auth	F/E

C. Chemical safety and spill response procedures

F/E: Formalin/Formaldehyde/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., vermiculite, dry sand, earth), and place in a chemical waste container.
- Do not use combustible materials, such as saw dust.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Form. Solidifier	2 - L	Formaldehyde	50 gal.
Neutralizer Pads	50	Formaldehyde	50 gal.

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.

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 conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

- D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <http://www.oma.noaa.gov/fleeteval.html> and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships', specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

A. Meals and Berthing

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

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

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

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

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website

<http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf>.

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

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

The participant can mail, fax, or email the forms to the contact information below.

Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

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:

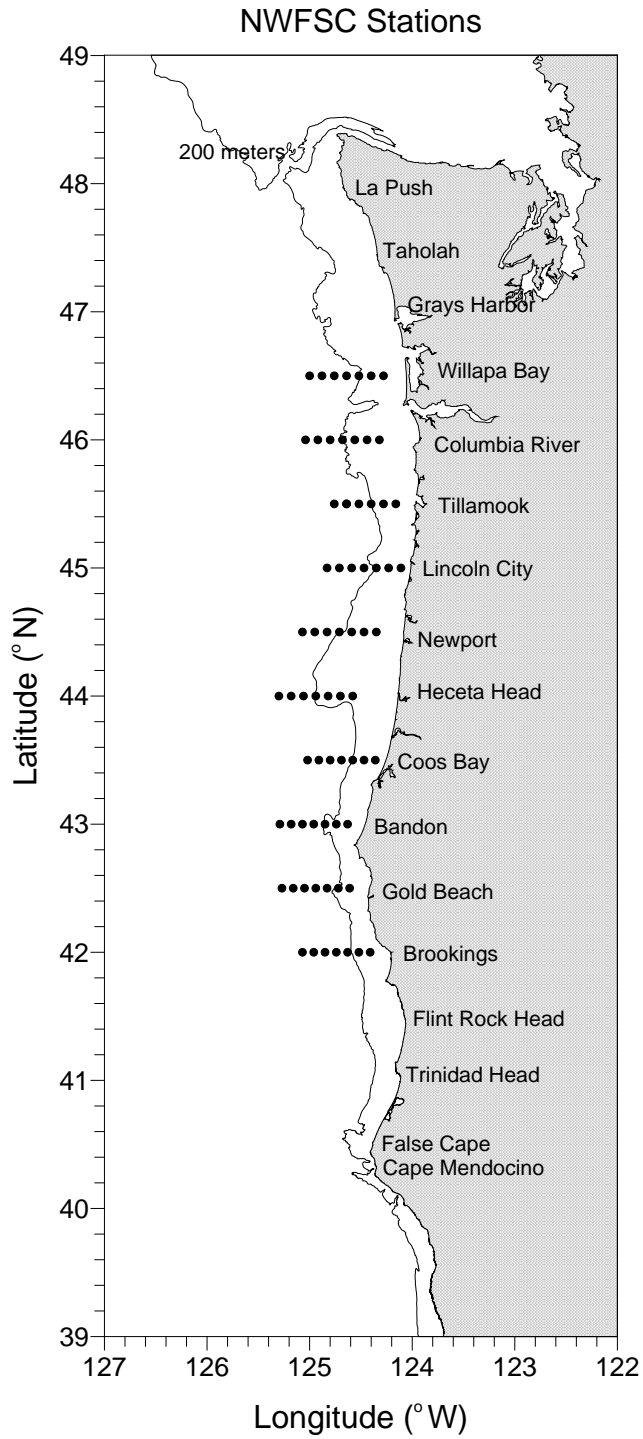
- (1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
- (2) Installation of the latest critical operating system security patches.
- (3) No external public Internet Service Provider (ISP) connections.

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

APPENDIX I: MAP OF MIDWATER TRAWL AND CTD STATION LOCATIONS



APPENDIX II: MIDWATER TRAWL AND CTD STATION LOCATIONS

FLINT ROCK HEAD

Latitude	Longitude
41° 30'	124° 15.6'
41° 30'	124° 22.2'
41° 30'	124° 28.8'
41° 30'	124° 42'
41° 30'	124° 55.2'

BROOKINGS

Latitude	Longitude
42° 0'	124° 24.6'
42° 0'	124° 31.2'
42° 0'	124° 37.8'
42° 0'	124° 44.4'
42° 0'	124° 51'
42° 0'	124° 57.6'
42° 0'	125° 4.2'

GOLD BEACH

Latitude	Longitude
42° 30'	124° 36.6'
42° 30'	124° 43.2'
42° 30'	124° 49.8'
42° 30'	124° 56.4'
42° 30'	125° 3'
42° 30'	125° 9.6'
42° 30'	125° 16.2'

BANDON

Latitude	Longitude
43° 0'	124° 37.8'
43° 0'	124° 44.4'
43° 0'	124° 51'
43° 0'	124° 57.6'
43° 0'	125° 4.2'
43° 0'	125° 10.8'
43° 0'	125° 17.4'

COOS BAY

Latitude	Longitude
43° 30'	124° 21.6'
43° 30'	124° 28.2'
43° 30'	124° 34.8'
43° 30'	124° 41.4'
43° 30'	124° 48'
43° 30'	124° 54.6'

43° 30' 125° 1.2'

HECETA HEAD

Latitude	Longitude
44° 0'	124° 34.8'
44° 0'	124° 42'
44° 0'	124° 49.2'
44° 0'	124° 56.4'
44° 0'	125° 3.6'
44° 0'	125° 10.8'
44° 0'	125° 18'

NEWPORT

Latitude	Longitude
44° 30'	124° 21'
44° 30'	124° 28.2'
44° 30'	124° 35.4'
44° 30'	124° 42.6'
44° 30'	124° 49.8'
44° 30'	124° 57'
44° 30'	125° 4.2'

LINCOLN CITY

Latitude	Longitude
45° 0'	124° 6.6'
45° 0'	124° 13.8'
45° 0'	124° 21'
45° 0'	124° 28.2'
45° 0'	124° 35.4'
45° 0'	124° 42.6'
45° 0'	124° 49.8'

TILLAMOOK

Latitude	Longitude
45° 30'	124° 9.6'
45° 30'	124° 16.8'
45° 30'	124° 24'
45° 30'	124° 31.2'
45° 30'	124° 38.4'
45° 30'	124° 45.6'
45° 30'	124° 52.8'

COLUMBIA RIVER

Latitude	Longitude
46° 0'	124° 19.2'
46° 0'	124° 26.4'
46° 0'	124° 33.6'
46° 0'	124° 40.8'
46° 0'	124° 48'
46° 0'	124° 55.2'
46° 0'	125° 2.4'

WILLAPA BAY

Latitude	Longitude
46° 30'	124° 16.8'
46° 30'	124° 24'
46° 30'	124° 31.2'
46° 30'	124° 38.4'
46° 30'	124° 45.6'
46° 30'	124° 52.8'
46° 30'	125° 0'

TAHOLAH

Latitude	Longitude
47° 0'	124° 35.4'
47° 0'	124° 42.6'
47° 0'	124° 49.8'
47° 0'	124° 57'
47° 0'	125° 4.2'
47° 0'	125° 11.4'

GRAYS HARBOR

Latitude	Longitude
47° 30'	124° 42.6'
47° 30'	124° 49.8'
47° 30'	124° 57'
47° 30'	125° 4.2'
47° 30'	125° 11.4'
47° 30'	125° 18.6'

Appendix III. NWFSC Marine Mammal Mitigation Procedures

The following suite of mitigation measures will be employed by the NWFSC during fisheries research. These procedures are the same whether the survey is conducted on board a NOAA vessel or charter vessel. The procedures described are based on protocols used during previous research surveys and/or best practices developed for commercial fisheries using similar gear. The NWFSC continually reviews its procedures and investigates options for incorporating new mitigation measures and equipment into its ongoing survey programs. Evaluations of new mitigation measures include assessments of their effectiveness in reducing risk to marine mammals but any such measures must also pass safety considerations and allow survey results to remain consistent with previous data sets. Additional mitigation measures that are being proposed for further development and implementation by the NWFSC during the five-year life of the authorization are detailed in Section 11.2.

1.1 Mitigation Measures for Marine Mammals during Research with Trawl Gear

The following protocols apply to all NWFSC surveys and research projects using surface trawl gear (Nordic 264 Trawl), mid-water trawl gear (Modified Cobb Midwater Trawl, Aleutian Wing Midwater Trawl, and commercial trawl gear), and bottom trawl gear (commercial-sized bottom trawls, double rigged shrimp trawl, Poly Nor'easter bottom trawl, modified Aberdeen bottom trawl, and 2-meter beam trawl). However, the great majority of marine mammals taken in NWFSC research gear in the past have been caught in surface trawl gear. While these mitigation measures have been in place for all trawl surveys since 2009, surveys using surface trawl gear have implemented monitoring and avoidance of marine mammal practices for many years prior to 2009 and have a strong culture of marine mammal mitigation as part of their survey operations. Where differences between implementation of these measures exist between surface trawl surveys and all other trawl surveys, they are noted below. These measures are relevant to all protected species, including sea turtles, but in actual practice they apply primarily to marine mammals because sea turtles are rarely seen during NWFSC surveys and have never been caught in NWFSC research gear. Note that the NWFSC conducts joint cruises with the SWFSC (i.e., the joint hake-sardine integrated acoustics-trawl survey). During joint surveys, the mitigation measures related to gear deployment for sardine sampling (conducted at night) are the responsibility of the SWFSC scientific team under SWFSC marine mammal protocols, and the mitigation measures related to gear deployment for hake (generally conducted during the day) are the responsibility of the NWFSC scientific team using the marine mammal protocols described below.

1.1.1 Monitoring methods

- The Captain and bridge crew monitor for marine mammals during transit and, on surface trawl surveys, are joined by designated members of the scientific party assigned to watch for marine mammals as part of the pre-set protocols as the vessel approaches a station. Detection of marine mammals is by visual observation with the aid of bridge binoculars as necessary. In general, average effective observation distance is about 500 meters from the vessel. A number of factors influence the ability of observers to detect marine mammals, including, but not limited to; the species, size, and numbers of animals present, their distance from the vessel and behavior, lighting conditions, weather conditions, sea state, and the specific vessel being used.
- For trawl operations at night, deck lights are used when crew are present but only illuminate the immediate area around the vessel; potential detection distances of marine mammals are small.
- For surface trawl surveys, the period of marine mammal monitoring begins about 10 minutes before the vessel is on station and extends continuously until the net has been retrieved. There is always a minimum of three and up to eight observers assigned to monitor for marine mammals, including crew on the bridge, depending on the numbers of marine mammals that have been seen during the station approach or are expected at that particular place and season. Any indication of

marine mammal presence and risk elicits the assignment of additional crew to stand watch in different locations around the ship, with the goal of providing 360 degree monitoring coverage around the vessel.

- For mid-water and bottom trawl surveys, the Chief Scientist must confirm with the Captain or the bridge that no marine mammals have been seen within 500 meters of the ship or appear to be approaching the ship during a 10-minute period prior to the deployment of any trawl gear. The 10-minute observation period is conducted by the Captain and bridge crew and typically occurs during transit prior to arrival at the sampling station, but may also include time on station if other types of gear or equipment (e.g., bongo nets) are deployed before the trawl.
- During standard trawl operations, at least some of the trackline to be towed is typically traversed prior to setting gear in order to check for hazards along the transect or, in the case of bottom trawls, to scan the bottom with echosounders to see if it is trawlable. On surface trawl surveys, CTD casts and plankton/bongo net hauls are made prior to setting the trawl. These activities can take 25-35 minutes after the vessel arrives on station, depending on water depth, and monitoring for marine mammals continues throughout these activities. Mid-water trawls and bottom trawls may not deploy other gears before deploying their trawl gear but reconnaissance of the trawl line often takes 10-15 minutes after arriving on station. In addition, once the decision is made to deploy the trawl gear, monitoring continues while the net is unspooled, which may take about 10 minutes. Before the trawl doors are deployed, the net floats on the surface behind the vessel but it is closed and actions can be taken if marine mammals are sighted near the ship (see operational procedures below). Thus, the monitoring period for marine mammals begins before the vessel arrives on station and extends continuously through gear deployment, typically for over 30 minutes on all trawl types.
- For surface trawls, monitoring for marine mammals continues after the trawl doors are deployed with a minimum of three and up to eight observers, including the bridge crew and members of the science party. Care is taken to provide some rest periods for observers to avoid observer fatigue. Lookouts divide up the area around the boat to ensure at least one person is looking at each sector around the vessel. At least two pairs of binoculars are on board and available for observers to verify a potential sighting. Lookouts search for any surface sign of marine mammal (e.g. blow, splash, dorsal fin) between the times when the trawl mouth is first deployed in the water until the time the trawl mouth is recovered on deck. Lookouts immediately alert the Captain and Chief Scientist as to their best estimate of the following information, relative to the ship's position, about any marine mammal or suspected marine mammal:
 - Distance
 - Bearing
 - Type/species
 - Number of individuals
 - Direction of travel or behavior
- For surface trawls, monitoring all around the ship continues until the trawl retrieval begins, at which point the focus is on the stern and the trawl itself. For mid-water and bottom trawls, once the trawl doors are deployed the net sinks to the intended depth. Based on the lack of historical interactions with these gear types and marine mammals during this period, the risk of interactions appears to be very low and monitoring efforts are reduced to the bridge crew while crew attend to other duties.
- In the case of surveys conducted aboard smaller research or chartered fishing vessels, the number of individuals and the amount of their time that may be devoted to serving as marine mammals

lookouts may be limited. Under these circumstances more reliance may be placed on the Chief Scientist to maintain a watch.

1.1.2 Operational procedures

- “Move-On” Rule. If any marine mammals are sighted within 500 meters of the vessel and are considered at risk of interacting with the vessel or research gear, or appear to be approaching the vessel and are considered at risk of interactions, the vessel has several options depending on the circumstances of the sighting. First, the set can be delayed while the vessel remains on site for some time period, usually at least 10 minutes, to see if they move off. If the marine mammals move off, the monitoring crew will conduct another 10-minute watch after the animals leave and, if no additional sightings are made, the trawl gear may be deployed. Second, the vessel may be moved away from the animals to a different section of the sampling area if the animals appear to be at risk of interaction with the gear. After the vessel is moved, monitoring protocols continue as reconnaissance of the new location is conducted and any other scientific gear is deployed (CTDs, bongos, etc.), a period of at least 10 minutes since moving to the new location. If no marine mammals are sighted that are considered at risk of interacting with the vessel or research gear, the trawl gear may be deployed.
- After moving on, if marine mammals are still visible from the vessel and appear to be at risk, the officer on watch, in consultation with the Chief Scientist, may decide to move again or to skip the station. The officer on watch will consult with the Chief Scientist or other designated scientist (identified prior to the voyage and noted on the cruise plan) and other experienced crew as necessary to determine the best strategy to avoid potential takes of marine mammals. Strategies are based on the species encountered, their numbers and behavior, their position and vector relative to the vessel, and other factors. For instance, a whale transiting through the area and heading away from the vessel may not require any move, may require a short delay before the gear is set, or may require only a short move from the initial sampling site, while a pod of dolphins gathered around the vessel may require a longer move from the initial sampling site or possibly cancellation of the station if the dolphins follow the vessel. Trawl gear is not deployed if marine mammals have been sighted within 500 meters of the ship unless those animals do not appear to be in danger of interactions with the trawl, as determined by the judgment of the Chief Scientist or officer on watch.
- During trawl operations, the most appropriate response to avoid incidental take is determined by the professional judgment of the officer on watch, in consultation with the Chief Scientist or other designated scientist and other experienced ship’s crew and science crew as necessary. In general, the critical distance for deciding to retrieve the net early is an observation of a marine mammal within 500 meters of the ship or marine mammals sighted at a greater distance but clearly closing on the vessel. These judgments take into consideration the species, numbers, and behavior of the animals, type of net being used, the status of the trawl net operation (net opening, depth, and distance from the stern), the time it would take to retrieve the net, and safety considerations for changing speed or course. Because the surface trawl is more prone to capturing marine mammals, based on the historical experience of the NWFSC, decisions on what course of action to follow may be different than for a mid-water or bottom trawl. In some situations, such as whale sightings, the risk of adverse interactions may be diminished by continuing to trawl until the marine mammals have left the area before beginning haul-back operations. In other situations, swift retrieval of the net may be the best course of action. If the Chief Scientist is not on watch during a trawl, any member of the scientific party has the authority to halt trawling operations if a marine mammal is observed in the vicinity and considered to be at risk. The Chief Scientist does not have to be notified before action is taken.

- All monitoring periods are documented in a logbook or on data sheets maintained by scientific party. Pertinent information includes: 1) Confirmation that the marine mammal monitoring protocol was completed prior to deployment of gear, 2) Records of any stations dropped because of the presence of marine mammals, and 3) Species or types of marine mammals observed (if possible) within 500 meters of the ship that cause an adjustment in our set protocols (e.g., extending of observation period).
- Logbooks from surface trawling operations indicate that, from 2008 through 2012, the NWFSC shortened 9.2% of tows and had to skip (not set at all) 0.9% of surface tows (out of a possible 694 tows). For comparison, 4 tows (0.6%) of the 694 conducted caught marine mammals. Shortened or skipped tows may also occur due to masses of jellyfish or gear complications but most of these incidents were because of the presence of marine mammals. The logbook data do not include the numbers of delays or moves caused by the presence of marine mammals but the move-on rule is implemented on a regular basis, especially during May and June when migratory marine mammals are in the area.
- Care is taken when emptying the trawl, including opening the cod end as close as possible to the deck of the checker (or sorting table) in order to avoid damage to marine mammals that may be caught in the gear but are not visible upon retrieval. The gear is emptied as quickly as possible after retrieval in order to determine whether or not marine mammals are present.

1.1.3 Tow duration

- Standard tow durations are typically 30 minutes or less at the targeted depth, excluding deployment and retrieval time, to reduce the likelihood of attracting and incidentally taking marine mammals. Note that retrieval and deployment times can exceed trawling time, depending on the gear. These tow durations decrease the opportunity for curious marine mammals to find the vessel and investigate. The resulting tow distances are typically 1 to 2 nautical miles, depending on the survey and trawl speed. Additionally, although the NWFSC has never caught sea turtles in trawl gear, short tow times reduce the likelihood that incidentally captured sea turtles would drown.

1.1.4 Gear modifications

- The NWFSC is currently working to refine a marine mammal excluder device (MMED) that was incorporated on an emergency basis into the Nordic 264 surface trawl net used for the Juvenile Salmon PNW Coastal Survey. This device is a rigid grate with a set of bars across the cod end of the net and an escape hatch just forward of this set of bars (Appendix A). This device was originally developed by the Southwest FSC for use in its sardine survey (Dotson et al. 2010). The NWFSC has tested the net/excluder device design used by the Southwest FSC and found that it caused a significant loss of some salmon species that were the target of their research (report in prep.). More recent experiments have used video cameras attached to the net opening and near the excluder device to test different configurations of the excluder device to minimize loss of target species. The experiments have looked at adding weight and stiffeners to the flap covering the escape hatch to keep it closed and flipping the MMED so the escape hatch faces down rather than up. Based on preliminary results, this downward-pointing escape hatch appears to be the best design for minimizing loss of target species. Additional research will be necessary to calibrate catch levels in tows with the excluder device compared to past tows that did not contain the excluder (i.e., to align the new catchability rates with historical data sets). During these configuration and calibration experiments some nets will be fished without the MMED in order to provide controls for catchability. Once the NWFSC completes these experiments the MMED will be used in all future trawls with this net. The NWFSC will use high-resolution video cameras on tows made with and without the MMED both to evaluate effects of the MMED on catch and to

determine if marine mammals enter the net undetected by observers and either escape on their own by swimming out of the net or through the MMED. All video data will be digitally recorded and reviewed at a later date.

1.1.5 Acoustic pinger devices

- For surface trawls only (using the Nordic 264 trawl), two pairs of acoustic signaling devices known as “pingers” are installed near the net opening, one on either side. Acoustic pingers, when submerged, emit an underwater pulse of sound, or “ping”. The intent of these devices is to discourage marine mammals from entering the net (see Appendix A in the accompanying EA).
- Pingers are manufactured by a number of companies but two brands typically used by the NWFSC include the Aquatec Subsea Limited, model AQUAmark, and Fumunda Marine, models F10 and F70. Pingers remain operational at depths between 10 m and 200 m. Tones range from 200 to 400 microseconds in duration, repeated every 5 or 6 seconds, with variable frequency of 10-160 kHz. The pingers generate a maximum sound pressure level of 145 decibels (dB) root mean square referenced to 1 micropascal at one meter.

1.1.6 Vessel Strike Avoidance

- When research vessels are actively sampling, vessel speeds are less than four knots, a speed at which the probability of collision with large whales and other marine mammals is negligible. When transiting between sampling stations, NWFSC research vessels cruise at 6-14 knots, but average about ten knots. This is slower than marine mammals can swim so the risk of collisions and serious injury or mortality is still very low. In addition, NWFSC research vessel captains and crew watch for marine mammals while underway during daylight hours and take necessary actions to avoid them. There are currently no Marine Mammal Observers (MMOs) aboard the vessels dedicated to watching for marine mammals to minimize the risk of collisions, although the large NOAA vessels operated by the NOAA Corps (e.g., R/V *Bell M. Shimada*) include one bridge crew dedicated to watching for obstacles at all times, including marine mammals. When research vessels are operating in areas and times when many marine mammals have been seen, additional crew may be brought up to the bridge to monitor for whales and captains may also reduce speed to improve the chances of observing whales and avoiding them. At any time during a survey or in transit, any bridge personnel that sights marine mammals that may intersect with the vessel course immediately communicates their presence to the helm for appropriate course alteration or speed reduction as possible to avoid incidental collisions, particularly with large whales.

WindFloat Pacific Project Proposed Area

