

Final Project Instructions


Date Submitted: February 29, 2016

Platform: NOAA Ship *Reuben Lasker*


Project Number: RL-16-02 (OMAO), 1604RL (SWFSC)

Project Title: Spring CPS Survey, Fisheries Resources Division

Project Dates: March 22, 2016 to April 23, 2016

Prepared by:  Dated: February 29, 2016
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SWFSC

Approved by:  Dated: FEB 29 MAR 1 2016
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Approved by:  Dated: 3/2/2016
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Science and Research Director
SWFSC

Approved by: _____ Dated: 20MAR2016
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Commanding Officer
Marine Operations Center - Pacific

I. Overview

A. Brief Summary and Project Period

Survey the distributions and abundances of pelagic fish stocks, their prey, and their biotic and abiotic environments in the California Current between Newport, Oregon and Point Conception, California during March 22 to April 23, 2016.

Depending on the modeled distribution of sardine potential habitat, and any information recently gathered from research projects (e.g. CalCOFI samples) or industry (e.g. sardine bycatch), the survey will be conducted using **compulsory** and **adaptive** transects, and the following sampling guidelines:

1. Depart San Diego, California and transit north towards the transect line located roughly 40 nautical miles (n.mi.) south of the northern extent of the potential sardine habitat determined at the time of departure (see attached map and corresponding waypoints, Appendices 1.a. and 1.b.). This northern-most transect and all of the transects to the south, separated by 40 n.mi., will constitute the **compulsory** transects.
2. If no Coastal Pelagic fish Species (CPS) eggs are found in Continuous Underway Fish Egg Sampler (CUFES) samples, no CPS are caught in the trawl, and no putative CPS targets are observed in the echograms during the first transect, sample the compulsory transect located 40 n.mi. to the south.
3. If CPS eggs, catch, or acoustic targets are sampled during the first transect, add the transect located 40 n.mi. to the north to the compulsory sampling plan. Add transects to the north, separated by 40 n.mi., until no CPS eggs or CPS targets are encountered.
 - a. Once the northernmost transect has been sampled without CPS, add unsampled transects to the south until at least five transects with 20-n.mi. spacing have been sampled (i.e., **adaptive** transects).
 - b. If no CPS eggs or adults are sampled during the fifth transect, add compulsory transects to the south, with 40-n.mi. spacing.
4. If CPS eggs or adults are encountered during subsequent compulsory transects, adaptively sample the transect 20 n.mi. to the north, and then sample unsampled transects to the south until at least five transects with 20-n.mi. spacing have been sampled.

- a. If no CPS eggs or adults are sampled during the fifth transect (i.e. on a compulsory transect), sample compulsory transects to the south, at 40-n.mi. spacing, until CPS eggs or adults are encountered, then go to 4.
- b. If CPS eggs or adults are encountered during fifth transect, add two more transects to the south, with 20-n.mi. spacing, until CPS are not sampled on the compulsory transect, then go to 4.

The goal is to sample all of the compulsory transects, with 40-n.mi. spacing, that are within the sardine potential habitat, adaptively decreasing to 20-n.mi. spacing in areas where CPS eggs or adults, or both, are present in echograms or catches. In the adaptive sampling areas, a minimum of five consecutive transects with 20-n.mi. spacing will be surveyed to comprise a stratum.

If time allows, acoustic and ichthyoplankton sampling will continue within the Southern California Bight. These stations will be added on an opportunistic basis.

B. Days at Sea (DAS)

Of the 30 DAS scheduled for this project, 30 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 area covered during this survey will be from Newport, Oregon to Point Conception, California and extend approximately 80 n.mi. offshore (but as far as 120 n.mi. depending on the habitat model; please refer to appendices 1.a. and 1.b.).

D. Summary of Objectives

Survey the distributions and abundances of pelagic fish stocks, their prey, and their biotic and abiotic environments in the California Current between Newport, Oregon and Point Conception, California.

The following are specific objectives for the Spring CPS Survey.

I.D.1. 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.

I.D.2. Continuously sample multi-frequency acoustic backscatter using the Simrad EK60/80 and ME70. The data will be used to estimate the distributions and abundances of CPS and krill.

I.D.3. 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.

I.D.4. Continuously sample air temperature, barometric pressure, and wind speed and direction using an integrated weather station.

I.D.5. Sample profiles of seawater temperature, salinity, oxygen and chlorophyll-a.

I.D.6. Sample profiles of seawater temperature and salinity using an underway CTD (UCTD) probe. The underway winch will be mounted on the ship's stern.

I.D.7. Sample plankton using a CalBOBL (CalCOFI Bongo Oblique) at prescribed stations. These data will be used to estimate the distributions and abundances of ichthyoplankton and zooplankton species.

I.D.8. Sample the vertically integrated abundance of fish eggs using a Pairovet net at prescribed stations. These data will be used to quantify the abundances and distributions of fish eggs.

I.D.9. Sample profiles of currents using the RDI/Teledyne Acoustic Doppler Current Profiler (ADCP), only when conducting station work (which include side stations). The ADCP will be secured during daytime transiting due to interference with the EK60/80. It is requested that the ship's survey technician be responsible for ADCP operations.

I.D.10. Sample fish near the surface at nighttime by conducting 2-5 surface trawls at stations (appendix 1.a) or at random sites each night. The data will be used to estimate the reproductive parameters, distributions, and demographics of sardine, anchovy and mackerels.

I.D.11. Monitor ambient sounds using the ship's hull-mounted hydrophones, recorded using scientist's instruments.

E. Participating Institutions

I.E.1 Southwest Fisheries Science Center (SWFSC)

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
David Demer**	Fishery Acoustician	March 22, 2016	March 22, 2016	M	SWFSC	US
Steve Sessions**	Fishery Acoustician	March 22, 2016	March 22	M	SWFSC	US
Josiah Renfree**	Fishery Acoustician	March 22, 2016	March 22, 2016	M	SWFSC	US
Scott Mau**	Fishery Acoustician	March 22, 2016	March 22, 2016	M	SWFSC	US
Kevin Stierhoff	Fishery Acoustician	March 22, 2016	April 7, 2016	M	SWFSC	US
David Griffith	Project Leader	March 22, 2016	April 23, 2016	M	SWFSC	US
Bryan Overcash	Fishery Biologist	March 22, 2016	April 7, 2016	M	SWFSC	US
Bev Macewicz	Fishery Biologist	March 22, 2016	April 23, 2016	F	SWFSC	US
Kelsey Gilmore	Fishery Biologist	March 22, 2016	April 7, 2016	F	SWFSC	US
Megan Human	Fishery Biologist	March 22, 2016	April 7, 2016	F	SWFSC	US
William Watson	Fishery Biologist	March 22, 2016	April 7, 2016	M	SWFSC	US
Scott Mau	Fishery Acoustician	April 11, 2016	April 23, 2016	M	SWFSC	US
Sherri Charter	Fishery Biologist	April 11, 2016	April 23, 2016	F	SWFSC	US
Ed Weber	Fishery Biologist	April 11, 2016	April 23, 2016	M	SWFSC	US
Noelle Bowlin	Fishery Biologist	April 11, 2016	April 23, 2016	F	SWFSC	US
Matthew Craig	Research Geneticist	April 11, 2016	April 23, 2016	M	SWFSC	US
Mohammad Sedarat	Fishery Biologist	April 11, 2016	April 23, 2016	M	SWFSC	US
Dylan Gorman	Volunteer	March 22, 2016	April 23, 2016	M	SWFSC	US

***Note: Acoustic Calibration staff to be transferred ashore via small boat following completion of calibration efforts if calibrations are conducted in the bay.*

G. Administrative

1. Points of Contacts:

Chief Scientist/alternate: Sam McClatchie/ Dave Griffith (858-546-7083/ 858-546-7155); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (Sam.McClatchie@noaa.gov / Dave.Griffith@noaa.gov)

Project Operation Lead: Sam McClatchie (858-546-7083); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (Sam.McClatchie@noaa.gov)

Ops Officer: LT Amber Payne (619-230-0331) NOAA Ship *Reuben Lasker* (OPS.Reuben.Lasker@noaa.gov)

2. Diplomatic Clearances

N/A

3. Licenses and Permits

a. CDFW on 02 April, 2015 (expires April 2018) NOAA-SWFSC-FRD-Cisco Werner (SC-12372)

b. MMPA Letter of Authorization (LOA) for the CA Current: 80 FR 58982. The LOA went into affect October 30, 2015 and is valid through October 29, 2020

c. ESA consult (eulachon, salmon, sea turtles): WCR ESA consultation 2015-2455

d. Oregon Scientific Taking Permit # 20332 issued to Dr. Gerard DiNardo (SWFSC Fisheries Resources Division Director) dates March 22, 2016 to December 31, 2016.

e. ONMS 304(d) concurrence.

f. SRP 50 CFR 600.745

II. Operations

1) Project Itinerary

Leg I: March 22: Depart San Diego, CA

April 7: Arrive San Francisco, CA.

Leg II: April 11: Depart San Francisco, CA

April 23: Arrive San Francisco, CA

Staging and de-staging

Staging for the Spring CPS Survey requires two full days. Staging will be conducted in San Diego, CA prior to the March 22 departure (10th Avenue Marine Terminal) and de-staging will be conducted in San Francisco, CA.

2) Operations to be Conducted

II.C.1. Underway Operations

II.C.1.a. 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. The Scientific Computing System (SCS) will serve as the main data collection system. All SCS data will be provided to SWFSC personnel at the completion of the project.

II.C.1.b. Acoustics: Calibration of the Simrad EK60/80 echosounders will be performed at the beginning of the project (requiring 6-8 hours). Attempt will be made to conduct the acoustic calibration while the ship is dockside. It is requested that 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 (date TBD). 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 down-riggers, 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.

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 small pelagic fish and krill biomasses between 10 and 750 m. A multiplexer will be used to alternate transmissions from the EK60 and EK80 echosounders.

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

An EK60/80 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 EK60/80 echosounders, the ME70, 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 environmental conditions collected by the SCS.

Three-dimensional imaging software, “Simrad TD50”, will be loaded on a PC in the acoustics lab for real-time viewing of water column and seabed backscatter. This beta version software will be evaluated for bugs, refinements, and its utility for visualizing aggregations of fish and zooplankton, and their behaviors and associations with seabed habitat.

An FTP program will be used in conjunction with the ship’s VSAT system to telemeter all EK60/80 raw data ashore in quasi-real-time.

The instrumented centerboard will be extended to the “intermediate” position (ca. transducers at 7.5 m below the surface) and the ship will maintain a speed of nominally 10 knots, during all daytime survey operations. Any changes to this depth should be avoided, and reported to the acoustic-system operator(s).

The vessel's Simrad ES60 depth sounder and Doppler current meter (or comparable) may be used minimally at the discretion of the Commanding Officer, but will normally remain off while underway. The ship shall inform the Project Leader of any use of the vessel's sounders, as it interferes with the signals received on the EK60/80 and ME70 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 ER60/80 will conflict with the EAL (EK60/80 Adaptive Logging program) and cause the EAL, ER60/80, and ME70 to crash.

A plate with a sound speed sensor and a pan-tilt-zoom camera has been attached to the retractable centerboard. These instruments 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 epi-pelagic animals, respectively. Data from the sound speed sensor will be input to the SCS and also logged with the Z-MUX software.

The UCTD will be deployed approximately three times each day, during daytime, at locations indicated by the Chief Scientist. The UCTD requires a vessel speed less than or equal to 10 kts. The ship's personnel is needed to assist with the operation and maintenance of this equipment. An underway stereo camera (UCAM), which interfaces with the UCTD, may be deployed opportunistically during the day to sample CPS and other potential acoustic scatterers. It is requested that the Survey Technicians record on the SCS and in the UCTD data files, the times and positions that the UCTD is deployed and recovered.

II.C.1.c. ADCP: The ship's ADCP should be activated only on station and be logged to a data acquisition system. Complete system settings will be provided by the oceanographer, but will include 5-minute averaging of currents, AGC and 4 beam returns in 60 8-meter bins. The ADCP will be secured during daytime transits due to interference with the EK60/80.

II.C.1.d. 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 be cleared from all marine growth prior to departure on March 22.

During both legs, 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 $505 \mu\text{m}$. 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 minutes in duration whenever possible. If two consecutive samples have a concentration of Pacific sardine eggs equal to or greater than $0.25 \text{ eggs min}^{-1}$, the ship will stop to conduct a Pairovet tow. Pairovet tows will continue at 4 n.mi. intervals until a concentration of less than $0.25 \text{ eggs min}^{-1}$ is observed in two consecutive CUFES samples.

II.C.2. Station Operations

Each standard daytime station will include the following:

II.C.2.a. CTD/Rosette will be lowered to approximately 200 meters (depth permitting) at each station to measure physical parameters at discrete depths for: temperature, salinity, oxygen, and chlorophyll.

Please have the Survey Technician (ST) record on the SCS, the times and positions that the CTD is deployed and recovered.

II.C.2.b. CalBOBL (CalCOFI Bongo Oblique): standard oblique plankton tow with 300 meters of wire out, depth permitting, using paired 505 μm mesh nets with 71 cm diameter openings. The technical requirements for this tow are: Descent wire rate of 50 meters per minute and an ascent wire rate of 20 meters per minute. All tows with ascending wire angles lower than 38° or higher than 51° in the final 100 meters 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.

Please have the ST record bongo deployed and bongo recovered for SCS.

II.C.2.c. Pairovet net: will be fished from 70 meters to the surface (depth permitting) using paired 25 cm diameter 150 μm mesh nets at all stations. The technical requirements for Pairovet tows are: Descent rate of 70 meters per minute, a terminal depth time of 10 seconds, and an ascent rate of 70 meters per minute. All tows with wire angles exceeding 15° during the ascent will be repeated.

Please have the ST record Pairovet deployed and Pairovet recovered for SCS.

II.C.2.d. Weather observations.

II.C.3.a. Operations for each standard night station:

- 1) Two to five surface tows using a 264 Nordic Rope Trawl fitted with a marine mammal exclusion device (MMED) will be conducted during nighttime operations. Each tow will be fished on the surface for a 45 minute duration at a towing speed of approximately 3.5 – 4.5 knots. In an attempt keep the footrope from sinking too deep during deployment, it is requested that prior to the tom weights being deployed, the ship's speed be increased to 3.0 – 3.5 knots. The SWFSC's fishery acousticians will place recently constructed submersible video cameras on the interior surface of the Nordic 264 trawl. The cameras will be placed in order to watch fish behavior as well as to determine effects and efficiency of the marine mammal excluder device. The catch from each tow will be processed in the following manner: Sardines collected in each trawl will be randomly subsampled. Standard length and body weight will be measured, otoliths will be collected, and ovaries preserved in buffered formalin. These fish

are assigned a maturity code based on a four stage system developed during a previous Trinational Sardine Forum.

- 2) Bongo net tow.
- 3) CTD cast to 200 meters.

Please have the ST record the deployment and recovery of the trawl, CTD, and Bongo for SCS.

It is requested that the Officer on Deck (OOD) note the locations and times when the acoustic data collection starts and stops each day. After the last trawl of each night or 30 minutes prior to sunrise, the ship will return to the exact location where the acoustic sampling stopped the previous day, and resume acoustic sampling.

There will be two to five trawls per night. The first set will be approximately one hour after sunset. Trawls may or may not occur on predetermined stations. Trawl spacing will be determined based on sardine egg density, the acoustic backscatter observed during daytime, and other factors.

II.C.4.a. Plankton Nets, Oceanographic Sampling Devices, Video Camera and ROV Deployments: 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.

II.C.4.b. For the nighttime trawl operations, protected species watches (e.g. marine mammals and turtles) 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.

30 minute protected species watch (Monitoring prior to deploying trawl gear)

Protected species watches (visual observation) will be initiated by a designated person/s no less than 30 minutes 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.

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 distance to protected species during daytime. During nighttime operations, visual observation shall be conducted using the naked eye and available vessel lighting.

Move-on rule

If marine mammals, sea turtles or other protected species are sighted within 1 n.mi. 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 n.mi. between the set location and estimated location of sighted protected species. If, after moving on, marine mammals or sea turtles remain within the 1 n.mi. exclusion zone, the CS or watch leader may decide to move again or to skip the station, but in any case **may not set while a marine mammal or sea turtle is in the 1 n.mi. exclusion radius.**

Monitoring during trawl deployment, fishing and retrieval

In addition to the 30 minute 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, Chief Scientist (CS), or other designated person/s. If marine mammals or sea turtles 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 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 Chief Scientist expertise that is used 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 n.mi. away from the trawl set location.**

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.

Marine mammal excluder devices (MMED)

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

Acoustic deterrent devices

Pingers must be deployed during all trawl operations and on all types of trawl nets. Two to four pingers will be placed along the footrope and/or headrope and will be tested regularly to ensure they are operating properly.

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.

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 CS or watch leader will call Krista Catelani immediately at 707-293-3563 (cell) or 858-546-7166 (work) 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.

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-004.01, *SWFSC Marine Mammal Handling Guidelines*, and the Pacific Islands Region's *Identification, Handling and Release of Protected Species* (PSIT-005.01), and SWFSC's marine mammal and sea turtle sampling protocol (PSIT-002.01) 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.

Protected Species Sampling and Data Collection

Under the incidental take authorization SWFSC scientists are authorized and encouraged to collect samples from protected species incidentally captured or killed during fisheries research activities. For sampling, follow guidelines in SWFSC's *Detailed Sampling Protocol for Marine Mammal and Sea Turtle Incidental Takes* and fill out the Marine Mammal and Sea Turtle Biological Sampling form.

II.C.4.c. Standard tow durations have been reduced to 45 min or less at targeted depth, excluding deployment and retrieval time, to reduce the likelihood of attracting and incidentally taking protected species. These short tow durations decrease the opportunity for curious marine mammals to find the vessel and investigate. The resulting tow distances are typically 1 to 2 n.mi., depending on the survey and trawl speed. Additionally, short tow times reduce the likelihood that captured sea turtles would drown.

II.C.4.d. Vessel speeds are restricted on research projects in part to reduce the risk of ship strikes with marine mammals. Transit speeds vary from 8-12 knots, but average 10 knots. The vessel's speed during active sampling is typically 3.5-4.5 knots due to sampling design. Thus, these much slower speeds essentially eliminate the risk of ship strikes.

D. Dive Plan

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

A dive is requested for clearing the CUFES intake of attached mussels prior to departure and the transducer faces of any marine biofouling prior to calibration.

E. Applicable Restrictions

Conditions which preclude normal operations:

In the event of poor weather conditions, we will work with the ship's officers on developing the best strategy for completion of all stations safely.

We have replacement gear for most operations. Equipment failure should not impact our project.

III. Equipment

A. Equipment and Capabilities provided by the ship

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

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

EK60/80 Echosounders with transducers (ES18-11, ES38B, ES70-7C, ES120-7C,

ES200-7C, ES333).

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

SBE911+ 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 paironet tows

Scientific Computing System (SCS)

Motion compensated balances for fish baskets

ME70 multibeam system

-80°C Freezer

Calibration apparatus including motorized downriggers, control box, and standard spheres

B. Equipment and Capabilities provided by the scientists (with counts and approximate total weight)

30 cc and 50 cc syringes (SWFSC)

Canulas (SWFSC)

(34) Pint, (15) quart, (5) gallon, (32) 4 oz., and (9) 8 oz. jar cases (SWFSC) (350 lbs.)

(6) Cases of scintillation vials (SWFSC) (120 lbs.)

Inside and outside labels (SWFSC)

CalCOFI net tow data sheets (SWFSC)

(2) 71 cm CalCOFI Bongo frames (SWFSC) (40 lbs.)

(6) 71 cm CalCOFI 505 µm mesh nets (SWFSC) (10 lbs.)

(4) CalCOFI 150 µm Paironet nets and codends (SWFSC) (5 lbs.)

(2) CalCOFI Paironet frames (SWFSC) (10 lbs.)

- (12) 333 μm mesh codends (SWFSC) (2 lbs.)
- (6) Digital flowmeters (SWFSC) (10 lbs.)
- (1) 75 lb Bongo weight (SWFSC)
- (1) 100 lb hydro weight (SWFSC)
- (2) Standard CalCOFI tool boxes (SWFSC) (50 lbs.)
- Bucket thermometers and holders (SIO)
- Hand held inclinometer for Pairovet and Bongo tows (SWFSC)
- Weather observation sheets (SWFSC)
- (2) Dissecting microscopes (SWFSC) (50 lbs. w/case)
- (2) NETS Nordic 264 midwater trawl (SWFSC) (4000 lbs.)
- (2) NETS 3.0 m X Lite trawl doors (SWFSC) (2400 lbs.)
- (2) Trawl rigging (SWFSC) (1000 lbs.)
- (4) Fish measuring boards (SWFSC) (20 lbs.)
- (4) Motion compensated scales (SWFSC) (100 lbs.)
- (2) Go-Pro trawl camera systems (SWFSC) (60 lbs.)
- (1) Z-MUX impedance-measuring transducer-multiplexer system (SWFSC) (20 lbs.)
- (2) Laptop computer to run the EK60/80 Adaptive Logging (EAL) software (SWFSC) (10 lbs.)
- (6) Multifrequency EK80 GPTs (18, 38, 75, 120, 200, and 333 kHz).
- (1) Underway CTD – (UCTD, 2 probes, 1 winch (SWFSC) (80 lbs.)
- (3) Underway stereo camera (UCAM, SWFSC) (60 lbs.)
- (3) Experimental incubation bath systems (SWFSC) (200 lbs.)
- (14) Shipping containers (fish bins) (SWFSC) (800 lbs.)

IV. Hazardous Materials

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A. Policy and Compliance

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

Per 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 stowage is available as soon as chemical quantities are known.

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

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

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

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

B. Inventory

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

C. Chemical safety and spill response procedures

A: ACID/Bases

- Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
- Ventilate closed spaces before entering them.

- Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
- **Large Spills:** Dike far ahead of spill for later disposal. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal.
- **Small Spills:** Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
- Never return spills in original containers for re-use.
- Neutralize spill area and washings with soda ash or lime. Collect in a non-combustible container for prompt disposal.
- J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

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 saw dust.

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 zip lock bag.
- If contact with water occurs, use proper neutralizing agent prior to cleanup.
- Store in sealed container to be returned and disposed by SWFSC.

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
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. Supplementary (“Piggyback”) Projects

V.A.1. Shipboard egg rearing experiment(s): SWFSC would like to try using sardine eggs incubated in a series of fixed temperature baths to determine temperature-dependent development rates. This will be an opportunistic experiment that will depend on getting one or more ripe male and female sardines from a trawl sample to obtain fertilized eggs of known age to rear in 3 temperature treatments. This experiment will run approximately 5-7 days and will require sampling of 2-3 eggs per treatment at 3-4 hour intervals through hatching (~2-4 days) and sampling 1-2 larvae once or twice daily after that through yolk absorption. It is desired that this project be configured in the constant environment room or the hydro lab.

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 Chief Scientist will receive all original data related to the project. The Chief Scientist will in turn furnish the Commanding Officer 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 Chief Scientist will be released to him, including supplementary data specimens and photos gathered by the scientific crew.

VII. Meetings, Vessel Familiarization, and Project Evaluations

- A. Pre-Project Meeting: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship’s crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of

the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

- B. Vessel Familiarization Meeting: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.
- C. Post-Project Meeting: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hours before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

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

VIII. Miscellaneous

A. Meals and Berthing

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

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

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

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 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 Chief Scientist or the NOAA website

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

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

The completed 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 Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to

participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

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

E. IT Security

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

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

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

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

F. Foreign National Guests Access to OMAO Facilities and Platforms

Foreign National access to the NOAA ship or Federal Facilities is not required for this project.

Appendix 1.a. Requested transects for 1604RL displaying compulsory and adaptive lines.

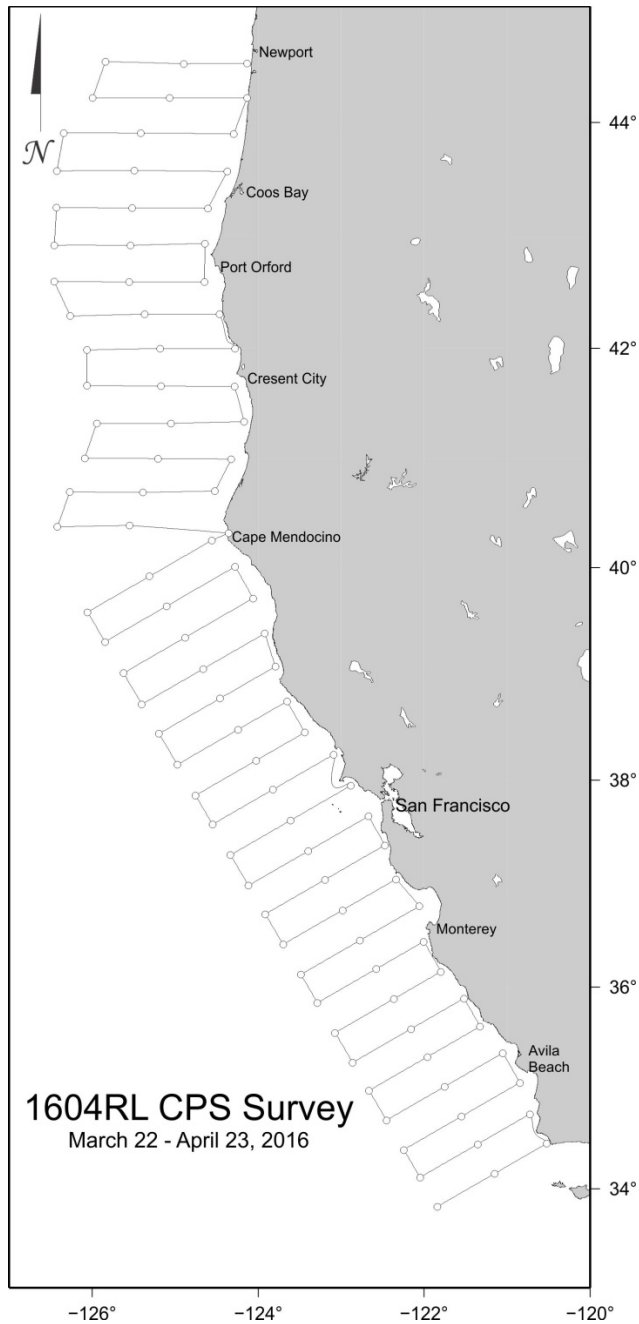


Figure 1: The first compulsory transect, potentially located as far north as Newport, OR, will be selected prior to departure. If no CPS eggs are found in CUFES, no putative CPS acoustic targets are observed in echograms, and no CPS are collected in trawls, compulsory (40 n.mi.-spacing) transects will be occupied in the southward direction. Upon encountering CPS, adaptive sampling (20 n.mi.-spacing) will commence for a total of five consecutive transects spaced 20 n.mi. apart (see adaptive sampling guidelines above).

Appendix 1.b. Station List doubling as acoustic transect waypoints (coordinates in decimal degrees).

Ord. Occ.	Dec. Latitude	Dec. Longitude
1	44.51012579	-124.1347391
2	44.50790776	-124.8965183
3	44.52634357	-125.8398587
4	44.21248465	-125.9933345
5	44.21136934	-125.06575
6	44.21358737	-124.1346346
7	43.89972845	-124.2917697
8	43.90679245	-125.4155467
9	43.90790776	-126.3412855
10	43.57607448	-126.4236605
11	43.57829251	-125.4933885
12	43.57122851	-124.3736762
13	43.24802343	-124.602647
14	43.24913873	-125.5169869
15	43.25358737	-126.4277912
16	42.92110026	-126.4544183
17	42.91998495	-125.5392991
18	42.93619016	-124.6412798
19	42.5930492	-124.645223
20	42.59416451	-125.552546
21	42.59861315	-126.4563113
22	42.29083117	-126.2618762
23	42.30703638	-125.36754
24	42.30592107	-124.4641537
25	41.9981391	-124.2786967
26	41.99925441	-125.1779604
27	41.98638254	-126.0604251
28	41.66389542	-126.0609676
29	41.65944679	-125.1689057
30	41.65499815	-124.2809246
31	41.33787002	-124.1697571
32	41.32166482	-125.0487349
33	41.32278012	-125.9444277
34	41.00558786	-126.0897181

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35	41.00113923	-125.2042426
36	40.99669059	-124.3227495
37	40.70413935	-124.5195767
38	40.69126748	-125.3860098
39	40.69571612	-126.269183
40	40.37519053	-126.418339
41	40.3880624	-125.5507389
42	40.31772919	-124.3548631
43	40.25106252	-124.5556347
44	39.91772919	-125.3072581
45	39.58439586	-126.0552027
46	39.30726773	-125.8448289
47	39.64060106	-125.0998965
48	40.00726773	-124.2762779
49	39.71281909	-124.0604037
50	39.34615242	-124.8804905
51	39.01281909	-125.6222677
52	38.71837045	-125.4006823
53	39.05170379	-124.6620145
54	39.38503712	-123.9198232
55	39.07457566	-123.7920533
56	38.77457566	-124.4572273
57	38.44124232	-125.19301
58	38.14679369	-124.9732783
59	38.48012702	-124.2405181
60	38.74679369	-123.6518467
61	38.45234505	-123.4384468
62	38.18567838	-124.0246996
63	37.85234505	-124.7544813
64	37.57521692	-124.5493962
65	37.90855025	-123.8223785
66	38.24188359	-123.0920316
67	37.94743495	-122.8808493
68	37.61410162	-123.6082525
69	37.28076828	-124.3323747
70	36.98631964	-124.1162485
71	37.31965298	-123.39498
72	37.65298631	-122.6704778
73	37.37585818	-122.4732114

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74	37.04252485	-123.1950214
75	36.70919152	-123.9136417
76	36.41474288	-123.6992164
77	36.74807621	-122.9833704
78	37.04807621	-122.3364227
79	36.78696091	-122.0563271
80	36.45362757	-122.7725371
81	36.12029424	-123.4856487
82	35.84316611	-123.2854163
83	36.17649944	-122.5748422
84	36.44316611	-122.0041847
85	36.14871747	-121.7970636
86	35.88205081	-122.3655627
87	35.54871747	-123.0734784
88	35.25426884	-122.8623623
89	35.58760217	-122.1570666
90	35.88760217	-121.5197635
91	35.61047404	-121.3264603
92	35.31047404	-121.9615407
93	34.97714071	-122.6644048
94	34.68269207	-122.4548503
95	35.0160254	-121.7545336
96	35.34935874	-121.0513303
97	35.0549101	-120.8476262
98	34.72157677	-121.5482772
99	34.38824343	-122.2460832
100	34.1111153	-122.0503058
101	34.44444864	-121.3548297
102	34.74444864	-120.7265031
103	34.45	-120.5239048
104	34.15	-121.15
105	33.81666667	-121.8430351