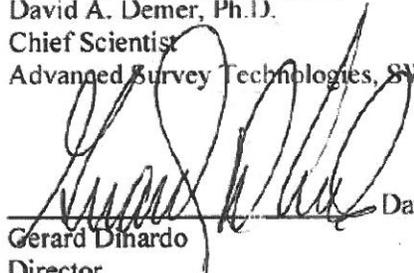


Project Instructions

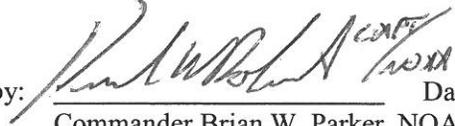
Date Submitted: 05/08/2017
Platform: NOAA Ship *Reuben Lasker*
Project Number: RL-17-04
Project Title: West Coast Pelagic Fish Survey, Fisheries Resources Division
Project Dates: June 19 – August 11, 2017

Prepared by: CUTTER.GEORGE.1380547
836
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Date: 2017.05.19 17:31:47 -0700
Dated: 5/19/2017

Approved by: 
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Commanding Officer
Marine Operations Center – Pacific
Dated: 6/16/2017

I. Overview

A. Brief Summary and Project Period

Survey the distributions and abundances of coastal pelagic fish species (CPS), their prey, and their biotic and abiotic environments in the California Current between San Diego, California and the northern extent of Vancouver Island, Canada, **June 19 – August 11, 2017**.

The survey domain encompasses the anticipated distributions of the northern sub-populations of Pacific sardine (*Sardinops sagax*) and Northern anchovy (*Engraulis mordax*). Acoustic transects will be conducted using the following sampling guidelines:

Depart San Diego, California and transit to the northernmost transect line within the modeled potential sardine habitat (<http://swfscdata.nmfs.noaa.gov/AST/sardineHabitat/habitat.asp>) evaluated 1 June 2017 (see candidate survey region and waypoints in **Appendices B & C**). The goal is to sample all of the compulsory transects (20-nmi spacing) that are within the potential habitat of the northern subpopulation of Pacific sardine, and add adaptive transects (10-nmi spacing) in areas where CPS are abundant (see the adaptive sampling protocol in **Appendix A**). The transects will be surveyed as close to shore as navigable, and as far offshore as necessary to map the western extent of CPS, based on: the presence of CPS eggs in CUFES, CPS echoes in echograms, or CPS in trawl catches.

B. Days at Sea (DAS)

Of the 50 DAS scheduled for this project, 50 DAS are funded by a Line Office Allocation according to the Fleet Allocation Plan. This project is estimated to exhibit a high Operational Tempo.

C. Operating Area

The candidate survey area spans from the northern extent of Vancouver Island, Canada to Point Conception, CA, extending offshore to ~50-nmi in the Southern CA Bight (SCB) and to ~100-nmi north of Pt. Conception (see map in **Appendices B & C**).

D. Summary of Objectives

The principal objectives are to estimate the distributions and abundances of CPS (particularly the northern subpopulations of Pacific sardine and northern anchovy), their prey, and their biotic and abiotic environments in the California Current.

To achieve these goals, specific activities include:

Continuously sample multi-frequency acoustic backscatter using Simrad EK60, EK80, and ME70. These data will be used to estimate the distributions and abundances of CPS and krill. All echosounders will be synchronized *ca.* hourly to the ship's NTP time server.

In areas with CPS sign, continuously sample acoustic backscatter with the SX90 sonar operating on low power (to avoid cross-talk with the echosounders). Along inter-transect segments, use high transmit power to maximize the detection range of nearshore CPS schools. When schools are potentially within its field of view, record acoustic imagery using the MS70. Additionally, at the locations and times decided by the Cruise Leader (CL) onboard or Chief Scientist (CS), record SX90 and MS70 data while the ship is held stationary.

Continuously sample pelagic fish eggs using the Continuous Underway Fish Egg Sampler (CUFES). The data will be used to estimate the distributions of spawning hake, Northern anchovy, jack and Pacific mackerel, and Pacific sardine.

Nearshore end-of-transect sampling – At the nearshore end of each transect, at the discretion of the CL/CS, the ship will stop and hold stationary for up to 15 minutes, with the port side of the ship aligned with the shore, as conditions allow. Alternatively the bow should be directed toward shore. During this stationary period, the SX90 will be operated on high power, at long-range, to observe nearshore fish schools. The MS70 will also be operated and its data recorded when schools are within its potential field of view.

Continuously sample sea-surface temperature, salinity, and chlorophyll-a using a thermosalinometer and fluorometer. These data will be used to estimate the physical oceanographic habitats for target species.

Continuously sample air temperature, barometric pressure, and wind speed and direction using an integrated weather station.

Sample profiles of seawater temperature and salinity using an underway CTD (UCTD) probe mounted on port side of the ship's stern.

Sample profiles of seawater temperature, salinity, oxygen and chlorophyll-a once during nighttime trawl sampling using the CTD rosette.

Sample fish near the surface using a Nordic 264 Rope Trawl at 2-5 locations selected each night by the CL/CS. The data will be used to estimate the reproductive parameters, distributions, and demographics of sardine, anchovy, and mackerels. Fish behavior inside trawls and the performance of the marine mammal excluder device (MMED) will be visually observed using cameras and lights mounted inside the net.

Monitor ambient sounds using the ship's hull-mounted hydrophones recorded using scientist's instruments.

If it does not cause interference in the EK60, EK80, ME70, SX90, and MS70 data, continuously sample profiles of currents using the RDI/Teledyne Acoustic Doppler Current Profiler (ADCP). It is requested that the ship's Survey Technicians (ST) be responsible for ADCP operations.

Cooperatively survey CPS in the nearshore areas off Washington and Oregon. Coordinate with F/V *Lisa Marie* to embark two industry observers before she conducts echosounder, sonar, and purse-seine sampling along nearshore extensions of *Lasker's* survey, and then disembarks the observers. In the same region, coordinate with the fishing industry's aerial-photographic sampling.

E. Participating Institutions
Southwest Fisheries Science Center (SWFSC)

F. Personnel transfers

Ship-to-shore mid-leg personnel transfers are required. During leg 1, on or about Saturday, 7/1, disembark D. Palance, J.Zwolinski, and D. White, and embark T. Sessions via the ship's launch, at the nearest point of land with small boat access, preferably Westport, WA. Also, during leg 1, A.Blair and G. Shaughnessy will embark *Lasker* for five days, transferring, via the ship's launch, from and to F/V *Lisa Marie*.

During Leg 2, on or about Sunday 7/30, disembark D. Murfin and *TAS* D. Chambers, and embark G. Cutter via the ship's launch, at the nearest point of land with small boat access, preferably Bodega Harbor, CA.

G. Personnel/Science Party (June 19 – Aug 11)

Leg	Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality	Email	Note
1-1	D. Palance	Fishery Acoustician	2017/06/19	2017/07/01	M	NOAA	US	danial.g.palance@noaa.gov	Disembark mid-leg 1
1-1	J. Zwolinski	Fishery Acoustician	2017/06/19	2017/07/01	M	NOAA	FN	Juan.Zwolinski@noaa.gov	Disembark mid-leg 1
1-1	D. White	Teacher at sea	2017/06/19	2017/07/01	F	TAS	US	dwhite@isd138.org	Disembark mid-leg 1
1-2	T. Sessions	Fishery Acoustician	2017/07/01	2017/07/13	M	NOAA	US	steve.sessions@noaa.gov	Embark mid-leg 1
1	Amy Hays	Fishery Biologist	2017/06/19	2017/07/13	F	NOAA	US	Amy.hays@noaa.gov	
1	Sue Manion	Cruise Leader / Fishery Biologist	2017/06/19	2017/07/13	F	NOAA	US	sue.manion@noaa.gov	
1	Emily Gardner	Fishery Biologist	2017/06/19	2017/07/13	F	NOAA	US	emily.gardner@noaa.gov	
1	Bryan Overcash	Fishery Biologist	2017/06/19	2017/07/13	M	NOAA	US	bryan.overcash@noaa.gov	
1	Dereka Chargualaf	Fishery Biologist	2017/06/19	2017/07/13	F	NOAA	US	dereka.chargualaf@noaa.gov	
1	Nicolas Osborn	Volunteer / trawl proc.	2017/06/19	2017/07/13	M	UCSD	US	nosborn@ucsd.edu	
1	Angela Klemmedson	Volunteer	2017/06/19	2017/07/13	F	UCSD/SIO	US	angela.klemmedson@gmail.com	
1	A. Blair	Industry fisherman	> 06/19	<07/13	M	F/V Lisa Marie	US	neworegon14@aol.com	Embark mid-leg, disembark 5 days later
1	Greg Shaughnessy	Industry fisherman	>2017/06/19	<2017/07/13	M			gshaughnessy@oceancos.com	Embark mid-leg, disembark 5 days later
2-1	D. Murfin	Fishery Acoustician	2017/07/17	2017/07/30	M	NOAA	US	david.murfin@noaa.gov	Disembark mid-leg 2
2-1	D. Chambers	Teacher at sea	2017/07/17	2017/07/30	M	TAS	US	davec@pratcc.edu	Disembark mid-leg 2
2-2	G. Cutter	Fishery Acoustician	2017/07/30	2017/08/11	M	NOAA	US	george.cutter@noaa.gov	Embark mid-leg 2
2	Phillip Dionne	Fishery Biologist	2017/07/17	2017/07/30	M	WA Dept of Fish&W	US	Phillip.Dionne@dfw.wa.gov	Disembark mid-leg 2

						ildlife			
2	Patrick Biondo	Fishery Biologist	2017/07/30	2017/08/11	M	WA Dept of Fish&Wildlife	US	Phillip.Dionne@dfw.wa.gov	Embark mid-leg 2
2	Dave Griffith	Cruise Leader / Fishery Biologist	2017/07/17	2017/08/11	M	NOAA	US	dave.griffith@noaa.gov	
2	Lanora Vasquez	Fishery Biologist	2017/07/17	2017/08/11	F	NOAA	US	lanora.vasquezdelmercado@noaa.gov	
2	Sue Manion	Fishery Biologist	2017/07/17	2017/08/11	F	NOAA	US	sue.manion@noaa.gov	
2	Andrew Thompson	Fishery Biologist	2017/07/17	2017/08/11	M	NOAA	US	Andrew.thompson@noaa.gov	
2	Nina Rosen	Trawl processor	2017/07/17	2017/08/11	F	SIO	US	nerosen@ucsd.edu	
2	Austin Grodt	Volunteer	2017/07/17	2017/08/11	M	SIO	US	agrodt@ucsd.edu	

Note: If calibrations are conducted at anchor in the San Diego Bay, calibration staff shall be transferred ashore via small boat following completion of calibration.

H. Administrative

Points of contact

Project Leader: George Cutter (858-546-5691); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (george.cutter@noaa.gov)

Chief Scientist: David Demer (858-546-5603); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (David.Demer@noaa.gov)

Ops Officer: LT David Vejar (619-230-0331) NOAA Ship Reuben Lasker (OPS.Reuben.Lasker@noaa.gov)

Diplomatic Clearances

This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Diplomatic clearance has been requested.

Licenses and Permits

This project will be conducted under the following permits and agreements:

- a) California Department of Fish and Wildlife (CDFW) on 02 April 2015 (expires April 2018) NOAA-SWFSC-FRD-Cisco Werner (SC-12372).
- b) Marine Mammal Protection Act (MMPA) Letter of Authorization (LOA) for the CA Current (50 CFR Part 219, Subpart A) effective October 30, 2015, and is valid through October 29, 2020.
- c) NMFS ESA consult (eulachon, salmon, sea turtles): NOAA Fisheries West Coast Region (WCR) Endangered Species Act (ESA) Consultation 2015-2455.
- d) Office of National Marine Sanctuaries (ONMS) 304(d) consultation concurrence received by the SWFSC on March 16, 2015.
- e) NOAA Fisheries WCR Scientific Research Permit (SRP) as specified in 50 CFR 600.745.
- f) Permit to conduct CPS surveys in all 5 west coast Sanctuaries (OMB# 0648-0141) valid through 12/31/2018.
- g) Oregon Department of Fish and Wildlife (ODFW), *2017 - SCIENTIFIC TAKING PERMIT – FISH. Permit #21193. NMFS-SWFSC-FRD Gerard Dinardo. March 2, 2017 to Dec. 31, 2017.*
- h) Washington Scientific Taking Permit –in process to be provided upon receipt. NOAA Ship *Reuben Lasker* will not conduct scientific operations in Washington state waters until permit is received and filed on the ship and at MOC-P..
- i) This project involves Marine Scientific Research in waters under the jurisdiction of Canada. Diplomatic clearance has been requested. Authorization for research operation in Canadian waters – in process to be provided upon receipt. NOAA Ship *Reuben Lasker* will not conduct scientific operations in Canadian waters until Canadian Diplomatic Clearance is received and the permit is filed on board and at MOC-P.

II. Operations

The CL/CS is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The CO is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary

Leg 1: 2017/06/19 - 2017/07/13

Leg 2: 2017/07/18 - 2017/08/11

Leg 1: **June 19:** Depart San Diego, CA

July 01: Mid-leg personnel transfer, **location:**

(**Westport (Grays Harbor), WA**; alternatively in the event of severe weather, Neah Bay, WA, or Port Angeles, WA, with sufficient advance time notice to transferring personnel to change travel plans)

July 13: Arrive San Francisco, CA

Leg 2: **July 18:** Depart San Francisco, CA

July 30: Mid-leg personnel transfer, **location:**

(**Bodega Harbor, CA**; alternatively Eureka, CA, with sufficient advance time notice to transferring personnel to change travel plans)

August 11: Arrive San Diego, CA

B. Staging and De-staging

Staging: **June 13-16**, San Diego, CA, 10th Ave. Marine Terminal

Sonar Calibration: **June 13-16**, San Diego, CA, 10th Ave. Marine Terminal

De-staging: **Aug. 11 or 12-14**, San Diego, CA

C. Operations to be conducted

Underway Operations

a) Scientific Computing System (SCS) Data Collection

The SCS will serve as the main data collection system throughout the survey. Copies of all SCS data will be provided to SWFSC personnel at the completion of the project on a provided hard disk drive (HDD). The following SCS data streams shall be provided by the Electronics Technician (ET) or ST:

- (1) EAL/ZMUX Send SCS Message at 1-s interval
- (2) CUFES Send SCS Message at 1-s interval
- (3) MOA Continuous Event Logs at 30-s interval

b) Position and motion data

The ship will ensure that the POS-MV GNSS Azimuth Measurement System (GAMS) is calibrated and that heading data accuracy is less than 0.05 degrees. The ship will record position and motion data from the Trimble/Appplanix POS-MV to binary files via Ethernet storage option for the POS-PAC data set selection, plus ZDA and UTC NMEA sentences. The ship will supply position and motion data from the POS-MV to all of the scientific sonar systems (EK60, EK80, MS70, ME70, SX90) at a rate of at least 5 Hz, and the ship will ensure that all IMU- and antenna-transducer x,y,z-offset measurements from the most recent ship's survey are installed appropriately to each sonar system.

c) Thermosalinometer sampling

The ship will provide and maintain a thermosalinometer (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity. A backup unit (calibrated and in working order) will also be provided by the vessel and remain aboard during the project.

d) Acoustics

Calibration of the Simrad EK60 and EK80 echosounders will be performed at the beginning of the project (requiring 6-8 hours). An attempt will be made to conduct the acoustic calibration while the ship is dockside. It is requested that the transducer faces are cleaned of all barnacles or any other bio-fouling that will potentially hinder the calibration operations and degrade echosounder data, within one week prior to the calibration (tentative calibration date is during week prior to departure from San Diego). The EK60/80 transducer faces may be cleaned from the centerboard chest with the centerboard retracted to the "maintenance" position; the ME70 transducer must be cleaned by SCUBA divers. With the centerboard in the "maintenance" position, SWFSC engineers will install a plate with a sound velocity profiler (SVP) and a pan-tilt-zoom (PTZ) camera and conduct measurements of transducer impedance while the transducers are dry. The SVP and PTZ camera will be used to monitor the sound speed, temperature, and pressure at the transducer faces to improve calibration accuracy, and to observe the presence and behaviors of epipelagic animals, respectively. Data from the SVP will be input to the SCS and also logged with the Z-MUX software.

Immediately prior to calibration, a CTD will be cast to obtain measures of temperature and salinity versus depth, to calculate mean sound speeds and absorption coefficients. The centerboard will remain in the retracted position. Three motorized downriggers, two on one side of the vessel and one on the other, will be used to swing a 38.1-mm-diameter tungsten carbide sphere beneath the centerboard-mounted transducers. It is requested that the STs locate all calibration equipment (downriggers, cabling, and spheres) and participate in the calibration procedures for training purposes.

Throughout the project, EK60 and EK80 echosounders will be operated at 18, 38, 70, 120, 200 and 333 kHz and interfaced to a data acquisition system to estimate the biomasses of small pelagic fish and krill between 10 and 350 m depth. An "EK-MUX" multiplexer will be used to alternate transmissions from the EK60 and EK80 echosounders. The ST, with assistance from the acoustician, will verify the correct date and time on the echosounder computers and track total kilometers surveyed by EK60, EK80, ME70, MS70, and SX90 and submit respective distances to swfsc.ita@noaa.gov within 30 days following the conclusion of the project. These distances

are required for environmental compliance as directed by SWFSC's Letter of Authorization for the California Current Research Area, (LOA CCRA -80 FR 58982) under the Marine Mammal Protection Act (valid until 29 October 2020).

Throughout the project, the ME70 multibeam sonar, configured to collect data to 500 m, will be operated synchronously with the EK60/80 echosounders.

Throughout the project, the MS70 quantitative multibeam sonar, configured to collect data to 250 m, will be operated synchronously with the EK60 and EK80 echosounders by the acoustic-system operator. Operation of the MS70 requires the centerboard to be extended to the "intermediate" position, at least. If possible, lower the ship's centerboard to the intermediate position while exiting San Diego Bay.

In areas with CPS, the SX90 omnidirectional fish finding sonar will be operated synchronously with the EK60 and EK80 echosounders.

An EK60/EK80 Adaptive Logging program (EAL) will be run continuously to detect the seabed depth and optimize the transmit interval and logging range while avoiding aliased seabed echoes ("false bottoms"). The EAL will provide a pseudo seabed depth telegram to the ship's K-Sync, to adaptively adjust the transmit intervals of the EK60, EK80, ME70, MS70, SX90, and the ADCP.

A "Z-MUX" multiplexer system will periodically measure the impedances of each of the EK60/80 transducers, ambient noise as measured by the EK60/80 echosounders, and the concomitant measurements of environmental conditions collected by the SCS.

Simrad TD50 four-dimensional imaging software will be loaded on a PC in the acoustics lab for real-time viewing of water column and seabed backscatter. This software will be used to visualize EK80, MS70, ME70, and SX90 in real-time, particularly in nearshore areas where the seabed is in the range of all echosounders.

The most current versions of EK80, MS70, ME70, SX90, and TD50 will be provided to the ship's ET for installation by approximately **16 June 2017**.

An FTP program may be used in conjunction with the ship's VSAT system to telemeter raw and processed echosounder data ashore in quasi-real-time as bandwidth permits.

The instrumented centerboard will be extended to the "intermediate" position (ca. transducers at ~7 m below the surface) and the ship will maintain a speed of nominally 10 kn during all daytime survey operations (vessel speed may be increased to 12 kn during transits between acoustic transect). Any changes to this depth should be avoided and reported to the acoustic-system operator(s). The acoustic-system operator(s) may request that the centerboard is fully extended (ca. transducers ~9 m below the surface) to reduce bubble-generated noise during heavy weather. The OOD or ST shall record changes in the centerboard position in the SCS (Button labels: CB Flush, CB Intermediate, CB Extended).

The vessel's Simrad ES60 depth sounder and Doppler velocity log (or comparable) may be used minimally at the discretion of the Commanding Officer (CO), but will normally remain off and secured via circuit breaker(s) while underway. The ship shall inform the CL/CS and acoustic-system operator(s) of any use of the vessel's sounders, as it interferes with the signals received on the EK60/80, ME70, MS70, and SX90 echosounders that will be used continuously. The ER60/80 display on the bridge must be a video replicate of the ER60/80 running in the Acoustics Lab. A second instance of the ER60 will conflict with the EAL and cause the EAL, ER60/80, ME70, and MS70 to crash.

The UCTD (Teledyne Oceanscience Underway CTD, <http://www.teledynemarine.com/underwayctd/>) will be deployed one to five times along each acoustic transect, during the daytime, at locations indicated by the CL/CS (**Appendix C**). The vessel speed during UCTD casts shall be nominally 10 kn, but may be reduced at the request of the UCTD operator to achieve the desired cast depth. Two persons are required for UCTD sampling. The ST shall handle the preparation, deployment, recovery, and data download for each cast, with another member of the ship's crew or a member of the scientific party if crew is unavailable. An underway stereo camera (UCAM), which interfaces with the UCTD, may be deployed opportunistically during the day to visually sample CPS and other potential acoustic scatterers.

The OOD or ST shall record the time that the UCTD is deployed and recovered in the SCS event logger (Button labels: UCTD deployed, UCTD recovered).

e) ADCP

The ship's ADCP should be activated by the ST and data logged. Complete system settings will be provided by the oceanographer but will include 5-min averaging of currents, AGC and 4 beam returns in 60 8-meter bins. **The ADCP will be secured during daytime transits and nighttime trawl if it interferes with the EK60, EK80, ME70, SX90, or MS70 data.**

f) CUFES

The egg pump will be mounted inside the ship's hull drawing water from a depth of 3 m. It is requested that the CUFES intake is cleared from all marine growth prior to departure.

During the survey, the pump will run continuously between stations to sample any pelagic fish eggs. Approximately 640 l min⁻¹ is sent through a concentrator which filters all material larger than 505 µm. The sieved material is then collected and identified. All fish eggs are identified to the lowest taxa, counted and entered into the data acquisition software. Each sample entry is coupled with sea surface temperature, geographical position, wind speed and direction, date and time, and surface salinity. Sampling intervals will be 30-min in duration whenever possible. The CUFES pump shall be configured to report the flow rate in liters min⁻¹ (not gallons min⁻¹).

CUFES data should be updated and plotted on a map shared with the acoustics laboratory as often as possible, for use by the CL/CS for determining potential fishing locations or other sampling activities.

g) Nearshore sampling

In areas with CPS, along inter-transect segments, observations of nearshore schools will be made using the SX90 operating with high transmit power and, if fish are potentially within its field of view, the MS70. At the discretion of the CL/CS, SX90 and MS70 measurements may be made with the ship held stationary for up to 15 minutes. Along nearshore transits between transect endpoints fish schools detected by the SX90 will be investigated using the MS70 by altering the ships path to encounter the school within 150 m of the port side of the ship, where possible.

h) Cooperative nearshore sampling

Off Washington and Oregon, nearshore CPS will be surveyed in cooperation with industry. F/V *Lisa Marie* will embark two industry observers before she conducts echosounder, sonar, and purse-seine sampling along nearshore extensions of *Lasker's* survey, and then disembark the observers. In the same region, the CL/CS will coordinate with the fishing industry's aerial-photographic sampling if aerial surveys are being conducted. Sonar sampling along nearshore transits may be directed for encounter with fish schools sampled by the industry vessel.

Station Daytime Station Sampling Operations

No standard daytime station operations are planned. Unplanned daytime station work may occur at the discretion of the CL/CS and may include hand-line fishing for CPS and camera deployments.

Standard Nighttime Station Sampling Operations

Each standard nighttime station will include the following:

- i) Surface trawls
- j) Bongo net tow
- k) Pairovet net tow

During leg 1, the 264 Nordic Rope Trawl net with sampling pockets will be replaced with one without pockets. Both nets are fitted with an MMED. Two to five surface tows will be conducted each night. The first set will be approximately one hour after sunset, and the last set will be concluded prior to sunrise. Trawl locations will be determined based on CPS egg density, daytime CPS backscatter, and other factors.

Each trawl tow will be fished on the surface for a 45-min duration at a towing speed of approximately 3.5-4.5 knots. The duration of trawls shall be reduced only when necessary to avoid protected species or ensure the safety of the ship or its crew, in which cases a minimum duration of 45 min is preferred but may be reduced at the discretion of the CL/CS. In an attempt keep the footrope from sinking too deep during deployment, it is requested that once the tom weights are in the water, the ship's speed is increased to 3.0-3.5 knots. The trawl will be fitted with cameras and lights to observe the behaviors of target species and to assess the performance of the MMED. The catch from each tow will be processed according to the SFWSC mid-water trawl sampling protocol (**Appendix D**). The acoustic trawl mensuration system (Simrad ITI) may be used to monitor the performance of the trawl net, but shall be secured when not in use to avoid interference with the scientific echosounders.

When possible (weather permitting), a trawl catch greater than five baskets will be lifted on to the sorting table with the ship's crane. Smaller catches can be dumped into either plastic trash cans or a fish tote.

The OOD or ST shall record shall record the time of station arrival and departure in the SCS event logger (Button labels: Arrive Station, Depart Station) and the time that the trawl is deployed and recovered (Button labels: Shoot Doors, Net in Water, Begin Fishing (EQ), Haul Back, Net on Deck).

It is requested that the OOD note the locations and times when the acoustic sampling starts and stops each day in the SCS event logger (Button labels: Resume Transect, Break Transect) and for each transect (Button labels: Start Transect, End Transect). After the last trawl of each night or 30 min prior to sunrise, the ship will return to the exact location where the acoustic sampling stopped the previous day, and resume acoustic sampling.

l) CTD Sampling

To compare results, CTD/rosette casts will be made to a depth of 350 m during the first and last survey transects and UCTD casts will then be made in the same locations. CTD/rosette casts will also be made, at the discretion of the CL/CS, in the event of problems with the underway CTD system. For each sample, the CTD/rosette shall be lowered to approximately 350 m (or to within ~10 m of the seabed when the seabed depth is < 350 m) at each station to measure temperature, salinity, oxygen, and chlorophyll-a. The OOD or ST shall record the time that the CTD is deployed and recovered in the SCS event logger (Button labels: CTD deployed, CTD recovered).

m) CalBOBL (CalCOFI Bongo Oblique) Sampling

CalBOBL samples will be collected only during the station work at night. Each sample shall be a standard oblique plankton tow with 300 m of wire out, depth permitting, using paired 505 μm mesh nets with 71-cm diameter openings. The tow requires a descent wire rate of 50 m min^{-1} and an ascent wire rate of 20 m min^{-1} . All tows with ascending wire angles lower than 38° or higher than 51° in the final 100 m of wire will be repeated. Additionally, a 45° wire angle should be closely maintained during the ascent and descent of the net frame. The port side sample will be preserved in buffered ethanol at every station. An additional bongo tow will be taken at night in conjunction with the trawling operations, whether the ship is occupying a station or not.

The OOD or ST shall record shall record the time that the bongo is deployed and recovered in the SCS event logger (Button labels: Bongo IN, Bongo OUT).

n) Pairovet Sampling

Pairovet samples will be collected only during the station work at night. For each sample, a Pairovet net will be fished from 70 m to the surface (depth permitting) using paired 25-cm diameter 150- μm mesh nets at all stations. The technical requirements for Pairovet tows are a descent rate of 70 m min^{-1} , a terminal depth time of 10 seconds, and an ascent rate of 70 m min^{-1} . All tows with wire angles exceeding 15° during the ascent will be repeated.

Preserve port-side pairovet samples in ethanol, in support of experiments using metagenomics to identify fish larvae from plankton samples. The methods will be the same as usual for ethanol preservation with one exception. As typical, ethanol will be changed after 24 hours. Instead of disposing of all of the initial ethanol, however, the processor will siphon some of it up with a disposable plastic pipettor and place the ethanol in a falcon tube. The falcon tube will be labelled such that it is easy to determine the time and location where it was collected. The falcon tube will then be stored in the freezer and the pipettor will be thrown out. A different pipettor will be used for each sample. Andrew Thompson will provide the tubes and the pipettors.

The OOD or ST shall record shall record the time that the Pairovet is deployed and recovered in the SCS event logger (Button labels: Pairovet IN, Pairovet OUT).

o) Weather observations

Routine weather observations will be made using the standard SWFSC procedure during every net tow and trawl event (i.e., at every “order occupied”).

Other sampling gear

The SWFSC deploys a wide variety of gear to sample the marine environment during all of their research projects. These types of gear are not considered to pose any risk to protected species and are therefore not subject to specific mitigation measures. However, the OOD and crew monitor for any unusual circumstances that may arise at a sampling site and use their professional

judgment and discretion to avoid any potential risks to protected species during deployment of all research equipment.

Protected Species Watches

For the nighttime trawl operations, protected species (e.g. marine mammals and turtles) watches are now a standard part of conducting fisheries research activities, particularly those that use gear (e.g., long-lines and mid-water trawls) known to interact with protected species or that we believe have a reasonable likelihood of doing so in the future.

a) 30-min pre-set protected species watches

Protected species watches (visual observation) will be initiated by a designated person/s from the science party no less than 30 min prior to deployment of gear for sampling in order to determine if any protected species are near the proposed trawl set location. This watch can occur during transit leading up to arrival at the sampling station. If stations are less than 5-nmi apart (or less than a 30-min transit time at typical transit speed) then pre-set watch should be conducted for the duration of the transit. Upon arrival at a sampling station, trawl operations shall be conducted immediately except when it is necessary to conduct a bongo plankton tow or CTD deployment prior to deploying trawl gear. Protected species watches will be conducted using any binocular or monocular sighting instrument, with a means to estimate the distance to protected species during the daytime. During nighttime operations, visual observation shall be conducted using the naked eye and available vessel lighting.

b) Move-on rule

If marine mammals, sea turtles or other protected species are sighted within 1 nmi of the planned set location prior to setting the gear, the vessel will transit to a different section of the sampling area to maintain a minimum distance of 1 nmi between the set location and estimated location of sighted protected species. If, after moving on, protected species remain within the 1-nmi exclusion zone, the CL/CS or watch leader may decide to move again or to skip the station, but in any case, may not set while protected species are in the 1-nmi exclusion radius.

c) Monitoring during trawl deployment, fishing, and retrieval

In addition to the 30 min protected species watch, visual monitoring efforts for protected species are required throughout the entire period of time that trawl gear is in the water. These watches will occur from deployment through gear retrieval and will be conducted by the watch leader, CL/CS, or other designated person/s. If protected species are sighted before the gear is fully retrieved, the most appropriate response to avoid incidental take will be determined by the professional judgment of the CL/CS, watch leader and other experienced crew as necessary. This judgment will be based on his/her past experience operating gears around marine mammals and SWFSC training sessions that will facilitate dissemination of CL/CS expertise that is used when operating in these situations (e.g., factors that contribute to marine mammal gear interactions and those that aid in successfully avoiding these events). These professional judgment decisions will be recorded in the provided visual monitoring watch logs. If trawling efforts have been suspended due to the presence of marine mammals, trawl operations may only resume when sighted protected species are estimated to be at least 1 nmi away from the trawl set location. If mammals are observed in or near the net, the trawl survey lead or CL/CS may request immediate retrieval of the net which should be done as rapidly as safely possible so as to prevent lethal takes.

d) Data collection for visual watches

The visual monitoring watches (from 30 min prior to set through gear retrieval) and any data gathered during these watches will be recorded in the watch logs provided for each survey and in the SCS.

e) Marine mammal excluder device (MMED)

At all times, Nordic 264 trawl nets must be fitted with a marine mammal excluder device to allow marine mammals caught during trawling operations an opportunity to escape.

f) Acoustic deterrent devices

Pingers must be deployed during all trawl operations and on all types of trawl nets. Two to four pingers (3 kHz @ 135 dB, 10 kHz @ 132 dB, and 70 kHz @ 145 dB) will be placed along the footrope and/or headrope and will be tested at the conclusion of every trawl to check if they are operating properly – pinger function will be noted in the data collection watch logs.

g) Other standard trawl survey protocols

The gear will be emptied as quickly as possible upon retrieval in order to determine whether or not protected species are present.

Care will be taken when emptying the trawl to avoid damage to protected species that may be caught in the gear but are not visible during retrieval.

h) Reporting, Data Collection, and Handling Procedures for Protected Species

All protected species (marine mammals, sea turtles, seabirds, and fish) lethal and non-lethal interactions with fisheries research gear will be reported to Krista Catelani via the Incidental Take Authorization account: SWFSC.ITA@noaa.gov. These interactions will be immediately relayed to the SWFSC Director and recorded in the Protected Species Incidental Take Database within 48 hours of the event.

In addition, for take of marine mammals and sea turtles, the CL/CS or watch leader will call Krista Catelani immediately at 707-293-3563 (cell – anytime) or 858-546-7166 (work – daytime only) to provide a detailed report of the event. Catch of eulachon and salmon will only be reported to SWFSC.ITA@noaa.gov at the conclusion of every survey day; no call is necessary. Appropriate communications on all authorized takes will occur in a timely manner to allow Krista Catelani to report the event to the PSIT in the required 48 hours.

i) Lethal take of marine mammal or sea turtle

If a lethal take of a marine mammal or sea turtle occurs, priority should be placed on removing the animal from the gear as quickly and safely as possible so photographs and measurements can be taken according to the protocol (PSIT-002.02; **Appendix E**). After documentation and sampling, the animal(s) should be wrapped in bag(s) (trash bags or provided body bag) and placed in the scientific freezer. Concurrently, as stated above, Krista Catelani should be notified immediately.

j) Non-lethal take of any protected species

Priority for any non-lethal take is to release the animal as quickly as possible according to (3) Protected Species Handling instructions (below) to maximize the chances of post-release survival. First and foremost, please take into consideration safety of all crew and staff. Concurrently, as stated above, Krista Catelani should be notified immediately.

k) Protected Species Handling

In general, following a "common sense" approach to handling protected species will present the best chance of minimizing injury to the animal and of decreasing risks to scientists, officers and crew. There are inherent safety concerns associated with handling/disentangling protected species, so using good judgment and ensuring human safety is paramount. SWFSC researchers should refer to PSIT-004.02 (**Appendix E**), SWFSC Marine Mammal Handling Guidelines, and

the Pacific Islands Region's Identification, Handling and Release of Protected Species (PSIT-005.01, **Appendix E**), and SWFSC's marine mammal and sea turtle sampling protocol (PSIT-002.01, **Appendix E**) for more specific guidance on protected species handling and sampling (e.g., species identification, safe removal of fishing gear, etc.).

For all marine mammal and sea turtle incidental interactions, SWFSC researchers will record interaction information using the Protected Species Incidental Take Form and the Marine Mammal and Sea Turtle Biological Sampling form. For any incidental takes of protected fish species (salmon and eulachon), SWFSC researchers will fill out the Protected Fish Specimen Data form.

1) Protected Species Sampling and Data Collection

SWFSC scientists are authorized under MMPA regulation 50 CFR 216.22 and encouraged to collect samples from authorized protected species (see **Appendix E**) incidentally captured or killed during fisheries research activities. For sampling, follow guidelines in PSIT-002.02, SWFSC's Detailed Sampling Protocol for Marine Mammal and Sea Turtle Incidental Takes (**Appendix E**) and fill out the Marine Mammal and Sea Turtle Biological Sampling form.

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 CO.

A dive is requested for clearing the CUFES intake of attached mussels prior to departure and the transducer faces (the ME70, in particular; the EK60/80 transducer faces may be cleaned with the centerboard in the "maintenance" position) of any marine biofouling prior to calibration.

E. Applicable Restrictions

In the event of poor weather conditions, we will work with the ship's officers on developing the best strategy for the safe completion of all sampling. We have replacement gear for most operations; equipment failure should not impact our project.

III. Equipment

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

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

Starboard hydro winch with 0.375" cable for standard Bongo and Pairovet tows

Starboard hydro winch with 0.375" cable for standard CTD casts

Starboard A-frame w/blocks to accommodate 0.375" cables

Port and starboard trawl winches with 1.0" diameter mechanical cable

Stern gantries with blocks to accommodate 1.0" cable

Access to the trawl ramp

Winch monitoring system

Knudsen 12 kHz depth recorder or comparable (EK60/80)

Acoustic Doppler Current Profiler

EK60 general-purpose transceivers (GPTs) with transducers (ES18-11, ES38B, ES70-7C, ES120-7C, ES200-7C, ES333-7C).

Calibration apparatus for EK60 echosounders, including motorized downriggers, control box, and standard spheres.

ME70 and MS70 multibeam echosounder systems.

SX90 omnidirectional echosounder system.

Trimble/Applanix POS-MV position and motion measurement system.

Differential-corrected GPS and/or GNSS positioning system.

Gyro.

NTP time server and client software that automatically synchronizes all echosounder and scientific computers at approximately 1-hour intervals.

Navigation planning software installed in scientific spaces (e.g., Chemistry Lab, Acoustics Lab) with planned transects and sampling stations (Rose Point, [OpenCPN](#), etc.).

Very Small Aperture Terminal (VSAT) high-bandwidth satellite communication system

Seabird SBE911+ CTD with calibrated temperature, conductivity, oxygen and fluorometer sensors.

Pump, collector and concentrator unit for CUFES water sampling.

(1) 75 lb. weight for bongo tows.

(1) 100 lb. weight for Pairovet tows.

Scientific Computing System (SCS).

Calibrated, motion-compensated balances for fish baskets, and calibration weights

-80 °C Freezer.

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

EK80 wide-band transceivers (WBTs) (18-, 38-, 70-, 120-, 200-, and 333-kHz)

30-cc and 50-cc syringes.

Canulas

(10) Pint, (8) quart, (2) gallon, (4) 4 oz, and (9) 8 oz. jar cases (70 lbs.)

(5) Cases of scintillation vials (50 lbs.) Inside and outside labels

CalCOFI net tow data sheets

- (2) 71-cm CalCOFI Bongo frames (40 lbs.)
- (6) 71-cm CalCOFI 505 μm mesh nets (10 lbs.)
- (4) CalCOFI 150 μm Pairovet nets and codends (5 lbs.)
- (2) CalCOFI Pairovet frames (10 lbs.)
- (12) 333 μm mesh codends (2 lbs.)
- (6) Digital flowmeters (10 lbs.)
- (1) 75-lb. Bongo weight
- (1) 100-lb. hydro weight
- (2) Standard CalCOFI tool boxes (50 lbs.)
- Bucket thermometers and holders (SIO)
- Handheld inclinometer for Pairovet and Bongo tows
- Weather observation sheets
- (2) Dissecting microscopes (50 lbs. w/case)
- (2) NETS Nordic 264 midwater trawl (6000 lbs.)
- (2) NETS 3.0 m X Lite trawl doors (2400 lbs.)
- (2) Trawl rigging (1000 lbs.)
- (4) Fish measuring boards (20 lbs.)
- (4) Motion compensated scales (100 lbs.)
- (2) Go-Pro trawl camera systems (60 lbs.)
- (1) Impedance-measuring transducer-multiplexer system (Z-MUX) (20 lbs.)
- (1) EK60/EK80 echosounder multiplexer (EK-MUX) (20 lbs.)
- (2) Computer to run the EK60/80 Adaptive Logging (EAL) software (10 lbs.)
- (1) Underway CTD – (UCTD, 2 probes, 1 winch (80 lbs.)
- (3) Underway stereo camera (UCAM, SWFSC) (60 lbs.)
- (14) Shipping containers (fish bins) (250 lbs.)

IV. Hazardous Materials

A. Policy and Compliance

The CL/CS 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 OMAO procedures, 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 storage 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 clean up 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 Individuals	Spill control
Ethyl alcohol (95%)	15 gallons(in 5-gallon cans)	UN1170, Waste contained and disposed of by SWFSC at end of project, Stored in hazardous material room and cabinet under fume	Dave Griffith, Sue Manion	F

Common Name of Material	Qty.	Notes	Trained Individuals	Spill control
		hood		
Ethyl alcohol (95%)	20 L (in 20 ml vials)	No waste. Stored in Chem Lab	Dave Griffith, Sue Manion	F
Buffered formalin (10%)	20 gallons in 4 oz. and 8 oz. jars.	Stored in wet lab, no waste	Dave Griffith, Sue Manion	F
Formaldehyde solution (37%)	5 gallons	No waste, Stored in wet lab fume hood	Dave Griffith, Sue Manion	F
Tris buffer	500ml	Stored in Chem Lab	Dave Griffith, Sue Manion	F
Sodium borate powder	500gr	Stored in Chem Lab	Dave Griffith, Sue Manion	D

C. Chemical safety and spill response procedures

F: Formalin/Formaldehyde/Ethanol/Acetone

- 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.

D: Powdered and granular chemicals

- Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
- Sweep up dry chemical and place in a doubled ziplock bag.
- If contact with water occurs, use proper neutralizing agent prior to cleanup.
- Store in sealed container to be returned and disposed of by SWFSC.

Inventory of Spill Kit Supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
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Chemical Spill pads	100	Formaldehyde, Alcohols	29 gallons
Formaldehyde Eater	5 gal	Formaldehyde	10 gallons

- D. Radioactive Materials
No Radioactive Isotopes are planned for this project.

V. Additional Projects

- A. Ancillary science projects
None planned.

- B. NOAA fleet ancillary projects
No NOAA Fleet Ancillary Project 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.

The CL/CS will receive all original data related to the project from the ST. The CL/CS will, in turn, furnish the CO with a complete inventory listing of all data gathered by the scientific party, detailing types of operations and quantities of data prior to departing the ship. All data gathered by the vessel's personnel that are desired by the CL/CS will be released to them, including supplementary data specimens and photos gathered by the scientific crew.

VII. Meetings, Vessel Familiarization, and Project Evaluations

- A. Pre-Project Meeting

The CL/CS and CO will convene 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 CL/CS in arranging this meeting.

- B. Vessel Familiarization Meeting

The CO 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 CO is responsible for convening a meeting no earlier than 24 hours before or 7 days after the completion of a project to discuss the overall successes 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 CL/CS, and members of the scientific party and is normally arranged by the Operations Officer and CL/CS.

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 <https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey> and provides a "Submit" button at the end of the form. It is also located at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform. 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 survey.

All scientific berths should be cleaned prior to occupation at the start of the survey.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the CL/CS. The CL/CS and CO 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 CL/CS 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 CL/CS 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 CL/CS will ensure that all non-NOAA or non-Federal scientists aboard also have proper orders. It is the responsibility of the CL/CS 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 CO. 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 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, Revised: 02 JAN 2012) must be completed in advance by each participating scientist. The NHSQ can be obtained from the CL/CS 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 form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign, and date the form, and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

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 CL/CS 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 CL/CS to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the CL/CS may be relayed to the program office. Sometimes it is necessary for the CL/CS to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the CL/CS. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via e-mail and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128 kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30-d increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required it must be arranged at least 30 d in advance.

E. IT Security

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

- Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.
- Installation of the latest critical operating system security patches.
- 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 NMFS Deemed Exports point of contact to assist with the process.

Full compliance with NAO 207-12 is required.

Responsibilities of the CS:

- a) Provide the CO with the e-mail generated by the FNRS granting approval for the foreign national guest's visit. This e-mail will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
- b) Escorts – The CS is responsible for providing escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
- c) 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 Regional Security Officer.
- d) Export Control - Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

The CO and the CS 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 CO:

- e) Ensure only those foreign nationals with DOC/OSY clearance are granted access.
- f) 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 NMAO approval and compliance with export and sanction regulations.
- g) Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.
- h) Ensure receipt from the CS or the DSN of the FNRS e-mail granting approval for the foreign national guest's visit.
- i) 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.
- j) Export Control - 8 weeks in advance of the project, provide the CS 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 CS of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the CS can take steps to prevent the unlicensed export of Program controlled technology. The CO and the CS will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.
- k) 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 Regional Security Officer.

Responsibilities of the Foreign National Sponsor:

- l) 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.
- m) The DSN of the foreign national shall assign an onboard Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen, NOAA (or DOC) employee. According to DOC/OSY, this requirement cannot be altered.
- n) Ensure completion and submission of NAO 207-12 Appendix C (Certification of Conditions and Responsibilities for a Foreign National

IX. Appendices

A. Survey Design and Adaptive Sampling Protocol

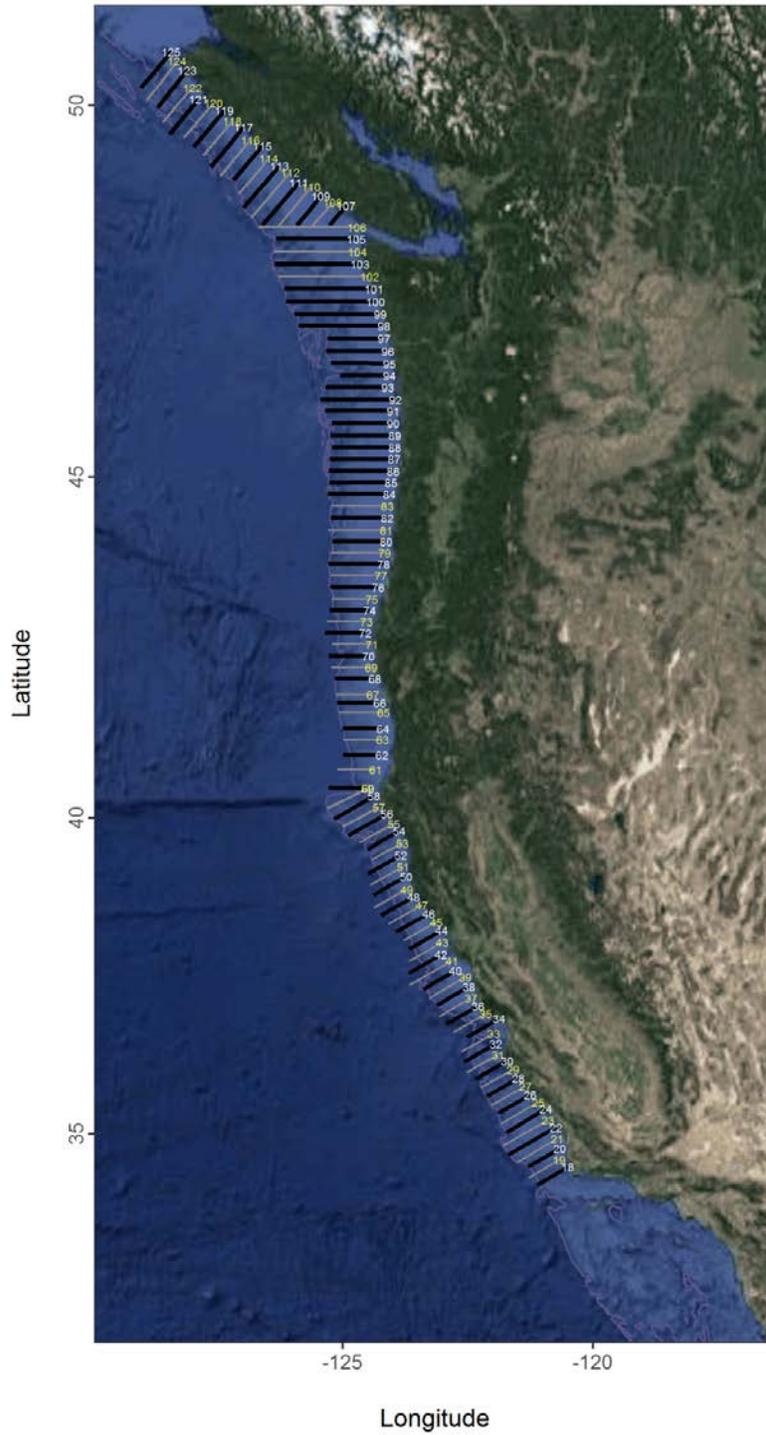
The proposed survey design attempts to make optimal use of the available survey time by allocating *a priori* higher effort in regions of highest interest: Washington and Oregon, San Francisco and Monterey regions (Figure 1). In these regions transects are placed every 10 nmi for maximum resolution and precision. Outside these regions, transects are placed every 20 nmi to achieve a balance between precision and time savings. Together, they form the “compulsory survey pattern”.

Within the areas of the compulsory pattern on which transects are spaced by 20 nmi, additional transects might be added upon the observation of CPS. These transects are called adaptive transects because they will result in adapting the survey design *on-the-fly*. Adaptive transects might be added according to the following protocol:

1. If CPS are observed during a compulsory transect, an adaptive transect will be added 10 nmi to the north. The ship will then transit to the transect 20 nmi south to resume sampling on the next adaptive transect, followed by a compulsory transect and one last adaptive transect. This scheme guarantees that when adaptive sampling is initiated, there is a minimum of 3 adaptive transect added to the compulsory pattern to comprise a stratum.
2. If CPS eggs or adults are encountered on the last compulsory transect of the adaptive event, continue adding adaptive transects to the compulsory pattern. Revert to the compulsory sampling pattern once CPS are absent from a compulsory transect.
3. Resume adaptive sampling once CPS eggs or adults are found.

B. Survey Map

Planned compulsory (thick green lines, black labels) and adaptive (thin gray lines, red labels) acoustic transects for RL-17-04. Compulsory transects are generally spaced 20-nmi apart, with adaptive transects between, every 10 nmi, except off Washington and Oregon where compulsory lines have 10-nmi spacing (Figure). Waypoints for acoustic lines provided in Appendix C.



C. Sampling waypoints

Acoustic Transects

a) Compulsory and adaptive acoustic transects

Waypoints for compulsory acoustic transects mapped in **Appendix B**. Transects are numbered from south to north, but will be sampled from north to south.

Transects begin at a water depth of ca. 30 m and extend to the 1000-fathom isobath.

Adaptive transect coordinates are provided separately below.

Transect	Waypoint	Longitude (° E)	Latitude (° N)	Set
18	18.1	-120.505	34.45887	Compulsory
18	18.2	-121.122	34.16321	Compulsory
20	20.1	-120.668	34.76101	Compulsory
20	20.2	-121.298	34.4599	Compulsory
22	22.1	-120.741	35.10849	Compulsory
22	22.2	-121.697	34.65899	Compulsory
24	24.1	-120.947	35.40743	Compulsory
24	24.2	-121.742	35.0174	Compulsory
26	26.1	-121.259	35.64132	Compulsory
26	26.2	-121.886	35.34505	Compulsory
28	28.1	-121.494	35.90936	Compulsory
28	28.2	-122.124	35.60971	Compulsory
30	30.1	-121.722	36.18394	Compulsory
30	30.2	-122.353	35.88755	Compulsory
32	32.1	-121.944	36.46011	Compulsory
32	32.2	-122.584	36.16123	Compulsory
34	34.1	-121.884	36.86608	Compulsory
34	34.2	-122.528	36.5618	Compulsory
36	36.1	-122.295	37.05836	Compulsory
36	36.2	-122.943	36.76794	Compulsory
38	38.1	-122.481	37.37333	Compulsory
38	38.2	-123.123	37.07317	Compulsory
40	40.1	-122.753	37.62312	Compulsory
40	40.2	-123.392	37.33009	Compulsory
42	42.1	-123.035	37.8773	Compulsory
42	42.2	-123.686	37.57883	Compulsory
44	44.1	-123.032	38.25656	Compulsory
44	44.2	-123.683	37.96135	Compulsory
46	46.1	-123.288	38.5205	Compulsory
46	46.2	-123.939	38.23128	Compulsory
48	48.1	-123.591	38.78142	Compulsory
48	48.2	-124.238	38.48664	Compulsory
50	50.1	-123.737	39.09774	Compulsory

50	50.2	-124.391	38.80592	Compulsory
52	52.1	-123.838	39.43039	Compulsory
52	52.2	-124.493	39.13535	Compulsory
54	54.1	-123.877	39.7969	Compulsory
54	54.2	-124.509	39.51392	Compulsory
56	56.1	-124.126	40.06471	Compulsory
56	56.2	-124.898	39.72283	Compulsory
58	58.1	-124.377	40.33087	Compulsory
58	58.2	-125.17	39.98078	Compulsory
60	60.1	-124.5	40.45067	Compulsory
60	60.2	-125.28	40.44806	Compulsory
62	62.1	-124.213	40.95283	Compulsory
62	62.2	-124.995	40.95276	Compulsory
64	64.1	-124.196	41.34607	Compulsory
64	64.2	-125.004	41.34686	Compulsory
66	66.1	-124.257	41.72892	Compulsory
66	66.2	-125.123	41.72987	Compulsory
68	68.1	-124.36	42.09417	Compulsory
68	68.2	-125.146	42.09417	Compulsory
70	70.1	-124.49	42.4275	Compulsory
70	70.2	-125.28	42.4275	Compulsory
72	72.1	-124.555	42.76083	Compulsory
72	72.2	-125.35	42.76083	Compulsory
74	74.1	-124.46	43.09417	Compulsory
74	74.2	-125.259	43.09417	Compulsory
76	76.1	-124.295	43.42575	Compulsory
76	76.2	-125.243	43.42575	Compulsory
78	78.1	-124.189	43.76187	Compulsory
78	78.2	-125.286	43.76187	Compulsory
80	80.1	-124.137	44.09009	Compulsory
80	80.2	-125.204	44.0902	Compulsory
82	82.1	-124.115	44.4275	Compulsory
82	82.2	-125.24	44.4275	Compulsory
84	84.1	-124.071	44.76012	Compulsory
84	84.2	-125.299	44.76012	Compulsory
85	85.1	-124.038	44.9276	Compulsory
85	85.2	-125.266	44.92281	Compulsory
86	86.1	-123.997	45.09029	Compulsory
86	86.2	-125.282	45.09029	Compulsory
87	87.1	-123.973	45.25778	Compulsory
87	87.2	-125.258	45.25299	Compulsory
88	88.1	-123.959	45.42047	Compulsory
88	88.2	-125.215	45.41569	Compulsory

89	89.1	-123.963	45.58795	Compulsory
89	89.2	-125.249	45.58795	Compulsory
90	90.1	-123.989	45.75821	Compulsory
90	90.2	-125.215	45.75821	Compulsory
91	91.1	-123.989	45.92567	Compulsory
91	91.2	-125.353	45.92567	Compulsory
92	92.1	-123.946	46.08743	Compulsory
92	92.2	-125.446	46.08743	Compulsory
93	93.1	-124.097	46.25459	Compulsory
93	93.2	-125.349	46.25459	Compulsory
94	94.1	-124.072	46.42175	Compulsory
94	94.2	-125.058	46.42175	Compulsory
95	95.1	-124.072	46.58352	Compulsory
95	95.2	-125.241	46.58891	Compulsory
96	96.1	-124.097	46.75067	Compulsory
96	96.2	-125.338	46.75067	Compulsory
97	97.1	-124.18	46.92322	Compulsory
97	97.2	-125.302	46.91783	Compulsory
98	98.1	-124.18	47.09577	Compulsory
98	98.2	-125.885	47.09577	Compulsory
99	99.1	-124.245	47.25754	Compulsory
99	99.2	-125.968	47.25754	Compulsory
100	100.1	-124.342	47.4247	Compulsory
100	100.2	-126.141	47.4247	Compulsory
101	101.1	-124.374	47.59186	Compulsory
101	101.2	-126.173	47.59186	Compulsory
103	103.1	-124.658	47.92617	Compulsory
103	103.2	-126.36	47.92617	Compulsory
105	105.1	-124.729	48.26083	Compulsory
105	105.2	-126.333	48.26083	Compulsory
107	107.1	-124.932	48.70082	Compulsory
107	107.2	-125.268	48.44115	Compulsory
109	109.1	-125.44	48.83245	Compulsory
109	109.2	-125.921	48.43803	Compulsory
111	111.1	-125.88	49.00602	Compulsory
111	111.2	-126.61	48.44523	Compulsory
113	113.1	-126.269	49.22503	Compulsory
113	113.2	-126.982	48.67269	Compulsory
115	115.1	-126.611	49.48505	Compulsory
115	115.2	-127.188	49.03788	Compulsory
117	117.1	-126.979	49.72333	Compulsory
117	117.2	-127.636	49.21107	Compulsory
119	119.1	-127.37	49.9422	Compulsory

119	119.2	-127.977	49.46707	Compulsory
121	121.1	-127.881	50.08287	Compulsory
121	121.2	-128.462	49.62597	Compulsory
123	123.1	-128.114	50.46228	Compulsory
123	123.2	-128.702	49.97561	Compulsory
125	125.1	-128.432	50.69081	Compulsory
125	125.2	-129.036	50.23869	Compulsory

b) Adaptive acoustic transects

Waypoints for compulsory acoustic transects mapped in Appendix B. Transect are numbered from south to north, but will be sampled from north to south. Transects begin at a water depth of ca. 30 m and extend ca. 2000 m depth.

Transect	Waypoint	Longitude (° E)	Latitude (° N)	Set
17	17.1	-120.152	34.45768	Adaptive
17	17.2	-121.132	33.98188	Adaptive
19	19.1	-120.682	34.57587	Adaptive
19	19.2	-121.296	34.27273	Adaptive
21	21.1	-120.719	34.92275	Adaptive
21	21.2	-121.519	34.54102	Adaptive
23	23.1	-120.906	35.22881	Adaptive
23	23.2	-121.806	34.80844	Adaptive
25	25.1	-121.098	35.51562	Adaptive
25	25.2	-121.843	35.16975	Adaptive
27	27.1	-121.354	35.77838	Adaptive
27	27.2	-122.037	35.46556	Adaptive
29	29.1	-121.603	36.04316	Adaptive
29	29.2	-122.241	35.74813	Adaptive
31	31.1	-121.903	36.28373	Adaptive
31	31.2	-122.535	35.99343	Adaptive
33	33.1	-121.988	36.62231	Adaptive
33	33.2	-122.628	36.32833	Adaptive
35	35.1	-122.147	36.9456	Adaptive
35	35.2	-122.779	36.64748	Adaptive
37	37.1	-122.440	37.19196	Adaptive
37	37.2	-123.077	36.89462	Adaptive
39	39.1	-122.552	37.52335	Adaptive
39	39.2	-123.261	37.19399	Adaptive
41	41.1	-122.826	37.77606	Adaptive
41	41.2	-123.671	37.39108	Adaptive
43	43.1	-123.019	38.07117	Adaptive
43	43.2	-123.668	37.77713	Adaptive
45	45.1	-123.133	38.3869	Adaptive
45	45.2	-123.794	38.09689	Adaptive
47	47.1	-123.424	38.64996	Adaptive
47	47.2	-124.087	38.36099	Adaptive
49	49.1	-123.728	38.89449	Adaptive
49	49.2	-124.384	38.6117	Adaptive
51	51.1	-123.803	39.24226	Adaptive
51	51.2	-124.452	38.95962	Adaptive
53	53.1	-123.814	39.61146	Adaptive

53	53.2	-124.421	39.35319	Adaptive
55	55.1	-123.986	39.90633	Adaptive
55	55.2	-124.67	39.61836	Adaptive
57	57.1	-124.279	40.16084	Adaptive
57	57.2	-124.996	39.86267	Adaptive
59	59.1	-124.504	40.44643	Adaptive
59	59.2	-125.311	40.14091	Adaptive
61	61.1	-124.341	40.73159	Adaptive
61	61.2	-125.112	40.73497	Adaptive
63	63.1	-124.208	41.18193	Adaptive
63	63.2	-124.985	41.17659	Adaptive
65	65.1	-124.188	41.58537	Adaptive
65	65.2	-125.081	41.58769	Adaptive
67	67.1	-124.396	41.85498	Adaptive
67	67.2	-125.134	41.85498	Adaptive
69	69.1	-124.437	42.26083	Adaptive
69	69.2	-125.225	42.26083	Adaptive
71	71.1	-124.426	42.59417	Adaptive
71	71.2	-125.218	42.59417	Adaptive
73	73.1	-124.529	42.9275	Adaptive
73	73.2	-125.325	42.9275	Adaptive
75	75.1	-124.418	43.26083	Adaptive
75	75.2	-125.219	43.26083	Adaptive
77	77.1	-124.236	43.59848	Adaptive
77	77.2	-125.24	43.59848	Adaptive
79	79.1	-124.16	43.9275	Adaptive
79	79.2	-125.223	43.9275	Adaptive
81	81.1	-124.135	44.24741	Adaptive
81	81.2	-125.29	44.24741	Adaptive
83	83.1	-124.113	44.59417	Adaptive
83	83.2	-125.212	44.59417	Adaptive
102	102.1	-124.46	47.75902	Adaptive
102	102.2	-126.288	47.76441	Adaptive
104	104.1	-124.712	48.09333	Adaptive
104	104.2	-126.371	48.09333	Adaptive
106	106.1	-124.72	48.42226	Adaptive
106	106.2	-126.688	48.42226	Adaptive
108	108.1	-125.207	48.74323	Adaptive
108	108.2	-125.608	48.43323	Adaptive
110	110.1	-125.635	48.95163	Adaptive
110	110.2	-126.274	48.44493	Adaptive
112	112.1	-126.048	49.13991	Adaptive
112	112.2	-126.819	48.54472	Adaptive
114	114.1	-126.48	49.32184	Adaptive
114	114.2	-127.066	48.86413	Adaptive

116	116.1	-126.844	49.5614	Adaptive
116	116.2	-127.445	49.0951	Adaptive
118	118.1	-127.211	49.8046	Adaptive
118	118.2	-127.783	49.35592	Adaptive
120	120.1	-127.585	50.03523	Adaptive
120	120.2	-128.177	49.58509	Adaptive
122	122.1	-128.007	50.23974	Adaptive
122	122.2	-128.595	49.78913	Adaptive
124	124.1	-128.31	50.57786	Adaptive
124	124.2	-128.921	50.06382	Adaptive

UCTD Stations

Preliminary waypoints for planned underway CTD (UCTD) stations. Station locations are approximately spaced 15-nmi apart and staggered on adjacent lines to improve sampling coverage. If the waypoints provided do not occur precisely on the acoustic transect, the OOD shall choose the point on the transect closest to the UCTD waypoint.

Point of Contact: Juan Zwolinski

Longitude	Latitude	label
-128.502	50.68266	UCTD 477
-128.742	50.48375	UCTD 476
-128.988	50.27951	UCTD 475
-128.873	50.10416	UCTD 474
-128.617	50.3196	UCTD 473
-128.359	50.53697	UCTD 472
-128.165	50.42114	UCTD 471
-128.414	50.21871	UCTD 470
-128.654	50.01594	UCTD 469
-128.544	49.82919	UCTD 468
-128.308	50.01508	UCTD 467
-128.069	50.19216	UCTD 466
-127.929	50.04523	UCTD 465
-128.171	49.85694	UCTD 464
-128.413	49.66479	UCTD 463
-128.125	49.62467	UCTD 462
-127.885	49.81208	UCTD 461
-127.64	49.99505	UCTD 460
-127.424	49.89953	UCTD 459
-127.667	49.71026	UCTD 458
-127.927	49.50767	UCTD 457
-127.731	49.39648	UCTD 456
-127.504	49.57941	UCTD 455
-127.269	49.75969	UCTD 454
-127.032	49.68042	UCTD 453
-127.314	49.4647	UCTD 452
-127.583	49.25145	UCTD 451
-127.395	49.13393	UCTD 450
-127.144	49.33178	UCTD 449
-126.893	49.52144	UCTD 448
-126.764	49.36596	UCTD 447
-126.952	49.22029	UCTD 446
-127.138	49.07628	UCTD 445
-127.016	48.90236	UCTD 444
-126.774	49.08893	UCTD 443
-126.532	49.28149	UCTD 442
-126.322	49.18438	UCTD 441
-126.469	49.07156	UCTD 440
-126.624	48.95336	UCTD 439
-126.774	48.83673	UCTD 438
-126.931	48.71261	UCTD 437
-126.768	48.58431	UCTD 436
-126.603	48.71327	UCTD 435
-126.44	48.84003	UCTD 434
-126.265	48.97592	UCTD 433
-126.101	49.09917	UCTD 432
-125.933	48.96605	UCTD 431
-126.238	48.7297	UCTD 430

-126.557	48.48544	UCTD 429
-126.225	48.48604	UCTD 428
-125.965	48.69544	UCTD 427
-125.687	48.91163	UCTD 426
-125.49	48.7924	UCTD 425
-125.68	48.64328	UCTD 424
-125.864	48.48849	UCTD 423
-125.542	48.48696	UCTD 422
-125.386	48.60454	UCTD 421
-125.243	48.71657	UCTD 420
-125.025	48.6291	UCTD 419
-125.21	48.48664	UCTD 418
-126.612	48.42198	UCTD 417
-126.207	48.41988	UCTD 416
-125.783	48.42136	UCTD 415
-125.377	48.42285	UCTD 414
-124.979	48.42177	UCTD 413
-124.904	48.25993	UCTD 412
-125.254	48.26069	UCTD 411
-125.596	48.2592	UCTD 410
-125.944	48.2592	UCTD 409
-126.257	48.26157	UCTD 408
-126.292	48.09301	UCTD 407
-125.942	48.09353	UCTD 406
-125.594	48.09353	UCTD 405
-125.248	48.09353	UCTD 404
-124.896	48.09315	UCTD 403
-124.843	47.92594	UCTD 402
-125.205	47.92667	UCTD 401
-125.576	47.92518	UCTD 400
-125.939	47.92627	UCTD 399
-126.286	47.92602	UCTD 398
-126.211	47.76424	UCTD 397
-125.85	47.76317	UCTD 396
-125.474	47.7603	UCTD 395
-125.101	47.7603	UCTD 394
-124.73	47.75937	UCTD 393
-124.635	47.59165	UCTD 392
-124.999	47.59239	UCTD 391
-125.373	47.59239	UCTD 390
-125.737	47.59143	UCTD 389
-126.097	47.59185	UCTD 388
-126.066	47.42462	UCTD 387
-125.708	47.4242	UCTD 386
-125.335	47.42324	UCTD 385
-124.959	47.42516	UCTD 384
-124.584	47.42455	UCTD 383
-124.47	47.25785	UCTD 382
-124.829	47.25652	UCTD 381
-125.18	47.25748	UCTD 380
-125.537	47.25748	UCTD 379
-125.892	47.25777	UCTD 378
-125.811	47.09617	UCTD 377
-125.465	47.09477	UCTD 376
-125.116	47.09573	UCTD 375
-124.763	47.09477	UCTD 374
-124.41	47.09541	UCTD 373
-124.354	46.92254	UCTD 372
-124.796	46.91966	UCTD 371

-125.226	46.91821	UCTD 370
-125.265	46.75017	UCTD 369
-125.023	46.7507	UCTD 368
-124.769	46.7507	UCTD 367
-124.525	46.7507	UCTD 366
-124.267	46.75026	UCTD 365
-124.262	46.58334	UCTD 364
-124.716	46.58657	UCTD 363
-125.164	46.58917	UCTD 362
-125.077	46.42118	UCTD 361
-124.684	46.42092	UCTD 360
-124.274	46.4215	UCTD 359
-124.259	46.25455	UCTD 358
-124.765	46.25733	UCTD 357
-125.275	46.25531	UCTD 356
-125.373	46.08733	UCTD 355
-125.05	46.08652	UCTD 354
-124.737	46.08652	UCTD 353
-124.427	46.08652	UCTD 352
-124.113	46.08659	UCTD 351
-124.093	45.92612	UCTD 350
-124.379	45.92768	UCTD 349
-124.683	45.92618	UCTD 348
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-125.278	45.9258	UCTD 346
-125.142	45.75834	UCTD 345
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-124.077	45.75761	UCTD 341
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-124.62	45.58675	UCTD 338
-124.908	45.58972	UCTD 337
-125.173	45.58799	UCTD 336
-125.144	45.41554	UCTD 335
-124.881	45.41695	UCTD 334
-124.616	45.41844	UCTD 333
-124.347	45.41993	UCTD 332
-124.08	45.42028	UCTD 331
-124.093	45.25741	UCTD 330
-124.377	45.25561	UCTD 329
-124.641	45.25561	UCTD 328
-124.917	45.25411	UCTD 327
-125.184	45.25331	UCTD 326
-125.207	45.09017	UCTD 325
-124.942	45.08942	UCTD 324
-124.673	45.0893	UCTD 323
-124.396	45.09081	UCTD 322
-124.114	45.09022	UCTD 321
-124.147	44.92772	UCTD 320
-124.419	44.92607	UCTD 319
-124.676	44.92459	UCTD 318
-124.93	44.92459	UCTD 317
-125.195	44.92377	UCTD 316
-125.227	44.7598	UCTD 315
-124.99	44.76076	UCTD 314
-124.712	44.76076	UCTD 313
-124.456	44.76076	UCTD 312

-124.182	44.76002	UCTD 311
-124.191	44.5945	UCTD 310
-124.433	44.59498	UCTD 309
-124.672	44.59498	UCTD 308
-124.917	44.59647	UCTD 307
-125.14	44.59498	UCTD 306
-125.167	44.42745	UCTD 305
-124.945	44.42816	UCTD 304
-124.699	44.42816	UCTD 303
-124.455	44.42816	UCTD 302
-124.204	44.42746	UCTD 301
-124.221	44.24754	UCTD 300
-124.469	44.2475	UCTD 299
-124.719	44.2475	UCTD 298
-124.978	44.2475	UCTD 297
-125.217	44.24688	UCTD 296
-125.133	44.08972	UCTD 295
-124.92	44.08946	UCTD 294
-124.697	44.08946	UCTD 293
-124.471	44.08946	UCTD 292
-124.239	44.08967	UCTD 291
-124.259	43.92747	UCTD 290
-124.496	43.92651	UCTD 289
-124.713	43.92651	UCTD 288
-124.937	43.92502	UCTD 287
-125.15	43.92737	UCTD 286
-125.217	43.76229	UCTD 285
-124.979	43.76237	UCTD 284
-124.759	43.76237	UCTD 283
-124.529	43.76237	UCTD 282
-124.293	43.76181	UCTD 281
-124.319	43.59879	UCTD 280
-124.535	43.59825	UCTD 279
-124.747	43.59975	UCTD 278
-124.969	43.59975	UCTD 277
-125.169	43.59891	UCTD 276
-125.173	43.42583	UCTD 275
-124.803	43.42529	UCTD 274
-124.411	43.42582	UCTD 273
-124.502	43.2603	UCTD 272
-124.839	43.26089	UCTD 271
-125.149	43.26076	UCTD 270
-125.19	43.09418	UCTD 269
-124.872	43.09453	UCTD 268
-124.536	43.09428	UCTD 267
-124.605	42.92679	UCTD 266
-124.938	42.92663	UCTD 265
-125.257	42.92739	UCTD 264
-125.28	42.76013	UCTD 263
-124.962	42.75958	UCTD 262
-124.638	42.7604	UCTD 261
-124.511	42.59401	UCTD 260
-124.836	42.59357	UCTD 259
-125.149	42.59427	UCTD 258
-125.211	42.42702	UCTD 257
-124.897	42.4267	UCTD 256
-124.564	42.42721	UCTD 255
-124.513	42.26076	UCTD 254
-124.837	42.26089	UCTD 253

-125.156	42.26177	UCTD 252
-125.078	42.09412	UCTD 251
-124.766	42.0947	UCTD 250
-124.437	42.09413	UCTD 249
-124.422	41.91383	UCTD 248
-124.756	41.91485	UCTD 247
-125.078	41.91231	UCTD 246
-125.056	41.72967	UCTD 245
-124.69	41.72902	UCTD 244
-124.326	41.72871	UCTD 243
-124.256	41.58565	UCTD 242
-124.646	41.5868	UCTD 241
-125.012	41.58793	UCTD 240
-124.961	41.41207	UCTD 239
-124.605	41.41207	UCTD 238
-124.245	41.41147	UCTD 237
-124.251	41.23843	UCTD 236
-124.6	41.23737	UCTD 235
-124.938	41.23622	UCTD 234
-124.961	41.06627	UCTD 233
-124.634	41.06633	UCTD 232
-124.297	41.06635	UCTD 231
-124.314	40.89792	UCTD 230
-124.646	40.89838	UCTD 229
-124.973	40.89861	UCTD 228
-125.047	40.75915	UCTD 227
-124.747	40.75899	UCTD 226
-124.419	40.75942	UCTD 225
-124.509	40.59556	UCTD 224
-124.816	40.59669	UCTD 223
-125.107	40.59721	UCTD 222
-125.211	40.42955	UCTD 221
-124.897	40.43536	UCTD 220
-124.576	40.44017	UCTD 219
-124.556	40.41325	UCTD 218
-124.883	40.28228	UCTD 217
-125.23	40.14383	UCTD 216
-125.113	40.00539	UCTD 215
-124.786	40.14309	UCTD 214
-124.451	40.28141	UCTD 213
-124.336	40.13667	UCTD 212
-124.64	40.0103	UCTD 211
-124.939	39.88658	UCTD 210
-124.84	39.74823	UCTD 209
-124.511	39.8948	UCTD 208
-124.184	40.03929	UCTD 207
-124.043	39.8818	UCTD 206
-124.33	39.761	UCTD 205
-124.613	39.64223	UCTD 204
-124.453	39.53917	UCTD 203
-124.197	39.65322	UCTD 202
-123.933	39.77108	UCTD 201
-123.872	39.58528	UCTD 200
-124.118	39.48213	UCTD 199
-124.364	39.37795	UCTD 198
-124.435	39.16129	UCTD 197
-124.157	39.28738	UCTD 196
-123.895	39.40496	UCTD 195
-123.859	39.21705	UCTD 194

-124.126	39.10119	UCTD 193
-124.394	38.98476	UCTD 192
-124.335	38.83063	UCTD 191
-124.065	38.95109	UCTD 190
-123.794	39.07194	UCTD 189
-123.784	38.86969	UCTD 188
-124.062	38.75064	UCTD 187
-124.329	38.63582	UCTD 186
-124.182	38.51236	UCTD 185
-123.921	38.63117	UCTD 184
-123.646	38.75574	UCTD 183
-123.482	38.62441	UCTD 182
-123.758	38.50424	UCTD 181
-124.031	38.38636	UCTD 180
-123.882	38.25648	UCTD 179
-123.616	38.37529	UCTD 178
-123.344	38.49555	UCTD 177
-123.189	38.36233	UCTD 176
-123.466	38.2406	UCTD 175
-123.739	38.12155	UCTD 174
-123.627	37.98635	UCTD 173
-123.363	38.10692	UCTD 172
-123.087	38.23161	UCTD 171
-123.075	38.04604	UCTD 170
-123.345	37.92334	UCTD 169
-123.612	37.80172	UCTD 168
-123.63	37.60477	UCTD 167
-123.267	37.77344	UCTD 166
-122.899	37.94286	UCTD 165
-122.803	37.78921	UCTD 164
-123.132	37.63761	UCTD 163
-123.618	37.41577	UCTD 162
-123.339	37.35421	UCTD 161
-123.044	37.48946	UCTD 160
-122.738	37.6288	UCTD 159
-122.606	37.49814	UCTD 158
-122.912	37.35664	UCTD 157
-123.208	37.21912	UCTD 156
-123.069	37.09833	UCTD 155
-122.806	37.2219	UCTD 154
-122.535	37.34735	UCTD 153
-122.494	37.1665	UCTD 152
-122.761	37.0422	UCTD 151
-123.022	36.92083	UCTD 150
-122.889	36.79182	UCTD 149
-122.622	36.91232	UCTD 148
-122.35	37.03412	UCTD 147
-122.202	36.91938	UCTD 146
-122.463	36.7967	UCTD 145
-122.725	36.67405	UCTD 144
-122.473	36.58767	UCTD 143
-122.208	36.71268	UCTD 142
-121.939	36.8393	UCTD 141
-122.043	36.59686	UCTD 140
-122.314	36.47292	UCTD 139
-122.574	36.35329	UCTD 138
-122.53	36.18622	UCTD 137
-122.266	36.30909	UCTD 136
-121.998	36.43433	UCTD 135

-121.956	36.25861	UCTD 134
-122.218	36.13818	UCTD 133
-122.478	36.01955	UCTD 132
-122.298	35.91365	UCTD 131
-122.045	36.03201	UCTD 130
-121.776	36.15771	UCTD 129
-121.659	36.0169	UCTD 128
-121.925	35.89449	UCTD 127
-122.187	35.77331	UCTD 126
-122.069	35.6358	UCTD 125
-121.814	35.75697	UCTD 124
-121.549	35.8833	UCTD 123
-121.411	35.75204	UCTD 122
-121.699	35.62026	UCTD 121
-121.981	35.49118	UCTD 120
-121.832	35.37087	UCTD 119
-121.575	35.49214	UCTD 118
-121.311	35.61528	UCTD 117
-121.15	35.4913	UCTD 116
-121.475	35.34038	UCTD 115
-121.789	35.19522	UCTD 114
-121.689	35.04339	UCTD 113
-121.346	35.21239	UCTD 112
-121.001	35.38137	UCTD 111
-120.959	35.20368	UCTD 110
-121.156	35.11204	UCTD 109
-121.357	35.01848	UCTD 108
-121.557	34.92577	UCTD 107
-121.751	34.83529	UCTD 106
-121.642	34.68477	UCTD 105
-121.43	34.78539	UCTD 104
-121.211	34.88758	UCTD 103
-120.991	34.99059	UCTD 102
-120.781	35.08948	UCTD 101
-120.774	34.89636	UCTD 100
-120.95	34.81214	UCTD 99
-121.121	34.72995	UCTD 98
-121.299	34.64671	UCTD 97
-121.467	34.56617	UCTD 96
-121.242	34.48671	UCTD 95
-120.986	34.60946	UCTD 94
-120.722	34.73562	UCTD 93
-120.735	34.54977	UCTD 92
-120.993	34.42122	UCTD 91
-121.244	34.29823	UCTD 90
-121.07	34.18766	UCTD 89
-120.814	34.31142	UCTD 88
-120.558	34.43371	UCTD 87
-120.208	34.4304	UCTD 86
-120.424	34.32571	UCTD 85
-120.637	34.22162	UCTD 84
-120.861	34.11356	UCTD 83
-121.075	34.01008	UCTD 82
-120.759	33.97902	UCTD 81
-120.541	34.07736	UCTD 80
-120.322	34.17481	UCTD 79
-120.1	34.27404	UCTD 78
-119.885	34.36965	UCTD 77
-119.614	34.32532	UCTD 76

-119.916	34.17803	UCTD 75
-120.218	34.03027	UCTD 74
-120.524	33.87867	UCTD 73
-120.82	33.73439	UCTD 72
-120.72	33.58504	UCTD 71
-120.404	33.74115	UCTD 70
-120.096	33.89181	UCTD 69
-119.927	33.9742	UCTD 68
-119.691	34.08988	UCTD 67
-119.471	34.19726	UCTD 66
-119.332	34.0802	UCTD 65
-119.65	33.92251	UCTD 64
-119.974	33.76424	UCTD 63
-120.293	33.60717	UCTD 62
-120.601	33.45576	UCTD 61
-120.334	33.39368	UCTD 60
-120.022	33.54876	UCTD 59
-119.699	33.70892	UCTD 58
-119.391	33.86133	UCTD 57
-119.062	34.02187	UCTD 56
-118.739	33.98331	UCTD 55
-119.066	33.82183	UCTD 54
-119.374	33.66931	UCTD 53
-119.682	33.51653	UCTD 52
-120.008	33.35665	UCTD 51
-119.792	33.25152	UCTD 50
-119.474	33.40941	UCTD 49
-119.159	33.5643	UCTD 48
-118.844	33.717	UCTD 47
-118.526	33.8724	UCTD 46
-118.464	33.71918	UCTD 45
-118.794	33.55535	UCTD 44
-119.109	33.39758	UCTD 43
-119.329	33.28764	UCTD 42
-119.744	33.07886	UCTD 41
-119.547	32.98903	UCTD 40
-119.229	33.1489	UCTD 39
-118.908	33.3065	UCTD 38
-118.66	33.42856	UCTD 37
-118.281	33.61583	UCTD 36
-118.009	33.56552	UCTD 35
-118.311	33.41558	UCTD 34
-118.662	33.24149	UCTD 33
-118.98	33.0826	UCTD 32
-119.295	32.92702	UCTD 31
-119.089	32.84011	UCTD 30
-118.769	32.99593	UCTD 29
-118.458	33.15005	UCTD 28
-118.14	33.30389	UCTD 27
-117.804	33.46581	UCTD 26
-117.677	33.34354	UCTD 25
-118.005	33.18288	UCTD 24
-118.32	33.02649	UCTD 23
-118.638	32.86981	UCTD 22
-118.95	32.7172	UCTD 21
-118.805	32.60009	UCTD 20
-118.49	32.75693	UCTD 19
-118.175	32.91238	UCTD 18
-117.86	33.06874	UCTD 17

-117.544	33.22269	UCTD 16
-117.417	33.10014	UCTD 15
-117.733	32.94379	UCTD 14
-118.047	32.7857	UCTD 13
-118.362	32.63032	UCTD 12
-118.677	32.47246	UCTD 11
-118.636	32.30467	UCTD 10
-118.31	32.46435	UCTD 9
-117.99	32.62317	UCTD 8
-117.67	32.77931	UCTD 7
-117.347	32.93833	UCTD 6
-117.332	32.75088	UCTD 5
-117.645	32.59515	UCTD 4
-117.955	32.44145	UCTD 3
-118.266	32.28653	UCTD 2
-118.58	32.12917	UCTD 1

D. Trawl Processing

Point of Contact: Sue Manion

TRAWL CATCH PROTOCOL

Standard trawl duration is 45 minutes. Reduction of standard duration is approved for:

- 1) marine mammal sighted during tow (any duration)
- 2) presence of crab pots and if safely possible.

In the event of marine mammal sightings near the opening of the net during a tow, trawling should cease and the trawl should be recovered as rapidly as safely possible.

At any time, in the event of unsafe conditions trawling may be ceased based on the recommendation of the trawl lead fishermen, Deck Crew Chief, OOD, and/or CO, with concurrence of the CL/CS.

I. During trawl net retrieval:

Only target CPS, mola, sharks, ESA/MMPA species, or Humboldt squid falling on the deck or caught in mesh forward of the MMED will be collected and included as part of the total catch. Process and Release quickly if alive.

Remove and keep any gilled CPS.

Toss any other species forward of the MMED.

II. Total Catch General Procedure

★ Always process any marine mammals/turtles (per SWFSC MMPA research permit)

A. Less Than about 5 baskets caught

If the catch does not fit in a basket or the large garbage can, then crane the codend to the outside sorting table and dump the catch onto the table for sorting!

1. All Target species remove, sort and process from entire catch:

- Target CPS fish (sardine, anchovy, Pacific and jack mackerel)
- ESA fish species (salmon and eulachon)
- Minor target species (refer to attached list)

2. Non-target taxa (includes market squid) catch may be adaptively sampled:

- Take a random composition sample and process
a composition sample could be the whole amount or a random filled white tub
- Record any remainder weight

B. Large total catch (> 5 baskets)

Place entire catch on the outside sorting table & push out the sliding door all samples into baskets

Only if a mechanical failure of the crane occurs, can the catch be grabbed from bins or from the codend & then put in baskets

ATM-like surveys:

1. Remove, sort and process ESA fish species from the entire catch

2. Take a random 5 basket sample (used for sorting and estimation)

- Sort and process CPS fish and minor target species CPS processing is reduced to number of fish in the 5 baskets. If more than 50 fish, process 50. If only 2 (i.e., sardine) are present in 5 baskets, do not sort/look for more, just process the 2 fish.
- Take random white tub composition sample of non-target taxa (includes market squid) and process
- Record remainder weight of non-target taxa

3. Weigh and record any unsorted baskets

DEPM surveys:

1. Remove, sort and process ESA fish species from the catch
2. If less than 100 anchovy or sardine is present in the catch, remove (sort) species from whole catch and process; otherwise continue from step 3.
3. Take a random 5 basket sample (used for sorting and estimation)
 - Remove, sort and process CPS fish and minor target species
 - Take random composition sample of non-target taxa (includes market squid) and process
 - Record remainder weight of non-target taxa
3. Weigh and record any unsorted baskets

III. Processing CPS, sharks, and minor target (see list) species

- If a species catch is 50 individuals or less, process all specimens
- If a species catch is >50 individuals, take a 50 random subsample and process, record remainder weight of the species.

Refer to Target Species Biological Processing Chart and Bin Processing Chart for specific quantities needed.

IV. Processing ESA listed fish (salmon and eulachon):

Process adult salmon (>250mm FL) and eulachon quickly, release if alive

Note: Prepare and Send ITA report within 24 hours

Salmon (adults and juveniles):

- Identify to lowest taxon, including juveniles if possible
- Record Alive or Dead
- Measure fish (mm FL) and weight (g)
- Record presence/absence of adipose fin
- Take Fin clip on adults (for DNA)
- Freeze all juveniles(<250mm FL) individual bag/wrap with ID tick on fish

Eulachon:

- Measure length frequency (mm FL) and group weight(g) of random 50
- Obtain remainder weight(g) and calculate total number of fish
- Freeze 5 fish (California only): group bag

V. Processing Non-Target taxa

a composition sample could be the whole amount or a random filled white tub

- a. Fish, Pyrosomes, *Thetys*, Crustaceans, Cephalopods (includes market squid):
 - Separate into lowest taxon (combine myctophids and note species)
 - Group weight(g) of random 20 per each taxon
 - Measure FISH length frequency (mm FL), n=20 (except no measurements on myctophids and juveniles of rockfish, hake, or flatfishes).
 - Obtain remainder weight(g) for each taxon
- b. Gelatinous taxa, Krill, and Fish-Invertebrate larvae
 - Group all and weigh (use itis-tsn code 202423 for Animalia)
 - Take picture, record camera and number
 - Identify presence to lowest taxon and record itis-tsn code for that taxon

Target Species Biological Processing Chart (every trawl but no larval stages) **ATM**

	Length Frequency	Group Weight (kg)	Length (mm)	Individual Weight (g)	Sex Maturity	Ovary Mature+Immat.	Otolith	DNA	Remainder Weight (kg)	Body Disposition
Pacific sardine* 161729	N/A	N/A	50 SL	50	25	10	25	25	Yes	Discard
Northern anchovy* 161828	N/A	N/A	50 SL	50	25	10	25	25	Yes	Discard
Pacific mackerel* 172412	N/A	N/A	50 FL	50	25	10	25	25	Yes	Discard
Jack mackerel* 168586	N/A	N/A	50 FL	50	25*	10	25	25	Yes	Discard
Market squid ** 82371	N/A	N/A	50 ML	50	N/A	N/A	N/A	N/A	Yes	##
Minor target***	50	50	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Discard

* see Bin charts below

** Market squid the 50 L&W should be a random mixture (both large and small sizes) of the catch

Market squid >75mm - individually bag and freeze 20 (>75mm) if available in the 50, discard the rest >75mm in the 50

Market squid <75mm - freeze group of 50 from the random sample or some may come from the remainder weight sample

*** Refer to Minor Target Species Chart (length frequency on fish only, except sharks, do individual FL&W and take DNA)

Bin Processing Chart for Sardine and Anchovy proportion 25 fish over the 12 bin sizes

Bin size 20 mm

Bin #	1	2	3	4	5	6	7	8	9	10	11	12
Bin start	40	51	71	91	111	131	151	171	191	211	231	>=251
Bin end	50	70	90	110	130	150	170	190	210	230	250	

• record sex and maturity, take otoliths and a DNA sample for the 25 bin selected fish

• up to 10 ovaries (any visual maturity code) will be removed from the 25 bin selected fish (max n = 10; if no females in 25 then # ovary saved = 0)

Bin Processing Chart for Mackerels proportion 25 fish over the 12 bin sizes

Bin size 50 mm

Bin #	1	2	3	4	5	6	7	8	9	10	11	12
Bin start	31	51	101	151	201	251	301	351	401	451	501	>=551

Bin end	50	100	150	200	250	300	350	400	450	500	550	
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- record sex and maturity, take otoliths and a DNA sample for the 25 bin selected fish
- up to 10 ovaries (any visual maturity code) will be removed from the 25 bin selected fish (max n = 10; if no females in 25 then # ovary saved = 0)

Target Species Biological Processing Chart (every trawl but no larval stages) **DEPM**

	Length Frequency	Group Weight (kg)	Length (mm)	Individual Weight (g)	Sex Maturity	Ovary Mature/Immat.	Otolith	DNA	Remainder Weight (kg)	Body Disposition
Pacific sardine* 161729	N/A	N/A	50 SL	50	50	25 / 2	25+	25+	Yes	Discard
Northern anchovy* 161828	N/A	N/A	50 SL	50	50	25 / 2	25+	25+	Yes	Discard
Pacific mackerel 172412	N/A	N/A	50 FL	50	25	10	25	25	Yes	Discard
Jack mackerel 168586	N/A	N/A	50 FL	50	25	10	25	25	Yes	Discard
Market squid** 82371	N/A	N/A	50 ML	50	N/A	N/A	N/A	N/A	Yes	##
Minor target***	50	50	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Discard

* Sardine and Anchovy: if 25 mature ovaries are not sampled in the random 50, obtain more fish, cut open, and process any mature females (codes 2-4) until n=25; take 2 immature ovaries if present in random 50. All Females with Ovaries removed must have Otoliths removed & saved, this includes females not selected as a 'bin-fish'.

** Market squid: the 50 L&W should be a random mixture (both large and small sizes) of the catch

Market squid >75mm - individually bag and freeze 20 (>75mm) if available in the 50, discard the rest >75mm in the 50

Market squid <75mm - freeze group of 50 from the random sample or some may come from the remainder weight sample

*** Refer to Minor Target Species Chart (length frequency on fish only, except sharks, do individual FL&W and take DNA)

Bin Processing Chart for Sardine and Anchovy (Otolith-DNA) proportion 25 fish over the 12 bin sizes

Bin size 20 mm

Bin #	1	2	3	4	5	6	7	8	9	10	11	12
Bin start	40	51	71	91	111	131	151	171	191	211	231	>=251
Bin end	50	70	90	110	130	150	170	190	210	230	250	

Bin Processing Chart for Mackerels proportion 25 fish over the 12 bin sizes

Bin size 50 mm

Bin #	1	2	3	4	5	6	7	8	9	10	11	12
Bin start	31	51	101	151	201	251	301	351	401	451	501	>=551
Bin end	50	100	150	200	250	300	350	400	450	500	550	

- record sex and maturity, take otoliths and a DNA sample for the 25 bin selected fish
- up to 10 ovaries (any visual maturity code) will be removed from the 25 bin selected fish (max n = 10; if no females in 25 then # ovary saved = 0)

Minor Target Species Chart

Scientific Name	Common Name	Itis tsn
FISH		
<i>Alosa sapidissima</i>	American shad	161702
<i>Atherinopsis californiensis</i>	jacksnelt	166012
<i>Brama japonica</i>	Pacific pomfret	170289
<i>Clupea pallasii</i>	Pacific herring	551209
<i>Cololabis saira</i>	Pacific saury	165609
<i>Hypomesus pretiosus</i>	surf smelt	162030
<i>Mallotus villosus</i>	capelin	162035
<i>Merluccius productus (>110mm)</i>	Pacific hake or whiting (>110mm)	164792
<i>Mola mola</i>	ocean sunfish	173414
<i>Peprilus simillimus</i>	Pacific butterfish or pompano	172565
<i>Sarda chiliensis</i>	Pacific bonito	172408
(identify species of adult rockfish)	(name) rockfish	code#
<i>Sphyrna argentea</i>	Pacific barracuda (CA barracuda)	170426
<i>Thunnus alalunga</i>	albacore	172419
INVERTEBRATES		
Phacelophora camtchatica	eggyolk jelly	51696
Aurelia	moon jellys unident	51700
Chrysoira	chrysoira jellyfish	51640
Dosidicus gigas	humbolt squid	82538
Onychoteuthis borealijaponicus	boreal clubhook squid	82442
SHARKS and RAYS		
Alopias vulpinus	thresher shark	159916
Prionace glauca	blue shark	160424
Squalus acanthias	spiny dogfish	160617
Torpedo californica	Pacific torpedo ray	160833
Dasyatis violacea	pelagic stingray	160950
Myliobatis californica	bat ray	160981
Hydrolagus colieii	spotted ratfish	161015
ESA SPECIES Chart		
Oncorhynchus	Pacific salmon unidentified	161974
Oncorhynchus gorboscha	pink salmon	161975
Oncorhynchus keta	chum salmon	161976
Oncorhynchus kisutch	Coho salmon	161977
Oncorhynchus nerka	sockeye salmon	161979
Oncorhynchus tshawytscha	chinook salmon (king salmon)	161980
Oncorhynchus mykiss	steelhead	161989
Thaleichthys pacificus	eulachon	162051

E. Marine Mammal and Sea Turtle Incidental Take and Sampling Documents

Point of Contact: Krista Catelani (revised 2/2/2017)

All of the marine mammal sampling protocols are available for download by NOAA employees from the [SWFSC EC/ITA Document Repository](https://drive.google.com/drive/folders/0BxKoDRm1QXQ5NVRMUjFBYVN0Tnc) (<https://drive.google.com/drive/folders/0BxKoDRm1QXQ5NVRMUjFBYVN0Tnc>).

Specific documents mentioned above:

[PSIT-002.02 - Marine Mammal & Sea Turtle Sampling Protocol](#)

(<https://drive.google.com/a/noaa.gov/file/d/0BxKoDRm1QXQ5Unh0Q2o4eTJ3TmM/view?usp=sharing>)

[PSIT-004.02 SWFSC Marine Mammal Handling Protocol](#)

(<https://drive.google.com/a/noaa.gov/file/d/0BxKoDRm1QXQ5NXUxRVJYMEd2eWM/view?usp=sharing>)

[PSIT-005.01 PIRO Protected Species Handling Protocol](#)

(<https://drive.google.com/a/noaa.gov/file/d/0BxKoDRm1QXQ5VEJQZzlPOV9oTGM/view?usp=sharing>)

[List of Authorized Take Species for SWFSC Trawl Surveys](#)

(<https://drive.google.com/file/d/0BxKoDRm1QXQ5eDF2aEZfSHdOZzg/view>)