

Final Project Instructions

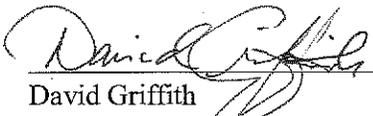
Date Submitted: January 27, 2017

Platform: NOAA Ship *Bell M. Shimada*

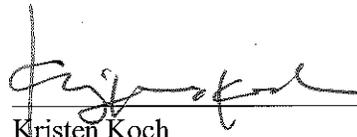
Project Number: SH-17-03 (OMAO), 1703SH (SWFSC)

Project Title: Gear Selectivity Survey and Sailandrone Ground Truthing, SWFSC/PMEL.

Project Dates: March 4, 2017 to March 19, 2017

Prepared by:  Dated: January 27, 2017
David Griffith
Chief Scientist
SWFSC

Approved by:  Dated: 2/28/17
Gerard DiNardo, Ph.D.
Fisheries Resources Director
SWFSC

Approved by:  Dated: 2/28/17
Kristen Koch
Acting Science and Research Director
SWFSC

Approved by: _____ Dated: _____
Commander Brian Parker., NOAA
Commanding Officer
Marine Operations Center - Pacific

I. Overview

A. Brief Summary and Project Period

I.A.1. Determine the selectivity characteristics of the Nordic 264 midwater trawl in relation to potential escapement of coastal pelagic species (CPS). Conduct selectivity operations between Newport, Oregon and San Diego, California during the period of March 4 to March 19, 2017.

I.A.2. Ground truth the Saildrone UAS instrument suite with the *Shimada*.

B. Days at Sea (DAS)

I.B.1. Of the 16 DAS scheduled for this project, 15 are funded by a Line Office Allocation. This project is estimated to exhibit a high Operational Tempo.

I.B.2. 1 UxS day is funded for OAR-PMEL to run instrument comparisons between the *Shimada* and a Carbon Saildrone.

C. Operating Area

I.C.1. The area covered during this survey will be from Newport, Oregon to San Diego, California and extend up to 100 kilometers offshore (Appendix 1.). Specific trawl sites will be determined by a combination of CUFES samples, the potential sardine habitat model and acoustic targets. Trawl sites will generally fall within the 150 to 300 meter isobath shown on the trackline in Appendix 4.

I.C.2. UxS Saildrone: The *Shimada* – Saildrone comparison will take place somewhere along the CA coast between San Francisco and Santa Barbara in less than 300m water depth. The exact location will be determined based on observations from SH-17-02. The requirements are an area with fish aggregates in the water column in less than 300m.

D. Summary of Objectives

Determine the selectivity characteristics of the Nordic 264 midwater trawl in relation to potential escapement of coastal pelagic species (CPS) between Newport, Oregon and San Diego, California.

The following are specific objectives for this survey.

I.D.1. Continuously sample pelagic fish eggs using the Continuous Underway Fish Egg Sampler (CUFES). The data will be used to locate potential adult CPS schools to fish on in the evening hours.

I.D.2. Continuously sample multi-frequency acoustic backscatter using the Simrad EK60. The data will be used to locate potential CPS targets to fish on during the evening hours.

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

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

I.D.5. Sample fish near the surface each night by conducting 2-5 surface trawls at stations or random sites selected each night by the Chief Scientist (CS). The data will be used to determine the selectivity characteristics of the Nordic 264 midwater trawl for CPS.

I.D.6. Conduct 24 hrs of Saildrone comparison operations to validate carbon, fisheries acoustics, ADCP, oceanographic, and meteorological sensors integrated onto the Saildrone UAS.

E. Participating Institutions

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

I.E.2 Pacific Marine Environmental Laboratory (PMEL)_

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

Name (Last, First)	Title	Date Aboard	Date Disembark	Gender	Affiliation	Nationality
Griffith, David	Chief Scientist	March 4, 2017	March 19, 2017	M	SWFSC	US
Overcash, Bryan	Fishery Biologist	March 4, 2017	March 19, 2017	M	SWFSC	US
Hays, Amy	Fishery Biologist	March 4, 2017	March 19, 2017	F	SWFSC	US
Gardner, Emily	Fishery Biologist	March 4, 2017	March 19, 2017	F	SWFSC	US
Herndon, Julian	Research Scientist (UxS Chief Sci)	March 4, 2017	March 19, 2017	M	JISAO/PMEL	US

G. Administrative

1. Points of Contacts:

Chief Scientist/alternate: David Griffith/Amy Hays (858-546-7155/858-546-7130); 8901 La Jolla Shores Drive, La Jolla, CA, 92037

(Dave.Griffith@noaa.gov / Amy.Hays@noaa.gov)

UxS Saildrone Chief Scientist/ alternate: Julian Herndon / Noah Lawrence-Slavas (206-526-6256 / 206-498-4666); 7600 Sand Point Way NE, Seattle, WA 98115

(julian.herndon@noaa.gov / noah.lawrence-slavas@noaa.gov)

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

Ops Officer: LT Sara Sheehan (206-427-2374) NOAA Ship *Bell M. Shimada* (OPS.Bell.Shimada@noaa.gov)

Saildrone: Contact: Richard Jenkins, (510-326-0946),

E-mail: richard@saildrone.com

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

I.3.G.a. CDFW on 02 April, 2015 (expires April 2018) NOAA-SWFSC-FRD-Cisco Werner (SC-12372)

I.3.G.b. MMPA Letter of Authorization (LOA) for the CA Current: 80 FR 58982. The LOA went into effect October 30, 2015 and is valid through October 29, 2020

I.3.G.c ESA consult (eulachon, salmon, sea turtles): WCR ESA consultation 2015-2455

I.3.G.d. ONMS 304(d) consultation concurrence received by SWFSC April 14, 2015

I.3.G.e. Oregon Scientific Taking Permit # xxxxx issued to Dr. Gerard DiNardo (SWFSC Fisheries Resources Division Director) (pending).

I.3.G.f. SRP 50 CFR 600.745 (pending)

II. Operations

A. Project Itinerary

March 4: Depart Newport, Oregon

March 19: Arrive San Diego, California

B. Staging and Destaging

Staging will be conducted in Newport, OR at the NOAA facility at MOC-P. Gear shipment from the SWFSC will be scheduled to arrive on March 2 at which time loading will take place. Destaging will be conducted in San Diego, CA at the NOAA facility at 10th Avenue Marine Terminal. Since much of the gear used during this survey will need to be transferred over to the *Reuben Lasker* it is requested that destaging of the Shimada occur no later than March 20. The *Reuben Lasker* departs San Diego on March 21.

C. Operations to be Conducted

II.C.1. Underway Operations

II.C.1.a. *Thermosalinometer sampling* - The ship will provide and maintain a thermosalinometer (TSG), which is calibrated and in working order, for continuous measurement of surface water temperature and salinity. A backup unit (calibrated and in working order) will also be provided by the vessel and remain aboard during the project. The Scientific Computing System (SCS) will serve as the main data collection system. All SCS data will be provided to SWFSC personnel at the completion of the project.

II.C.1.b. *Acoustics*: The EK60 echosounders will be operated at 18, 38, 70, 120 and 200 kHz and interfaced to a data acquisition system to estimate small pelagic fish and krill locations between 10 and 250 m. The ST will verify the correct date and time on the echosounder computers and track total kilometers surveyed by EK60 and ME70 and submit respective distances to swfsc.ita@noaa.gov no later than 14 d following the conclusion of the project. These distances are required for environmental compliance as directed by SWFSC's Letter of Authorization for the California Current Research Area, (LOA CCRA -80 FR 58982) under the Marine Mammal Protection Act (valid until 29 October 2020).

It is requested that the center board will be extended to mid-depth (ca. transducers at 7.5 m), during all survey operations, with CO approval based on navigational safety. Any changes to this depth will affect scientific data acquisition and should be reported to the acoustic-system operator(s).

The vessel's Simrad ES60 depth sounder (or comparable sounder located on the bridge) and Doppler current meter may be used minimally at the discretion of the Commanding Officer, but will normally remain off while underway. The ship shall inform the Chief Scientist of any use of the vessel's sounders, as it interferes with the signals received on the EK60 and ME70 that will be used continuously.

II.C.1.c. *CUFES*: The pump will run continuously when underway to sample any pelagic fish eggs. Approximately 640 liters/minute is sent through a concentrator which filters all material larger than 505 μ m. 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, wind speed and direction, 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 on March 4 that the CUFES intake be cleared from all marine growth.

II.C.2. Operations for each standard night station:

II.C.2.a. Two to five surface tows using a 264 Nordic Rope Trawl (Appendix 3) fitted with a marine mammal exclusion device (MMED) will be conducted during nighttime operations. Two trawls will be set up on the two net reels with one trawl in standard configuration and one with external catchment bags to retain CPS escapement. The modified trawl will be rigged with TS2 synthetic rigging while the standard trawl will be rigged with standard wire rigging (Appendix 3). The decision to fish either the modified trawl or standard trawl will be done randomly each night. Each consecutive trawl will alternate between the standard and the modified trawl. Each tow will be fished on the surface for a 45 minute duration at a towing speed of approximately 3.5 – 4.5 knots with a target speed of 3.8 knots. The catch from each tow will be processed in the following manner: CPS collected in each trawl and in the external catchment bag will be randomly subsampled. Standard length and body weight will be measured. These fish are assigned a maturity code based on a four stage system developed during a previous Trinational Sardine Forum.

Please have the ST record the deployment and recovery of the trawl, in SCS. SCS buttons to be added to trawl events are (program input here).

There will be two to five trawls per night. The first set will be approximately one hour after sunset. Trawls will not occur on predetermined stations but rather determined by results from CUFES, acoustic targets and the potential sardine habitat model. These criteria will also determine trawl spacing.

II.C.2.b. For the nighttime trawl operations, protected species watches (e.g. marine mammals and turtles) are now a standard part of conducting fisheries research activities, particularly those that use gear (e.g., long-lines and mid-water trawls) known to interact with protected species or that we believe have a reasonable likelihood of doing so in the future.

30 minute, pre-set, protected species watch (monitoring prior to deploying trawl gear)

Protected species (marine mammals, sea turtles, sea otters, short-tailed albatross) watches (visual observation) will be initiated by a designated person/s no less than

30 minutes prior to deployment of gear for sampling in order to determine if any protected species are near the proposed trawl set location. This watch can occur during transit leading up to arrival at the sampling station. If stations are less than 5 nautical miles apart (or less than a 30 minute transit time at typical transit speed) then pre-set watch should just last duration of transit. Protected species watches will be conducted using any binocular or monocular sighting instrument, with a means to estimate distance to infringing protected species during daytime. During nighttime operations, visual observation shall be conducted using the naked eye and available vessel lighting.

Move-on rule

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

Monitoring during trawl deployment, fishing and retrieval

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

Data collection for visual watches

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

Marine mammal excluder devices (MMED)

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

Acoustic deterrent devices

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

Other standard trawl survey protocols.

- The gear will be emptied as quickly as possible upon retrieval in order to determine whether or not protected species are present.
- Care will be taken when emptying the trawl to avoid damage to protected species that may be caught in the gear but are not visible during retrieval.

Reporting, Data Collection and Handling Procedures for Protected Species

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

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

Lethal take of Marine Mammal or Sea Turtle

If a lethal take of a marine mammal or sea turtle occurs, priority should be placed on removing animal from gear as quickly and safely as possible so photographs

and measurements can be taken according to protocol, PSIT-002.02, and then the animal should be wrapped in bag/s (trash bags or provided body bag) and placed in the scientific freezer. Concurrently, as stated above, Krista Catelani should be notified immediately.

Non-lethal take of any protected species

Priority for any non-lethal take is to release the animal as quickly as possible according to instructions below for its best chance of survival post-release. First and foremost, please take into consideration safety of all crew and staff. Concurrently, as stated above, Krista Catelani should be notified immediately

Protected Species Handling

In general, following a “common sense” approach to handling protected species will present the best chance of minimizing injury to the animal and of decreasing risks to scientists, officers and crew. There are inherent safety concerns associated with handling/disentangling protected species, so using good judgment and ensuring human safety is paramount. SWFSC researchers should refer to PSIT-004.02, SWFSC Marine Mammal Handling Guidelines, and the Pacific Islands Region's Identification, Handling and Release of Protected Species (PSIT-005.01), and SWFSC's marine mammal and sea turtle sampling protocol (PSIT-002.01) for more specific guidance on protected species handling and sampling (e.g., species identification, safe removal of fishing gear, etc.). For all marine mammal and sea turtle incidental interactions, SWFSC researchers will record interaction information using the Protected Species Incidental Take Form and the Marine Mammal and Sea Turtle Biological Sampling form. For any incidental takes of protected fish species (salmon and eulachon) SWFSC researchers will fill out the Protected Fish Specimen Data form.

Protected Species Sampling and Data Collection

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

II.C.2.c. Standard tow durations have been reduced to 45 minutes or less at targeted depth, excluding deployment and retrieval time, to reduce the likelihood of attracting and incidentally taking protected species. These short tow durations decrease the opportunity for curious marine mammals to find the vessel and investigate. The resulting tow distances are typically 1 to 2 nautical miles,

depending on the survey and trawl speed. Additionally, short tow times reduce the likelihood that captured sea turtles would drown.

II.C.2.d. Vessel speeds are restricted on research projects in part to reduce the risk of ship strikes with marine mammals. Transit speeds vary from 8-12 knots, but average 10 knots. The vessel's speed during active sampling is typically 3.5-4.5 knots due to sampling design. Thus, these much slower speeds essentially eliminate the risk of ship strikes.

II.C.3. UxS Saildrone Comparison Operations

1. The objective is to ground truth the Saildrone's scientific payload using the *Bell M. Shimada*. We would like to do this under a variety of Saildrone operating conditions, which will replicate different wind approach angles, water speeds, heel angles, and wave approach angles. During the inter-comparison, the ship will follow the Saildrone, behind, and if possible downwind, at distances ranging from 100 to 500 meters. The procedure will be as follows: The Saildrone will be placed on a course, either a straight run or a box course by the Saildrone operator.
2. The ship will verify, with the Saildrone operator over the phone & e-mail (Contact: Richard Jenkins, Phone: 510 326 0946, E-mail: richard@saildrone.com), the box waypoint positions and that the Saildrone is on the box course. Additional information, such as the width of the corridor between the waypoints, nominally 200m that the sail drone will stay within while tacking, current position, speed through water, etc. will also be relayed.
3. The ship will then approach the Saildrone to a comfortable distance and the ship will shadow the Saildrone as it moves around the box course. The ship will verify with the Saildrone operator, via e-mail & phone, when they are making their approach and are in position with visual ID. The Saildrone will then maintain its current operating scheme, until the ship calls again to disengage or ask the Saildrone to change its operation mode.

II.C.3.a. Underway $p\text{CO}_2$ Comparison. During the entire 24 hours of comparison work the ship will run the underway $p\text{CO}_2$ system and follow as closely as practical to the Saildrone.

II.C.3.b. Water sample collection. Every 6 hours during the comparison period the ship will take surface water samples with either the ship's CTD rosette, or a Van Dorn sampler supplied by PMEL. The ship should approach to within 100m of the Saildrone to collect these samples. Water samples will be collected by the PMEL scientist.

II.C.3.c. Oceanographic and Meteorological sensor comparison. During the entire 24 hour period the ship will log the scientific sensors as requested.

II.C.3.d. EK60 Comparison. During the first 12 hours of the comparison the ship will conduct an EK60 comparison with the Saildrone. The frequencies we are interested in collecting are 38 and 200 khz. The ship should secure all other active acoustics during this time as they will interfere with the Saildrone's and the Ship's EK60.

II.C.3.e. ADCP Current Comparison. During the second 12 hours of the comparison the ship will conduct an ADCP comparison to validate Saildrone's ADCP system. The ship should secure the EK60 and all other active acoustics during this time so they do not interfere with the Saildrone's ADCP.

D. Dive Plan

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

A dive is requested for clearing the CUFES intake of attached growth prior to departure on March 4.

E. Applicable Restrictions

Conditions which preclude normal operations:

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

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

III. Equipment

A. Equipment and Capabilities provided by the ship

We request the following measurement 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. Measurement instruments include all sensors associated with the underway systems such as the thermosalinometers and fluorometers, and atmospheric sensors such as barometers, thermometers and wind indicators.

Winch monitoring system

Port and starboard trawl winches with 1.125" diameter mechanical cable

Stern gantries with blocks to accommodate 1.125" cable

Access to the trawl ramp

Knudsen 12 kHz depth recorder or comparable to measure bottom depth to 4000+ meters (EK60)

Multifrequency EK60 GPTs and transducers (ES18-11, ES38B, ES120-7C, ES200-7C)

Scientific computing system

Applanix PosMV position and motion sensor

Pump, collector and concentrator unit for CUFES water sampling

For UxS Saildrone comparison operations we request the following measurement systems. All measurement instruments are assumed to have current calibrations and we request that all pertinent calibration information be included in the data package.

1. The Underway $p\text{CO}_2$ system
2. The EK-60 fish finder (38 and 200 khz),
3. The ADCP with associated POS-MV, Gyro and GPS systems to get current information.
4. The ship should log the scientific sensors listed below for comparison with the Saildrone at a 60-second SCS logging rate. Please make sure that the filters are cleaned on the ship's underway seawater system and that the flow rate is reasonable. Please Bleach the intake and pipes just before the cruise
 - a. Wind Speed & Direction
 - b. Near-surface (i.e. from ship's underway seawater system) water temperature
 - c. Near-surface salinity
 - d. Near-surface dissolved oxygen
 - e. Atmospheric LWR and SWR from ship's mast
 - f. Air temperature/relative humidity
 - g. Barometric pressure
 - h. Near-surface chlorophyll-a concentration
 - i. GPS data

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

30 cc and 50 cc syringes (SWFSC)

Canulas (SWFSC)

(4) Scintillation vial flats (SWFSC) (5 lbs.)

(4) Standard CalCOFI tool boxes (SWFSC) (80 lbs.)

Bucket thermometers and holders (SIO)

Weather observation sheets (SIO)

(2) Dissecting microscopes (SWFSC) (50 lbs.)

(2) Nordic 264 midwater trawls with (1) external catchment bag (4000 lbs.)

(1) Set of 3 m² X-Lite trawl doors (2400 lbs.)

(2) Sets of trawl rigging (1000 lbs.)

- (4) Fish measuring boards (20 lbs.)
- (4) Motion compensated scales (100 lbs.)
- (2) Go-Pro trawl camera systems (60 lbs.)
- (1) External harddrive (1 TB) for data transfer
- (4) Shipping containers (fish bins) (300 lbs.)

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

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

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

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

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

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

B. Inventory

Common Name of Material	Qty	Notes	Trained Individual	Spill control
Formaldehyde solution (37%)	20L	No waste. Stored in fume hood	Amy Hays	D
Sodium borate powder	500gr	Stored in Chem lab	Amy Hays	E
Mercuric Chloride, saturated soln.	30mL x 2	Stored in Chem Lab	Julian Herndon	F
Air + CO ₂ standards compressed cylinders	4 tanks	Secured in Chem Lab	Julian Herndon	G

NOTE: Mercuric Chloride and CO₂ standard gases are already on board the Shimada and will remain on board for ongoing *p*CO₂ measurements and discrete bottle samples.

C. Chemical safety and spill response procedures

D: Formalin/Formaldehyde/Ethanol/Acetone/Tris buffer

- 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.

E: Powdered and granular chemicals

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

F: Mercuric Chloride

- Wear appropriate PPE.
- Contain spill and absorb with paper towel or sorbent material.
- Store saturated sorbent material in double plastic bags for return and disposal by PMEL EH&S.

G: Compressed gas cylinders

- Ensure cylinders are secure to bulkhead with chain and straps at 2 heights.
- Close valve in case of leak. Note: CO₂ concentrations are below OSHA permissible exposure levels (PEL) for both Short Term Exposure Limit (STEL) and Time-Weighted Average (TWA).

Inventory of Spill Kit supplies

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Chemical Spill pads	100	Formaldehyde, Alcohols	110L
Uni-Safe spill binder	14 kg	Formaldehyde, alcohols, acids	120L

C. 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 conducting a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.
- D. Project Evaluation Report
- Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <https://sites.google.com/a/noaa.gov/omao-intranet-dev/operations/marine/customer-satisfaction-survey> and provides a "Submit" button at the end of the form. It is also located at https://docs.google.com/a/noaa.gov/forms/d/1a5hCCkgIwaSII4DmrHPudAehQ9HqhRqY3J_FXqbJp9g/viewform. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

VIII. Miscellaneous

- A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically

meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the survey.

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

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

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 7, 1999 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

B. Medical Forms and Emergency Contacts

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

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

The completed form should be sent to the Regional Director of Health Services at Marine Operations Center. The participant can mail, fax, or scan the form into an email using the contact information below. The NHSQ should reach the Health Services Office no later than 4 weeks prior to the project to allow time for the participant to obtain and submit additional information that health services might require before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of the NHSQ. Be sure to include proof of tuberculosis (TB) testing, sign and date the form, and indicate the ship or ships the participant will be sailing on. The

participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

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

The only secure email process approved by NOAA is [Accellion Secure File Transfer](#) which requires the sender to setup an account. [Accellion's Web Users Guide](#) is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The "Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services
Marine Operations Center – Pacific
2002 SE Marine Science Dr.
Newport, OR 97365
Telephone 541-867-8822
Fax 541-867-8856
Email MOP.Health-Services@noaa.gov

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

C. Shipboard Safety

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

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

D. Communications

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

E. IT Security

Any computer that will be hooked into the ship's network must comply with the *NMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Completion of these requirements prior to boarding the ship is required. 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.
- (4) Any computer or device connected through the Government network and internet is subject to NOAA IT shore based monitoring.
- (5) For connections to the ship's Public Network, personnel are limited to one personal device. No phones will be allowed on the ship's Network.

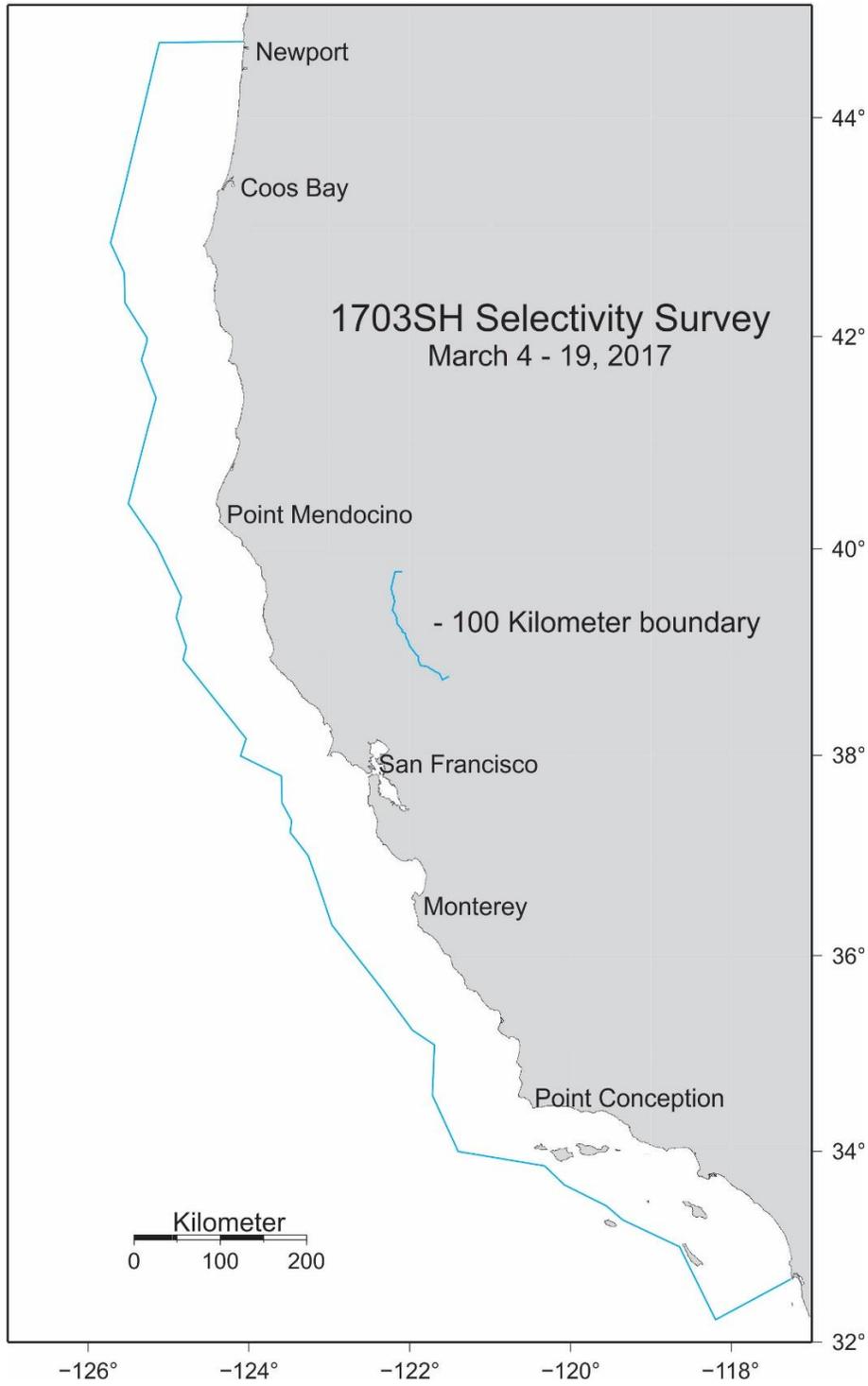
Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

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.

IX. Appendix

Appendix 1. Potential survey area (100 kilometer boundary)

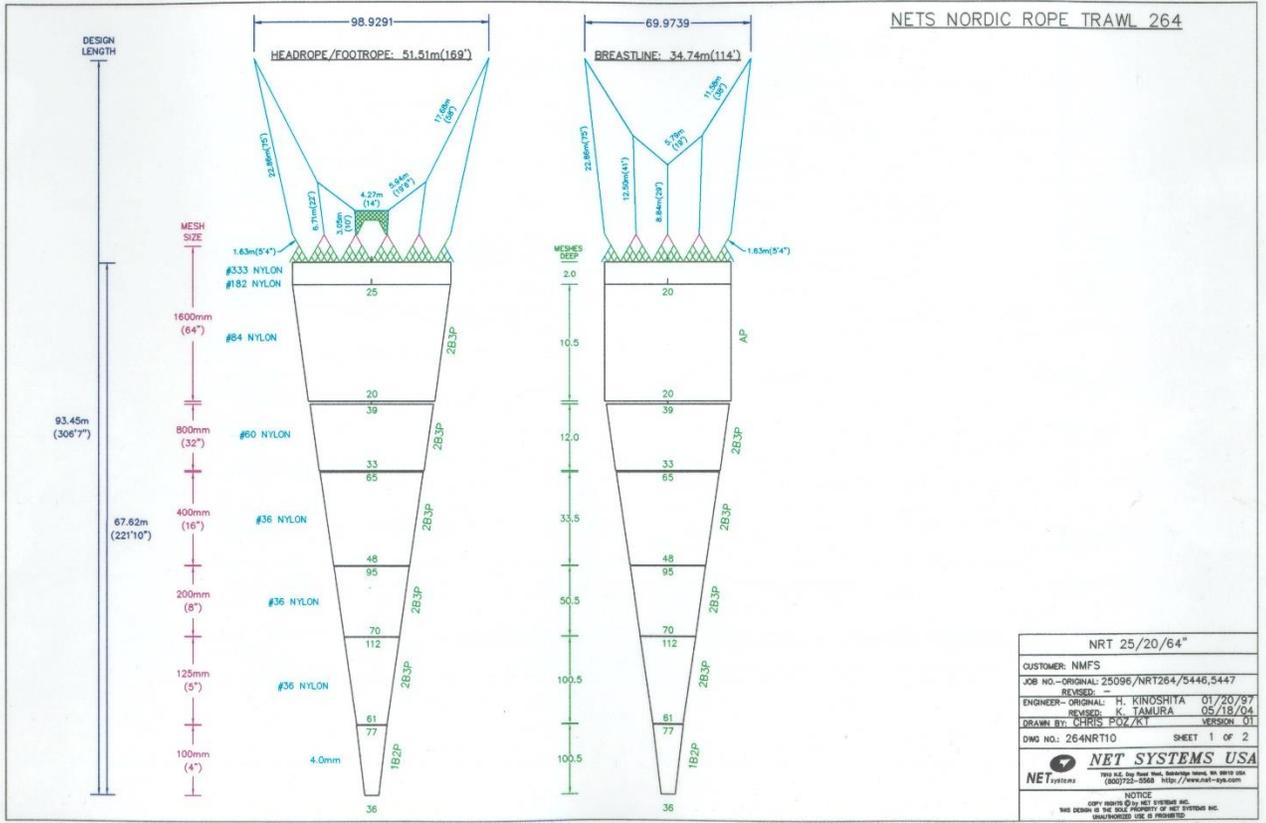


Appendix 2. Saildrone information

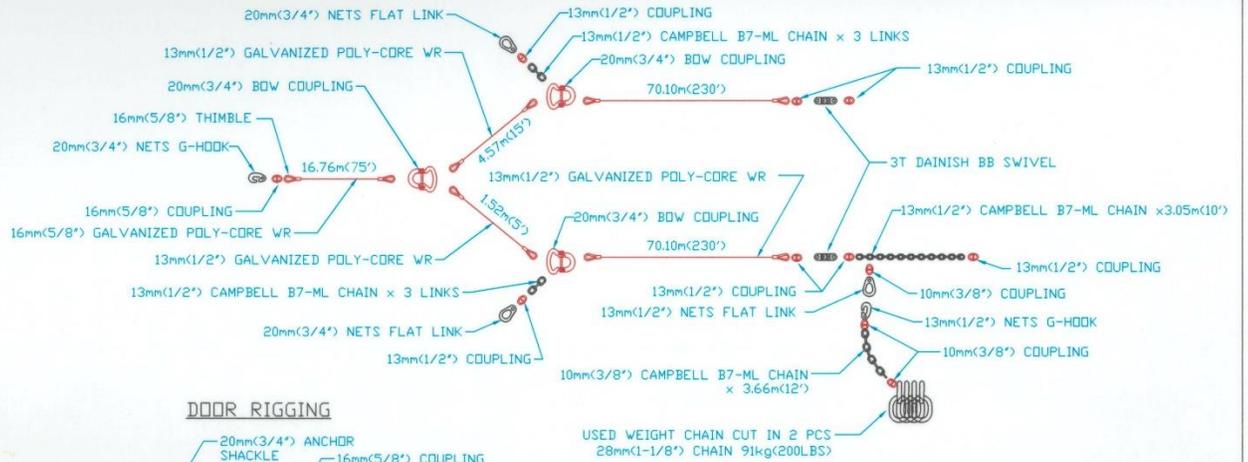
- The Saildrone is a sailing vessel, and thus will be tacking and gybing when sailing up / down wind. However, it will not leave the corridor set between the waypoints. If we keep the corridor narrow, at say 200m, the ship can get close with some comfort.
- Under 10knts of wind the Saildrone will be moving at ~2 knts. In 15-20 knots of wind the Saildrone will do 3-5 knots.
- During the approach, The Saildrone operator will be able to ‘see’ the near real-time *Bell M. Shimada* position on their command console via AIS. After visual ID has been established and while the comparison is underway, the Saildrone will need to turn off their AIS as it compromises sensor data quality. In addition to AIS and being 20’ tall and bright orange, see figure #2 below, the Saildrone has a tricolor light on its mast.
- The Saildrone’s real time position and information can be seen on a website, the web address and a login password will be given to the ship at the beginning of the cruise.
- The ship should log sea state information and ship’s speed during the tests. If there is a better ship speed indicator than GPS available, i.e. speed through water or Doppler, we would like to record it as well to see if we can extrapolate current information from the Saildrone’s water speed sensor.



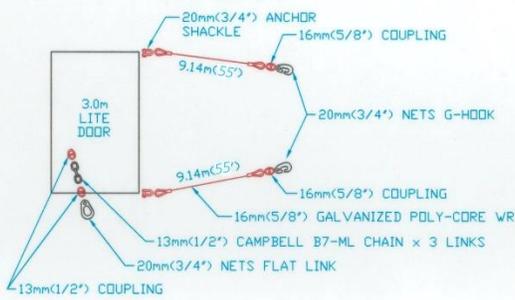
Appendix 3. Nordic 264 specifications



230' RIGGING FOR NORDIC ROPE TRAWL 264 - Lasker/Shimada configuration



DOOR RIGGING



USED WEIGHT CHAIN CUT IN 2 PCS
28mm(1-1/8') CHAIN 91kg(200LBS)

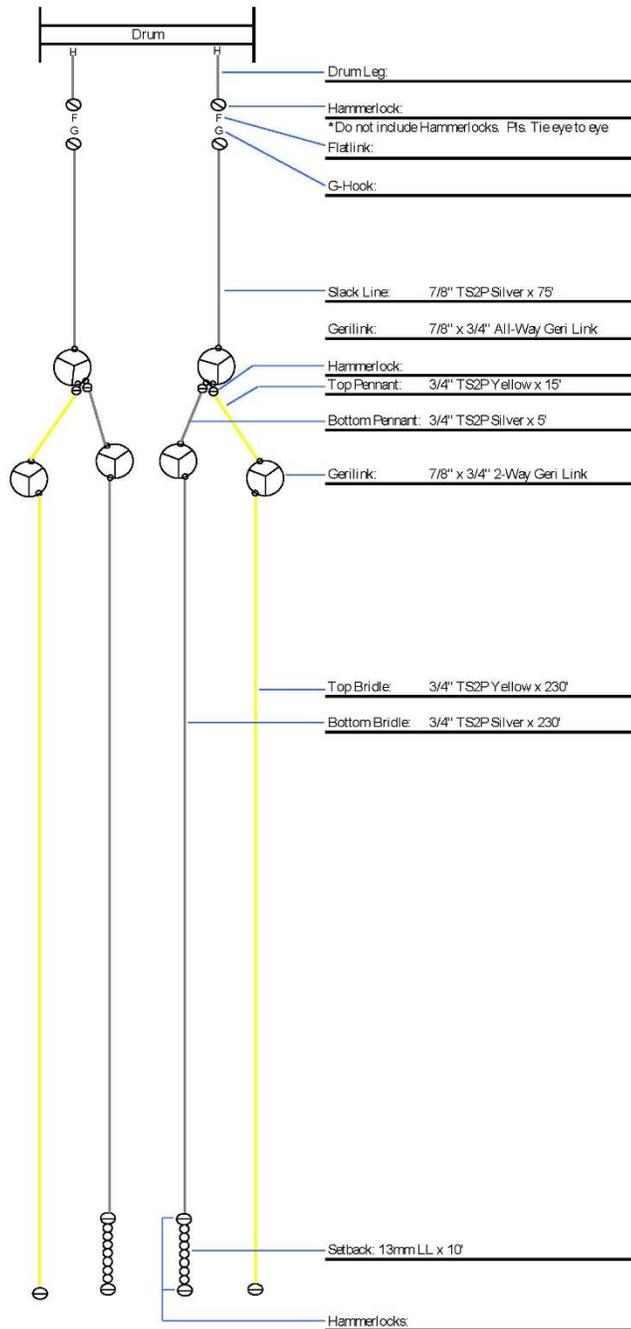
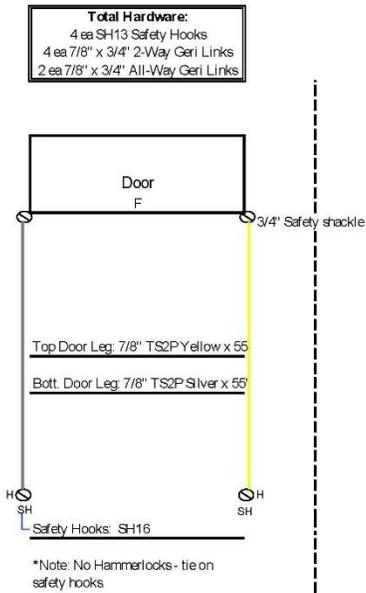
NOTE:
ALL CONNECTORS AND FITTINGS IN THIS RIGGING DRAWING ARE CRITICAL TO SAFETY AND SYSTEM INTEGRITY AND SHOULD BE SIZED AND MAINTAINED ACCORDINGLY

230' RIGGING FOR NRT-264	
CUSTOMER: NMFS (LA JOLLA)	
JOB NO. ORIGINAL: 25096/XRIG2509610/-	
REVISED -	
ENGINEER-ORIGINAL: NETS STAFF	05/12/98
REVISOR: NETS STAFF	05/18/04
DRAWN BY: GREGG PH/ZRY	VERSION: 01
DWG NO.: 264NRR01	SHEET 1 OF 1
NET SYSTEMS USA	
<small>1700 Hill St. Redwood City, California 94061, USA 650.726.3568 http://www.net-systems.com</small>	
<small>NOTICE: THIS NET SYSTEMS INC. DESIGN IS THE SOLE PROPERTY OF NET SYSTEMS INC. UNAUTHORIZED USE IS PROHIBITED.</small>	

2 Pennant TS2 Rigging

NOAA, David Griffith

8/11/15



Appendix 4. Trackline way points

	Latitude (decimal degrees)	Longitude (decimal degrees)
1	44.399434	124.55125
2	44.198728	124.469804
3	43.919774	124.467497
4	43.29809	124.58989
5	42.848102	124.715273
6	42.3514	124.597994
7	41.83124	124.442483
8	41.293504	124.382134
9	40.790289	124.432364
10	40.393556	124.49519
11	40.063279	124.282169
12	39.685443	123.937569
13	39.041878	123.928998
14	38.414552	123.44156
15	38.034629	123.476708
16	37.661333	123.200951
17	37.294141	122.802807
18	36.998157	122.526733
19	36.341552	122.036544
20	35.82503	121.520566
21	35.080305	120.987287
22	34.549781	120.767133
23	34.300937	120.345266
24	34.040201	119.17459
25	33.890332	118.643023
26	33.479285	118.213006
27	33.258577	117.55674
28	33.020231	117.348505
29	32.632148	117.369304