Final Project Instructions

Date Submitted: June 27, 2016

Platform: R/V *Ocean Starr*

Project Number: 1607OS

Project Title: CalCOFI Survey, Fisheries Resources Division.

Project Dates: July 8, 2016 to July 27, 2016

Prepared by:  Dated: June 24, 2016

Amy E. Hays
Chief Scientist
SWFSC

Approved by: _____ Dated: _____

Gerard DiNardo , Ph.D.
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SWFSC

Approved by: _____ Dated: _____

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Science and Research Director
SWFSC

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 area of the California Current between San Diego, California and Avila Beach, California during the period of July 8 to 27, 2016.

B. Operating Area

From San Diego, CA to Avila Beach, CA and out 300 nautical miles. Please refer to appendix 1.b.

C. Summary of Objectives

Survey the distributions and abundances of pelagic fish stocks, their prey, and their biotic and abiotic environments in the area of the California Current between San Diego, California and Avila Beach, California.

I.C.1. Continuously sample pelagic fish eggs using the Continuous Underway Fish Egg Sampler (CUFES). The data will be used to estimate the distributions and abundances of spawning hake, anchovy, mackerel, and spawning Pacific sardine.

I.C.2. Continuously sample multi-frequency acoustic backscatter using the Simrad EK60. The data will be used to estimate the distributions and abundances of coastal pelagic fishes (e.g., sardine, anchovy, and mackerel), and krill species.

I.C.3. Continuously sample sea-surface temperature, salinity, and chlorophyll-a using a thermosalinometer. These data will be used to estimate the physical oceanographic habitats for target species.

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

I.C.5. Sample profiles of seawater temperature, salinity, chlorophyll-a, nutrients, and phytoplankton using a CTD with water-sampling rosette and other instruments at prescribed stations. Measurements of extracted chlorophyll and phaeophytin will be obtained with a fluorometer. Primary production will be measured as C^{14} uptake in a six hour in situ incubation. Nutrients will be measured with an auto-analyzer. These data will be used to estimate primary productivity and the biotic and abiotic habitats for target species.

I.C.6. Sample the light intensity in the photic zone using a standard secchi disk once per day in conjunction with a daytime CTD station. These data will be used to interpret the measurements of primary production.

I.C.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.C.8. Sample plankton using a Manta (neuston) net at prescribed stations. These data will be used to estimate the distributions and abundances of ichthyoplankton species.

I.C.9. 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.C.10. Sample plankton using a PRPOOS (Planktonic Rate Processes in Oligotrophic Ocean Systems net) at all prescribed CalCOFI stations on lines 90.0, 86.7, 83.3 and 80.0 only. These data will be used in analyses by the LTER (Long Term Ecological Research) project.

I.C.11. Continuously observe, during daylight hours, seabirds and mammals. These data will be used to estimate the distributions and abundances of seabirds and marine mammals.

D. Participating Institutions

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

I.D.2 Scripps Institution of Oceanography (SIO)

I.D.3 Farallon Institute Advanced Ecosystem Research (FIAER)

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

Name (First, Last)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Amy Hays	Chief Scientist	July 8, 2016	July 27, 2016	F	SWFSC	US
Bryan Overcash	Fishery Biologist	July 8, 2016	July 27, 2016	M	SWFSC	US
James Wilkinson	Oceanographer	July 8, 2016	July 27, 2016	M	SIO	US
David Wolgast	Oceanographer	July 8, 2016	July 27, 2016	M	SIO	US
Jennifer Rodgers-Wolgast	Oceanographer	July 8, 2016	July 27, 2016	F	SIO	US
Daniel Schuller	Chemist	July 8, 2016	July 27, 2016	M	SIO	US
Shonna Dovel	LTER	July 8, 2016	July 27, 2016	F	SIO	US
Megan Roadman	LTER	July 8, 2016	July 27, 2016	F	SIO	US
Katherine	Marine Mammal	July 8, 2016	July 27,	F	SIO	US

Whitaker	Observer		2016			
Arial Brewer	Marine Mammal Acoustician/Observer	July 8, 2016	July 27, 2016	F	SIO	US
Ashlyn Giddings	Marine Mammal Observer	July 8, 2016	July 27, 2016	F	SIO	US
Sophie Webb	Bird Observer	July 8, 2016	July 27, 2016	F	FIAER	US
Max Seibert	Volunteer	July 8, 2016	July 27, 2016	M	SWFSC	US
Erin Johnston	Volunteer	July 8, 2016	July 27, 2016	F	SWFSC	US
Cameron Quackenbush	Volunteer	July 8, 2016	July 27, 2016	M	SIO	US
Dan Averbuj	Volunteer	July 8, 2016	July 27, 2016	M	SIO	US

F. Administrative

1. Points of Contacts:

Chief Scientist/alternate: Amy Hays/Bryan Overcash (858-546-7130/ 858-546-7126); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (Amy.Hays@noaa.gov/Bryan .Overcash@noaa.gov)

Project Operation Lead: Sam McClatchie (858-546-7183); 8901 La Jolla Shores Drive, La Jolla, CA, 92037 (Sam.McClatchie@noaa.gov)

2. Diplomatic Clearances

N/A

3. Licenses and Permits

a. All marine mammal work is covered under a federal research permit NMFS Permit 727-1915 issued to Dr. John Hildebrand of SIO.

b. CDFW ON April 2, 2015 to NOAA-SWFSC-FRD-Cisco Werner (SC-12372)

II. Operations

A. Project Itinerary

July 8: Arrive San Diego, CA

July 8-9: Load scientific gear (10th Avenue Marine Terminal NOAA dock)

Leg I: July 10: Depart San Diego, CA

July 27: Arrive San Diego, CA (offload, 10th Avenue Marine Terminal NOAA dock)

Staging and De-staging

Staging for CalCOFI requires two full days. Final de-staging will be conducted in San Diego, CA (10th Avenue Marine Terminal NOAA dock).

We request 1 laboratory van to be craned onto the afterdeck and secured in San Diego prior to departure. The dimension of the van is approximately 8x10x8 feet weighing 6500 lbs. Power requirement is 110V.

We request 1 electric winch to be craned onto the afterdeck and secured in San Diego prior to departure. The dimension of the winch is 4.5x4.5 feet. Power requirement is 440V 3-phase.

B. Operations to be Conducted

II.B.1. Underway Operations

II.B.1.a. Thermosalinometer sampling - The SWFSC will provide and maintain a thermosalinometer (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity.

II.B.1.b. Acoustics: Calibration of the Simrad EK60 echosounders was performed at the beginning of the charter on June 16 off Newport, OR. No further calibrations are planned.

Throughout the cruise, the EK60 echosounders will be operated at 38, 70, 120 and 200 kHz and interfaced to a data acquisition system to estimate small pelagic fish and krill biomasses between 10 and 750 m. An EK60 Adaptive Logging program (EAL) will be run continuously to detect the seabed depth and optimize the logging range while avoiding aliased seabed echoes (“false bottoms”). The vessel's depth sounder and Doppler current meter may be used minimally at the discretion of the Captain, but will normally remain off while underway. During daytime transit between stations, the ship will maintain a desired speed of 10 knots. The ship shall inform the Cruise Leader of any use of the vessel's sounders, as it interferes with the signals received on the EK60s that will be used continuously.

II.B.1.c. CUFES: The egg pump will be mounted inside the ship’s hull drawing water from a depth of three meters. The pump will run continuously between stations to sample any pelagic fish eggs. Approximately 640 liters/minute is sent through a concentrator which filters all material larger than 505µm. The sieved material is then collected and

identified. All fish eggs are identified to lowest taxa, counted and entered into the data acquisition software. Each sample entry is coupled with sea surface temperature, geographical position, date and time, and surface salinity. Sampling intervals will vary in length, depending on the number of fish eggs seen, from five to 30 minutes.

It is requested that prior to departure from Ballard, WA that the CUFES intake be cleared from all marine growth.

It is requested that prior to departure from Ballard, WA that the hull be cleaned of all barnacles and other bio-fouling organisms that will impede the acoustic calibration operations.

II.B.1.d. Bird Observations: During daylight hours a bird observer will be posted on the flying bridge to identify and count birds while the ship is underway during cruise transects.

II.B.1.e. Acoustic hydrophone: During transit between most daylight stations, an acoustic hydrophone array will be towed from the stern at a distance of 300 meters with a deck loaded winch to record sounds from marine mammals. The winch is 440V 3-phase with a deck pattern of 4.5 by 4.5 feet. Upon approaching a station, two sonobuoys will be deployed one nautical mile prior to stopping for station work.

II.B.2. Station Operations

Each standard station will include the following:

II.B.2.a. CTD/Rosette consisting of 24 10-liter hydrographic bottles will be lowered to approximately 500 meters (depth permitting) at each station to measure physical parameters and collect water at discrete depths for analysis of: salinity, nutrients, oxygen, chlorophyll, etc. It is requested that the hydraulic hoist on the port side trolley way be installed and operational.

II.B.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.

II.B.2.c. Manta net (neuston) tow: using a 505 μm mesh net on a frame with a mouth area of 0.1333 m^2. Tows are 15 minutes in duration at towing speed of approximately 1.5 - 2.0 knots. Wire angles should be kept between 15° and 25°.

II.B.2.d. 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 out to and including station

70.0. 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.

II.B.2.e. A PRPOOS (Planktonic Rate Processes in Oligotrophic Ocean Systems) net will be taken on specific stations on line 90.0, 86.7, 83.3, and 80.0. These stations are occupied as part of the LTER (Long Term Ecological Research) project. The mesh of the PRPOOS net is 202 μm and the tow is a vertical cast up from 210 meters. The technical requirements for the PRPOOS tows are: Decent rate of 40 meters per minute, a terminal depth time of 20 seconds and an ascent rate of 50 meters per minute.

II.B.2.f. Primary productivity: at about 1100 hours on each day a primary productivity CTD cast consisting of six 10-liter hydrographic bottles (mounted on CTD frame) will be carried out. The cast arrangement will be determined by a Secchi disc observation. This cast will be in conjunction with an already scheduled station. The purpose of the cast is to collect water from six discrete depths for daily *in situ* productivity experiments. Measurements of extracted chlorophyll and phaeophytin will be obtained with a fluorometer. Primary production will be measured as C^{14} uptake in a six hour *in situ* incubation. Nutrients will be measured with an auto-analyzer. All radioisotope work areas will be given a wipe test before the departure of the SIO technical staff.

II.B.2.g. A light meter (Secchi disk) will be used to measure the light intensity in the euphotic zone once a day with the primary productivity cast and all daytime stations.

II.B.2.h. Weather observations.

II.B.3.a. Order of Operations for each standard station:

1) CTD to 515 meters with 24 bottle rosette (depth permitting).

2) Secchi disk (daylight stations only, Secchi will be first prior to CTD on Primary Productivity station of the day which is typically 0900-1100).

3) PRPOOS net tow (lines 90.0, 86.7, 83.3 and 80.0 only).

4) Pairovet net tow (on all lines out to station 70.0 but not to include near shore SCCOOS).

5) Manta net tow (on all stations except for near shore SCCOOS and stations after line 76.7).

6) Bongo net tow (on all stations).

II.B.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 cruises. 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.

Marine mammal watches are now a standard part of conducting fisheries research activities, particularly those that use gear (e.g., longlines and mid-water trawls) known to interact with marine mammals or that we believe have a reasonable likelihood of doing so in the future. Marine mammal watches are conducted in two ways. First, watches are conducted by lookouts (those navigating the vessel and other crew) at all times when the vessel is being operated. Second, marine mammal watches and monitoring occur for 30 minutes prior to deployment of gear, and they continue until gear is brought back on board, for longlines and mid-water trawl gear. Watches in the first category are not done by dedicated staff; these personnel primary duties as lookout according to the Rules of the Road are "maintaining a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision." Watches in the second category are done by dedicated scientists with no other responsibilities during the watch period. If marine mammals are sighted within 1 nm of the planned set location then the sampling station is either moved or canceled. Watch-standers record the estimated species and number of animals present and their behaviors. This information can be valuable in understanding whether some species may be attracted to vessels or gear.

II.B.4.b. Vessel speeds are restricted on research cruises in part to reduce the risk of ship strikes with marine mammals. Transit speeds vary from 8-11 knots.

While underway:

We will have a bird observer on the flying bridge during all daylight transects.

We will have 2 marine mammal observers on the flying bridge during all daylight transects.

We will have a marine mammal acoustician with a towed hydrophone. The hydrophone will be towed off the stern at a distance of 300 meters between daylight stations. The hydrophone will be deployed at a ship speed of 5 knots while leaving a station. Once deployed, ship can travel at full speed. The hydrophone can be retrieved at ship's full speed.

At 1 mile prior to each daylight station marine mammal observers will deploy 2 sonobuoys. The hydrophone will be retrieved at this time.

Communication will be open to bridge during all hydrophone deployments and retrievals.

C. Dive Plan

N/A

D. 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 (itemized)

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 ¼" cable for standard Bongo, Manta, Pairovet and PRPOOS tows

Port oceo winch with 0.434" EM cable for standard CTD casts

Port J-frame w/blocks to accommodate 0.434" cable

Constant temperature room set at 22°C ± 1°C (71.5°F ± 2°F)

Winch monitoring systems

Hydraulic lifter/trolley for port side CTD deployment

Knudsen 12 kHz depth recorder or comparable

Multifrequency EK60 transducers (ES38B, ES70-7C, ES120-7C, ES200-7C)

Pump, collector and concentrator unit for CUFES water sampling

GPS feed to flying bridge for use by bird observers

GPS feed to main labs for use by scientists

110V power to science van on main deck

440V power to science winch on main deck

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

37% Formalin (SWFSC)

Ethanol (SWFSC)

Tris buffer (SWFSC)

Sodium borate (SWFSC)

30 cc and 50 cc syringes (SWFSC)

Cannulas (SWFSC)

Pint, quart and gallon jars (SWFSC)

Inside and outside labels (SWFSC)

CalCOFI net tow data sheets (SWFSC)

71 cm CalCOFI Bongo frames (SWFSC)

71 cm CalCOFI 505 μm mesh nets (SWFSC)

CalCOFI 150 μm Pairovet nets and codends (SWFSC)

CalCOFI Pairovet frames (SWFSC)

333 μm mesh codends (SWFSC)

Digital flowmeters (SWFSC)

PRPOOS frames (SIO)

170 lb PRPOOS weight (SIO)

202 μm mesh PRPOOS nets and codends (SIO)

75 lb Bongo weight (SWFSC)

100 lb hydro weight (SWFSC)

CalCOFI Manta net frames (SWFSC)

60 cm CalCOFI 505 μm mesh Manta nets (SWFSC)

Standard CalCOFI tool boxes (SWFSC)

Bucket thermometers and holders (SIO)

Hand held inclinometer for Pairovet and Bongo tows (SWFSC)

Oxygen auto-titration rig with reagents (SIO)

Oxygen flasks (SIO)

Guildline Portasal (SIO)

Salinity bottles (SIO)

Standard sea water (SIO)

Data sheets for scheduled hydrographic work (SIO)

Weather observation sheets (SIO)

Primary productivity incubation rack (SIO)

C^{14} and other chemicals for primary productivity work (SIO)

24 niskin bottles (10 liter) for rosette (SIO)

SBE911+ CTD unit with necessary sensors (SIO)

Turner fluorometer (SIO)

90% acetone and all supplies for chlorophyll extraction (SIO)

Nutrient auto analyzer (SIO)

Chemicals for all nutrient analyses (SIO)

EK60 Echosounders (GPTs), Ethernet switch, and logging computer (SWFSC)

Laptop computer running Matlab / EAL EK60 Adaptive Logging software (SWFSC)

EK60 calibration apparatus (SWFSC)

Isotope van (SIO)

Winch for acoustic array (SIO)

Dissecting microscopes (SWFSC)

Sonobuoys (SIO)

IV. Hazardous Materials

A. Policy and Compliance

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

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

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

Common Name of Material	**Qty**	**Notes**	**Trained Individual**	**Spill control**
Ethyl alcohol (95%)	80L (in 20L cans)	UN1170, Waste contained and disposed of by SWFSC at end of project. Stored in hazmat locker	Amy Hays	F
Formaldehyde solution (37%)	20L	UN1198, No waste, Stored in wet lab	Amy Hays	F
Tris buffer	500ml	Stored in wet lab	Amy Hays	F
Sodium borate powder	500gr	Stored in wet lab	Amy Hays	F
HCL (1.2N)	4L	UN1789, No waste, Stored in Radiation van on aft deck	David Wolgast	A
Sulfuric acid (10 Normal)	4L	Stored in Chem lab, waste neutralized by base in assay	David Wolgast	A
Acetone (90%)	7L	UN1090, Waste contained and disposed of by SIO at end of project, Stored in Rad van	David Wolgast	F
Manganous Chloride	4L	No waste, stored in wet lab	David Wolgast	A
Sodium Hydroxide/Sodium Iodide	4L	UN1824, Waste neutralized by acid in assay, Stored wet lab	David Wolgast	A

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Ethanol (95%)	1L	UN1170, No waste, Stored in Constant temperature room	David Wolgast	F
Ecolume Scintillation Fluid	2.5L	No waste, Stored in Rad van	David Wolgast	F
14C Sodium Bicarbonate (5.0mCi)	20ml	Waste contained and disposed of by SIO at end of project, UCSD EH&S, Stored in Rad van	David Wolgast	Waste remains in Rad van vacuum jugs in secondary containment
HCL (12N)	150ml	No waste, Stored in wet lab/Dropper bottles with secondary containment	Shonna Dovel	A
Isopropyl Alcohol (91%)	30ml	No waste, Stored in wet lab/Dropper bottles with secondary containment	Shonna Dovel	A
Liquid Nitrogen	50L Dewar	No waste, Stored wet lab	Shonna Dovel	A
Acetone (90%)	7L	No waste, Stored in wet lab and freezer with secondary containment	Shonna Dovel	F
HCL (1N)	400ml	No waste, Stored in wet lab/Dropper bottles with secondary containment	Shonna Dovel	A
0.01 mg/ml DAPI 4',6-Diamidino-2-Phenylindole,Dihydrochloride	4x1-ml aliquots	Stored in Chem lab. Concentrated DAPI in freezer with secondary containment	Shonna Dovel	A

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Buffered Formalin (10%)	2L	Stored in Chem lab fume hood with secondary containment	Shonna Dovel	F
Alkaline Lugol's fixative (100%)	250ml	Stored in Chem lab refer with secondary containment	Shonna Dovel	F
Paraformaldehyde (10%)	.5L	Stored in Chem lab refer with secondary containment	Shonna Dovel	F
Proflavin (0.033%)	250ml	Stored in Chem lab refer with secondary containment	Shonna Dovel	F
Sodium Thiosulfate (0.190M)	250ml	Stored in Chem lab refer with secondary containment	Shonna Dovel	F
Basic Lugol's fixative (100%)	500ml	Stored in Chem lab fume hood with secondary containment	Shonna Dovel	F
Ammonium Molybdate	75g	No waste, Stored in Chem lab	Dan Schuller	D
Ammonium Sulfate	0.1322g	No waste, Stored in Chem lab	Dan Schuller	D
Ascorbic acid	46g	No waste, Stored in Chem lab	Dan Schuller	D
Brij-35 (15%)	15g	No waste, Stored in Chem lab	Dan Schuller	D
Imidazole	8g	No waste, Stored in Chem lab	Dan Schuller	D
Copper Sulfate	2g	No waste, Stored in Chem lab	Dan Schuller	D
N-(1-naphthyl) ethylenediamine dihydrochloride	2g	No waste, Stored in Chem lab	Dan Schuller	D
Cadmium Coil	3g	No waste, Stored in Chem lab	Dan Schuller	D

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Oxalic acid	100g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium dodecyl sulfate	24g	No waste, Stored in Chem lab	Dan Schuller	A
Potassium antimony tartrate	0.34g	No waste, Stored in Chem lab	Dan Schuller	D
Potassium Phosphate	0.8g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium chloride	850g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium Nitrite	1.4g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium hydrogen carbonate	15g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium Hydroxide	10g	No waste, Stored in Chem lab	Dan Schuller	D
Sodium Hydroxide	0.1L	No waste, Stored in Chem lab	Dan Schuller	A
Ammonia Sulphate	1L	No waste, Stored in Chem lab	Dan Schuller	A
Sodium sulfite	2.4g	No waste, Stored in Chem lab	Dan Schuller	D
Sulfanilamide	20g	No waste, Stored in Chem lab	Dan Schuller	D
O-phthalaldehyde	4g	No waste, Stored in Chem lab	Dan Schuller	D
Ethanol	1500ml	No waste, Stored in Chem lab	Dan Schuller	F
HCL (dilute 1.2N)	2.5L	No waste, Stored in Chem lab	Dan Schuller	A
HCL (conc. 12N)	4L	No waste, Stored in Chem lab	Dan Schuller	A

SPILL CONTROL

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.

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

**Note: Please see attached Appendix 1.a. detailing spill control efforts for Scripps Institution of Oceanography.

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.

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory of hazardous material indicating all materials have been used or removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials.

MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

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

B. Radioactive Isotopes

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

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

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

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

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

C. Inventory (itemized) of Radioactive Materials

Common Name Radioactive Material	**Concentration**	**Amount**	**Notes**
14C Sodium Bicarbonate	5.0mCi	20ml	To be used and stored in Science provided Rad van on main deck of ship. All waste contained and offloaded on or about April 15 by UCSD,EH&S

V. Additional Projects

A. Supplementary ("Piggyback") Projects

N/A

B. NOAA Fleet Ancillary Projects

N/A

VI. Disposition of Data and Reports

A. Data Responsibilities

The Chief Scientist will receive all original data related to the project. The Chief Scientist will in turn furnish the Captain 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.

B. Pre and Post Project Meeting

Prior to departure, the Chief Scientist will conduct a meeting of the scientific party to train them in sample collection and inform them of project objectives. Some vessel protocols, e.g., meals, watches, etiquette, etc. will be presented by the ship's Operations Officer.

VII. 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 Captain 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.

B. Shipboard Safety

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. Steel-toed shoes are required to participate in any work dealing with suspended loads, including CTD deployments and recovery. The ship does not provide steel-toed boots. Hard hats are also 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.

C. 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 SWFSC 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.

Appendices

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

Appendix 1.a. Detailed list of Scripps Oceanography Chemicals and spill control plan.

Scripps Oceanography, CalCOFI Chemical Spill Kit List, *Ocean Starr* March 2016

The main concern here is the 10 normal Sulfuric Acid which is secured to the bench in wooden box to prevent spill. We bring a 13.5 lbs bag of Baking soda to neutralize acid in the event of a spill.

Our Radiation van has a spill kit that consists of 2 x 1/2 gallon of Safety Sorbent, the spill kits listed below were just ordered along with additional baking soda.

In addition to the spill kit in the Rad van we bring 6 x 1/2gallon additional cartons of Safety Sorbent

http://wyksorbents.com/anti-slip-safety-sorbent/

Safety Sorbent 8 x 1/2 gallon (http://wyksorbents.com/anti-slip-safety-sorbent/)

Sodium Bicarbonate (Arm & Hammer baking soda) 2 x 13.5 lbs bag for Acid Spills

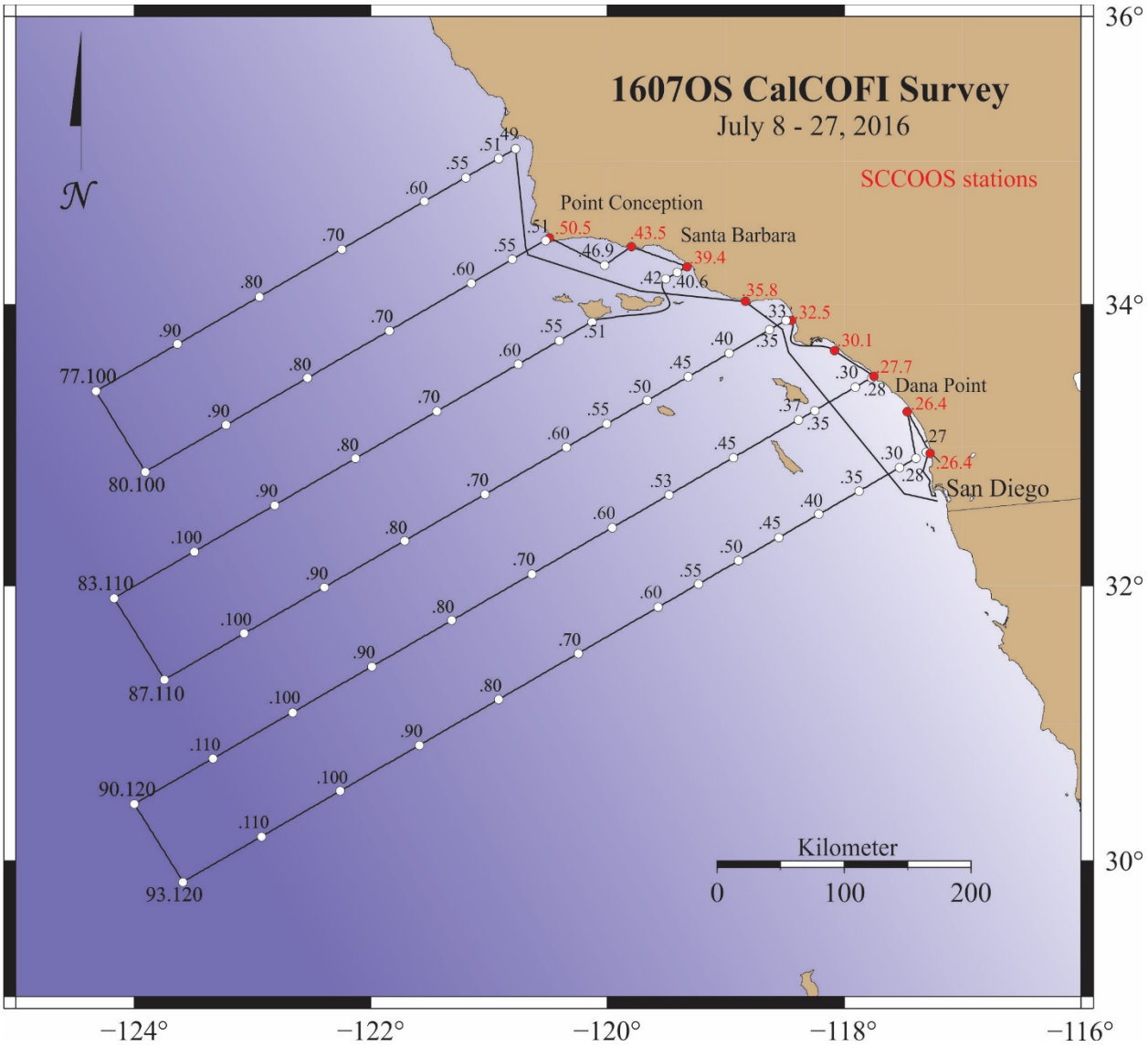
Portable Allwik Economy Spill Kit in Yellow Bag x2
(http://www.fastenal.com/web/products/detail.ex?sku=1007705)

Vinyl gloves 20+ boxes (50-100) count

Containment bags 3 rolls of 50 each

Roll paper towels 12 each.

Appendix 1.b. Requested cruise track and station location.



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

Schedule_Order	Line	Station	Dlatitude	Dlongitude
1	93.3	26.7	32.95637243	117.3053809
2	93.4	26.4	32.94905192	117.2735654
3	91.7	26.4	33.24350056	117.4654169

4	93.3	28	32.91303909	117.3943818
5	93.3	30	32.84637243	117.5312206
6	93.3	35	32.67970576	117.8728643
7	93.3	40	32.51303909	118.2138649
8	93.3	45	32.34637243	118.5542278
9	93.3	50	32.17970576	118.8939582
10	93.3	55	32.01303909	119.2330612
11	93.3	60	31.84637243	119.5715421
12	93.3	70	31.51303909	120.2466579
13	93.3	80	31.17970576	120.9193461
14	93.3	90	30.84637243	121.5896467
15	93.3	100	30.51303909	122.2575992
16	93.3	110	30.17970576	122.9232422
17	93.3	120	29.84637243	123.5866142
18	90	120	30.41794919	123.9989326
19	90	110	30.75128253	123.3316429
20	90	100	31.08461586	122.6620162
21	90	90	31.41794919	121.9900131
22	90	80	31.75128253	121.3155939
23	90	70	32.08461586	120.6387183
24	90	60	32.41794919	119.9593451
25	90	53	32.65128253	119.4822756
26	90	45	32.91794919	118.9355113
27	90	37	33.18461586	118.3870812
28	90	35	33.25128253	118.2497109
29	90	30	33.41794919	117.9058212
30	90	28	33.48461586	117.7680788
31	90	27.7	33.49461586	117.7474083
32	88.5	30.1	33.67442348	118.0836933
33	86.8	32.5	33.88887212	118.4442347
34	86.7	33	33.88952596	118.4903339
35	86.7	35	33.82285929	118.6287319
36	86.7	40	33.65619263	118.9742516
37	86.7	45	33.48952596	119.3190964
38	86.7	50	33.32285929	119.6632718
39	86.7	55	33.15619263	120.0067835
40	86.7	60	32.98952596	120.3496367
41	86.7	70	32.65619263	121.0333897
42	86.7	80	32.32285929	121.7145734
43	86.7	90	31.98952596	122.3932299
44	86.7	100	31.65619263	123.0694006

45	86.7	110	31.32285929	123.7431265
46	83.3	110	31.91175657	124.1703953
47	83.3	100	32.2450899	123.4923224
48	83.3	90	32.57842323	122.8117321
49	83.3	80	32.91175657	122.1285823
50	83.3	70	33.2450899	121.4428307
51	83.3	60	33.57842323	120.7544339
52	83.3	55	33.7450899	120.4092298
53	83.3	51	33.87842323	120.1325788
54	83.3	42	34.17842323	119.5085132
55	83.3	40.6	34.2250899	119.4112355
56	83.3	39.4	34.2650899	119.3278113
57	81.7	43.5	34.40555136	119.80037
58	81.8	46.9	34.27489752	120.0252367
59	80	50.5	34.46666667	120.4890554
60	80	51	34.45	120.5239048
61	80	55	34.31666667	120.802448
62	80	60	34.15	121.15
63	80	70	33.81666667	121.8430351
64	80	80	33.48333333	122.5333494
65	80	90	33.15	123.2209872
66	80	100	32.81666667	123.9059922
67	76.7	100	33.38824343	124.3228913
68	76.7	90	33.72157677	123.633345
69	76.7	80	34.0549101	122.9410906
70	76.7	70	34.38824343	122.2460832
71	76.7	60	34.72157677	121.5482772
72	76.7	55	34.88824343	121.1983102
73	76.7	51	35.02157677	120.9178206
74	76.7	49	35.08824343	120.7774028
75	85.4	35.8	34.02135923	118.8341306