SeaLog User Manual, v2.2

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1 SeaLog Application Description

SeaLog was designed to provide a robust data-logging application to collect at-sea data of marine birds and mammals. The U.S. Geological Survey, along with DOI partners from The National Park Service and U.S. Fish and Wildlife Service, with programing assistance from ABR, Inc., collaborated in the development of this software. SeaLog is a Windows 10 compatible observation logging tool. It is highly customizable, allowing users to choose display fields, species codes, and provides a mechanism for user assigned hot-key shortcuts. A graphic depiction on a user designed map provides visual feedback and a list of observations allows for rapid assessment and identification of typos. A background SQL database contains the raw data until cleared by the user. Data exported from SeaLog are in comma delimited format and can be read by any program capable of opening csv files; however, this data was designed to be read directly into a companion application, QA/QSea, for data proofing and standardization.

2 Installation

SeaLog comes with an installer, downloadable from the SeaLog site. Unless you have a good reason, you should download the latest installer listed on that page, which will be named "sealog_installer" followed by the version number, such as "sealog_installer_2.2.7.exe".

To install the program, double-click the installer. It will automatically install the program into `C:\SeaLog`, and create a series of subdirectories as follows. The program is configured to use these directories for the files used at run-time, but they can be customized using the "Settings" dialog. See the Section 6 section.

- `C:\SeaLog\config`: SeaLog configuration JSON files
- `C:\SeaLog\tilepackages`: Tile packages for the map background
- `C:\SeaLog\export`: Data export location (observation, settings, log CSV files)
- `C:\SeaLog\vector_data`: GeoJSON vector layers to display on the map
- `C:\SeaLog\sounds`: Sounds to play at the end of the timer

3 Running the Application

When collecting data, a GPS receiver must be connected to the laptop. SeaLog works with a variety of internal and external GPS receivers, the only requirement is a standard NMEA-formatted data stream. Tools to resolve serial port issues are provided on the SeaLog web site. If SeaLog fails to get a GPS location from your receiver, the map display will not show your current location with a blue dot, and the map background from your tile package may not appear. The coordinates in the lower right corner of the screen will also be red. It can take a few minutes for a receiver to begin sending valid coordinates, so it is best to start up SeaLog in advance of your survey.

When starting the app for the first time, it will use default configuration files. These default settings control the look of the data entry panel on the left, and the assignment of hot-keys to expedite data entry. Default files can be customized by following the procedures described in Section 6, “Configuration.”

> **Note**
>
> If you have had a previous version of SeaLog installed, begin in edit mode, close the edit dialog (which may be empty if you are just starting for the day), and select “Clear Data” from the top menu bar. Check the box indicating that you want to “Clear data”, then click “OK”. Exit and restart SeaLog and the database structure will be updated.

When started, the application opens into a screen with a mode option window with 3 panels (Figure 1): the mode selection (A) dictates whether the user wishes to begin data collection or to edit the database. The left panel (B) is for data entry, the center panel (C) for map and survey track display and the right panel (D) for the list of observations recorded.

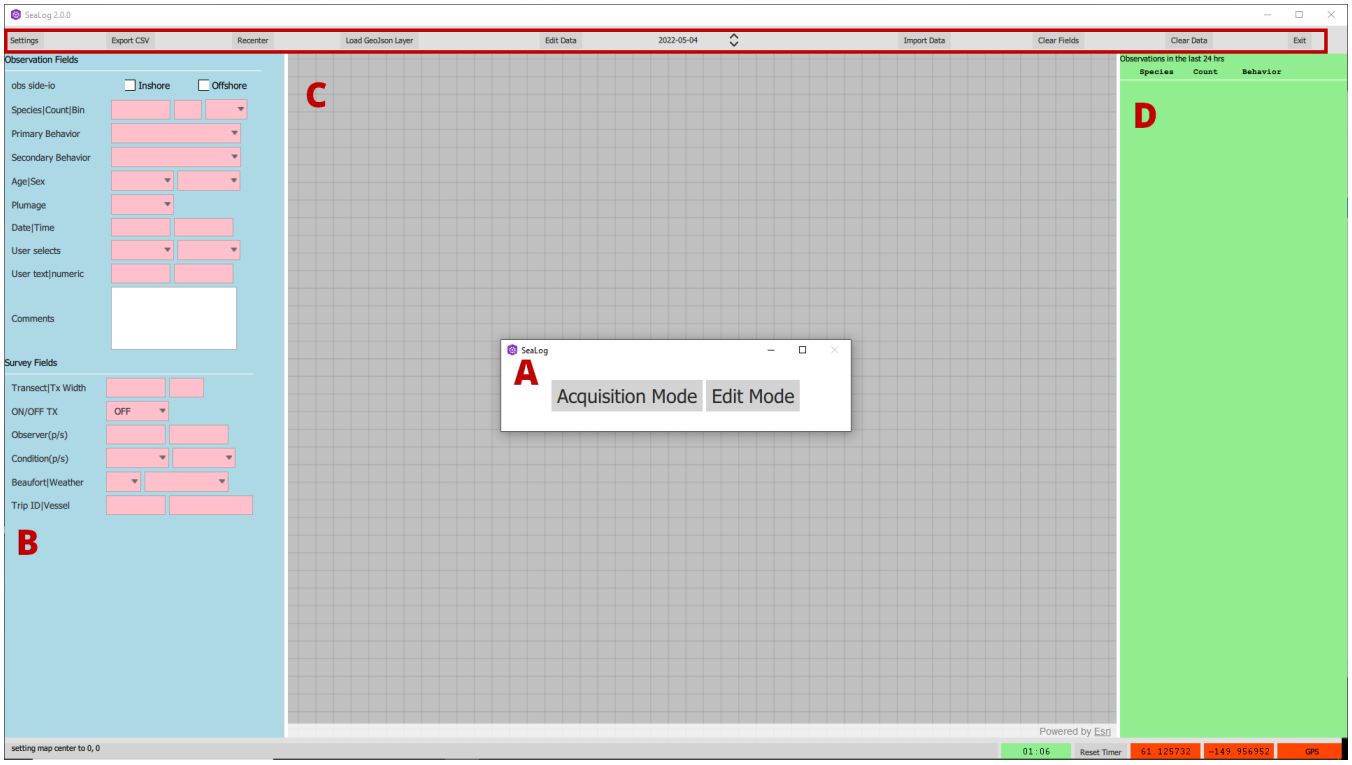


Figure 1: SeaLog screenshot with (A) mode selection dialog, (B) Entry panel, (C) Map panel, and (D) Observations panel. The Menu Bar runs along the top and is outlined in red.

3.1 Mode Dialog

SeaLog will open with a “Mode” window in the center of the screen (Figure 1). “Acquisition Mode” will initiate the collection of GPS data and enable user entries into the database. “Edit Mode” will open a

window displaying a table of data entries from the database for the current day for editing purposes.

3.2 Menu Bar

The menu bar at the top of the program contains a list of nine buttons that control higher level actions within the app. These actions dictate the "look and feel" of the application as well as control basic database functions which are detailed below.

3.2.1 Settings

The settings button opens a dialog box that allows you to configure SeaLog. The window has three tabs: one for identifying the location of the configuration files, the second to identify the distance between concentric buffers around a point, and a third "Miscellaneous" tab that sets GPS capture rate, timer duration and sound. The "Configuration" section below (Section 6) provides detailed information on setting up SeaLog.

> **Note**
>
> Making changes to any of the values on the "Files" tab (configuration files and tile package location) will require restarting the program for them to take effect. Changes made to the other tabs will be implemented immediately after hitting "OK"

3.2.2 Reset Serial Port

The "Reset Serial Port" button closes and re-opens the serial port defined in Settings. In cases where the GPS signal has been lost but the GPS unit appears to be working, it may be possible for SeaLog to pick up the GPS locations without restarting by pressing this button.

3.2.3 Export CSV

This button exports the settings and observations comma delimited (csv) files to the location specified in the "Settings" menu (default is `C:\SeaLog\export`). Exporting data does not remove data from the app database, so you can export the data multiple times to act as a backup. The exported file will be named - "observations_" plus version, date, and time. In addition, a text file called "settings_", version, date, and time is generated to provide the list of configuration files used for data collection. This is important when using QA/QSea to proof the data as it requires the correct JavaScript Object Notation (JSON) configuration files to run. Finally, a log file "log_", version, date, and time is generated with any logging information collected. This file can be important in cases where the program crashes or there are unusual entries in the observation CSV.

3.2.4 Recenter

This recenters the map to your GPS location.

> **Note**
>
> Even if you do not recenter the display, the application will continue to move the map to keep the current location within the display area.

3.2.5 Edit Data

This button will open the database records for a selected time, allowing for multiple record changes. The current day is the default date displayed but different days or all dates can be selected from a drop-down menu to the right of the Edit Data button. See Section 5.1 for more details. Although this button is always functional, users need to be aware that if they are in Acquisition Mode, the GPS will continue to collect and log records while you are editing data.

3.2.6 Import Data

This button allows previously exported data to be "reloaded" into SeaLog. This might occur if some systemic errors were discovered post-survey. We have found that errors in the metadata are not always easy to identify. For example, if after a survey it was determined that a transect number was incorrectly assigned twice. While this sort of editing could be accomplished outside of the SeaLog environment, there can be issues introduced to the data. By making all edits within SeaLog, potential data truncation or corruption introduced by 3rd party software can be eliminated. Many programs, such as spreadsheets, tend to make assumptions and can impose formats that change data. Because output from SeaLog is structured and formatted to be read directly into QA/QSea, we recommend initial editing be completed within SeaLog.

> **Note**
>
> Only new data will display in SeaLog once it has acquired a GPS signal. Imported data will not appear on the map.

3.2.7 Clear Fields

This button clears all the "Observation Fields" in the top section of panel "A" (Figure 1). This is used to reset the fields so a new observation can be entered, but it will not remove any data in the database. This is handy when a recorder has typed incorrect information into one or more fields.

> **Note**
>
> This will not clear any of the “Survey Fields”.

3.2.8 Clear Data

This button offers you the option of clearing all the data in the database. To avoid accidental deletion of data, a pop-up requires the user to also check the “Clear data” checkbox and click “OK” to clear the database. We recommend that this be done after installation if previous versions of SeaLog have been installed. The structure of the database changed in version 2.0 and any database prior to version 2.0 will cause errors.

As a precaution, when the database is cleared, all data in the database is exported to a CSV file as a backup. If the data has already been exported and archived, this CSV can be deleted. Until it has been cleared, data continues to accumulate in the background while the app is in use. Users will need to decide when to clear data. For example, users may want to clear data between survey, day, location, etc. so each survey’s exported data is unique.

3.2.9 Exit

This closes the app. Changes to the configuration files, e.g., selecting a different Optional Fields JSON file, require users to exit and restart for them to take effect.

> **Note**
>
> This will not clear the database and no data will be lost by closing the application.

When you restart the program and select “Acquisition” mode, it will begin appending data to the existing database. If users are beginning a new survey the database should be cleared using the Clear Data button described above.

4 Acquisition Mode

4.1 Data Entry Panel

There are two types of fields in the Data Entry panel on the left: Observation Fields on top and Survey Fields below. The Survey fields are “sticky”, i.e., once entered are persistent until changed by the user. This saves the repeated entry of unchanging information such as vessel or transect number. Observation Fields are non-sticky and will reset to blank fields once an observation is made and “Enter/Return” is clicked. Changes to the survey fields require the users to hit “Enter” or escape to enable the hot-key methodology used for Observation Fields.

There are two main ways of entering data into the fields. The first, and recommended method, is to use the user-defined hot-keys to enter data without needing to manually select a field and enter data. This is the default and will reset itself following each entry. In this mode, no fields are focused (highlighted) and the user-defined keyboard hot-keys populate the fields for which the hot-key has been defined (species codes, counts, on/off transect, behaviors, and observation side fields can all be set up for direct input using hot-keys). This method utilizes the keyboard, rather than mouse or Tab selection, and is significantly faster for data entry with a little practice.

The second method for data collection is manual entry by selecting (focusing) fields with a mouse and either typing in values or selecting from the drop-down lists. In this mode, you click or tab into individual fields (or use a hot-key to jump directly to a field) to set their focus, then enter the value for that field.

- When a field has been focused, it will be highlighted with a blue border
- The "Tab" key moves to the next field
- "Shift+Tab" moves to the previous field
- "Esc" un-focuses the field, which will take you back to hot-key mode

> **Note**
>
> After each entry the app will return to the unfocused state (hot-key mode).

More details and examples of both methods are described in detail in the following sections.

4.1.1 Hot-key Method

The primary observation fields including species, count, on/off transect, observer side, and both behavior fields can be set up for data entry without needing to individually click on or tab between fields to set their focus. Single keystroke hot-keys enter behaviors, set transect to on or off, observation side, and species codes for which a single hot-key has been set up. The order of entry does not matter when in the hot-key mode, users can input a number or behavior before species.

If users fail to input a behavior that field will be empty. However, if a number is not entered, SeaLog automatically enters a "1" in the count field. This accomplishes two things, first many sightings are of just 1 animal, speeding up data entry, secondly, counts can be missed. If missed and we feel a count of 1 is preferable to dropping the sighting. When any number is entered it replaces the default of "1."

To enter a pre-defined species value hit the hot-key for that species code as defined in the `hotkeys.json` file. As an example, if there is a hot-key where "n" is assigned the value "HOPU," entering "n" fills out the entire species code to HOPU, and also sets the count to 1 and populates the date, time, latitude and longitude fields (Figure 2). The default file `hotkeys.json` can be replaced by changing it in the "Settings" (Section 6.1).

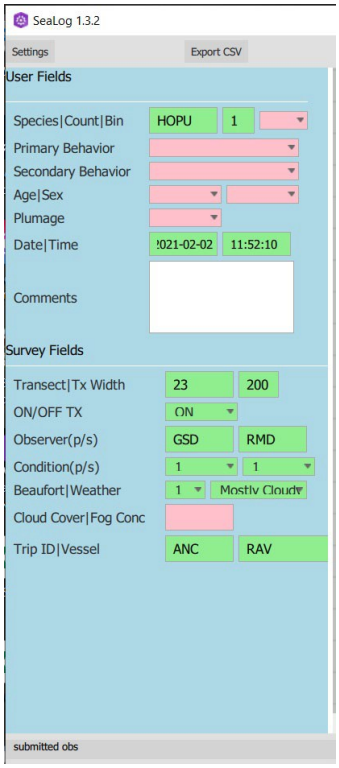


Figure 2: Example entry panel

To enter a count different from the default "1", type the number and the count box will automatically be replaced with the entered number. So, in the example above, after typing "n", if the user then hits 8 the species code will be HOPU and the count will be 8. Then typing another number will add it to the box, so "1" would then set the count as 81. Hitting the backspace key will delete the most recent number entered and the delete key will clear the whole field.

While manual entry of the full four-letter codes is available, the use of "hot-keys"—single keys assigned to a species code—will display the associated four-letter code. When a second letter is typed, this code will be overwritten allowing the user to manually type in a full four-letter code.

If a sighting is made of a species lacking a hot-key assignment, all letters can be added manually, and the code will still be evaluated for validation. Any code not listed in the `speciesValidationList.json` will still be allowed to be entered and submitted but will be highlighted light red to indicate that it is not in the validation list. The light red field highlight shows up during data entry on the left, and after the observation has been submitted, in the list of observations in the right panel.

> **Note**
>
> The default `speciesValidationList.json` is based on codes from the North Pacific Pelagic Seabird Database (NPPSD; Section 9).

4.1.2 Manual method

To enter data using the manual method, use the mouse or hot-key to select (or "focus") a field and then enter data in with the keyboard for text input fields or use the up and down arrow keys on the keyboard to select values from the list in drop downs. To get to the next field hit the "Tab" key, enter data, and then either continue with the "Tab" key or use the hot-key for the next row. Survey fields in particular are typically entered manually as they are rarely changed (sticky fields) and do not warrant dedicated hot-keys.

For example, to fill out the Observer fields start by selecting the field with the mouse or hitting "Ctrl+o." This will give focus to the first observer field as shown in Figure 3a. Focus is indicated with a blue outline around the field. Next, fill in the field using the keyboard and then hit the "Tab" key to give focus to the next key in the row (Figure 3b). Although this example was for one of the "Survey Fields" this method will work for any data entry field.

(a) Field selection or focus

(b) Text entry and tab

Figure 3: Manual entry of Observer Field with field selection or focus (a) and text entry and tab (b)

Anytime the manual entry method is used on any field, users must either hit "Esc" to re-enable the unfocused (hot-key mode) or hit the enter key to record the current entry and reset to the unfocused mode.

4.2 Map Panel

The center panel of the app displays a map loaded from a tile package. Tile packages are a proprietary image format that incorporates data into a raster format at different levels (resolution) and provides the base imagery layer for the SeaLog program. They are created using ESRI ArcMap or ArcGIS Pro. These GIS projects should use the Web Mercator (3857) projection. Directions for creating tile packages are detailed in Section 10. Users add raster and vector layers, setting the display extent to your area of interest. Select the "Data Management Tools," from the toolbox" and then select "Create Map Tile Package" to begin. Additional information on making tile packages is available on the ESRI website. Tile packages are selected in the "Settings" dialog (Section 6) and the selected map will be retained until changed by the user. The map display shows the current GPS location of the vessel with a blue dot and a yellow track-line is drawn as the vessel travels along the surveyed route. In addition, recorded observations are added to the map as black dots with the species code as a label.

4.3 Observations List Panel

The right panel of the app displays a list of previously recorded observations. The list will add new observations at the top of the list and the previous entries will scroll down. Each observation in the list has the transect, record number, species code, and count displayed. Observations with a light red background indicate species codes that do not appear in the species code validation list. All observations remain in the database and will be exported as entered to allow survey-specific inputs, but the highlighting is used as a visual indicator to alert the user that the species code is not in the list and may be invalid.

4.3.1 Editing During Data Acquisition

During data collection users can edit individual records by selecting records from the right panel. When selected, an editable window will open (Figure 4). Users may edit any of the fields, in this case, the species code was changed. Once changed, and another field is selected, the background will change to green if it is a recognized code. When all edits are made to a record users should select "Update" and the record will be changed in the database (Figure 5). This will be reflected in the observations panel on the right (Figure 6).

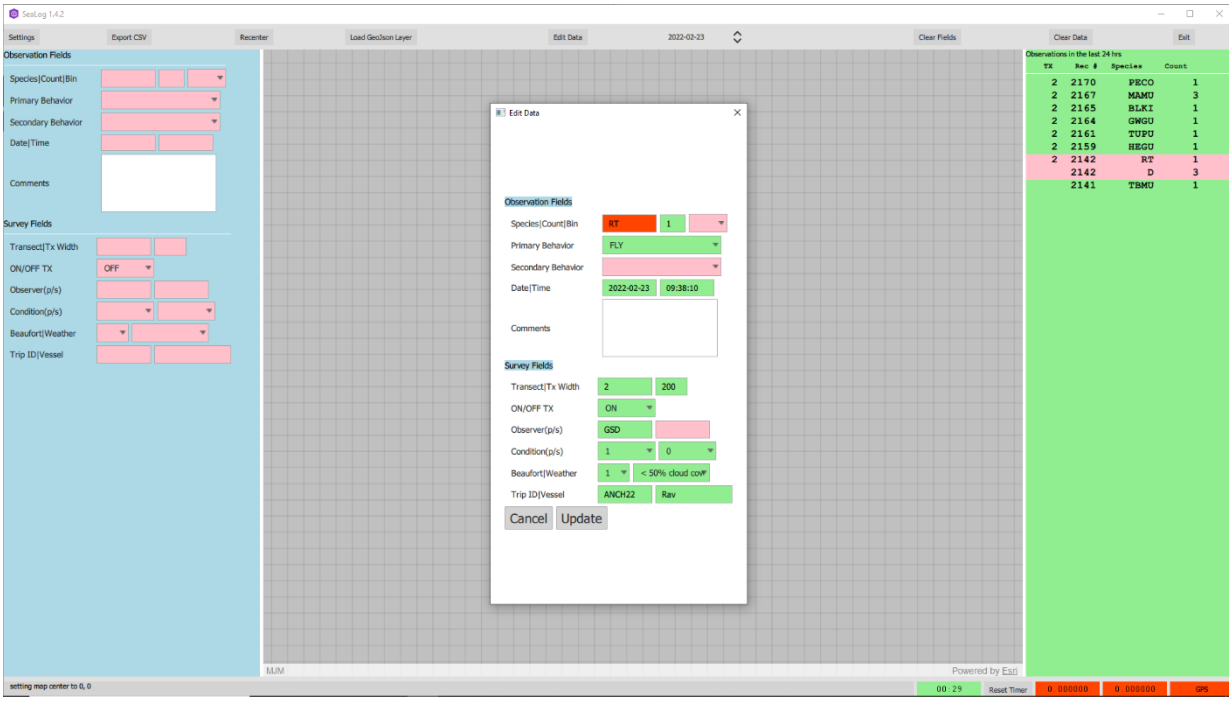


Figure 4: Edit window for individual records during data acquisition. Note the dark red background indicates an unrecognized species code.

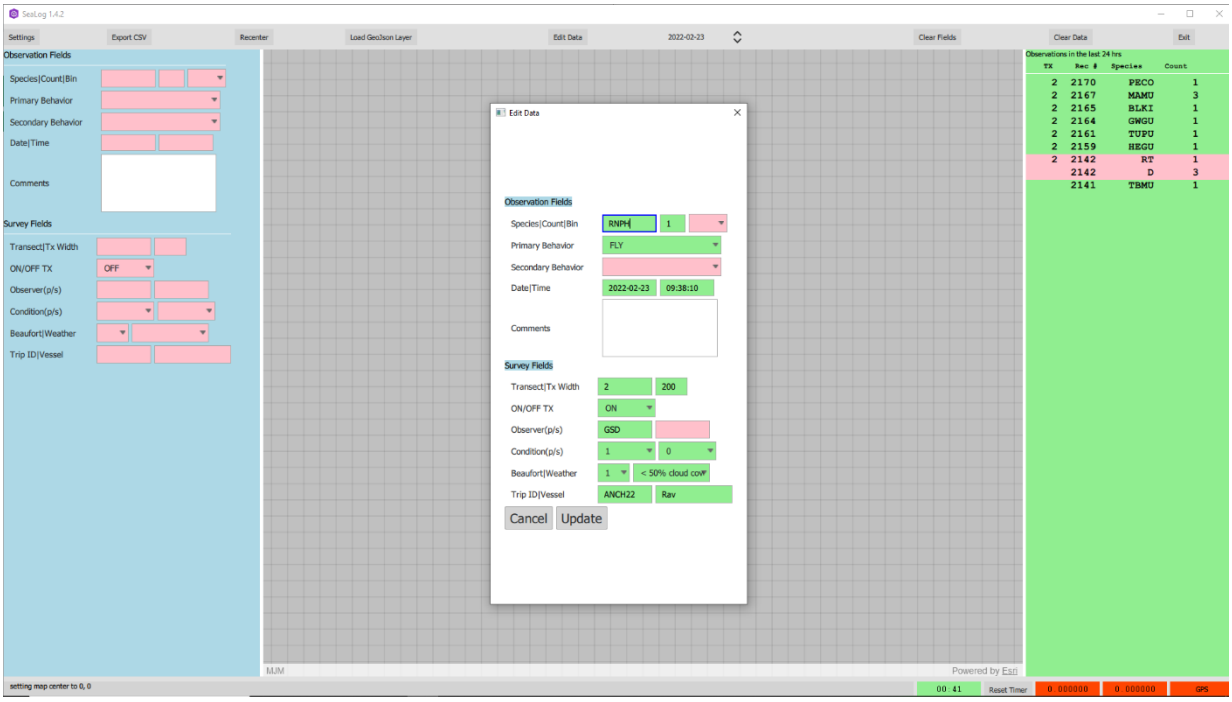


Figure 5: Edit window for individual record showing the green background indicating a recognized species code. Note until updated the panel on the right and database are unchanged.

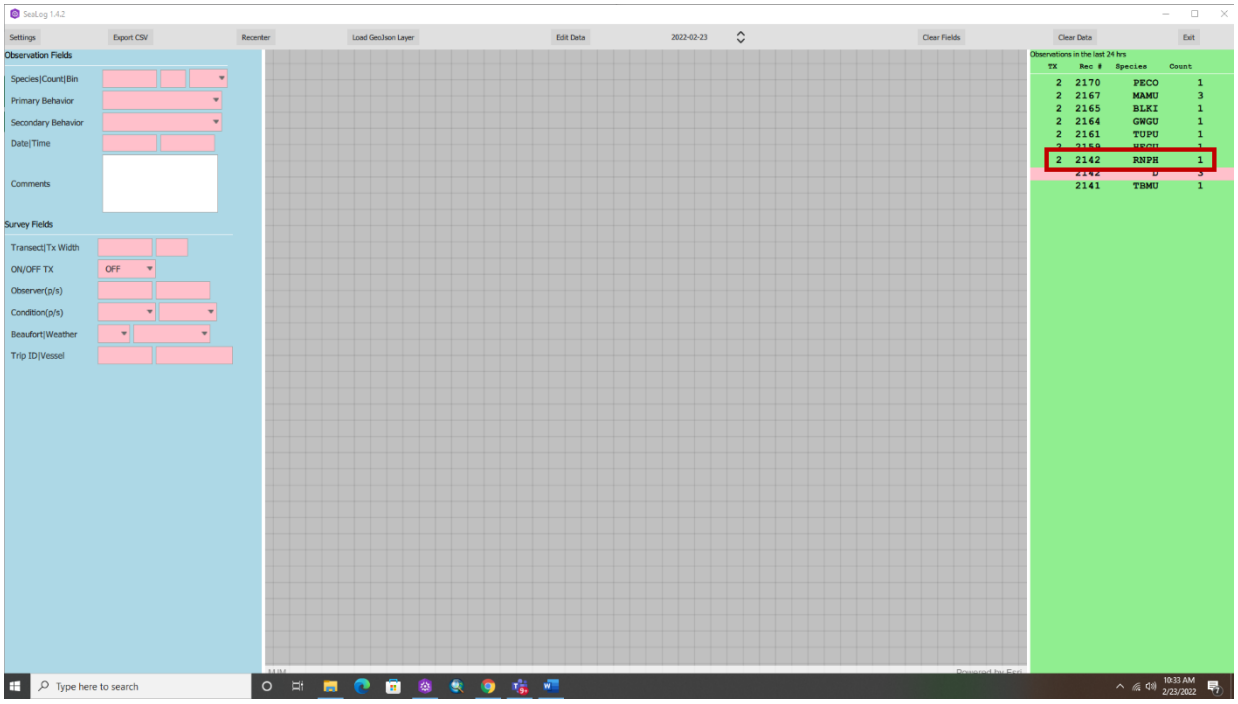


Figure 6: Result of edit update on an individual record. Note the change to the record in the right panel.

4.4 Status bar

The status bar shows informational messages about the app on the left-hand side. On the right side it displays the GPS status and current location. The GPS status and location will be green if there has been a new GPS position update within the last 10 seconds, otherwise it will be a light red color if no change in position is detected. The status bar also contains a timer to the left of the GPS position indicators. The timer will continuously count down from whatever interval is specified in “Settings”, “Miscellaneous”, “Timer duration (seconds)”. When it reaches five seconds remaining, it turns light red, and when it expires, the app plays the sound file (uses a wav file) defined on the same settings tab, “Timer sound file.” After it expires, the timer starts over. The “Reset Timer” button to the left of the indicator will also reset the timer to its initial duration.

> **Note**
>
> Note, the sound file can be replaced by selecting a new wav file, exiting the application, and restarting it.

5 Edit Mode

5.1 Data Table

Once you select the “Edit Mode” a data table of the last 35 observations from the current day will be displayed. Users can scroll down and see all records collected that day. If edits are required on previous days, the edit window should be exited, the correct date selected from the drop-down section on the menu bar, and the “Edit Data” button selected. This will open the selected days observation records (Figure 7).

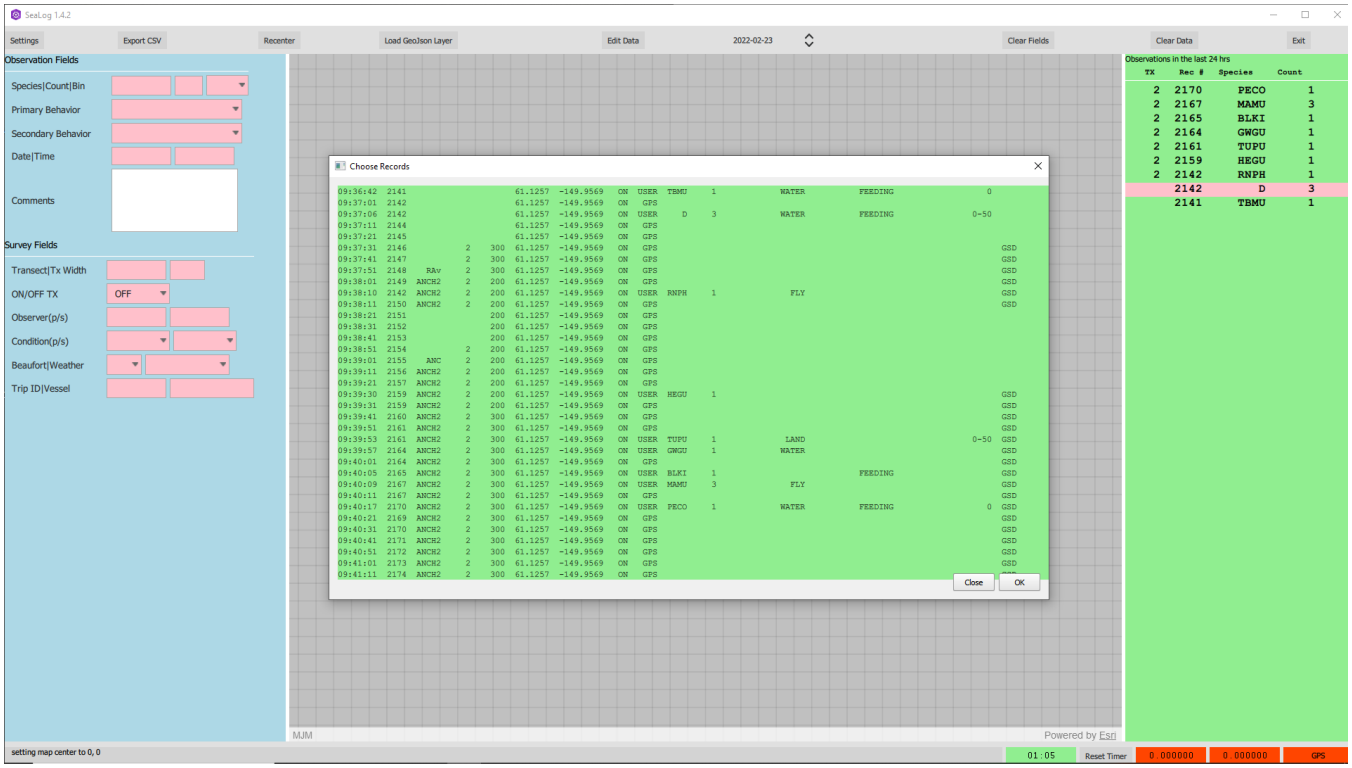


Figure 7: Multi-record data table displayed following entrance to Edit Mode.

While in Edit Mode, no GPS locations will be added to the data table. If a single record is highlighted and the OK button selected, that single record will display in an edit window. This window will operate just like normal data entry in the field for a single observation. If a range of records need to be edited, select the first record in the series, then hold down the Shift key and select the last record in the series (Figure 8). All selected records will be highlighted. If necessary, you may reselect using the same commands. You can also select individual records by holding down the Ctrl key and clicking each record. Once “OK” is selected an edit window will be displayed (Figure 9).

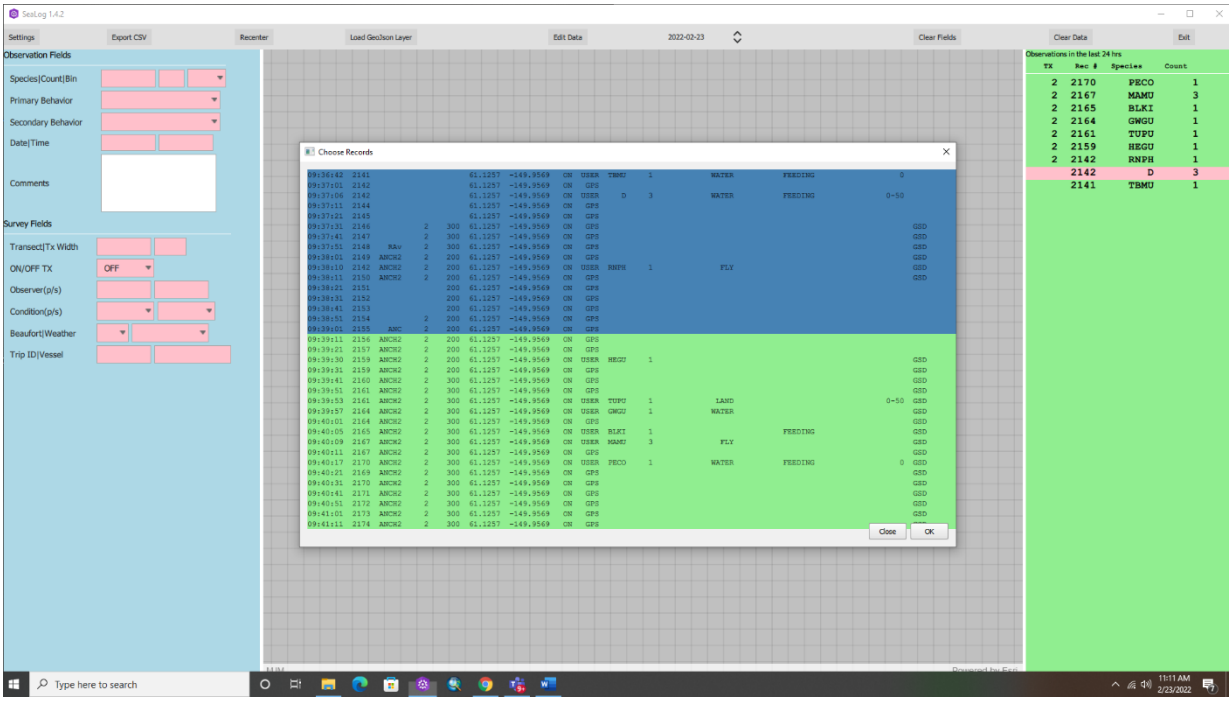


Figure 8: Data records “selected” (blue highlight) in the Edit Mode.

> **Note**
>
> When in group edit mode, any changes to fields will be applied to **all selected records**. This means that users should apply caution when using this feature. There is no “undo” button.

When a group of records is selected the color and displayed value are an indication of the contents. If the result of a selection is green for a field, it indicates that all records have the same value. If you compare the selection of records in Figure 8 and the result in Figure 9 it is clear that only the ON/OFF TX field is identical. Regardless of field color, changes will be global. The color is simply an indication of homogeneous or heterogeneous contents.

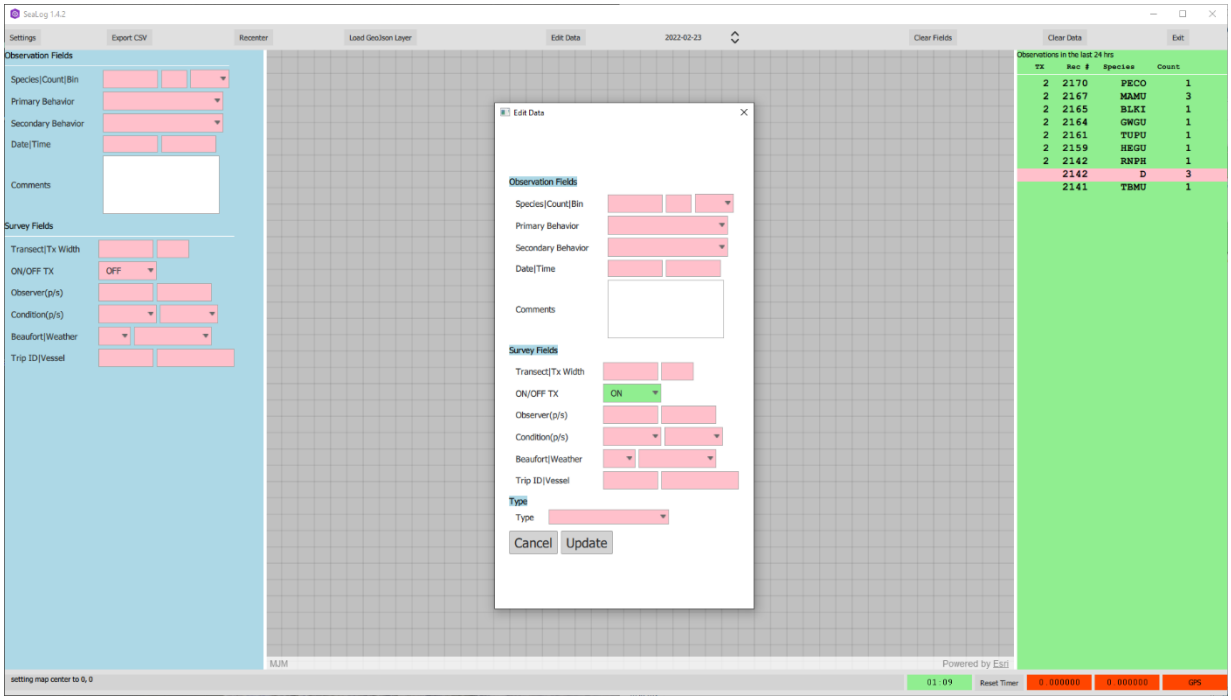


Figure 9: The edit window displayed looks like the window for records selected in Figure 8.

Before beginning group edits, we suggest that users backup their data. For the records selected in Figure 9, changes to the “Observer” and “Trip ID” fields will affect all records (Figure 10). When a field is filled in, its background will change to green, indicating all records will now have that value. Once updated, edits made in on the example data Figure 8–Figure 10 and can be seen in the resulting data table (Figure 11).

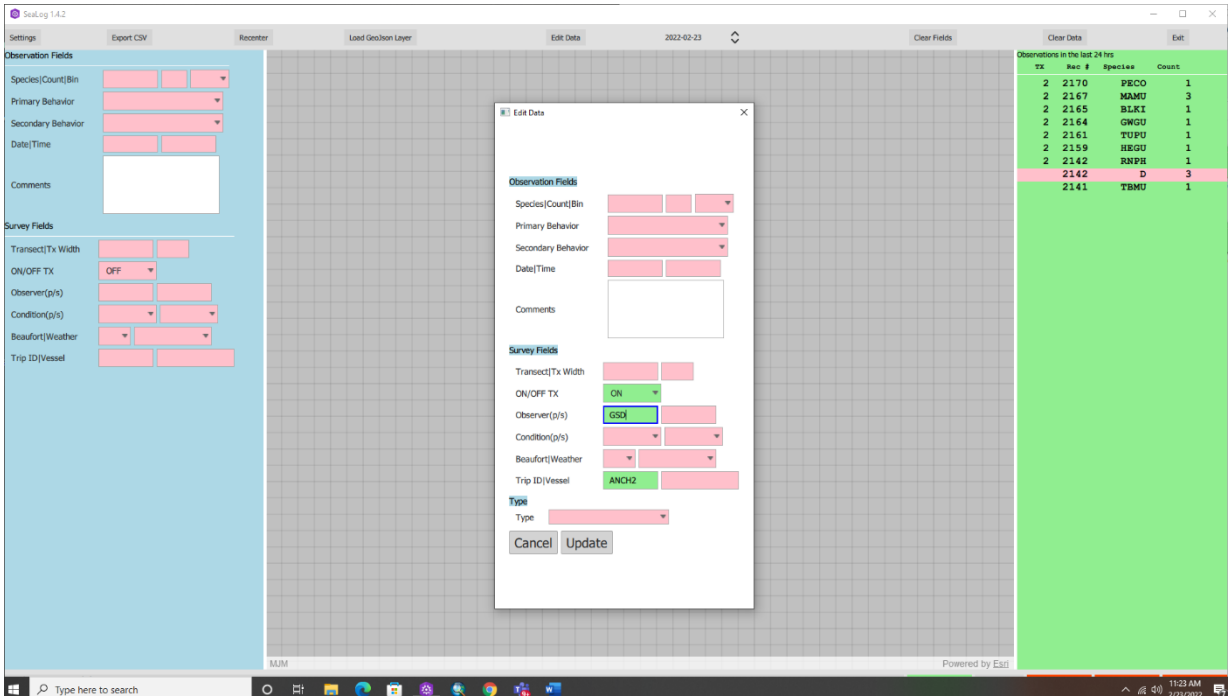


Figure 10: Changes made to Observer and Trip ID fields in the group edit mode.

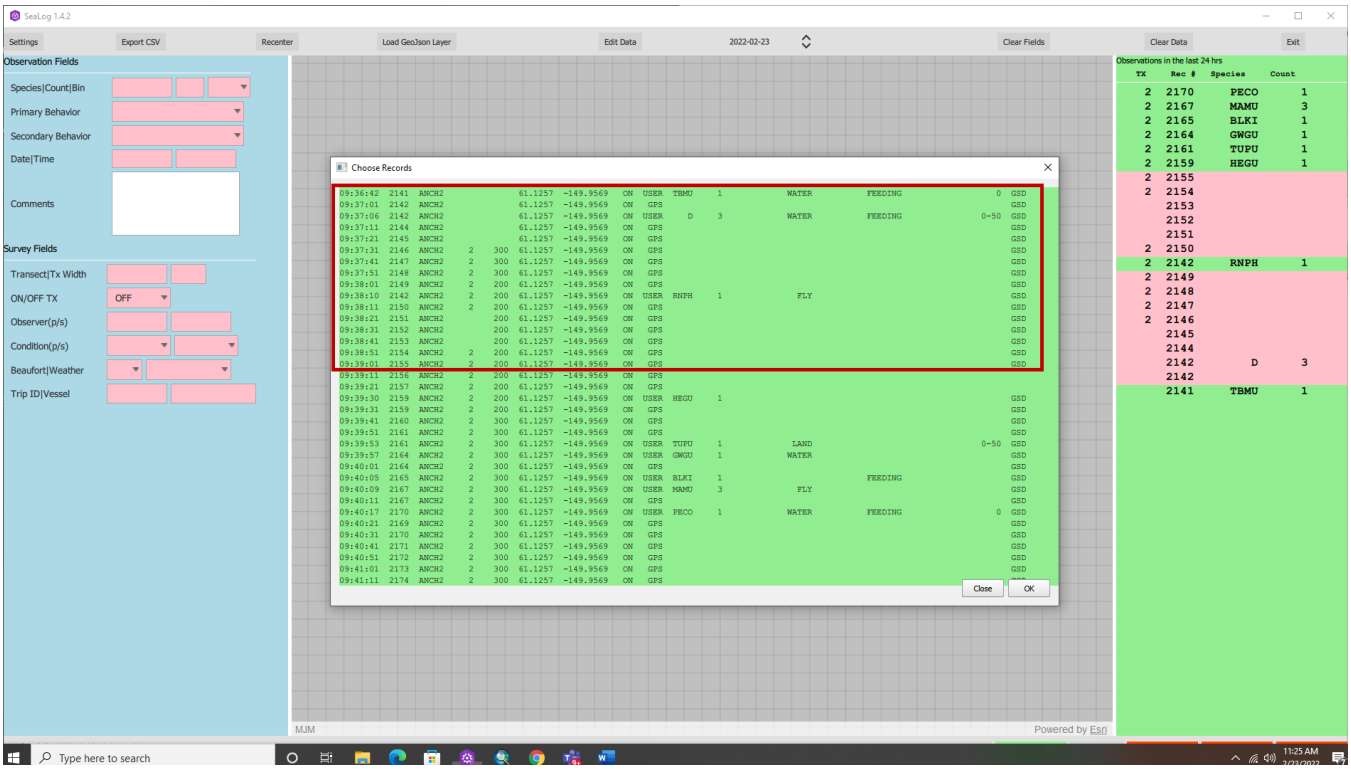


Figure 11: Data table following the group edits (Figure 10) made on data selected (Figure 8), outlined in red). Note the changes to the Observer and Trip ID fields.

One special case of data editing is the trimming of data at either the beginning or end of transects. In these cases, users should select the records to be trimmed and use the “Type” field drop-down to select DEL (Figure 12). The result can be seen in the data table (Figure 13) When these data are processed using QA/QSea these records will be ignored.

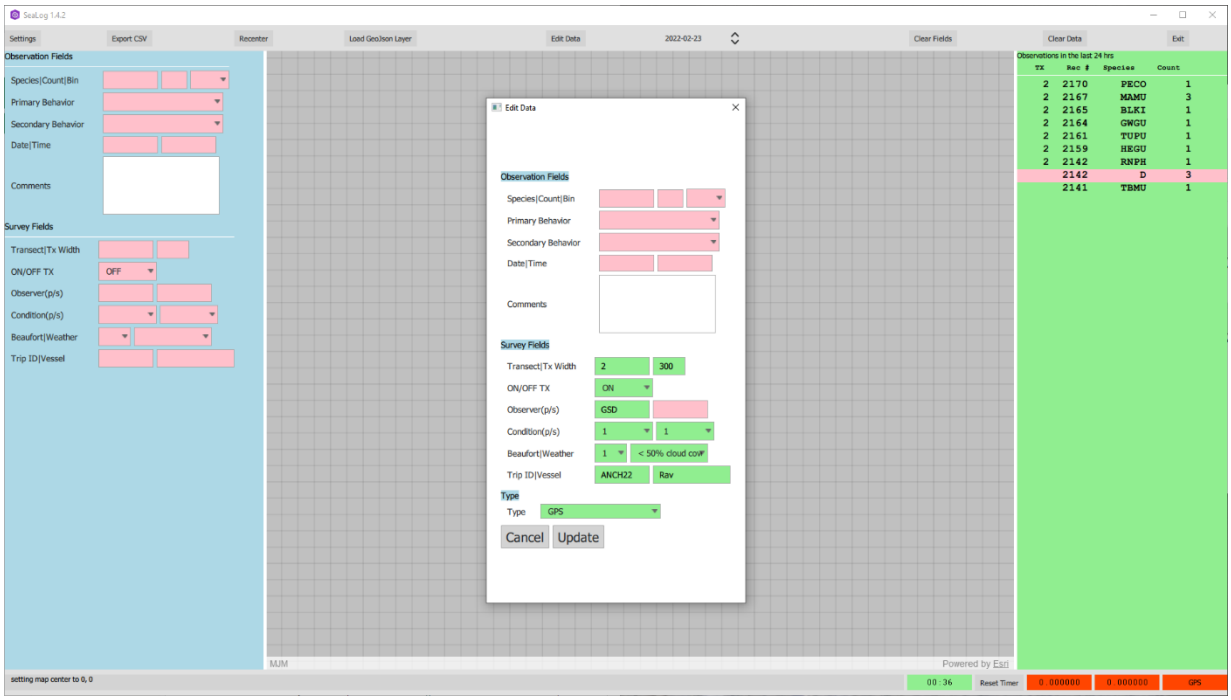


Figure 12: Changing “Type” field to DEL indicates these were OFF Transect locations.

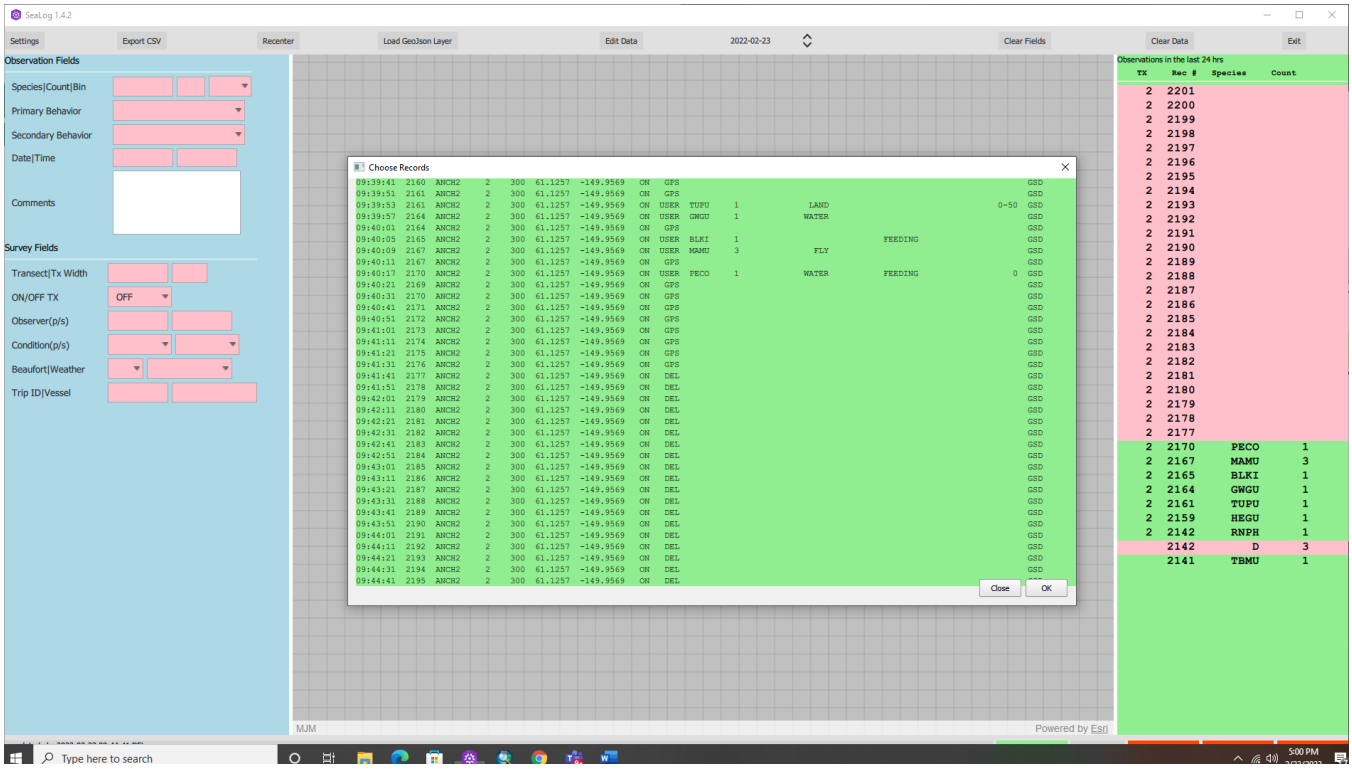


Figure 13: The result of changing the “Type” field is displayed in the data table following the update.

6 SeaLog Configuration

The SeaLog app uses five configuration files that allow the user to configure various settings. The first time the app runs after being installed, the configuration files are set to default files that are installed with the application in `C:\SeaLog\config`. Users can edit these default files or can use the settings to select different configuration files (Figure 14).

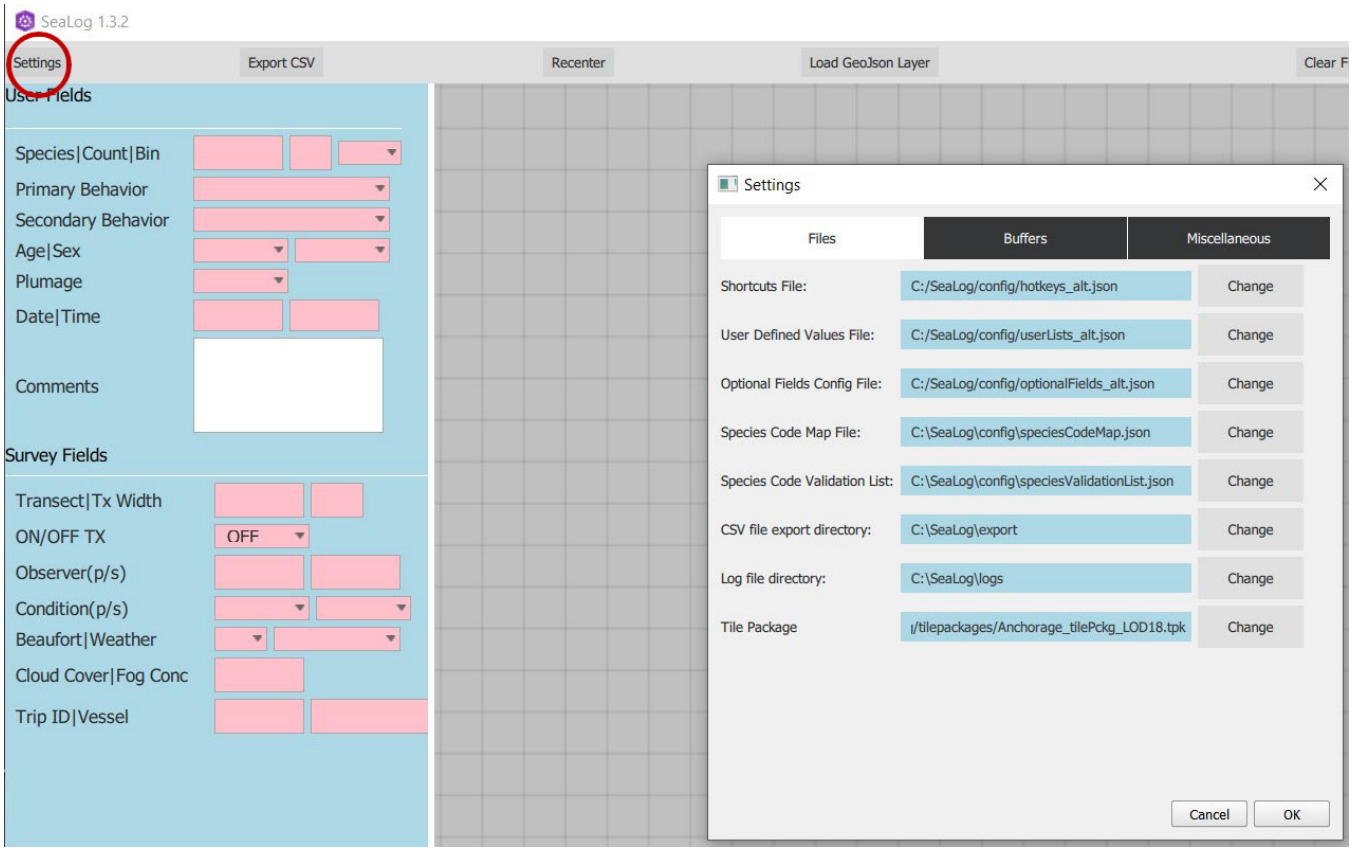


Figure 14: Settings button (red circle) opens the Settings dialog box with file locations. Tabs provide access to additional options.

All the configuration files use JSON Notation syntax but can easily be modified by simple pattern-matching and replacing existing values in a text editor. If, once started, the application fails to accept data, noted due to inoperable hot-keys or a failure to log data, there is likely a syntax error in one of your configuration files. If an error is not obvious, json files can be tested using an online validator such as https://jsonlint.com.

Modified configuration files can either replace the existing defaults in `C:\SeaLog\config`, or be saved in a different location. The location of configuration files can be changed by clicking the "Settings" button, opening a tabbed window. Under the "Files" tab the location of configuration files is listed. Selecting "Change" will open a file dialog box allowing users to navigate to a new file location. After hitting "OK", exit the app, and restart. When the app reopens, it should reflect your changes to the configuration files.

> **Warning**
>
> We recommend users always keep a copy of the default configuration files for reference

> **Note**
>
> Always exit and restart SeaLog after making changes in Settings.

6.1 hotkeys.json

The hot-keys file contains a mapping of hot-keys (left column) to actions (right column). Notice that the start and end of these file is marked by opening and closing braces: "{" and "}."

> **Warning**
>
> - All lower-case letters and numbers need to be listed in the file regardless of whether they have a hot-key assigned. The program only knows to watch for the keys listed in the file, so letters and numbers must be included to allow for hot-key species and count data entry.
> - Do not assign actions to the number keys (0–9) since these automatically populate the "count" field.
> - Be careful changing the hot-keys at the top of the file since those actions are critical to the proper functioning of the program.

To change the hot-key, simply replace the value on the left with a desired key or key combination. Key combinations that involve the Shift, Ctrl, and Alt keys and their combinations should use the plus sign between the modifier and normal keys: `ctrl+t`, `alt+shift+t`, etc.

Values in the right column, are limited to a specific set of actions that are used internally by the app. A list of actions appears in Section 9.

Each hotkey can be assigned a single action such as populating the species code with "SEOT":

```
"o"   : "species: SEOT",
```

Or, a single hotkey can perform multiple actions by wrapping each action in square brackets, as shown below where hitting "F4" will populate both "WATER" for primary behavior and "FEEDING" for secondary behavior.

```
"F4" : [ "primaryBehavior: WATER", "secondaryBehavior: FEEDING" ],
```

> **Warning**
>
> Be very careful with the formatting of these multiple actions: the entire list must be surrounded by square brackets, each individual action is enclosed in double quotes, and a comma separates actions and ends the hotkey entry.

The following shows the default `hotkeys.json` file. The section at the top in lines 1–8 define default actions that shouldn't be modified, and below that we have a series of key that set focus using the Ctrl or Meta modifier (Ctrl-v or Meta-v sets the focus to the Vessel field). Single letters "c", "g", and "h" to record "PECO","STSH", and "SOSH", respectively. And "F12" toggle transect on/off, and "F1" through "F3" to set primary behavior.

We suggest that users only change key assignments as required. Small syntax errors, e.g. missing a comma, will cause the program to malfunction. To assist users we have included two versions of hot-keys files, `hotkeys.json` and `hotkeys_alt.json`. By comparing the two versions, users can gain a better understanding of how hot-keys are assigned and how the file can be modified.

```
1  {
2    "SHORCUTS"   : "ACTIONS",
3    "Return"     : "submit",
4    "Enter"      : "submit",
5    "Shift+c"    : "clear",
6    "Shift+q"    : "quit",
7    "Backspace"  : "backspace",
8    "Delete"     : "delete",
9
10   "Ctrl+v"     : "vesselFocus",
11   "Ctrl+t"     : "tripIdFocus",
12   "Ctrl+o"     : "observerFocus",
13   "Ctrl+c"     : "conditionFocus",
14   "Ctrl+e"     : "beaufortFocus",
15   "Ctrl+w"     : "cloudCoverFocus",
16   "Ctrl+i"     : "iceTypeFocus",
17   "Ctrl+b"     : "binFocus",
18   "Ctrl+f"     : "plumageFocus",
19   "Ctrl+h"     : "commentsFocus",
20
21   "Meta+v"     : "vesselFocus",
22   "Meta+t"     : "tripIdFocus",
23   "Meta+o"     : "observerFocus",
24   "Meta+c"     : "conditionFocus",
25   "Meta+e"     : "beaufortFocus",
26   "Meta+w"     : "cloudCoverFocus",
27   "Meta+i"     : "iceTypeFocus",
28   "Meta+b"     : "binFocus",
29   "Meta+f"     : "plumageFocus",
30   "Meta+h"     : "commentsFocus",
31
32   "`"          : "transectToggle",
33   "Ctrl+p"     : "obsSidePSToggle",
```

```
34
35      "F8"        : "bin: 0",
36      "F9"        : "bin: 0-50",
37      "F10"       : "bin: 50-100",
38      "F11"       : "bin: 100-150",
39      "F12"       : "bin: OFF-TX",
40
41      "!"         : "sex: Male",
42      "@"         : "sex: Female",
43
44      "#"         : "age: Adult",
45      "$"         : "age: Juvenile",
46      "%"         : "age: YOY",
47
48      "^"         : "plumage: Summer",
49      "&"         : "plumage: Winter",
50      "*"         : "plumage: Molting",
51
52      "F1"        : "primaryBehavior: LAND",
53      "F2"        : "primaryBehavior: FLY",
54      "F3"        : "primaryBehavior: WATER",
55      "F4"        : [ "primaryBehavior: WATER", "secondaryBehavior: FEEDING" ],
56      "F5"        : "secondaryBehavior: WITH FISH",
57      "F6"        : "secondaryBehavior: ON OBJECT",
58      "F7"        : "secondaryBehavior: DEAD",
59
60      "a"         : "species: MAMU",
61      "b"         : "species: TUPU",
62      "c"         : "species: PECO",
63      "d"         : "species: BRMU",
64      "e"         : "species: UNMU",
65      "f"         : "species: PIGU",
66      "g"         : "species: STSH",
67      "h"         : "species: SOSH",
68      "i"         : "species: UNGU",
69      "j"         : "species: UNSH",
70      "k"         : "species: HASE",
71      "l"         : "species: STSL",
72      "m"         : "species: RNPH",
73      "n"         : "species: HOPU",
74      "o"         : "species: SEOT",
75      "p"         : "species: HOPU",
76      "q"         : "species: COMU",
```

```
77    "r"          : "species: ANMU",
78    "s"          : "species: KIMU",
79    "t"          : "species: BLKI",
80    "u"          : "species: GWGU",
81    "v"          : "species: FTSP",
82    "w"          : "species: TBMU",
83    "x"          : "species: PALO",
84    "y"          : "species: HEGU",
85    "z"          : "species: DCCO",
86
87    "Print"      : "species: PRNT",
88    "Pause"      : "species: PAUS",
89    "SysReq"     : "species: SYSR",
90    "Home"       : "species: HOME",
91    "End"        : "species: ENDO",
92    "ScrollLock": "species: SCRO",
93
94    "Ctrl+r"     : "userSelectTwo: Red",
95    "Ctrl+s"     : "userSelectOne: Athletics",
96
97    "Meta+a"     : "userSelectOneFocus",
98    "Meta+d"     : "userSelectTwoFocus",
99    "Meta+x"     : "userTextFocus",
100   "Meta+n"     : "userNumericFocus",
101
102   "0"          : "",
103   "1"          : "",
104   "2"          : "",
105   "3"          : "",
106   "4"          : "",
107   "5"          : "",
108   "6"          : "",
109   "7"          : "",
110   "8"          : "",
111   "9"          : ""
112 }
```

The example below shows how to re-map the hot-key “l” to the species LESA. Change the species code on line 71 in the configuration file shown above as follows:

```
    "l" : "species: LESA",
```

There is a relationship between many of the options in `hotkeys.json` and the choices added to `userLists.json` (Section 6.3). The options that are tied to hot-keys for fields such as “bin”, “plumage”,

“primaryBehavior”, “secondaryBehavior” need to match the choices in `userLists.json`.

For example, the default `hotkeys.json` (above) include these hot-keys:

```
{
  ...
  "F8"         : "bin: 0",
  "F9"         : "bin: 0-50",
  "F10"        : "bin: 50-100",
  "F11"        : "bin: 100-150",
  "F12"        : "bin: OFF-TX",
  ...
}
```

These choices (0, 0-50, 50-100, etc.) match the following section from `userLists.json`:

```
{
  ...
  "bin": [
    "0",
    "0-50",
    "50-100",
    "100-150",
    "OFF-TX"
  ],
  ...
}
```

The combination of `hotkeys.json` and `userLists.json` allows you to customize both what appears in the drop-downs, as well as the hot-keys you use to quickly select them.

6.2 optionalFields.json

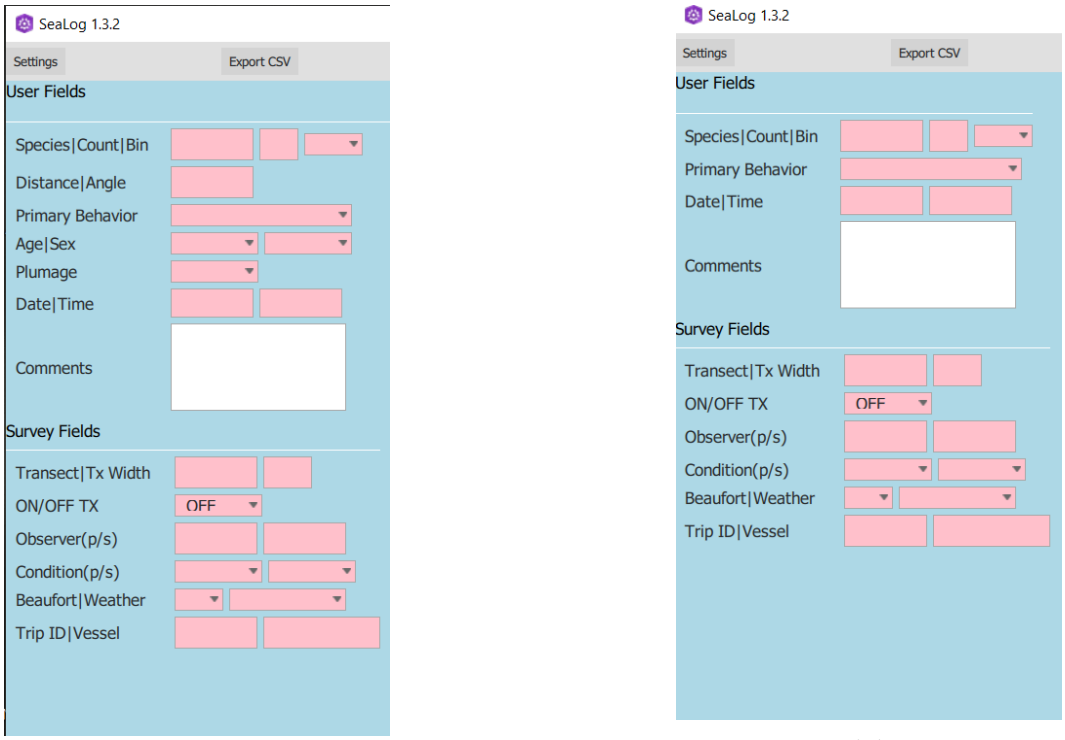
The optional fields configuration file specifies which fields to display in the app. By default, several fields are hidden. To change the visibility status of a field simply change its value in the optionalFields.json configuration file from true to false, all lowercase.

> **Warning**
>
> Do not change the names of the fields on the left side, and do not add or remove rows from this file.

For example, to remove the ‘age,’ ‘sex,’ and ‘plumage’ fields from the app, you would modify these three lines in optionalFiles.json, leaving the rest of the file as-is.

```
"age": false,
"sex": false,
"plumage": false,
```

By removing fields unnecessary for a given survey, data entry can be tailored to the needs of the user (Figure 15b). By removing unused fields users can simplify the interface and minimize potential entry errors.



(a) (b)

Figure 15: Fields display based on the default `optionalFields.json` (a) and the changes indicated above (b)

6.3 userLists.json

This file specifies the user-defined lists for most drop-down fields in the program, including primary and secondary behaviors, bin ranges, ice types, weather conditions, sex, age, and plumage.

The file is split into sections by field: behavior, bin, sex, age, plumage, ice_type, and weather, and under each section there is either a list of options (all fields except behavior fields) or another pair of sections (primary and secondary for the behavior section).

Values can be changed or added to this file by following these rules:

- Change existing values by only changing the text between the quotes.

- New values can be added to either list by placing them between brackets,
- All values should be separated by a comma except the last one in the last which should have no comma at the end in keeping with the JSON format.

> **Note**
>
> Even if you have hidden some of the fields using the `optionalFields.json` configuration file, you should leave the default values in this file.

> **Warning**
>
> Do not remove sections even if you don't need them.

Here is a section from the default `userLists.json`:

```
{
  ...
  "user_select_1": [
    "Athletics",
    "Giants",
    "Phillies",
    "Tigers",
    "Cubs"
  ],
  ...
}
```

To use this field for something useful, such as "glare", this could be changed as follows:

```
{
  ...
  "user_select_1": [
    "No Glare",
    "Light Glare",
    "Moderate Glare",
    "Severe Glare"
  ],
  ...
}
```

When values are changed in this file, most users will find it helpful to add matching hot-keys in the hot-keys file `hotkeys.json` following the appropriate format described in the (Section 6.1).

> **Warning**
>
> Be sure that the option in userLists.json matches the hot-key action exactly or the hot-key will not select the option.

Keep in mind that the default `userLists.json` includes standard behavior and bin values for the NPPSD. Whenever possible users should employ the provided behaviors and use the user definable fields for additional detail. This standardization simplifies the merging of data from different surveys.

speciesCodeMap.json

The app has three basic ways of entering species codes: (1) use hot-keys that allow quick single-letter entry that are defined in the `hotkeys.json` file (Section 6.1), (2) two-letter species shortcuts that map to the full four-letter codes, and (3) four-letter species codes can be entered in full (and validated against the `speciesValidationList.json`, below).

`speciesCodeMap.json` has the mapping between two-letter codes and what four-letter code will appear in the app. For example, the app has the hot-key 'g', which records 'PIGU' in the default configuration. The following configuration in speciesCodeMap.json allows users to enter "gg" for GLGU and "gw" for GWGU.

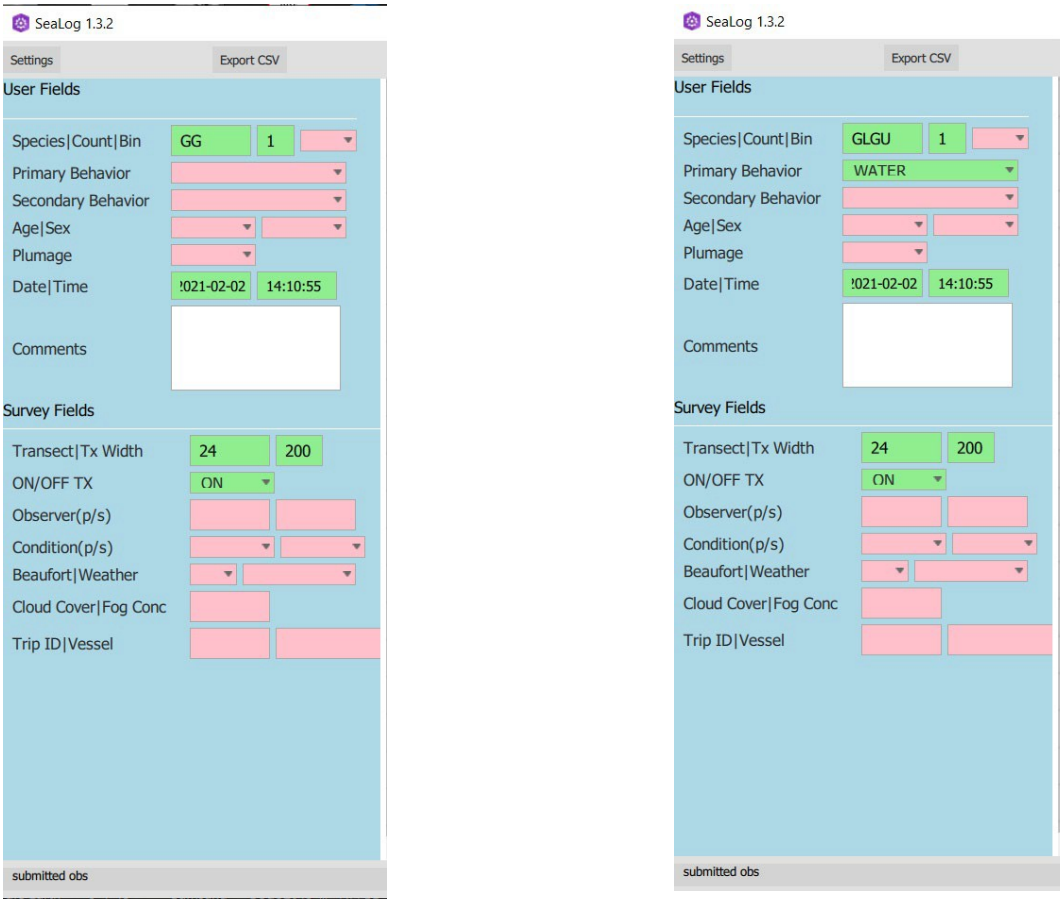
```
{
  "GG": "GLGU",
  "GW": "GWGU"
}
```

For example, after entering "gg" the Species field will contain the two letters entered (Figure 16a), and as soon as another non-alphabetic key is entered, the two-letter code will be converted to the four-letter code (Figure 16b). In this example, "F3" was entered, selecting a primary behavior of "WATER", updating the Species code, and highlighting it green to indicate it is a valid species present in the speciesValidationList.json file (Figure 16b). If a third letter had been entered after "gg", it would be considered to be part of the species code and it would be added to the Species field.

In summary, when you enter the first "g", SeaLog populates the Species field with the single-letter hot-key for "g", which is "STSH" in the default configuration. If a second "g" is entered, the Species field reverts to "GG". If a third letter is entered, that letter will be appended to the end of the species code. If any other non-alphabetic hot-key or number is entered, the two-letter code is converted from "GG" to "GLGU".

6.4 speciesValidationList.json

The app performs basic validation on species codes by matching the code on the form against a list of valid codes defined in `speciesValidationList.json`. When a user enters a code not in this list, the



(a) (b)

Figure 16: Multiple letter hot-key behavior.

form field turns light red to indicate an invalid code, and after submitting the record, it will also show up in light red in the list of observations in the rightmost panel.

`speciesValidationList.json` should be a comprehensive list of four-letter species codes. The default list contains many species codes, but the user should ensure that all required species and survey specific codes are in the list. This file should be a JSON list with all valid species codes listed between the brackets. For example, here's a subset of the default file.

```
[
  "AGPL",
  "ALTE",
  "AMAV",
  "AMBD",
  "AMCO",
  ...
  "ZERO"
]
```

You may add new species by adding them in double quotes, terminated with a comma (except the last line, as shown above), and remove species by deleting lines from the file.

6.5 GeoJSON

The app allows you to add vector data such as station locations, transect lines, and study area polygons to the map by including a GIS layer file in GeoJSON format.

GeoJSON can be exported from ArcMap or ArcGIS Pro layers by going to the ArcToolbox, and selecting "Conversion Tools", "JSON", "Features to JSON". In the dialog box that appears, select your layer in the "Input features" section, adding a new file to the "Output JSON" section, and choosing both "Formatted JSON" and "GeoJSON" options. Be sure the coordinate system of your layer is WGS 84 Web Mercator (3857) or transform it before exporting. Unfortunately neither ArcMap nor ArcGIS Pro allow you to add multiple layers to a single GeoJSON file. If you want multiple layers, especially of different geometry types (points, lines, polygons), you will either need to use an alternative conversion method, or manually combine multiple GeoJSON files into a single file.

> **Note**
>
> GeoJSON layers must be in the WGS84 Web Mercator projection.

An R script is available (gdb_to_geojson.R) to convert all the layers in an ESRI File Geodatabase (or other GIS database format) in the Tools section of the SeaLog website. Follow the directions in the comments starting on line 46 ("START HERE").

The GeoJSON parser built into SeaLog supports adding style parameters to each layer so they can be symbolized on the map in different ways (color, size, etc.). Table 1 shows the different geometry types, and what style options are available.

Table 1: GeoJSON Style options

Geometry Type	Style Options
Point, Multipoint	• `color`: the color of the point in `#rrggbb` or `#aarrggbb` format • `size`: the size of the point (a number)
Line, MultiLine	• `color`: the color of the point in `#rrggbb` or `#aarrggbb` format • `width`: the width of the line (a number)
Polygon, MultiPolygon	• `color`: the color of the perimeter in `#rrggbb` or `#aarrggbb` format • `fill`: the fill color of the polygon (same format as color) • `width`: the width of the perimeter (a number)

To add styles, create a style element with the options you want to include (for example a feature that's blue and 5 pixels in diameters):

```
"style": { "color": "#0000ff", "size": 5 }
```

Then add this style to the feature (line 3) at the same level as the "geometry" field that defines the point/line/polygon:

```
1  {
2    "type": "Feature",
3    "style": { "color": "#0000ff", "size": 5 },
4    "properties": { "location": "House" },
5    "geometry": {
6      "type": "Point",
7      "coordinates": [ -16461457.022395052015781, 9580437.806151647120714 ]
8    }
9  }
```

Because GeoJSON gets complicated very quickly as you add features, be sure to check the JSON file before using it with SeaLog. You can use an online JSON validator to confirm the basic syntax is correct, see if the layer loads using R, or view the layer using a GIS program like QGIS. To test the layer in R, you can use code similar to code below. Replace "sealog.json" on line 5 with the name of your GeoJSON file. If the file is properly formatted, you should see a list of features in the console, and a new tab should open in your browser with the layers displayed.

```
1  library(tidyverse)
2  library(sf)
3  library(mapview)
4
```

```r
geojson <- read_sf("sealog.json")

geometry_types <- geojson %>%
  mutate(geometry_type = st_geometry_type(geometry)) %>%
  pull(geometry_type) %>%
  unique()

add_layers <- function(geometry_type) {
  geojson %>% filter(grepl(geometry_type, st_geometry_type(geometry)))
}

layers <- map(geometry_types, add_layers)

mapview(layers, layer.name = geometry_types)
```

> **Note**
>
> The mapview library doesn't currently support style annotations in GeoJSON, so your styles will not be displayed.

7 Troubleshooting

The most likely source of problems with the app are incorrectly configured configuration files. Prior to making changes in the default configuration files, users should back up these files. If the application is not functioning properly following changes to the configuration files, we suggest reviewing the Configuration section (Section 6). If the issue is not apparent, try using the default configuration files and see if the problem persists.

For bugs that are not fixed by using the default configuration files, take note of the specific action or series of actions that triggers the behavior and contact Sarah Schoen (USGS) GS-AKA-ASC-SeaLog@usgs.gov or Chris Swingley (ABR) at cswingley@abrinc.com, 907-455-6777 x105. The program saves a continuously running log of what its doing as part of the Export Data process, so be sure to send the observations, settings, and log files from the day you experienced problems may help identify the issue.

8 Appendix 1. NPPSD species code list (SeaLog default)

Common Name	NPPSD 4-Letter Code	Scientific Name
Aleutian Tern	ALTE	*Onychoprion aleuticus*
American Avocet	AMAV	*Recurvirostra americana*
American Black Duck	AMBD	*Anas rubripes*
American Coot	AMCO	*Fulica americana*
American Dipper	AMDI	*Cinclus mexicanus*
American Golden Plover	AGPL	*Pluvialis dominica*
American White Pelican	AWPE	*Pelecanus erythrorhynchos*
American Wigeon	AMWI	*Mareca americana*
Ancient Murrelet	ANMU	*Synthliboramphus antiquus*
Arctic Loon	ARLO	*Gavia arctica*
Arctic Tern	ARTE	*Sterna paradisaea*
Ashy Storm-petrel	ASSP	*Hydrobates homochroa*
Atlantic Puffin	ATPU	*Fratercula arctica*
Audubon's Shearwater	AUSH	*Puffinus lherminieri*
Baird's Beaked Whale	BKWH	*Berardius bairdii*
Baird's Sandpiper	BASP	*Calidris bairdii*
Bald Eagle	BAEA	*Haliaeetus leucocephalus*
Band-rumped Storm-petrel	BRSP	*Hydrobates castro*
Bar-tailed Godwit	BTGO	*Limosa lapponica*
Barau's Petrel	BAPE	*Pterodroma baraui*
Barrow's Goldeneye	BAGO	*Bucephala islandica*
Bearded Seal	BESE	*Erignathus barbatus*
Belted Kingfisher	BEKI	*Megaceryle alcyon*
Beluga Whale	BEWH	*Delphinapterus leucas*
Black Guillemot	BLGU	*Cepphus grille*
Black Noddy	BLNO	*Anous minutus*
Black Oystercatcher	BLOY	*Haematopus bachmani*
Black Scoter	BLSC	*Melanitta americana*
Black Skimmer	BLSK	*Rynchops niger*
Black Storm-petrel	BLSP	*Hydrobates Melania*
Black Tern	BLTE	*Chlidonias niger*
Black Turnstone	BLTU	*Arenaria melanocephala*
Black-bellied Plover	BBPL	*Pluvialis squatarola*
Black-crowned Night-Heron	BCNH	*Nycticorax nycticorax*
Black-footed Albatross	BFAL	*Phoebastria nigripes*
Black-headed Gull	BHGU	*Chroicocephalus ridibundus*
Black-legged Kittiwake	BLKI	*Rissa tridactyla*
Black-tailed Gull	BTGU	*Larus crassirostris*
Black-vented Shearwater	BVSH	*Puffinus opisthomelas*
Black-winged Petrel	BWPE	*Pterodroma nigripennis*

Common Name	NPPSD 4-Letter Code	Scientific Name
Blue Whale	BLWH	*Balaenoptera musculus*
Blue-gray Noddy	BGNO	*Anous ceruleus*
Blue-winged Teal	BWTE	*Spatula discors*
Bonaparte's Gull	BOGU	*Chroicocephalus philadelphia*
Bonin Petrel	BOPE	*Pterodroma hypoleuca*
Bottlenose Dolphin	BNDO	*Tursiops truncates*
Bowhead Whale	BOWH	*Balaena mysticetus*
Brachyramphus Murrelet	BRMU	*Brachyramphus spp.*
Brandt's Cormorant	BRCO	*Urile penicillatus*
Brant	BRAN	*Branta bernicla*
Brown Booby	BRBO	*Sula leucogaster*
Brown Noddy	BRNO	*Anous stolidus*
Brown Pelican	BRPE	*Pelecanus occidentalis*
Bryde's Whale	BRWH	*Balaenoptera brydei*
Buff-breasted Sandpiper	BBSA	*Calidris subruficollis*
Bufflehead	BUFF	*Bucephala albeola*
Buller's Shearwater	BULS	*Ardenna bulleri*
Bulwer's Petrel	BUPE	*Bulweria bulwerii*
Cackling Goose	CACG	*Branta hutchinsii*
California Gull	CAGU	*Larus californicus*
California Sea Lion	CASL	*Zalophus californianus*
Canada Goose	CANG	*Branta canadensis*
Canvasback	CANV	*Aythya valisineria*
Caspian Tern	CATE	*Hydroprogne caspia*
Cassin's Auklet	CAAU	*Ptychoramphus aleuticus*
Chapman's Storm-Petrel	CHSP	*Oceanodroma leucorhoa chapmani*
Christmas Shearwater	CHSH	*Puffinus nativitatis*
Clark's Grebe	CLGR	*Aechmophorus clarkia*
Common Dolphin	CODO	*Delphinus delphis*
Common Eider	COEI	*Somateria mollissima*
Common Goldeneye	COGO	*Bucephala clangula*
Common Gull	COGU	*Larus canus*
Common Loon	COLO	*Gavia immer*
Common Merganser	COME	*Mergus merganser*
Common Murre	COMU	*Uria aalge*
Common Snipe	COSN	*Gallinago gallinago*
Common Tern	COTE	*Sterna hirundo*
Cook's Petrel	COPE	*Pterodroma cookie*
Craveri's Murrelet	CRMU	*Synthliboramphus craveri*
Crested Auklet	CRAU	*Aethia cristatella*
Crow; Raven; Magpie	CORV	*Corvidae (Family)*
Cuvier's Beaked Whale	GBWH	*Ziphius cavirostris*
Dall's Porpoise	DAPO	*Phocoenoides dalli*

Common Name	NPPSD 4-Letter Code	Scientific Name
Dark-rumped Petrel	DRPE	*Pterodroma phaeopygia*
Double-crested Cormorant	DCCO	*Nannopterum auritum*
Dovekie	DOVE	*Alle alle*
Dunlin	DUNL	*Calidris alpina*
Eared Grebe	EAGR	*Podiceps nigricollis*
Elegant Tern	ELTE	*Thalasseus elegans*
Emperor Goose	EMGO	*Anser canagicus*
Eurasian Wigeon	EUWI	*Mareca Penelope*
False Killer Whale	FKWH	*Pseudorca crassidens*
Fin Whale	FIWH	*Balaenoptera physalus*
Flesh-footed Shearwater	FFSH	*Ardenna carneipes*
Fork-tailed Storm-petrel	FTSP	*Hydrobates furcatus*
Forster's Tern	FOTE	*Sterna forsteri*
Franklin's Gull	FRGU	*Leucophaeus pipixcan*
Gadwall	GADW	*Mareca strepera*
Garganey	GARG	*Spatula querquedula*
Glaucous Gull	GLGU	*Larus hyperboreus*
Glaucous-winged Gull	GWGU	*Larus glaucescens*
Glaucous-winged x Herring Gull	GHGU	*N.A.*
Golden Eagle	GOEA	*Aquila chrysaetos*
Gould's Petrel	GOPE	*Pterodroma leucoptera*
Gray Whale	GRWH	*Eschrichtius robustus*
Gray-backed Tern	GBTE	*Onychoprion lunatus*
Gray-tailed Tattler	GTTA	*Tringa brevipes*
Great Black-backed Gull	GBGU	*Larus marinus*
Great Blue Heron	GBHE	*Ardea herodias*
Great Cormorant	GRCO	*Phalacrocorax carbo*
Great Egret	GREG	*Ardea alba*
Great Frigatebird	GRFB	*Fregata minor*
Great Skua	GRSK	*Stercorarius skua*
Greater Scaup	GRSC	*Aythya marila*
Greater White-fronted Goose	GWFG	*Anser albifrons*
Greater Yellowlegs	GRYE	*Tringa melanoleuca*
Green Heron	GRHE	*Butorides virescens*
Green-winged Teal	GWTE	*Anas crecca*
Guadalupe Fur Seal	GUFS	*Arctocephalus townsendi*
Guadalupe Murrelet	GUMU	*Synthliboramphus hypoleucus*
Gyrfalcon	GYRF	*Falco rusticolus*
Harbor Porpoise	HAPO	*Phocoena phocoena*
Harbor Seal	HASE	*Phoca vitulina*
Harlequin Duck	HADU	*Histrionicus histrionicus*
Hawaiian Petrel	HAPE	*Pterodroma sandwichensis*
Heermann's Gull	HEEG	*Larus heermanni*

Common Name	NPPSD 4-Letter Code	Scientific Name
Herald Petrel	HEPE	*Pterodroma heraldica*
Herring gull	HERG	*Larus argentatus*
Hooded Merganser	HOME	*Lophodytes cucullatus*
Horned Grebe	HOGR	*Podiceps auratus*
Horned Puffin	HOPU	*Fratercula corniculate*
Hudsonian Godwit	HUGO	*Limosa haemastica*
Humpback Whale	HBWH	*Megaptera novaeangliae*
Iceland Gull	ICGU	*Larus glaucoides*
Ivory Gull	IVGU	*Pagophila eburnean*
Japanese Murrelet	JAMU	*Synthliboramphus wumizusume*
Juan Fernandez Petrel	JFPE	*Pterodroma externa*
Kelp Gull	KEGU	*Larus dominicanus*
Kermadec Petrel	KEPE	*Pterodroma neglecta*
Killer Whale	KIWH	*Orcinus orca*
King Eider	KIEI	*Somateria spectabilis*
Kittlitz's Murrelet	KIMU	*Brachyramphus brevirostris*
Laughing Gull	LAGU	*Leucophaeus atricilla*
Laysan Albatross	LAAL	*Phoebastria immutabilis*
Leach's Storm-petrel	LESP	*Hydrobates leucorhous*
Least Auklet	LEAU	*Aethia pusilla*
Least Sandpiper	LESA	*Calidris minutilla*
Least Storm-petrel	LTSP	*Hydrobates microsoma*
Least Tern	LETE	*Sternula antillarum*
Lesser Black-backed Gull	LBBG	*Larus fuscus*
Lesser Frigatebird	LEFR	*Fregata ariel*
Lesser Scaup	LESC	*Aythya affinis*
Lesser Yellowlegs	LEYE	*Tringa flavipes*
Long-beaked Common Dolphin	LBCD	*Delphinus capensis*
Long-billed Curlew	LBCU	*Numenius americanus*
Long-billed Dowitcher	LBDO	*Limnodromus scolopaceus*
Long-billed Murrelet	LBMU	*Brachyramphus perdix*
Long-eared Owl	LEOW	*Asio otus*
Long-tailed Duck	LTDU	*Clangula hyemalis*
Long-tailed Jaeger	LTJA	*Stercorarius longicaudus*
Mallard	MALL	*Anas platyrhynchos*
Manx Shearwater	MASH	*Puffinus puffinus*
Marbled Godwit	MAGO	*Limosa fedoa*
Marbled Murrelet	MAMU	*Brachyramphus marmoratus*
Masked Booby	MABO	*Sula dactylatra*
Merlin	MERL	*Falco columbarius*
Minke Whale	MIWH	*Balaenoptera acutorostrata*
Mongolian Plover	MOPL	*Charadrius mongolus*
Mottled Petrel	MOPE	*Pterodroma inexpectata*

Common Name	NPPSD 4-Letter Code	Scientific Name
Murphy's Petrel	MUPE	*Pterodroma ultima*
Mute Swan	MUSW	*Cygnus olor*
Nazca Booby	NABO	*Sula granti*
Newell's Shearwater	NESH	*Puffinus newelli*
Northern Elephant Seal	NESE	*Mirounga angustirostris*
Northern Fulmar	NOFU	*Fulmarus glacialis*
Northern Fur Seal	NOFS	*Callorhinus ursinus*
Northern Gannet	NOGA	*Morus bassanus*
Northern Goshawk	NOGO	*Accipiter gentilis*
Northern Harrier	NOHA	*Circus hudsonius*
Northern Pintail	NOPI	*Anas acuta*
Northern Right Whale Dolphin	NRWD	*Lissodelphis borealis*
Northern Shoveler	NSHO	*Spatula clypeata*
Osprey	OSPR	*Pandion haliaetus*
Pacific Golden Plover	PAGP	*Pluvialis fulva*
Pacific Loon	PALO	*Gavia pacifica*
Pacific White-sided Dolphin	PWSD	*Lagenorhynchus obliquidens*
Parakeet Auklet	PAAU	*Aethia psittacula*
Parasitic Jaeger	PAJA	*Stercorarius parasiticus*
Parkinson's Petrel	PAPE	*Procellaria parkinsoni*
Pectoral Sandpiper	PESA	*Calidris melanotos*
Pelagic Cormorant	PECO	*Urile pelagicus*
Peregrine Falcon	PEFA	*Falco peregrinus*
Phoenix Petrel	PHPE	*Pterodroma alba*
Pied-billed Grebe	PBGR	*Podilymbus Podiceps*
Pigeon Guillemot	PIGU	*Cepphus columba*
Pink-footed Shearwater	PFSH	*Ardenna creatopus*
Polar Bear	POBE	*Ursus maritimus*
Pomarine Jaeger	POJA	*Stercorarius pomarinus*
Pycroft's Petrel	PYPE	*Pterodroma pycrofti*
Pygmy Sperm Whale	PSWH	*Kogia breviceps*
Red Knot	REKN	*Calidris canutus*
Red Phalarope	REPH	*Phalaropus fulicarius*
Red-Billed Tropicbird	RBTR	*Phaethon aethereus*
Red-Footed Booby	RFBO	*Sula sula*
Red-breasted Merganser	RBME	*Mergus serrator*
Red-faced Cormorant	RFCO	*Urile urile*
Red-legged Kittiwake	RLKI	*Rissa brevirostris*
Red-necked Grebe	RNGR	*Podiceps grisegena*
Red-necked Phalarope	RNPH	*Phalaropus lobatus*
Red-tailed Hawk	RTHA	*Buteo jamaicensis*
Red-tailed Tropicbird	RTTR	*Phaethon rubricauda*
Red-throated Loon	RTLO	*Gavia stellata*

Common Name	NPPSD 4-Letter Code	Scientific Name
Redhead	REDH	*Aythya americana*
Rhinoceros Auklet	RHAU	*Cerorhinca monocerata*
Ribbon Seal	RBSE	*Histriophoca fasciata*
Right Whale	RIWH	*Eubalaena japonica*
Ring-billed Gull	RBGU	*Larus delawarensis*
Ringed Seal	RISE	*Pusa hispida*
Risso's Dolphin	RIDO	*Grampus griseus*
River Otter	RIOT	*Lontra canadensis*
Rock Sandpiper	ROSA	*Calidris ptilocnemis*
Ross's Gull	ROGU	*Rhodostethia rosea*
Rough-legged Hawk	RLHA	*Buteo lagopus*
Royal Tern	ROYT	*Thalasseus maximus*
Ruddy Duck	RUDU	*Oxyura jamaicensis*
Ruddy Turnstone	RUTU	*Arenaria interpres*
Sabine's Gull	SAGU	*Xema sabini*
Sanderling	SAND	*Calidris alba*
Sandhill Crane	SACR	*Antigone canadensis*
Scripps's Murrelet	SCMU	*Synthliboramphus scrippsi*
Sea Otter	SEOT	*Enhydra lutris*
Sei Whale	SEWH	*Balaenoptera borealis*
Semipalmated Plover	SEPL	*Charadrius semipalmatus*
Semipalmated Sandpiper	SESA	*Calidris pusilla*
Sharp-shinned Hawk	SSHA	*Accipiter striatus*
Sharp-tailed Sandpiper	SPTS	*Calidris acuminata*
Short-billed Dowitcher	SBDO	*Limnodromus griseus*
Short-billed Gull	SBIG	*Larus brachyrhynchus*
Short-eared Owl	SEOW	*Asio flammeus*
Short-finned Pilot Whale	SFPW	*Globicephala macrorhynchus*
Short-tailed Albatross	STAL	*Phoebastria albatrus*
Short-tailed Shearwater	STSH	*Ardenna tenuirostris*
Slaty-backed Gull	SBAG	*Larus schistisagus*
Snow Goose	SNGO	*Anser caerulescens*
Snowy Egret	SNEG	*Egretta thula*
Snowy Owl	SNOW	*Bubo scandiacus*
Snowy Plover	SNPL	*Charadrius nivosus*
Solander's Petrel	SOPE	*Pterodroma solandri*
Solitary Sandpiper	SOSA	*Tringa solitaria*
Sooty Shearwater	SOSH	*Ardenna grisea*
Sooty Tern	SOTE	*Onychoprion fuscatus*
South Polar Skua	SPSK	*Stercorarius maccormicki*
Spectacled Eider	SPEI	*Somateria fischeri*
Spectacled Guillemot	SPGU	*Cepphus carbo*
Sperm Whale	SPWH	*Physeter macrocephalus*

Common Name	NPPSD 4-Letter Code	Scientific Name
Spinner Dolphin	SPDO	*Stenella longirostris*
Spotted Sandpiper	SPSA	*Actitis macularius*
Spotted Seal	SPSE	*Phoca largha*
Stejneger's Beaked Whale	STBW	*Mesoplodon stejnegeri*
Stejneger's Petrel	STPE	*Pterodroma longirostris*
Steller Sea Lion	STSL	*Eumetopias jubatus*
Steller's Eider	STEI	*Polysticta stelleri*
Steller's Sea Eagle	STSE	*Haliaeetus pelagicus*
Stilt Sandpiper	STSA	*Calidris himantopus*
Streaked Shearwater	STRS	*Calonectris leucomelas*
Striped Dolphin	STDO	*Stenella coeruleoalba*
Surf Scoter	SUSC	*Melanitta perspicillata*
Surfbird	SURF	*Calidris virgata*
Swinhoe's Storm-petrel	SSTP	*Hydrobates monorhis*
Synthliboramphus Murrelet	SYMU	*Synthliboramphus spp.*
Thayer's Gull	THGU	*Larus glaucoides thayeri*
Thick-billed Murre	TBMU	*Uria lomvia*
Townsend's Shearwater	TOSH	*Puffinus auricularis*
Townsend's Storm-petrel	TOSP	*Hydrobates socorroensis*
Tristram's Storm-petrel	TRSP	*Hydrobates tristrami*
Trudeau's Tern	TRTE	*Sterna trudeaui*
Trumpeter Swan	TRUS	*Cygnus buccinator*
Tufted Puffin	TUPU	*Fratercula cirrhata*
Tundra Swan	TUSW	*Cygnus columbianus*
Unidentified Albatross	UALB	*Diomedeidae (Family)*
Unidentified Alcid	UNAL	*Alcidae (Family)*
Unidentified Auklet	UNAU	*Aethia or Ptychoramphus spp.*
Unidentified Balaenoptera	UFWH	*Balaenoptera spp.*
Unidentified Baleen Whale	UNBW	*Mysticeti (Suborder)*
Unidentified Beaked Whale	UBKW	*Mesoplodon spp.*
Unidentified Bird	UNBI	*Aves (Class)*
Unidentified Booby	UNBO	*Sula spp.*
Unidentified Cetacean	UNCE	*Cetacea (Order)*
Unidentified Cormorant	UNCO	*Phalacrocorax spp*
Unidentified Dark Shearwater	UNDS	*Ardenna grisea or Ardenna tenuirostris*
Unidentified Dolphin	UNDO	*Unidentified Delphinidae*
Unidentified Dowitcher	DOWI	*Limnodromus sp.*
Unidentified Duck	UNDU	*Anatinae (Subfamily)*
Unidentified Duck; Goose; or Swan	UNWF	*Anatidae (Family)*
Unidentified Eagle	UNEA	*Accipitridae spp.*
Unidentified Eider	UNEI	*Somateria or Polysticta spp.*
Unidentified Falcon	UNFA	*Falco spp.*
Unidentified Frigatebird	UNFB	*Fregata spp.*

Common Name	NPPSD 4-Letter Code	Scientific Name
Unidentified Godwit	GODW	*Limosa spp.*
Unidentified Goldeneye	UNGO	*Bucephala spp.*
Unidentified Goose	UGOO	*Branta*
Unidentified Grebe	UNGR	*Podicipedidae spp.*
Unidentified Guillemot	UNGI	*Cepphus spp.*
Unidentified Gull	UNGU	*Larus spp.*
Unidentified Ibis	UNIB	*Plegadis spp.*
Unidentified Jaeger/Skua	UNST	*Stercorarius spp.*
Unidentified Kittiwake	UNKI	*Rissa spp.*
Unidentified Loon	UNLO	*Gavia spp.*
Unidentified Marine Mammal	UNMM	*Mammalia (Class)*
Unidentified Merganser	UNME	*Mergus spp.*
Unidentified Murre	UNMU	*Uria spp.*
Unidentified Murrelet	UNML	*Brachyramphus or Synthliboramphus spp.*
Unidentified Noddy	UNNO	*Anous or Procelsterna spp.*
Unidentified Otter	UNOT	*Lutrinae (Subfamily)*
Unidentified Phalarope	UNPH	*Phalaropus spp.*
Unidentified Pilot Whale	PIWH	*Globicephala spp.*
Unidentified Pinniped	UNPI	*Caniformia (Suborder)*
Unidentified Plover	UNPL	*Pluvialus or Charadrius spp.*
Unidentified Porpoise	UNPO	*Phocoenidae spp.*
Unidentified Procellariidae	UNPR	*Procellariidae (Family)*
Unidentified Pterodroma	UNPT	*Pterodroma spp.*
Unidentified Puffin	UNPU	*Fratercula spp.*
Unidentified Raptor	RAPT	*Accipitridae or Falconidae (Family)*
Unidentified Sandpiper	UNSA	*Scolopacidae (family)*
Unidentified Scaup	USCA	*Aythya spp.*
Unidentified Scoter	UNSC	*Melanitta spp.*
Unidentified Sea Lion	UNSL	*Eumetopias spp.*
Unidentified Seal	UNSE	*Phocidae (Family)*
Unidentified Shearwater	UNSH	*Puffinus spp.*
Unidentified Shorebird	UNSB	*Charadii (Suborder)*
Unidentified Skimmer	SKIM	*Rynchops spp.*
Unidentified Stint	USTI	*Calidris spp.*
Unidentified Storm-petrel	UNSP	*Hydrobatidae (Family)*
Unidentified Swan	SWAN	*Cygnus spp.*
Unidentified Tern	UNTE	*Sterninae spp.*
Unidentified Tropicbird	UNTR	*Phaethon spp.*
Unidentified Turnstone	UNTU	*Arenaria spp.*
Unidentified Whale	UNWH	*Suborder Mysticeti or Odontoceti*
Unidentified Yellowlegs	YELL	*Tringa spp.*
Upland Sandpiper	UPSA	*Bartramia longicauda*
Walrus	WALR	*Odobenus rosmarus*

Common Name	NPPSD 4-Letter Code	Scientific Name
Wandering Tattler	WATA	*Tringa incana*
Wedge-rumped Storm-petrel	WRSP	*Hydrobates tethys*
Wedge-tailed Shearwater	WTSH	*Ardenna pacifica*
Western Grebe	WEGR	*Aechmophorus occidentalis*
Western Gull	WEGU	*Larus occidentalis*
Western Sandpiper	WESA	*Calidris mauri*
Western x Glaucous-winged Gull	WGWH	*N.A.*
Western/Clark's Grebe	WCGR	*Aechmophorus spp.*
Whimbrel	WHIM	*Numenius phaeopus*
Whiskered Auklet	WHAU	*Aethia pygmaea*
White Tern	WHTT	*Gygis alba*
White-faced Storm-petrel	WFSP	*Pelagodroma marina*
White-necked Petrel	WNPE	*Pterodroma cervicalis*
White-rumped Sandpiper	WRSA	*Calidris fuscicollis*
White-tailed Tropicbird	WTTR	*Phaethon lepturus*
White-winged Scoter	WWSC	*Melanitta deglandi*
Whooper Swan	WHOS	*Cygnus cygnus*
Willet	WILL	*Tringa semipalmata*
Wilson's Phalarope	WIPH	*Phalaropus tricolor*
Wilson's Snipe	WISN	*Gallinago delicata*
Wilson's Storm-petrel	WISP	*Oceanites oceanicus*
Wood Duck	WODU	*Aix sponsa*
Wood Sandpiper	WOSP	*Tringa glareola*
Yellow-billed Loon	YBLO	*Gavia adamsii*
No Birds On Scan	ZERO	

9 Appendix 2: Hot-Key Actions

The following table shows all the possible actions defined for hot-keys. See Section 6.1 for more information.

Action	Description
Submit	Submits the currently entered observation.
Clear	Clears the data in the observation form on the left.
Quit	Quits the program.
Backspace	The key to use for backspace: Do not change.
Delete	The key to use for delete: Do not change.
vesselFocus	Sets the focus to the vessel field.
tripIdFocus	Sets the focus to the trip id field.
observerFocus	Sets the focus to the observer field.

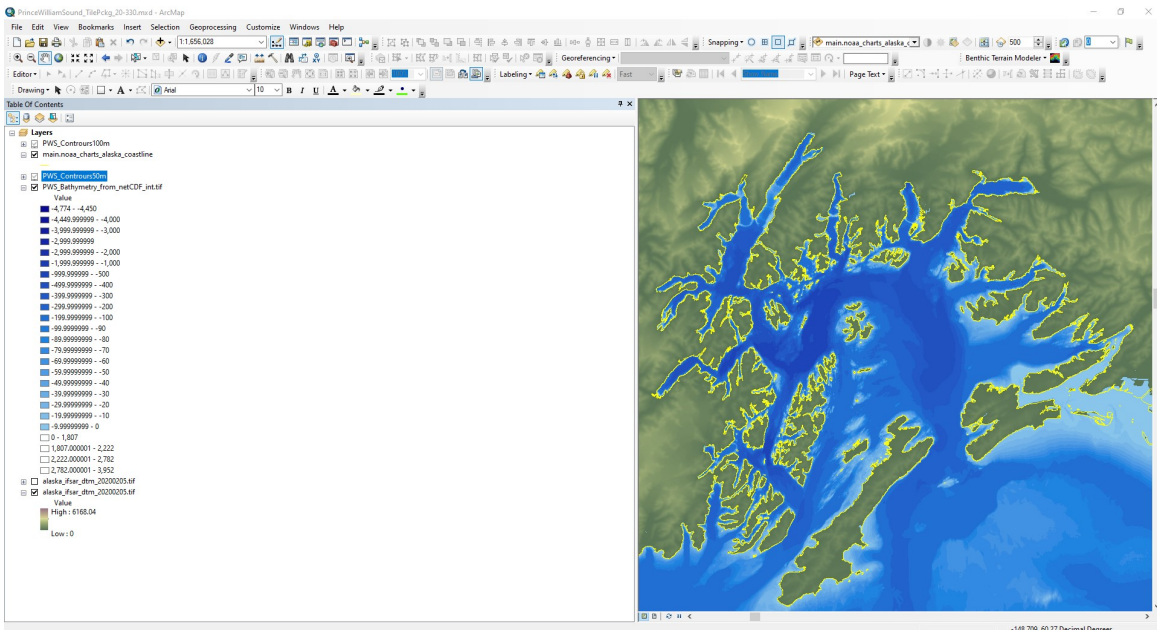
Action	Description
conditionFocus	Sets the focus to the condition field.
beaufortFocus	Sets the focus to the Beaufort field.
cloudCoverFocus	Sets the focus to the cloud cover field.
iceTypeFocus	Sets the focus to the ice type field.
binFocus	Sets the focus to the bin field.
ageFocus	Sets the focus to the age field.
sexFocus	Sets the focus to the sex field.
plumageFocus	Sets the focus to the plumage field.
commentsFocus	Sets the focus to the comments field.
transdectToggle	Toggles the transect field between ON and OFF.
obsSideIOToggle	Toggles the obs side between inshore, offshore, and none.
obsSidePSToggle	Toggles the obs side between port, starboard, and none.
primaryBehavior: FLY	Sets the primary behavior to the value after the colon (FLY in this example); see the Behavior Actions section below.
secondaryBehavior: DIVING	Sets the primary and secondary behaviors to the strings before and after the pipe character (FLY primary, diving secondary).
species: HOPU	Sets the species code to the value after the colon (HOPU in this example); see the New Species section below.
bin: 0	Sets the bin drop down to the value after the colon (0 in this example)
age: Adult	Sets the age drop down to the value after the colon (Adult in this example)
sex: Male	Sets the sex drop down to the value after the colon (Male in this example)
plumage: Winter	Sets the plumage drop down to the value after the colon (Winter in this example)

10 Appendix 3: Creating Tile Packages for SeaLog

Tile packages can be easily made from within ArcGIS. The tile package will be a raster of whatever is in the map display panel. In addition to coastlines, users may want to add transects, colony sites, etc. Tile packages tend to be very large and can take long periods to create for even small areas, so allow sufficient time for production. Below are step-by-step instructions for creating a tile package. A moderate level of experience with ArcGIS is required.

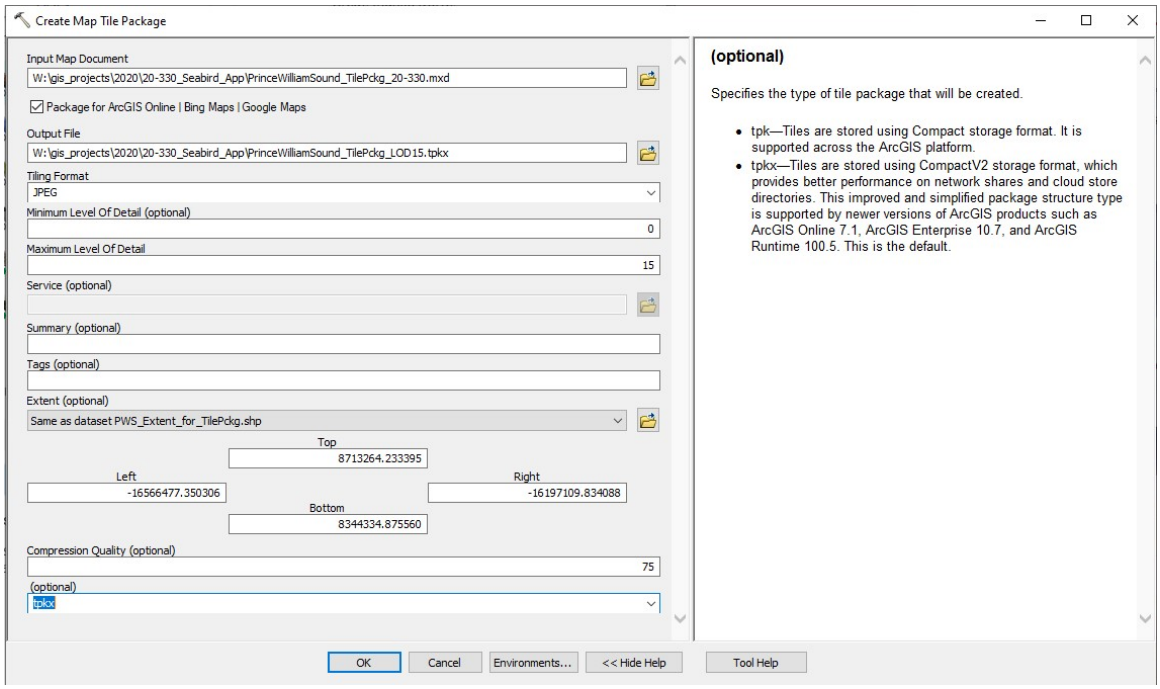
1. Make sure the "Data Frame" coordinate system is set to WGS_1984_Web_Mercator_Auxiliary_Sphere- if not the tile package will not be displayed.
2. No layers can be grouped, and no WMS layers included, or the tile package will not be displayed.

3. Zoom display to the area of interest. Move the table of contents bar right/left to restrict the area if necessary. The tile package extent will match the map area shown in the MXD. Only the area displayed will be included in the tile package.



4. Under File/Map Document Properties, update text to show your current tile package information. The tile package will not be created if this information is not filled in.

5. Open ArcGIS Toolbox and navigate to Data Management Tools>Package/>Create Map Tile Package.



6. Browse to the current map project (red arrow) and identify a name and location of the output tile package (blue arrow). The level of detail (resolution) of the tile package will be dependent on the “Maximum Level of Detail” (yellow area). While resolution can be project or study area dependent, we suggest users do not select a value less than 12. This will typically result in a large file that can take hours to complete.
7. We recommend users turn off the displayed layers and add the tile package to the project. If it displays in the current map extent it should work in SeaLog. If a tile package is sent to you, we have a tool that can test it without starting ArcGIS. Tile Package Checker