

CLAM DIGGING



**Digging into the operations of CLAMS
Catch Logger for Acoustic Midwater Surveys**

March 2013

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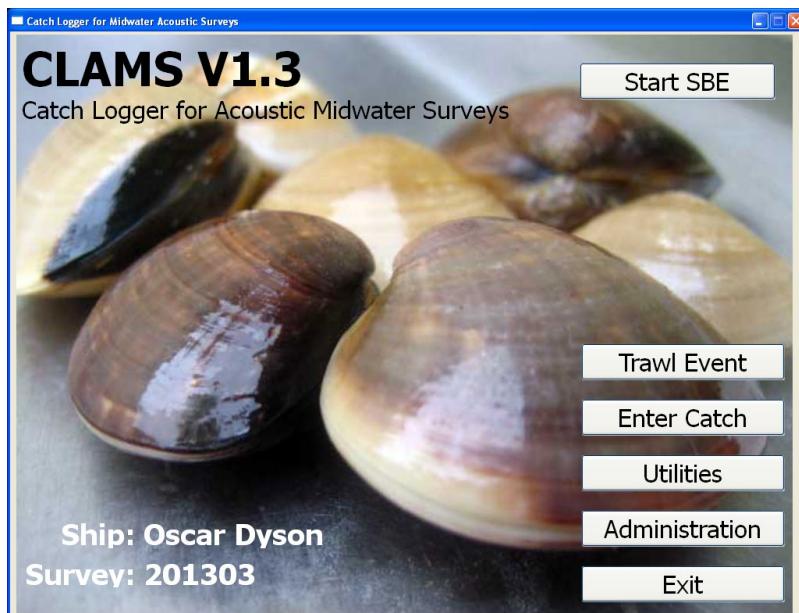
1. The CLAMS SYSTEM

The Catch Logger for Acoustic Midwater Surveys (CLAMS) is a piece of software capable of recording all data associated with trawling events. This includes essential information such as station/haul number, geographic location, duration of trawl, total weight of the haul, catch composition, and individual specimen measurements.

The program itself runs in an intuitive fashion by recording data in the following order:

1. Trawl Location and Duration
2. Total Catch Weight (if known, i.e. loadcell)
3. Catch Composition and Species Total Weight
4. Individual measurements for Specified Specimens

To launch the program, click the CLAMS icon located on the desktop.



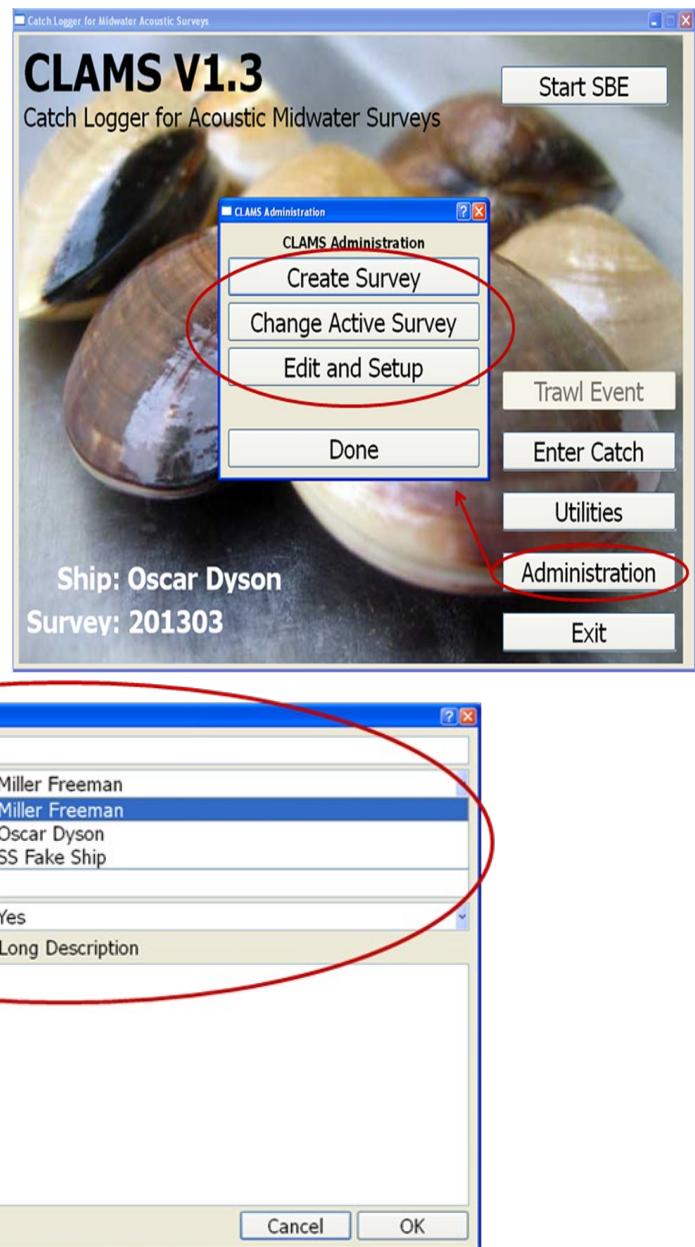
2. Setting up the System

Before entering your first trawl event into CLAMS, you must let the system know what ship and survey you are on. If this is a new survey, you must create a new survey using the CLAMS administration button. If the survey already exists, then you can change the associated survey in the same location.

a. Creating a Survey

To create a new survey in CLAMS

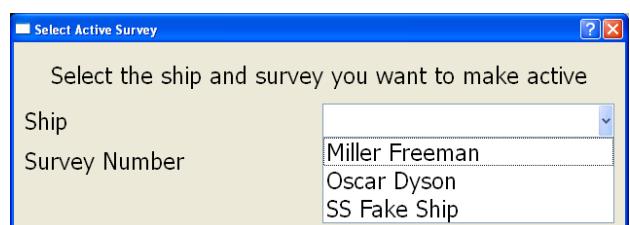
- 1) Click Administration
- 2) Click Create Survey
- 3) Fill in the applicable Survey Number, Survey Vessel, Survey Start Date, Survey End Date, Short Description and Long Description information
- 4) Choose to make this survey active or not.
- 5) Click OK.



b. Changing Active Survey

To change the active survey to another survey already created in the system:

- 1) Click Administration
- 2) Click Change Active Survey
- 3) Choose your ship from the drop down menu
- 4) Enter your Survey Number
- 5) Click OK

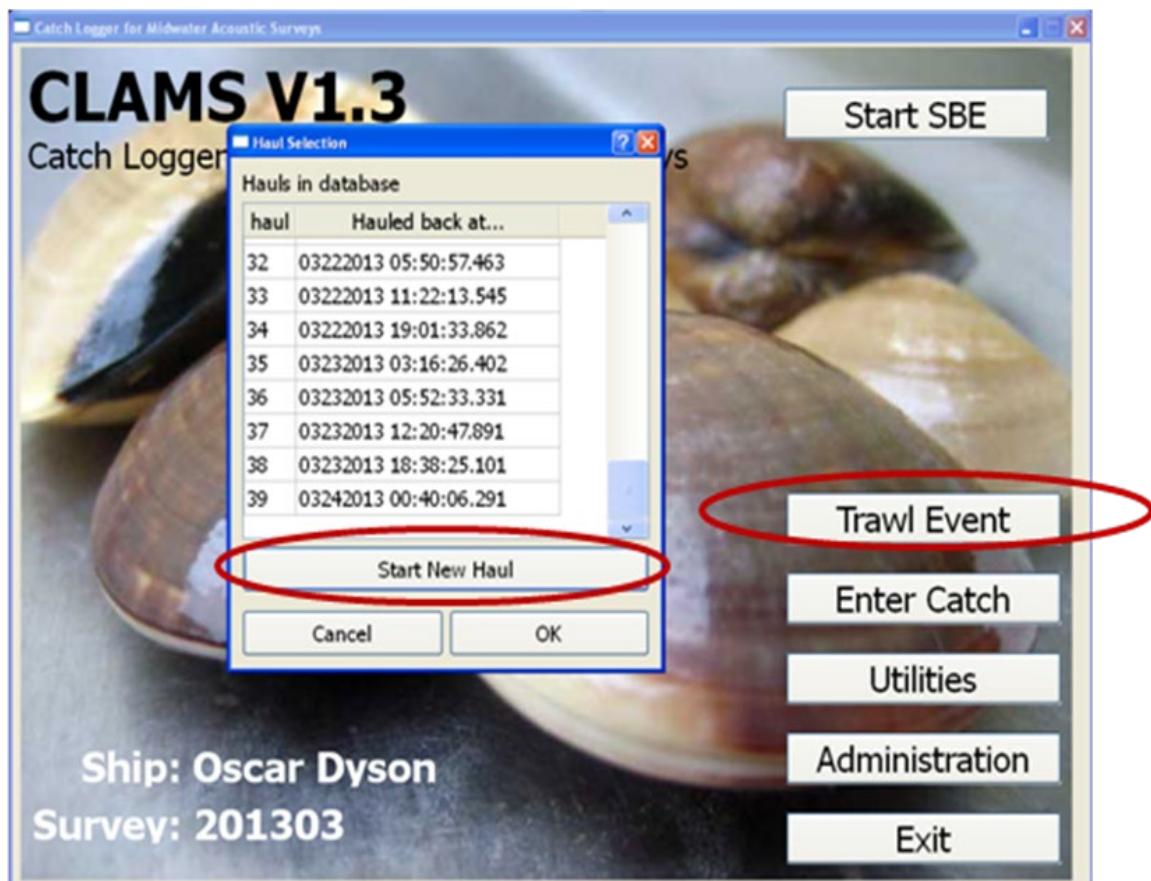


Now that the ship and survey is set up within the system, you can start recording trawling operations.

When troubleshooting some problems in CLAMS (if unfortunately there is a need), it is often useful to change the active survey to “SS Fake Ship” so as to not accidentally corrupt collected data.

3. Trawling Events

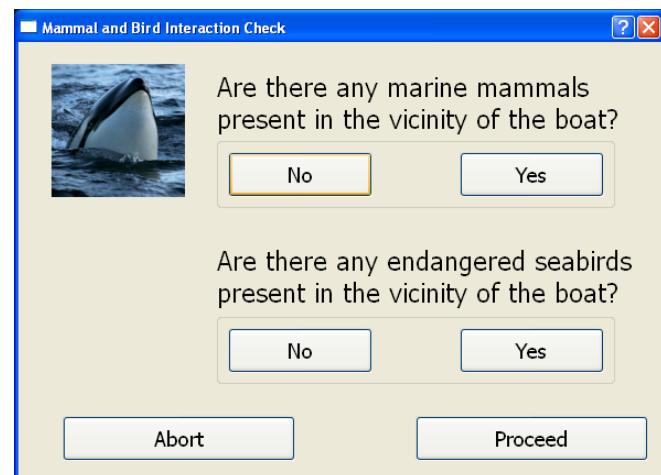
To start a new trawl event, start by clicking on “Trawl Event” button on the CLAMS start page. A dialog will be loaded that gives you the option to either “Start New Haul” or choose a prior haul. Choosing a prior haul gives one the ability to inspect collected data, fix errors or record comments under that haul at a later time.



After selecting the “Start New Haul” option, a scientist selection dialog will come up. After choosing the user’s name, a marine mammal dialog window opens next. Answer the questions

for marine mammals and seabirds, and then decide if now is still a good time to trawl.

If continuing, a Trawl dialog window will open. The next available haul number will automatically be assigned to the Trawl. The user should fill in all applicable information to the Trawl event. The next window shows user collected data on Transect Number, Stratum, Trawl Gear, Haul Type, Door Type, Liner Mesh Size, Netsounder Type, and Tomweights weight. If marine mammals or endangered seabirds are seen during the trawl, this information can be recorded by marking the selection.

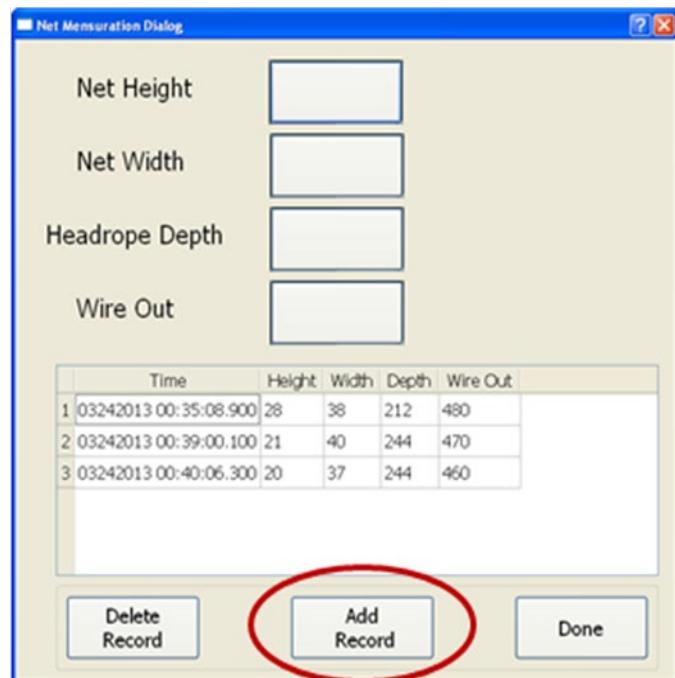


Clicking the net “Action” buttons located on the left side of the display record the latitude, longitude, time and potentially bottom depth (not for CLAMS ABL) for each of the four event actions via SCS (MACE) or GPS data (ABL). Requirement and status of the “Action” buttons are represented by color coding. “EQ” and “Haulback” are initially red telling that the action is required. Once the required action is completed the color turns to green. “Doors Out” and “Doors In” are both yellow signifying optional data.

Action	Time	Latitude	Longitude	Bottom Depth
DoorsOut	03252013 06:49:43.8...	5554.4511N	15607.9320W	170.91

Once the “EQ” or “Haulback” action buttons are clicked, a net dimensions window will appear. This allows the user to record the ship’s wireout and also the netsounder net dimensions including net height, net width, and headrope depth.

This dialog window can also been reached by clicking the “Net Dimensions” button on the bottom of the Trawl dialog window. CLAMS allows the user to enter the net mensuration data multiple times during a trawl. Each entry is entered by changing the mensuration data (if needed) and clicking “Add Record”. A time weighted trawl average is calculated for the collected data. Entries can be edited if necessary by highlighting the desired entry, changing the values, and hitting update record. “Add Record” will turn to “Update Record” once a prior entry is highlighted.



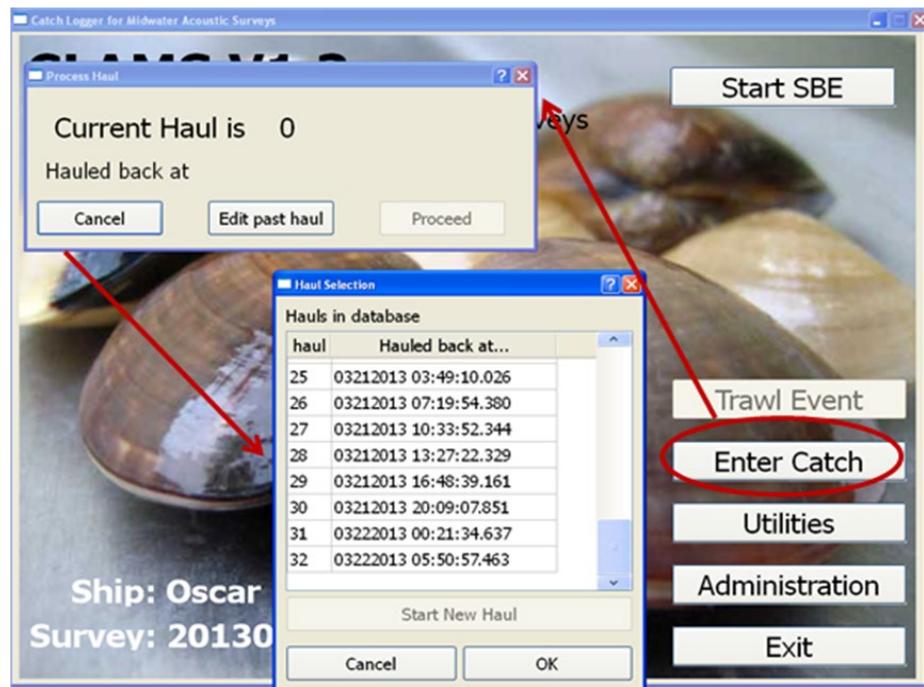
Any applicable comments can be entered in the CLAMS system during the trawl (or during most other dialog windows) by clicking the “Comment” button on the bottom of the window at any time.

Once the trawl is complete, “Gear Performance” should be entered via the drop down selection menu. This is required information. Select “Done” and exit the Trawl Event.

4. Entering the Catch

After the trawl has been completed, it's time to enter the catch.

This is started by clicking “Enter Catch” on the CLAMS startup screen. The just completed Trawl Event should automatically be set as the current haul, but if not have no fear. Just click “Edit Past Haul” then the correct haul number when the haul selection dialog pops up.



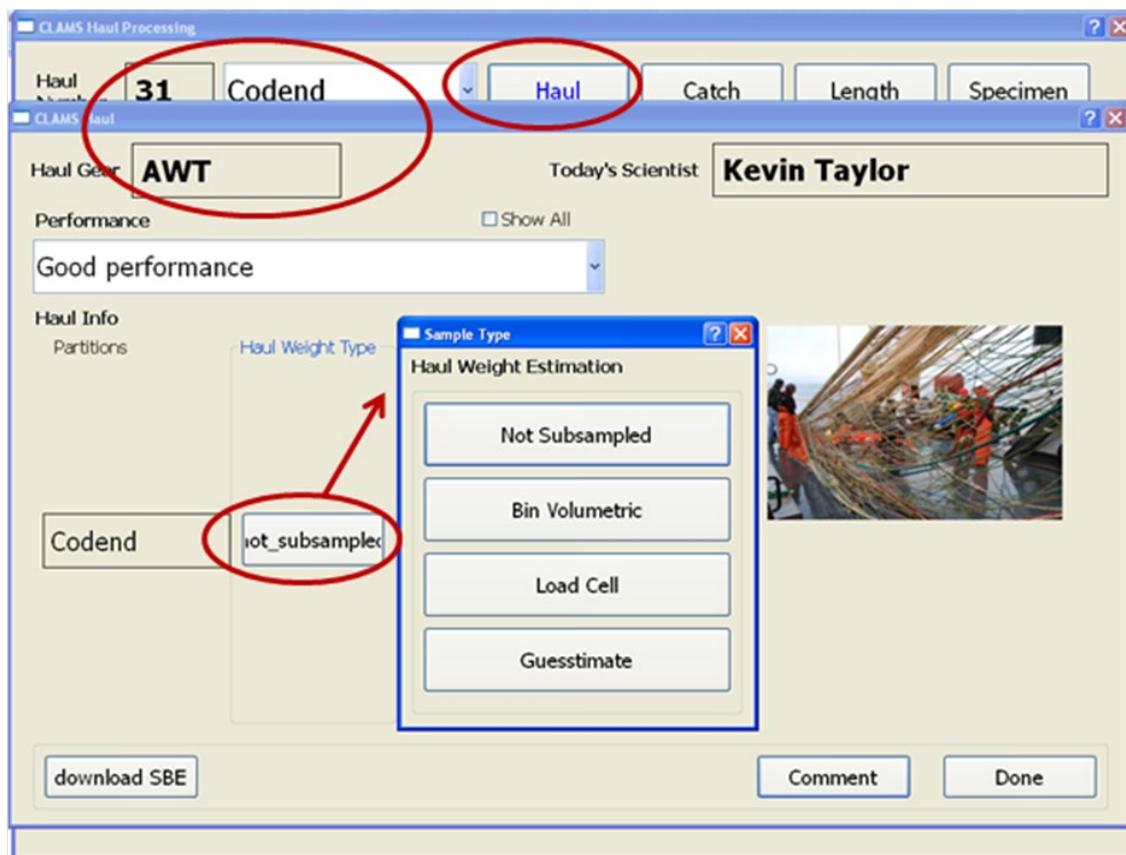
Do make sure the correct haul is selected or the catch will go to the wrong haul.

Once you have selected the correct haul number, CLAMS will have you select the user from its loaded list of names. Next, the CLAMS Haul Processing screen will open. The current haul number will be displayed in the upper left hand corner with the following options available: Haul, Catch, Length and Specimen.

The first thing we must do is tell the system how we will be calculating the total weight of the codend catch.

a. Overall Weight of the Codend

Select the “Haul” button brings up the next dialog. This is the place where we will decide the total weight in the codend. From this window we must fill in or change if necessary the “Performance” and the “Haul Weight Type”.



Selecting “Haul Weight Type” gives the following options:

- **Not Subsampled:** Entire catch will be individually weighed (not subsampled) on the basket scale. Codend weight will be calculated from the summation of these upcoming basket measurements and will remain as TBD (to be determined) at the moment. This is probably the most common choice for smaller catches (not “splitters”).

- **Bin Volumetric:** Enter bin dimensions (width, length, depth) in meters to calculate catch weight. A default density of 1.0 g/cm³ (1000 kg/m³) is entered, but is adjustable as necessary. Calculation is in kg. This is used for “splitter” type hauls where only a subsample will be checked in and analyzed.
- **Load Cell:** Enter a gross weight (catch plus codend) and tare weight (empty codend) to determine total catch weight. CLAMS will subtract tare from gross to calculate the catch weight. This is available in kg or lb. This is used for “splitter” type hauls where only a subsample will be checked in and analyzed.
- **Guestimate:** Enter a visual estimate of the codend catch weight in kg. This is used for “splitter” type hauls where only a subsample will be checked in and analyzed.

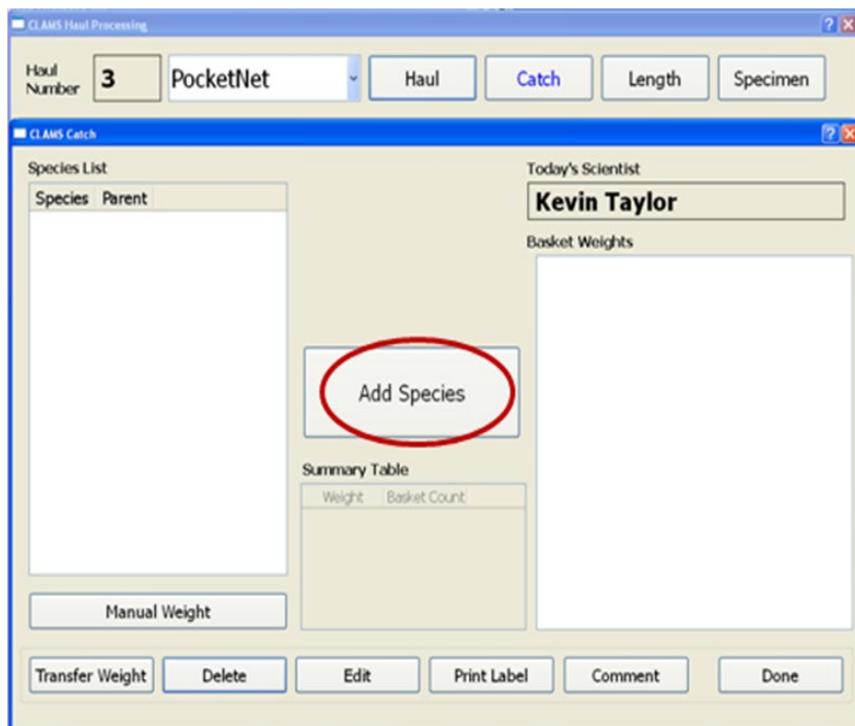
The later three of these four choices (“splitter” type) will use the proportions generated in the subsampled weights to calculate the total catch of each species present.

After selection, click “Done”.

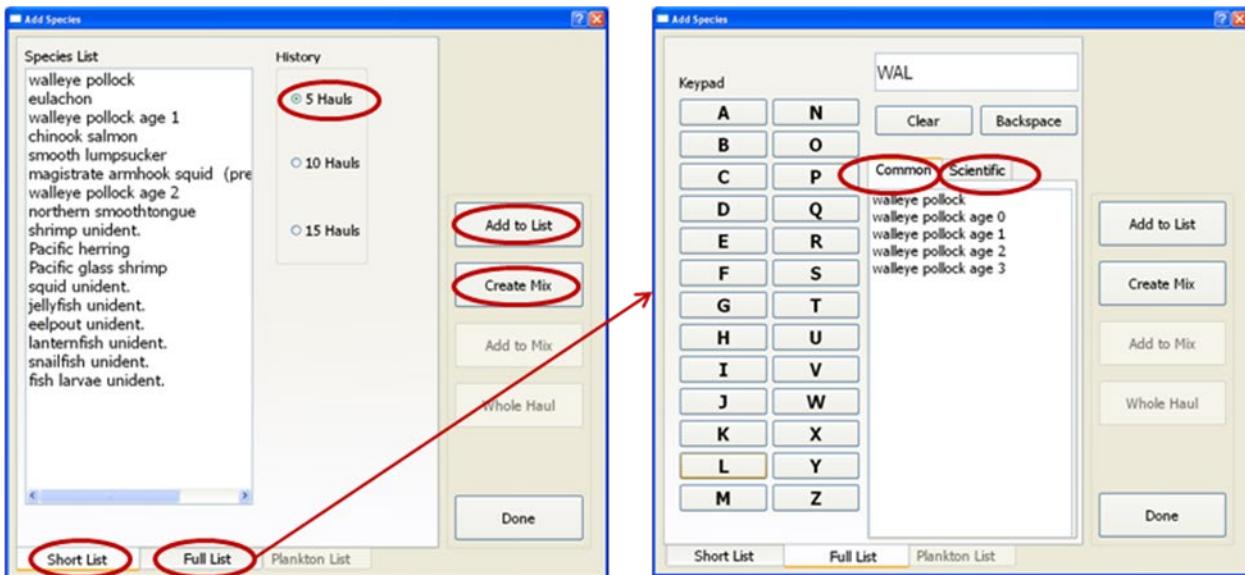
b. Weighing the Sorted Catch or Subsample

The next step in the process is sorting your catch into individual species. CLAMS has the ability to enter a mix of species if it is time prohibitive to completely sort the catch or subsample of the catch. The mix will have to have a subsample sorted to know proportions, but more on that in section 4.C.

The next steps are to select the gear partition to be entered (i.e. codend, pocketnet, etc.) and then click on the “Catch” button. This will allow us to check in all species caught and their associated weights from the sorted catch. We’ll assume that the catch was easy to sort and everything will be entered individually.



Start by clicking the “Add Species” button. This will bring up a dialog screen (next page) showing the most common species caught over the last several hauls. This is displayed on the short list tab (left image, next page) and has the option to display the last 5, 10 or 15 hauls. The “Full List” tab (right image, next page) allows for the searching of specific species by typing either its common or scientific name into the search bar. The “Common” or “Scientific” tab must be selected to display the desired results.



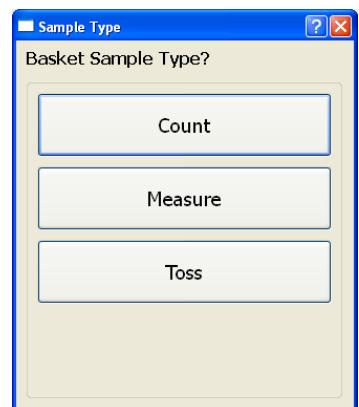
Once the desired selection is found, click the “Add to List” button to have it displayed on the main Catch screen. After all species have been added, click “Done”.

Each species has the ability to be entered into the catch as:

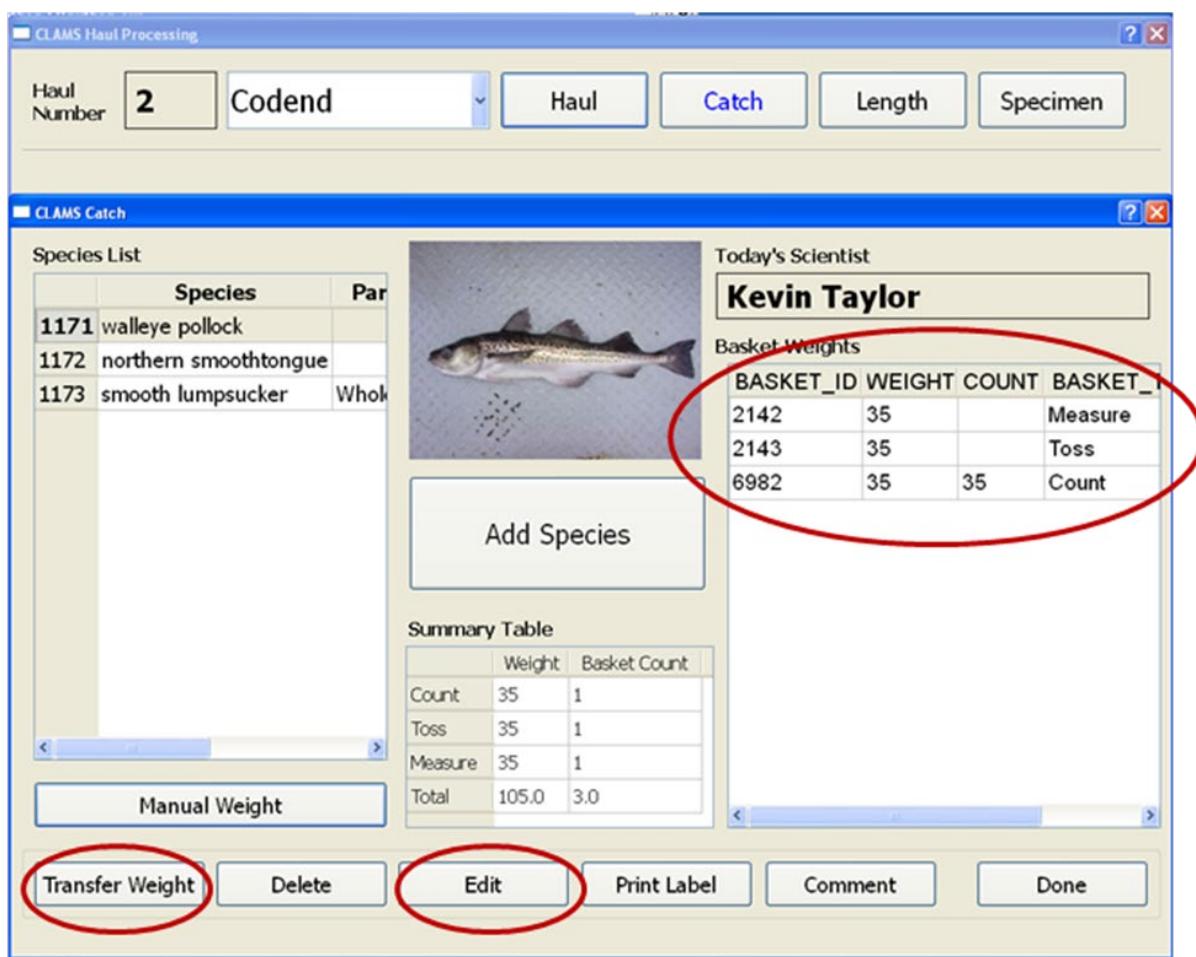
- **Add to List:** Add’s species to the catch list. If using a “splitter” type of haul weight, the calculated species catch weight and individuals caught for this species will be extrapolated over the entire weight of the codend.
- **Create Mix/Add to Mix:** “Create a Mix” creates the ability to subsample the portion of the catch to be processed. Useful for very diverse catches. “Add to Mix” adds that species to the created “Mix”. If using a “splitter” type of haul weight, the calculated species catch weight and individuals caught for this mixture will be extrapolated over the entire weight of the codend. More on this in section 4.C.
- **Whole Haul:** If using one of the “splitter” types of codend, selecting a species as “Whole Haul” tells the system that this weight is for the **entire haul** and to **not extrapolate** over the non-subsampled catch.

The Marel basket scale is linked to the Catch dialog to allow the user to have weight entered digitally. By selecting the species from the Species List on the left and placing the specimen basket on the tared basket scale, the user just needs to hit enter on the scale to send the weight to CLAMS. Once the measurement has been sent, the user is shown a weight measurement type dialog window with three basket measurement types:

- **Measure:** All contents of this basket will be saved for subsequent individual specimen measurements after the bulk weight check-in. This includes individual lengths, weights, otolith collection, etc.
- **Toss:** All contents of this basket will be discarded and weight is for total specimen catch weight.
- **Count:** All contents of this basket will be discarded, but the total



count of specimens in the basket is given to calculate an average weight. Useful if not keeping a measure basket or not many specimens in the measure basket.

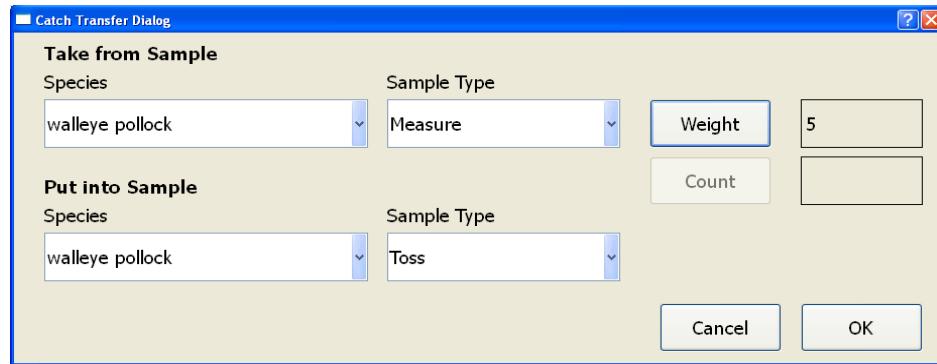


The entered basket weights and basket type are displayed to the right for the selected species to the left. In this case walleye Pollock is selected and three baskets have been entered: 1 measure, 1 toss and 1 count.

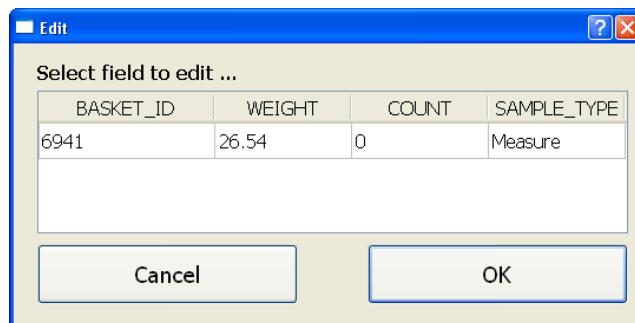
If the basket scale is not sending digital weights to the system, the user can enter them manually using the “Manual Weight” button. If the user makes a mistake while entered the catch data, there are several ways to fix them.

To delete a basket, just select the basket on the right and hit the “Delete” button. A warning message will appear to make sure this is the correct action to take.

You can also transfer weights from one basket type to another if needed. For example, say you set aside 300 kilograms of walleye pollock for measure. The system expects you to take subsequent measurements on all 300 kilograms set aside. If you want to shift some of that weight to Toss, click on the “Transfer Weight” button. A window pops up that allows you to shift weight types within species or shift weights from one species to another here.



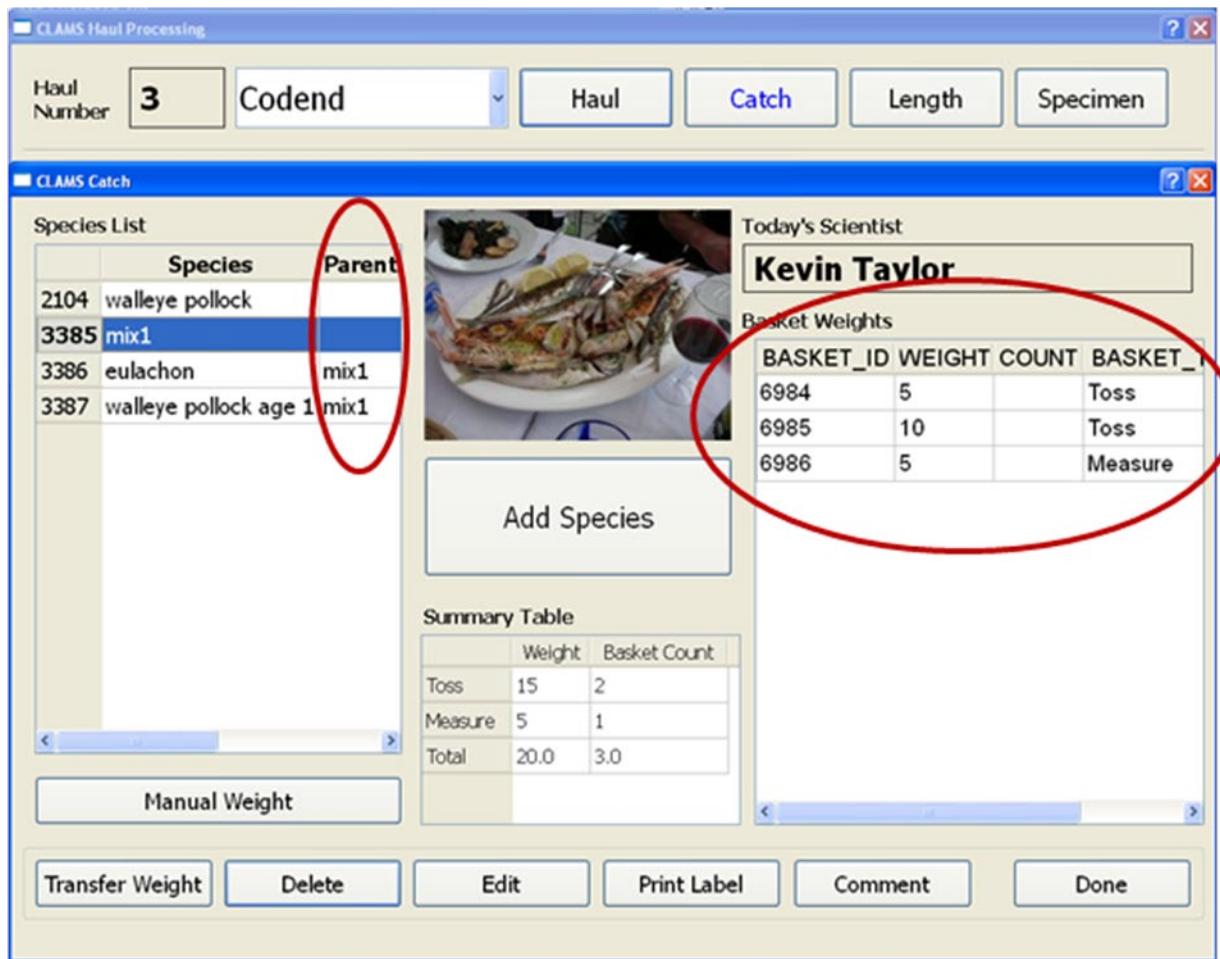
If you misweighed a basket (i.e. not tared scale) or want to shift your basket sample type, you can highlight the basket and click the edit button to bring up an editable field window.



c. Creating a Mix

If a catch (or subsample of a catch if you are splitting the codend catch) is too diverse to sort the entire thing individually, a mix can be created. This is done under the “Add Species” button. This simplifies the sorting process for difficult catches. This is done by:

- 1) Under Add Species, create a Mix
- 2) Add species to the Mix by hitting “Add to Mix” instead of “Add to List” as normal. This is visible on the Catch screen as showing the parent as Mix.
- 3) Check-In (weigh) the mixed composition in baskets into CLAMS as either Toss or Measure with the Mix being the highlighted species.
- 4) The Measure baskets are then sorted and acts as a subsample to find the Mix composition
- 5) The sorted individual species weights are checked in under their unique species letting CLAMS know the composition of the Measure basket
- 6) The Mix composition proportions of the Measure basket is applied to all Mix baskets checked-in to find the total catch weight of those species.

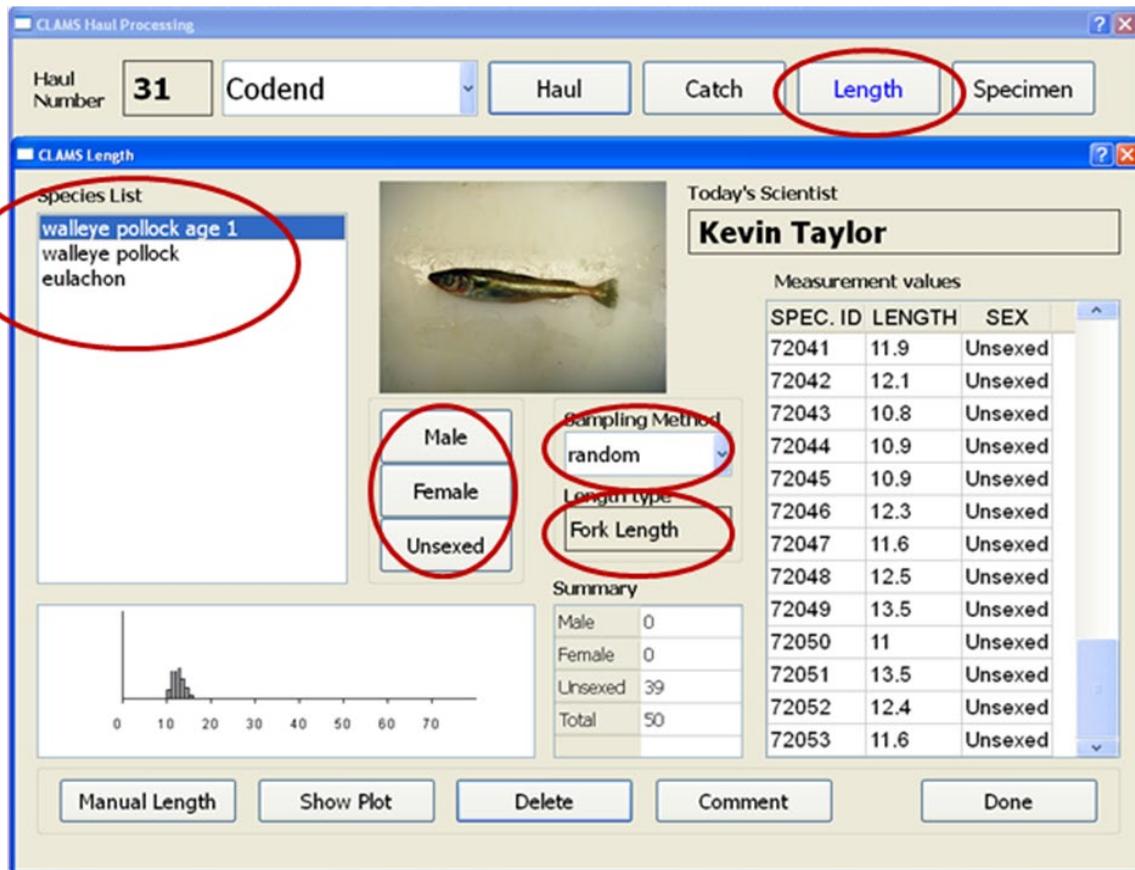


Not all species in the catch have to be entered into the Mix in order to use a Mix. A simple example is a trawl consisting of mostly adult walleye Pollock and a mixture of age 1 walleye Pollock and Eulachon. The adult Pollock can be separated out from the rest and checked in as normal while the small species can be weighed in together as a mix. The checked-in mixed baskets are either labeled as “Toss” or “Measure”. The “Measure” is the subsample of that mix to be sorted. The sorted weights are then entered under their species in the Catch dialog.

Once the catch is completely checked-in, click “Done” to exit this screen. Next it’s time to take some individual specimen readings for the baskets that you set aside as “Measure”

5. Recording Individual Lengths

The simplest of the individual readings is taking length measurements. If you are not taking any other data on these specimens other than the bulk checked-in weight and individual lengths, click on the “Length” button to load the “Length” screen. In this screen you will see all selectable species on the left. This is all of the species that you set a basket aside with the “Measurement” classifier.



Before taking any measurements, one must select:

- Species to be measured
- Sex of specimen (Male, Female or Unsexed)

If you make a mistake and want to delete a reading: highlight the selection and hit the “Delete” button.

A histogram displayed the measured data. A summary display gives the number of measurements taken.

The Length Type is shown above as Fork Length and is the measurement type with that species as defined within the database.

The sampling method is a selectable drop down menu that allows for the choice of:

- Random:** A random sample taken from the catch and will be applied towards catch statistics of average length and weight
- Non-Random:** A non-random sample specifically removed from the catch for measurement. This measurement will not be applied to the average length and weight calculations, but will still store the data in the database.

Once collection is complete, the user can change species to collect lengths on the new species or click “Done” to exit the Length window. The current system is configured to take length measurements sent directly from the Ichthystick. If you do not have one of these or it is malfunctioning, a manual length can be entered.

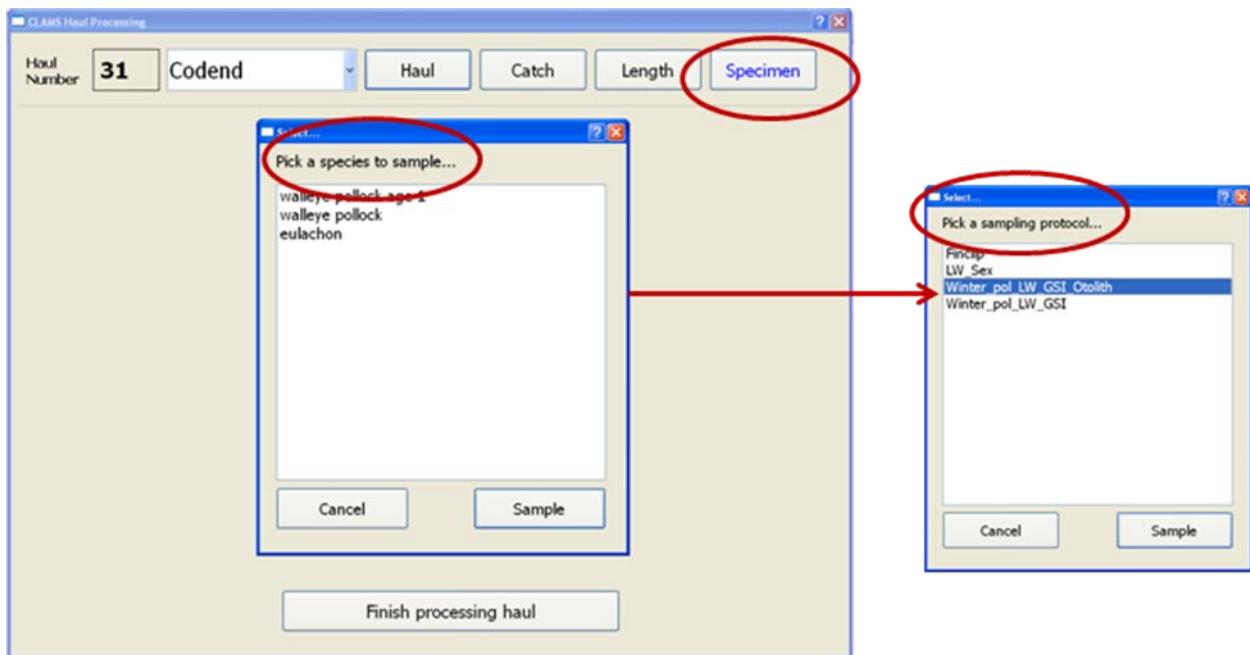
If a more complicated measurement collection for individual specimens is required, a protocol defining the required measurements (i.e. weight, length, ovary weight, otolith barcode, etc.) must be loaded.

6. Sampling Protocols

a. Loading Sampling Protocols

To start easy, we're going to assume that we're going somewhere familiar to use where we have a well defined protocol in place for sample collections. For MACE, that could be going out on the Winter Pollock Survey. In that case we know that for all Pollock we follow one or two specific protocols. These include collecting: length, weight, gonadosomatic index, liver weight and otoliths.

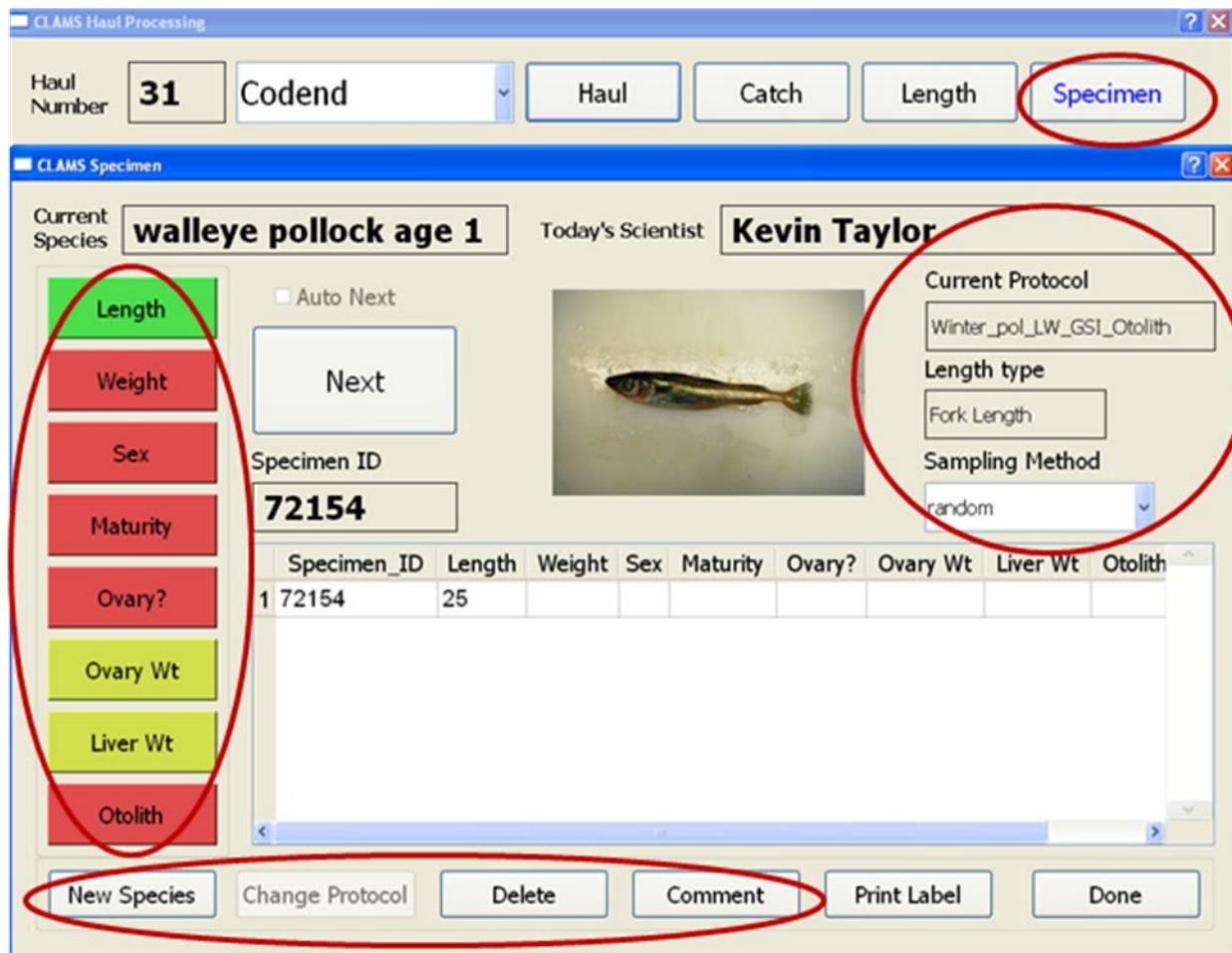
To get into these well defined protocols, we'd select the "Specimen" button, choose our species to sample and then choose our preloaded sampling protocol.



We'll look at building protocols if they don't already exist in a later section.

b. Taking Protocol Measurements

Once the sampling protocol has been loaded for the desired species, the "Specimen" window is loaded displaying the desired information per specimen. As was the case with the Trawl Event window, requirement and status of the measurement buttons are represented by color coding. Red buttons signify that the measurement is required. Once the required action is completed the color turns to green. Optional measurements are shown as yellow buttons.



CLAMS is currently configured so that smaller Marel specimen scales automatically send measurements to the Specimen dialog when the enter button is pressed on the scale.

Most protocols require the user to accomplish the measurements in a standard order, top to bottom of the categories listed on the left. Collection out of order (depending on protocol and measurement type) could generate an error window to be displayed.

For the case above, the Length button turns green when the Ichthystick sends the specimen measurement. If the CLAMS system has speakers then an audible tone acknowledging measurement is generated as well. The Weight button would turn next when a measurement was detected from the scale. The "Sex", "Maturity" and "Ovary" buttons would generate a dialog window prompting the user to establish a sex, maturity stage and if the ovary was to be collected for later analysis. The optional weights for the ovary and liver are also linked to the scale and expected to be accomplished in order descending from top to bottom. The system is smart enough to know that the second scale reading for this specimen is ovary weight, while the third is liver weight. The Otolith button is linked to the barcode reader and acknowledges measurement when a valid barcode is read. Each of the associated measurements are displayed with the associated specimen number. Otolith vial barcodes can be read at anytime during the process.

If an error is made while entering measurement data, the collected data can be edited by selecting the appropriate specimen number in the tabular data and then clicked the button of the

measurement (left column) to be altered. A warning window will be displayed alerting you to the potential change before the actual change to the data is made. Carefully read all alert messages!

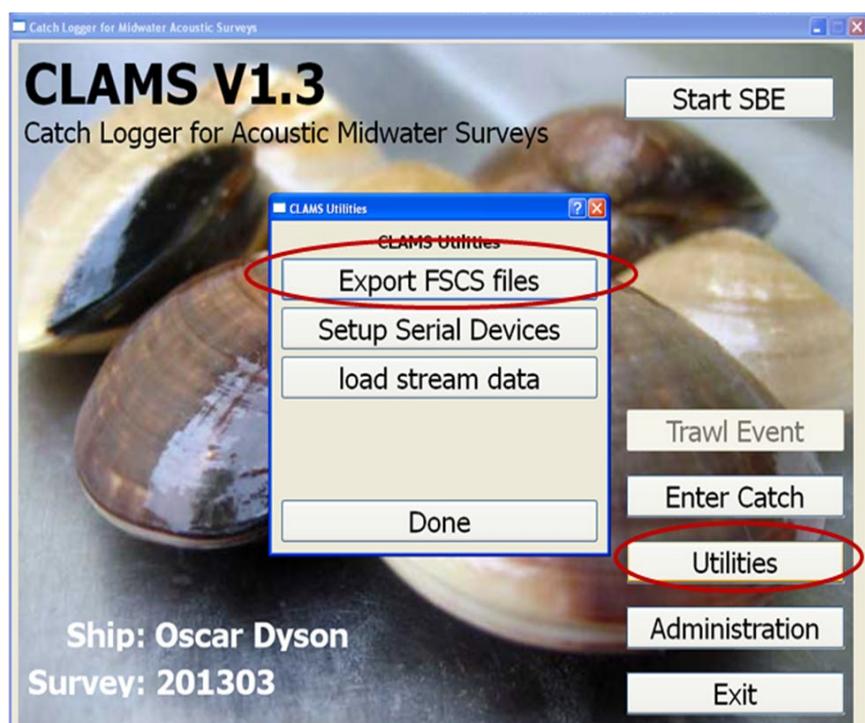
As with the Length window, Random and Non-Random data can be collected. The non-random data will not be used to generate average length/weight or length/weight keys.

Once done with collection, the user can either shift the protocol to enter a new protocol for the same species, change the species or complete specimen sampling by hitting the “Done” button.

7. Exporting Data

MACE: Exporting CLAMS data should be done in accordance with the Book of the Cave. The CLAMS side of things is as simple as clicking “Utilities” then selecting “Export FSCS files” and the desired haul. This data should be then read into MACE Launcher and accessed from the macebase biological application.

ABL: A separate GUI application (CLAMSABLreport.pyw) exports catch data from desired hauls into csv files. Each haul has an associated haul, catch, length, and specimen report generated. Wess Strausburger has a way of entering the generated csv files into ABL’s database.



8. Protocols

To create a new protocol (if a desired one does not exist). This is for the advanced user and if you are uncomfortable doing this, you should seek help from someone who’s comfortable or done this before.

- a. Click on “Administration” from the CLAMS front page
- b. Click Edit and Setup
- c. Set the “Table Type” as “Lookup” and set “Tables” as “specimen_protocol”
- d. Click “Insert Record”
- e. Enter the name and description desired for the new protocol

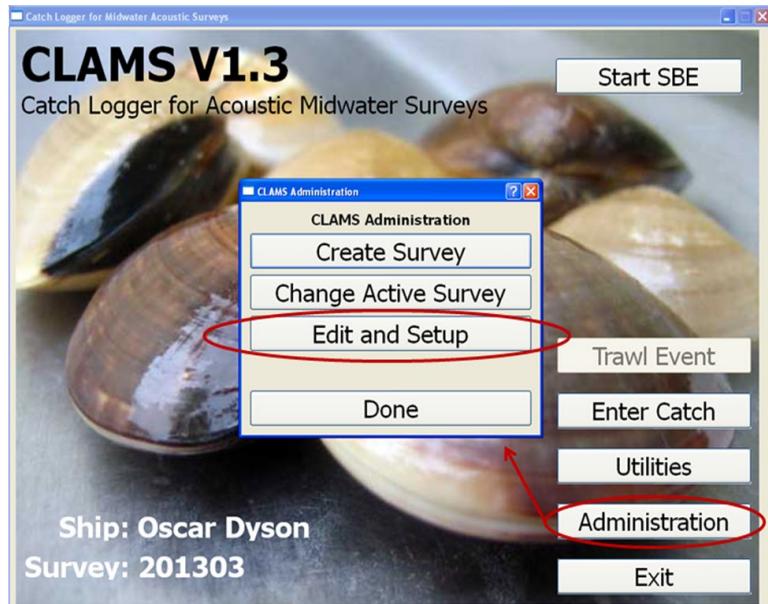
- f. Click “Commit Changes”
- g. Change “Table Type” to “Setup” and set “Tables” as “protocol_definition”
- h. Click ‘Insert Record’ and add the
 - 1) Protocol Name: The one you just created
 - 2) Measurement Type: Available options are visible in Table Type: “Lookup” → Tables: “measurement_types”. Best bet is to use options found in other existing protocols to ensure they are wired right in the system.
 - 3) Measurement Order: Set order (1 to # of measurements)
 - 4) Force Measurement: 1 for required measurement, 0 for optional
 - 5) Force Order: 1 for forcing collection in linear order (meas. order 1,2,3,etc.) or 0 for no
 - 6) Label: what the button label will display
- i. Click “Commit Changes”
- j. Repeat steps h→i as necessary to cover all measurement types needed
- k. Change “Table Type” to “Setup” and set “Tables” as “protocol_map”
- l. Click ‘Insert Record’ and add the
 - 1) Protocol Name: The one you just created
 - 2) Species Code: If not known, can be found in “Table Type” as “Lookup” and set “Tables” as “species”
 - 3) Set Active: 1 to set active, 0 to turn off.
- m. Click “Commit Changes”
- n. Repeat steps l→m as necessary to cover all species needed

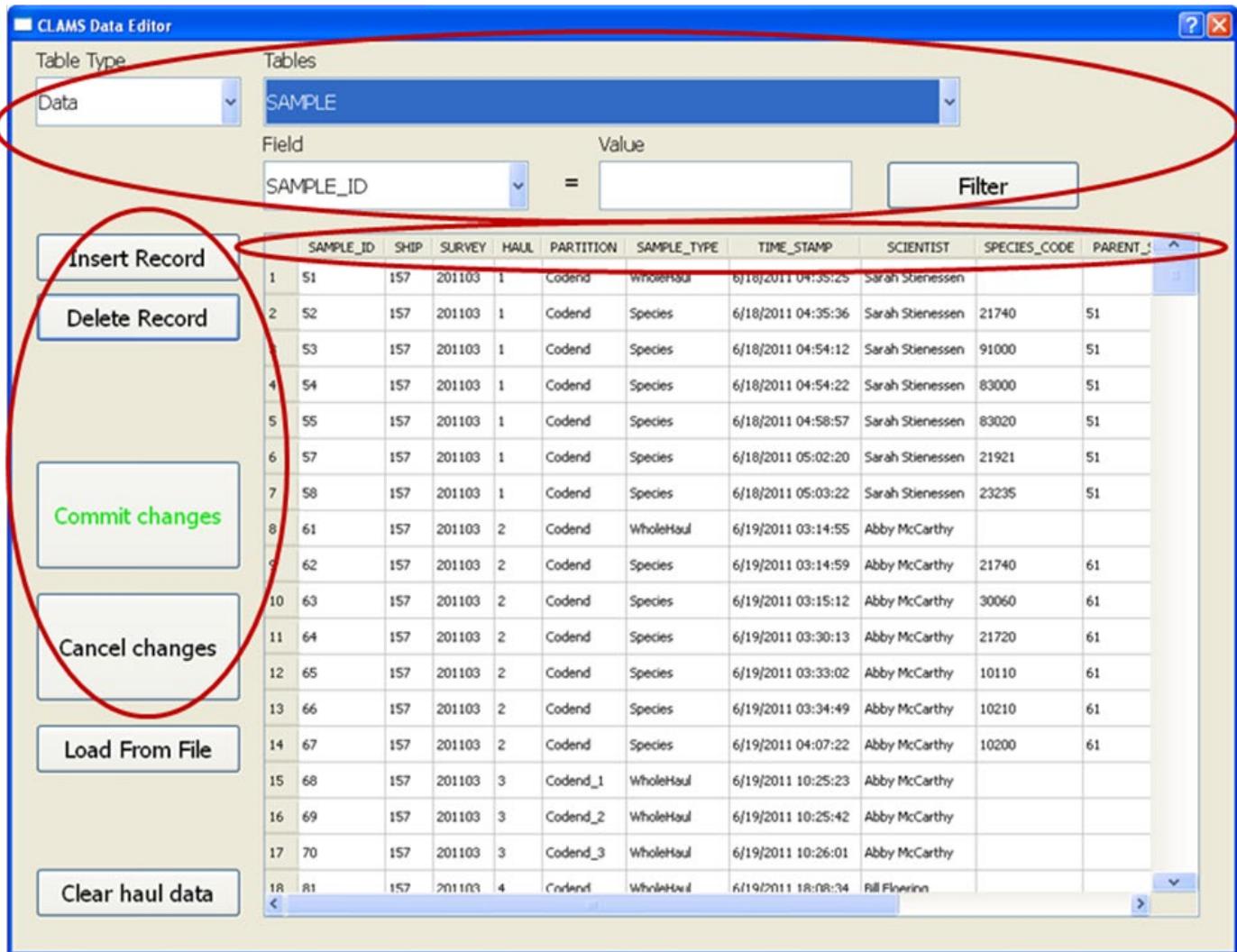
Appendix 1: Editing Tables and Data

If necessary, CLAMS data can be altered either within the application itself or through a database integrated development environment (IDE) such as SQL developer or Infomaker. This appendix will cover the case for the former, but not the later.

To access the database data, start by clicking on “Administration” from the CLAMS start page. Next click “Edit and Setup”.

This will bring you to the CLAMS Data Editor window.





To alter the data that you choose:

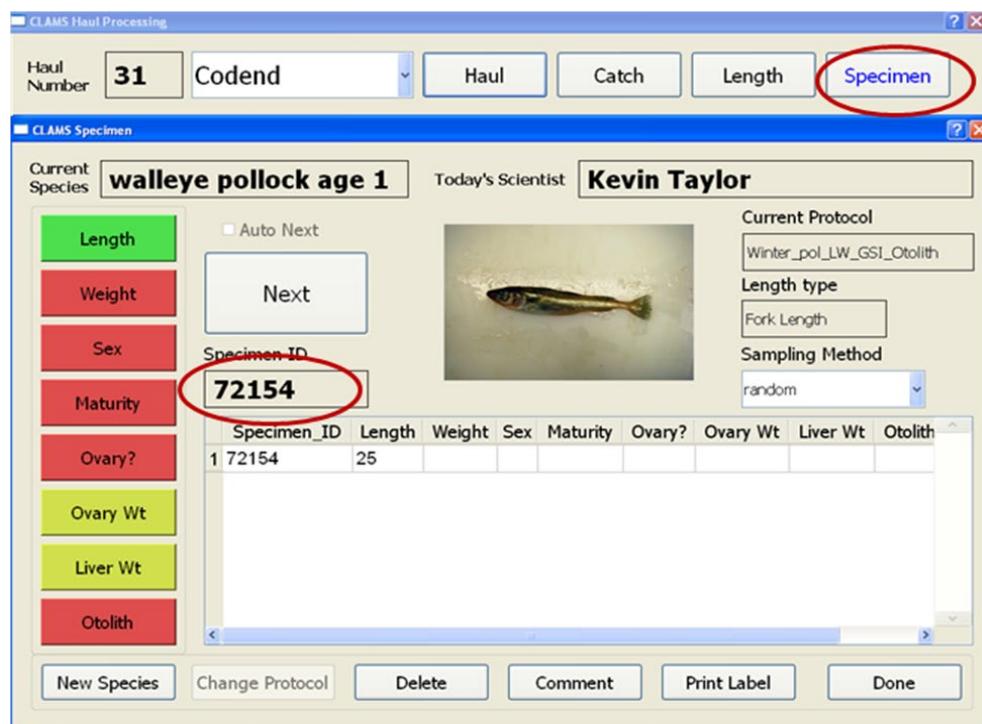
- Choose your table type from Setup, Lookup or Data (table types in Appendix2)
- Choose the table that you wish to adjust. Table descriptions found in Appendix 2.
- You can filter the displayed tabular data by selecting from the field drop down menu, entering a value in value box and clicking “Filter”. This is helpful if wishing to adjust measurements from a certain haul, specimen ID, sample ID, etc.
- Click to highlight the row to be adjusted.
- Make adjustments as necessary to that row
- Click “Commit Changes” or “Cancel Changes” as necessary. Only one row can be adjusted at a time.
- To add data, click the “Insert Record” button and add all applicable data. Ensure that all relational database tables are updated correctly to reflect any new entries if applicable.
- To delete data, highlight the entry to be deleted and click the “Delete Record” button. Ensure that there is no discrepancies within the database by attempting to delete parent records for which children already exist

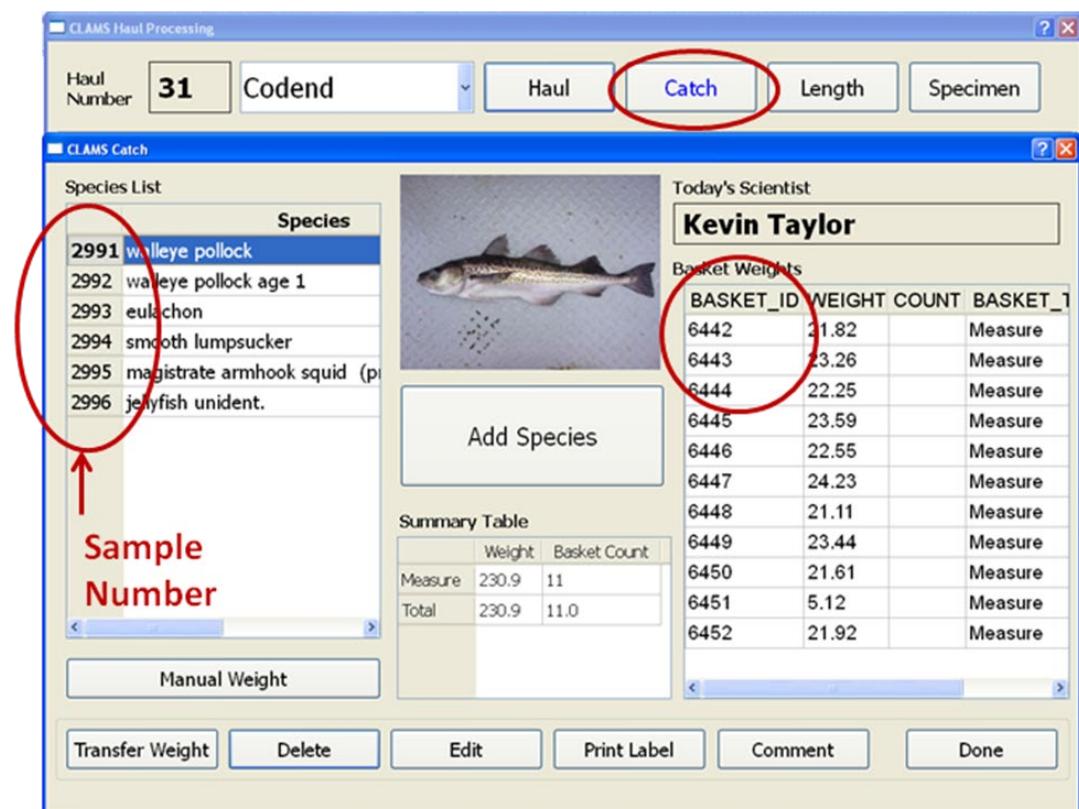
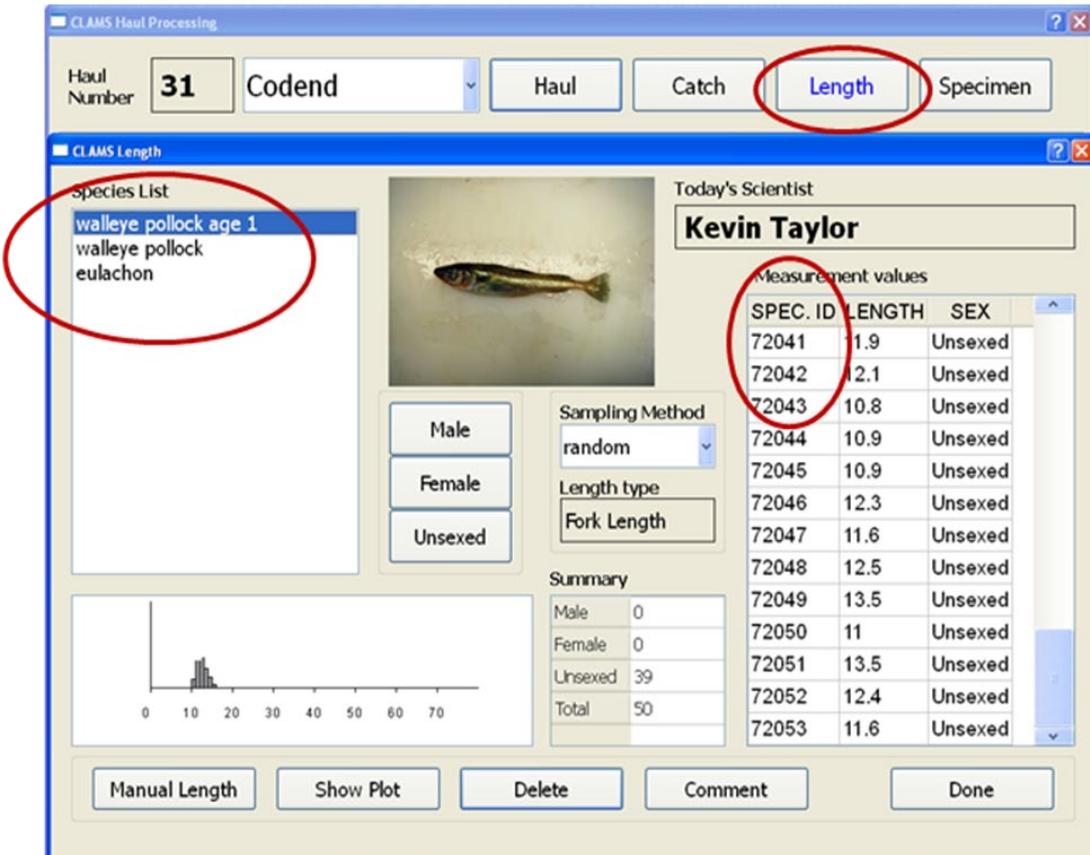
- i. The “Clear Haul Data” button will delete all data associated with a haul by clearing out all associated entries. This is possibly done easier by hand.
- j. The “Load From File” button allows for the loading of lookup table data from csv files. This works best with a fresh load of CLAMS. If small adjustments are needed it is easier to manually enter them in by inserting and deleting rows of data as necessary.

When adjusting data, there are several key numbers that are tracked within the CLAMS database that are useful/necessary to adjust the correct records. These include:

- a. **Specimen ID:** unique specimen number associated with an individual specimen. All individual length, weight, etc. data gets linked to this value. It is also linked to its parent sample ID. Most of the data to be adjusted if necessary is found in the **Measurement and Specimen Tables**.
- b. **Sample ID:** All unique species in a given haul are assigned a unique sample number. The sample number is linked to the species code, haul, partition, etc. Most of the data to be adjusted if necessary is found in the **Sample Table**.
- c. **Basket ID:** Each checked in basket during the Catch process gets assigned a unique basket ID. Although baskets are not tracked to associated specimens, their unique weight and species composition is. Most of the data to be adjusted if necessary is found in the **Basket Table**.
- d. **Species Code:** Race code books are used to give each species a unique species code. The species codes lookup table is found in the table labeled **Species**.

Below are some images where you can find these important numbers.





Appendix 2: Relational Database Tables

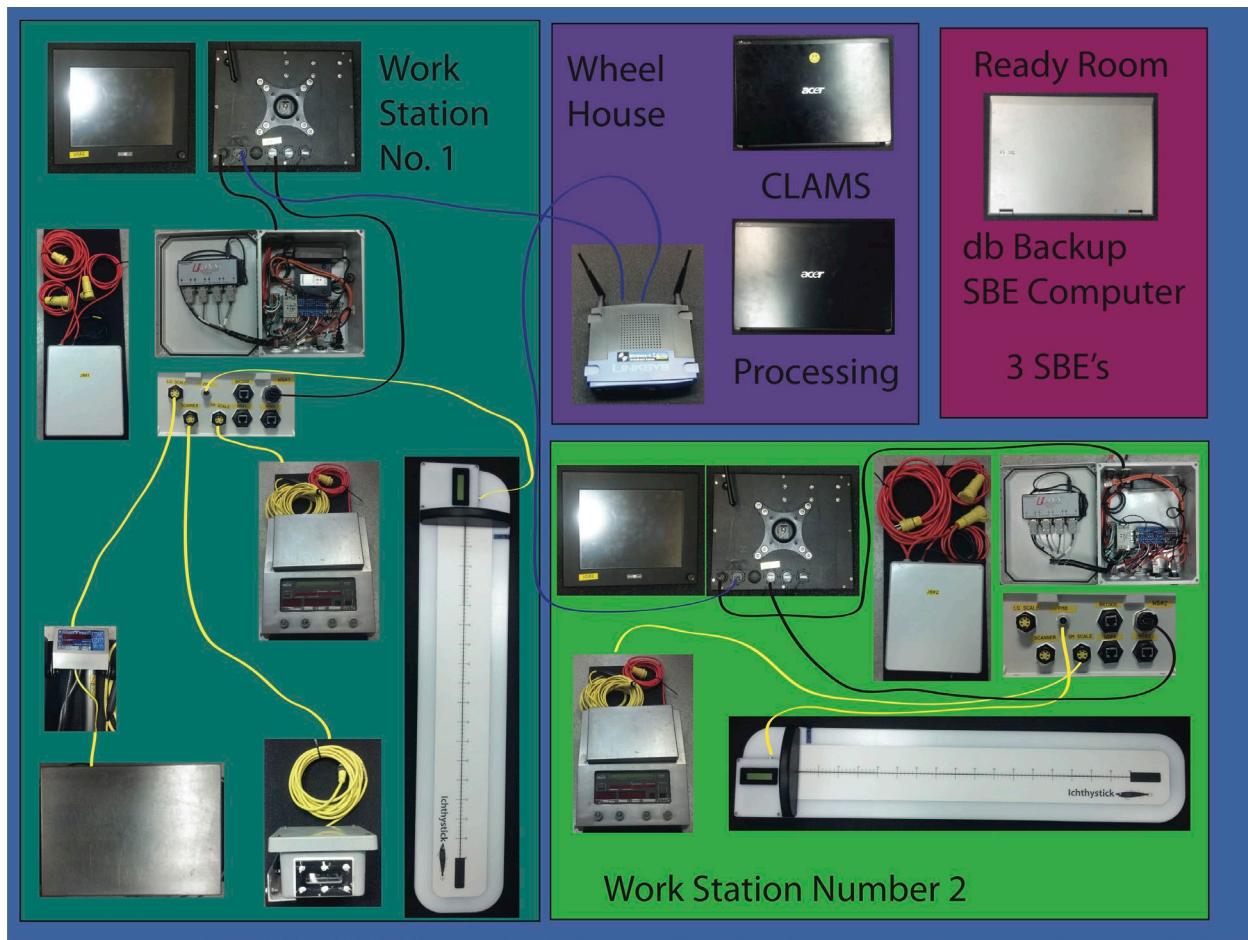
This is a listing of the relational database tables associated with CLAMS and a quick definition of each

Table Name	Table Type	Description
application_configuration	Setup	Storage of active ship/survey, data export directory
basket	Data	basket id, sample id, type, count, weight, time
basket_types	Lookup	definition of basket types
conditional_definitions	Lookup	definition of written conditional statements (scripts)
conditionals	Setup	Link of conditional to protocol for implementation
device	Lookup	Device ID, name, model, S/N and description
device_configuration	Lookup	Setup of device including baud rate, sound files, dialog script
device_interfaces	Lookup	Device interface type and description (scs, serial, software, etc.)
device_parameters	Lookup	Parameter type, data type and description (baudrate, serialport, etc)
gear	Lookup	Fishing gear name, type, code and description
gear_accessory	Data	Table of used fishing gear accessory and access. option per trawl
gear_accessory_options	Lookup	Options available for gear accessory in trawl dlg and active (1 or 0)
gear_accessory_types	Lookup	Gear accessory types (doors, netsounder, etc.)
gear_options	Setup	Table of all gear options available per gear type
gear_partition_types	Lookup	Description of partition type (nonCatch, Catch, etc.)
gear_partitions	Lookup	Partition name, type and description (pocketnet, codend, etc.)
gear_types	Lookup	Description of gear type (single codend, multi codend, plankton)
haul	Data	Ship, survey, haul #, gear, haul code, perf. Code, name, comments
haul_data	Data	Ship, survey, haul, partition, haul parameter, value
haul_parameters	Lookup	Haul stuff name, units, description (eq, vert opening, stratum, etc.)
haul_performance	Lookup	performance code descriptions
haul_stream_data	Data	Streamed haul data, mostly SCS stuff. A LOT of records.
haul_types	Lookup	Haul type code and description (opportunistic off bottom, etc.)
haul_weight_types	Lookup	Codend weight types: load cell, guess, etc.
maturity_description	Lookup	Maturity code and description
maturity_tables	Lookup	table description
measurement	Data	Link specimen id, device id, measurement type & value

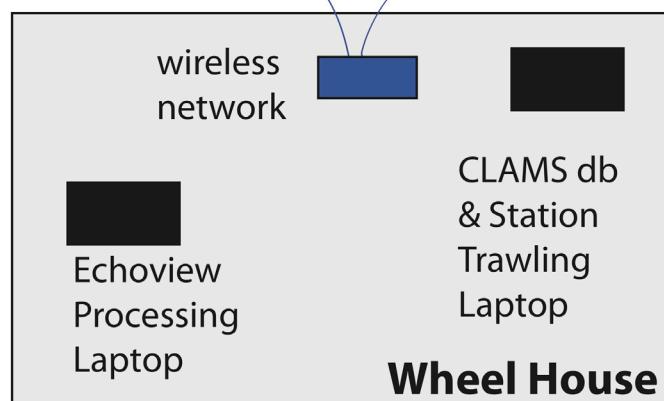
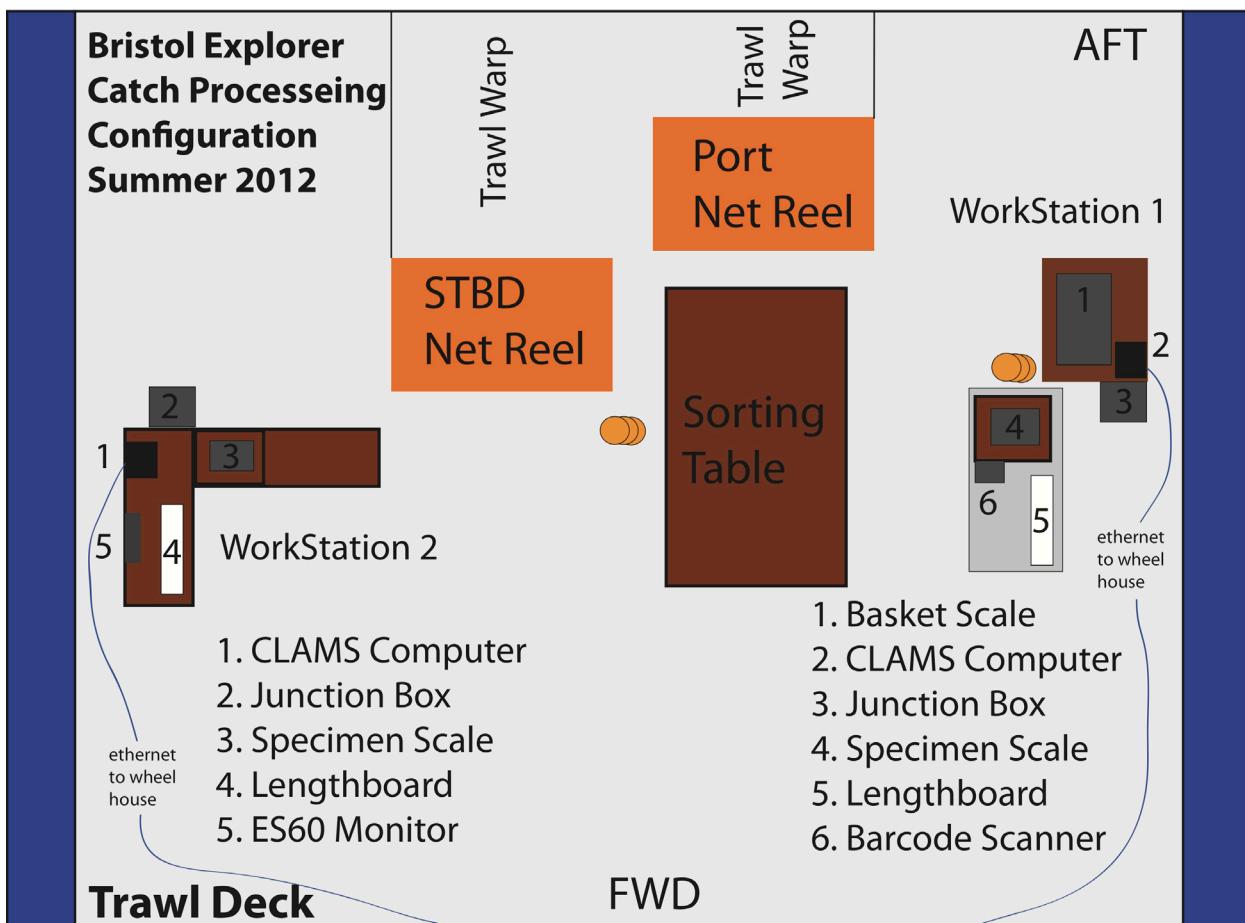
Table Name	Table Type	Description
measurement_setup	Setup	Link workstn id, meas. type, dev. id & interface, GUI module
measurement_types	Lookup	Description of measurement type and it's data type
override	Data	Log of overrides
partition_options		empty
personnel	Lookup	scientists, affiliation and active or not
protocol_definition	Setup	Protocol setup linking measurement type, order and name buttons
protocol_map	Setup	Protocol setup linking species codes
sample	Data	sample Id # to ship, survey, haul, partition, species code, parent
sample_data	Data	empty
sample_parameters		empty
sample_types	Lookup	species sampling types: whole haul, sorting table, species, mix
sampling_methods	Lookup	methods: random or non-random
ship	Data	ship codes, name and description
species	Lookup	species code lookup table
specimen	Data	specimen id, sample id, wrkstn, method, scientist, protocol, time
specimen_protocol	Lookup	Name and description of protocol
survey	Data	Survey name, ship, dates and description
validation_configuration		empty
validation_definitions	Lookup	Validation types and definitions (length fall in range, etc)
validations	Setup	Link validation to protocol, measurement type and validation order
version		Current versions of biological acoustic
workstation	Lookup	Workstation name, id and location
work_station_configuration	Setup	Setup of workstation allowing access and set directories

Appendix 3: CLAMS ABL Bristol Explorer Setup

Below are imaged of the CLAMS ABL setup on the F/V Bristol Explorer during Summer of 2012. There were three workstations: one in the wheelhouse as a trawling laptop which also housed the database and two on the backdeck, one as a catch and specimen station and the other as a specimen station only. The wiring and measurement types are shown below.



The configuration of the backdeck is shown in a simple block diagram below.



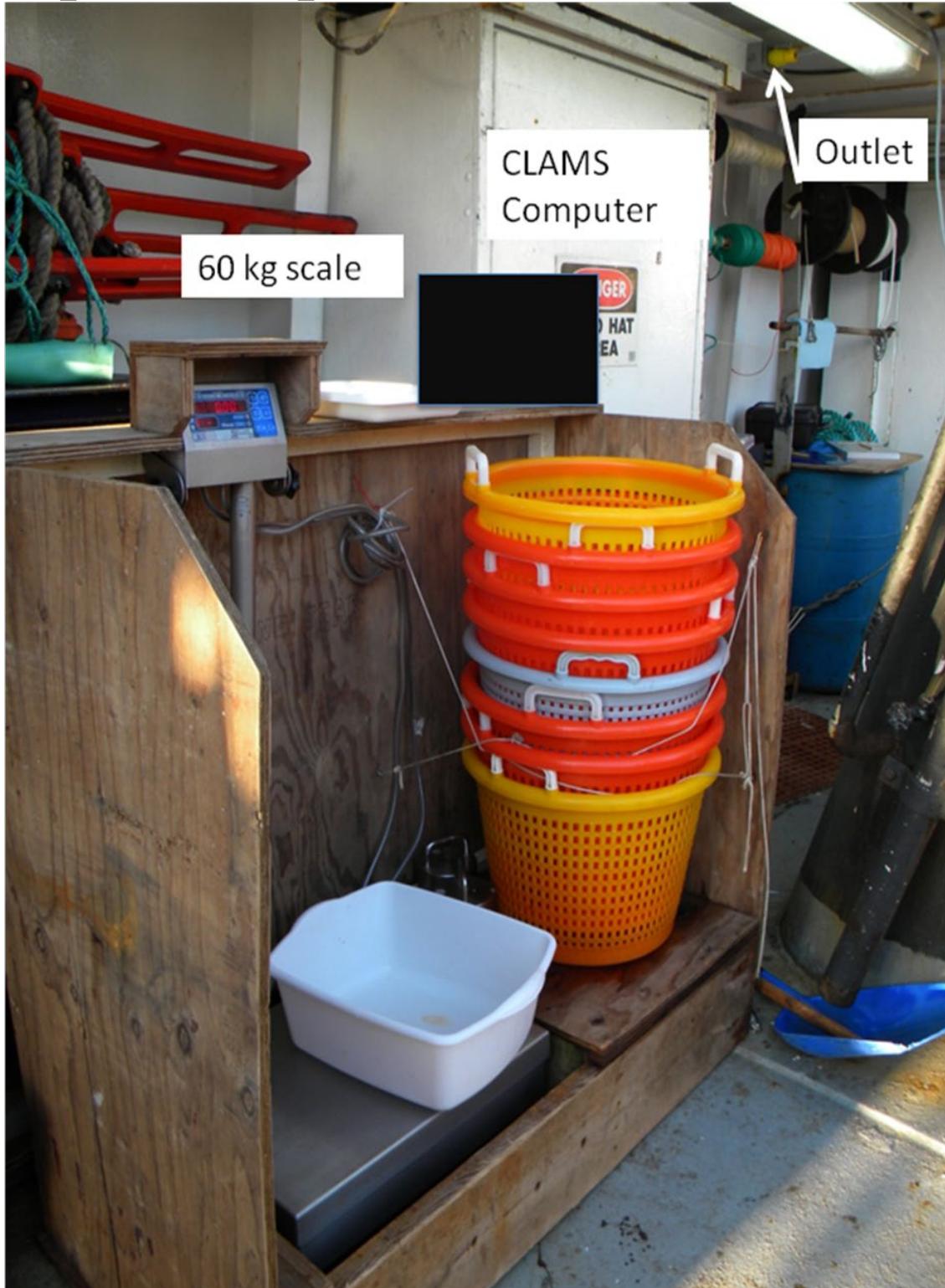
Wheel House



Bristol Explorer Backdeck: Sorting Table and Workstation 1



Workstation 1: Catch (Specimen portion not shown)



Work Station 2

