UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way N.E.
Seattle, Washington 98115-6349

Project Instructions

Date Submitted:	May 30, 2019
Platform:	NOAA Ship *Oscar Dyson*
Project Number:	DY-19-07 (AFSC)
Project Title:	Fall Juvenile Survey (EMA/FOCI Age-0 groundfish and salmon recruitment)
Project Dates:	August 13, 2019 to September 14, 2019

Prepared by: Matthew T Wilson Dated: 30 May 2019
Matt Wilson
Chief Scientist
AFSC/RACE Division

Approved by: NAPP.JEFFREY.M.1365891679 Digitally signed by NAPP.JEFFREY.M.1365891679 Date: 2019.05.30 07:57:41 -07'00' Dated: 30 May 2019
Dr. Jeffery M. Napp
Division Director
AFSC/RACE Division

Approved by: Robert J Foy Dated: June 3, 2019
Dr. Robert J. Foy,
Science and Research Director
Alaska Fisheries Science Center

Approved by: Digitally signed by HOPKINS.MICHAEL.L.1005253515 Date: 2019.08.02 15:30:11 -07'00' Dated:
Captain Michael L. Hopkins, NOAA
Commanding Officer
Marine Operations Center – Pacific

I. Overview

A. Brief Summary and Project Period

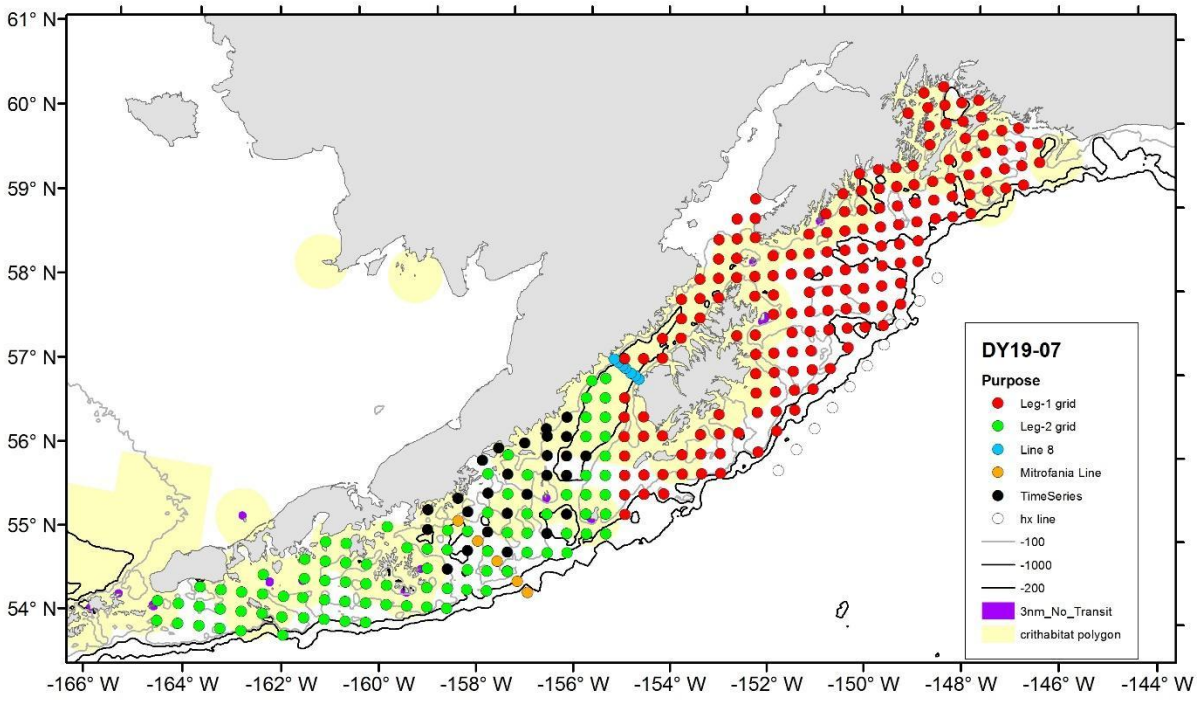
EMA-EcoFOCI Juvenile Walleye Pollock and Forage Fish Survey: Leg 1, August 13 – 26, 2019; Leg 2, August 29 – September 14, 2019.

B. Days at Sea (DAS)

Of the 31 DAS scheduled for this project, 31 DAS are funded by an OMAO allocation, 0 DAS are funded by a Line Office Allocation, 0 DAS are Program Funded, and 0 DAS are Other Agency funded. This project is estimated to exhibit a High Operational Tempo.

C. Operating Area (include optional map/figure showing op area)

Gulf of Alaska – DY-19-07 operation sites by leg (Leg 1, Leg 2) and purpose (see Appendix 1 for coordinates). “Line 8” and “Mitrofania Line” are CTD-only sites, all others are bongo-and-trawl sites.



D. Summary of Objectives

Fisheries (midwater trawl) and oceanographic survey to:
1. Extend time series of abundance of age-0 Walleye Pollock and other select forage fishes in the western Gulf of Alaska;

2. Collect zooplankton and measure environmental variables that potentially affect the ecology of these fishes; and

3. Conduct CTD casts and water sampling at stations along two transects to examine the physical, chemical, and biological oceanography associated with cross-shelf flow.

4. Opportunistic testing of surface pots for live capture of sablefish juveniles pending approval by ship's personnel of methods to deploy and retrieve the gear.

E. Participating Institutions

NOAA – Alaska Fisheries Science Center (AFSC), Resource Assessment and Conservation Engineering (RACE) Division
7600 Sand Point Way N.E., Seattle, Washington 98115-0070

NOAA – Pacific Marine Environmental Laboratory (PMEL)
7600 Sand Point Way N.E., Seattle, Washington 98115-0070

NOAA – Alaska Fisheries Science Center (AFSC), Ecosystem Monitoring and Assessment (EMA), Auke Bay Laboratories
17109 Point Lena Loop Road, Juneau, AK, 99801

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

Name (Last, First)	**Title**	**Date Aboard**	**Date Disembark**	**Gender**	**Affiliation**	**Nationality**
Busby, Morgan	Sci.	Aug. 11	Aug. 26	M	AFSC/RACE	USA
Deary, Allison	Sci.	Aug. 11	Aug. 26	F	AFSC/RACE	USA
Dougherty, Annette	Sci.	Aug. 27	Sept. 14	F	AFSC/RACE	USA
Harpold, Colleen	Sci.	Aug. 27	Sept. 14	F	AFSC/RACE	USA
Harris, Callie	TAS	Aug. 11	Aug. 26	F	Teacher-at-Sea	USA
Moss, Jamal	Sci.	Aug. 27	Sept. 14	M	AFSC/EMA	USA
Nicolls, Dave	Sci.	Aug. 11	Aug. 26	M	AFSC/RECA	USA
Ormseth, Olav	Sci.	Aug. 27	Sept. 14	M	AFSC/REFM	USA
Paquin, Melanie	Sci.	Aug. 27	Sept. 14	F	AFSC/RACE	USA
Porter, Steve	Chief Sci.	Aug. 27	Sept. 14	M	AFSC/RACE	USA
Proctor, Peter	Sci.	Aug. 27	Sept. 14	M	OAR/PMEL	USA
Rogers, Lauren	Sci.	Aug. 11	Aug. 26	F	AFSC/RACE	USA
Strasburger, Wess	Sci.	Aug. 11	Aug. 26	M	AFSC/EMA	USA
Suryan, Rob	Sci.	Aug. 27	Sept. 14	M	AFSC/ABL	USA
Tabisola, Heather	Sci.	Aug. 11	Aug. 26	F	OAR/PMEL	USA
Wilson, Matt	Chief Sci.	Aug. 11	Aug. 26	M	AFSC/RACE	USA

G. Administrative

1. Points of Contacts:

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Laura Dwyer LT/NOAA ; (Operations Officer II, NOAA Ship *Oscar Dyson*); NOAA Corps, 2002 SE Marine Science Dr., Newport, OR 97365; ph: (541) 867-8911/2 (Ship's VOIP), OPS.Oscar.Dyson@NOAA.GOV

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

This Project will be conducted under a Scientific Research Permit issued by the Alaska Regional Office, National Marine Fisheries Service (SRP #2019-B2), and a Fish Resource Permit issued by the State of Alaska (CF-19-032). The Chief Scientist will be included as an authorized participant on both permits.

II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

Leg 1
Depart: August 13, 2019 Kodiak, AK
Arrive: August 26, 2019 Kodiak, AK

Leg 2
Depart: August 29, 2019 Kodiak, AK
Arrive: September 14, 2019 Dutch Harbor, AK

B. Staging and Destaging:

For staging, the equipment and supplies necessary for the project will be 1) stored in the Kodiak Pier 2 warehouse from the prior EMA-FOCI Larval Groundfish Assessment survey, and 2) shipped to Kodiak from Seattle for loading onto NOAA Ship *Oscar Dyson* prior to departure from Kodiak on August 13, 2019. We request ship's assistance with loading on August 12, 2019, including access to the Pier 2 warehouse, a forklift and forklift operator, and use of the ship's crane and a crane operator. We will require dedicated use of the chemistry, hydrographic, wet, dry, and fish processing labs for sample and equipment preparation and request as much counter and cabinet space as possible. We will use the Dry lab for FastCat/SeaCat operations.

For destaging, most of the gear, unused supplies, and samples collected will remain on board *Oscar Dyson* because much of the gear and remaining supplies will be used during project DY-19-08. The trawl gear (3 trawls, 4 doors, bridles and other trawl wires) will be offloaded in Dutch Harbor on Sept 14, 2019 for shipment to Seattle.

C. Operations to be Conducted:

Preparation for all project scientific operations will be made prior to project's beginning.

1) Load starboard (primary) net reel with Stauffer trawl #2 (ID stamped on stainless "bracelet" near wingtip), load port (secondary) net reel with Stauffer trawl #1. The shrimp trawl is aboard only as backup for the Stauffer trawls.
2) Hang the 5x7 trawl doors (steel-v, 1250 lbs each).
3) Setup bongo/FastCat array and deck test electronics.
4) Make ready the CTD/rosette.
5) Ensure -80 °C and walk-in freezers are working and available.

6) Setup all relevant labs and electronic/computer systems.

The Navigation Officer and Chief Scientist will determine the specific grid location at which to commence station operations. Operations for this project will be conducted 24/7. The project will begin upon departure from Kodiak, Alaska on August 13, 2019.

Please advise the science party if 2 Survey Technicians will **NOT** be available for the project.

1. **Underway Operations** –

Scientific Computer System (SCS) shall operate throughout the project, acquiring and logging data from navigation, meteorological, and oceanographic sensors.

Scientific echo-sounder (EK60) shall operate throughout the project to collect acoustic data from multiple transducers (e.g., 18, 38, 120, and 200 kHz). We request that Survey Department monitor and adjust the system as needed.

We request that the centerboard be LOWERED for the duration of the project.

2. **Station Operations** –

The collection sites can be grouped into two categories: 1) net operations, and 2) CTD transects. Net operations will be conducted at all sites except CTD-transect sites. Net operations entail sampling with a bongo/FastCat array and a Stauffer trawl in succession; these will be oblique tows to 200 m depth depending on water depth.

The tentative order of station occupation (see Operating Area – Gulf of Alaska) will be determined daily in consultation with ship's personnel. This order will likely change to increase overall sampling efficiency, but is expected to generally adhere to the following.

- Leg 1 (Aug 13 - 26) will focus on sampling the eastern part of the study area.
- Leg 2 (Aug 29 – Sept 14) will focus on the western part of the study area.

Net Operations

Bongo/FastCat Array

The standard gear for zooplankton/ichthyoplankton sampling will be the bongo/FastCat array. Both the 60-cm and 20-cm bongo nets will be used. The 60-cm bongo nets will be 0.505-mm mesh. The 20-cm bongo nets will be 0.153-mm mesh. A FastCat will be mounted above the bongo to provide depth, temperature, and salinity data. Tows will be to 200 meters or 10 meters off the bottom where water depth is shallower.

Two SCS buttons are required:

1) Surface (in/out),
2) EQ

Marks to the SCS will be made in the Survey Office (Dry Lab) by a scientist on-watch who will be monitoring the FastCat operation throughout the station occupation. The processing of FastCat files and CTD files will be the responsibility of the scientific personnel on watch.

The samples collected from the 20-cm and 60-cm bongos will be processed in the following manner. For each, Net 1 will be preserved in 1.8% formaldehyde, buffered with sodium borate, and boxed. Net 2 from each bongo will be used for rapid zooplankton assessment and then discarded.

Several CTD casts, no Niskin bottles required, will be requested during each leg to verify the performance of the FastCat.

Stauffer (aka anchovy) trawl

The Chief Scientist and Operations Officer will decide which of the ship's sonar/net sonde systems to use on the trawl. Prior to some hauls, it may be prudent to traverse the anticipated trawl path over the seafloor prior to putting the net in the water. For every haul, the codend liner will be tied closed and the codend secured with a cowbell-pucker string. Prior to and during trawling operations, a scientist will be on the Bridge to fill out the FOCI Trawl Haul Form, coordinate with the Officer of the Deck (OOD) on when to call events (doors out, EQ, haulback, doors in), and to record events in SCS and CLAMS.

Three SCS buttons are required:

1) Doors in the water,
2) EQ,
3) Doors out of the water

The Stauffer trawl will be deployed to a headrope depth of 200 meters, or to a footrope depth of 10 meters off the bottom, whichever is shallowest. In areas of high seafloor relief, it may be necessary to increase the distance off bottom to ensure the trawl does NOT contact the bottom. Net depth will be monitored using the ship's Simrad ITI (trawl eye), FURUNO, or 3rd-wire systems, whichever is deemed most suitable. Standard trawl operations will be used for deployment. Once equilibrium is achieved, as determined by the scientist, ***the trawl will be retrieved at a wire rate of about 10 meters per minute***. Ship speed during retrieval is typically 2.5-3 kts.

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Sablefish surface traps

Sampling will be conducted opportunistically (or as possible) with deployment near dusk and retrieval after a minimum soak time. A number of different pot designs, lighting color, and bait will be tested. Pots will be set in the evening and retrieved in the morning at times and locations such to minimize impact on daily survey operations. Deployment at stations on or near the slope/shelf break

is preferred. Pots will be stringed together, floated at the surface, and well-marked to increase visibility during late evening/early morning. Longline poles lighted with strobes and marked with radar reflectors will be affixed to minimize navigational hazard. The purpose of this project is to evaluate as a proof of concept before scaling. The vessel will resume other net sampling after the pots are deployed and will return later to recover the pots; as such, this may require some adjustment in the sequence of bongo/trawl site occupation.

CTD transects

CTD FastCAT-verification: A cast will be conducted at each of 3 locations corresponding approximately with the start, midpoint, and end of each leg. Because these casts are only to verify FastCat performance, the maximum depth should correspond approximately with the intended bongo/FastCat array depth, and no bottles or sensors other than conductivity, temperature, and depth are needed. The CTD will be the first operation at the chosen locations. These are NOT part of the CTD Transects.

CTD Transects: These transects will be occupied weather and time permitting, and Niskin bottles will be needed to collect water samples:

1) "Line 8" transect
   All 7 Line-8 sites will be sampled: Fox 56, 57, 58, 59, 60, 61, and 55 following Line-8 protocol; however, only nutrient and phytoplankton samples will be collected. There will be no bongo.

2) "Mitrofania Line" transect
   All hydrographic casts include high-resolution vertical profiling of water properties (including temperature, salinity, chlorophyll fluorescence, PAR, dissolved O_2) to within 10 m of the bottom using a Seabird 911Plus CTD. Nutrient samples will be collected at all sites. At each site, collect a sample at 0, 10, 20, 30, 40, 50, 75, 100m depth, and at 10m off bottom. These samples will be frozen at –80C for analysis at a later date at the NOAA laboratories in Seattle. Oxygen samples will be collected at only one site to calibrate the CTD oxygen sensors. At that site, collect a sample at the surface and at 10m off bottom. Samples will be preserved with 1 ml solutions of MnCl2 and sodium hydroxide (8 M) / sodium iodide (4 M), and stored on board for titration during the survey. There will be no bongo.

D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations: poor weather and equipment failure. Poor weather would be waited out in a sheltered area until operations could be resumed and modifications would be made to the sampling grid. Sheltered areas are of scientific interest; therefore, while waiting out poor weather, the Chief Scientist may request sampling operations to assess local physical conditions, zooplankton, and fish populations. Equipment failure would have to be addressed immediately for the project to continue.

III. Equipment

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

1. Acoustic Equipment
   - GPS with NEMA 183 to ER60 (2)
   - 50/200 kHz ES60 Bridge sounder
   - Furuno FE-700 fathometer
   - Acoustic echosounders (5)
2. Trawling Equipment
   - 3rd wire FS-70 net sonar with winch and accessories (2)
   - Simrad ITI net mensuration system (2)
   - Furuno CN24-40 headrope transducer
   - Stern trawl capabilities for trawling including reel and transfer wires
3. Oceanographic Equipment
   - Both starboard oceanographic winches with conducting cable, slip rings and blocks. Forward winch terminated for CTD/rosette; aft winch terminated for FastCat/SeaCat.
   - Seabird SBE 911+CTD System
   - Seabird SBE19+CTD (SeaCat), PDIM, and deck unit for real time data on bongo tows
   - Niskin Bottles 10 L (need 10 total+ spares)
   - SBE45 Thermosalinograph with fluorometer
   - Wire speed indicators and readout for both hydrographic winches visible in Dry Lab or where FastCat/SeaCat operations occur
   - Weather instr. for above surface PAR, wind speed/direction
4. Biological Sampling Equipment
   - Fish lab conveyor system
   - Catch sorting and weighing table
   - Calibrated Marel M60 60kg scale (2)
   - Calibrated Marel M60 6kg scale (2)
   - Large gray tubs for dumping catch into (2)
   - Fish baskets
   - Fish trays
5. Computing equipment
   - Scientific Computing System
6. Sample storage equipment
   - Ultracold freezer (-80C)

- Walk in freezer (-10C)
- Stand up freezer (-20C)
- Hazmat storage cabinets

7. Laboratory and exterior working space
   - Use of Pentium PC in Dry and/or Computer Lab for data analysis,
   - Remote access in the computer lab to FastCat data stored in the survey lab.
   - Scientific Computer System (SCS)
   - Video monitors in Dry, Chemistry, and Wet labs for viewing SCS output
   - Laboratory space with exhaust hood, sink, lab tables, and storage space
   - Sea-water hoses and spray nozzles to wash nets (quarterdeck and aft deck),
   - Adequate deck lighting for night-time operations,
   - Navigational equipment including GPS and radar,
   - Safety harnesses for working on starboard sampling station/hero platform and fantail
   - Ship's crane(s) used for loading and/or deploying gear and supplies

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

1. Trawling Equipment
   - 3 small-mesh midwater trawls (2 Stauffer; 1 shrimp) equipped with 3-mm (1/8") mesh codend liner
   - 4 steel-v trawl doors (each door: 5'x7', 1250 lbs)
   - 4 door-rigging wires (legs and extension wire, 77' overall)
   - 10 bridles for Stauffer trawl (30 fm, includes 2 spares)
   - 6 bridles for shrimp trawl (10 fm, includes no spares)
   - All accessories to make trawls fishable (G-hooks, flatlinks, 5/8" hammerlocks, open hammerlocks, chain, cowbell-pucker string)
2. Plankton Equipment
   - 60 cm bongo frames (2)
   - 20 cm bongo frames (2)
   - 60 cm bongo nets and cod-ends
   - 20 cm bongo nets and cod-ends
   - 50 kg bongo weights (2)
   - Flow meters (10)
   - Wire angle indicators (2)
   - Miscellaneous supplies
3. Oceanographic Equipment (1,500lbs)
   - Biospherical QSP2300 PAR sensor
   - SBE 43 dissolved oxygen sensor (2)
   - Secondary TC sensors for SBE 911+
   - One SBE-49 FastCat
   - Filter racks and pumps (2)
4. Sablefish live traps (300lbs)
5. Biological Sampling Equipment (500lbs)

- CLAM system fully complete w/ length boards w/ magnets, multiple stations w/touchscreen monitors, and other hardware
- 5-gal buckets (5)
- Two length boards for adult fish
- Two length boards for small fish
- Mechanical platform scale (backup for Marel "basket" scale)
- Triple beam balance (backup for Marel "specimen" scale)
- 1200 Zip-loc bags (various sizes)
- Sieves, jar holder, funnels, squirt bottles
- 51 cases of 32-oz jars, closures, and labels
- Preservative-dispenser equipment
- Hazardous materials spill kit
- Forms: COD (200), Haul (300), Catch (300), Length (600 double-sided)

6. Computing equipment (50lbs)
   - CLAMS laptop from AFSC/FOCI
   - IBM compatibles
   - Cruise Operations Database (COD) software
   - Paper forms: COD, and trawl Haul, Catch, and Length

IV. Hazardous Materials

A. Policy and Compliance

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

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

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

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

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

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

B. Inventory

NOAA vessel *Oscar Dyson* was loaded 4/10/2019 by FOCI and PMEL personnel. All chemicals listed will be used for the entire 2019 Dyson field season. Chemical volumes will be reported to the Environmental Compliance Officer and the designated contact for each survey will be required to report to chemical owners. The name of the group responsible for each of the chemicals is designated after the chemical name in the table. MSDS, chemical hygiene plan, and SOPs will be provided to the Dyson before commencement of the Project.

Common Name	**Concentration**	**Amount**	**Spill Response (all FOCI/MACE/PMEL /E MA personnel)**	**Notes**
Ethanol Property of FOCI	100%	5 -1 gal. plastic jugs	Gloves 3M Sorbent Pads Plastic bag	Store in Chem. Lab yellow flammables cabinet.
Formaldehyde Property of FOCI	37%	8 – 2.5 gal. barrels	Gloves Eye Protection Fan-Pads Formalex PolyForm-F Plastic bags	Store in Fish Lab flammable cabinets. Will need to place 4 in each cabinet.
Lithium 9v Batteries Property of PMEL		8	NA	In SeaBird and Wetlabs instruments
Lithium AA Batteries Property of PMEL		96	NA	In SeaBird instruments and MicroCats Saft LS14500

Lithium D Cell Batteries Property of PMEL		150	NA	In RCM9 & Peggy Mooring
Lithium DD Cell Batteries Property of PMEL		2 x 12 each	NA	In Argo Floats, stored on aft-deck, outside
Mangan ese Chloride Property of PMEL	3M	1 liter	Gloves Kitty Litter Plastic bag	Not a regulated chemical/soluti on. Used for oxygen titrations.
Potassium Iodate	0.00167 M	1 liter	Spill Control: PI Gloves	Used for oxygen titrations.
Property of PMEL			Plastic bag	
Sodium Borate Solution Property of FOCI	5-6%	1 – 5 gal.	Gloves Paper towels Plastic bag	Not a regulated chemical. Working container will be secured on Fish Lab counter.
Sodium Borate Powder Property of FOCI	100%	1 – 500 g	Gloves Wet paper towels Plastic bag	Not a regulated chemical. Stored in Spill Kit.
Sodium Iodide/Na OH Solution Property of PMEL	4 M Nal, 8 M NaOH	1 liter	Spill Control: B	Used for oxygen titrations.
Sodium Thiosulf ate Property of PMEL	0.11 M	1 liter	Spill Control: ST	Used for oxygen titrations.
Sulfuric Acid Property of PMEL	5 M	1 liter	Spill Control: A	Used for oxygen titrations.

C. Chemical safety and spill response procedures

A: ACID

- 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.

B: Base

- Use proper PPE.
- Ventilate area.
- Neutralize with dilute acid such as HCl if possible.
- Absorb with cat litter or vermiculite.
- Vacuum or sweep up material and place into suitable disposal container.
- Do not breathe dust.
- Do not get water on spilled substances.

M: Mercury

- Spills: Pick up and place in a suitable container for reclamation or disposal in a method that does not generate dust. Sprinkle area with sulfur or calcium polysulfide to suppress mercury. Use Mercury Spill Kit if need be.

F: Formalin/Formaldehyde

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

PI: Potassium Iodate

- Avoid Contact with combustibles (wood, paper, clothing …).
- Keep substance damp with water spray.
- Vacuum or sweep up material and place into suitable disposable container (plastic bag).

ST: Sodium Thiosulfate

- Ventilate area of leak or spill.
- Wear protective gloves and clean body-covering
- Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.
- Recover liquid or particulate in 5 gallon bucket. Absorb with a kitty litter and place in disposable bag.
- Do not use combustible materials, such as saw dust to absorb.

E: Ethanol

- Eliminate all ignition sources
- Wear PPE

FOCI Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Formalex	1 – 5 gallon 2 -1 gallon	Formaldehyde cleanup (all concentrations)	1:1 control	Formalex will be used in conjunction with Fan-Pads to reduce spill volume.
Fan-Pads	2 rolls (50 sheets each roll)	Formaldehyde cleanup (all concentrations)	50 sheets = 50 - 150 ml spills	Formalex will be used in conjunction with Fan-Pads to reduce total spill volume.
PolyForm-F	1 – 5 gal. bucket	Formaldehyde cleanup (all concentrations)	1:1 control	Pour onto large spill immediately to deactivate formaldehyde.
3 M Pads	10 pads	Ethanol cleanup	10 pads=10 - 250ml spills	Pads may be reused if dried out under fume hood.
Nitrile Gloves	8 pairs each S,M,L,XL	For all cleanup procedures	N/A	Gloves will be restocked by each survey group.
Eye Protection	4 pairs goggles 1 face shield	Formaldehyde cleanup	N/A	Eye protection will be cleaned before re-

				use.
Tyvex Lab Coats	2 coats	Formaldehyde cleanup	N/A	Coats will be cleaned with Fan- Pads and Formalex before reuse.
Plastic Bags	2	Formaldehyde cleanup/Fan Pads	N/A	Bags may be packed full and sealed.

PMEL Acid-Base Spill Kit Contents	**Amount**	**Use**	**Total Spill Volume Controllable**	**Notes**
Spilfyter Acid Neutralizer	1 box	Clean up acid spill— H_2SO_4	1.5l of 5M Sulfuric Acid 5.57l of 10% (1N) HCl	
Spilfyter Base Neutralizer	1 box	Clean up base spill-- NaOH	2.0l of Sodium Hydroxide	
Vinyl Gloves	1 box	Protect hands during cleanup	N/A	
Foxtail/Dustpan	1 each	Pick up absorbed neutralizer	N/A	
Rubber apron	1 each	Protect during cleanup	N/A	
Paper Towels	1 roll	Absorb liquids	N/A	
Goggles	2 pair	Protect eyes	N/A	
Chemical absorbent (kitty litter)	1 liter	Absorb liquids	0.5l	
Plastic Bags	2 each	Contain used absorbents/waste	N/A	

Chemical Hygiene Plan and Standard Operating Procedures (SOPs)

Previous sections of the Project Instructions include a list of hazardous materials by name and anticipated quantity. Chemicals will be transported, stored and used in a manner that will avoid any spills and adequate containment, absorbents and cleanup materials will be available in the event of a chemical spill.

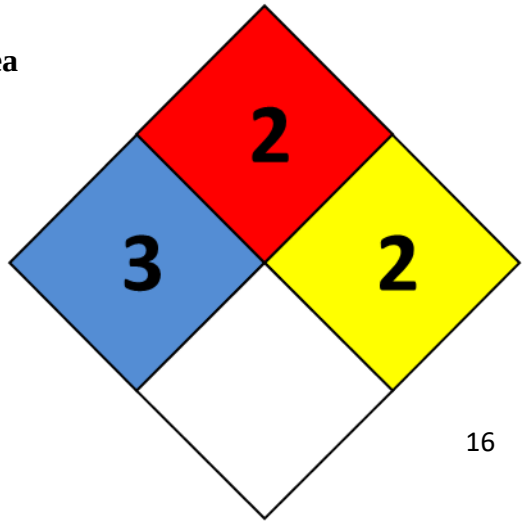
The scientific chemicals to be used for this project are: (1) ethyl alcohol (100%) and (2) formaldehyde (37%). Other chemicals brought aboard are consumer products in consumer quantities. Dilutions of the scientific chemicals will be used to preserve in faunal organisms collected with benthic grab samplers, as described in the Operations section of these Project Instructions. Use of these chemicals and the specified dilutions will only occur in exterior locations on the ship away from air intakes. Scientific chemicals shall not be disposed over the side.

Standard Operating Procedures and Information Sheets are provided here for the scientific chemicals. Included are details concerning personal protective equipment, work area precautions, special handling and storage requirements, spill and accident procedures/first aid, waste disposal and other pertinent information. Both small and large spills are of particular concern. In both cases, the spill response is intended to first contain the spill and then neutralize it. This may be easily accomplished for small spills depending on the degree of vessel motion and the prevailing environmental conditions. In all cases, the first responder should quickly evaluate the risks of personal exposure versus the potential impacts of a delayed response to the spill and act accordingly. For example, if the spill is small and it is safe to do so, a neutralizing agent should be rapidly applied to encircle/contain the spill and then cover it. However, a large formaldehyde spill (> 1 L) is extremely hazardous and individuals at risk of exposure should immediately leave the area. The CO or OOD should be notified immediately so that a response team with self-contained breathing apparatus (SCBA) can be deployed to complete the cleanup operation or dispense the hazard with a fire hose directed overboard. The vessel's course should be adjusted to minimize exposure of personnel to wind-driven vapors and to limit spread of the spill due to vessel motion. The reportable quantity (RQ) of formaldehyde is 1,000 pounds and the RQ for ethyl alcohol is 5,000 pounds which greatly exceed the quantities brought aboard for this project.

Standard Operating Procedures – Formaldehyde At-Sea

Chemical Name: 37% Formaldehyde
UN Number: 1198

<u>Hazard Ratings: (on a scale of 0 to 4)</u>
Health (blue): 3 Flammability (red): 2
Reactivity (yellow): 2 Special (white):



<u>Personal Protection Gear Needed</u>
* gloves

* goggles or face shield

Special Handling Instructions
* If a ventilation hood is not available, then pouring of chemical must be done outside. At least two people should be involved with large chemical transfers in case of an emergency.
* Chemical must be stored at temperatures above 15^{o} c to prevent polymerization of paraformaldehyde.

First Aid
* If swallowed, give large amounts of drinking water and induce vomitting.
* If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.
* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

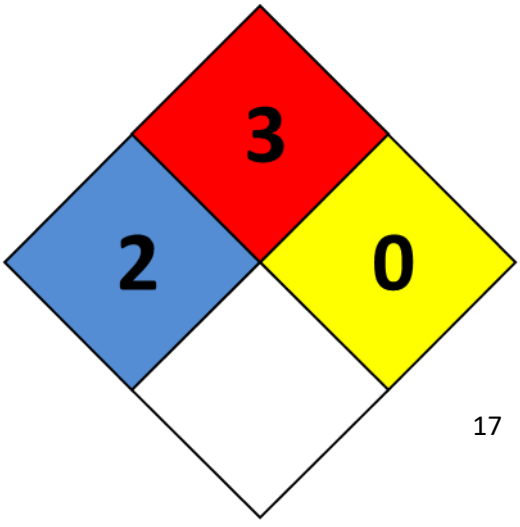
Spill Cleanup Procedures
* **For small spills** (500-1000 mls):
  Cover spill quickly with a Fan Pad and spray on Formalex to deactivate and absorb chemical. Let material sit for 10 - 15 minutes. Dispose of materials in plastic bag.
* **For large spills** (1000 mls - ?):
  Use a combination of Fan Pads and Formalex as quickly as possible to contain spill and deactivate it. Vacate area and try to ventilate room, if possible. Call Bridge immediately.

Deactivation/Disposal Procedures At Sea
* Formalex is a greenish liquid that is to be used to insure proper chemical deactivation. Formalex should also be used in conjunction with Fan Pads. Place used Fan Pad in plastic bag, seal, and put in bottom of Spill Kit.
* Fan Pads may be used to absorb small spills alone but these pads work best when used with Formalex to immediately control the vapor layer.

Shipping Procedures and Restrictions
* 37% formaldehyde cannot be ship by air due to its flammability rating.

* All quantities should be over-packed with absorbency material in case the original container is damaged. When shipping by barge or land, labels are not required for quantities under 110 gallons by D.O.T. but the container should have MSDSs and the UN number readily available.

Standard Operating Procedures – Ethanol At-Sea



Chemical Name: 100% Alcohol
UN Number: 1170

Hazard Ratings: (on a scale of 0 to 4)
Health (blue): 2 Flammability (red): 3
Reactivity (yellow): 1 Special (white):

Personal Protection Gear Needed

* gloves
* goggles or face shield when pouring

Special Handling Instructions
* Keep away from heat, flame, and other potential ignition sources.
* Store in a well ventilated area or in a flammable cabinet.

First Aid
* If swallowed, give large amounts of drinking water and induce vomitting.
* If vapors inhaled, get out into fresh air immediately. Give oxygen if breathing is difficult.
* If spilled on skin or splashed in eyes, flush with water for at least 15 minutes.

Spill Cleanup Procedures

Absorb ethanol with 3M Sorbent Pads and allow to dry in a well ventilated area away from ignition source.

Deactivation/Disposal Procedures At Sea

Use 3M Sorbent Pads to absorb the ethanol. Put used pads outside to dry (secure from blowing overboard and exposure to flame). Once dry, the pads may be reused or burned.

Shipping Procedures and Restrictions

Due to the flammability rating of 95% ethanol, this chemical cannot be shipped by air. Transportation by barge or land vehicle will require the ethanol container to be over-packed with absorbent materials such as clumping kitty litter or shredded paper. Include MSDSs and the UN number with the shipment for reference in the event of a spill.

D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

B. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information.* To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and

allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

A. Data Classifications: *Under Development*

a. OMAO Data

b. Program Data

B. Responsibilities: *Under Development*

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 hrs before or 7 days after the completion of a project to discuss the overall success and shortcomings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist or Principal Investigator, as appropriate. 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, cheese, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current makeup 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. Unless prior arrangements are made, the science party may move aboard the night before scheduled departure and must move off the ship the day after scheduled arrival (at the end of project). The Chief Scientist/Principal Investigator 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 or Principal Investigator to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

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

B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf.

NHSQs must be submitted every 2 years for individuals under the age of 50 and every 1 year for ages 50 and above. NHSQs must be accompanied by NOAA Form (NF) 57-10-02 - Tuberculosis Screening Document in compliance with OMAO Policy 1008 (Tuberculosis Protection Program,

which requires a yearly PPD or TB exam).

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

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT_Privacy/PROD01_008240).

The only secure submission process approved by NOAA is kiteworks by Accellion Secure File Transfer, which requires the sender to set up an account using a valid NOAA email address and password. User accounts may expire after 30 days of inactivity. Simply re-register to send and receive files.

Persons without a NOAA email account must fax or mail their forms.

Contact information:

Marine 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 Operations Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

C. Shipboard Safety

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

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed

shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth has increased, on average per ship, to 768 kbs and is shared by all vessel's staff and the science team at no charge to sailing personnel. Increased bandwidth in 7 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

E. IT Security

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

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

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

Computer Operating Systems that the support vendor has identified as reaching "End of Life" for support will not be allowed on the shipboard network. Examples include Microsoft Windows XP and Vista as well as Windows Server 2003.

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.

G. Marine Mammal, Endangered, and Protected Species

Mitigation measures for compliance with the MMPA and NEPA shall include but are not limited to the following.

Affected species:

These draft-standard mitigation measures apply to all marine mammals, including whales (especially North Pacific right, humpback, and Cook Inlet beluga), seals (especially ice-associated species), sea lions (especially Steller sea lions), walrus, polar bears, and sea otters; plus ESA-listed sea turtles, salmon, green sturgeon, and migratory bird species of special interest, including spectacled eiders, Steller's eiders, and short-tail albatross.

General principles:

AFSC shall take all necessary measures to coordinate and communicate in advance of each specific survey with the National Oceanic and Atmospheric Administration's (NOAA) Office of Marine and Aviation Operations (OMAO) or other relevant parties on non-NOAA platforms to ensure that all mitigation measures and monitoring requirements described herein, as well as the specific manner of implementation and relevant event-contingent decision-making processes, are clearly understood and agreed upon.

AFSC shall coordinate and conduct briefings at the outset of each survey and as necessary between ship's crew (Commanding Officer/master or designee(s), as appropriate) and scientific party in order to explain responsibilities, communication procedures, marine mammal monitoring protocol, and operational procedures.

AFSC shall coordinate as necessary on a daily basis during survey cruises with OMAO personnel or other relevant personnel on non-NOAA platforms to ensure that requirements, procedures, and decision-making processes are understood and properly implemented.

When deploying any type of sampling gear at sea, AFSC shall at all times monitor for any unusual circumstances that may arise at a sampling site and use best professional judgment to avoid any potential risks to marine mammals during use of all research equipment. AFSC shall convey this requirement to IPHC.

AFSC shall implement handling and/or disentanglement protocols as specified in the guidance that shall be provided to AFSC survey personnel.

AFSC shall adhere to a final Communication Plan. In summary and in accordance with the Plan, AFSC shall: (i) notify and provide potentially affected Alaska Native subsistence communities with the Communication Plan through a series of mailings, direct contacts, and planned meetings throughout the regions where AFSC fisheries research is expected to occur; meet with potentially affected subsistence communities to discuss planned activities and to resolve potential conflicts regarding any aspects of either the fisheries research operations or the Communication Plan; develop field operations plans as necessary, which shall address how researchers will consult and maintain communication with contacts in the potentially affected subsistence communities when in the field, including a list of local contacts and contact mechanisms, and which shall describe operational procedures and actions planned to avoid or minimize the risk of interactions between AFSC fisheries research and local subsistence activities; schedule post-season informational sessions with subsistence contacts from the study areas to brief them on the outcome of the AFSC fisheries research and to assess performance of the Communication Plan and individual field operations or

cruise plans in working to minimize effects to subsistence activities; and

Vessel operation procedures (transiting protocols):

Vigilant monitoring by vessel master to avoid ship strikes and navigational hazards, with the following minimum approaches:

- all marine mammals: >100 yds
- North Pacific right whale: >500 yds
- polar bears: >0.5 mile (on land or ice)
- walrus: >1 mile (on land)

No Transit Zones – Steller sea lion (SSL) rookeries and major haulouts, unless otherwise authorized.

Slow down to <= 10 knots if listed marine mammals are within 0.5 miles, especially in respective critical habitats (North Pacific right whale, Cook Inlet beluga whale, SSL).

Keep unnecessary lights off while anchored or while transiting near seabird colonies.

Monitoring during acoustic transect:

Active visual monitoring by chief scientist or designee (can be vessel master or informed protected species observer).

If a marine mammal is nearby, inform chief scientist immediately, slow vessel down to 10 knots and use other avoidance procedures. Use best professional judgement.

Acoustic Harassment Zone (100 yds) – record observation of animal entering zone and report interaction details post-survey.

Night-time operations:

Minimize night-time operations to the extent possible.

Scan area using available ship lights for > 50 m aft and amidships visibility during gear deployment. During limited visibility, conduct a general search of the research area.

Maintain vigilance during transit.

Overboard sampling protocols:

AFSC shall conduct overboard-sampling operations as soon as is practicable upon arrival at the sampling station.

AFSC shall initiate marine mammal watches (visual observation) at least 15 minutes prior to deployment of any gear into the water, including dredges, trackline reconnaissance, CTD casts, and plankton or bongo net hauls. Marine mammal watches shall be conducted by scanning the surrounding waters with the naked eye and range-finding binoculars (or monocular). During nighttime operations, visual observation shall be conducted using the naked eye and available vessel

lighting.

AFSC shall implement the move-on rule mitigation protocol, as described in this paragraph. If one or more marine mammals are observed and are considered at risk of interacting with the vessel or research gear, or appear to be approaching the vessel and are considered at risk of interaction, AFSC shall either remain onsite or move on to another sampling location. If remaining onsite, the deployment shall be delayed. If the animals depart or appear to no longer be at risk of interacting with the vessel or gear, a further observation period shall be conducted. If no further observations are made or the animals still do not appear to be at risk of interaction, then the set may be made. If the vessel is moved to a different section of the sampling area, the move-on rule mitigation protocol would begin anew. If, after moving on, marine mammals remain at risk of interaction, the AFSC shall move again or skip the station. Marine mammals that are sighted shall be monitored to determine their position and movement in relation to the vessel to determine whether the move-on rule mitigation protocol should be implemented. AFSC may use best professional judgment in making these decisions.

AFSC shall maintain visual monitoring effort while sampling gear is in the water (i.e., throughout the period of gear deployment and retrieval). If marine mammals are sighted before the gear is fully removed from the water, AFSC shall take the most appropriate action to avoid marine mammal interaction. AFSC may use best professional judgment in making this decision.

If sampling operations have been suspended because of the presence of marine mammals, AFSC may resume those operations when practicable only when the animals are believed to have departed the area. AFSC may use best professional judgment in making this determination.

Within 24 hours of any incidental take of, or injuries or mortalities to, marine mammals as a result of operations, the Chief Scientist/Field Party Chief shall report incident to the vessel CO, Jon Kurland (jon.kurland@noaa.gov, 907-586-7638) or Robyn Angliss robyn.angliss@noaa.gov, 206-526-4032), and Jeff Napp (jeff.napp@noaa.gov; 206-526-4148). This information will be entered into the Protected Species Incidental Take (PSIT) system.

IX. Appendices

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

Project	Possible order	Grid	Lat - DD	Lat - MM.M	Lon - DD	Lon - MM.M	Purpose
DY19-07	1	hf191	57	59.809	152	26.97	Leg-1 grid
DY19-07	2	hh193	58	0.179	152	1.482	Leg-1 grid
DY19-07	3	hj191	57	46.035	152	1.98	Leg-1 grid
DY19-07	4	hl189	57	31.891	152	2.388	Leg-1 grid
DY19-07	5	hn187	57	17.746	152	2.712	Leg-1 grid
DY19-07	6	hp185	57	3.648	152	2.229	Leg-1 grid
DY19-07	8	ht181	56	34.936	152	2.39	Leg-1 grid
DY19-07	10	hp181	56	48.964	152	27.773	Leg-1 grid
DY19-07	13	hl181	57	2.861	152	53.37	Leg-1 grid
DY19-07	14	hn179	56	48.717	152	53.364	Leg-1 grid
DY19-07	15	hp177	56	34.367	152	52.999	Leg-1 grid
DY19-07	16	hr175	56	19.948	152	52.945	Leg-1 grid
DY19-07	17	hp173	56	19.918	153	17.811	Leg-1 grid
DY19-07	18	hn175	56	34.202	153	18.45	Leg-1 grid
DY19-07	19	hl177	56	48.346	153	18.612	Leg-1 grid
DY19-07	20	hl173	56	33.832	153	43.686	Leg-1 grid
DY19-07	21	hn171	56	19.687	153	43.368	Leg-1 grid
DY19-07	23	hn167	56	5.215	154	7.714	Leg-1 grid
DY19-07	24	hl169	56	19.317	154	8.604	Leg-1 grid
DY19-07	25	hj167	56	18.947	154	33.918	Leg-1 grid
DY19-07	26	hl165	56	4.802	154	33.366	Leg-1 grid
DY19-07	27	hl161	55	50.097	154	58.16	Leg-1 grid
DY19-07	28	hj163	56	4.432	154	58.674	Leg-1 grid
DY19-07	29	hh165	56	18.576	154	59.298	Leg-1 grid
DY19-07	30	hf167	56	32.721	154	59.85	Leg-1 grid
DY19-07	31	hh173	56	47.606	154	9.318	Leg-1 grid
DY19-07	32	hf171	56	47.236	154	34.788	Leg-1 grid
DY19-07	32	hd173	57	1.38	154	35.106	Leg-1 grid
DY19-07	33	hd169	56	46.865	155	0.324	Leg-1 grid
DY19-07	33	hb171	57	1.01	155	0.72	Leg-1 grid
DY19-07	34	gz173	57	15.154	155	1.038	Leg-1 grid
DY19-07	36	FOX55	57	28.8	154	42	Line 8
DY19-07	37	FOX56	57	31.2	154	46.8	Line 8
DY19-07	38	FOX57	57	33	154	52.8	Line 8
DY19-07	39	FOX58	57	36.6	155	0.6	Line 8
DY19-07	40	FOX59	57	38.4	155	4.2	Line 8
DY19-07	41	FOX60	57	40.8	155	10.2	Line 8
DY19-07	42	FOX61	57	43.2	155	15.6	Line 8

DY19-07	43	gx179	57	43.813	154	35.562	Leg-1 grid
DY19-07	44	gv177	57	43.443	155	1.422	Leg-1 grid
DY19-07	45	gz181	57	44.183	154	9.774	Leg-1 grid
DY19-07	46	gx183	57	58.328	154	9.672	Leg-1 grid
DY19-07	47	gz185	57	58.699	153	43.884	Leg-1 grid
DY19-07	48	gx187	58	12.843	153	43.614	Leg-1 grid
DY19-07	49	gz189	58	13.213	153	17.82	Leg-1 grid
DY19-07	50	gv189	58	26.987	153	43.248	Leg-1 grid
DY19-07	51	gx191	58	27.358	153	17.37	Leg-1 grid
DY19-07	52	gz193	58	27.728	152	51.576	Leg-1 grid
DY19-07	53	gv193	58	41.502	153	16.83	Leg-1 grid
DY19-07	54	gx195	58	41.872	152	50.952	Leg-1 grid
DY19-07	55	gv197	58	56.017	152	50.232	Leg-1 grid
DY19-07	56	gt199	59	10.161	152	49.41	Leg-1 grid
DY19-07	57	gv201	59	10.532	152	23.448	Leg-1 grid
DY19-07	58	gt203	59	24.676	152	22.44	Leg-1 grid
DY19-07	59	gt207	59	39.191	151	55.272	Leg-1 grid
DY19-07	60	gv205	59	25.046	151	56.472	Leg-1 grid
DY19-07	61	gx203	59	10.902	151	57.558	Leg-1 grid
DY19-07	62	gx199	58	56.387	152	24.348	Leg-1 grid
DY19-07	63	gz197	58	42.242	152	25.146	Leg-1 grid
DY19-07	64	hb199	58	42.613	151	59.418	Leg-1 grid
DY19-07	65	hb203	58	57.128	151	32.808	Leg-1 grid
DY19-07	66	hd201	58	42.983	151	33.774	Leg-1 grid
DY19-07	67	hd197	58	28.469	152	0.204	Leg-1 grid
DY19-07	68	hf199	58	28.839	151	34.632	Leg-1 grid
DY19-07	69	hh197	58	14.695	151	35.4	Leg-1 grid
DY19-07	71	hl193	57	46.406	151	36.648	Leg-1 grid
DY19-07	72	hn191	57	32.261	151	37.134	Leg-1 grid
DY19-07	73	hp189	57	18.236	151	36.685	Leg-1 grid
DY19-07	74	hr187	57	4.082	151	36.656	Leg-1 grid
DY19-07	75	ht185	56	49.696	151	36.872	Leg-1 grid
DY19-07	76	hx181	56	20.909	151	36.855	hx line
DY19-07	77	hx185	56	35.652	151	11.526	hx line
DY19-07	78	hr191	57	18.697	151	11.061	Leg-1 grid
DY19-07	79	hp193	57	32.729	151	11.141	Leg-1 grid
DY19-07	80	hn195	57	46.776	151	11.382	Leg-1 grid
DY19-07	81	hl197	58	0.92	151	10.728	Leg-1 grid
DY19-07	82	hj199	58	15.065	151	9.984	Leg-1 grid
DY19-07	84	hf203	58	43.354	151	8.196	Leg-1 grid
DY19-07	85	hd205	58	57.498	151	7.152	Leg-1 grid
DY19-07	86	hd209	59	11.822	150	40.686	Leg-1 grid
DY19-07	87	hf207	58	57.868	150	41.574	Leg-1 grid

DY19-07	88	hh205	58	43.724	150	42.69	Leg-1 grid
DY19-07	89	hj203	58	29.579	150	43.716	Leg-1 grid
DY19-07	90	hl201	58	15.435	150	44.634	Leg-1 grid
DY19-07	91	hn199	58	1.291	150	45.462	Leg-1 grid
DY19-07	92	hp197	57	47.125	150	45.597	Leg-1 grid
DY19-07	93	hr195	57	33.215	150	45.466	Leg-1 grid
DY19-07	94	ht193	57	18.929	150	45.837	Leg-1 grid
DY19-07	95	ht189	57	4.361	151	11.355	Leg-1 grid
DY19-07	96	hx189	56	50.299	150	46.197	hx line
DY19-07	97	hx193	57	4.851	150	20.869	hx line
DY19-07	98	ht197	57	33.402	150	20.32	Leg-1 grid
DY19-07	100	hp201	58	1.548	150	19.837	Leg-1 grid
DY19-07	101	hn203	58	15.805	150	19.368	Leg-1 grid
DY19-07	102	hl205	58	29.95	150	18.366	Leg-1 grid
DY19-07	103	hj207	58	44.095	150	17.268	Leg-1 grid
DY19-07	104	hh209	58	58.239	150	16.062	Leg-1 grid
DY19-07	105	hf211	59	12.383	150	14.76	Leg-1 grid
DY19-07	106	hd213	59	25.882	150	14.515	Leg-1 grid
DY19-07	107	hd217	59	39.845	149	48.344	Leg-1 grid
DY19-07	108	hf215	59	26.898	149	47.76	Leg-1 grid
DY19-07	109	hh213	59	12.81	149	49.119	Leg-1 grid
DY19-07	110	hj211	58	58.609	149	50.634	Leg-1 grid
DY19-07	111	hl209	58	44.465	149	51.912	Leg-1 grid
DY19-07	112	hn207	58	30.32	149	53.088	Leg-1 grid
DY19-07	113	hp205	58	16.008	149	53.835	Leg-1 grid
DY19-07	114	hr203	58	1.965	149	54.275	Leg-1 grid
DY19-07	115	ht201	57	47.78	149	54.802	Leg-1 grid
DY19-07	116	hx197	57	19.309	149	55.54	hx line
DY19-07	117	hx201	57	33.673	149	30.211	hx line
DY19-07	118	ht205	58	2.062	149	29.285	Leg-1 grid
DY19-07	119	hr207	58	16.197	149	28.68	Leg-1 grid
DY19-07	120	hp209	58	30.321	149	27.924	Leg-1 grid
DY19-07	121	hn211	58	44.835	149	26.634	Leg-1 grid
DY19-07	122	hl213	58	58.979	149	25.272	Leg-1 grid
DY19-07	123	hj215	59	13.241	149	23.551	Leg-1 grid
DY19-07	124	hh217	59	27.235	149	22.264	Leg-1 grid
DY19-07	125	hf219	59	41.15	149	21.009	Leg-1 grid
DY19-07	126	hd221	59	53.713	149	22.172	Leg-1 grid
DY19-07	127	hf223	59	55.374	148	54.153	Leg-1 grid
DY19-07	128	hh221	59	41.557	148	55.41	Leg-1 grid
DY19-07	129	hj219	59	27.661	148	56.693	Leg-1 grid
DY19-07	130	hl217	59	13.687	148	57.995	Leg-1 grid
DY19-07	131	hn215	58	59.938	148	58.78	Leg-1 grid

DY19-07	132	hp213	58	45.658	148	59.927	Leg-1 grid
DY19-07	133	hr211	58	30.864	149	2.123	Leg-1 grid
DY19-07	134	ht209	58	16.309	149	3.65	Leg-1 grid
DY19-07	135	hv207	58	2.117	149	4.372	Leg-1 grid
DY19-07	136	hx205	57	47.943	149	4.883	hx line
DY19-07	137	hx209	58	2.044	148	39.688	hx line
DY19-07	138	hv211	58	16.833	148	37.901	Leg-1 grid
DY19-07	139	hx213	58	17.946	148	11.078	hx line
DY19-07	140	hx217	58	33.211	147	43.352	hx line
DY19-07	141	ht213	58	31.817	148	35.575	Leg-1 grid
DY19-07	142	ht217	58	46.596	148	8.557	Leg-1 grid
DY19-07	143	hr215	58	46.485	148	33.587	Leg-1 grid
DY19-07	144	hp217	59	0.495	148	32.656	Leg-1 grid
DY19-07	145	hr219	59	1.466	148	6.04	Leg-1 grid
DY19-07	146	hp221	59	15.227	148	5.385	Leg-1 grid
DY19-07	147	hn219	59	14.59	148	31.626	Leg-1 grid
DY19-07	148	hl221	59	28.1	148	31.128	Leg-1 grid
DY19-07	149	hn223	59	29.137	148	4.471	Leg-1 grid
DY19-07	150	hl225	59	42.411	148	4.262	Leg-1 grid
DY19-07	151	hj223	59	41.978	148	29.835	Leg-1 grid
DY19-07	152	hh225	59	55.779	148	28.556	Leg-1 grid
DY19-07	153	hj227	59	56.195	148	2.976	Leg-1 grid
DY19-07	154	hn227	59	43.581	147	37.317	Leg-1 grid
DY19-07	155	hp225	59	29.854	147	38.113	Leg-1 grid
DY19-07	156	hr223	59	16.339	147	38.493	Leg-1 grid
DY19-07	157	ht225	59	16.449	147	13.464	Leg-1 grid
DY19-07	158	hv227	59	17.524	146	46.639	Leg-1 grid
DY19-07	159	ht229	59	31.214	146	45.917	Leg-1 grid
DY19-07	160	hr227	59	31.105	147	10.947	Leg-1 grid
DY19-07	161	hp229	59	44.375	147	10.842	Leg-1 grid
DY19-07	162	hr231	59	45.763	146	43.4	Leg-1 grid
DY19-07	163	hp233	59	58.793	146	43.571	Leg-1 grid
DY19-07	164	hn231	59	57.922	147	10.163	Leg-1 grid
DY19-07	165	hj231	60	10.31	147	36.118	Leg-1 grid
DY19-07	166	hh233	60	23.919	147	34.847	Leg-1 grid
DY19-07	167	hd233	60	34.741	148	3.658	Leg-1 grid
DY19-07	168	hf235	60	37.442	147	33.588	Leg-1 grid
DY19-07	169	hd237	60	48.227	147	37.487	Leg-1 grid
DY19-07	170	hf239	60	51.265	147	6.733	Leg-1 grid
DY19-07	171	hh237	60	37.84	147	7.993	Leg-1 grid
DY19-07	172	hj235	60	24.326	147	9.26	Leg-1 grid
DY19-07	173	hl237	60	24.738	146	43.664	Leg-1 grid
DY19-07	174	hj239	60	38.241	146	42.401	Leg-1 grid

DY19-07	175	hl241	60	38.646	146	16.798	Leg-1 grid
DY19-07	176	hn239	60	26.295	146	15.855	Leg-1 grid
DY19-07	177	hn235	60	12.16	146	43.009	Leg-1 grid
DY19-07	178	hp237	60	13.106	146	16.299	Leg-1 grid
DY19-07	179	hr235	60	0.316	146	15.853	Leg-1 grid
DY19-07	180	ht233	59	45.872	146	18.37	Leg-1 grid
DY19-07	181	hv231	59	32.281	146	19.092	Leg-1 grid
DY19-07	182	hx233	59	32.869	145	53.165	Leg-1 grid
DY19-07	183	hv235	59	46.932	145	51.546	Leg-1 grid
DY19-07	184	ht237	60	0.423	145	50.824	Leg-1 grid
DY19-07	185	hr239	60	14.762	145	48.306	Leg-1 grid
DY19-07	186	ht241	60	14.869	145	23.277	Leg-1 grid
DY19-07	187	hv239	60	1.475	145	23.999	Leg-1 grid
DY19-07	188	hx241	60	2.055	144	58.072	Leg-1 grid
DY19-07	189	hz239	59	48.099	144	59.692	Leg-1 grid
DY19-07	190	hx237	59	47.515	145	25.619	Leg-1 grid
DY19-07	191	hz235	59	33.457	145	27.238	Leg-1 grid
DY19-07	192	gv173	57	28.928	155	27.126	Leg-2 grid
DY19-07	193	gt171	57	27	155	46.002	Leg-2 grid
DY19-07	194	gx171	57	14.784	155	26.814	Leg-2 grid
DY19-07	195	gz169	57	0.639	155	26.418	Leg-2 grid
DY19-07	196	hb167	56	46.495	155	25.944	Leg-2 grid
DY19-07	197	hd165	56	32.35	155	25.386	Leg-2 grid
DY19-07	198	hf163	56	18.206	155	24.756	Leg-2 grid
DY19-07	199	hh161	56	4.061	155	24.054	Leg-2 grid
DY19-07	200	hj159	55	49.917	155	23.274	Leg-2 grid
DY19-07	201	hl157	55	35.627	155	22.536	Leg-2 grid
DY19-07	202	hj155	55	35.402	155	47.724	Leg-2 grid
DY19-07	203	hh157	55	49.547	155	48.654	Leg-2 grid
DY19-07	204	hf159	56	3.691	155	49.506	Leg-2 grid
DY19-07	205	hd161	56	17.836	155	50.292	Leg-2 grid
DY19-07	206	hb163	56	31.98	155	51	TimeSeries
DY19-07	207	gz165	56	46.124	155	51.636	Leg-2 grid
DY19-07	208	gx167	57	0.269	155	52.188	Leg-2 grid
DY19-07	209	gv169	57	14.413	155	52.668	Leg-2 grid
DY19-07	210	gv165	56	59.899	156	18.042	TimeSeries
DY19-07	211	gx163	56	45.754	156	17.4	TimeSeries
DY19-07	212	gz161	56	31.61	156	16.686	TimeSeries
DY19-07	213	hb159	56	17.465	156	15.9	TimeSeries
DY19-07	214	hd157	56	3.321	156	15.036	Leg-2 grid
DY19-07	215	hf155	55	49.177	156	14.1	TimeSeries
DY19-07	216	hh153	55	35.032	156	13.098	Leg-2 grid
DY19-07	217	hj151	55	20.888	156	12.024	Leg-2 grid

DY19-07	218	hh149	55	20.517	156	37.392	Leg-2 grid
DY19-07	219	hf151	55	34.661	156	38.544	TimeSeries
DY19-07	220	hd153	55	48.806	156	39.63	Leg-2 grid
DY19-07	221	gz157	56	17.095	156	41.58	TimeSeries
DY19-07	222	gx159	56	31.24	156	42.45	TimeSeries
DY19-07	223	gv161	56	45.384	156	43.248	TimeSeries
DY19-07	224	gt163	56	51	156	45	TimeSeries
DY19-07	225	gu158	56	40.002	157	13.002	TimeSeries
DY19-07	226	gx155	56	16.724	157	7.344	Leg-2 grid
DY19-07	227	gz153	56	2.58	157	6.318	TimeSeries
DY19-07	228	hb151	55	48.436	157	5.226	Leg-2 grid
DY19-07	229	hd149	55	34.291	157	4.068	Leg-2 grid
DY19-07	230	hf147	55	20.147	157	2.838	Leg-2 grid
DY19-07	232	M1	54	51	157	0	Mitrofania Line
DY19-07	233	M2	54	58.8	157	13.8	Mitrofania Line
DY19-07	234	M3	55	6	157	27	Mitrofania Line
DY19-07	235	M4	55	12.6	157	40.8	Mitrofania Line
DY19-07	236	M5	55	19.8	157	54	Mitrofania Line
DY19-07	237	M6	55	26.4	158	7.2	Mitrofania Line
DY19-07	238	M7	55	33	158	21	Mitrofania Line
DY19-07	239	M8	55	40.2	158	34.2	Mitrofania Line
DY19-07	240	hf143	55	5.632	157	26.982	Leg-2 grid
DY19-07	241	hd145	55	19.777	157	28.356	TimeSeries
DY19-07	242	hb147	55	33.921	157	29.664	Leg-2 grid
DY19-07	243	gz149	55	48.065	157	30.9	TimeSeries
DY19-07	244	gx151	56	2.21	157	32.076	Leg-2 grid
DY19-07	245	gv153	56	16.354	157	33.18	TimeSeries
DY19-07	246	gt155	56	30.499	157	34.212	Leg-2 grid
DY19-07	247	6E	56	35.185	157	47.343	TimeSeries
DY19-07	248	5E	56	25.508	158	7.546	TimeSeries
DY19-07	249	gt151	56	15.984	157	59.094	Leg-2 grid
DY19-07	250	gv149	56	1.84	157	57.906	TimeSeries
DY19-07	251	gx147	55	47.695	157	56.652	Leg-2 grid
DY19-07	252	gz145	55	33.551	157	55.332	TimeSeries
DY19-07	253	hb143	55	19.406	157	53.946	Leg-2 grid
DY19-07	254	hd141	55	5.002	157	53.322	Leg-2 grid
DY19-07	255	hf139	54	50.665	157	52.206	Leg-2 grid
DY19-07	256	hd137	54	50.554	158	17.204	Leg-2 grid
DY19-07	257	hb139	55	4.891	158	18.084	Leg-2 grid
DY19-07	258	gz141	55	19.036	158	19.614	TimeSeries
DY19-07	259	gx143	55	33.181	158	21.078	Leg-2 grid
DY19-07	260	gv145	55	47.325	158	22.482	TimeSeries
DY19-07	261	3E	55	56.609	158	36.31	TimeSeries

DY19-07	262	gr141	55	46.584	159	14.37	TimeSeries
DY19-07	263	gt139	55	32.44	159	12.81	TimeSeries
DY19-07	264	gp135	55	31.699	160	4.848	Leg-2 grid
DY19-07	265	gt135	55	17.925	159	37.08	Leg-2 grid
DY19-07	266	gv137	55	18.295	159	11.178	Leg-2 grid
DY19-07	267	gv141	55	32.81	158	46.908	Leg-2 grid
DY19-07	268	gx139	55	18.665	158	45.36	Leg-2 grid
DY19-07	269	gz137	55	4.521	158	43.746	TimeSeries
DY19-07	270	hb135	54	50.377	158	42.072	Leg-2 grid
DY19-07	271	hd133	54	36.019	158	41.086	Leg-2 grid
DY19-07	272	hb131	54	35.907	159	6.084	Leg-2 grid
DY19-07	273	gz133	54	50.006	159	7.734	Leg-2 grid
DY19-07	274	gx135	55	4.151	159	9.486	Leg-2 grid
DY19-07	275	gz129	54	35.492	159	31.578	Leg-2 grid
DY19-07	276	gx123	54	20.606	160	21.012	Leg-2 grid
DY19-07	277	gv125	54	34.751	160	23.124	Leg-2 grid
DY19-07	278	gx127	54	35.121	159	57.312	Leg-2 grid
DY19-07	279	gv129	54	49.265	159	59.286	Leg-2 grid
DY19-07	280	gt127	54	48.895	160	25.176	Leg-2 grid
DY19-07	281	gr129	55	3.04	160	27.174	Leg-2 grid
DY19-07	282	gn129	55	16.814	160	55.242	Leg-2 grid
DY19-07	283	gp127	55	2.669	160	53.22	Leg-2 grid
DY19-07	284	gr125	54	48.525	160	51.144	Leg-2 grid
DY19-07	285	gt123	54	34.381	160	49.008	Leg-2 grid
DY19-07	286	gv121	54	20.236	160	46.818	Leg-2 grid
DY19-07	287	gt119	54	19.866	161	12.702	Leg-2 grid
DY19-07	288	gr121	54	34.01	161	14.976	Leg-2 grid
DY19-07	289	gp123	54	48.155	161	17.19	Leg-2 grid
DY19-07	290	gn125	55	2.299	161	19.356	Leg-2 grid
DY19-07	291	gl127	55	16.444	161	21.456	Leg-2 grid
DY19-07	292	gl123	55	1.929	161	45.564	Leg-2 grid
DY19-07	293	gn121	54	47.785	161	43.32	Leg-2 grid
DY19-07	294	gp119	54	34.1	161	42.515	Leg-2 grid
DY19-07	295	gr117	54	19.495	161	38.664	Leg-2 grid
DY19-07	296	gr113	54	4.981	162	2.214	Leg-2 grid
DY19-07	297	gp115	54	18.179	162	5.921	Leg-2 grid
DY19-07	298	gn117	54	33.269	162	7.14	Leg-2 grid
DY19-07	299	gj117	54	47.044	162	35.814	Leg-2 grid
DY19-07	300	gl115	54	32.899	162	33.348	Leg-2 grid
DY19-07	301	gn113	54	18.755	162	30.822	Leg-2 grid
DY19-07	302	gn109	54	4.24	162	54.366	Leg-2 grid
DY19-07	303	gl111	54	18.385	162	57.024	Leg-2 grid
DY19-07	304	gj113	54	32.529	162	59.628	Leg-2 grid

DY19-07	305	gh111	54	32.159	163	25.992	Leg-2 grid
DY19-07	306	gj109	54	18.014	163	23.304	Leg-2 grid
DY19-07	307	gl107	54	3.87	163	20.562	Leg-2 grid
DY19-07	308	gj105	54	3.499	163	46.836	Leg-2 grid
DY19-07	309	gh107	54	17.644	163	49.662	Leg-2 grid
DY19-07	310	gf109	54	31.788	163	52.44	Leg-2 grid
DY19-07	311	gf105	54	17.273	164	16.104	Leg-2 grid
DY19-07	312	gh103	54	3.129	164	13.194	Leg-2 grid
DY19-07	313	gf101	54	2.759	164	39.636	Leg-2 grid
DY19-07	314	gd103	54	16.903	164	42.63	Leg-2 grid