Avian Survey Application (SeaScribe) Manual

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Mobile Avian Survey Data Collection Software Application

BOEM contributing staff:
Josh Wadlington
The Bureau of Ocean Energy Management

Submitted by:
Project Manager: Andrew Gilbert
Andrew.Gilbert@briloon.org

Contributing staff:
Dr. Iain Stenhouse and Emily Connelly
Biodiversity Research Institute, Inc.
652 Main Street, Gorham, Maine
www.briloon.org

Matthew Merrill and Mako Bates
Tilson Government Services, LLC
245 Commercial St., Portland, ME 04101
www.tilsontech.com
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1 Purpose
The seabird survey application for Android and iOS devices, hereafter referred to as SeaScribe, was developed to fill a need for a modern data collection application for seabird survey efforts. The challenge was to create an intuitive, flexible application that would be cross-platform for Android and iOS environments and usable on both phones and tablets. This application will be freely available and hopefully gain wide acceptance and use. It is specifically designed to greatly increase data standardization and allow more thorough data recording, as well as increase the speed of post-survey processing while reducing data errors. We also expect that this program will make digital marine surveys collected by citizen-scientists more accessible.
2 System requirements

SeaScribe runs on smartphones or tablets running Android version 4.4-5.1 and iOS version 8.3-9.1. While future OS versions may be compatible with SeaScribe, we make no guarantee that it will do so.

There is no minimum size allowed for use, however, we suggest use of a screen size no smaller than 7”. The application was optimized for a 10” screen and we recommend this size tablet for optimal usability of the application.

Devices must have a built-in GPS or be able to obtain location services through attached GPS via Bluetooth or some other method. Location services must be enabled for the position information to be recorded in the survey app. A testing tool is provided in SeaScribe to test whether the GPS is operational. More information about this tool is provided later (see 6.2).

The device must be able to communicate via Wi-Fi or other data connection to the internet and must have a valid email account and/or Dropbox account to be able to export data. It is best if these accounts are set up prior to using SeaScribe.

We have done only limited testing of wireless keyboards and pointing devices (e.g., mice, trackballs) but they should be able to be used with SeaScribe as long as they work with the device itself. Use of wireless keyboards and pointing devices may assist with data entry.
3  Installing SeaScribe

3.1  Android
Installing the app to an Android device is very easy. You can visit the Google Play store and search for SeaScribe. Tap “INSTALL” to install the app. You may need to provide a password. Accept the special permissions to continue to install. The application will be downloaded and installed.

Alternatively, download the installer file (SeaScribe.apk) from http://www.briloon.org/seascribe or http://www.boem.gov/Renewable-Energy-Program-Mapping-and-Data/ or otherwise obtain a copy of the installer. Browse to the file on your device and click on the installer file. You must agree to allow the app to use certain functions such as the microphone and location services, etc. You must also change security settings to allow installation of third party applications. You must have installation rights on your device as well, which may be controlled by your organization. Seek IT support if you cannot install this app successfully.

3.2  Apple
To install the Apple iOS version on an iPhone or iPad, open the App Store on your device and search for SeaScribe. Click “install” to install the application. The application will be downloaded and installed. You may be asked to provide a password for your account. Once successfully installed, you can click open or tap on the application on the device window.
4 Removing SeaScribe

4.1 Android
Go to the device’s settings, select Apps or Application Manager, touch the app you want to uninstall and touch uninstall. You may also be able to drag the app to the trash in the application folder. Deleting the app will also remove all of the data. Make sure you have removed whatever data you would like prior to uninstalling.

4.2 Apple
Long-press the icon for the app and click the “X” on the upper corner of the app. Agree to delete the app and all of its data. You can also remove an app by going to Settings – General – Storage & iCloud Usage – Storage – Manage Storage – SeaScribe – Delete App. Agree to delete the app and all of its contents. Deleting the app will also remove all of the data. Make sure you have removed whatever data you would like prior to uninstalling.
5 Standard Survey Methods

There are two major survey methods in use today: the line transect method (distance sampling) and strip transect method. Some also use a hybrid method, but in our opinion there is no real benefit to such a method as it makes analysis more complicated with limited benefits. We generally advocate use of the line transect method as estimates of true abundance are of greatest accuracy because they account for differences in detectability and can include effects of observer bias and other environmental effects (e.g., sea state or light conditions) on abundance estimates (Buckland et al., 2001; Ronconi and Burger, 2009).


5.1 Line transect method (distance sampling)

Conduct surveys looking forward from one side of the vessel (plane or ship) in a bow-to-beam arc extending to 90° on one side (0-90° or 270-360° depending on what side you are on). Observations should be made on the side of the vessel that provides the best visibility (e.g., the least glare), changing sides throughout the survey as necessary to maintain good viewing conditions, but recording the change of sides in SeaScribe. Scan continuously using the naked eye or binoculars to identify birds, marine mammals, sea turtles, and other fauna or objects in the distance. Regularly scan ahead for diving birds, or for sitting birds that may flush off of the water. Record distance to the object or group in meters and angle to the object in degrees from the front (bow 0°) of the vessel, 90° being the starboard (or right) side and 270° being the port (or left) side relative to the bow (front) of the vessel. Record the number observed in the group (being 1 or more objects). The distance and angle must be recorded for the center of the group when it is first sighted. When densities are high and the observer struggles to keep up with entry, record as many distances and angles as possible without missing objects to record. Modeling methods can correct detections without distance measurements, but DO NOT change monitoring protocols under these conditions (e.g., switch from a line transect to a strip transect to reduce the number of objects for observers to count). At the beginning of the survey, and every 15-30 minutes throughout the observation period, record Beaufort sea state, visibility code, and the side the observer is viewing from. SeaScribe will prompt you for this information at a user-defined time (15 minutes default). Record this information whenever the observer changes or conditions visibly change.

The most difficult aspect of this method is the estimation of distance. Observers should practice estimating distance for objects of different sizes at different known distances prior to starting surveys. There are methods that can be used as well to assist with distance estimation such as creating a distance ruler, for which a tool is provided in SeaScribe (see 6.9.2).
5.2 Strip transect method

Conduct the strip transect method from one side of the vessel or the other, whichever has the best visibility (e.g., the least glare), changing sides throughout the survey as necessary to maintain good viewing conditions. In the strip method, all objects are counted within an area 300 m from the centerline of the vessel (300 m distance and 90° arc). Primarily the observer should watch the forward 90 degree quadrant, but occasionally look behind to determine if birds are following the vessel. Use a reliable estimate of the strip boundary from the observation position such that the observer can quickly determine if an object is within the strip or not. Scan continuously using the naked eye or binoculars to identify birds, marine mammals, sea turtles, and other fauna or objects in the distance. Regularly scan ahead for diving birds, or for sitting birds that may flush off of the water. At the beginning of the survey, and every 15-30 minutes throughout the observation period, record Beaufort sea state, visibility code, and the side the observer is viewing from. SeaScribe will prompt you for this information at a user-defined time (15 minutes default). In addition, record this information whenever the observer changes or conditions visibly change. If you record any incidental observations outside of the 300 m strip, such as for rare animals or marine mammals, make sure to record the distance (>300 m) or that these are out-zone (outside 300 m zone) birds somehow so they can be removed from analysis of relative density.
6 Using SeaScribe

SeaScribe was designed to be as intuitive as possible considering the complexity of the task. The main entry to the application is the main menu when you first bring up the app. Start here to access all areas of the application.

6.1 Main menu

When you start SeaScribe you will see a main window with four menu buttons (Figure 1):

1. “Start New Survey” – the entry point for starting a new survey.
2. “Existing Surveys” – access existing survey data.

Click one of the blue buttons to advance to the next screen. Each will be explained below.

![Main menu screenshot](image)

_Figure 1. Main menu._
6.2 Start New Survey
This is the primary screen for beginning a new survey, where a survey is considered a collection of one or more transects – a transect being an un-interrupted period of observation during a survey. It is up to the user to determine how they want to define a survey rather than a new transect period under an existing survey. This screen asks the user to provide information about the survey itself, including the survey name, methodology, observers taking part and their experience, survey platform, survey region and sub-region, species list, and ancillary fields (Figure 2).

![Start New Survey Screen](image)

**Figure 2. Start new survey screen**

Filling out the form:

- Note that for all fields, a red outline here indicates a problem with data entry, in most cases a field that is required but not yet filled in.

  1. Enter the survey name (required) – this can be any alphanumeric entry up to 100 characters in length.
2. Enter the mode – either “standard” or “audio only”. This provides a fork for the application for data entry later on, either as full data entry capabilities and including audio and photos or “Audio Observations Only” which provides a data entry window with audio recording buttons only to simplify this type of data entry. Standard is default.

3. Methodology – select the stored methodology or click “+” to add a new methodology (Figure 3). This allows the user to define the survey methodology and stores it for later selection. Once this is entered, you can simply select it in the drop down, speeding up data entry in the future.
   a. Enter a methodology name in alphanumeric format up to 100 characters (required). This is a name you will select later if using this methodology again when setting up a new survey.
   b. Select the survey type (required): fixed width (strip), line transect (distance sampling), or combined.
   c. Select the counting methodology: continuous, snapshot, or vector (required).
   d. Select if one or both sides of the vessel are being used to count (required) – this is important as it helps determine the primary viewing area of the observer.
   e. Ancillary fields – here you can add or modify any additional fields to the observation form. Use this subform to add ancillary fields, remove or create and add new ancillary fields to the observation form. Ancillary fields are beyond the core set of default fields and are meant to allow observers to record additional information for specific research needs (see 6.3). These fields added here with a methodology are always added when this methodology is selected, saving time in the future once set up.
   f. Click “Save” to accept the “New Methodology” and return to the “Start New Survey” form. Click “Clear” to start over. Click the “< Start New Survey” at top left to return to the “Start New Survey” form.

![Figure 3. New methodology subform.](image)

4. Enter the number of observers and add observer(s) contact information. This will automatically create the number of observer fields (observer 1, observer 2, etc.). If you have not already done so, you must populate this list of observers by going to the “New Observer” subform (Figure 4).
Once you add the observer, you can select them from the dropdown box and then enter their experience level and any notes about their experience such as years of experience, whether they have good knowledge of marine mammals, turtles, or other taxa, etc. Continue to do this for each observer that is observing during the survey. You will be able to select each observer in the observations form later on and have the opportunity to add observers then as well if they are not entered here.

5. Select the survey platform or add a new survey platform if necessary. Click the “+” to go to the “New Survey Platform” subform (Figure 5). Entering the platform name and type (watercraft, aircraft, or point location). Click “Save” to accept or “Clear” to clear the form to start over. “Cancel” (top right) exits without saving.
6. Select the Region from the list: North Atlantic Ocean, North Pacific Ocean, or Arctic Ocean (required).
7. Select the sub-region if desired.
8. Select the species list that will be used to populate and validate the species selected in the observation form. Currently, SeaScribe provides lists that support the Atlantic Seabird Catalog database (formerly the Northwest Atlantic Seabird Compendium\(^1\)) and the North Pacific Pelagic Database\(^2\). The species lists have different codes for different species, species groups, and objects so it is important to select the correct species list to support the geographic area you are observing in.
9. The ancillary fields added in the methodology will be displayed, check for accuracy. If you want to modify the ancillary fields, you can do so by clicking here, but any changes to the ancillary fields will create a new methodology.
10. Click the Check GPS bar to test the GPS for operation. If the GPS is able to return a location, the bar will turn green. If the bar does not turn green (see Figure 6), you may need to improve your view of the sky to allow for better GPS signal. Also, check to make sure that Location Services are enabled which allows the device to access GPS and provide locations to the app. On Android devices, you may be able to use an external Bluetooth GPS receiver by connecting to the external GPS and enabling “Allow mock locations” under the Debugging section of Developer options in settings. Install a third party GPS app to test the external GPS before using.
11. Click “Start Transect” once all required fields are entered and the Start Transect button is not grayed out. Click “Clear” if you want to clear the fields and start again.

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6.3 Adding ancillary fields to the observation form

Adding and removing ancillary fields is easy. When you select the Ancillary Fields field, you are brought to the “Select Ancillary Fields” form (Figure 7). In this form, you can add available fields to the selected fields list on the right of the form using the right arrow (>), remove it with left arrow (<), add all (>>, or remove all (<<). If you need to create and add a new ancillary field, click the “+” button and the “New Ancillary Field” subform will pop up. Click “Save” to save the ancillary field list to the methodology.
To create a new ancillary field (Figure 8):

1. Give the field a unique name.
2. Tell it how frequently the observation should be recorded – every observation or only periodically change.
3. Determine the sort order; where it shows in the observation form.
4. Choose the input control (numeric, text, select from a list).
   a. When using select from a list, you tell the application how many selections you would like and then enter the selections to create the dropdown list in the observation field.
   b. Scroll down the form to complete and enter “Save” to save, “Clear” to clear the form and start over or “Cancel” to exit without saving the new ancillary field.

![New Ancillary Field](image)

Figure 8. Create new ancillary field.

However, ancillary fields are considered intrinsic to the methodology, for which you will be warned.
That is, if you change ancillary fields for a methodology that has already been created, you must then change the name of the methodology and this popup box will prompt for a new name.

6.4 Starting a transect

Once you have clicked “Start Transect” at the end of the “Start New Survey Form” you will enter the Start Transect form. Here you will enter the initial conditions for the start of the survey and confirm the system date/time are correct. This is important as it provides a backup date/time for observations if the GPS fails to provide it.

Figure 9. Blank start transect form.
1. Enter the Transect Name if one is used.
2. Select the Observer from the list you entered initially (required).
3. Enter the observation Position (port or starboard) (required).
4. Enter the Beaufort sea state (0-12, required, see 6.9.1).
5. Enter the Visibility category: 0-300m, 300-500m, 500m-1km, 1-3km, 3-5km, unlimited (required).
6. Check that the date is correct. If it is not, you must correct it with the device’s date/time settings since this date/time used here is pulled from the system clock. If it is correct, click the radio button to confirm.
7. Once you are finished and all required fields have been filled in, click the “Start Recording Observations” button (Figure 10) to proceed to the observation form or “Cancel” to exit.

![Start Transect form](image)

**Figure 10. Filled in start transect form.**

### 6.5 Recording Standard Observations

You will see on entry to the observation form that it is split into a header bar and four viewing panes (Figure 11):

1. Data entry – main part of the form for recording all observation related data.
2. Map – the map of the survey area including survey track(s) and observation points.
3. Spreadsheet – data records are shown here and can be edited.
4. Action pane – pane for holding various buttons including the save observation, clear data, take picture, record audio, and stop transect buttons.

Viewing panes can be manipulated in size to maximize or minimize one pane over another by dragging the grey bars left or right or up and down.
6.5.1 Observation form header bar
The bar will be green when SeaScribe is successfully acquiring a location and turns red when GPS signal is lost. While SeaScribe will continue to function and observations can be saved, no positional information will be recorded, only the system date-time stamp will recorded for that observation which can be used to estimate position in post-processing if speed and direction are known.

There are two buttons at the right hand side of the bar: and for layout and options.

6.5.1.1 Layout observation form button

allows the user to select a pre-defined layout. Click this button to access it.

The following options are available:

1) Maximize data-entry area.
2) Maximize map area (Figure 13).

Figure 12. Maximized data entry in observation form.

Figure 13. Maximized map area in observation form.
3) Maximize spreadsheet area (Figure 14).

![Image: Spreadshirt Area](image)

**Figure 14.** Maximize the spreadsheet area in observation form.

4) Reset layout.

**6.5.1.2 Options and tools button in the observation form**

![Image: Options and Tools](image)

This button gives access to various tools and options for the observation form (Figure 15):

1) Center Map – center map on current location.
2) Reset Map Zoom to Default.
3) Show Offline Map Cache – if maps were cached while online (see 6.9.10), you can switch to the map cache that is stored on the device.
4) View Online Map – switch to online map display if internet is available for viewing.
5) Disable GPS Heartbeat – turn off the GPS heartbeat which records the current position every X seconds as designated in the settings (see 6.8.1).
6) Disable Center Map on Latest GPS – do not move map to center on latest GPS position.
7) Show all Transects on Map – map all of the transects recorded from the survey to show prior transects.
8) Show Illustrated Beaufort Scale – show Beaufort sea state chart for reference (see 6.9.1).
9) Show Distance Estimation Guide – show the distance estimation tool for calculating measurements to put on a guide for distance references (see 6.9.2).
10) Stop Transect.
6.5.2 Entering observations into the observation form

Entering observations can be as simple as entering the species and count, but can include many other observation fields and as recommended should include the distance and angle to every observed animal, for which the layout of the fields was optimized. The default fields are described below, but the app can be customized to include ancillary fields as well. The observation fields are broken into two categories: non-persistent (entered every record as needed) and persistent fields (are carried from one record to the next until the user changes the values).

6.5.2.1 Non-persistent fields

- Species – enter the four letter species or species group code or starting typing in the name and SeaScribe will return a list of matches that you can select (Figure 16). In order to speed up data entry, SeaScribe keeps a record of the most recorded codes and adds them to the quick species selector below the species entry field. The program will continue to update this list so that you have an up to date list of species codes to choose from. This can greatly speed up data entry.
If a species code is entered that is not in the application database, SeaScribe prompts for additional information about this code when you go to save the observation (Figure 17). Please enter the common name for the object and type (bird, marine mammal, sea turtle, fish, or other). If this was an error in data entry, you may cancel and change the species code.

- Count – counts can be entered as any whole number or use the quick pick “1” value.
- Distance – distance to object in meters.
- Degree – bearing to object with the front of the vessel equal to 0 degree, right side 90 degrees, left side 270 degrees, etc.
- Behavior – select the behavior of the animal from the list.
• Quick Behavior – press the quick behavior button to speed up behavioral code entry. These can be changed in the settings of the app.
• Direction – cardinal movement of the object.
• Age – age code of the animal.
• Plumage – plumage code of the animal.
• Sex – male, female, or unknown.
• Linked With – is a unique identifier that allows the observer to link species observations records together so that one can associate species that have been observed together.
• Comment – any additional comments about the observation.

Figure 18. Example of filled in fields in the observation form.

Ancillary fields are typically found below these such as “Flight height” and “Oiled” fields below (Figure 19), but sort order can be set when adding these fields (see 6.3).
6.5.2.2 Persistent fields

Persistent fields are ones that normally do not change, or change infrequently and are recorded in each record until the user changes them. SeaScribe will prompt for the user in the header bar with a blue “Time to review persistent form fields” alert. You can change the alert schedule in the settings. Other persistent fields can be added as a customization by the user, such as the weather code below in Figure 20.

- Observer – select the observer or add an observer using the “+” button if not already entered during initial survey setup.
- Position – side of the vessel observations are being made on.
- Beaufort – the sea state code.
- Visibility – the visibility category.
Using the buttons, the user can take photos using the onboard camera and/or record audio and associate these image and audio files with an observation record. These files are also exported and associated with the record for ease of reviewing and archiving later.

Selecting the camera button gives you access to the camera device and its functionality, allowing you to “retry” or “ok” the picture for saving.

Selecting the green audio recording (microphone) button allows the user to record a segment of audio and save it to the observation.

The audio file can later be played and deleted or saved if necessary by clicking on the audio field in the record for that observation in the spreadsheet view.
6.5.3 Mapping pane

The map pane allows the user to track the progress of the survey as well as shows the observations in increasing size markers with larger counts (Figure 21). The observation circle marker has a number of settings including color, radius multiplier, radius minimum and radius maximum allowing the user to customize these markers. The blue line below shows the track of the survey and can be customized for color in settings (see 6.8.2). If you would like to display all the tracks from transects for the survey go to the observation options and click “Show All Transects on Map.”

![Observations with increasing size marker depending on count and survey track line.](image)

The map displays the current map center location and zoom level of the map in the lower right of the map window. The default is for the map view to shift to keep the last position centered in the window, but this can be disabled by going to the observations form options (see 6.5.1.2). The map is dynamic and can be manipulated by touching the map and dragging it and can be zoomed out or in by using two fingers to pinch or spread fingers apart. You can always re-center the map by going to the options for the form in the header bar (see 6.5.1.2).

The map defaults to online streaming of map content. If you do not have internet access, the map will show no content in the background, though the track and observation points will continue to display. If you anticipate not having internet connection while conducting the survey, it is advised that you download a map cache for the anticipated survey area at multiple zoom levels (see 6.9.10). Doing so will allow the map background to display properly once the “Show Offline Map Cache” button is clicked in
the options button of the header bar (see 6.5.1.2). If no maps are available in the map cache, the following will be shown:

Download map content prior to beginning the survey when internet is available.

Other options are available for the map including resetting the map zoom to default, fit the map to course, and disable center map on latest GPS.

6.5.4 Spreadsheet pane
The spreadsheet pane shows the observation records as they are entered and allows the user to make edits to these observations while still collecting data. The user can maximize this pane for easier viewing and editing if necessary by clicking the layout options button in the header (see 6.5.1.1).

6.5.4.1 Editing records in the spreadsheet pane
To edit records, simply scroll to the desired record to edit and click in the cell for editing. Clicking on a cell will bring up the appropriate keyboard or dropdown list. If it’s a text or number field simply type in the field.

If it’s a dropdown list, click the cell and then click the list shown again and it will expand to allow selection of the correct entry.
6.5.4.2 Marking a record for deletion in the spreadsheet pane

The first column of the spreadsheet view allows you to mark the record for deletion.

We do not include the ability to make deletions during the survey to prevent accidental deletion, so we provide a way to flag a record for deletion later, after which they can be processed for deletion in the data editor once the transect is complete (6.7.2.1). When a record is flagged for deletion, a reason must be entered in the popup box.

6.5.5 Finishing the transect

When you have finished the transect, you may click the “Stop Trans” button in the button pane or in the options button list. Once you have clicked this button it confirms that you want to stop collecting data
for this transect. Click “OK” to accept or click “Cancel” to return to the observation form and continue
the transect. Caution, once you click “OK”, there is no way to continue, you must start a new transect
and then merge the two transects later in post-processing if they need to be continuous for analysis
purposes.

Once you have confirmed that you want to end the transect, you will be given the opportunity to add
comments about the transect if you want. Click “Stop Transect” to exit.

6.6 Recording Audio-Only Observations
In some surveys, it may be necessary to perform audio-only data entry during the survey. This is
common when performing aerial surveys where animals are passing by at high rates of speed and
entering data in the standard data entry form could result in missed animals. We have provided an
audio-only data entry form with simple, large buttons for recording audio observations and saving
records. Each audio file is geo-referenced and the record of which can be seen in the spreadsheet view.
Click “Record” to start recording an observation and “Save obs” to stop recording and save the
observation audio file. Clicking “Cancel” will cancel the current audio recording. Click “Stop Trans” to
exit the current transect.
6.7 Existing Surveys

Within “Existing Surveys”, the user can see the list of existing surveys, most recent first, and corresponding transects, also most recent first (Figure 23). There are different operations that can be performed when selecting surveys or transects of chosen surveys.

![Existing surveys screen](image_url)

**Figure 23.** Existing surveys screen.
6.7.1 Operations on surveys

6.7.1.1 Start new transect
This button allows you to start a new transect within an existing survey. This brings you back to the “Start Transect” form (see 6.4) where you can continue to add data to the survey.

6.7.1.2 Generate survey report
You can generate a summary report for the survey by selecting the survey of interest and pressing “Generate Report”. An on-screen report will be created with information about the survey including survey name, duration, distance traveled, methodology, number of transects, transect name(s), and number of users along with a summary table of observations to included observed species, number observed, total count, counts/hour, and counts/km (Figure 24).

Figure 24. The survey report tabulating a survey.

Within the survey report screen, if you click the upper right button on the screen, you are given the option to “Submit Report” via email or Dropbox in HTML format. This report can be read in any web browser and will show up in email content as well.
Select the export destination (Email or Dropbox) and select “Export” or “Cancel” (Figure 25). If you choose email and an email client is set up then the html report will be attached to a generated email in the email client on the device. Enter a recipient to send. If you choose to export via Dropbox and no Dropbox account is linked to SeaScribe, the program will request an email and password to link (Figure 26).

Figure 25. Survey report exporting parameters.

Figure 26. Dropbox sign in form for linking Dropbox to SeaScribe.
6.7.1.3 Submit survey data
To submit data by email or Dropbox, select one or more surveys. Selected surveys will be highlighted in blue and can be unselected by clicking the selected (blue) row. Click “Submit” for selected survey(s) to submit all of the data collected for the survey(s) including all transects. Like report submission, data submission gives you options for the export destination, email or Dropbox, as well as export format options: JSON (JavaScript object notation) and CSV (comma-separated value). JSON is a lightweight data-interchange format popular for programming and the web (http://www.json.org/). Using JSON, all fields and metadata are stored in this text-based format and only a single file is exported per survey. CSV data is presented in tabular format, ready to be loaded into statistical software or GIS programs for example. When selecting CSV, in addition to the data, metadata about the survey is provided separately as a JSON file, and the trip report in HTML (total of three files).

You will see that once data are submitted that the column “Submitted since Last Change?” will be filled in with either Email and/or Dropbox. Successful export will generate an email with attachment(s) when submitting by email, but note that SeaScribe can’t verify whether or not the email has been sent. Check your sent email box for confirmation of submission. If results have been successfully written to Dropbox, an “Export Results” dialog box will be shown.
If submitting data directly to BOEM, the address ‘boemseascribe@boem.gov’ can be used to submit data. This address is monitored by personnel at BOEM.

6.7.1.4 Delete a survey
To delete survey level data, select one or more surveys. Selected surveys will be highlighted in blue and can be unselected by clicking the selected (blue) row. Click “Delete” for selected survey(s) to delete all of the data collected for the survey(s) including all transects. Confirmation is required.

Click “OK” to confirm and proceed to the next confirmation step or “Cancel” to exit. In the next step, you will be provided a confirmation code to enter to execute the deletion. This is a safety mechanism to protect the user from accidental deletion. Enter the code and click “Delete” to delete or “Cancel” to exit.

After deletion, the survey and associated transect(s) will be removed from the list (Figure 28).

Figure 28. Transect removed after deletion from list of transects.
6.7.2 Operations on transects
When a transect is selected after selecting a survey, you can “Open Data Editor”, “Generate Report”, and “Delete”.

6.7.2.1 Data editor
You can edit observations for a particular transect by selecting the transect and clicking the “Open Data Editor” button which takes you to the editor screen.

![Image of Data Editor screen]

Figure 29. The data editor screen.

If you click on the options button at the top right you have access to three options: “Start New Transect for this Survey”, “Submit Survey”, and “Exit”.

![Image of Options in Data Editor]

Figure 30. Options in the data editor.

In the data editor, like on the real-time spreadsheet view of the observations form (see 6.5.4), you can edit data fields (Figure 31, Figure 32).
Figure 31. Editing text fields in the data editor.

Figure 32. Editing dropdown fields in the data editor.
You can also process records for deletion here that you marked while recording data or marked here in data editing. Mark any additional records you may wish to delete and click the **Process Deletes** button.

### 6.7.2.2 Generate transect-level report

You can generate a summary report for a transect by selecting the transect of interest and pressing “Generate Report”. An on-screen report will be created with information about the transect including survey name, duration, distance traveled, methodology, number of transects, transect name(s), and number of users along with a summary table of observations to included observed species, number observed, total count, counts/hour, and counts/km (see Figure 24 for similar report at the survey level).

Within the survey report screen, if you click the upper right button on the screen 💌, you are given the option to “Submit Report” via email or Dropbox in HTML format. This report can be read in any web browser and will show up in email content as well.

Select the export destination (Email or Dropbox) and select Export or Cancel (Figure 25). If you choose email and an email client is set up then the html report will be attached to a generated email in the email client on the device. Enter a recipient to send. If you choose to export via Dropbox and no Dropbox account is linked to SeaScribe, the program will request an email and password to link (Figure 26).

### 6.7.2.3 Delete a transect

To delete transect level data, highlight a transect in blue by selecting it (unselected by clicking the selected blue row). Click “Delete” for the selected transect to delete all of the data collected for this transect. Confirmation is required. After deletion, the transect will be removed from the list.

### 6.8 Settings

SeaScribe has a number of settings that allows the user to customize many things within the program. You can access the settings from the main menu of SeaScribe (see Figure 1). The settings are grouped into the following categories: GPS, mapping, map cache navigator, user interface, hotkeys, alerts, export and system. SeaScribe comes with default settings, which can always be reset by clicking the reset button at the bottom of the form. If any settings are outside of the required bounds, SeaScribe will suggest the upper or lower limit and also prompt you with a red box around it to enter a value.

#### 6.8.1 GPS settings

The first category of settings is related to GPS function (Figure 33).
Figure 33. GPS function settings.

The following settings are available:

1) **Automatic GPS Polling Activated** – you can either enable or disable the polling function of the GPS. Automatic polling means that SeaScribe will request a location from the GPS and record this location along with the persistent field data at the set polling interval. Having polling on allows the user to record the track and thus effort for the survey. If the survey is a fixed survey effort, however, such as a seawatch, you may not want the location information being constantly recorded since it is of the same position (enabled or disabled, default = enabled).

2) **Automatic GPS Polling Interval (s)** – the polling interval in seconds (see above) (5-3600 s, default = 30 s).

3) **GPS Timeout (s)** – when GPS signal is poor, the GPS can “timeout” causing no location to be returned to SeaScribe. This timeout issues a warning in SeaScribe. The timeout interval can be lengthened if signal is poor and timeout occur regularly or shortened as necessary (1-60 s, default = 10 s).

4) **Record failures during polling** – when a request for GPS coordinates fails, do you want to record the error message to the database (enabled or disabled, default = disabled).

### 6.8.2 Mapping settings

Here you can adjust settings related to mapping in the observation form (Figure 34).
Figure 34. Mapping function settings.

Mapping options include:

1) Initial zoom level (1-15, default = 11).
2) Follow Latest GPS Logged – move the map to follow the latest GPS position logged (enabled or disabled, default = enabled).
3) Course Line Color – select one of fifteen colors (default = blue).
4) Circle Rim Color – select one of fifteen colors (default = red).
5) Circle Fill Color – select one of fifteen colors (default = red).
6) Circle Fill Opacity – set the opacity of the circle fill from transparent (0) to opaque (100) (default = 50).
7) Circle Radius Multiplier – this sets the multiplier of the observation point circle radius; this factor is responsible for the circle size increasing as the observation count increases (1-20, default = 5).
8) Circle Radius Minimum – this sets the minimum of the observation point circle radius (10-100, default = 10).
9) Circle Radius Maximum – this sets the maximum of the observation point circle radius (100-1000, default = 500).

6.8.3 Map cache navigator settings

These setting set define options in the map cache navigator (Figure 35).

Figure 35. Map cache navigator settings.
Settings include:

1) Show the Lowest Zoom Only – you can end up with a lot of tiles in the map cache, especially if you cache multiple zoom levels. This makes the Offline Map Cache display difficult to navigate, due to the sheer number of tiles. When Show Lowest Zoom Only is enabled, only tiles from the lowest zoom level will be displayed in the Offline Map Cache display. For example, if you cache zoom levels 10 to 12, only tiles from the level 10 set are shown (enabled or disabled, default = enabled).

2) Show Label Tiles – the ArcGIS ocean maps are split into two sets of tiles; terrain and labels, both are downloaded when the user requests to cache a map. In the Offline Map Cache display, the label tiles are small enough to be largely illegible, making their usefulness in that display minimal. This setting exists to once again reduce the number of tiles in the Offline Map Cache display (enabled or disabled, default = disabled).

6.8.4 User interface settings
Settings related to the user interface (Figure 36).

![User Interface Settings](image)

**Figure 36. User interface settings.**

1) Set the divider width between panes in the observation data entry form. A wider divider is easier to touch in the UI, but takes up valuable screen real estate.

6.8.5 Hotkeys settings
These are settings to control hotkeys (Figure 37). By default, only behavior has a hotkey field. If the user adds any hotkeys to age or plumage, the “Quick Age” and “Quick Plumage” fields are added to the observation form. The user can change the listed order if you click the blue “Show Reorder” button. Drag the values using the three lined symbol at right to the desired order. Click “Save” to save the hotkey settings or “Cancel” or click outside of the popup form to cancel and exit.

![Hotkey Settings](image)

**Figure 37. Hotkey settings.**

1) Age – assign the ages as hotkeys to speed up data entry.
2) Behavior – assign the behavior hotkeys which have defaults as shown in the settings.
3) Plumage – assign the plumages as hotkeys to speed up data entry.

6.8.6 Alerts settings
Here the user can modify settings related to the persistent check alert (Figure 38).
6.8.7 Export settings
Settings related to data export.

1) Detach from Dropbox Account – this setting allows the user to detach the device from Dropbox. This is a 3-step process including signing out of Dropbox, disassociating the application from the Dropbox account via a web browser, and restarting the app. You will be asked to click next to continue after explaining this process in a dialog box.

6.8.8 System settings
System settings can be changed here. Except for “About”, all of these options are designed to assist with debugging any issues that may arise. As such, we recommend leaving the default settings unless directed otherwise by a technical support representative.
1) **Debugging Mode** – if enabled, extra options are shown in the Manage Data page. These extra options are Export Database, View Persistent Logs, and View Device Info (enabled or disabled, default = disabled).

2) **Logging Level** – sets the transient logging level. Levels, in order from most voluminous to least, are Debug, Info, Warn, Error, and Fatal. This is of no practical use unless the device is directly connected to a developer workstation for debugging purposes; we recommend leaving the setting at Info (Trace, Debug, Info, Warn, Error, or Fatal; default = Info).

3) **Persistent Log Threshold** – sets persistent logging level. Levels, in order from most voluminous to least, are Debug, Info, Warn, Error, and Fatal. We recommend never setting this threshold below Info unless so directed by a technical support representative (Debug, Info, Warn, Error, or Fatal; default = Info).

4) **About** – this is not a setting at all, but provides details about SeaScribe (Figure 41): version, funders (BOEM) and creators (BRI and Tilson), mapping data and open source attributions as well as links to further information (press “Go” to open a web browser for more info and click the X to return to SeaScribe).
Figure 41. The about screen.
6.9 Tools
SeaScribe provides a few tools accessed from the “Tools” menu: illustrated Beaufort scale, distance estimation guide, manage data, and offline maps, each of which will be described below (Figure 42).

![Figure 42. Tools menu.](image)

6.9.1 Illustrate Beaufort Scale
This tool provides an illustrated guide to assessing Beaufort Scale (sea state). The conditions and an image are provided to assist the observer in correctly identifying Beaufort condition (Figure 43) which has an important effect on object detection. This scale is also accessible from the observation form options and tools button in the Observation Form.

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3 https://en.wikipedia.org/wiki/Beaufort_scale
**Beaufort Scale**

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**0 - Calm**

Wind Speed: < 1 km/h / < 1 mph / < 1 knots / < 0.3 m/s

Wave: 0 m / 0 ft

Sea Conditions: Flat.

Land Conditions: Calm. Smoke rises vertically.

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**1 - Light Air**

Wind Speed: 1.1-5.5 km/h / 1-3 mph / 1-3 knots / 0.3-1.5 m/s

Wave: 0.2-0.3 m / 0-1 ft

Sea Conditions: Ripples without crests.

Land Conditions: Smoke drift indicates wind direction. Leaves and wind vanes are stationary.

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**2 - Light Breeze**

Wind Speed: 5.6-11 km/h / 4-7 mph / 4-6 knots / 1.6-3.3 m/s

Wave: 0.2-0.5 m / 1-2 ft

Sea Conditions: Small wavelets. Crests of glassy appearance, not breaking.

Land Conditions: Wind felt on exposed skin. Leaves rustle. Wind vanes begin to move.
3 - Gentle Breeze

Wind Speed  12-19 km/h / 8-12 mph / 7-10 knots / 3.4-5.4 mps
Wave       0.5-1 m / 2-3.5 ft
Height     
Sea Conditions  Large wavelets. Crests begin to break; scattered whitecaps.
Land Conditions  Leaves and small twigs constantly moving, light flags extended.

4 - Moderate Breeze

Wind Speed  20-28 km/h / 13-17 mph / 11-16 knots / 5.5-7.9 mps
Wave       1-2 m / 3.5-6 ft
Height     
Sea Conditions  Small waves with breaking crests. Fairly frequent whitecaps.
Land Conditions  Dust and loose paper raised. Small branches begin to move.

5 - Fresh Breeze

Wind Speed  29-38 km/h / 18-24 mph / 17-21 knots / 8.0-10.7 mps
Wave       2-3 m / 6-9 ft
Height     
Sea Conditions  Moderate waves of some length. Fairly frequent whitecaps.
Land Conditions  Branches of a moderate size move. Small trees in leaf begin to sway.
5 - Fresh Breeze

**Wind Speed** 29-38 kmh / 18-24 mph / 17-21 knots / 8.0-10.7 mps

**Wave Height** 2-3 m / 6-9 ft

**Sea Conditions** Moderate waves of some length. Fairly frequent whitecaps.

**Land Conditions** Branches of a moderate size move. Small trees in leaf begin to sway.

6 - Strong Breeze

**Wind Speed** 39-49 kmh / 25-30 mph / 22-27 knots / 10.8-13.8 mps

**Wave Height** 3-4 m / 9-13 ft

**Sea Conditions** Long waves begin to form. White foam crests are very frequent. Some airborne spray is present.

**Land Conditions** Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic bins tip over.

7 - High Wind, Moderate Gale, Near Gale

**Wind Speed** 50-61 kmh / 31-38 mph / 26-33 knots / 13.9-17.1 mps

**Wave Height** 4-5.5 m / 13-19 ft

**Sea Conditions** Sea heaps up. Some foam from breaking waves is blown into streaks along wind direction. Moderate amounts of airborne spray.

**Land Conditions** Whole trees in motion. Effort needed to walk against the wind.
8 - Gale, Fresh Gale

**Wind Speed**
62-74 kmh / 38-46 mph / 34-40 knots / 17.2-20.7 mps

**Wave Height**
5.5-7.5 m / 18-25 ft

**Sea Conditions**
Moderately high waves with breaking crests forming spindrift. Well-marked streaks of foam are blown along wind direction. Considerable airborne spray.

**Land Conditions**
Some twigs broken from trees. Cars veer on road. Progress on foot is seriously impeded.

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9 - Strong Gale

**Wind Speed**
75-88 kmh / 47-54 mph / 41-47 knots / 20.8-24.4 mps

**Wave Height**
7-10 m / 23-32 ft

**Sea Conditions**
High waves whose crests sometimes roll over. Dense foam is blown along wind direction. Large amounts of airborne spray may begin to reduce visibility.

**Land Conditions**
Some branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over.

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10 - Storm, Whole Gale

**Wind Speed**
89-102 kmh / 55-63 mph / 48-55 knots / 24.5-28.4 mps

**Wave Height**
9-12.5 m / 29-41 ft

**Sea Conditions**
Very high waves with overhanging crests. Large patches of foam from wave crests give the sea a white appearance. Considerable tumbling of waves with heavy impact. Large amounts of airborne spray reduce visibility.

**Land Conditions**
Trees are broken off or uprooted, structural damage likely.
### 11 - Violent Storm

- **Wind Speed**: 103-117 km/h / 64-73 mph / 56-63 knots / 28.5-32.6 mps
- **Wave Height**: 11.5-16 m / 37-52 ft
- **Sea Conditions**: Exceptionally high waves. Very large patches of foam, driven before the wind, cover much of the sea surface. Very large amounts of airborne spray severely reduce visibility.
- **Land Conditions**: Widespread vegetation and structural damage likely.

![Image of Violent Storm](image)

### 12 - Hurricane Force

- **Wind Speed**: ≥ 118 km/h / ≥ 74 mph / ≥ 64 knots / ≥ 32.7 mps
- **Wave Height**: ≥ 14 m / ≥ 46 ft
- **Sea Conditions**: Huge waves. Sea is completely white with foam and spray. Air is filled with driving spray, greatly reducing visibility.
- **Land Conditions**: Severe widespread damage to vegetation and structures. Debris and unsecured objects are hurled about.

![Image of Hurricane Force](image)

Figure 43. Beaufort sea state scale descriptions.

#### 6.9.2 Distance Estimation Guide

The distance estimation guide is a tool for calculating the measurements on a ruler necessary to estimate distance of the object using the horizon and markings on a ruler or window as a guide (Figure 44). Enter the distance between the observer and ruler (or window) when the observer’s arm is fully outstretched (holding the ruler) or distance of the eye to the window which will have markings. Enter the distance above water in meters. Enter distances you would like estimated in a comma-separated list. Click “Calculate” and the list of distances (in meters) and distance below horizon in millimeters is given to be marked on the ruler or window.

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6.9.3 Manage Data

The “Manage Data” subform gives access to the database which stores the data behind the scenes for the application. Within this form you can select to: edit ancillary fields, edit survey platforms, edit observers, edit methodologies, reset all settings to defaults, and update the database.
6.9.4 Edit ancillary fields

You will see in the edit ancillary fields table a list of all of the ancillary fields that have been added and the information about those fields (Figure 46). Here you can edit fields that are not in use, delete fields that have not been used, and add new fields.

![Edit Ancillary Fields Table](image)

**Figure 46. Edit ancillary fields table.**

To edit a field click the cell in a row you want to change that does not have the “In Use” designator. If the field is already in use and you try to edit it, a warning is given that the field can’t be edited because it is in-use by the listed methodologies. Once the ancillary field has been used in survey, that field is locked from editing or deletion to preserve the information for that survey. You will need to add another ancillary field with the changes you desire.
To delete an unused ancillary field, click the open circle in the “Del?” column in the field of choice. Only those ancillary fields with rows that do not say “In Use” are able to be deleted. Click the red “Process Deletes” button to execute the ancillary field delete.

To add a new ancillary field, click the blue “New” button; doing so will open the “New Ancillary Field” dialog box where you can enter values for the new field. Click “Save” to save the new field or “Clear” to start over and “Cancel” to exit without creating a field (Figure 47).

![New Ancillary Field dialog box](image)

**Figure 47.** Enter a new ancillary field from the edit ancillary field form.

Once created, the new ancillary field gets listed in the table and is available for use in surveys (Figure 48).
6.9.5 Edit survey platforms

The user can edit survey platform information or delete survey platform(s) from the database (Figure 49). Select the cell in the platform of interest to edit or click the “Del?” cell and click “Process Deletes” to delete.

To edit a text field simply click in the field and make the edits in the cell (Figure 50).
To change a dropdown click the dropdown box and select the desired entry (Figure 51).

6.9.6 Edit observers
The user can edit observer information or delete observer(s) from the database (Figure 52). Select the cell in the observer record to edit or click the “Del?” cell and click “Process Deletes” to delete. Editing observer fields follows in the same way as for survey platforms.
6.9.7 Edit methodologies
The user can edit methodologies or delete them from the database (Figure 53). Select the cell in the platform of interest to edit or click the “Del?” cell and click “Process Deletes” to delete.

To edit a text field simply click in the field and make the edits in the cell (Figure 54).
Figure 54. Edit a text field for a methodology.

To change a dropdown click the dropdown box and select the desired entry (Figure 55).

Figure 55. Changing a dropdown box for a methodology.

You can also modify the ancillary fields for a methodology using the select ancillary field dialog box (Figure 56).
6.9.8 Reset all settings to defaults
You can perform a “factory reset” on the settings by clicking on the “Reset All Settings to Default” button which will bring up the following dialog box.

Click “Cancel” to exit or “OK” to accept the factory reset.

6.9.9 Update the database
The database can be reset as well which will delete all data and reset to the base database. Caution should be taken as this will irreversibly delete ALL DATA. You will be asked to confirm deletion and enter a confirmation code to complete the database update.
6.9.10 Offline Maps

Because access to the internet is typically unavailable during surveys, SeaScribe has a utility for caching maps while internet is available and using these maps while offline (Figure 58). This utility requires the user to move around the map and cache maps at various zoom levels. Pan to the area of the map that you think will be most useful for your survey efforts. By default the map centers on your current location, if known.
When you click on the menu button at the top right of the screen a suite of available options drop down including: cache visible map, view offline, view online, clear cache, show cache contents and help.

When you cache the visible map, you are asked to set zoom levels to the upper and lower bounds you wish to cache. SeaScribe allows multiple zoom levels of caching to speed up the process of caching maps. When you open the Cache maps dialog (below) it sets the “From Zoom” and “To Zoom” to the current zoom level.

You can cache three levels of zoom at a time. Select “From Zoom” and “To Zoom” and click “Cache” to begin downloading and caching map tiles or “Cancel” to exit. When you click “Cache” you will be asked to confirm the request for the specified number of tiles. As tiles are downloaded and cached, the progress will be followed at the lower left corner of the screen. SeaScribe uses the ESRI World Ocean Base and Reference maps which currently only have tiles up to zoom level 13; no tiles are available at zoom levels 14 or 15. If you zoom into level 14 or 15, the tiles are replaced by a blue warning tile that
says “Map data not yet available”. Future versions of this base map may have more detailed map data at finer zoom levels (14-15).

A dialog box will show when the cache request is complete and the number of tiles and size of the cached tiles will be shown in the lower left hand corner of the screen (Figure 59).

By switching to offline mode, you can check to see if the needed map tiles have been cached for use later. Wherever map tiles are missing the map screen will show gray background (Figure 60). Switching back to online mode will allow you to download any additional tiles needed.
By selecting “Show cache contents” you can see the list of cached map tiles and go to a cached map tile by clicking the blue “Go” button next to the tile you want to pan to (Figure 61).
Map tiles will be available until you clear the cache. Note that continuing to cache map tiles uses up storage on the device which will only be released when the map cache is cleared. You will be asked to confirm cache clearing.

Once confirmed the cache cleared dialog box will display.

Clicking help will give guidance about the processing of caching tiles.
6.10 Application errors and enhancement requests

Note that this application does not have planned ongoing maintenance; however, it is possible that the user will encounter errors (bugs) in the software or want to make enhancement requests. All errors and enhancement requests should be directed to BOEM at boemseascribe@boem.gov. It is hoped that annually all bugs and enhancement requests will be considered and addressed. Feel free to direct all comments positive and negative to this address as well. We hope that SeaScribe will benefit the marine survey community for years to come.