

Slime Lab Manual

(aka fish / wet lab manual)

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Introduction

(aka fish / wet lab manual)

This is the **Slime Lab Manual**. This manual describes the procedures for at sea data biological sampling and physical oceanographic measurements that occur aboard the NOAA Ship Oscar Dyson during a NOAA-AFSC Midwater Assessment Conservation Engineering (MACE) survey. The manual is written to provide an overview of the sampling procedures that take place in the chem/fish lab for new or volunteer scientists/staff, a place for returning scientist to refresh themselves on procedures, and in-depth guide for all tasks that occur in the slime lab.

This manual is broken into several sections, [Pre-Season Preparations](#), [Gear Trials](#), [Acoustic Calibration](#), [Pre-Haul Preparations](#), [Sampling Procedures](#), [Data QA/QC](#), and [Post Survey Tasks](#). Some [Additional References](#) are also provided. There is a sidebar on the left to navigate to main topics. Within each topic there is a Table of Contents on the right side of the screen that can be used to navigate to content within that topic.



Glossary of Terms

Here is a [glossary of roles and terms](#) relevant to MACE surveys aboard NOAA Ships. This is helpful to anybody new to the NOAA ship Oscar Dyson.

Pre-Season Preparation

This is a list of tasks related to the slime lab that should be completed before gear trials at the start of a survey season.

A. Equipment Checklist

Gear Inventory (MACE loading and shipping) is a rolling spreadsheet maintained through Google Sheets to track and inventory gear shipped to and from Alaska. [Click here to open the Google Sheet](#)

B. Special Study Supplies

Pre-cruise preparation includes soliciting Special Studies requests for all surveys during the upcoming year. In November, the MACE Special Collections Request form is emailed to contacts on the special_studies_announcement_list which is found in the G:\special_studies folder under the last survey year. The announcement list is a living document in which new contacts are added and old or invalid email addresses are deleted.

After they are received, Special Study requests are put in a subfolder in G:\special_studies by year, then by either Winter or Summer. Information should include: 1. Project goals with some background information. 2. Specific sampling instructions/procedures which include:

- storage requirements
 - time and space requirement
 - specific details of any activities that may impact vessel/MACE personnel or equipment
3. When and how supplies, chemicals, and samples will be shipped to and from the vessel.
 4. A chemical inventory.

C. Sampling Requirements

Obtain information on sampling requirements from stock assessment authors. Use this to create **Table Tips**.

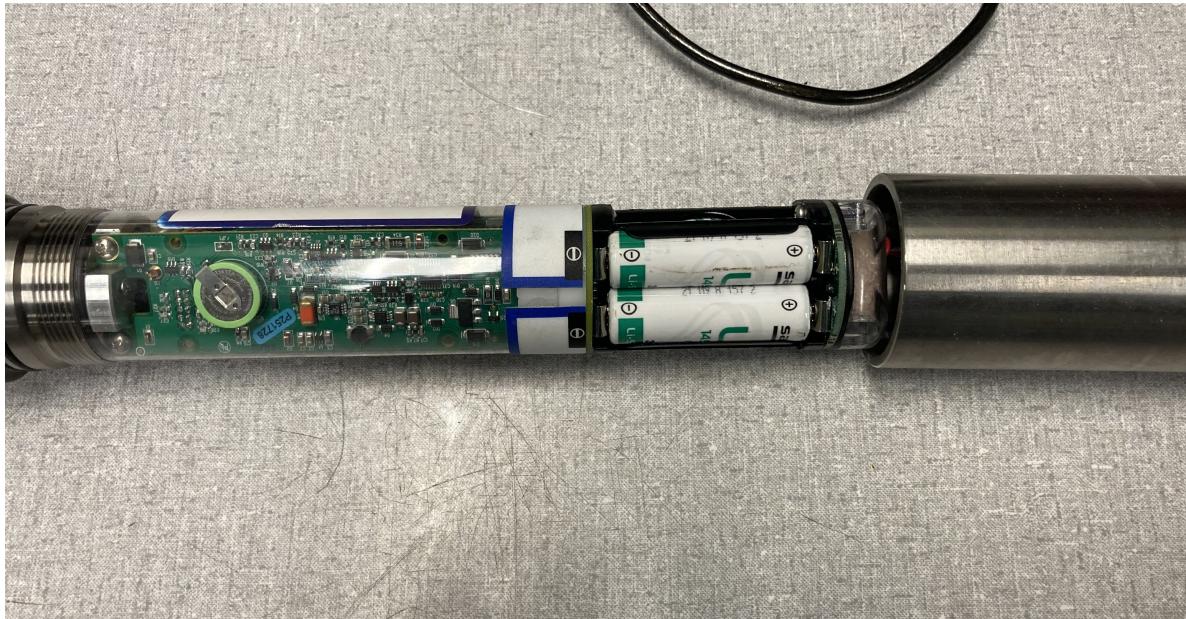
i Draft Question: Equipment Calibration

Does it make sense to provide a quick run down of per-cruise calibrations/ testing of wet lab equipment in this manual (i.e. scales, length boards, SBEs)?

Equipment Calibration

SBE

MACE has three **SBE 39plus Temperature (Depth) recorders**. These are sent in for calibration every other year. This is typically coordinated with GAP. For years when they are not sent in, the batteries should be replaced prior to gear trials. They each take 4 AA 3.6V lithium batteries. To replace the batteries unscrew the probe end. This should be possible to do by hand. Gently pull out until the battery compartment is accessible. Try not to add additional twists to the wires. Replace batteries and screw end back to hand tightness.



i Draft Question: Age and Growth

Does organizing the age and growth supplies fall under this manual?

Gear Trials

Prior to the start of a survey season the fish and chem lab can be set-up and equipment checked. This typically occurs during the gear trials.

A. Fish Lab

Equipment

If not installed already, under the direction of MACE IT unpack and connect the [length boards](#) and the [Marel scales](#) (specimen and basket scales) at the sampling stations and test the equipment with CLAMS.

Set up the CamTrawl battery charger in the chem lab and test both CamTrawl units by deploying them separately on a trawl and downloading them. Please see these pdfs for information on CamTrawl [battery charging](#) and the [quick guide](#) for operations.

During Gear Trials, do an in-water deployment test with the SBE (temperature (depth) data recorder). See these links for directions on SBE [initiation](#) and [downloading](#).

After you've set up the fish lab (generally, during gear trials or at the start of the summer survey), test out all the scales, length boards, and CLAMS stations. The safest way to do this is to confirm with MACE IT that the CLAMS active survey is 'SS Fake Ship'- this ensures that test data doesn't contaminate real survey data. Check with the IT staff to set this up. Once you have set the CLAMS survey to SS Fake Ship, go through a simulated haul in the fish lab (see details on standard haul processing tasks below) remember to check all protocols are correct for this survey including any additional protocol needs from Special Studies (fin clips, stomachs etc.).

While not being used, store and secure the [load cells](#) in a dry yet accessible location like the ready room. Charge and store the load cell batteries inside the Chem lab.

Cheat Sheets

- Post Table Tips in the fish lab on inboard wall near work station 1.
- Post Special Studies summaries and specific instructions and prepare any necessary.
- Post the large MACE ID poster on the wall nearest the ready room.
- Post maturity code descriptions on wall near CLAMS station 4.

Other Gear

- Set out and arrange fish lab gloves, nitrile gloves, work gloves, and staff raingear in the ready room area.
- Set out otolith vials/caps, scalpels, tweezers, knives, pencils in a tub next to sink in fish lab.
- Prepare oto juice - (instructions??)

B. Chem Lab

- Set out essential waterproof identification books and laminated id cheat sheets (e.g. myctophid and jellyfish) in a location in the chem lab that is easily accessible.
- Unpack totes of office supplies and excess fish lab sampling tools into drawers. Organize and label drawers by supply type for ease of access (e.g. Office Supplies, Fish Lab, Bags, Tapes and Bungees etc.).

C. Otoliths

Prepare Otolith supplies: Affix enough barcode labels to vials to fill 2-3 boxes. Labeled vials are arranged Left to Right, Top to Bottom (No Zigzag) in Styrofoam trays. Write the cruise info using permanent marker on the otolith boxes: (i.e. - DY2401 where DY = ship name Dyson, 24 = last 2 digits of year, 01 = cruise #), vial barcode # range, and the species collected.

Length Boards

If lengths are not measuring correctly you may need to **re-calibrate** the fish length boards (caution, the ruler inlaid on the length board is not a precise measuring tool and not used for calibration): * Place the magnet over the clear plexiglass plate right above the green led light. The light should turn red and then the length board should switch to calibration mode. * The screen on the length board will display calibration mode and it will instruct you to place

the magnet at 0 cm of the metric ruler (This should be up against the vertical barrier between the plexiglass covered control panel and the inlaid ruler). * The screen will then instruct you to place the magnet at 75 cm of the metric ruler (not the ruler inlaid). The 75 cm mark is noted (in permanent ink) on each fish board. The calibration mode will then finish and let you know when calibration is complete.

Weighing Scales

Locate the scale calibration weight sets in the Chem Lab floor cabinet aft of the computers and complete a calibration followed by a calibration test.

A scale calibration is performed by:

1. Simultaneously pressing the MENU and ZERO keys:
 - Wait until the scale asks for a reference weight – May take 15 seconds. “Put 20” or “Put 2” will display.
2. Place the reference weight (i.e. 20 or 2 kg weight) on the platform then press the PRINT key:
 - The message “====” appears on the display while the calibration takes place.
 - When the calibration is complete, the message “Fit nn” appears.
 - Values above 25 indicate a poor calibration; repeat calibration if needed.

After a calibration has been completed a calibration test should be conducted at the start of each field season. The test weights for the calibration test should remain stored in a dry secure location after use. In short, the calibration test is the placement of a full range of weights on the scale and recording the values. The scale calibration test sheet [scale calibration test sheet](#) has a tab for each scale and provides a list of the weights to be tested. The results from each scale should be documented on its tab along with the date of the test.

Load Cells

Compare the crane scale readouts to the load cell weights. Have both cranes (starboard and port) lift an object on the back deck. This could be a codend or any gear. The weight read out will display in the wet lab by clams station 1 and on the crane. Attach the loadcell and weigh the same object, compare for accuracy. If the crane weights are not similar to the loadcell do not use the crane readouts for fishing operations. See section Splitter Bin Vs. Sorting Table? for safely using the loadcell during fishing operations.

SBE

The SBE should be good to go after the [Pre-Season Preparations](#).

Acoustic Calibration

Fish lab personnel assist with acoustic calibration. If the vessel's large CTD is not working or if staff is not available the CastAway-CTD (aka "football") can be used. This piece of equipment is stored in the Chem Lab.

More Info Needed: I am thinking some instructions on the calibration spheres and downriggers would be nice.

CastAway-CTD

For select purposes the CastAway-CTD can be used as alternative to the large CTDs. The larger CTD may require 3-4 ship crew to safely cast over the "Hero deck" (side sampling station) while the small football CTD only requires 1 individual. To cast the CastAway-CTD secure it to the railing on the "Hero deck" and lower down to 30m. Communicate with the Bridge before and after lowering anything into the water from the ship.

1. If not installed, insert two of the rechargeable AA batteries included in the CastAway case into the CT
 - a. Remove the rubber outer case and unscrew bottom end cap to insert batteries, then reinsert CTD into rubber outer case
2. Using the magnetic stylus, turn on the CTD by inserting the magnetic end of the stylus into the contact on the top left of the screen.
3. Using the contact on the bottom left to move the selection (white box), make sure the deployment symbol , the small image of the CTD, is selected.
4. To start the cast, touch the contact on the bottom right with the magnetic stylus. The CTD will report if it is still waiting for GPS signal which is required for the date /time.
5. After the cast is complete, touch the contact on the bottom right again to end the recording.

[CastAway CTD Manual](#)



Pre-Haul Preparation

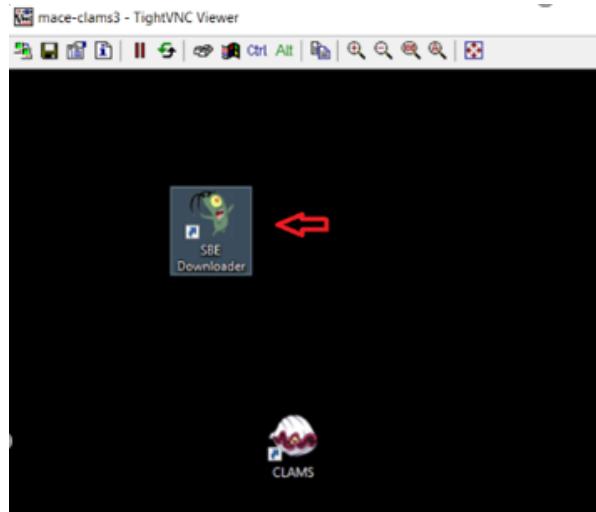
It is the responsibility of the Chief Scientist or their designee to determine the areas/depths where trawl hauls will be made. Decisions will be based on a semi-systematic, opportunistic sampling scheme to maximize the value of each sample with respect to the objectives of the survey. Once the timing of sampling has been determined there are several items that can be prepared in the fish lab.

- Check with FPC or Cave lead to see if you are needed for the [whale watch](#)
- Initiate the [SBE](#) and hang outside fish lab
- Prepare the [Camtrawl](#) with a charged battery, ensure that green light is slowly blinking and place at fish lab entrance
- Calibrate [Marel scales](#)
- Check that all [sampling supplies](#) are refilled and replaced as needed

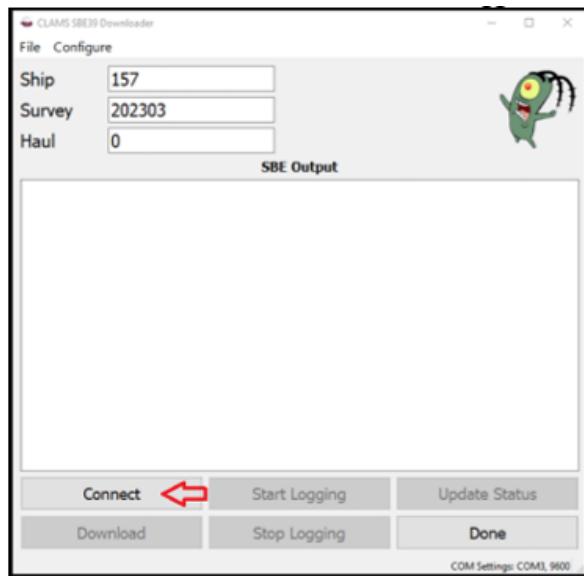
SBE

Trawls and Methots will be equipped with an SBE, commonly referred to as the “pipe bomb”. These data provide a temperature at depth profile from which an average headrope depth and an average headrope temperature are calculated. As part of the pre-haul preparations, the SBE needs to be set to record.

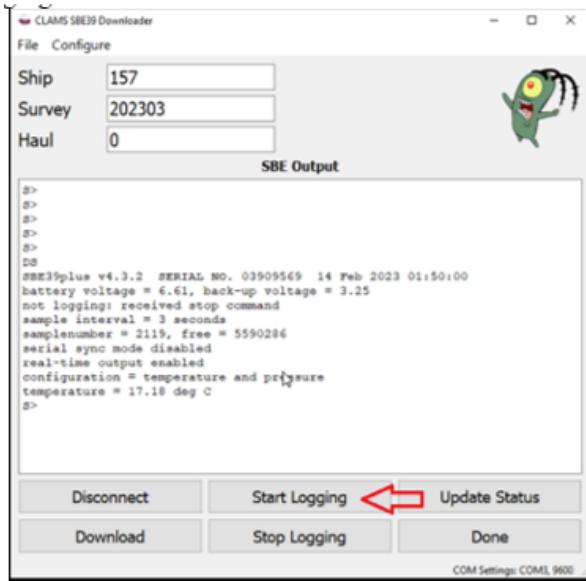
1. To connect to the SBE make sure it is plugged into the 4-pin connector correctly. The cable and SBE is located above the fish lab sink. Open the SBE Downloader on Workstation 3.



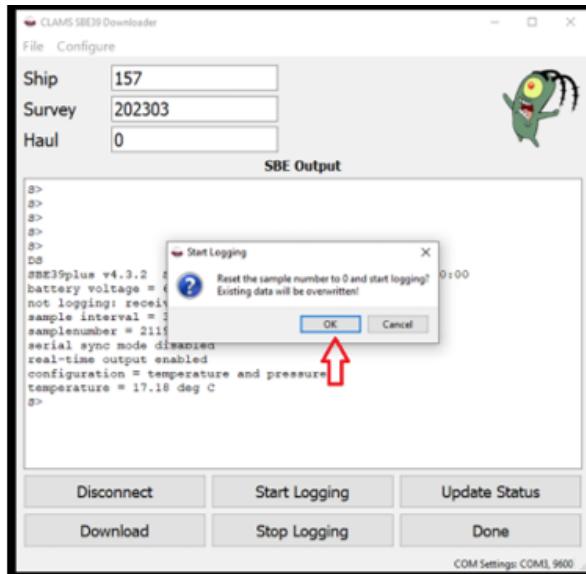
- Once the downloader program is open, click on “connect”. At the deployment of a haul it does not matter what haul number is displayed, however, following a haul you should start CLAMS at workstation 1 and initiate the current haul processing prior to opening the SBE Downloader to ensure that the SBE data are logged to the correct haul.



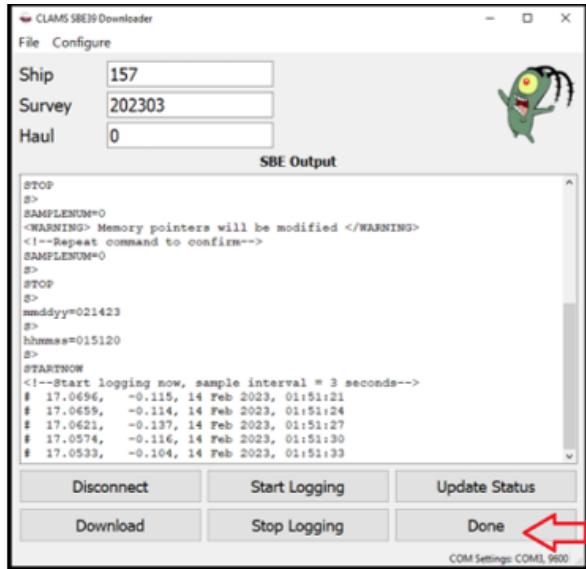
- The dialog box will scroll through some text. Once the dialog box stops, click on “start logging”.



4. A dialogue box will pop up asking if you are sure that you want to start logging which will clear all data currently on the device. This will reset the sample number to 0 and begin logging data after you click OK.



5. Let the program run until you can see that the SBE is logging data every 3 seconds. Then click on "Done". This will quit the SBE downloader and you can unplug the SBE cable and put the rubber dummy plug on. Place the SBE for the deck crew to mount to the net.



CamTrawl

Ensure a charged CamTrawl battery is placed in the CamTrawl, connected, closed, and secured with a “spaghetti” locking cord. Verify that the green light is slowly blinking on the dummy plug before deck crew attaches the assembly to the net. Floats should be upright or to the port side if laying down on top of the net. The deck crew is responsible for securing the CamTrawl to the net. For more information see the latest CamTrawl [quick guide](#).



Marel Scales

The large basket scale (at the end of the conveyor belt) and the smaller specimen scales (on the counters) require calibration before each haul is processed - use the stainless steel 20 kg (large scale) and 2 kg (small scale) weights provided for this purpose for each scale respectively. Remove all objects from scale and dump any water collected on top the 20 kg weight.

Marel M1100 Calibration:

1. Simultaneously press the MENU and ZERO keys:
 - Wait until the scale asks for a reference weight – May take 15 seconds. “Put 20” or “Put 2” will display.
2. Place the reference weight (i.e. 20 or 2 kg weight) on the platform then press the PRINT key:

- The message “====” appears on the display while the calibration takes place.
- When the calibration is complete, the message “Fit nn” appears.
- Values above 25 indicate a poor calibration; repeat calibration if needed.

Notes:

- While using the scale, Grade should be selected not Packing. Use the up or down arrow to change. The scale will not input weight into Clams when in Packing mode.
- Place an empty basket or tub on the scale and press “Tare”. You are ready to weigh baskets!
- If the scale is not providing steady readings and it has become difficult to collect weights, it may be necessary to re-calibrate scales mid-haul. This can occur if the weather changes or the ride of the ship changes between the initial calibration and getting back on transect.
- If the scale can not provide readings and the measuring plate appears loose and moves independently of the base. The load cell bolts may be loose and require tightening. There are two sets on either side of the scale.



Sampling Supplies

Replace and refill standard sampling supplies such as scalpel blades, the glycerol thymol squeeze bottle, vials caps, and the otolith vials trays as needed.

Determine if special study requests are applicable for the region and haul type and prepare for sampling if necessary (i.e., set up supplies, prepare labels, ovary bags, storage bags).

Protected Species Watch (AKA Whale Watch)



Check in with FPC or Cave Lead to determine if you are requested to complete a whale watch on the bridge 15 minutes prior to the net entering the water. Updated protocols for protected species observation and avoidance measures is located in the “BOC Associated Documents” folder or the current cruise folder. For 2025, look for the document titled “MACE protected species at-sea procs_FY25_v11.docx”. When beginning whale watch a common practice is to check in with the Officer on Deck (OOD) and ask if they have seen any protected species near the fishing location and what direction the ship will be heading for fishing. Observations for protected species can be focused in that direction.

Sampling Procedures

This section of the manual provides instruction on what to do when a midwater or bottom trawl catch first comes [onboard](#), how to sort the catch on the [slime line](#), and how to collect [biological samples](#). There is also a section on how to handle [Methot trawls](#).

Safety and Ergonomics

Prior to beginning sampling, take time to consider physical safety and ergonomics. There are several steps that can be taken.

- Consider some pre sampling stretches to warm up muscles (link to GAP stretches).
- The fish lab is wet and slippery, make sure that the non-slip floor mats are placed at all workstations.
- Remember to limit basket weights to 20 kg to prevent injuries and practice safe [lifting techniques](#).
- use two people to move heavy objects like the camtrawl or large totes of fish from the deck.

Midwater or Bottom Trawl catches

1. Recording the catch in CLAMS

Open the Catch Logger for Acoustic Midwater Surveys (CLAMS) app; See the document CLAM Digging located in the folder G:\CLAMS for entering catch data on the CLAMS app.



The CLAM digging document in G is from 2013. Is there some updated instructions somewhere that we can reference? Any quick bullets we could add here?

2. Equipment Retrieval

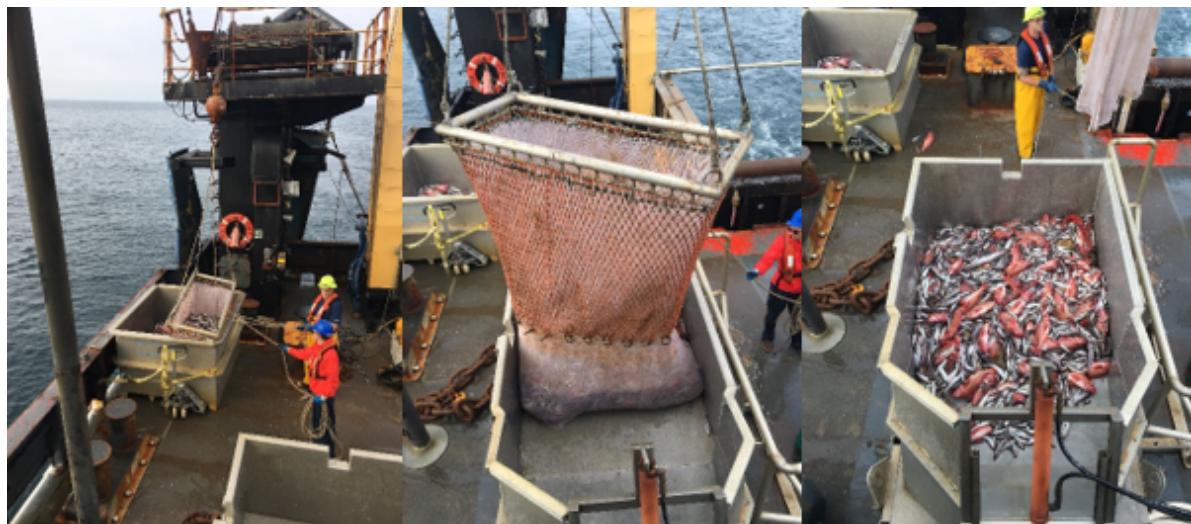
As the net is hauled back, obtain the SBE from the deck crew and [download](#) it as soon as possible. The SBE downloader app is located on the forward computer nearest the sink.

Rinse the CamTrawl with fresh water and if time allows [download](#) the images before the next deployment.

It is common for other equipment to be handed over to the slime lab from the deck crew; various integrated trawl instrumentation (ITI) and special study instrumentation (light sensors, etc.).

3. Splitter Bin Versus Sorting Table

Catches with a total catch weight of less than ~ 2,000 kg (2 tons) can be dumped directly into the sorting table (link to that section). However, for larger catches (>2,000 kg) they must first go into a deck “splitter” bin and are “split” for a subsample.



4. Splitter Bin

- For split catches, a total catch weight must be obtained by weighing the catch in the codend. The load cell (provide link to instructions) or the crane scale may be used. Each (?) crane has an internal scale that has a readout both at the crane and in the fish lab. However the crane scales and/or the readout in the fish lab is not always reliable. A weight from the load cell is preferred.

- Once the load cell is secure and hanging from the crane hook press TARE and you are ready to weigh the codend.
- After the codend is weighed and recorded the catch is dumped into the deck “splitter” bin.
- Next the the weight of the empty codend should be recorded.
- A cargo (brailer) net attached to a metal frame in the bottom of the splitter bin is used to collect a subsample of the catch. This subsample is then lifted into the sorting table.
- Once the crane is secure, wear PPE and receive deck permission to check the sorting table and splitter bin to make sure the catch is representative/homogenous.
- The total catch weight is the difference of the full codend and the weight of the empty codend. The load cell can output in either pounds or kilograms. Make sure the load cell reads in kilograms, otherwise select the pounds unit in CLAMS.

Splitter Tips

- If getting weights from the load cell on deck, checking the splitter bin, or checking the sorting table make sure you are wearing PPE (helmet + floatation, either a float coat or life jacket)! Also make sure the deck crew know you are out there.
- Deleted a note about using Whole Haul here. I think the practice of doing that is discouraged. Maybe want to double check that whole haul sampling for a single species is described somewhere, for example in case of a shark.
- If the total catch exceeds the capacity of the deck “splitter” bin and the catch is not homogenous, splits should be repeated (with subsequent emptying of the bin) until the entire codend is empty. Alternately, the end of the codend has been pinched off at the thick strap and placed into the sorting table and the rest of the catch dumped overboard. This is not ideal but has happened due to excessive catch, poor weather conditions, and inexperienced crew preventing safe splitter bin operations.

Shark or Marine Mammal

If a large shark is caught please follow the **MACE protocol** for its release. Remember to collect _____ measurements if possible.

Follow the marine mammal protocol (?) if one is caught.

Slime Line

The catch from the sorting table flows directly onto the ‘slime line’ though a hydraulic door.



Roles

At least three people are desirable for the slime line. One person (often the Fish Lab Lead) operates the belt system and also weighs and enters the catch data into CLAMS. It is essential for this person to be following the “Table Tips” for species collection intended for length frequency measurements, biological sampling, and Special Studies for the current survey. Table Tips are updated for each winter and summer survey, particularly biological collections and Special Studies. The second person operates the hydraulic sorting table door using the lever on the inboard side of the sorting belt (see image above) and allows the catch to steadily and slowly flow from the sorting table to the sorting belt so the catch can be efficiently screened and sorted by the slime line team. The third person will also sort species from the belt as directed by the Fish Lab Lead and often stands on the outboard side of the sorting belt. If there is low bycatch and the catch requires minimal sorting, only 2 people are necessary to run the slime line. In this case, the third person may get a jump start on measuring the lengths of the target species set aside by the Fish Lab Lead. If bycatch composes a significant portion of the catch, the third person helps sort out items from the catch to be weighed and measured after the table has been emptied.

Operations

Once the deck area around the sorting table is clear of deck operations and the ok is given from the deck lead, the sorting table can be raised. Clearly shout out to the deck “Table coming up!” so they are aware and the person on the outboard side of the sorting belt can raise the table using the hydraulic lever. The catch is steadily and slowly dumped onto the sorting belt by raising and lowering the table door to maintain a single layer of fish on the table that can be sorted through. The catch is sorted by species and weighed.

Once some of the catch has been allowed to flow onto the sorting belt, pause and make a sampling strategy! Reference common sampling strategies (i.e. the ‘sorting pollock’ table tips slide) and consider suggestions from team members; they may have an alternative, more efficient sorting strategy. Once a strategy has been chosen confirm it with the fish lab team so everyone is on the same page working together.

- Remember to avoid “picking” species or pollock of a particularly large or small size class from the belt unless you pick ALL individuals of that species/size or subclass of that species.
- When hauls are composed almost entirely of one species, the bycatch can be sorted off the sorting belt while the dominant species is left on the belt to be load into baskets and weighed. For example, all non dominant species are placed into a bin to be sorted after the belt is cleared.
- Occasionally there are 2 predominant species in the catch such as pollock and jellyfish, pollock and POP, or even pollock and a Mix. It is more ergonomic to leave both species on the belt and sort the 2 predominant species by sliding/tossing one species forward while leaving the other behind. This creates an alternating flow of two species moving towards the scale. The person at the scale weighing the catch will then need to switch between the two species in CLAMS while recording weights.

i When weighing baskets of selected species at the end of the sorting belt be mindful of the weight of the baskets. Repetitive heavy lifting of full baskets is discouraged at sea and may result in “repetitive stress/strain injuries.” Consider maintaining a maximum basket weight of ~20kg. It is encouraged to set aside **more** baskets that are **lighter** to make the lifting easier and **safer** for the fish lab **team**.

A reminder that everything in the catch gets weighed, then it is designated as being “**Measured**”, “**Counted**” or “**Tossed**”. Baskets that are retained for length/sex or biological sampling are designated “**Measure**”. Baskets that are weighed and “**Tossed**” are tossed over through the discard shoot. Baskets of target species are generally not “**Counted**”, this is typically reserved for catch species that we do not length (amphipods) or abundant larval fish such as Age-0 pollock. “**Counted**” baskets may be discarded after the counted amount has been entered into CLAMS.

Digital species ID guides for **Fishes** and **Invertebrates** can be accessed by clicking on the links. A suite of hard copies of ID guide books can also be found in the Chem Lab.

Subsample selection

Since weighing and measuring all individuals that have been sorted on the belt is not typically feasible (except for small hauls), a subsample of predominate species or species mixes is made. Subsamples can be taken from the targeted catch (often pollock or POP) and from the bycatch (everything else; often forage fishes). When the catch is subsampled, it must be random and representative of the whole catch.

When taking a subsample, a proportion is weighed and “**Measured**” while the remainder is weighed and “**Tossed**”. The weights and numbers from the measured subsample are extrapolated in the database to represent the total weight and number of that species in the catch. The fish marked as “**Measured**” are also referred to as the biological sample.

If alternative instructions are directed, (e.g., Special Studies) an additional option is weighed and “**Counted**” (sometimes larval fish, Age-0 and Age-1 pollock).

The size of the “**Measured**” biological sample depends on the species or the species mixture. Refer to the **Table Tips** posted on the wall for guidance. Instead of counting individual specimens for the biological sample, weight can be used. For example, if **Table Tips** recommends 300 adult pollock for biological sample, and you count 30 pollock in a basket weighing 20kg, instead of counting 300 pollock you could mark 10 baskets as “**Measured**” and “**Tossed**” the remainder. After the appropriate number of baskets for the biological sample have been weighed, recorded, and set aside for processing, all fish in excess of the selected biological sample may be weighted and selected as “**Tossed**” and discarded overboard.

Biological Sample

The subsample marked as “**Measured**” constitutes the biological sample. The biological sample is subdivided into either “**Specimens**” that include any fish that needs to be cut open and “**Length/Weights**” that include any organism in which only a length and weight is needed. “**Specimens**” include pollock that need to have otoliths taken, pollock and any other fish that need to have sex and/or maturity status recorded, and special study species. When both “**Specimens**” and “**Length/Weights**” are required they should be randomly selected from the biological sample. This can be done by randomly selecting the appropriate number of baskets of fish for each collection or alternatively, during a random basket collection, select the number of fish required for the “**Specimens**” sample by using a zigzag pattern; on the sorting belt, the zigzag method involves collecting all fish in a left to right or right to left zigzag pattern until the required number of fish has been reached. Separately, on a different random basket collection repeat the zigzag method for the “**Length/Weight**” sample.

Target Species Measure Subsample

Sorting pollock:

Can you easily separate size classes?



Example: haul contains **mostly adult pollock** with a **few age-1** pollock

- Sort into adult and age-1 size classes.
- For **MEASURE** samples:
Randomly select ~250 **adult pollock** for lengths, and ~50* for specimen samples
Randomly select ~40 **age-1 pollock** for lengths and ~20 for specimen samples

POLLOCK MEASURE TABLE:	
Adult: 30* otoliths, 20 additional sexed length/weight/maturity, 250 unsexed lengths (~300 fish total)	
Age 1: 5 otoliths, 15 additional unsexed length/weights, 40 unsexed lengths (~60 fish total)	

* The number of otoliths depends on region

Option 1 example: haul contains **a mix of adult, age-1, and age-2 pollock** you treat as **one big group** because sorting is too difficult and would take too long:

- Take ~50 pollock for specimen samples (30* otoliths & 20 sexed length/weight/maturity)
- Take ~300 unsexed pollock for lengths (**MEASURE samples**)

Option 2 example: haul contains **adult pollock** and **a mix with age-1s and and eulachon**.

- Separate **adult pollock** from the **mix**
- Subsample and sort ~75 kg (~2-3 baskets) of **mix**
- From **adult pollock**, take specimen and length samples in quantities on the **pollock measure table** (**MEASURE samples**)
- From sorted **mix**, take age-1 pollock specimen and length samples in quantities on the **pollock measure table** (**MEASURE samples**)

Always take an equal portion for the “**Measured**” subsample from the first, middle and last section of the catch by attempting an adaptable systematic random design, collecting every X basket. To help create the random design visually inspect the fullness and species composition of the sorting table before processing the catch. For example, when the fish table is half to three fourths full of predominantly average sized Adult Pollock, collecting every sixth basket is a great place to start. Keep in mind, random sampling is an adaptable practice; therefore, if more or less fish are needed, you may increase or decrease the collection frequency of baskets to obtain the ideal sample size. If less fish are needed, consider the option of reducing the basket fullness to reduce fish and maintain the sample design.

When estimating the number of baskets/target species to set aside it is a general practice to count the target species in the first basket and reflect upon that total with the posted amounts on the Table Tips. For example, if 30 fish are counted in the first basket and the Table Tips requests 30 pollock for otoliths, 20 for sexed length/weight/maturity and 250 for length only, set aside roughly ~ 1 basket for otoliths, 1 basket for sexed length/weight/maturity, and 9

baskets, for lengths. If using a basket, as subsampling tool all the fish must be measured within that basket. If there way more than needed, dump the fish out and collect a random sample from those for your measurement.

Non pollock Sampling

Non-pollock specimen goals

For:

- Capelin
- Eulachon
- Herring
- Rockfish sp.*
- Arctic cod
- Jellyfish
- Sand lance
- Northern smoothtongue
- Viperfish
- Myctophids

Take **10** length/weights, **25** lengths**

** If large amount of same species with multiple size classes: take **25** length/weights, **50-100** lengths

Age-0 pollock: Take **25** lengths only, weighed all together

*If rockfish are dominant catch: take at least 25 unsexed length/weights and 50 unsexed lengths per species.

For:

- Krill, isopods: No lengths or length/weights. Count subsample if possible
- All other species $\geq 5g$: **10** length/weights
- All other species $< 5g$: **10** lengths, weighed all together

Be sure you take the proper length types pre-selected by CLAMS!

Check the **Table Tips** to determine what quantity of a species should be retained for lengths, lengths/weights or special studies. Similar to pollock, non-pollock catch can be divided into fish that are weighed and kept for measurements and those that are weighed and then tossed. When not retaining the entirety of a bycatch species for “measurements” then take an equal portion for the measurement subsample from the first, middle and last section of the sorting table. For smaller species, like forage fish, the entirety of it can be collected in a few baskets then subsampled at the end. A simple practice to reduce to the desired amount is the “basket dump” technique. From the 2025 Observer Sampling Manual pg 13-5:

“The basket dump method works well on most vessels and in most fisheries as a method to randomly reduce a population. Once you have randomly selected a basket of unsorted catch from your species composition sample, split your selected basket by dumping it into two empty containers lined up next to each other. Assign numbers to the two empty baskets before dumping. After dumping the basket, randomly select one of these two containers and use all the predominant species in the randomly selected basket for your sex/length and specimen fish.”

Repeat the basket dump method until reaching the desired sample size.

Mixes and Submixes

Eulachon, juvenile pollock, and other forage fish are often caught together in Shelikof Strait. When a catch of multiple similar species cannot be separated to species in a reasonable amount of time at the sorting belt, create a “Mix” by selecting the species as “Mix”. The mix category can be created to encompass all of these individuals. In these cases, a portion of the mix needs to be further sorted, weighed and for species composition and measurements of the Mix. The rest of mix can be weighed and “Tossed”. Similar to collecting a subsample to “Measured” as described above, collect an equal portion of the “Mix” from the first, middle and last section to sort, weigh and measure. Unlike the subsample, we save a couple baskets to the side until the entire haul has been processed from the sorting table. The saved “Mix” basket(s) intended for species composition representation should be weighed and selected as a “Measured”. Similar to a subsample, the weights and numbers of the species composition of the “Mix” will be extrapolated in the database to represent the total weight and number for all of those species in the catch. See the **Table Tips** example below “Handling mixes”, this will also be posted in the fish lab. Sort the mix from the representative basket(s) by species, and weigh the separated species and remember that the parent sample is now the “Mix” and not the “Sorting Table.” The remaining “Mix” baskets from the sorting table should also be weighted and “Tossed.”

Handling mixes

- If you have **many small fish mixed together**, like eulachon and age-1 pollock, you might want to **make a mix**.
- In CLAMS, add a mix (just like adding a species).
- You will need to weigh at least a basket of the total mix as a **MEASURE** sample before you can input weights of individual species within the mix
 - Pick **MEASURE** for the portion of the mix that you will sort into species, and **TOSS** for the unsorted
- Sort the **MEASURE** sample to species
- Make sure that the species within the **mix** have been added to the **mix**, and **not to the codend**
- **You cannot have a species both inside and outside the mix – so sort carefully!**
- Within each species, take **MEASURE, COUNT, and TOSS** samples as needed to get the right number of specimens (see other sheets)

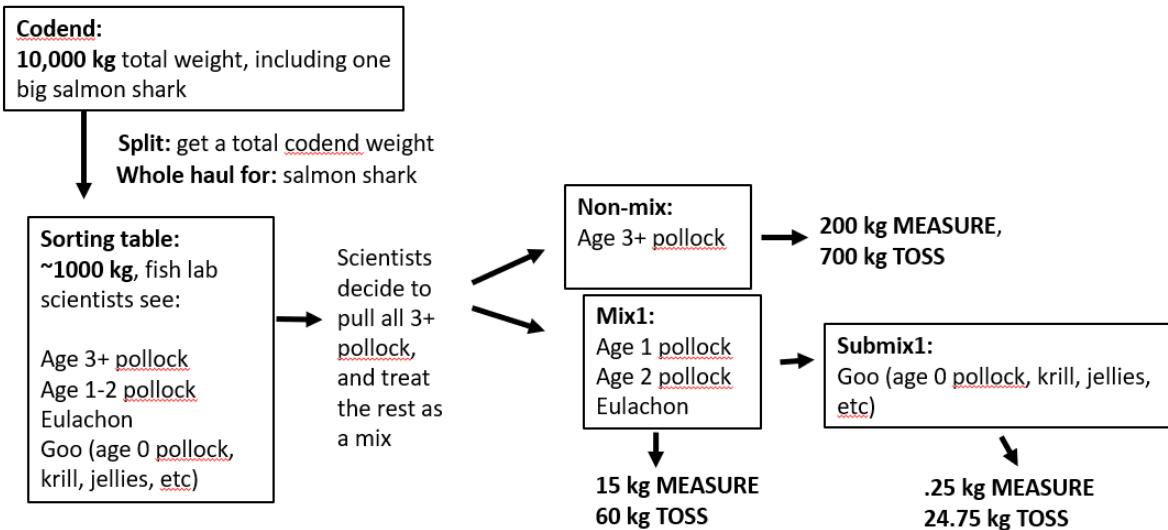
You can make a Submix too!
This lets you get appropriately sized subsamples without being overwhelmed by the goo.
See Submix example

You can have up to 2 primary mixes (Mix1, Mix2) and 1 submix (Submix1)!

Use Submix to sample the small stuff

Are you stuck with a time-consuming sorting mess? Consider a Submix.

In this example trawl, keeping enough of the mix to reach our goal of 60 age-1 pollock for measurements would require keeping 1 kg of goo (krill, age-0 pollock, jellies, etc) too. Submix the goo!



* Each species/group can only live in one place!

Biological Sampling

Length Frequency



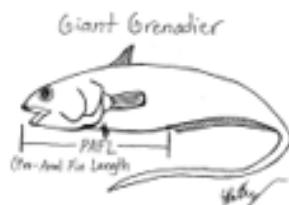
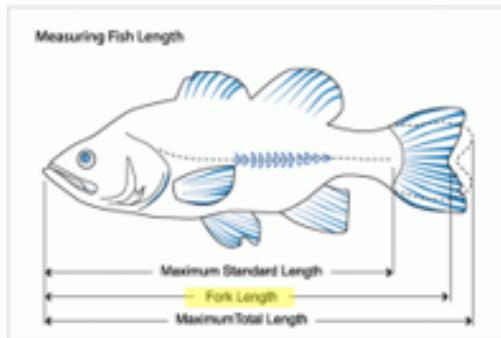
Length frequency data for each haul is collected at the species specific amounts identified in the **Table Tips**. Length frequency samples must be randomly selected. In general, lengths are collected from approximately 300 pollock per haul; 250 of those are lengths only as described here, and 50 more come from “**Specimens**” samples that include the otolith collection and additional length/weight/sex/maturity collections. Length frequency are typically collected from 35 (10 length/weights) non-target species (see “Subsample selection” section or **Table Tips** for target species divided into different size classes and length frequency goals).



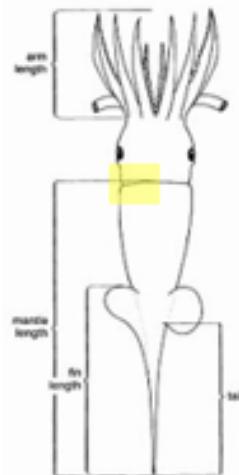
The Ichthysticks, also known as length boards, are used to magnetically measure the length of specimens into CLAMS. See posted **Table Tips** for examples of length types and species. For fish, place the tip of the snout at 0 (against the vertical panel at the left end of the measuring board) and position the pointed end of the stylus at the tip of the middle rays of the caudal fin (fork length). CLAMS will ask for specific lengths for each species. Keep the basket as the sampling unit (i.e., if you start sampling a basket, finish the basket) and avoid incidental hand selection biases.

Length types - Indicate in CLAMS when measuring!

Fish- Fork length if possible, standard length if not possible



Squid- mantle length



Shrimp, Krill or similar- total length



Jellyfish- bell diameter (length across the bell)

Other- total length as best you can

Fig. 1 General scheme for defining size dimensions (TL, total length; AL, abdominal length; CL, carapace length; PL, pectoral length; MSL, mantle length; BL, body length; TLL, total length across the bell).

All length boards are calibrated prior to entering the field (i.e. during Gear Trials). If measured lengths on the length board are significantly off from the length board ruler by more than a few millimeters they may need to be **recalibrated**. Contact MACE IT (i.e. Rick Towler, Scott Furnish, etc) and inform the Fish Lab Lead to monitor the length board for the possibility of future glitches; it is possible the length board will have to be switched for a spare. Please note the calibration process is conducted with a standard meter stick and not the ruler on the length board. Often the quickest fix to a frazzled length board is resetting the length board. The simplest reset option is completed by closing CLAMS and reopening the application.

When cleaning the wet lab do not spray high pressure water on the clear control board area of the length boards, that can introduce water into the system and ruin the boards!

Specimen Samples: Otoliths, Sex, Maturity, length/Weight, Gonad Weight, and Special Studies Sampling

In addition to unsexed length measurements described above, “**Specimens**” samples including the collection of otoliths, sex, maturity, specimen weight, and gonad weight is another slime

team collaboration that involves a minimum of 2 people. Depending on staffing, it may be preferable to complete measuring the lengths of all the target species and non-target species before proceeding to this data collection. The collection of length, weight, sex, maturity, and gonad weight is referred to as the GSI (gonadosomatic index) protocol. The collection of otoliths as the otolith protocol.

The GSI protocol can be completed efficiently by 1 person that has experience with target species (pollock) maturities.

Three people working collaboratively on the otolith protocol and special studies enables a more efficient processing times.

Alternatively, a Fish Lab Lead may prefer one person completes all the length measurements while two others start work on the GSI and /or the otolith protocols.

A reminder; both pollock specimen protocols in CLAMS collect GSI data, however only one protocol is capable of collecting otolith data, and is required to collect otoliths under that CLAMS protocol.



Question for later

Should we include a description on what a “protocol” is?

From the “Measure” baskets randomly placed aside for “**Specimens**” (i.e. otoliths and GSI) collect the following data in CLAMS under the Specimen tab: a. fork length b. specimen weight c. sex and maturity stage (refer to Maturity stages posted in fish lab) d. weight of all prespawning ovaries (stage 3) - If collecting ovaries, weigh the liver. e. otoliths f. any applicable Special Studies collection

Otoliths

It is the responsibility of the recorder and the vial scanner to make sure the otoliths are being placed in the correct vial. Throughout the collection process, the vial numbers are always scanned in an increasing numerical order, not out of order. After each row, always spot check the vial number correlates to the specimen number on CLAMS. If there are any discrepancies, discard the otoliths in question and erase the data. The data can be re-entered under the GSI protocol if otoliths are lost in the process.

During the otolith collection for a haul, use the squeeze bottle to fill vials just enough to cover otoliths with glycerol thymol. Vials should be tightly capped and re-checked for “extra” otoliths. Assure that each Styrofoam container is labeled with cruise number, specimen number range, and species.

Non-Random Sample Collection

Situations arise when a random sample of age structures is not desired or necessary. Note this occurrence on CLAMS by selecting NONRANDOM on the specimen form. Remember to unselect NONRANDOM if switching back to the random sample of Pollock. The length data recorded from age structure samples will not be combined with the length frequency measurements described earlier except when absolutely necessary (e.g., due to a small catch) and the sample is random.

Prohibited Species

Measure the length and weight all salmon and halibut captured and return to sea as quickly as possible. Halibut are measured by fork length; according to the 2025 Observer Sampling Manual pg.12-5: “If a halibut is longer than the Length board, lay the halibut on top of a tape measure. Do not obtain measurements derived from laying the tape measure over the top of the fish and sighting down. These are curvilinear lengths and they are not viable data for data users.”

The same measuring technique goes for large skates. Weights can be extrapolated from many species of large fish using Length-Weight tables only when the lengths are collected correctly, including salmon and sleeper sharks.

Rare and Unidentified Species Collection

Collections of rare or unusual species are always of interest to the scientists at the Alaska Fisheries Science Center. Preservation in 10% formalin solution is preferred for rare fish that are intended for long-term or museum collection. Freezing whole fish is preferred for fish that require species verification and are not rare. Frozen specimens also allow scientists to collect tissue samples, whereas the formalin does not.

When unidentifiable or questionable species are encountered, identify them consistently (e.g., “Rockfish Unid”) and freeze one or two representative samples in a separate bag and include a collection label. A voucher must accompany all physical samples. For MACE, a voucher simply consists of a printed specimen label which includes a specimen #, cruise, ship, date, haul. The collection should include a digital photograph. The photograph(s) should include unique/identifiable features of the specimen. The specimen should be placed on the length board or background similar to help discern the size of features. For each unknown species, keep at least one voucher specimen per leg for later identification. You are encouraged to use the voucher process as a method to verify identifications, particularly for the rockfish and smelts.

As soon as possible, email RACE/GAP Taxonomists with pictures to confirm identification or which method they would prefer the specimen to be preserved or not. Perhaps a simple picture will confirm the identification and there will be no need to collect the species as a voucher.

RACE/GAP Taxonomist Contacts: Sarah Friedman sarah.friedman@noaa.gov Thaddaeus Buser thaddaeus.buser@noaa.gov

Special Requests

Special Studies requests will be accommodated on a “not to interfere” basis with the primary goals of the cruise. It is encouraged for all assigned to the fish lab to read the Special Studies requests. Special Studies summaries will be posted in the fish lab to look over as a cheat sheet while processing and the original Special Studies collection requests will be printed out for reading in the Chem lab. Document Special Studies collections during/after each haul (i.e., tally histology, fecundity, stomach samples, whole specimens collected). Eventually, collections will be summarized in the cruise report.

Methot Trawl Catches

A Methot is a large rigid square framed net with a depressor and clump weight attached at the bottom to help keep the net vertical and is deployed from the stern using the OceoWinch. A flowmeter suspended in the upper corner of net measures the flow of water moving through the net and allows for the calculation of the volume of water sampled. The Methot is designed to catch larger zooplankton like euphausiids.

See the BOC Associated Documents folder for Methot documents on setup and net photos and operations. The training video of Methot operations is also located in the BOC... G:\Book of the CAVE and SOPs\BOC\BOC Associated Documents\Net Schematics and Documentation\Methot\Methot Procedure_from DY Aug 2024.mp4

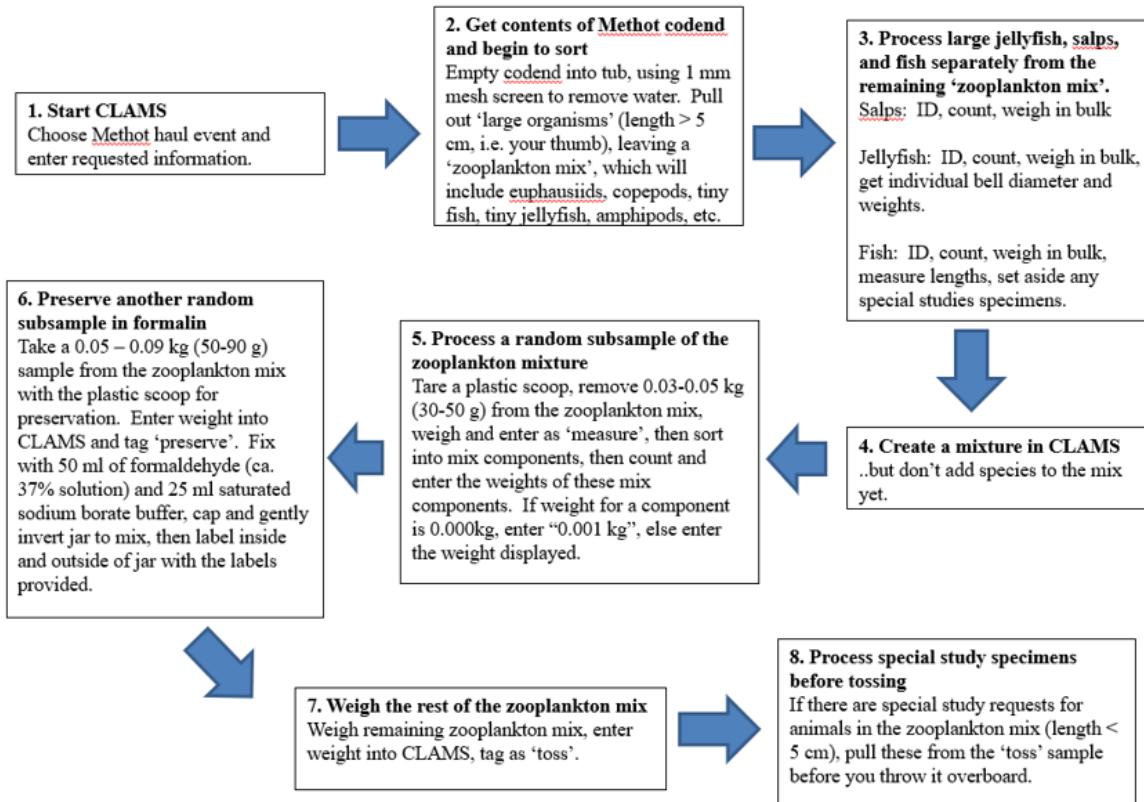
Setup and Sample Collection:

- Always wear PPE on deck: float coat or life vest and hardhat. If helping with net operations consider wearing steel toe boots and work gloves.
- Secure the SBE39 plus and PX sensor to the inside bottom of the frame (alternatively the Furuno depth sensor). *Is there a place to connect to that is obvious? If not a picture on where to attach would be helpful.*
- Clip the flowmeter to the monofilament loops in the upper corner, record initial flowmeter reading on notepad and let Acoustics Lab know which flowmeter serial number is in operation.

- Secure Methot codend to clips, to add an additional safeguard, wrap the clips with multiple passes of electrical tape.
- On retrieval, remove flowmeter and record initial and final flowmeter reading in CLAMS.
- Remove the SBE39 plus and [download](#).
- Empty the codend into a large gray tub. Spray the net until the entire sample, all euphausiids, have been washed down into the tub. 2 people carry the tub into the slime lab.

Processing Catch

Processing Methot catches

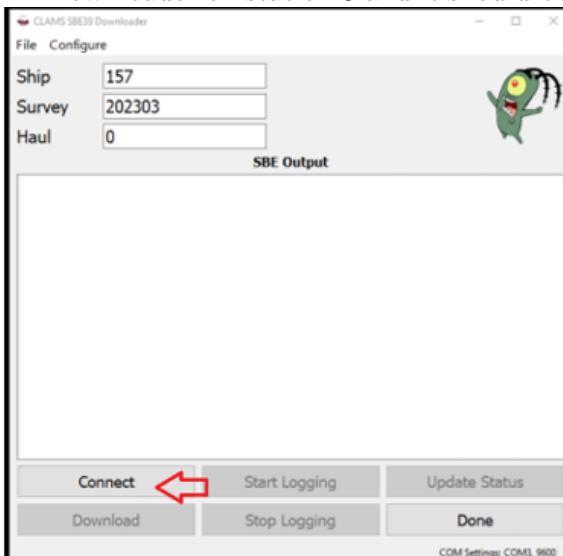


- First remove the large organisms (fish, squid, large jellyfish)
- Process as a normal trawl catch (i.e., sort/identify/weigh, and measure; subsample if necessary, CLAMS), Follow Table Tips for Length and Length/Weight guidelines.
- Empty the remaining contents through a sieve and into another tub.

- For **Gelatinous zooplankton**:
 - Separate salps and tiny jellyfish
 - * Salps: count and get bulk weight
 - * Jellyfish: identify using invert guide. Measure the bell diameters and get individual weights following **Table Tips**. Obtain the bell diameters by laying individuals out on the length board and measuring edge-to-edge.
 - For **Age-0 pollock (< 10 cm) and larval forage fishes (i.e. eulachon, capelin)**:
 - Separate age-0 and larval fish species from invertebrates
 - Measure the length only for a sample of 25 fish and record in CLAMS
 - For **Krill mix (What's left)**:
 - Collect the “*Measured*” subsample of the krill mix:
 - * Remove a small subsample (0.03-0.05 kg)
 - * Weigh/count and enter into CLAMS as Measure under the parent Mix.
 - Collect the “**Preserve**” subsample of the krill mix
 - * Before tossing, remove a preserve subsample (0.05-0.09 kg) and weigh it.
 - * Record the weight on jar’s inside label, and on the outside label. Enter this weight into CLAMS as “**Preserve**” under the parent Mix.
 - * Fix the subsample in formalin
 - * Wash the subsample into a 32 oz. jar. The krill mix should occupy no more than 1/3 to 1/2 of the jar. Leave room to add preservative.
 - * Add 50 ml of formaldehyde (ca. 37% solution) and 25 ml saturated sodium borate buffer solution.
 - * Fill the rest of the jar with seawater.
 - * Gently invert the jar a few times so that it is well mixed
 - * Label jars inside and outside with: Cruise, Haul, Date, Gear Type, and Sample Weight
 - Weigh the remaining mix as a “**Tossed**” and discard once sampling is completed.
 - Using masking tape, cut a small piece and cover the outside label on the lid of the jar. The outside label is not waterproof. Wrap electrical tape around the jar and lid to ensure it will remain securely closed.
-

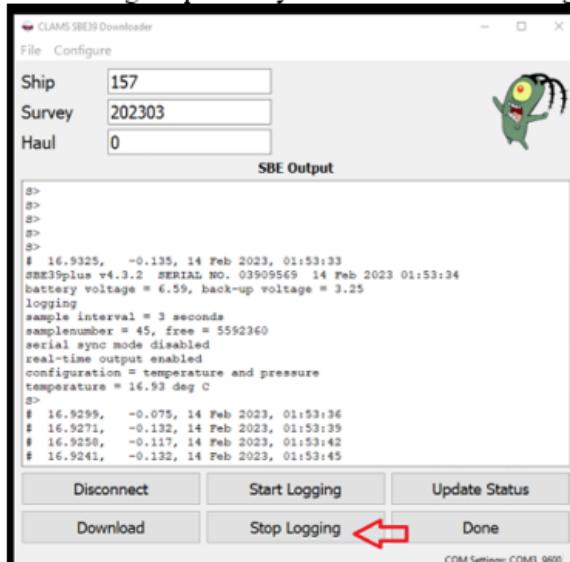
SBE

- 1. After the haul is retrieved, the deck crew will give you the SBE. Rinse it in the fresh water sink. Remove and store the dummy plug and plug in the 4-pin connector.
- 2. Open CLAMS on Station 1 and make sure the current haul is selected.
- 3. Open the SBE Downloader on station 3 and it should be on the current haul. Click



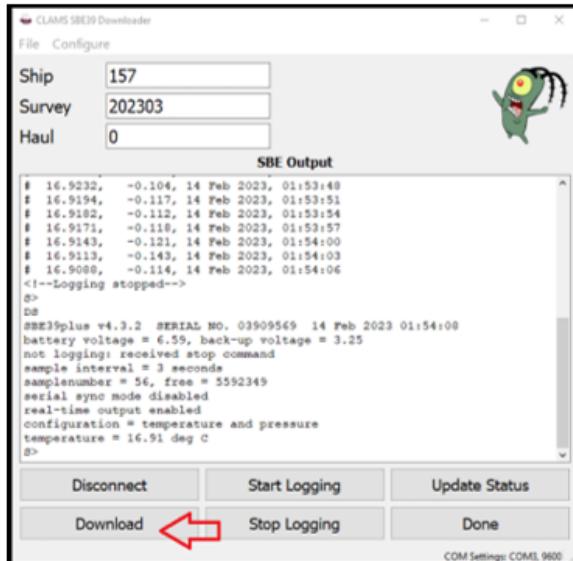
“connect”.

- 4. Once the dialog is open and you see the downloader logging data click on “stop

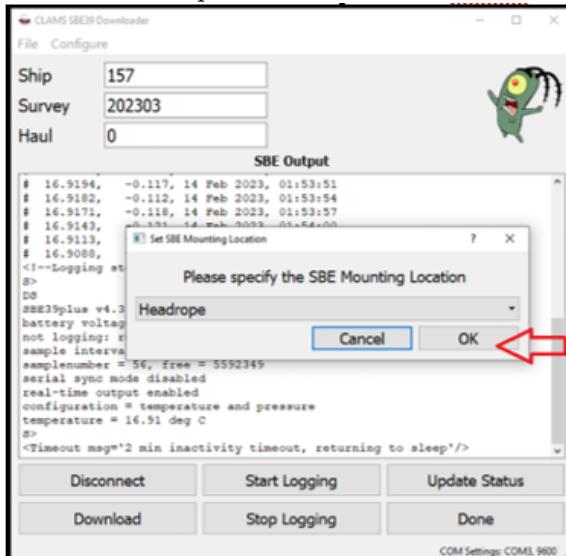


logging”.

- 5. Once the dialog box shows the SBE has stopped logging data click on “download”.



- 5. A prompt will appear asking the location where the SBE was mounted. Select the headrope for the LFS midwater net or footrope for the Methot net.



- 6. Once "OK" is pressed it will begin downloading the SBE data to the database. Once the d=Downloader reaches 100% it will beep and then you can click the "done" button to close the Downloader. If left unattended after downloaded the SBE Downloader app will timeout and disconnect, that's fine! You can close the program and all is good.

QA/QC

A QA/QC for each haul can be conducted.

This is in progress I just copied over some screen grabs that Matthew put together. Need to work on some text describing them. Perhaps this is the place we would want to describe the procedures for reviewing camtrawl images.

Haul Profile



Catch Composition

OpenQC

Ship: 1537 Survey: 360460 Haul: 2 Haul Approved

Haul Profile Catch Composition Specimen Summary PocketNet Composition Pollock Length Frequencies Pollock Maturity by Length Pollock Length Weights

CodeList

PartCode	Common Name	Species code	Subcategory
1	Codend	pollock	Adult
2	Codend	Pacific cod	None
3	Codend	pollock	Age 1
4	Codend	smooth lumpfish	None
5	Codend	Chinook salmon	None
6	Codend	salmon spp.	None
7	Codend	chrysaora jellyfish	None
8	Codend	halibut	Adult
9	Codend	northern...	None
10	Codend	bony arnook -	None
11	Codend	squid	None

CodeList (by weight)

* Did you create a Mix? Are all species listed?

Does the Sample weight and Total weight look correct? How about the Sampled numbers and the extrapolated Total number?

Don't forget to scroll down to see the entire catch

All is good

Sample weight (kg) Total weight (kg)
 Sample num (g) Total num
 Sampled num In-mate Whole haul

Total wt (kg)	Sample wt(g)	Total num	Sampled num	In-mate	Whole haul
204.994	202.776	372	372	0	0
2.9	2.9	1	1	0	0
0.06	0.06	4	4	0	0
3.216	3.216	2	2	0	0
16.51	16.51	11	11	0	0
3.81	3.81	15	15	0	0
0.06	0.06	10	10	0	0
49.56	5.305	49	49	1	0
0.342	0.104	21	21	1	0
0.532	0.102	5	5	1	0
0.526	0.082	19	19	1	0

* If applicable, the PocketNet Comp tab is setup the same as the Catch Comp tab

Printed: Printed: Printed: Printed:
 Printed: Printed: Printed: Printed:
 Printed: Printed: Printed: Printed:

Specimen Summary

Specimen Summary screenshot showing data entry and validation.

Top Navigation: Ship 157, Survey 282403, Haul 2, Haul Approved.

Left Panel: Specimen Summary tab selected. A table lists species details (e.g., Codend, Species Code 20622, Common Name northern ...). Columns include Partition, Species Code, Common Name, Subcategory, Mean W (From GW), Mean W (From Tot W).

Middle Panel: Pollock Length Weights table. Columns: Ave. Length, Baskets (M/T/C), Number Sampled (O., UW, L), Ovaries Collected, GSI Weights. A row for Chrysaora jellyfish (Ave. Length 0.292, Number Sampled 372 (15, 15, 322)) is highlighted with a red box.

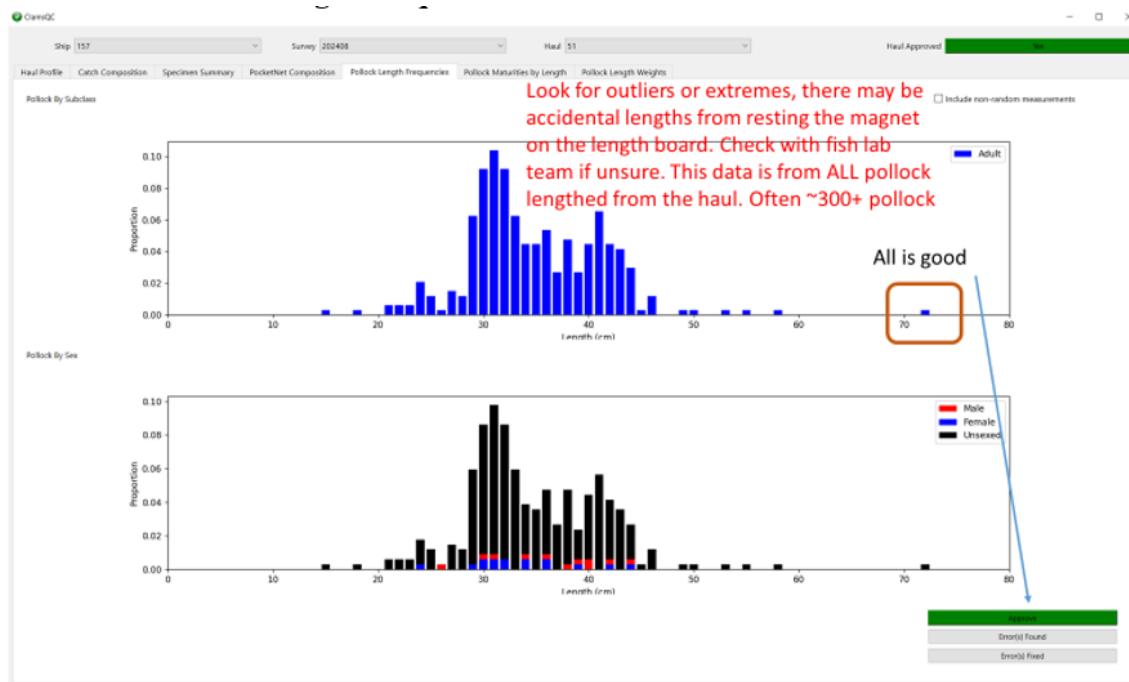
Right Panel: A green callout points to the highlighted row with the text: "The mean weight from the LW samples should be similar to the W only samples unless there is a small sample size or a high variation in species size, like chrysaora jellyfish."

Bottom Panel: Pollock Specimen By Maturity table. Columns: Common Name, Sex, Maturity, Number Sampled, Ave. Weight, Ave. Length, Otoliths. Rows show data for Walleye Pollock at various stages of maturity.

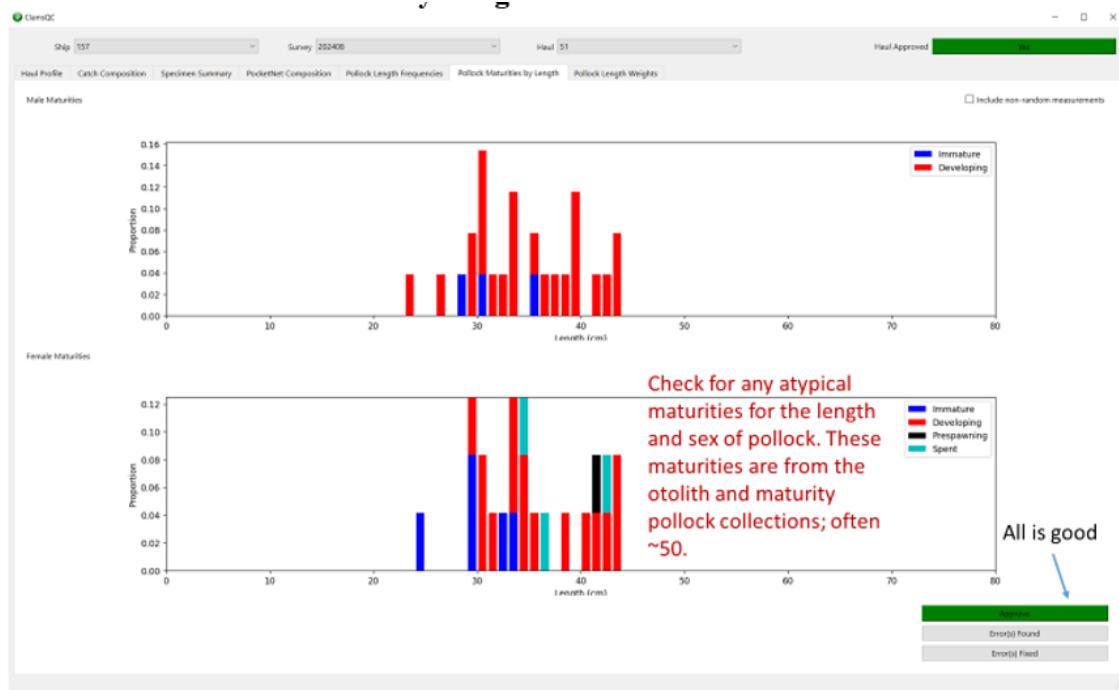
Annotations:

- A blue arrow points from the "LW" column in the middle panel to the "Mean W (From Tot W)" column in the top panel.
- A blue arrow points from the "LW" column in the middle panel to the "Ave. Length" column in the bottom panel.
- A blue arrow points from the "LW" column in the middle panel to the "Ovaries Collected" column in the bottom panel.
- A blue arrow points from the "LW" column in the middle panel to the "GSI Weights" column in the bottom panel.
- A blue arrow points from the "LW" column in the middle panel to the "All is good" text in the bottom right.
- A red box highlights the Chrysaora jellyfish row in the middle panel.
- A blue box highlights the "All is good" text in the bottom right.

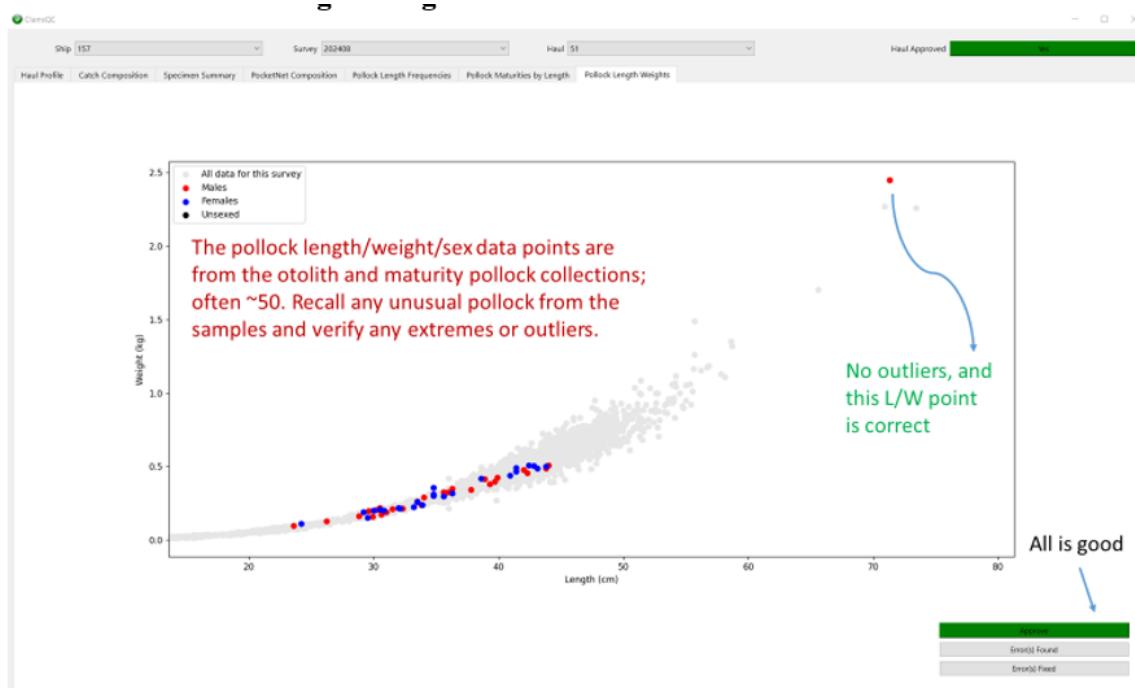
Pollock Length Frequencies



Pollock Maturities by Length



Pollock Length Weights



Post Sampling and Survey Cleanup

Post Sampling Cleanup

Cleanup during the survey does not need to be excessively thorough, however the wet lab should be rinsed off, organized and prepared for the next haul. After each haul surfaces should be sprayed down. This can be done with the overhead saltwater sprayers, the deck hose underneath the sorting table (Please do not turn the deck hose up to full pressure as this will cause excessive splashing), or the freshwater hose in the room forward of the wet lab. When spraying down the wet lab DO NOT spray the outlets located ~chest high throughout the wet lab – they can short out and/or start a fire. Pay particular attention to clearing fish and other debris from underneath the conveyor, tables and benches.

- Rinse down the sorting bin after every haul; do not leave fish or biologicals from the previous haul in the sorting bin. It is safer and more efficient when two people work together; one person climbs the sorting bin ladder while the other person hands the hose up and adjusts the hose pressure as directed.
- Rinse away any fish, blood or other biological materials from the sorting belt, counters, shelves, floors, and discard shoot. Include the horizontal surfaces like the side of the belts, tables, and walls.
- Baskets should be rinsed and stacked along the outboard wall.
- Rinse off all knives, forceps, and styluses.
- Length boards - Again, when cleaning the length boards do not spray water directly on the clear control board area or the plugs, doing so can introduce water into the system and ruin the boards!
- Computer touch screens should be lightly rinsed with fresh water and any scales removed by wiping with a sponge. **DO NOT SCRUB COMPUTER SCREENS WITH GREEN SCRUB PADS OR OTHER ABRASIVE MATERIAL** – abrasives will scratch the screens and destroy them.
- Carefully rinse Marel scales with freshwater and sponge.

Post Survey Cleanup

At the end of the survey the wet lab should have a thorough wash down and scrub with soap that includes all surfaces such as walls aft of the conveyor belt, outboard wall where baskets are stored, conveyor belt, discharge shoot, etc. This is a planned and collaborative effort between

the Fish lab team and the Survey Techs. The abrasive scrub sponges are best for removing scales and biologicals from flat surfaces such as the walls, countertops, and other horizontal surfaces. Whereas the scrub brushes might be better for baskets etc.

- Remove all baskets, bins, floor mats, and the under counter shelving from the fish lab to the back deck. Two or more people scrub, pressure wash, and rinse gear. Return the gear to the fish lab to dry once the entire lab has been cleaned.
- Under the direction of a Survey Tech, remove the sorting belt and scrub, pressure wash, and rinse the belt on the back deck. The belt can be replaced once the sorting belt area has been thoroughly scrubbed and washed. The sorting belt will serve as a drying area for the baskets etc.
- At the end of the survey season remove any posters, materials, and paperwork from the walls so the walls can be scrubbed and washed. Between sequential surveys, it is not necessary to remove these items.
- Remove items from under the fish lab sink, scrub with a floor brush.
- Diligently scrub the walls and all surfaces of the fish lab with the abrasive scrub sponges. 2 passes might be necessary. Four to six people cleaning inside the fish lab is plenty.
- One person cleans knives, forceps, tools, ID books, posters and puts special study materials away.
- Length boards - Again, when cleaning the length boards do not spray water directly on the clear control board area or the plugs, doing so can introduce water into the system and ruin the boards!
- Computer touch screens should be lightly rinsed with fresh water and any scales removed by wiping with a sponge. **DO NOT SCRUB COMPUTER SCREENS WITH GREEN SCRUB PADS OR OTHER ABRASIVE MATERIAL** – abrasives will scratch the screens and destroy them.
- Carefully clean Marel scales with sponge and freshwater. Remove top and allow to air dry.

Additional References

This section includes a [Volunteer Glossary](#) along with some [lifting techniques](#). We could place some more info here as needed.

Volunteer Glossary

Glossary of Roles and Terms Relevant to MACE surveys aboard NOAA Ships A non-exhaustive list of people, places and things relevant to surveys on the NOAA ship Oscar Dyson.

People

NOAA Corps - Commissioned Officer Corps, one of eight federal uniformed services of the United States, and operates under the National Oceanic and Atmospheric Administration. Always dressed in navy blue when at sea. Serve ~2 year billets alternately at sea or land based assignments.

- **CO-** Commanding Officer, captain of the ship and person responsible for all matters pertaining to safety, management, operations, and physical condition of the ship and makes the final call on all decisions affecting the ship and crew
- **XO-** Executive Officer, second in command after the CO. Responsible for resource management by overseeing ship personnel, materials, and budget.
- **Ops-** Operations Officer, Serves as liaison between science party and CO and thus serves as the primary point of contact between the science party and ship, coordinates day to day operations between the science party and ship.
- **Nav-** Navigation Officer, in charge of safe navigation and completion of appropriate route planning
- **Ensign-** Junior officer, relatively new to the ship and has limited survey experience
- **MPIC-** Medical Person In Charge, a member of the NOAA corps with extra medical training who can provide seasickness meds and who can consult a physician on call to provide other medication if needed.
- **OOD-** Officer on Duty/Deck, an Officer who is in charge of the ship for the day or watch

Civilian crew - non-commissioned civilian crew members that are either “permanently” assigned to the ship or are in the augment (rotational) pool for NOAA ships.

- **Chief Stew(ard)**- Head cook, Prepares menu and meals and ensures provisions are secured for surveys. Stationed in the galley, good person to know and be in good rapport with! Oversees the Steward or 2nd Cook.
- **2nd Cook** - Assists Chief Steward!
- **Chief Engineer** - Lead engineer, in charge of all the moving parts of the ship that aren't nets. Oversees the 1st Engineer, 2nd Engineer, 3rd Engineer, and General Vessel Assistant (GVA, or "Wiper").
- **Chief ET** - Ship's electronics technician responsible for keeping all the ship's computers and electronic equipment functioning. The person that connects personal devices to the ship's Wi-Fi and keeps us connected to the rest of the world when at sea.
- **Chief Boatswain (Bo'sun)**- In charge of fishing and deck operations including any over the side activities (CTD's, small boat deployments and usage, mooring deployments, etc.), almost always leads fishing operations during the day. With Lead Fishermen, oversees the Deck Crew.
- **Lead Fisherman** - Leads fishing ops during the 2nd shift, second in charge of deck operations after the Bo'sun, not the same person as the Chief Bo'sun! With the Chief Bo'sun, oversees the Deck Crew. Senior Survey Tech- Maintains the scientific seawater sampling system and other tools used during fishing operations. Survey techs also help during trawling and over the side operations. In charge of verifying cleanliness of wet lab at end of survey. Oversees the Survey Tech.

Science crew - civilian NOAA employees (primarily) in charge of the scientific operations.

- **Chief Scientist (CS) or Field Party Chief (FPC)** - Science leader, in charge of science decision-making during this survey.
- **Night cave** - Science lead from 4pm to 4am, makes fishing and survey-related choices and assists the FPC.
- **Wet lab leads** - Day and night wet lab leads are in charge of fish processing and setting up the camtrawl and the SBE prior to trawling. They're situated in the chem lab when not processing fish in the wet lab.
- **ET/IT** - MACE's electronics and software tech. Troubleshoots problems with the echosounder, CLAMs, and MACE's analysis software.

Specific places

- **Flying Bridge**- Located outside, atop the bridge. Many of the officers want people to ask permission to spend time up here. Even if they don't, it's a good idea to tell someone you're going up. Bridge- This is the uppermost interior deck, immediately below the flying bridge. This is the place where the ship's navigation, steering, and trawling operations take place. Nobody calls the bridge the 03 deck, even though that seems like it makes sense. You are welcome to visit the Bridge, except when the ship is leaving the dock or docking, or if you are asked to leave.

- **02 (oh-two) deck-** The deck where the CO, XO, some of the other officers, and the Chief Scientist have their staterooms. Also where the hospital and XO's office are located. Up one ladder (stairs on ships are called ladders!) from the 01 deck.
- **01 (oh-one) deck-** The deck where the science staterooms and the lounge are.
- **Main deck-** Where the Fish Lab, Chem Lab, and Acoustics Lab (or "Cave") are located. This could be called the 1 deck.
- **Mess Deck-** This is where the crew eat, not to be confused with...
- **Galley-** This is where the stewards do the cooking.
- **Fish Lab- Aka wet lab-** location where we in MACE process the catch
- **Chem Lab -** Adjacent to the fish lab, has two MACE computers set up, chemicals are stored there and there's a hood in there also.
- **Cave- Aka the Acoustics Lab-** this is where the MACE science team monitors the acoustics and makes decisions about trawling. We also work with the incoming data from here. It's where you'll find the Chief Scientist, Night Cave, and ET/IT unless they are fishing, eating, or sleeping.
- **Hero Deck aka Side Sampling Station or Ops Deck-** located outside on the starboard side of the Chem Lab, this is where "side ops" are done. When we lower something that isn't a trawl over the side of the ship, it goes in the water here. 2 deck- The deck below the main deck where crew staterooms, laundry, the gyms, and the engine room are all located.
- **Forward gym-** small gym where treadmill, some weights, and rowing machine are located.
- **Aft gym- aka iron gym-** shares space with the wire room where the huge winches that operate the trawls are located. This gym has more weights, and it is very loud down there while fishing operations are happening.
- **Laundry room-** located down the ladderwell just forward of the starboard forward hatch in the mess deck.

General places

- **Trawl alley and trawl ramp-** At the back (aft) of the ship, where the trawl is deployed.
- **Ladderway-** Stairs on a ship.
- **Passageway-** Hallway on a ship.
- **Gangway-** Mobile bridge used to embark and debark the vessel.
- **Head-** bathroom on a ship.
- **Weather deck/decks -** Decks that are open to weather, often secured during heavy seas/heavy freezing spray/other extreme weather conditions.
- **Port/Starboard -** Port is the left side when you're facing the bow (the pointy end in front) of the ship, and starboard is the right side. These terms help mariners avoid confusion about left & right, because they remain fixed regardless of which way the mariner faces.
- **Stern-** Back end of a ship.

Things you might hear (and what they mean)

- “**All stations**”- An announcement that pertains to everyone- listen up!
- “**Secure the laundry**”- Don’t use the laundry.
- “**Secure the water**” - You probably get this by now.
- “**Stand-by**”- Wait. Something might be happening.
- “**This is a drill, this is a drill**” - Clearly, this is a drill, but what kind of drill?!? If you listen(ed) during the welcome aboard briefing, you’ll know that there are three kinds of drills; Fire, Spill, MOB, Abandon Ship.
- “**Dog all doors/dogs**”- This is referring to the metal latches on the inside of the doors that lead out to weather decks. They keep the doors closed and make it so the watertight seals function. Sadly, there are no actual dogs aboard ship.

Gear

- **SBE- aka “pipe bomb”**- Sea Bird Electronics instrument used to measure the pressure/temp/salinity/depth that we place on the head rope of trawl nets. Yes, it’s a terrible nickname.
- **CTD**- Conductivity, Temperature, Depth instrument that’s deployed from the Hero Deck. Sometimes referred to as the CTD rosette.
- **LFS-trawl/net**- This is the main midwater fishing net that MACE uses to sample the fish population, it works in tandem with the...
- **PNE** - “Poly Nor’Eastern” net used for fishing on bottom. Is smaller than the midwater net and has roller gear on the footrope.
- **83-112**- A second kind of bottom- trawl net with roller gear. Methot- Square-frame net designed to sample krill and other large zooplankton. Deployed via the trawl ramp but uses a different winch.
- **Centerboard**- Extends
- **Transducers aka ’ducers or echosounders**- 18, 38, 70, 120, 200, and 330 kHz acoustic transducers that are mounted on the bottom of the ship’s centerboard and send active sound waves (pings) towards the bottom of the ocean.
- **Camtrawl**- the camera system that we attach to the LFS trawl. It is a stereo camera, which means we can get fish lengths from it. It also lets us know where fish are in the water column.

Lifting techniques

OSHA Proper Lifting Techniques: Safe Lifting Ergonomics <https://www.osha.com/blog/proper-lifting-techniques>

Safe lifting involves:

- Standing as close to the load as possible
- Planting your feet shoulder-width apart with one foot slightly ahead of the other
- Bending at the hips and knees only until you're deep in a squatting position
- Keeping your head up and straight with your shoulders back to keep your back straight
- Holding the load close to your body at waist height
- Engaging your core muscles as you push against the ground and straighten your legs

Here are a few essential don'ts to keep in mind for good lifting ergonomics:

- Never twist your torso while lifting. Stay "nose between your toes."
- Never lift a heavy item above shoulder level.
- Never carry a load that obstructs your vision.
- Never hold your breath while lifting, moving, and setting the load down.

As you carry the load to its destination, you want to maintain good ergonomics. That means:

- Holding the load as close to your body as possible, level with your belly button
- Keeping your shoulders in line with your hips as you move – don't twist your trunk
- Changing direction with your feet and leading with your hips
- Taking small steps and keeping a good grip with all your fingers

Setting down a heavy object is just as dangerous as picking it up. You'll want to reverse the lifting process, following the same ergonomic lifting principles:

- Keep the load close to your body and your back straight or slightly arched
- Squat down, bending only at the knees and hips
- Tighten your stomach muscles (engage your core) as you lower yourself
- Kneel on one knee if necessary