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Sampling Operations Database Application – Version 6.0 for FY23

Background: The information collected in the *Okeanos Explorer* (EX) Sampling Operations Database Application (SODA) was customized for the sampling operation protocols developed prior to the launch of the Campaign to Address Pacific Monument Science, Technology, and Ocean NEeds (CAPSTONE) expedition in FY15. Prior to FY17 and the last year of the campaign, the EX_SODA was updated with new and improved ideas of how the data should be categorized and new requirements by CAPSTONE Chief Scientist, Christopher Kelley. Beginning in FY19, the Global Foundation for Ocean Exploration (GFOE) took over ownership and administration of the Sample Data Management laptop that SODA runs on, to help streamline and improve onboard network connections. In FY20, the SODA was unused because of the field season cancellation due to COVID, however, updates to the user interface were made to accommodate the plans to collect water samples for eDNA analysis.

The following is a guide for the onboard Sample Data Manager ("the SDM") to use the SODA during an ROV mission on which sampling will be taking place.

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Information Hierarchy

- **Expedition** – Mission cruise on which sampling operations are to be performed (EXyynn > EX2206)
  - **Dive** – Dive operation within the cruise on which sampling operations are being performed (DIVE01, DIVE02, etc.)
    - **Primary Specimen** – the specimen observed and targeted by the science party for collection (Dnn_nn{B/G/W} for Biological, Geological, or Water example: EXyynn_D01_01B (D01 = Dive01 and 01B = Specimen 1 Biological)
      - **Primary Specimen Sub-Sample** – any dissected piece or genetic scraping of a primary specimen targeted for a secondary repository or preserved in a different manner (i.e., formalin instead of EtOH)). **Every piece that is preserved differently than the main specimen or is destined to a different repository should have its own unique record.**
      - **Lab Images/videos** – images taken during wet lab procedures by the lab camera and microscope
      - **Sub Images/videos** - video segments and frame grabs pulled from the ROV video segments recorded during specimen collections
      - **Associate Specimen** – other specimens that are brought to the surface on/or associated with the primary specimen. These can be:
        - geological specimens on which the primary specimen is attached
        - another biological specimen attached to that geological specimen
        - any biological specimens found clinging to or attached to the primary specimen or other associate specimens
        - **Associate Specimen Sub-Sample** – any dissected piece or genetic scraping of an associate specimen targeted for a secondary repository or preserved in a different manner (i.e., formalin instead of EtOH). **Every piece that is preserved differently than the main specimen or is destined to a different repository should have its own unique record.**
        - **Associate Specimen Image** – images taken during wet lab procedures by the lab camera or microscope
        - **Associate Specimen Video** – videos taken in the wet lab procedures
  - **Reports and Exports**
    - **Reports on the Dives/Specimen page**
      - Cruise and Dive Manifests – to be used to track the whereabouts of specimens throughout the cruise
      - Cruise and Dive Inventories – to inform the Expedition Coordinator of the total numbers of specimens managed during a cruise
      - Report for Onboard DM – run after all imagery has been managed and entered into the database. This file is saved for the onboard data manager to generate symbolic links of any high-definition footage or frame grabs from the submersible vehicles instead of making copies. This step helps to preserve server space.
      - Full Dive Specimen Report – saved in Sample/Cruise folder. Will be rsynched to shore so that participating scientists can read about the specimens and know which images/videos were taken/recorded.
      - Generate Dive Summary Tables - to export details to be included in the Dive Summary Report for each primary specimen
    - **Reports on the Reports/Exports page**
      - Specimens Collected to Date – provides a list of previously collected species and the depth and location for the science leads to review before collecting a similar species
      - Cruise Specimen Export (Excel spreadsheet to generate at end of cruise)

- Cruise Specimen Report
- Dive Specimen Report
- CITES (Convention on International Trade in Endangered Species) Reports
- GIS Records with and without links for the GIS team to include repository links in GIS data layers (after the repository has curated the specimens and sends back the links)
- Mission Report exports for Bio, Geo and Water Specimens

- **Repository reports and exports**
  - Smithsonian National Museum of Natural History – all biological and eDNA samples that are targeted for SNMNH; all geological specimens since some have biological associates.
  - Oregon State University – all geological samples are targeted for OSU
  - Deep Sea Corals Program – the NOAA DSC program receives an export for their database

Onboard Standard Operating Procedures (SOPs) for the Sample Data Manager (SDM)

An overview of the typical sample data manager (SDM) tasks before, during, and after a dive is presented below. A folder of SDM training videos is located in a Desktop folder of the SDM computer (C:\Users\ship.user\Desktop\SDM training videos). Internet access aboard the Okeanos for the Sample Data Manager is through the GFOE portal using the account name and password on the laptop.

Ask the on-board GFOE Data Manager to help map the sample data management laptop to the following networked drives on the ship (check with GFOE Data Manager for current folder names):

Y:\\10.10.2.200\SampleStaging
Z:\\10.10.2.20\PublicData
A:\\10.10.2.47\CruiseData

The 'Specimens Collected to Date' report in SODA (under 'Reports and Exports') will print out every unique specimen, and its collection lat/lon/depth for all cruises maintained in the database. This is a good reference for the science team in case they are targeting a specimen that has already been collected. This report would usually be run prior to the beginning of the first sampling operation.

****Important Note about the location of the database** the folder on the C: drive where the working copy of the database should live will always be named EX_SODA and nothing else. This is because the label templates will look there for the data to put on the labels. If the SDM wants to back up their database to C:\EX_SODA_cruiseID, that is OK, but always run from C:\EX_SODA. Just remember to check which database you are opening to prevent data from being entered in two different versions of the database.**

Prior to the first dive:

1. Set up the camera and light ring in the wet lab (Fig. A). Make sure that the camera battery is charged. Ask for help if needed.
2. Set up the microscope in the wet lab (Fig. B).
3. Set up the scales for weighing samples (Fig. C).
4. Have a bucket of seawater sitting in the refrigerator in the wet lab overnight before first dive (use seawater intake once ship is offshore in open/clean water). Some scientists use this, some use water from the bioboxes (Fig. D). If the water from the biobox will be used, ensure a 4-liter Nalgene bottle is available to scoop the water into buckets.
5. If the buckets have been used and are not dry from the previous dive, you can place these outside to dry. This helps keep the smell down.
6. If the black swatches that are used for photographs are dirty, wash these with gentle soap and hang to dry.
7. Ensure that the datamax printer is loaded with enough label material and ribbon, connecting properly with the computer, and printing clear labels (physically connect cable to Sample DM laptop).
8. Test the control room web-form and import the test sample import from the control room web-form. The Webform is accessible at 10.10.2.200/rov-sampling/ on SDM laptop. Export of the form (.csv) can be downloaded from 10.10.2.200/EX_DIVE_SAMPLES.csv

Fig A. Initial camera with light ring set-up.

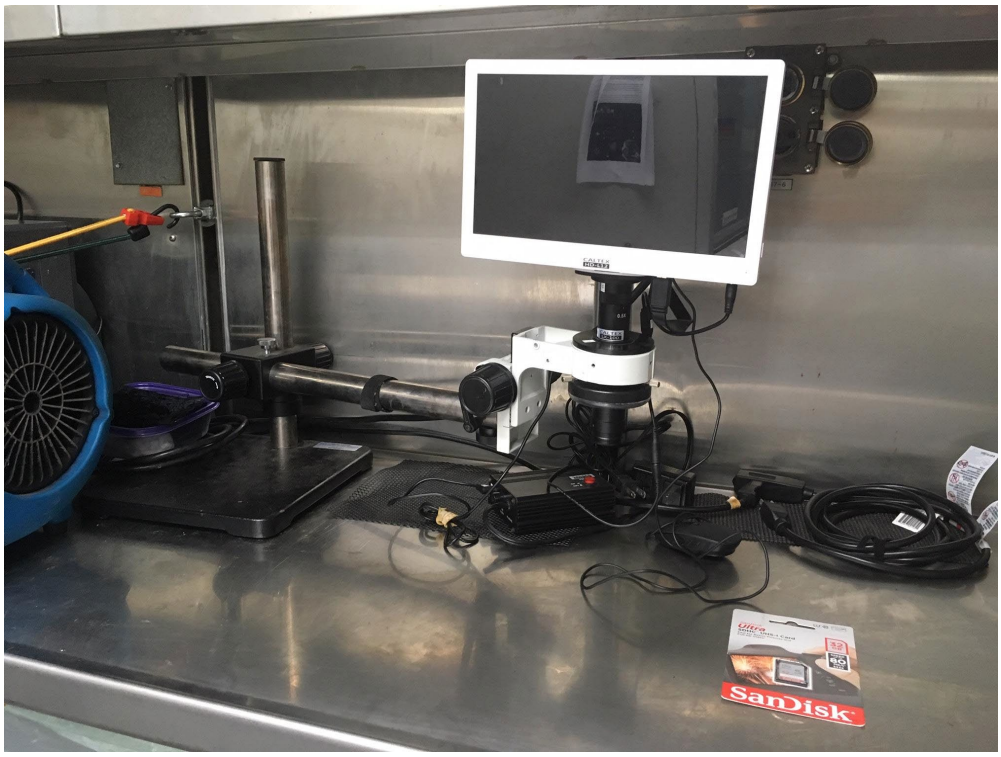


Fig B. Initial microscope set-up.

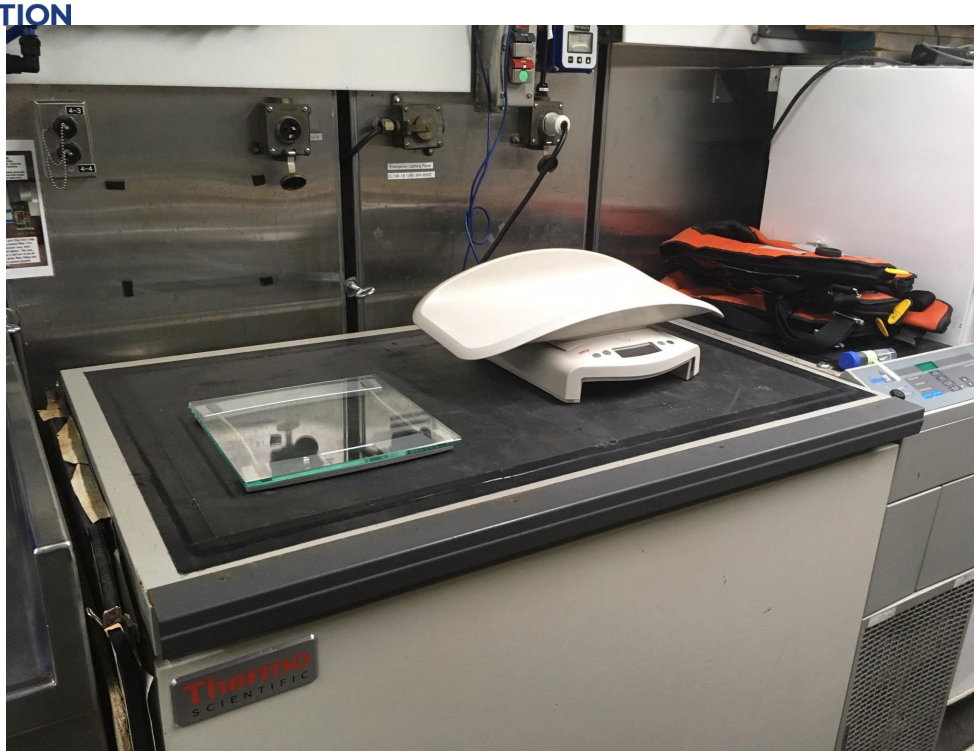


Fig C. Initial scale set-up.

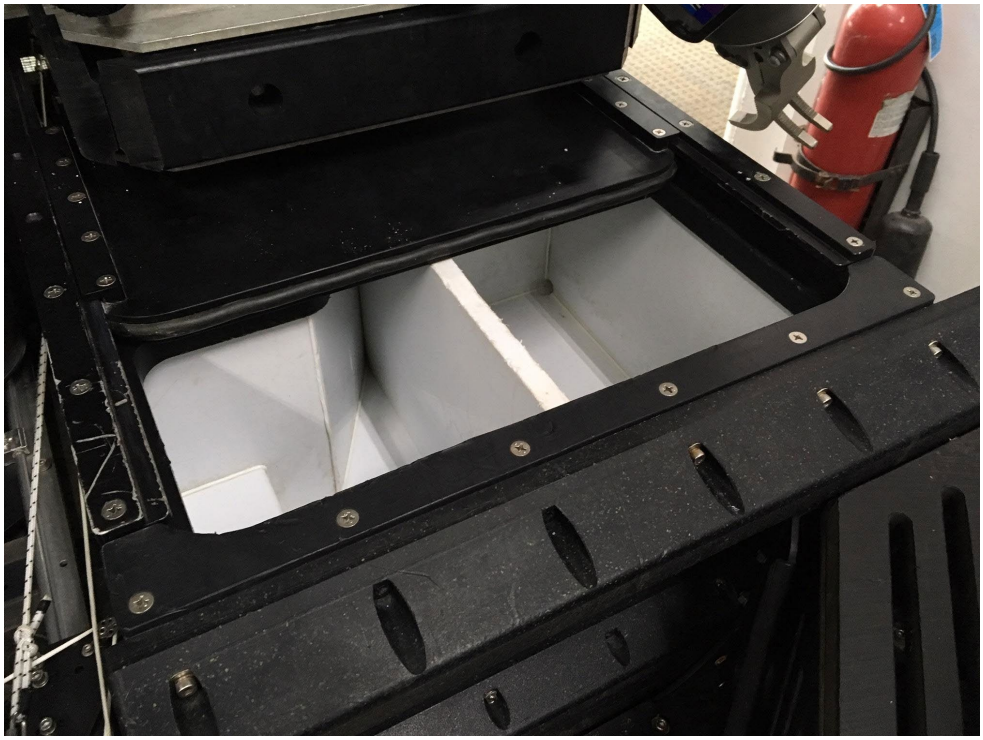
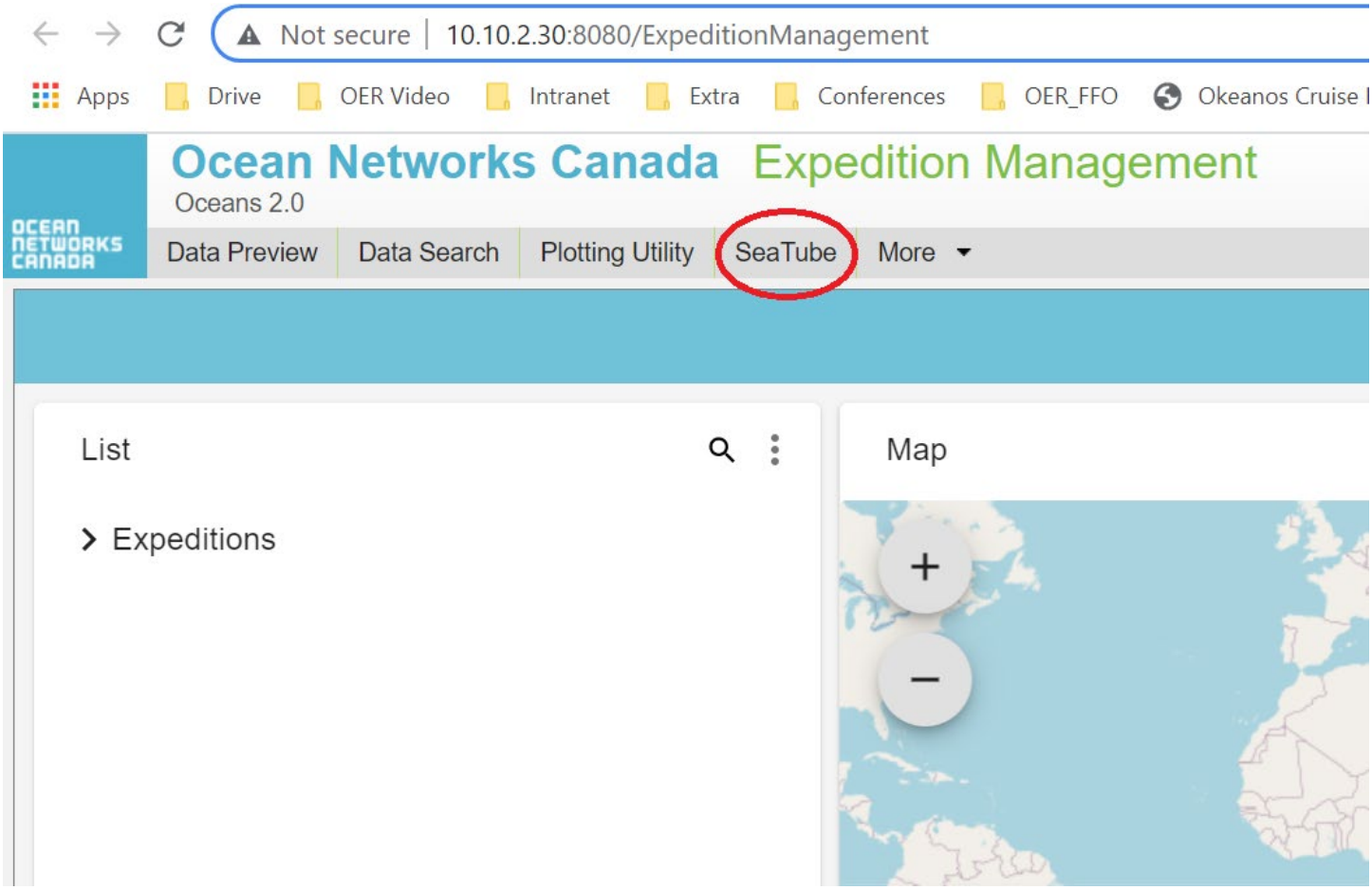


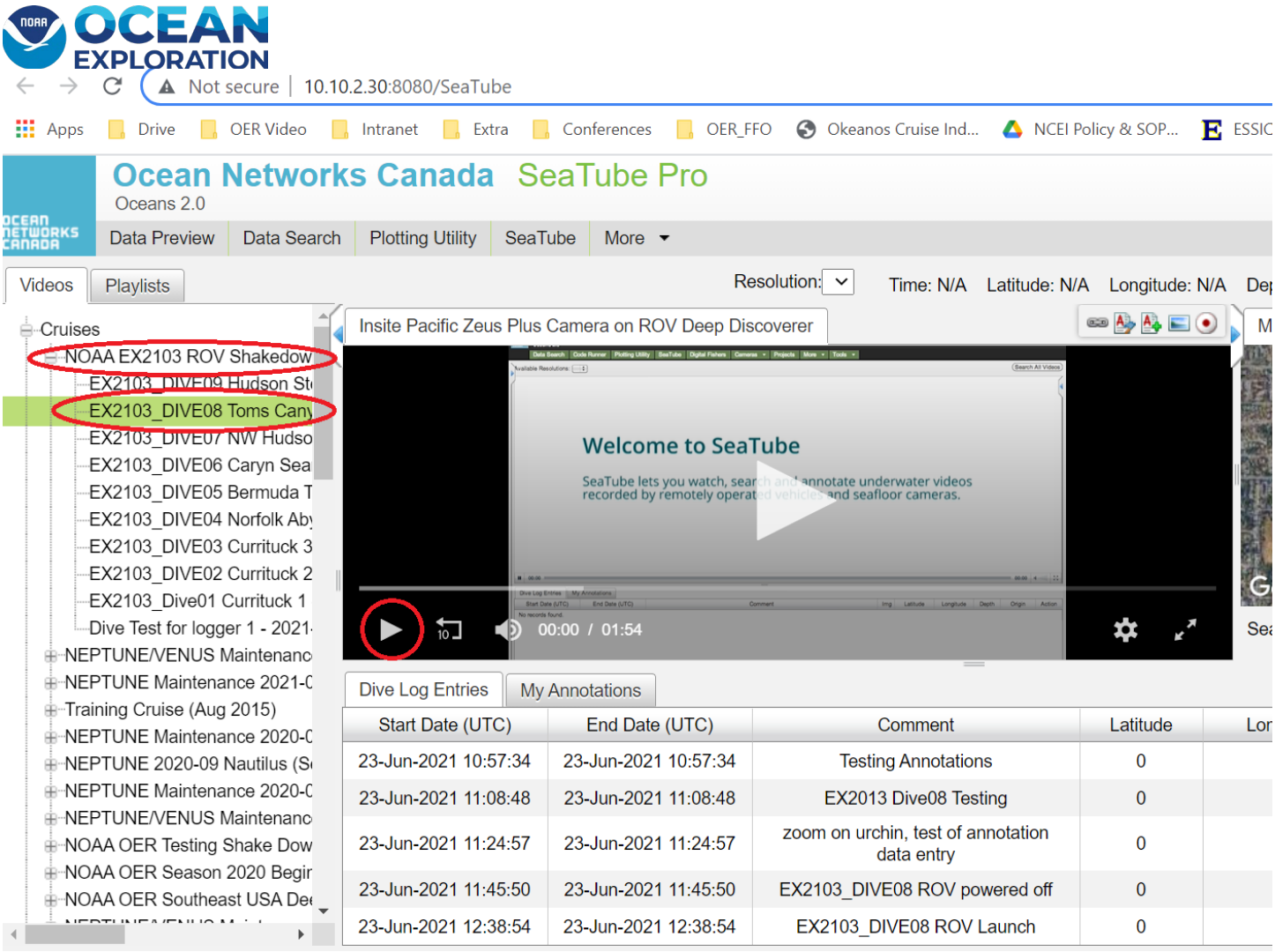
Fig D.Port bio boxes on ROV Deep Discoverer (D2).

During each dive:

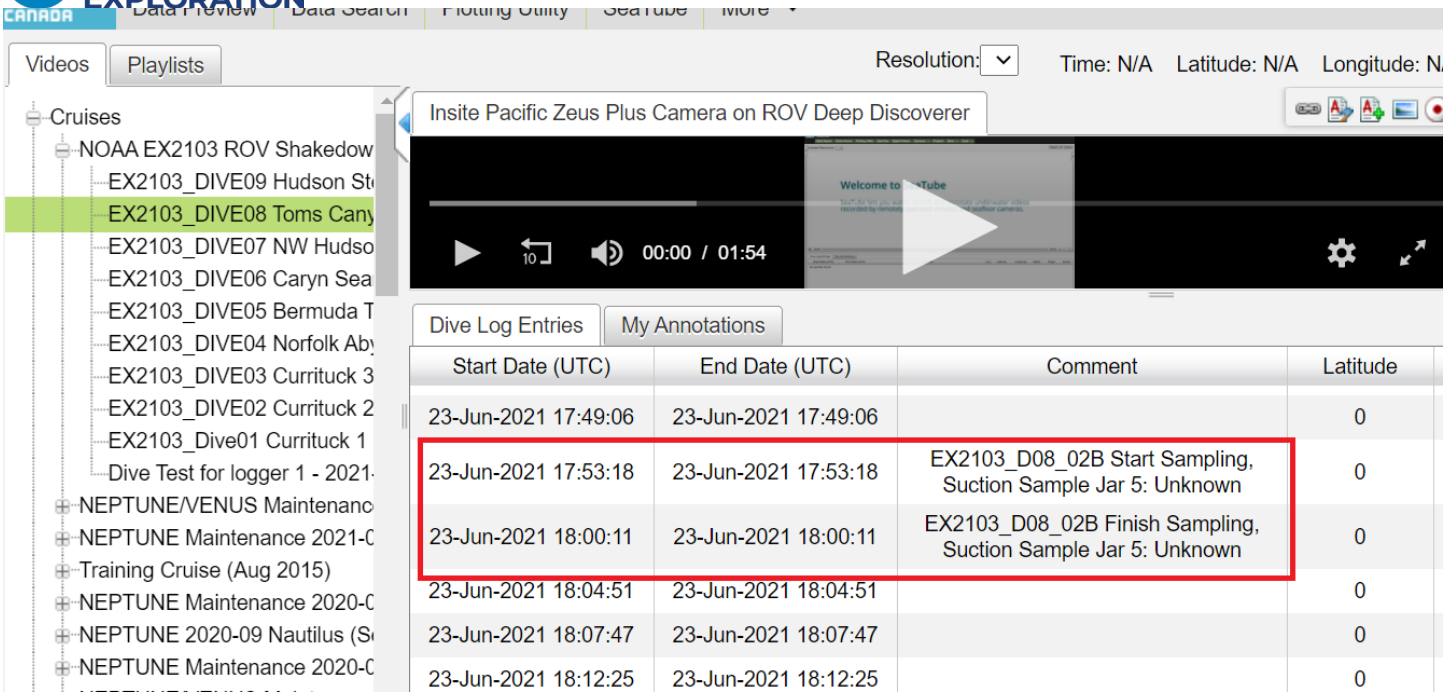
1. SDM needs to be aware of start times and durations of sampling operations and will need to note the start and end times for sampling operations. First check to see if sampling annotations have already been added.
    a. Log on to the ship-service SeaTubeV2, using personal account, at http://10.10.2.30:8080/SeaTubeV2
    b. Click on SeaTube in the upper headings.



    c. This will bring you to the cruises options for dive logs and annotations. Click on "+" next to the cruise you want and it will open a list of dives associated with the cruise. Click on the cruise you want to get collection times for. Once the page loads it's suggested to pause the video as this tends to make it easier to navigate the page by reducing system lag times.



d. Under the Dive Log Entries tab, scroll down until you come across an entry in the comment column that notes the start of sampling. In your own records take note of the Start time and End time for each sample, along with the sample number, container used, possible ID, and any other important information. Do this for each sample collected during the entire dive. If no samples are annotated in the comments, continue to step 2 of this section.



e. You may wish to keep SeaTube up while using SODA, but don't need to.
f. Continue on to Step 3.

2. If no samples are annotated in the comments, notate these times in SeaTube based on onboard training and the following steps.
    a. When a sample collection begins, note time. If a video segment other than one from the main ROVHD is desired, communicate this with the "clipper."
    b. Once sampling is complete, note the time in a log book. Following the sampling activity, use the "create observation" button in SeaTube to open an observation window.
    c. Edit the time in this window to correspond to the start of the sampling time recorded in the log book.
    d. Select "start geo sampling operations" or "start bio sampling operations" from the Operations drop down menu as appropriate.
    e. Edit the variables in the Annotation window to reflect the appropriate sample, add the field ID, then hit "save & exit."
    f. Repeat steps *c* through *f* for the "end" of sampling time.
3. During sampling, the science lead in the control room will fill out a web form (http://10.10.2.200/rov-sampling/) with the Sample ID EXyynn{L#}_D##_##{B/G/W (example: EX1903L2_D01_01B), the identity of the ROV box that the sample is placed in,the reason for collection, and an initial field identification and then click COLLECT. ***This field ID CANNOT contain any commas***. As a result, an EX_DIVE_SAMPLES.csv file will be auto-populated by a GFOE network process with the environmental variables at the time of collection with the three header fields and saved to the ship's network.

After the dive concludes:

1. As soon as the submersible recovery begins, the SDM should download the EX_DIVE_SAMPLES.csv by clicking the bookmarked site (http://10.10.2.200/EX_DIVE_SAMPLES.csv). This will automatically download the csv file to be ingested. Copy and replace the EX_DIVE_SAMPLES.csv from the network to the C:\EX_SODA folder on the Sample DM Laptop.
    a. Open the file and inspect for completeness, correctness, and remove any test specimens (i.e. DIVE00). **Also, make sure that no commas were used in the field identification, as that will throw off the ingest procedure.**
    b. If mistakes were found and needed to be corrected, ask the GFOE data manager to do so in the network file as well. The network file can also be cleared out. This way import errors won't happen every time.
    c. Make sure to close the EX_DIVE_SAMPLES.csv before working in SODA.
2. The SDM will open the SODA application, set the active cruise and open the Dives and Specimens menu and click Ingest New Specimens.
3. Immediately after a successful ingest, the SDM should notate the Dive Site Name in the Dive Location field. If the SDM can get the Phylum for each Primary Specimen, the intended Final Preservative to be used, and whether or not formalin will be used in the preparation or preservation steps entered in before printing the labels, then that would be advantageous. All of these fields will be printed on the specimen labels.
4. The SDM should then navigate to the just completed dive and Print Labels to the Datamax printer. The labels file will be generated and saved in C:\EX_SODA\completed\ folder so that it can be printed more than once if necessary. The printer will automatically cut after two labels have been printed. If one is left on the printer after it is finished, pressing the Feed button will advance the last label so it can be cut.

Wet lab procedures:

1. Once the ROV reaches the deck, the mad scramble for retrieving and preparing the specimens for processing begins and the SDM should be available to help (Fig. D and E). The SDM should have the wet lab prepared for sample processing by this point. The pre-printed labels indicate the collection box or canister on the ROV and can be placed in with the specimens to keep them identified. ****It is important that samples from each box be placed in the correspondingly labeled bucket to prevent mixups.****
2. During wet lab procedures, the SDM will enter any new information about the primary specimens and any associates found. Labels for associate specimens can be printed on an as needed basis.
3. GFOE techs will bring the suction sampler canisters into the wet lab (Fig. F).
4. Samples will be weighed and photographed individually, then double-bagged with labels and appropriate preservative for storage (Fig. G and H).
5. For shipping bio samples, they are not allowed to have more than 30 ml of EtOH or formalin in each specimen bag and they will have to be triple bagged with pig mat and wrapped in EtOH soaked paper towels to prevent degradation. (per Smithsonian)

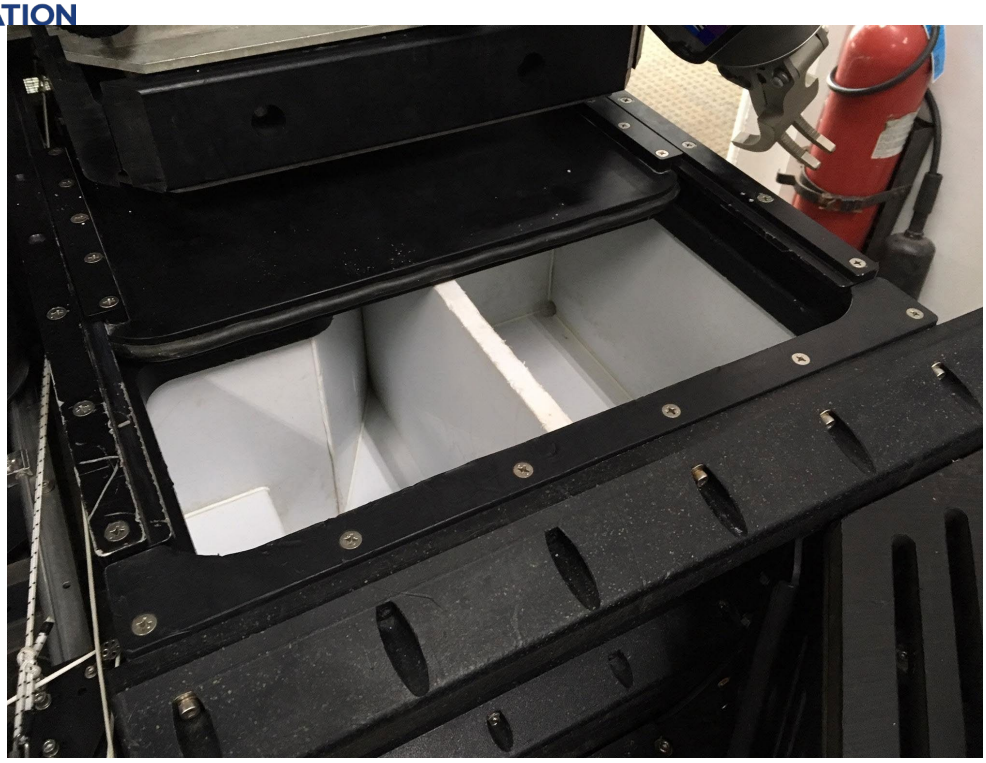


Fig D.Port bio boxes on ROV Deep Discoverer (D2).

Fig E. Starboard geo box.

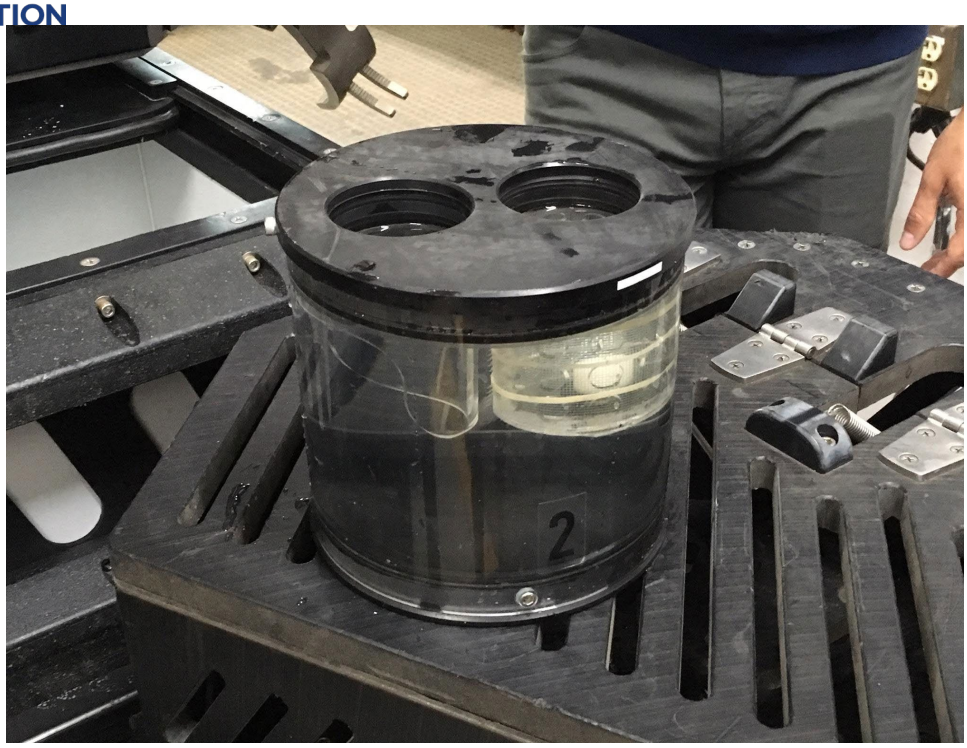


Fig F. D2 suction sampler canister.

Fig G. Storage boxes in wet lab for holding biological and geological physical samples after each dive.

Fig H. Chemical hood in wet lab for storing of ethanol, formalin, and deionized water.

Wet lab image/video ingest steps in SODA:

1. At a convenient time either after the dive or the next morning, the SDM can create the folders needed for the lab sample images and videos which will be created during wet lab procedures. These should be created on the network drive set up for the Sample Data Manager. The folder naming convention is up to the SDM, but folders of each specimen and associate specimen should be created.
   Examples:
   a. \EX2206\EX2206_DIVE01\D01_01B = Biological Specimen images and/or microscope videos
   b. \EX2206\EX2206_DIVE01\D01_02G = Geological Specimen images
   c. \EX2206\EX2206_DIVE01\D01_02G_A01 = Associate Specimen images found on SPEC02GEO
2. When ready, the SD cards will be plugged into the laptop and the appropriate images and videos for each individual sample will be saved in the corresponding folders set up by the DCM.
   a. The photo of the color palette should be taken before the first sample specimen with the wet lab camera and saved in the first biological or geological folder for that dive on the SDM laptop.
   b. Give the color palette photos a name such as 99999.jpg before renaming, so that they are the last pictures in the specimen folder when they are renamed in SODA.
3. Once the images and videos are saved, the SDM can automatically rename each file by clicking the button "Rename Lab MM Files" and/or "Rename Assoc Images" on the screen showing the specimen or associate you are renaming files for. You will need to navigate to the specimen or associate image folder you just created. SODA will use the Specimen ID and/or Associate Specimen ID to rename ALL the images and videos within the folder. The SDM will need to navigate back to the 01B/G folder in the folder that has just been renamed and manually rename the color palette photos to include _COLOR_PALETTE.

a. After renaming the files, the files will be programmatically uploaded into the images and/or videos tables in SODA to associate them with the appropriate specimen or associate specimen.

ROV image/video ingest steps in SODA:

Ask on-board GFOE Data Manager to help map Sample Data Management computer to the following drives:

(Note: drive letters may change. Ask the GFOE Data Manager to confirm.)
Y:\\10.10.2.200\SampleStaging
Z:\\10.10.2.20\PublicData
A:\\10.10.2.47\CruiseData

1. For images and videos recorded by the ROVHD, the SDM will go to the \CruiseData\EXyynn\Video\EXyynn_DIVE##_YYYYMMDD/ProRes for video and \CruiseData\EXyynn\Imagery\EXyynn_DIVE##_YYYYMMDD for imagery directory to identify which image files and which video files are associated with each primary specimen.
2. The SDM will then update the files called VideoFilesBySpecimen.csv and ImageFilesBySpecimen.csv in the C:\EX_SODA\ folder. These files need to contain the shortened Specimen ID in the format EXyynnL#_D##_##{B/G} and the name of the image files and video files from the submersible that correspond to sampling operations.
3. In the SODA database, the SDM can associate Submersible Images and Submersible Videos captured in the .csv files for the entire dive by clicking “Ingest ROV Image Names” and “Ingest ROV Video Names”. These buttons will read the ImageFilesBySpecimen.csv and VideoFilesBySpecimen.csv respectively and will assign the images and videos to the correct dive and specimen as indicated by the specimen ID in the first column. These files do not need to be emptied out, as the program will ignore those already ingested. The buttons, “Ingest Lab Images and View all Images” and “Ingest Lab Videos and View All Videos”, will show the user the newly ingested file names with either Submersible Framegrab or Submersible Video entered as the source.

Reports:

4. Once all of the images and videos have been associated with the specimens and associate specimens and the SDM feels that all of the information for the dive is complete, the SDM will click the button “Create Image/Video List for Onboard Data Manager”. This will generate an output text file that should be placed on the SampleStaging\EXyynn\EXyynn_DIVE##_YYYYMMDD. A program will use that file to know which submersible videos and images correspond to which specimen and their routine will generate symbolic links to those files in their file system for the periodic rsync to the shoreside repository.
5. Finally, the SDM should click the button labeled “Generate Final Dive Specimen Report” which will generate a .pdf document that should be printed and/or emailed to the Expedition Coordinator, who can share it with the participating scientists. This will go in the \SampleStaging\EX1703 directory labeled EXyynn_DIVE##_DAILY_SAMPLE_REPORT.pdf.

Transfer Images to Field Drive:

6. The Lab Images need to be put onto the SampleStaging\EXyynn directory. Each Dive will have its own directory labeled EXyynn_DIVE##_YYYYMMDD.
7. Place the EXyynn_DIVE##_Sample_Products.txt file in this directory.
8. Create an Imagery\ subdirectory in the Dive’s main directory (EXyynn_DIVE##_YYYYMMDD).

9. Create directory for each specimen labeled EXyynnL#_D##_##{B/G}
    a. Place all lab images here using WinSCP. WinSCP should be used as the transfer will continue if the transfer is interrupted at some point.

The previous list is a detailed step-by-step review of typical post-dive activities by the SDM. The rest of this document will provide a user interface guide on how the SDM shall interact with the SODA.

****Important Note about the location of the database** the folder on the C: drive where the working copy of the database should live will always be named EX_SODA and nothing else. This is because the label templates will look there for the data to put on the labels. If the SDM wants to back up their database to C:\EX_SODA_cruiseID, that is OK, but always run from C:\EX_SODA. Just remember to check which database you are opening to prevent data from being entered in two different versions of the database.**

To open the EX_SODA database, navigate to the C:\EX_SODA\ folder and double-click on EX_SODA.accdb. If a message is received to Enable Content, this action should be taken. It will be a one-time action. If the Microsoft "ribbon" is shown at the top of the screen. There are three ways to minimize the ribbon so that the screen real estate is available for the application.

1. Right-click on the ribbon and choose to minimize the ribbon
2. Enter Ctrl-F1
3. Use the up/down arrow toggle in the upper right corner, if available

Also, there will be some cases where the SDM might need to access the tables, queries, macros, reports and code that make up the database. This can be done by clicking F11 to open the Navigation Pane on the left side of the application forms. Clicking F11 again will close it. To make the best use of the screen's real estate for the application, this Navigation Pane should remain closed.

Navigation Buttons

Throughout the SODA, the SDM will notice some navigation buttons on screens (see Fig 1.) that allow for navigating to the First Record, the Previous Record, the Next Record, the Last Record, or a New Record. The button with the red 'x' is for deleting a record. There is also a button with an 'X' to close the screen that is currently shown.

Fig 1. Typical navigation button display on data entry screens.

Main Menu and Cruise Setup

The main form or Switchboard is shown in Fig 2 below. Past and current cruises will be maintained in the database. To work on a cruise already in the database, click on the Select Active Cruise dropdown to select the active cruise and then click Cruise Details to view/edit the active cruise header information and then Manage Dives and Specimens to open the main form on which most data entry will take place. Additionally, after selecting the active cruise, the SDM can click on Dives and Specimens to open the main form on which most data entry will take place (see Fig 5).

If a new cruise needs to be setup, click on New Cruise to open the data entry form for a New Cruise (Fig 3 and 4). From there, the SDM can click on Manage Dives and Specimens to open the main form for data entry. If the SDM tries to enter a new cruise that is already in the database, a message will be displayed explaining this.

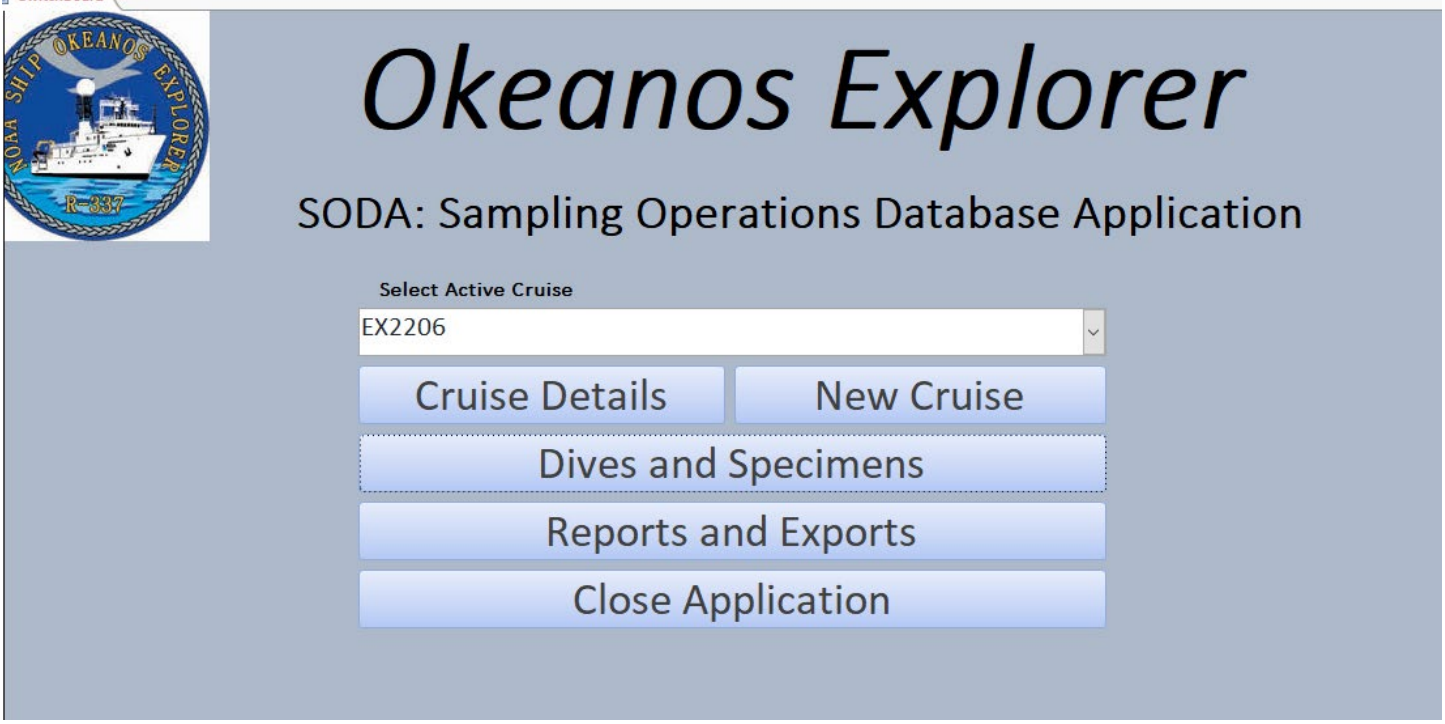


Fig 2. Switchboard

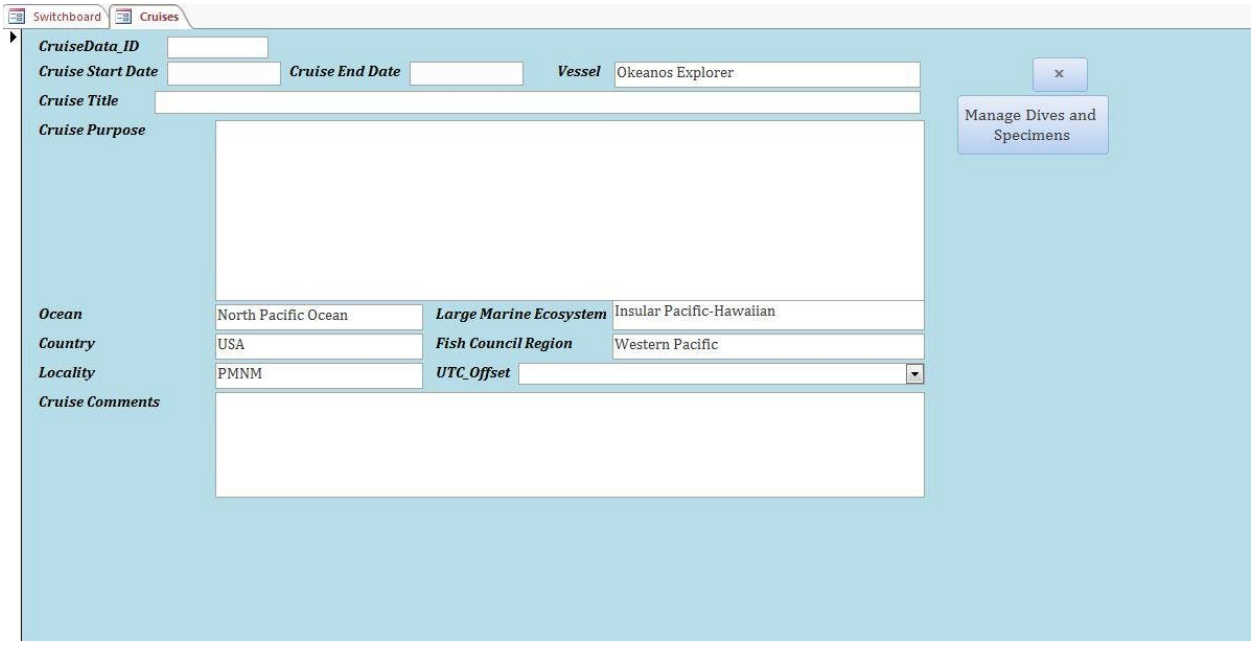


Fig 3. New Cruise Form

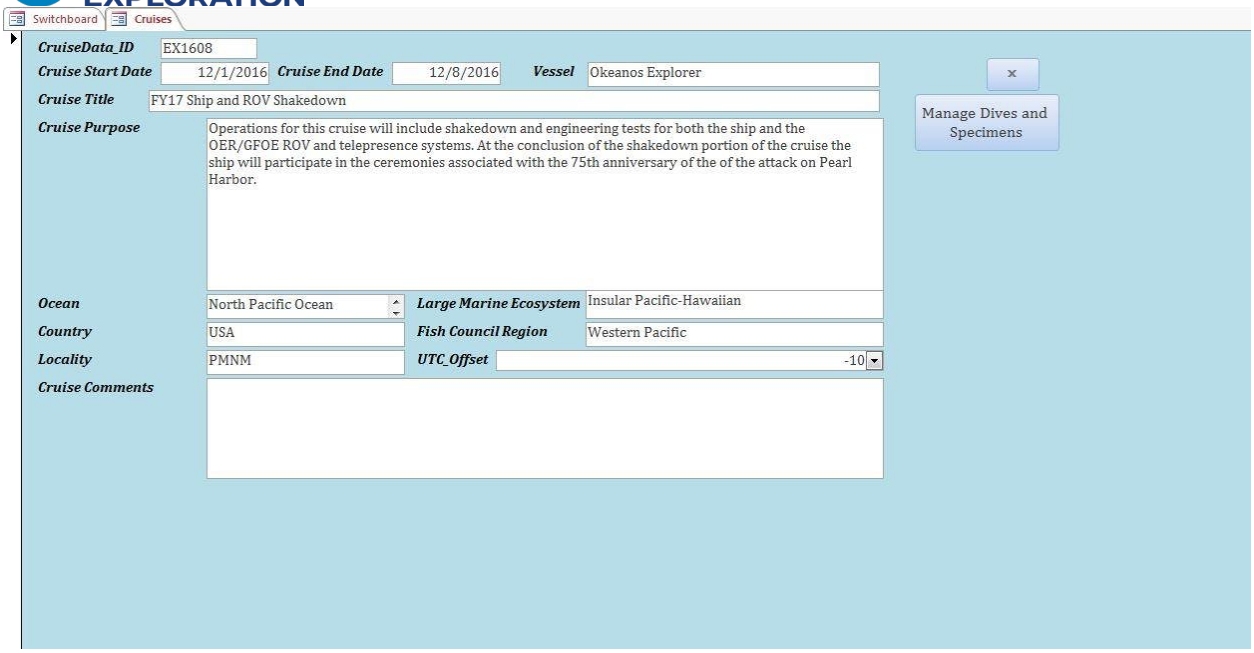


Fig 4. Cruise Details Form

Dives and Specimens

The main form for the EX_SODA is the Dives and Specimens form (Fig 5). Here the SDM can manage all of the dives and the related primary specimens, any associated specimens, subsamples, images and videos. The SDM can also ingest specimens after a dive operation is complete and print labels to be used during wet lab procedures. At the conclusion of the dive, the wet lab procedures, and the identification of all related images and videos, the SDM can generate a Dive Specimen Report to be distributed to all participating scientists and the Expedition Coordinator as well as a Image/Video List to be used by the onboard data managers to update their rsync procedures for post-dive processes.

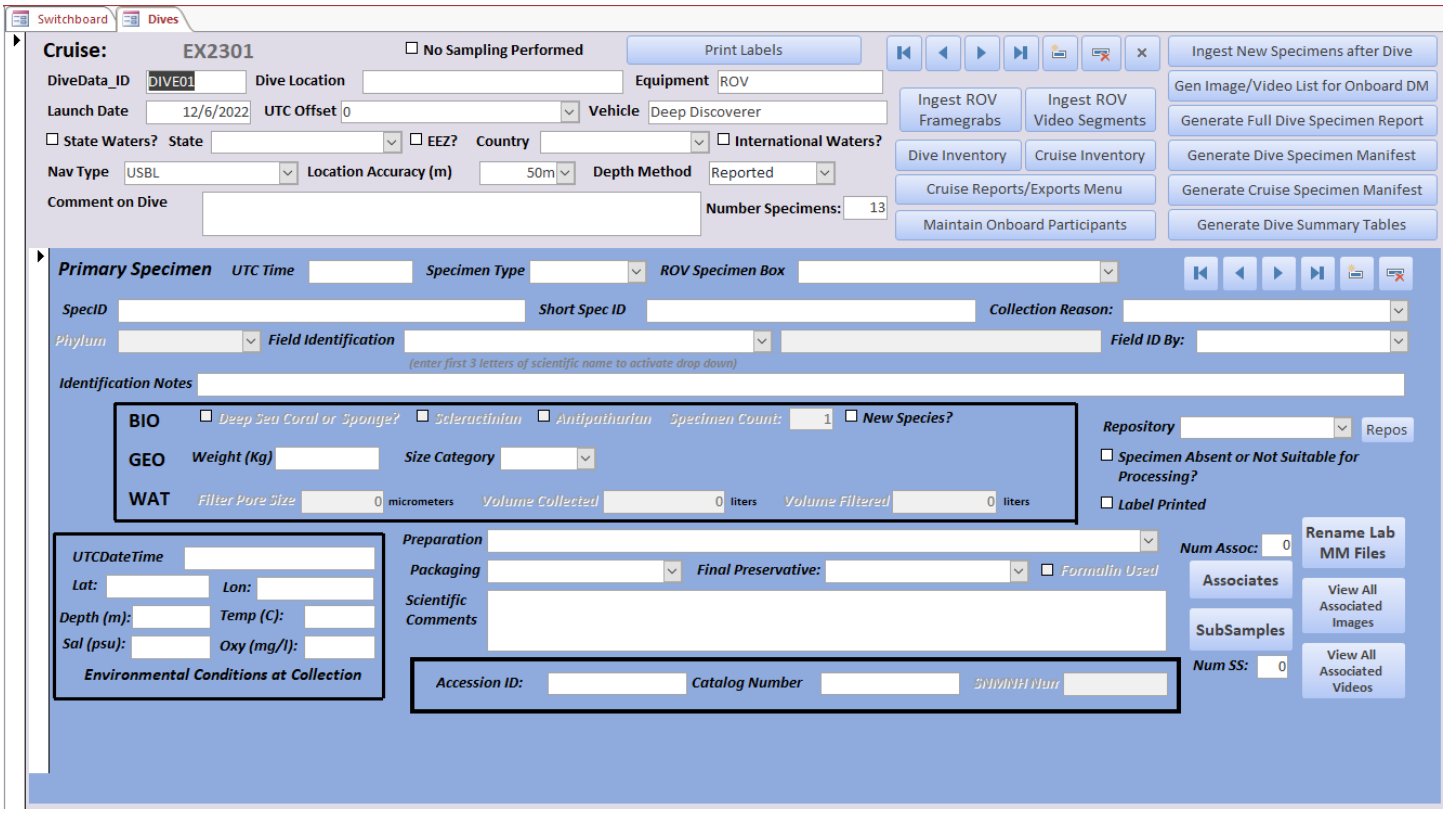


Fig 5. Dives and Primary Specimens (Main Form)

Dive details and the resulting specimens can be entered manually or ingested automatically. Ingesting them automatically is a preferred method.

Manual Dive Entry: The Launch Date of the dive and the UTC Offset are required for the system to be able to figure out the UTC date/time when a sample is actually being collected. If a dive launches at 8am locally, but it is actually 6pm UTC, and then that dive lasts for 8 hours, six hours into the dive, the UTC date will actually increment by one day. This will be handled by the software as long as the UTC Offset is set. Also, the UTC Offset may change during the course of a cruise, so it is up to the SDM to make sure the UTC Offset is updated appropriately. An important note – the Okeanos Explorer's ship's clock will display the time in UTC. If the EX_SODA user intends to know and use the UTC date as the launch date, the UTC Offset should be set to 0.

Note ** Suggest leaving the UTC Offset to 0 at all times and use the clock on the ship as the time.

Automatic Ingest: More than likely the specimens collected during a dive will be ingested after the conclusion of the dive instead of entered manually. During a dive operation, there is a process taking place in the control room whereby when a specimen is being placed into the collection box on the ROV, a designated person on the science team will use a simple form on a network display screen (see Fig 6 for an example) to identify the sample ID of the primary specimen being collected, the reason it's being collected, the Sample Box into which it is being placed, and a field identification (initial scientific identification). Then, once the specimen is safely in the Sample Box, the COLLECT button is pushed which will capture a snapshot of the latitude, longitude, depth, UTC date/time, temperature, salinity, and oxygen at that moment. This action will append a row into a network file called EX_DIVE_SAMPLES.csv

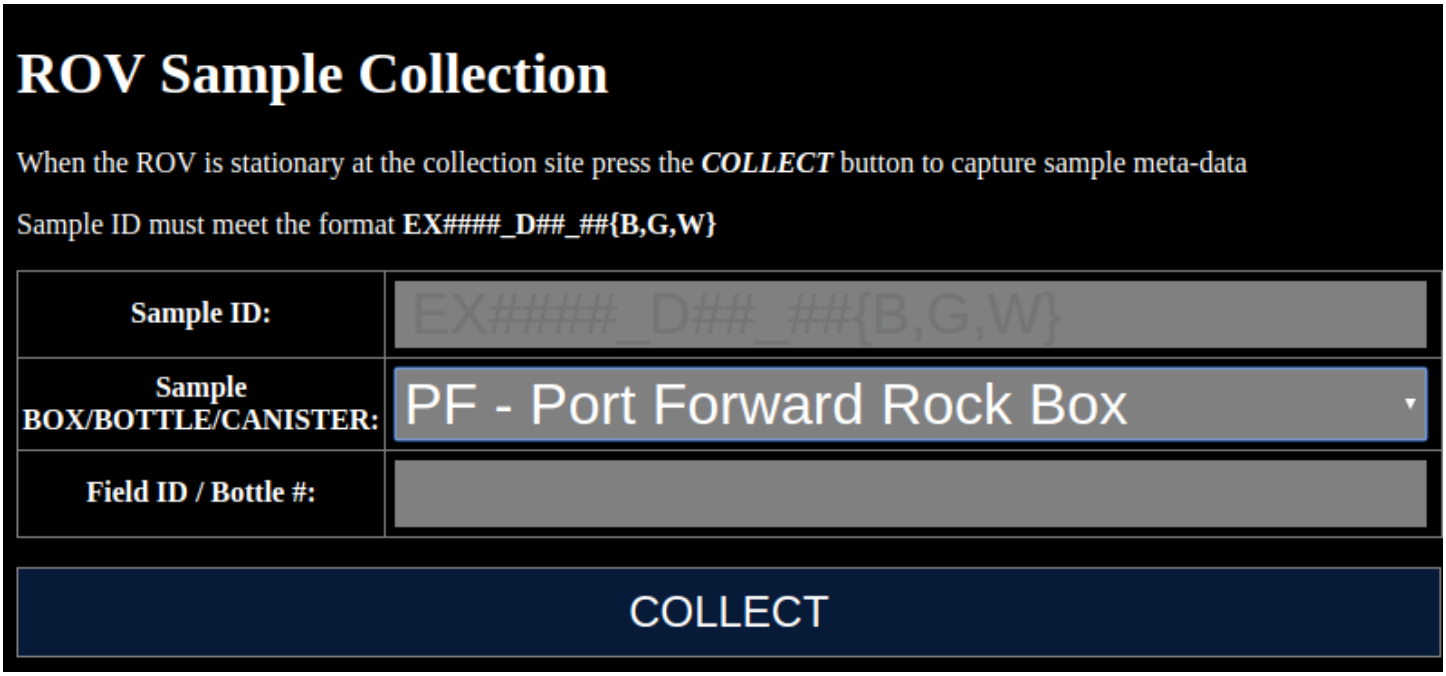
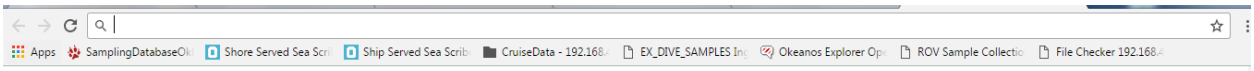


Fig 6. The sample collection interface in the control room.

- Once collect is clicked, the metadata from the ROV CTD will be collected in a csv file. You should check that this CSV file is being correctly created routinely. The CSV file can be found here: http:// 10.10.2.200/EX_DIVE_SAMPLES.csv. This is also bookmarked in Chrome.



- Clicking this bookmarked link will download the CSV file.

Following the conclusion of the dive and while the vehicles are on their ascent to the surface, the SDM needs to make sure the dives' specimen records get into the SODA laptop for processing.

The file updated through this control room process can be found at http:// 10.10.2.200/EX_DIVE_SAMPLES.csv

The SDM will ensure that a copy of the most recent EX_DIVE_SAMPLES.csv file is saved to the dedicated Sampling Operations laptop in the C:\EX_SODA\ folder, overwriting any previously saved file. Please note that typos made earlier in the dive will always appear each time you download the new copy. I found it useful to keep a running csv file in the

EX_SODA folder and save the newest downloaded csv to my desktop and copy the newest dive rows into my copy in EX_SODA to make sure they are all correct.

Once the SDM has an updated EX_DIVE_SAMPLES.csv file saved to the C:\EX_SODA folder, on the main Dives and Specimens form, the Ingest New Specimens after Dive button should be clicked. See Fig 7

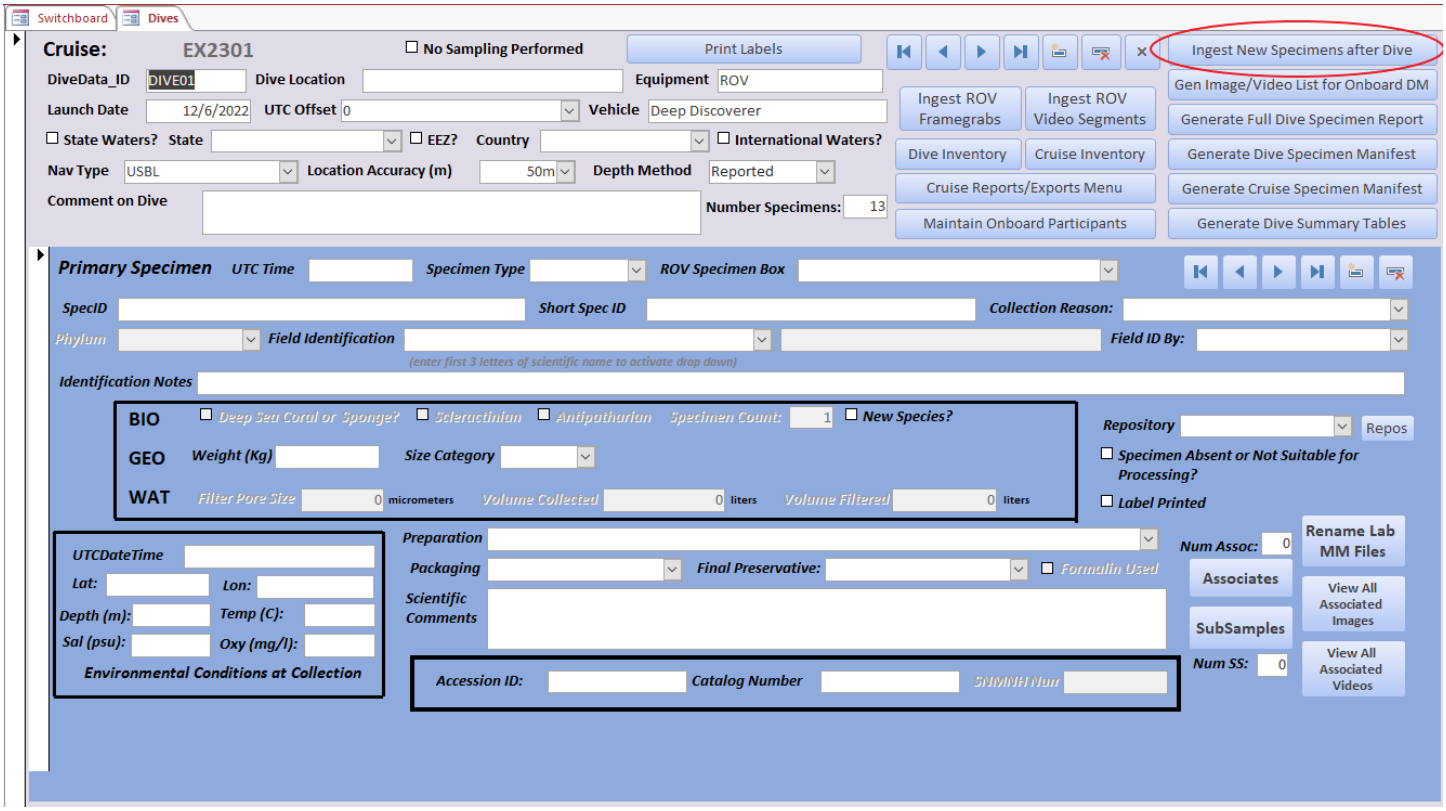


Fig 7. Ingest New Specimens after Dive

Upon successful ingest, the SDM will see a message indicating how many dives and how many specimens were added to the database. (Fig. 8) Any specimens in this file that have already been ingested will be ignored, so there is no need to clear out the EX_DIVE_SAMPLES.csv file after each dive operation. In fact, it is recommended to retain this file so it can be included as part of the data package sent to archive at the end of the cruise.

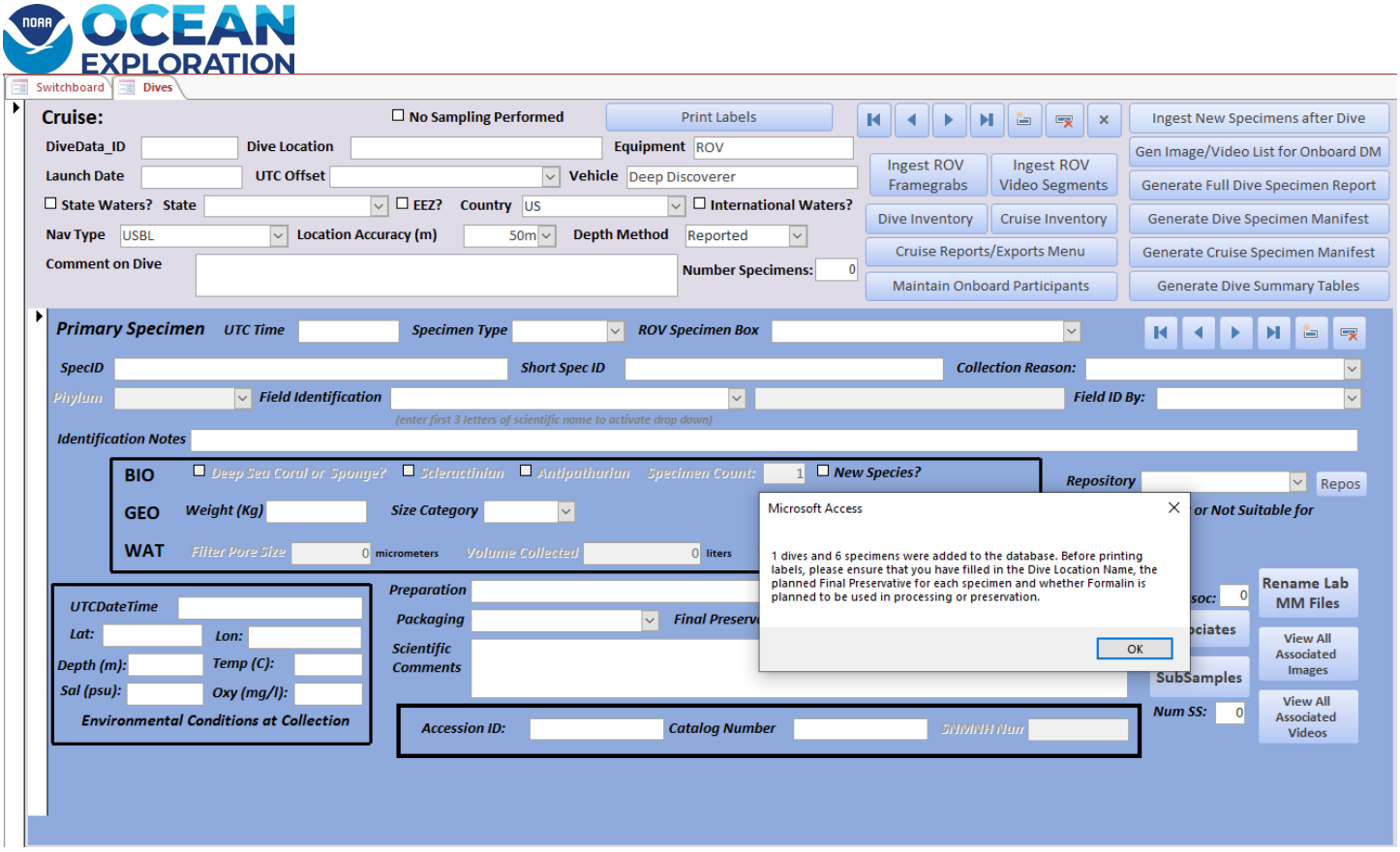


Fig 8. After successful ingest

After a successful ingest, the first thing that should be done is updating the Dive Location field. This field will have the name given to the dive site by the science party. It is logged on the control room message board each day. The dive location will also be printed on the specimen labels so it is important to have (See Fig 9) . Additionally, the World Register for Marine Species (WoRMS) has been integrated with SODA. To ensure the correct spelling of the biological Field Identifications, Select the Phylum and enter the first three letters of the class, order, family or genus to get a drop down list of potential answers for the collected specimen. It is recommended to copy the field identification into the Identification Notes field prior to doing this. Also printed on the label is the final preservative and whether or not formalin is used in the preparation or preservative processes, so it is suggested that the SDM check with the scientists about this for each primary specimen collected and filling these fields in as well. The labels can always be reprinted later, if necessary, but if this can be determined ahead of time, it will save having to do so.

Printing Labels

Next the labels need to be printed for the wet lab procedures. This is done by clicking the Print Labels button at the top. (See Fig 10) This action will print all of the labels for all of the primary specimens for which labels have not yet been printed and set the checkbox indicating that the labels have been printed. A notification that the Mail Merge was successful is the indication that the labels are ready to be printed. (See Fig 10) If labels need to be re-printed for a dive, this box should be unchecked and the Print Labels button clicked.

The following is what a biological label will look like:

Spec_ID: EX2000_D01_02B Formulin Used? Yes
Field ID: Cnidaria, Aulactinia stella
Vessel: Okeanos Explorer Sub: Deep Discoverer
CruiseID/DiveID: EX2000/DIVE01
UTC Date/Time: 20200818/190300
Dive Site: North Atlantic Ocean, test location
Lat/Lon/Depth (m): 43.9002/-58.9407/1315.64
Preservative: 10% Formalin
Box/Canister: Suction Canister 1

Before printing labels, the following fields should be filled out:

- Dive Site Name
- ROV Specimen Box
- Phylum/Field Identification
- Planned Final Preservative
- Whether Formalin will be used in preparation or preservation steps

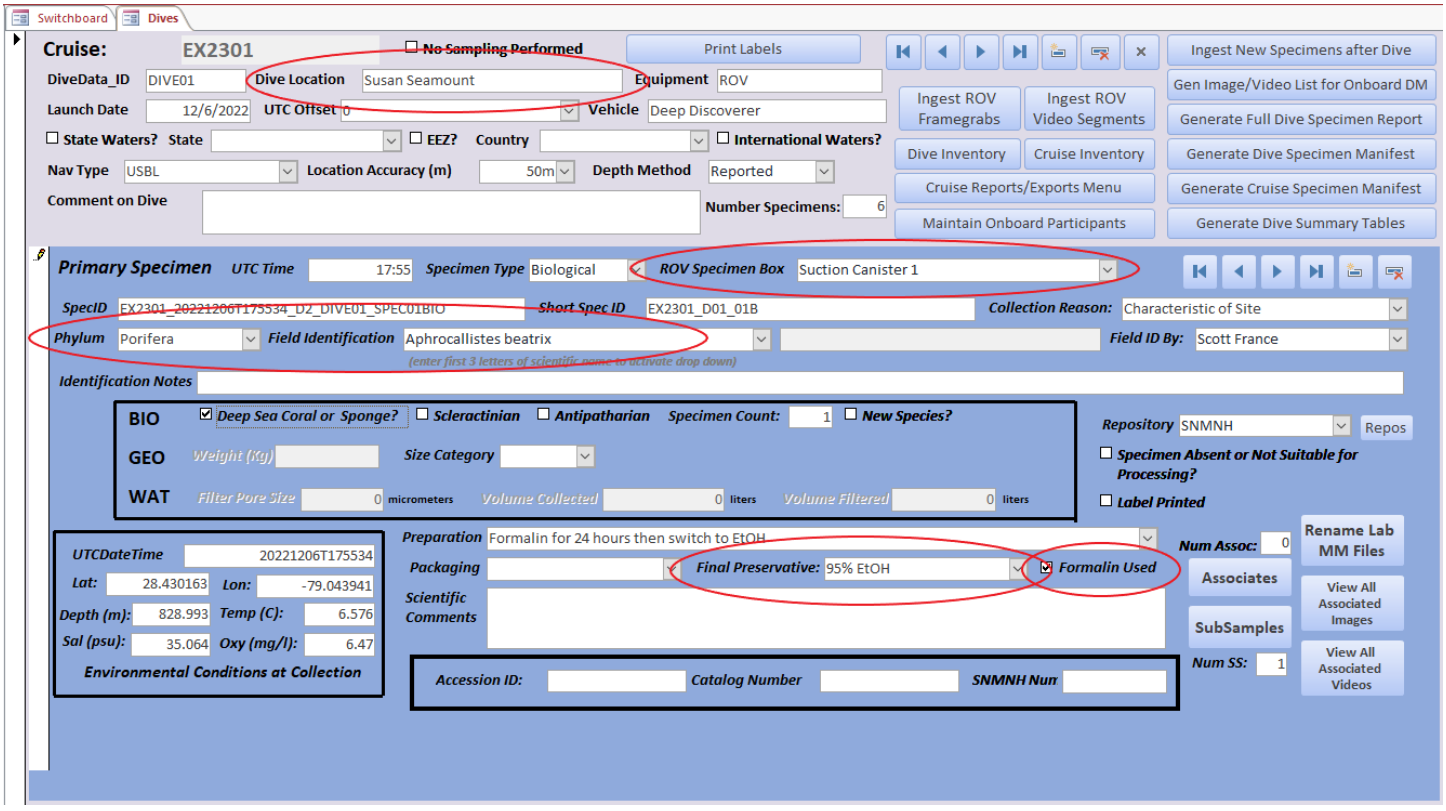


Fig 9. The Dive Location site name and other specimen details should be added before printing labels. This information will be included on the labels. See above example

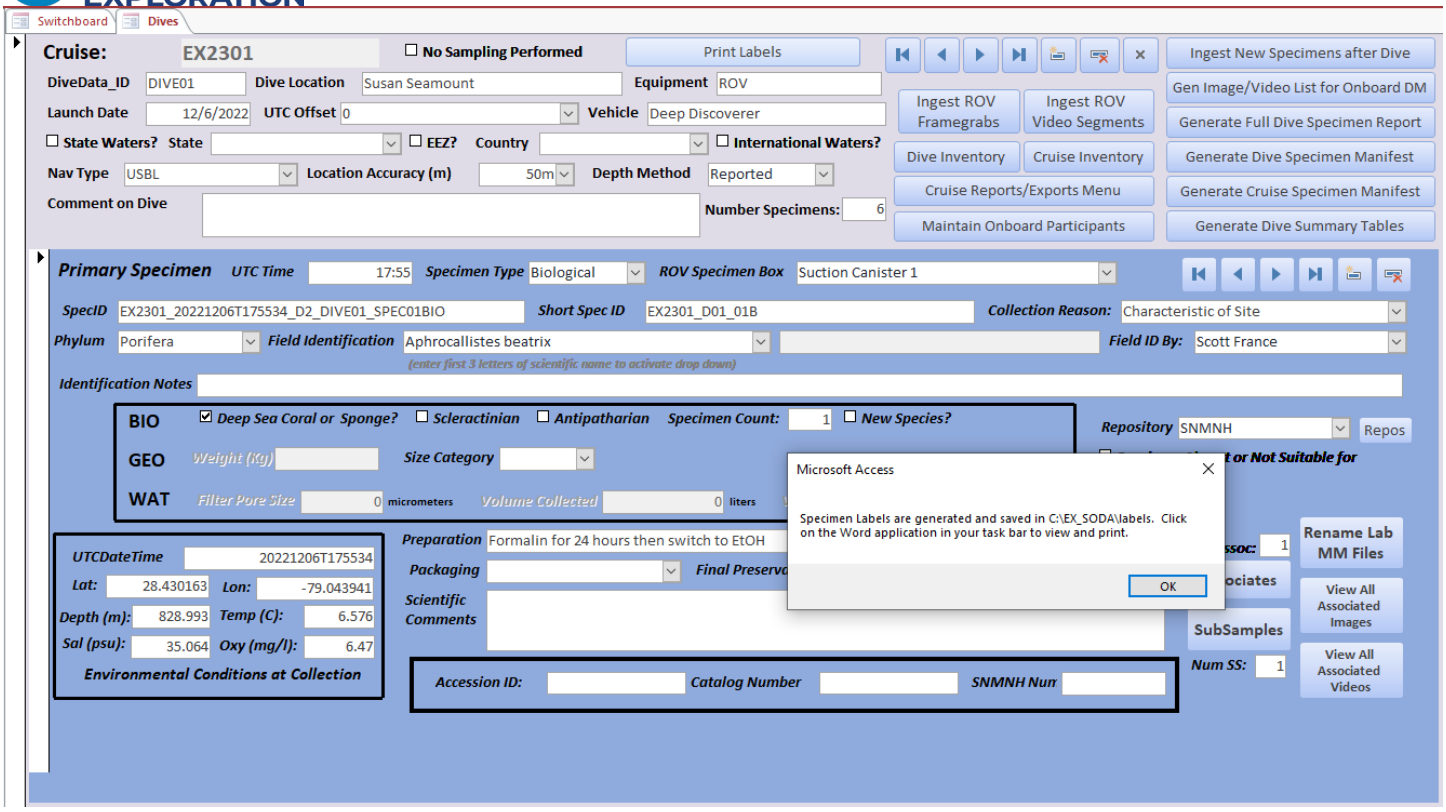


Fig 10. Printing labels creates a Mail Merge document in Microsoft Word that can then be printed. After printing, the “Labels Printed OK” box will be checked.

By clicking “Yes'' here, the user will see a Word document on the computer’s taskbar. By opening that, the labels file will be shown. (Fig 12) The file will also be saved in the C:\EX_SODA\completed folder. Primary specimens will have the naming convention “SpecimenLabels…” and associate specimens will have the naming convention “AssociateSpecimenLabels….” Each will have the file creation date time stamp, so the latest file will always be the latest one. This is also convenient in case the file needs to be re-printed due to printer malfunction or some other reason. See Figures 11 - 13 for the steps in printing the labels.

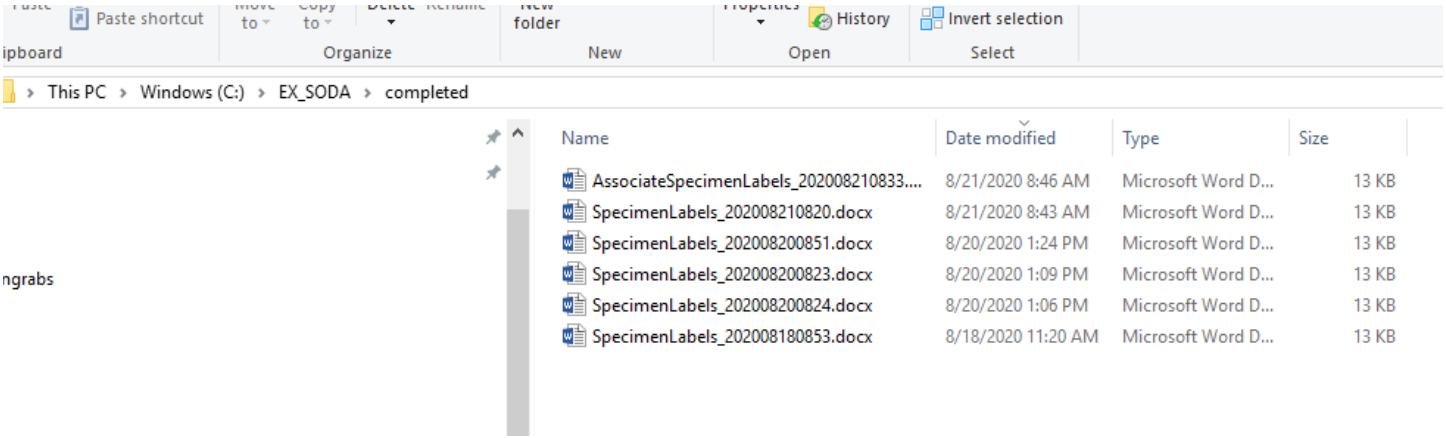


Fig 11. Label files will be saved in the “completed” folder.

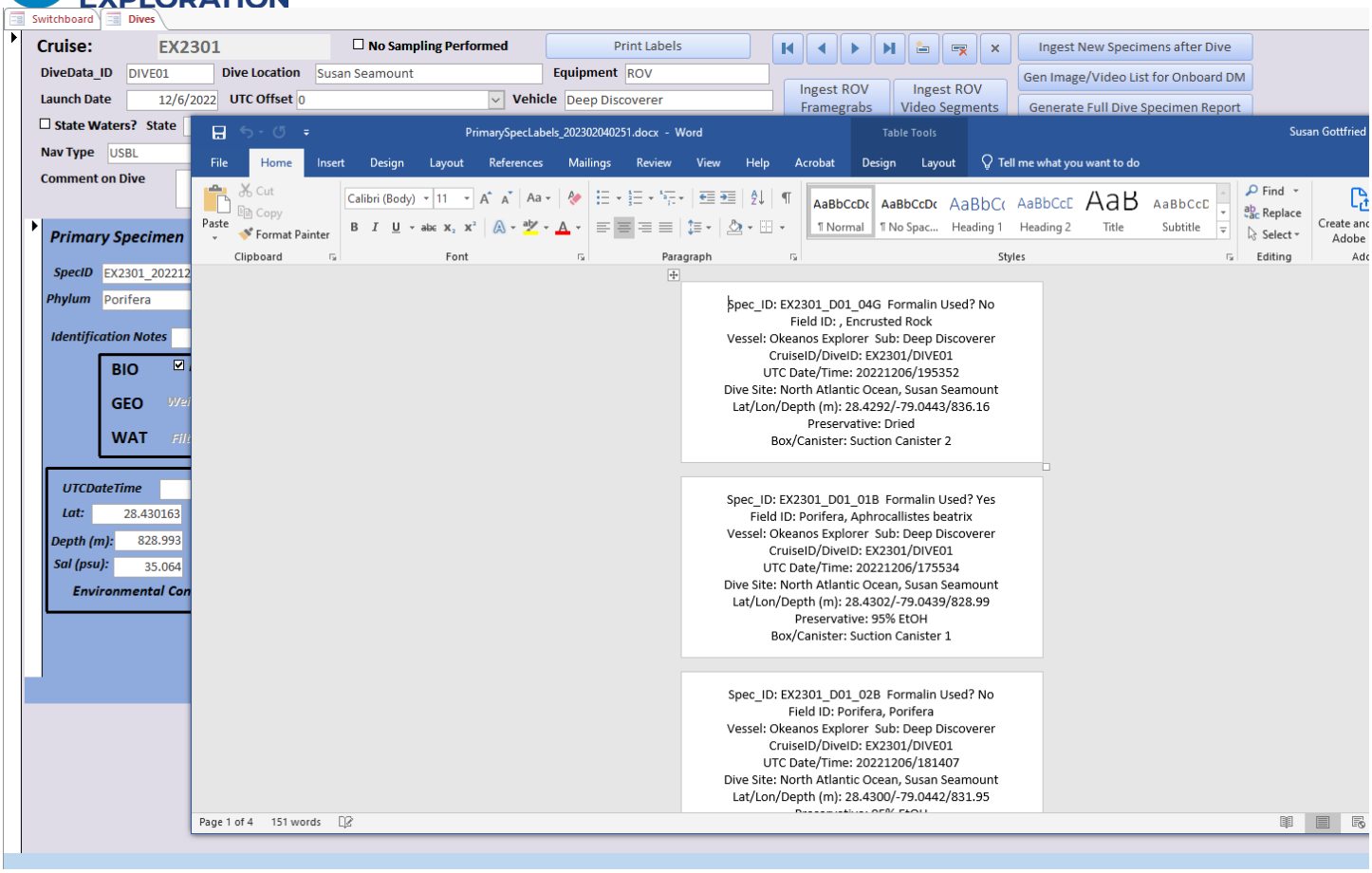


Fig 12. Example label in Microsoft Word. The labels are partitioned as separate pages to be printed as continuous form labels to the printer in the ship's wet lab.

Fig 13. The Datamax O'Neil label printer in the port corner of the wet lab. The printer cable needs to be connected to the back of the Sample Data Management laptop for label printing.

Wet Lab Procedures

Once the labels are printed and ready, they should be cut and separated. The science team may want two copies of each label, one for inside the bag with the specimen and one for between the specimen bag and an outer bag. If so, the mail merge file can be printed a second time or the number of copies can be set during the first printing.

During wet-lab procedures, the scientists will be directing the order in which specimens will be processed. Some specimens deteriorate more rapidly than others and so those specimens will be processed first. There will be a flurry of activity and a sense of urgency to get the specimens from the ROV boxes into the wet lab freezers or refrigerators. The SDM will learn to assist with this activity. Once post-processing begins, the SDM will need to capture the information that is being decided upon during the examination and post-processing of the targeted primary specimens and their associates, if any.

If any Primary Specimen is considered to be a Deep Sea Coral or Sponge or a New Species, there are checkboxes on the screen for those indications. (See Fig 14) If the Deep Sea Corals or Sponge checkbox is marked, the specimen will be included in the Deep Sea Corals database export and if the New Species checkbox is marked, the specimen will be included in a New Species report for the mission.

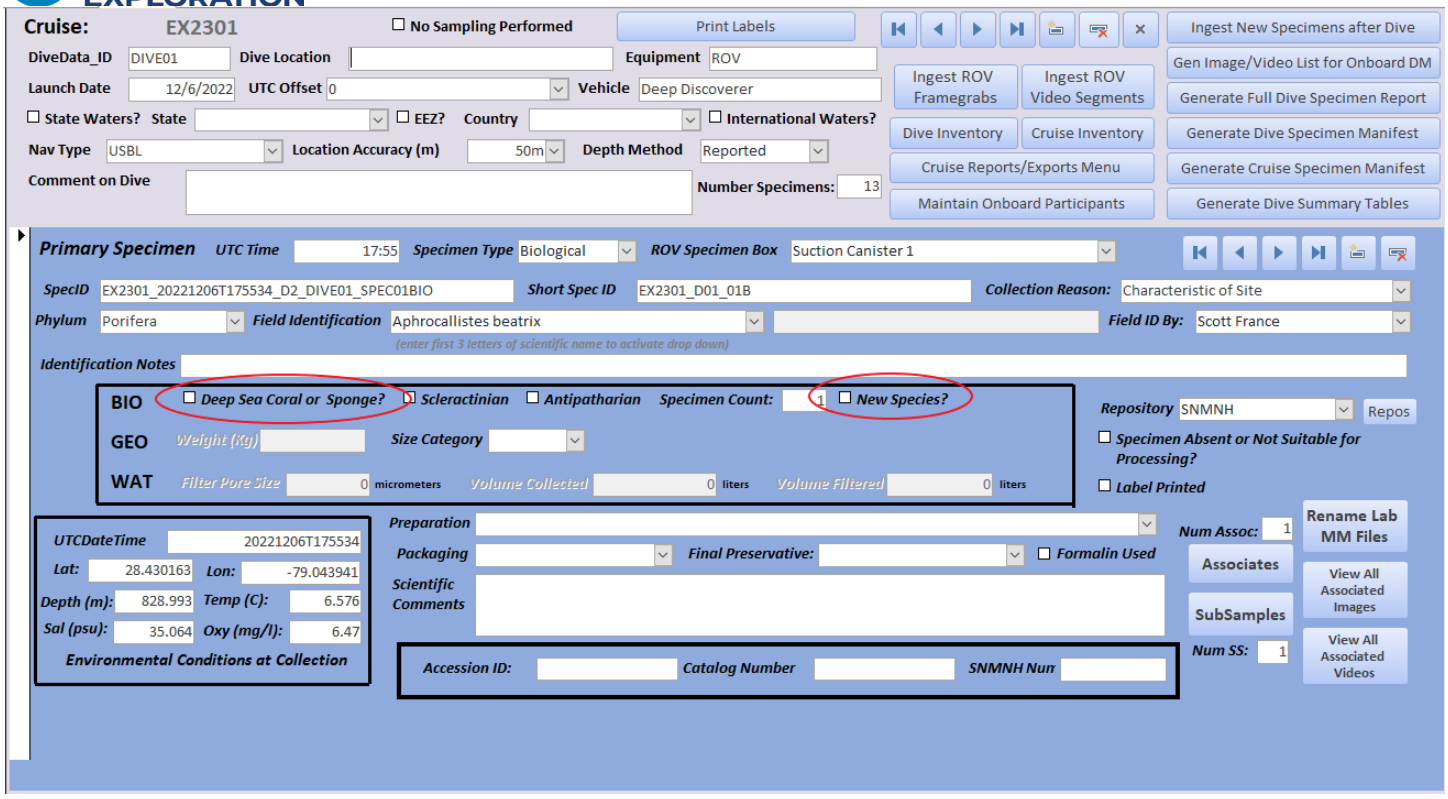


Fig 14. Indication for Primary Specimen being considered a deep-sea coral or sponge.

Be sure to populate the following drop down and free text menus: See Fig 15

1. Field Identification by
2. *Reason for collection (or add further explanation in comments)
3. *Specimen phylum
4. Size Category
5. Weight (rock)
6. Specimen count
7. *expected final preservative type for each specimen
8. How the specimen will be prepared for storage during the cruise - Preparation
9. How the specimen will be preserved for the repository delivery
10. *Repository

* should be populated prior to printing labels

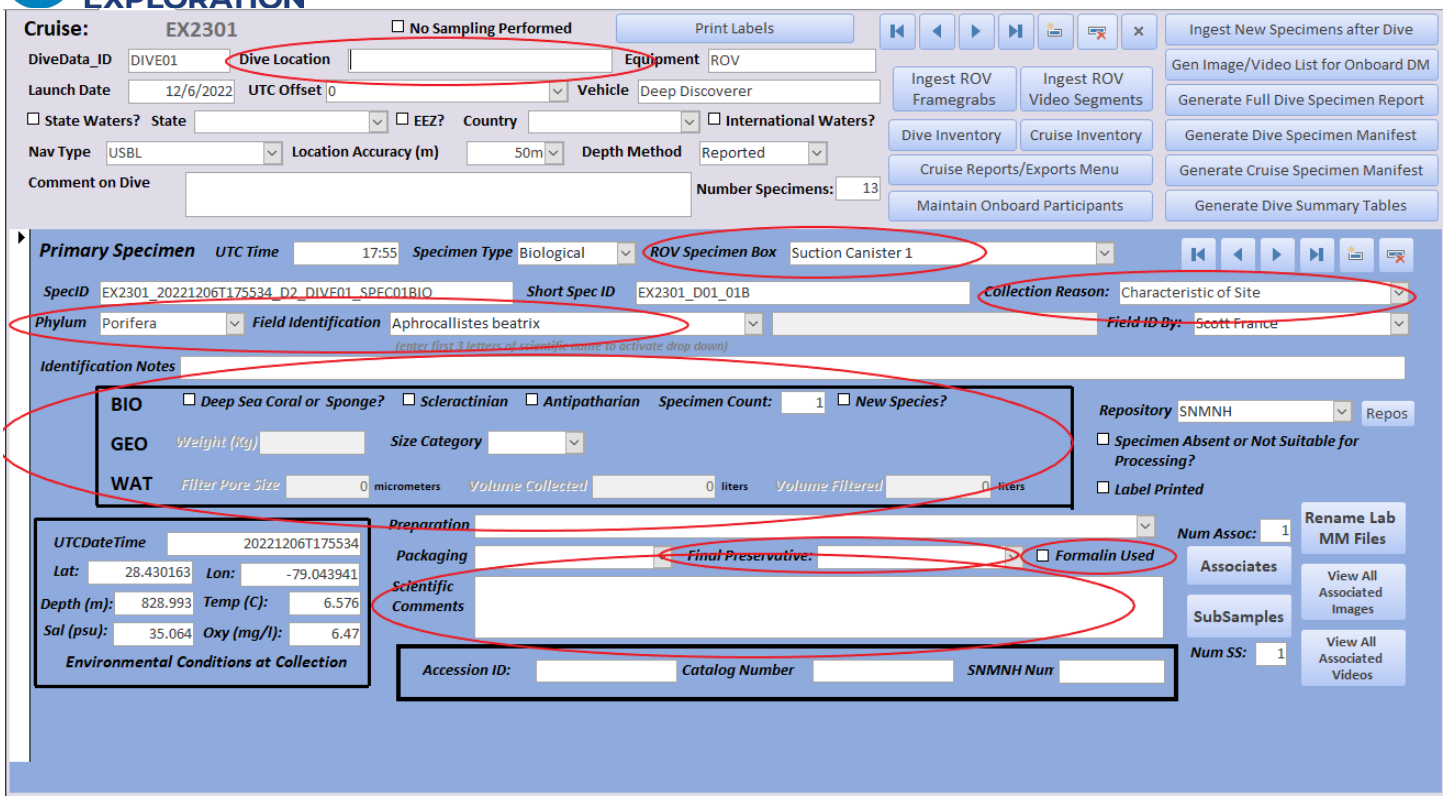


Fig 15. Important fields to populate

Documenting Associates

Associate specimens will be any specimen found on or with the primary specimen. If another specimen (likely geological) is collected in order to safely and effectively collect the targeted primary specimen, these will be categorized as associates. If any other organism is found to be living on the associated geological associate specimen, it and anything found living on it will be classified as an associate as well. (see Fig 16)

Associate specimens will be named with the primary specimen ID and an associate suffix - AnnT where nn is the consecutive number of associates found with that specimen and T is the specimen type of the associate. An example would be EX2301_20221206T175534_D2_DIVE01_SPEC01BIO_A01G indicating that a geological associate was separated from the primary specimen. This suffix helps to ensure that the separated specimens are delivered to the correct repository after the mission.

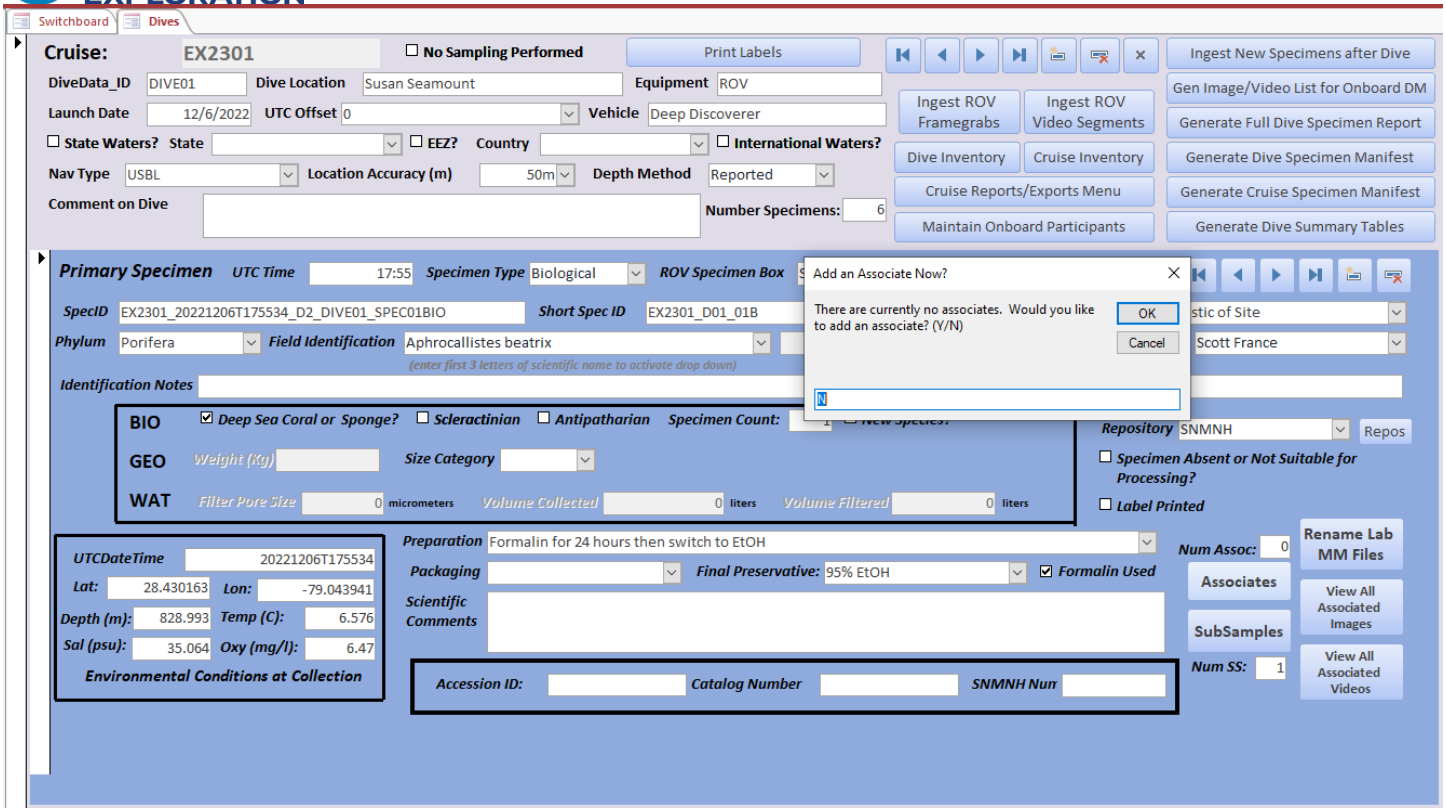


Fig 16. After clicking Associates button and there are not yet any related associates

When the user chooses to add an associate, a pop-up message will ask the user to confirm. Accepting 'No' will ensure that no associate would be created erroneously. But by entering "Y" or "yes", the Associates screen will appear in a "pop-up" mode – meaning it will be on top of the Dives and Specimens page. (See Fig 17.)

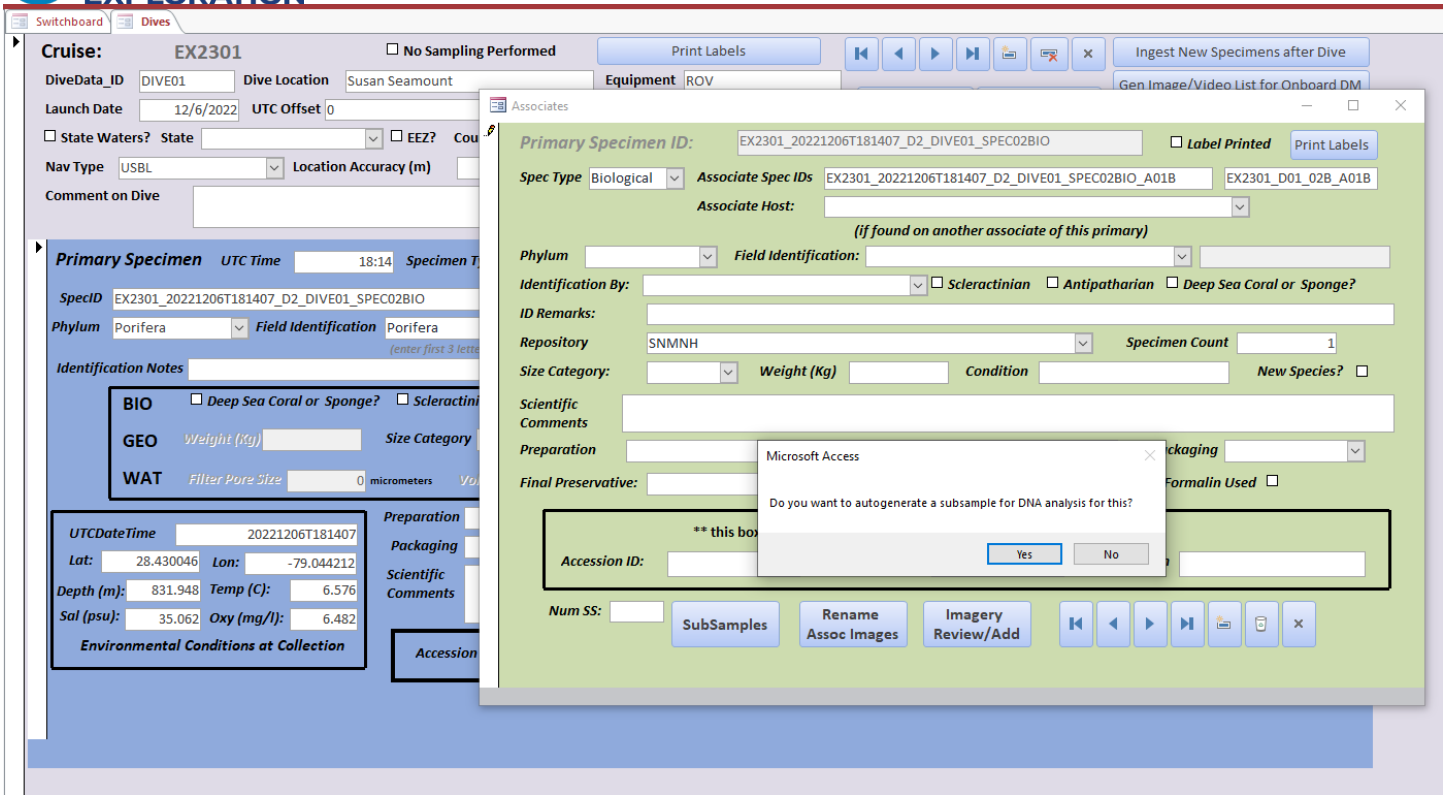


Fig 17. After answering “yes” or “y” to whether the SDM wants a new associate added.

An associate specimen can also be associated with another associate specimen. So If an associate specimen of the primary is “hosting” another organism, then that hosting associate is identified in the “Associate Host” field. The available associates will be available in a drop down from this field.

The measurements and other classifications of the Associate are entered on the screen with the green background. There is an indication checkbox if the Associate Specimen is considered a deep sea coral or specimen just like the Primary Specimens.

Once completed, the SDM can print a label (or two) of each associate individually. See Fig. 18-19

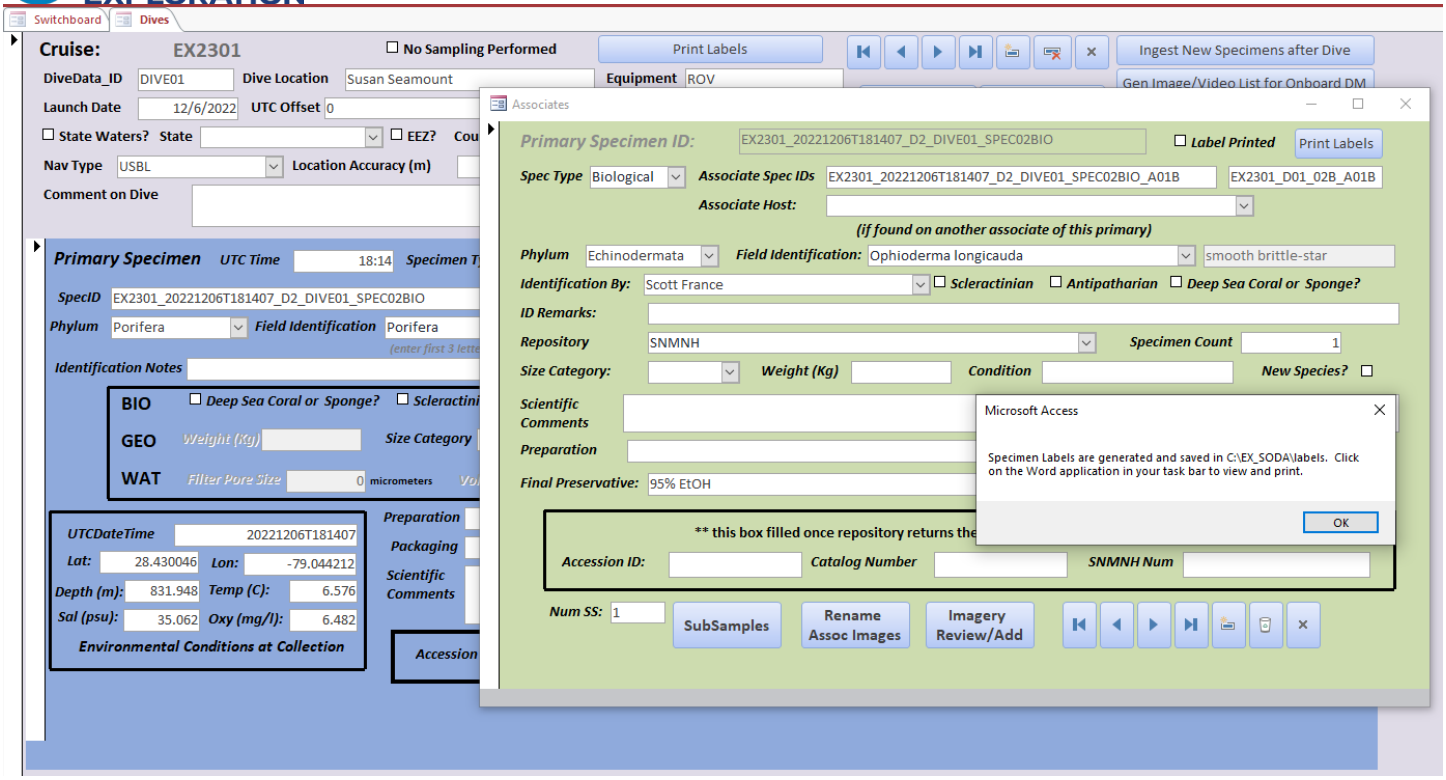


Fig 18. Print Associate labels individually as needed. Mark as Deep Sea Coral or Sponge if applicable.

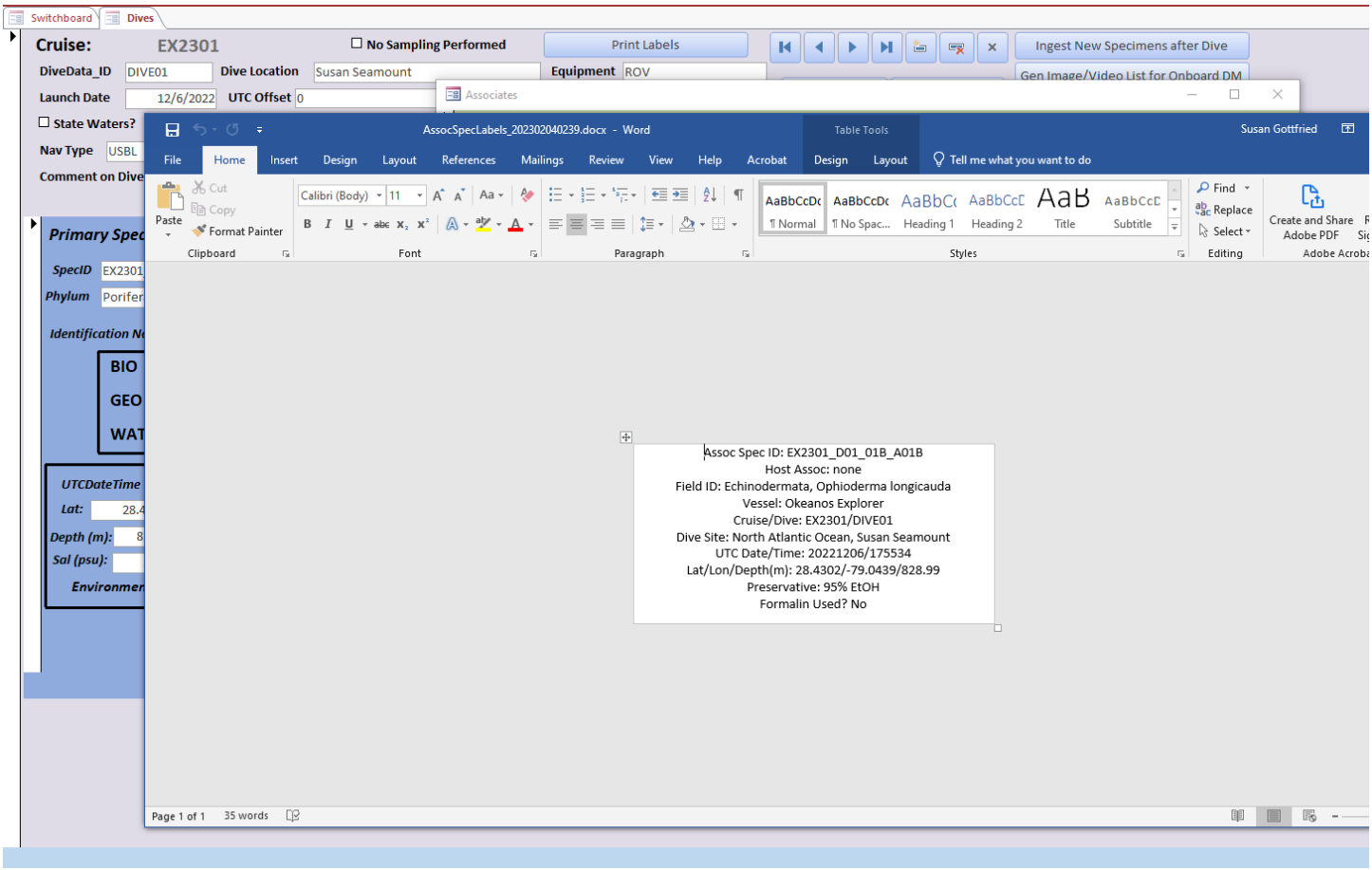


Fig 19. One Associate label is produced at a time.

Sub-Samples

Primary Specimens and Associate Specimens can be sub-sampled. A Subsample is added when a specimen is divided into pieces to be curated by more than one repository or to preserve a piece by a second preservation technique such drying a sponge and also preserving a small sample of the sponge in EtOH. A Subsample can also be a scraping of genetic material, which is saved in small vials and sent to the Smithsonian for genetic analysis.

A new feature of SODA is that during ingest, a subsample is automatically generated for each primary biological specimen, saving some time for the SDM. The same is true of any biological associate specimen separated and documented during wetlab procedures. If a biological associate is recorded, SODA will ask the user if a genetic subsample is needed and will make one if so. Alternatively, the subsamples can be added manually through the SubSample button on the corresponding screen. See Fig 20.

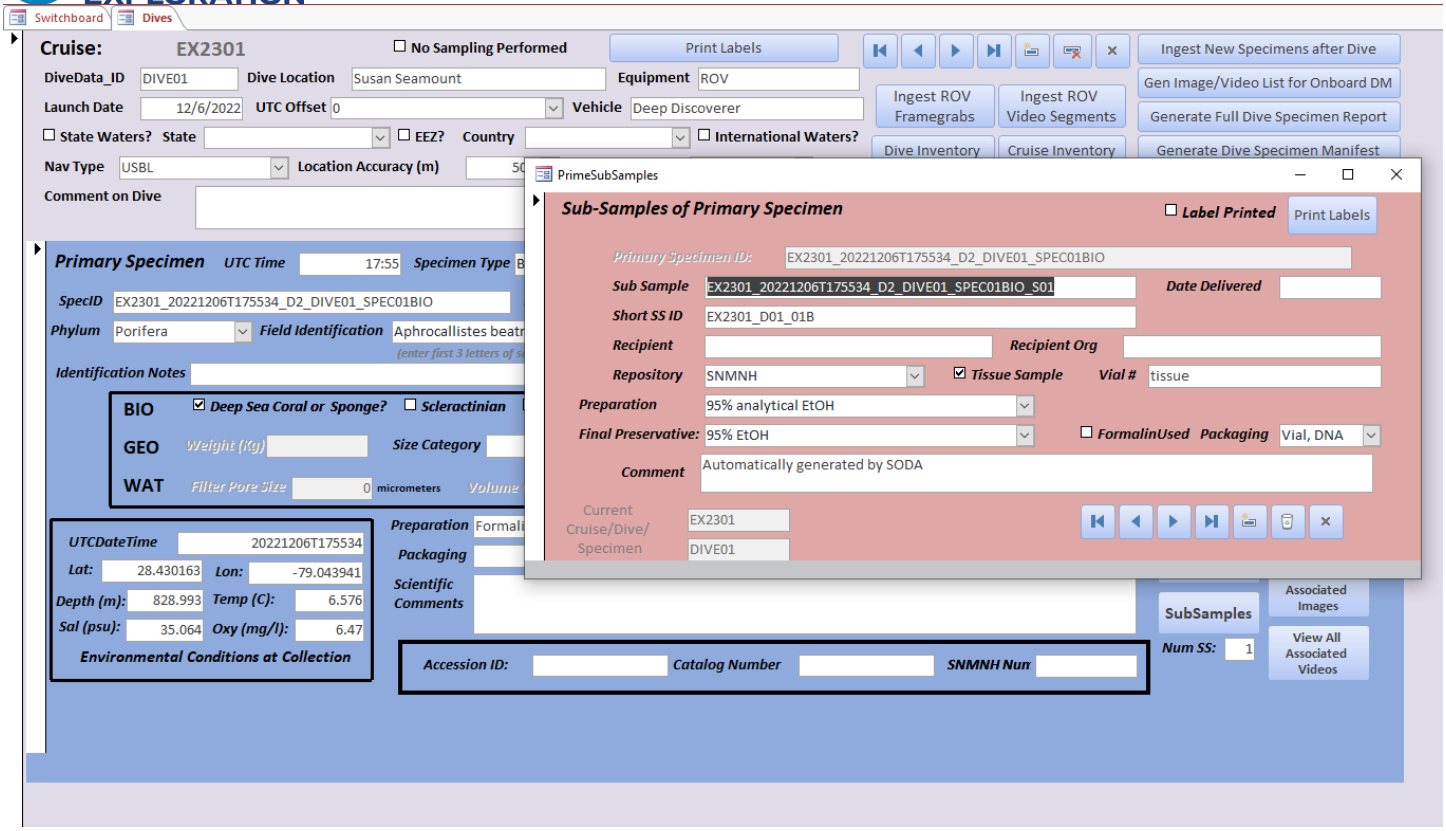


Fig 20. The subsample pop-up screen used for entering subsamples. The pop-up looks similar for either Primary samples or Associate samples.

Unlabeled plastic vials are maintained onboard for sending subsamples to the Smithsonian for DNA analysis (Fig. 21, lower right), and the 'Short Spec ID' needs to be copied into the 'Vial' field in SODA, written on each vial with a fine-point black Sharpie or a pencil, and written in pencil on archival paper, which goes inside the vial along with the subsample material. *Note* the SODA may be updated to print small labels for the subsamples, but at this writing, this is not done.

Packaging Samples

Packaging used for each biological sample (Fig. 21) also needs to be captured in SODA, using the following nomenclature: tupperware/tub (T), plastic bag (B), plastic jar (J), and glass vial (V; distinct from the tiny plastic DNA subsample vials); and three sizes for the jars and bags: small (s), medium (m), and large (l), e.g., Bm would be a medium-sized plastic bag. Tubs, jars, and vials need to have their lids wrapped snugly in parafilm to prevent leaking. If you parafilm them before shipment, they will have to be removed and drain the preservative to 30mL then re-parafilmed.

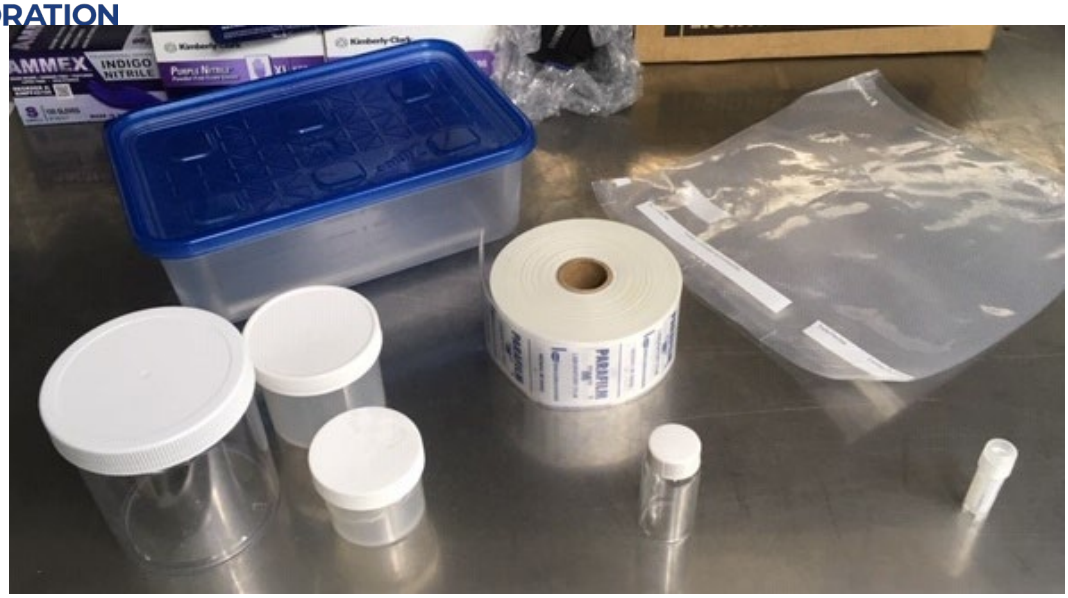


Fig 21. Packaging used for the biological samples. tupperware/tub (T) in upper right, plastic jars (JI, Jm, and Js) in lower left, glass vial (V) in lower middle, and plastic bag (B) in upper right. Tiny plastic vial for DNA subsample is in lower right. Parafilm in the center needs to be wrapped snugly around the lids of tubs, jars, and vials to prevent leaking. .

A heat sealer (Fig. 22) is used to seal the plastic bags, to prevent leaking of ethanol (EtOH) or Formalin used on biological samples. Setting 3 works well for the provided heat seal bags.

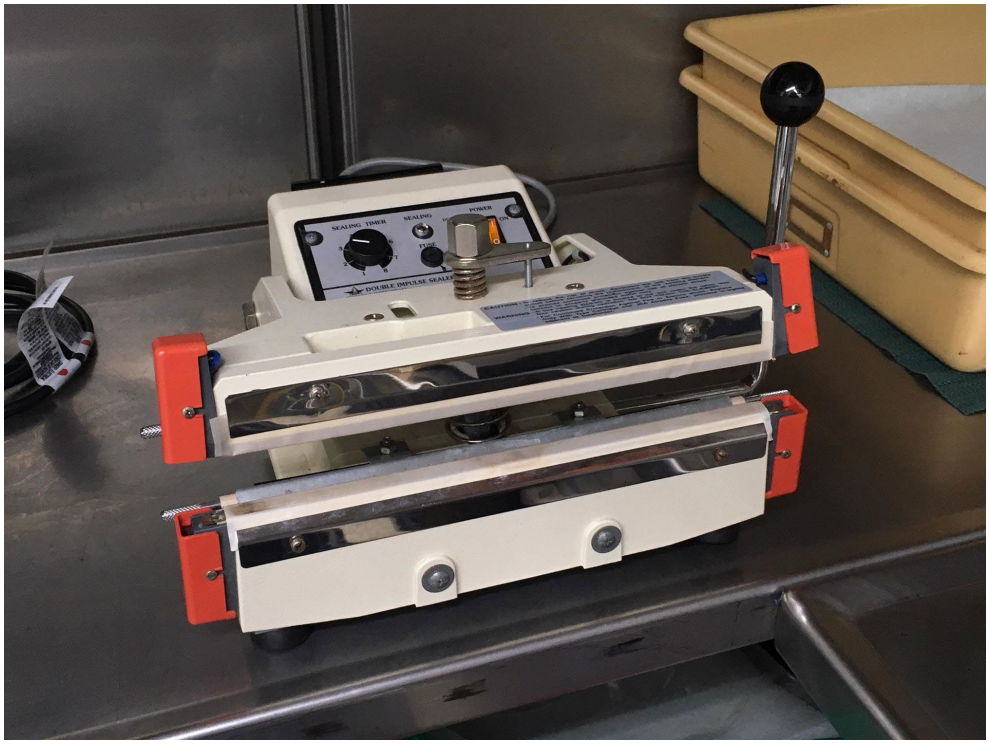


Fig 22. Heat sealer in wet lab for use on biological samples stored in plastic bags (cut rlll to needed size). Heat sealer should be unplugged when not in use.

Taking Lab Images and Videos

Image all specimens and associates with the lab cameras and /or microscope still and video (if needed) cameras. Here are a few things to keep in mind when taking all images:

- Before taking images in the wetlab for each day, take a photo of a gloved hand. When the SDM is browsing through photos to sort them into their respective folders (see Managing Lab Images and Videos below), this will indicate when a new day (dive) is beginning on the SD card.
- Before taking images for a particular specimen, take a picture of the color palette and the specimen label by itself so that when the SDM is browsing through photos to sort them into their respective folders, this will indicate when a new specimen is being imaged on the SD card.
- Make sure a scale (plastic ruler) is in most images
- Make sure to image the printed specimen label with specimen (and that it is legible, not fuzzy). This also includes subsample labels, if any
- Image diagnostic features
- Image all surfaces of rocks and organisms (as needed)
- Take a picture of the primary specimen with its associates intact and with labels
- If a member of the science team uses their own camera to take wetlab images, the images should be given an 'UNK_' prefix. This will ensure that the images get properly renamed and available to be included in the specimen archive.

Managing Lab Images and Videos

An important association handled by SODA are the lab video segments and images corresponding to the Primary and Associate Specimens.

The SDM will be responsible for setting up the folder structure for each specimen from a dive on the C:\drive of the laptop and will ensure that these images and videos will be saved in the corresponding folders.

During wet lab procedures, at least two cameras will be used to capture images of the specimens as they are being processed. A laboratory camera on a light stand (Canon) will be used to take pictures along with color palettes and the labels. Additionally, there is a network enabled WolfVision camera that can stream what it is seeing for remote scientists to be able to see wetlab procedures taking place. There is also a microscope with an integrated camera that will be used to take images and even videos of the microscopic features of the specimens. Any images of the specimens or their associates chronicled during wet lab procedures should be saved in their own separate folder on the SDM's laptop.

1. These should be created on the C:\ drive of the laptop or another drive assigned for use for the SDM. The folder naming convention is up to the SDM, but folders of each specimen and associate specimen should be created.
   a. Examples:

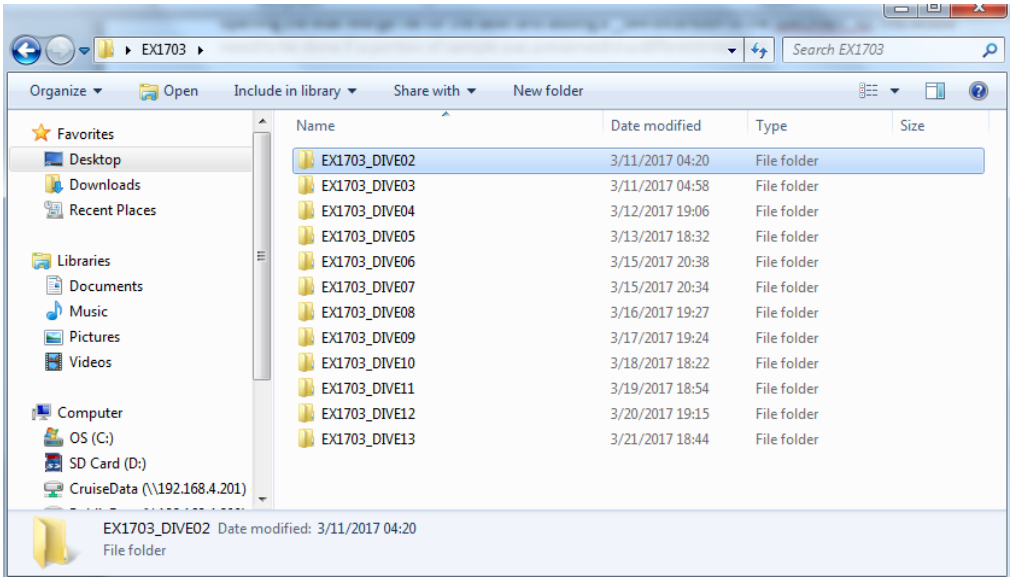
      \EX1903L2\ EX1903L2_DIVE01\SPEC01BIO = Biological Specimen images

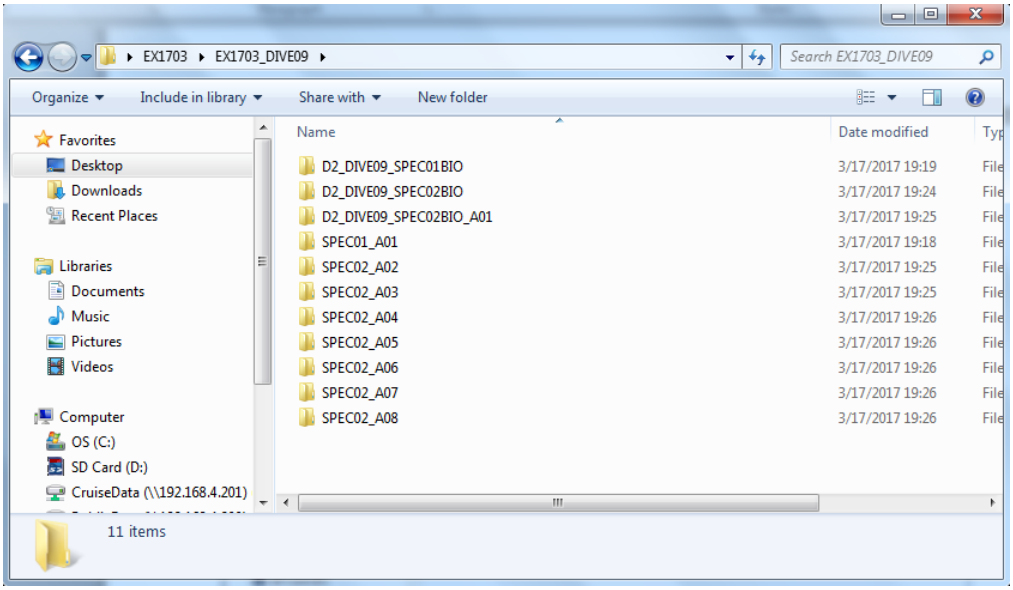
      \EX1903L2\EX1903L2_DIVE01\ SPEC02GEO = Geological Specimen images

      \EX1903L2\EX1903L2_DIVE01\ SPEC02GEO_A01 = Associate Specimen images found on SPEC02GEO

      \EX1903L2\EX1903L2_DIVE01\ SPEC01BIO = Biological Specimen video clips

2. This is done by copying the appropriate image or video files from the SD cards from the lab Canon camera or microscope camera and saving them to the corresponding folder for the primary and associates (as illustrated above).
3. For the WolfVision camera, an HDMI cord is plugged into the camera and the SDM laptop and copied from the WolfVision folder into the appropriate folder on the laptop.





Figs 23-24: Shows an example of folder naming conventions.

Note: It does not matter what these directories are named, as long as the appropriate images from the wet lab are in the correct directory. It WILL matter what directories are named on SampleStaging, which will be discussed below.

4. Rename Images: Once the images and videos are saved in the appropriate folders, the SDM can automatically rename each file in SODA by clicking the appropriate button:

a. "Rename Lab MM Files" on the primary specimen page and then navigating to folder with the specimen images or video files.

b. and "Rename Assoc Images" on the associate tab and then navigating to folder with the associate image/video files. (See Fig 25).

c. SODA will use the Specimen ID and/or Associate Specimen ID to rename the images or video files for that particular specimen within the folder. The images and video files from the cameras will have the naming conventions <insert naming convention> : (Note: nn or nnnnn indicate numbers in sequence)

- IMG0nnnn.jpg images and VIDnnnnn video files are from the microscope camera and will be renamed with the keyword MICRO and with an "_Mnn" suffix.
- IMG_nnnnn.jpg and IMG_nnnn.cr2 images and MVI_nnnn.MOV video files are from the lab camera and will be renamed with the keyword SMPSTL and with an "_Lnn" suffix.
- Images from the WolfVision camera will have the date yyyymmdd as the prefix of the file name with a .jpg extension. SODA will look for files that begin with this to rename those with the keyword SMPWLF and an "_Lnn" suffix.
- The COLOR_PALETTE will be labeled the same as the specimen that comes directly after the color palette with the extension _COLOR_PALETTE instead of _L##. You will do this by hand. Once renamed, you can add the file to the correct directory.
- Following the renaming step, the images will be automatically ingested into the database under the corresponding specimen. (See Fig 26)

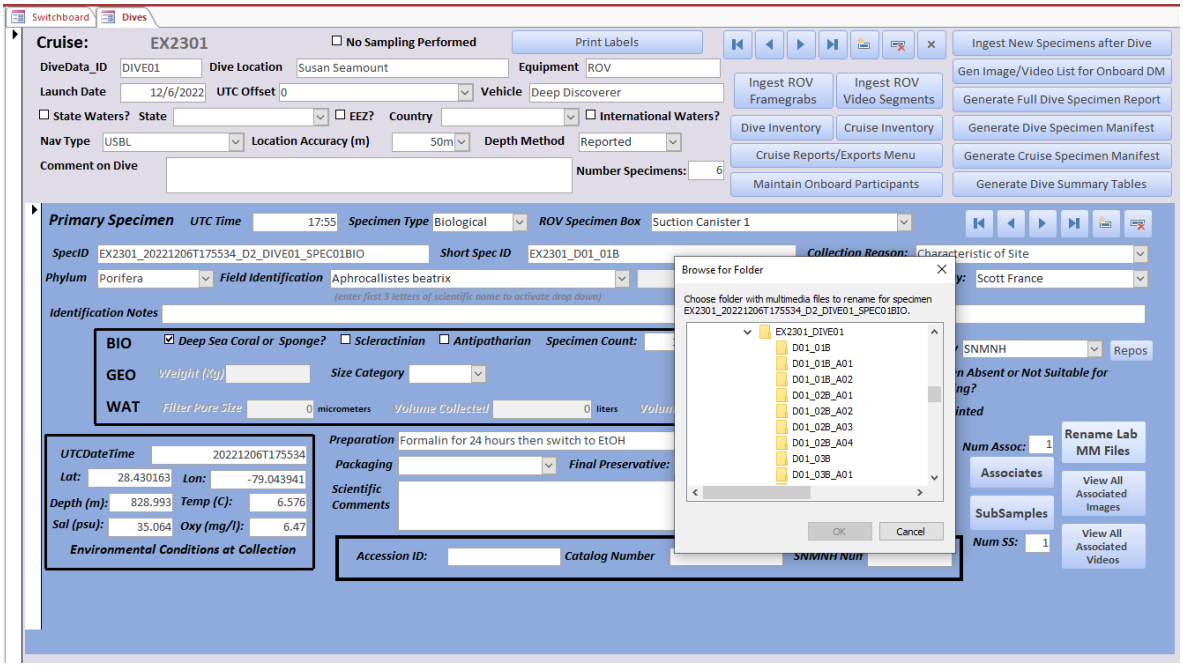


Fig 25. Navigating to the folder which contains the images for the specimen were on. This happens after pressing Rename Lab Images.

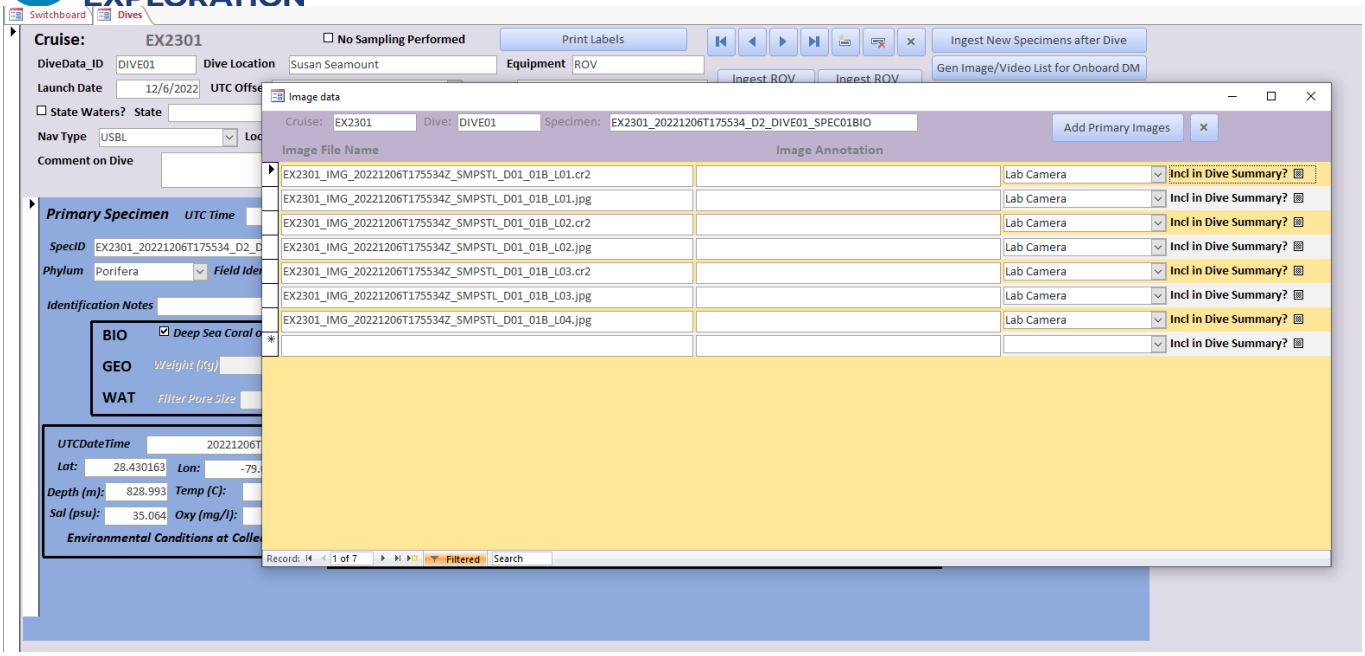


Fig 26. SODA will automatically display the names of the files added into the database.

Managing ROV Images/Videos

Once all of the wet lab procedures are complete and the specimens are stored, the SDM will locate all ROV imagery and video segments that correspond to the primary specimen collection. ROV dive images and video from the GFOE video team are usually staged overnight. This means that the SDM can add images and video from the dive the following morning. **The SDM will need to identify and select all ROV images and video that corresponds to each specimen collected during the dive**. This may include some minutes of imagery before the scientist decided to collect the specimen while they were trying to identify it (so it may be a few minutes before the collection start time). The following is the process for populating **ImageFilesBySpecimen.csv** and **VideoFilesBySpecimen.csv**, both of which reside in the EX_SODA\ folder.

The SDM will need to open a **Command Prompt** window to list the dive images and video files that are located in the networked 'cruisedata' folder (by cruise, Imagery/Video, and dive_date).

For ROV images, use this command in the command prompt window:

1. R: will take you to the cruisedata folder on the network. Once there, you can use the commands below.
2. dir EX####\Imagery\EX####_DIVE##_YYYYMMDD [a check, will return a list of files to your screen]
3. dir R:\EX####\Imagery\EX####_DIVE##_YYYYMMDD > C:\EX_SODA\ROV\ROVimagery_dive##.txt /b /o

   [The /b will list only the filename; the /o will list the files in alphabetical order.]

For ROV video, use this command:

4. R: will take you to the cruisedata folder on the network. Once there, you can use the commands below.

5. dir EX####\Video\EX####_DIVE##_YYYYMMDD\ProRes

6. dir R:\EX####\Video\EX####_DIVE##_YYYYMMDD\ProRes > C:\EX_SODA\ROV\ROVvideo_dive##.txt /b /o

ROV Imagery:

The GFOE video team will have already identified some files associated with each dive sample, using the naming convention '##_dive number_sample ID_camera#', e.g., ##_D11_01B_04.jpg.

1. Open a **Windows Explorer** window and review these and neighboring files in the corresponding folder on 'cruisedata' to identify those files that contain additional images of the first sample (both *in situ* and in the manipulator arm).
2. Open the **ImageFilesBySpecimen.csv** file located in the EX_SODA folder and add a new row at the bottom corresponding to the first sample, i.e., ShortSpecID (Cruise_Dive_SampleB/G/W) in the first column (e.g., EX1905L2_D11_01B). SODA will associate the names of all images within this .csv file to the appropriate sample.
3. Open the **ROVimagery_dive##.txt** file and copy the names of all files that have images of the first sample into the second column of the csv (new row for each file). Copy the appropriate ShortSpecID into the first column for each corresponding row in the second column.
4. Repeat steps 1 to 3 for each sample collected during the dive.

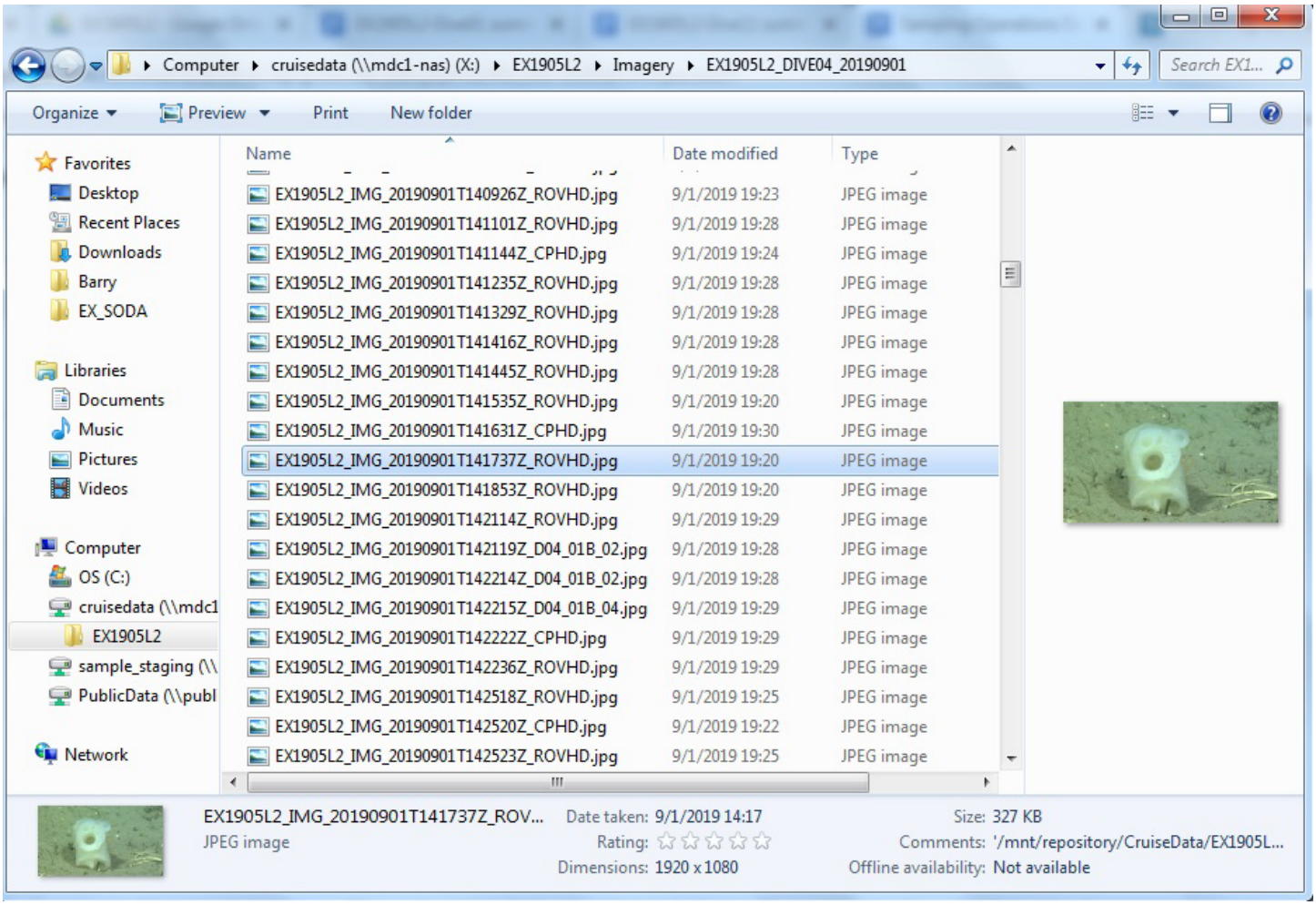
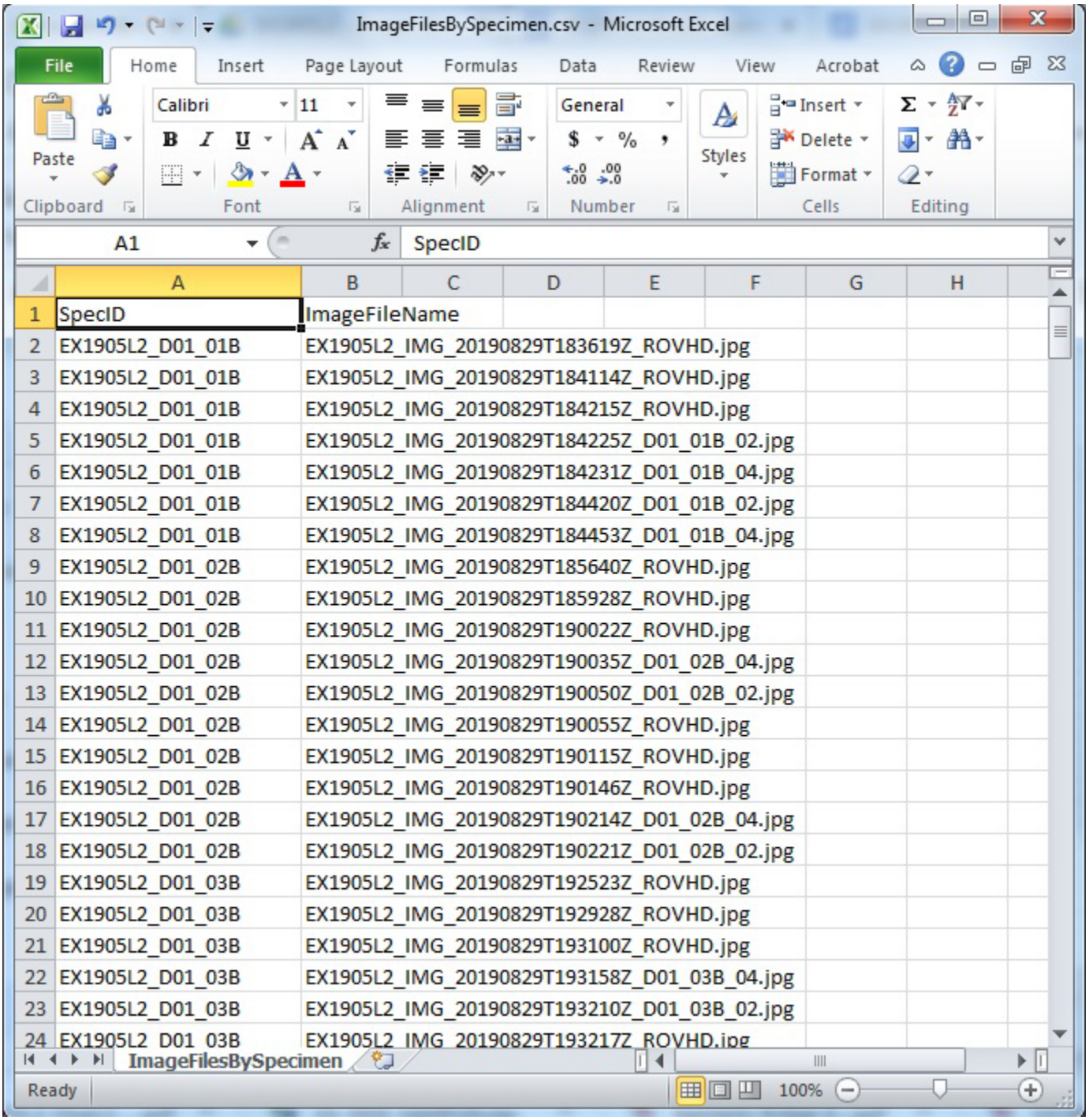


Fig. 27 Example of EX1905L2, Dive04 image files on the 'cruisedata' networked drive. Review files neighboring those that have already identified and renamed by the GFOE video team; *.CPHD.jpg denote images taken from the Seirios camera sled. Goal is to identify a good *in situ* image of the sample prior to collection.



	A	B
1	SpecID	ImageFileName
2	EX1905L2_D01_01B	EX1905L2_IMG_20190829T183619Z_ROVHD.jpg
3	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184114Z_ROVHD.jpg
4	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184215Z_ROVHD.jpg
5	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184225Z_D01_01B_02.jpg
6	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184231Z_D01_01B_04.jpg
7	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184420Z_D01_01B_02.jpg
8	EX1905L2_D01_01B	EX1905L2_IMG_20190829T184453Z_D01_01B_04.jpg
9	EX1905L2_D01_02B	EX1905L2_IMG_20190829T185640Z_ROVHD.jpg
10	EX1905L2_D01_02B	EX1905L2_IMG_20190829T185928Z_ROVHD.jpg
11	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190022Z_ROVHD.jpg
12	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190035Z_D01_02B_04.jpg
13	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190050Z_D01_02B_02.jpg
14	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190055Z_ROVHD.jpg
15	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190115Z_ROVHD.jpg
16	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190146Z_ROVHD.jpg
17	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190214Z_D01_02B_04.jpg
18	EX1905L2_D01_02B	EX1905L2_IMG_20190829T190221Z_D01_02B_02.jpg
19	EX1905L2_D01_03B	EX1905L2_IMG_20190829T192523Z_ROVHD.jpg
20	EX1905L2_D01_03B	EX1905L2_IMG_20190829T192928Z_ROVHD.jpg
21	EX1905L2_D01_03B	EX1905L2_IMG_20190829T193100Z_ROVHD.jpg
22	EX1905L2_D01_03B	EX1905L2_IMG_20190829T193158Z_D01_03B_04.jpg
23	EX1905L2_D01_03B	EX1905L2_IMG_20190829T193210Z_D01_03B_02.jpg
24	EX1905L2_D01_03B	EX1905L2_IMG_20190829T193217Z_ROVHD.jpg

Fig. 28 Example of files listed in the two-column ImageFilesBySpecimen.csv. Some files were identified by the GFOE video team, others by the sample data manager.

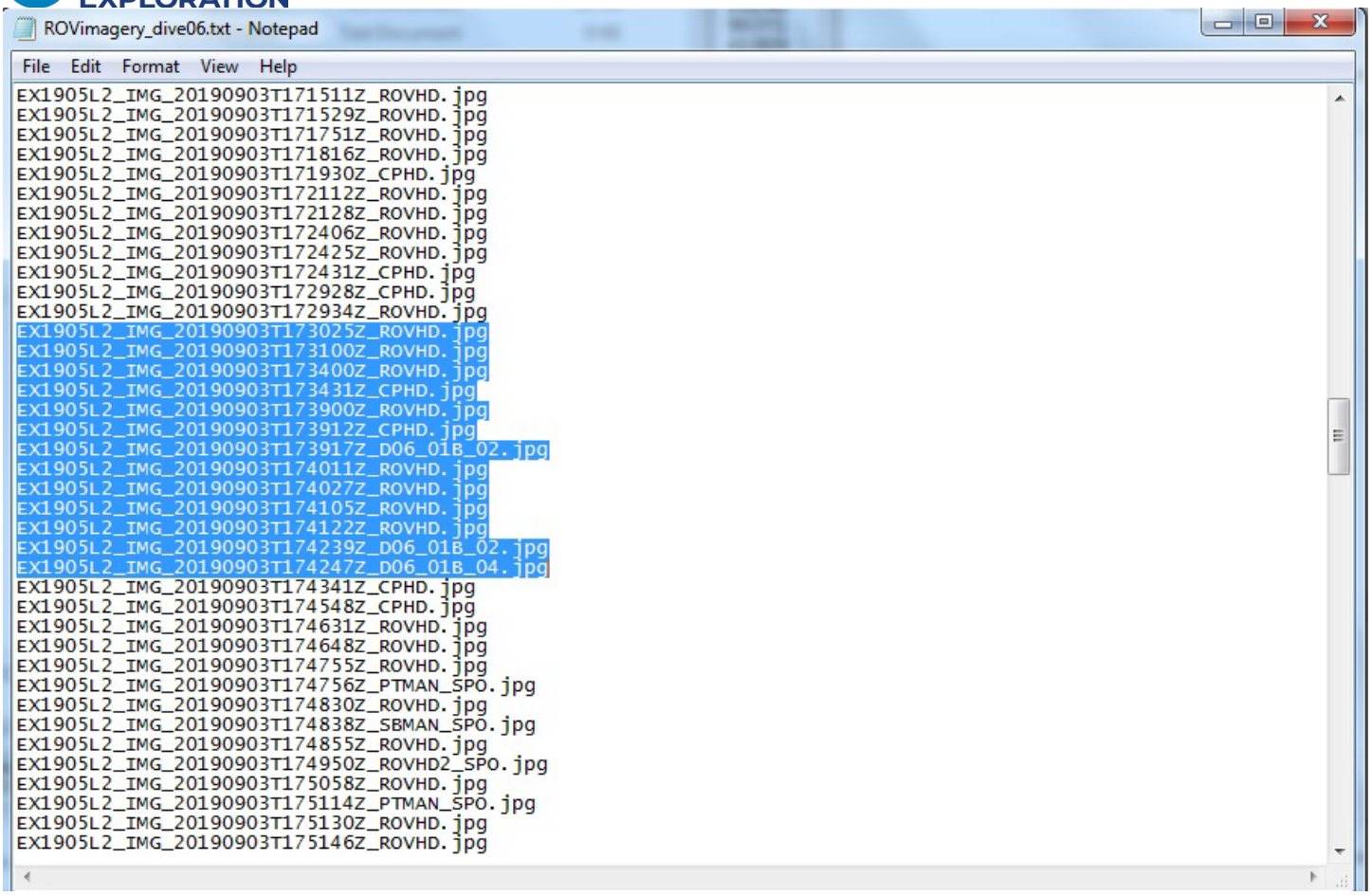


Fig. 29 Example of ROVimages_dive06.txt. Use this listing to select the file names associated with the sample, e.g., D06_01B (highlighted), and copy them to the ImageFilesBySpecimen.csv. Be sure to review nearby images in the list to identify clean photos of the specimen prior to collection. The images will be located on cruisedata in the dive's 'Imagery' folder, e.g., X:\EX1905L2\Imagery\EX1905L2_DIVE06_20190903\.

ROV Videos:

As with images, the GFOE video team will have already identified some video files associated with each dive sample, using the same naming convention '##_dive number_sample ID_camera#', e.g., ##_D09_02B_02.mov.

1. Open the **VideoFilesBySpecimen.csv** file located in the EX_SODA folder and add a new row at the bottom corresponding to the first sample, i.e., ShortSpecID (Cruise_Dive_SampleB/G/W) in the first column (e.g., EX1905L2_D09_01B). SODA will associate the names of all video files within this .csv file to the appropriate sample.
2. Open the **ROVvideo_dive##.txt** file and copy the names of all video files that have been renamed for the first sample into the second column of the csv (new row for each file). Use the times of images identified in the ROV Images steps above to identify additional 5-min video segments to include, usually the segment before the renamed ones. Copy the appropriate ShortSpecID into the first column for each corresponding row in the second column.
3. Repeat steps 1 and 2 for each sample collected during the dive.

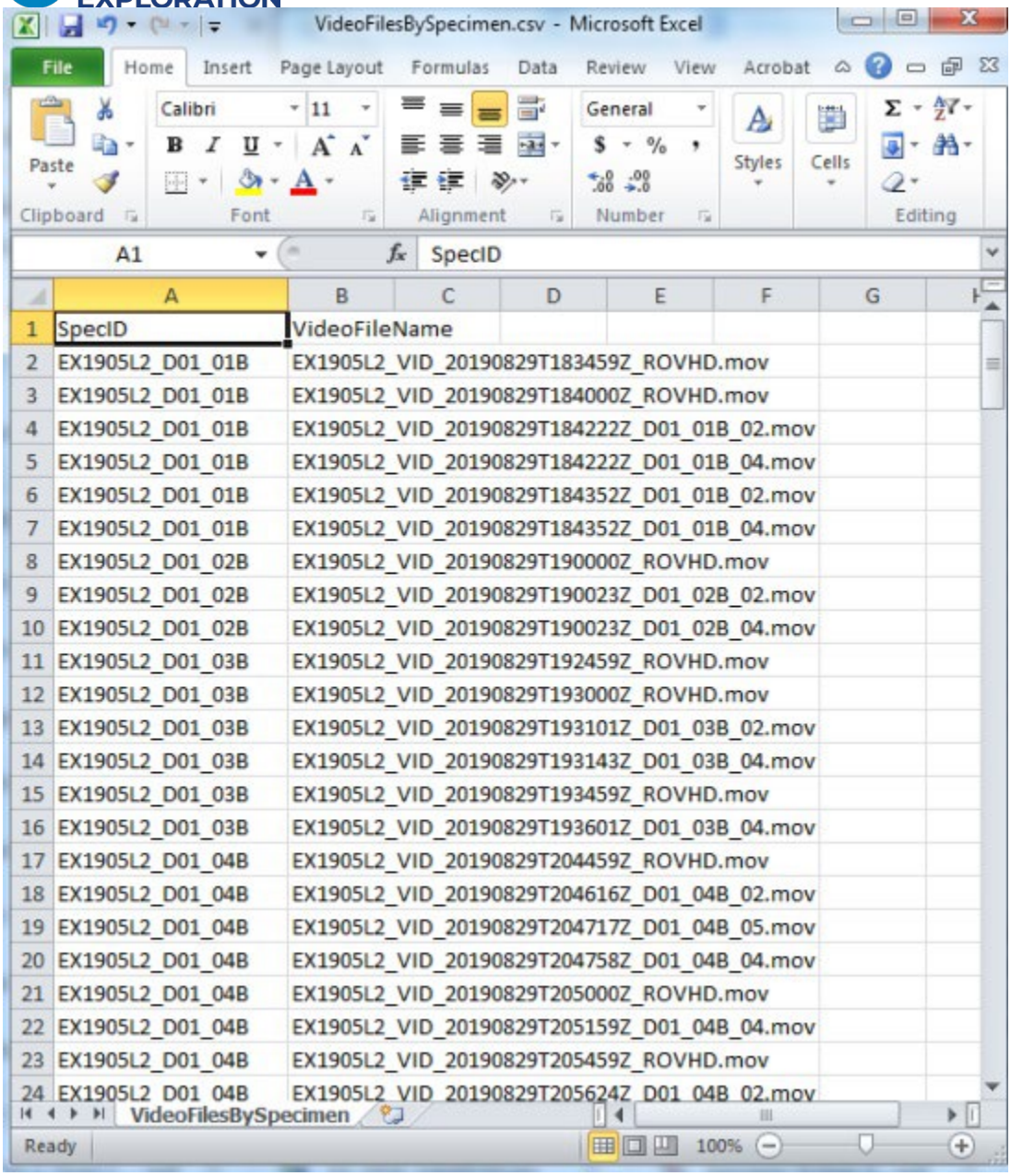


Fig 30. Example of files listed in the two-column VideoFilesBySpecimen.csv file.

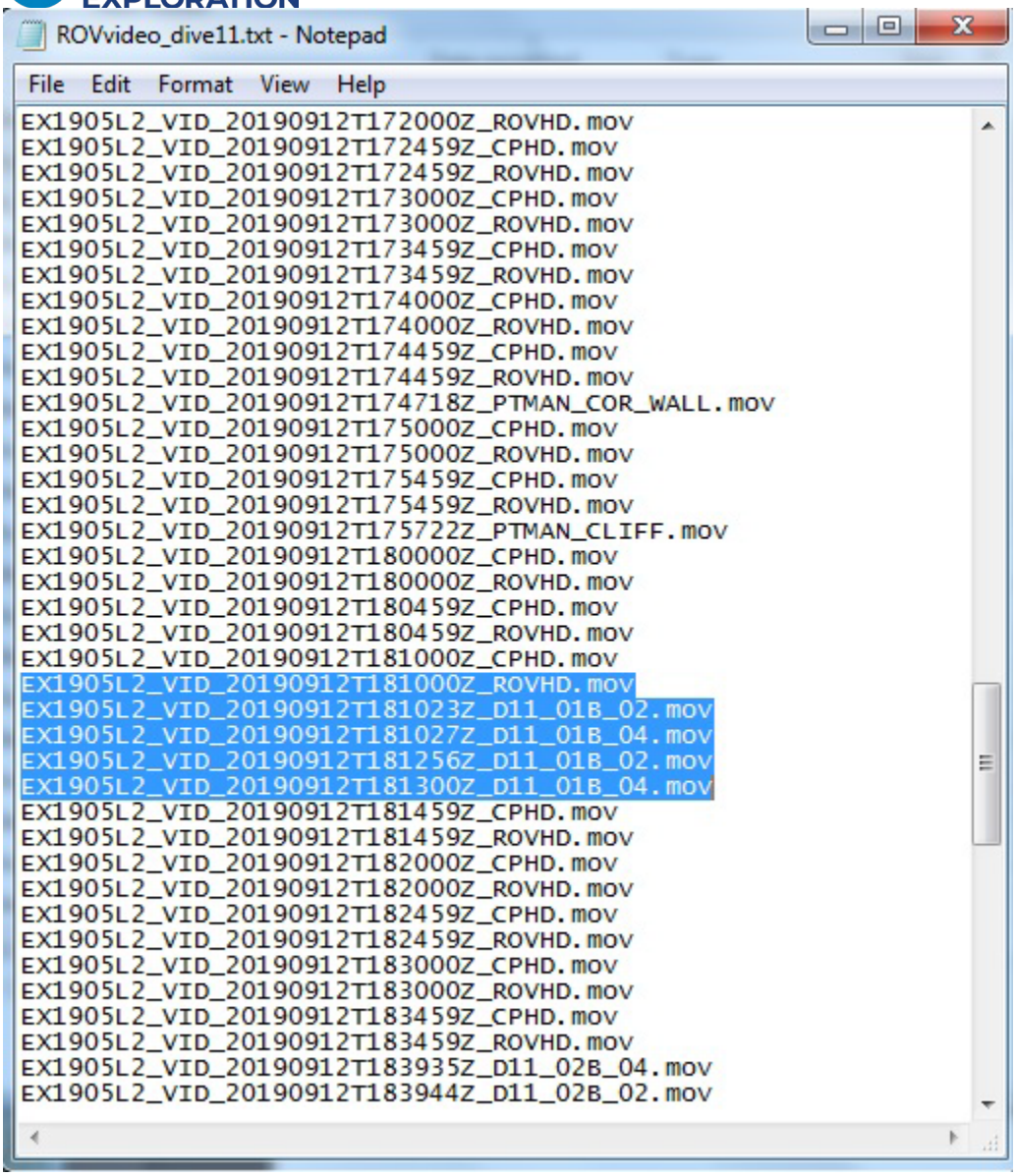


Fig 31. Example of files listed in ROVvideo_dive06.txt. Use this listing to select the video file names associated with the sample, e.g., D11_01B (highlighted), and copy them into the VideoFilesBySpecimen.csv; *.CPHD.mov denote video taken from the Seirios camera sled. Check the times of images associated with the sample to ensure that all of the corresponding 5-minute video segments are identified, typically including the one immediately prior. The video files will be located on cruisedata in the dive's 'Video' folder, e.g., X:\EX1905L2\Video\EX1905L2_DIVE06_20190903\ProRes\.

Ingesting ROV Videos and Images:

The ImageFilesBySpecimen.csv and the VideoFilesBySpecimen.csv discussed in the Managing ROV Images/Videos section above are ingested at the Dive level when ready. See Fig 32.

SODA will read through the csv files and will ingest any new records found and assign them to the appropriate specimen. The user will be given a notice of completion and the number of images or videos ingested.

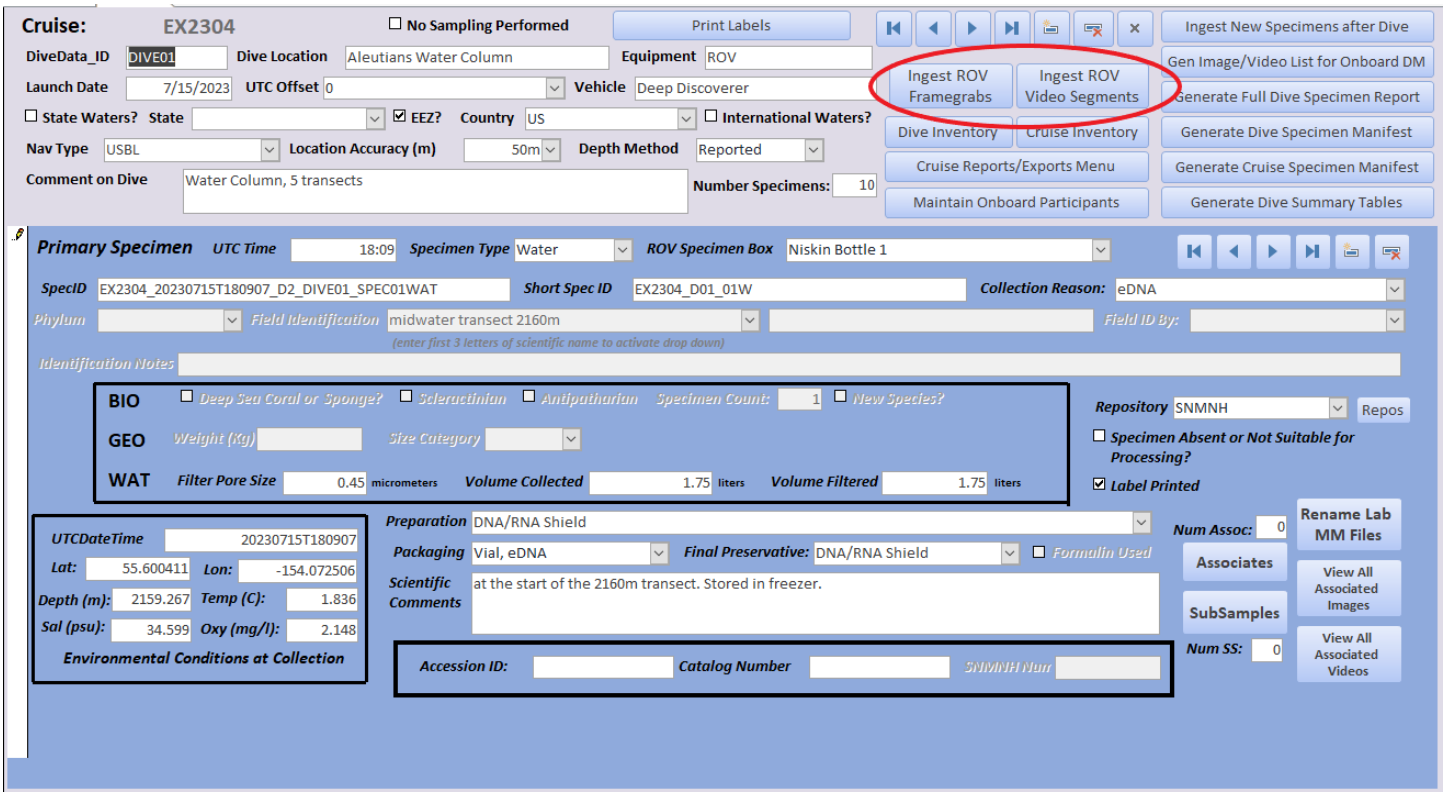


Fig 32. ROV image framegrabs and videos are read from the csv and associated with the active dive.

Reports

After all of the dive's specimens have been documented fully, there are two reports to be produced from SODA:

- 'Image/Video List for the Onboard DM' - Sample Products List
- 'Full Dive Specimen Report' - DAILY SUMMARY REPORT

Sample Products List

The SDM will create the Image/Video List for the onboard data manager by selecting the "Create Image/Video List for Onboard Data Manager" button on the dive page in SODA (Fig. 39). This will create a specific file (Cruise_DIVEnn_Sample_Products.txt) in the C:\EX_SODA\exports\ directory.

- This is text file is used by the onboard data manager to link all of the identified ROV images and videos associated with specimens collected on a particular dive with all of the images and videos taken in the wet lab.

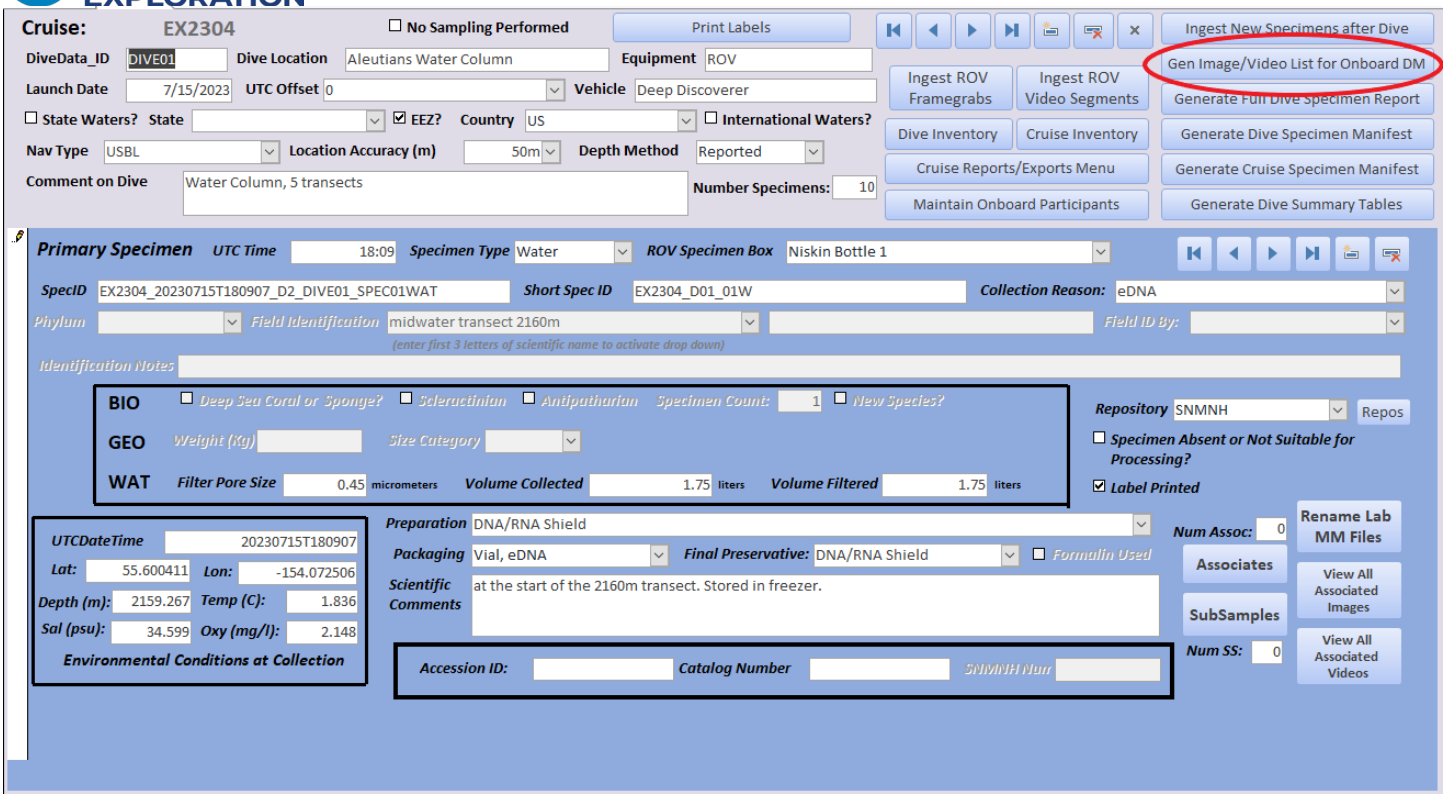


Fig 33. After all of the specimens have been completely documented for a dive, create an export file for the onboard data managers to use for linking of ROV image and video files.

Full Dive Specimen Report

The SDM will also create a 'Full Dive Specimen Report', which will be saved as a .pdf formatted file documenting all of the primary and associate specimens catalogued for a dive and listing all of the corresponding images and videos.

- This .pdf file will be saved in the C:\EX_SODA\exports directory and should be distributed to the Expedition Coordinator. The EC will then distribute it to participating scientists or others at their discretion. See Fig 40.
- Report name needs to be in the format: EX####_YYYYMMDD_DAILY_SAMPLE_REPORT.pdf, e.g., EX1905L2_20190830_DAILY_SAMPLE_REPORT.pdf.
- Use information in this report to populate the samples collected information in that day's online Dive Summary form.

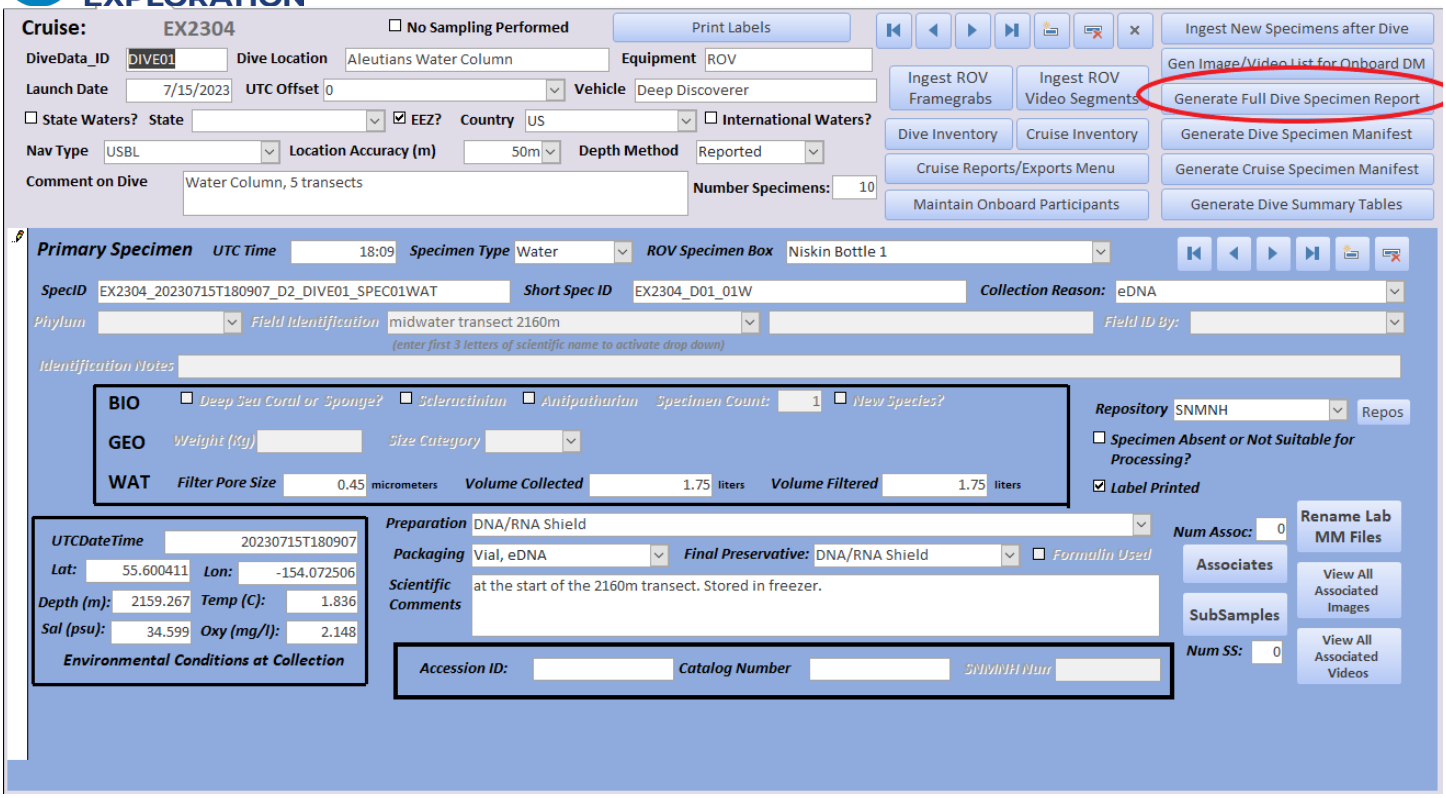


Fig 34. Create a Full Dive Specimen Report of the dive. Use information in this report to populate the samples collected information in that day's online Dive Summary form, and share with participating scientists.

Saving all Wet Lab images and video to Sample_Staging for permanent storage:

The wet lab images and video need to be copied to the Sample_Staging directory in the proper folder structure for eventual inclusion in 'cruisedata'. Note that ROV image and video files are not to be copied to Sample_Staging. It is for wet lab images and video only.

1. Create the appropriate cruise folder in Sample_Staging.
    - This should be Sample_Staging\EX####\.
2. Within the cruise folder create a folder for each dive.
    - They need to be formatted as follows: EX####_DIVE##_YYYYMMDD. An example is: EX1703_DIVE03_20170310.
3. Within each dive folder, create the folder 'Imagery'.
    - Example, EX1703_DIVE03_20170310\Imagery\
4. In the imagery folder there needs to be a folder for each specimen collected during the dive. There should be no associate folders; associate imagery goes in the specimen folder.
    - These folders must be named \…\Imagery\D##_##{B/G}
5. Copy the appropriate wet lab images into to these specimen folders.
6. If there are microscope or camera videos, create a folder 'Video' with subfolders for all specimens that have associated videos using the above folder structure and naming convention.

7. Copy the Daily Sample Report (Cruise_DIVEnn_Sample_Products.txt) to each main dive folder: EX####_DIVE##_YYYYMMDD. This file is generated from the main Dive screen under Gen Image/Video List for Onboard DM.
8. Add the Full Dive Specimen Report (Cruise_YYYYMMDD_DAILY_SAMPLE_REPORT.pdf) to this same main dive folder. This is generated from the main Dive screen button Generate Full Dive Specimen Report and then exported to PDF format using Access export utility.
9. Check that all files are named correctly by opening a browser and clicking on the 'Sample_Staging check' bookmark:
    - http://10.10.2.200:5000
    - If things are not correct, you will get an error which you'll need to fix, such as changing lowercase to capital letters or the name of a folder.
    - If everything is correct, you will see a listing such as in the figure below. QA/QC Cruise Data to ensure no files were corrupted in the process.

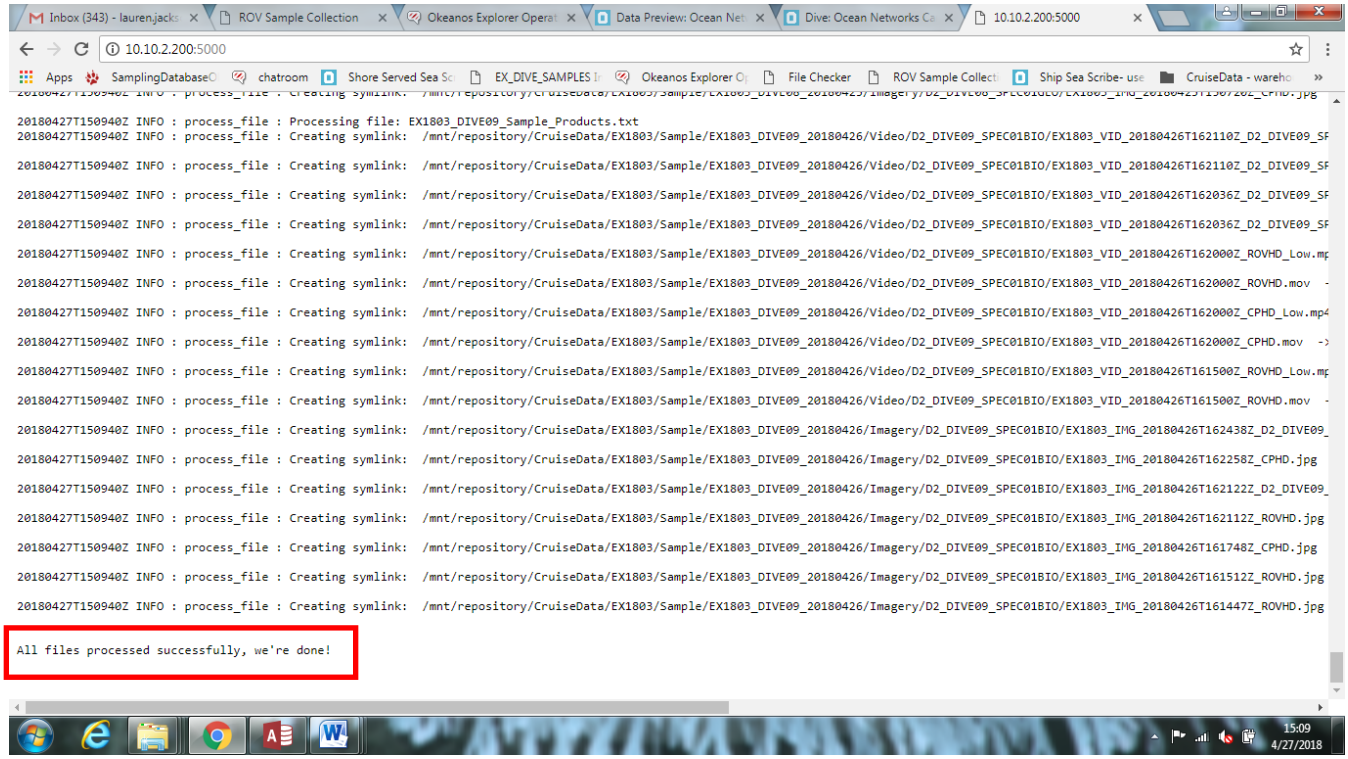


Fig 35. Example of successful transfer of dive images, video, and documents to 'cruisedata'.

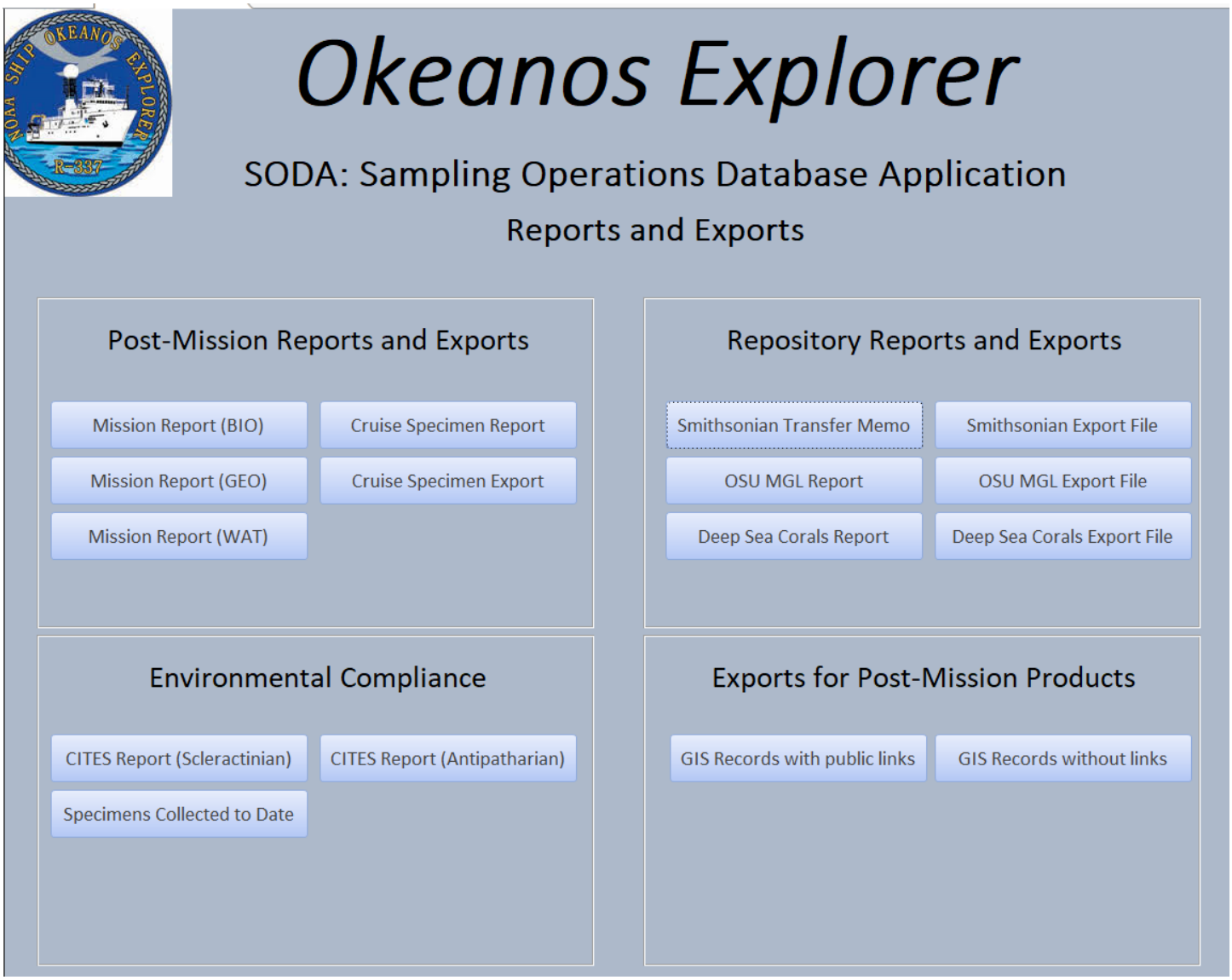


Fig 36. SODA Reports and Exports

At the close of the cruise, the SDM should use the Reports and Exports capabilities in SODA to print some final reports, as directed by the Chief Scientist. See Fig 36.

The Post-Mission Reports and Exports section has several options for the SDM. A Cruise Specimen Report, formatted similarly to the Full Dive Specimen Report (page 47) can be printed in a pdf format. Additionally, the Cruise Specimen Export button will produce an Excel spreadsheet of all of the specimens and associates and their corresponding images and videos. The Mission Report BIO, Mission Report (GEO) and Mission Report (WAT) will produce Excel tables for the Expedition Coordinator to include in the final Mission Report.

There are reports and export capabilities also for each of the repositories – Smithsonian National Museum of Natural History and Oregon State University Marine Geological Laboratory. For the Smithsonian, a Transfer Memo can be

created to provide counts of specimens by phylum. Additionally, an export for customized for the Smithsonian ingest is available. There is also a report and export for the Deep Sea Corals database.

For Environmental Compliance, two species, Antipatharian and Scleractinian, are species that are monitored by the Convention on International Trade in Endangered Species (CITES). A CITES report for each of these species can be exported. The 'Specimens Collected to Date' report under Environmental Compliance will print out every unique specimen, and its collection lat/lon/depth for all cruises maintained in the database. This is a good reference for the science team in case they are targeting a specimen that has already been collected. This report would usually be run prior to the beginning of the first sampling operation.

The Exports for Post-Mission Products currently has the capability to export the public links to the collected specimens curated by the Smithsonian. These public links are provided back to SODA after successful curation so that SODA can be updated with the Catalog and Accession numbers and the link to the record in their repository database. These export files are provided to NCEI's OER GIS team to update the GIS data layers with the new information.