APPENDIX A: SHOREWATCH USER GUIDE

GETTING STARTED

The ShoreWatch App seamlessly integrates ArcGIS Field Maps, ArcGIS Survey 123, and ArcGIS Online, leveraging the strengths of each to provide a comprehensive field data collection and mapping solution.

ArcGIS Field Maps 	Field Maps facilitates on-site map-based navigation and data capture. **ShoreWatch** – used to delineate marsh extent, structure lengths, and to create other features of Living Shoreline projects to capture baseline data for future monitoring. Creating these assets in Field Maps geolocates features and associated data. On subsequent routine monitoring site visits, these geolocated features can be used as reference points to consistently collect data in the same locations.
ArcGIS Survey123 	Survey123 enhances data collection through form-based surveys. **ShoreWatch** – used during routine monitoring site visits to gather and link data to created features in order to track changes over time.
ArcGIS Online 	ArcGIS Online ensures centralized data management, real-time synchronization, and powerful analysis capabilities. **ShoreWatch** – map with associated monitoring layers created and managed by CCRM for use in Field Maps and Survey 123. Users will use this map as the basemap for creating features and capturing data in the field. All monitoring data will be stored and managed on the ArcGIS Online platform.

Esri. Redlands, CA. www.esri.com

OVERVIEW

The following sections include instructions on downloading required apps, signing in, and changing device and app settings to ensure they function as needed during routine monitoring. Most of these steps only need to be completed once before the user's initial site visit. It is still recommended to familiarize yourself with these necessary settings, so they are not accidentally changed, or in case the user needs to troubleshoot problems in the field.

DEVICE SET-UP

- Ensure the device is WiFi and Bluetooth compatible. If using the devices internal GPS (not using an external GPS unit) the device must have a data plan.
- A waterproof or hardened case for the device is recommended, though not required, to protect the device from physical damage that may occur in the field.
- It is highly recommended that users bring portable chargersto the field for site visits or plan a break to recharge devices in vehicles. Attempts should be made to keep devices out of direct sunlight for prolonged periods to prevent overheating and put them to sleep when not in use.
    - Other settings to save battery life:
        - Low Power Mode – recommend only using low power mode when not actively collecting data (data collection will not be affected but thescreen will go to sleep at shorter intervals, requiring the user to continuously reopen their device).
        - Reduce screen brightness – reduce to minimum brightness thatstill allows for viewing the map.
        - Turn on Airplane Mode.
        - Disconnect from external GPS unit when not actively collectingGPS location data.
- ShoreWatch allows for the use of "talk-to-text" for recording information. To enable this feature:
    - Apple device: Settings > General > Keyboard > turn on Enable Dictation
    - Android device: Settings > System > Languages & input > Virtual keyboard> Gboard > Voice typing > tick 'Use voice typing' to turn iton

DOWNLOAD APPS

Download ArcGIS Field Maps and ArcGIS Survey123 apps to the device(s) that will be used for monitoring. These apps are free and can be downloaded like any other common app.

Note: Some external GPS units may require downloading an app onto your device. See Appendix B for details on downloading the free Bad Elf app for using the Bad Elf Flex unit.

PREPARING FOR SITE VISIT

OVERVIEW

Prior to venturing into the field for monitoring, users should make sure they have all necessary forms and maps downloaded and available on their device(s). In the field, Field Maps will be used to geolocate features and collect associated data and launch Survey123 forms for submitting monitoring data. This section will familiarize users with Field Maps and Survey123, provide instructions on downloading offline maps to their device and other tips to prepare for successful monitoring site visits.

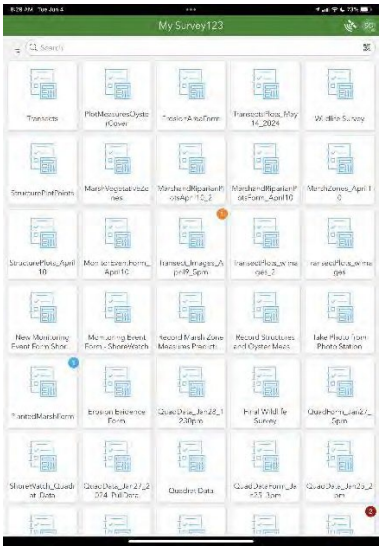
Note that while the following guidance is for the use of ShoreWatch on an Apple device (i.e, iPad/iPhone), it is possible to use other GPS enabled tablets or phones. Recognize that some items will appear differently on an Android device, but functionality will work the same for each. As an example, to submit completed items in Field Maps on an Apple device, a user will select Submit, while the user will select the check mark on an Android device to perform the same action. The focus of this document is for use on an Apple iPad (hereafter referred to as "device").

Completing these steps in-office while connected to WiFi is highly recommended because certain tasks, especially downloading offline maps, are more efficient with a strong internet connection.

SURVEY 123

To sign into Survey 123: Open app on device, select Sign In with ArcGIS Online, enter the CCRM provided ArcGIS Online account Username and Password and click Sign In.

HOME SCREEN



Forms: Survey forms that will be needed to use with Field Maps. These forms should include:

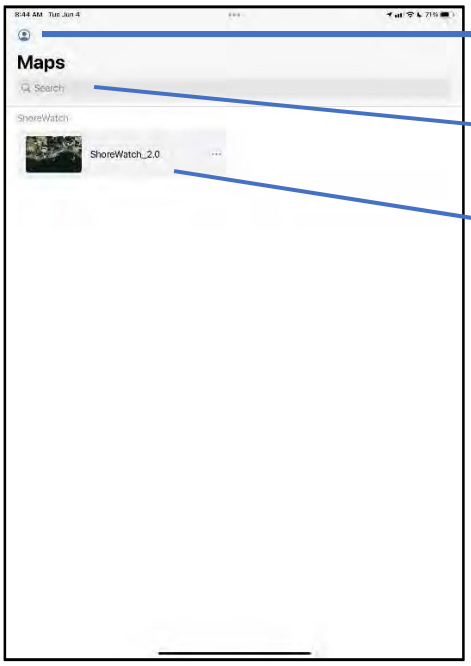
- Record Evidence of Erosion
- Marsh Measures
- Monitoring Event Info
- Planted Marsh Areas
- Plot Measures
- Structure Plot Point Measures
- Photos
- Wildlife Observations

Once the user has verified that all requisite forms are present, they can close the Survey123 app, but do not sign out of Survey123. In the field, Survey123 forms will be seamlessly accessed through Field Maps.

FIELD MAPS

To sign into Field Maps: Open app on device, select Sign In with ArcGIS Online, enter the CCRM provided ArcGIS Online account Username and Password and click Sign In.

MAPS SCREEN



Profile Icon: Provides profile information and settings.

Search: Search for maps.

Current: Displays the most recent map opened in Field Maps.

On Device: List of maps that have been downloaded to the device (offline maps).

Groups: List of all ArcGIS Online Groups that the profile belongs to. ShoreWatch Group is the group that contains the ShoreWatch Map.

Note: If the user is only in one group, it will automatically display all maps for that group.

The map used for the ShoreWatch App is ShoreWatch_2.0. This is the map created and managed by CCRM that will house all features and data created and recorded in ShoreWatch. Tap the ShoreWatch_2.0 map to download.

RELOAD MAP

Each time Field Maps is opened, it is a good idea to reload the map. This will update the map with any changes made by CCRM and ensure you are using the most recent forms for data collection. You do not need to reload the map the first time Field Maps is accessed.

To reload the map, tap the three blue dots to the right of the map title and select Reload Map. This will update and open the map.

Note that if using an offline map, the offline map should be reloaded before use of ShoreWatch as well.

SETTINGS

Selecting the Profile Icon will open the Profile menu. This is where users can adjust settings such as units of measurement, connection to external GPS units, and GPS accuracy. These settings only need to be set once before the initial site visit with ShoreWatch.

Measurement Units – determines the type of units in which Field Maps will report measurements. This needs to be set to Metric, as ShoreWatch requires measurement data to be reported in meters or centimeters.

- Under General --> select Units --> select Measurement Units --> select Metric (the check mark on the right-hand side will signify which unit is selected).

GPS Provider – allows the user to connect to and use an external GPS unit. The default is Integrated, which means that Field Maps is using the device's internal GPS. To utilize an external GPS unit, the user must first connect to the GPS unit via Bluetooth (see Appendix B for detailed instructions). When the GPS unit is connected to the device, the user must add and select the unit in Field Maps.

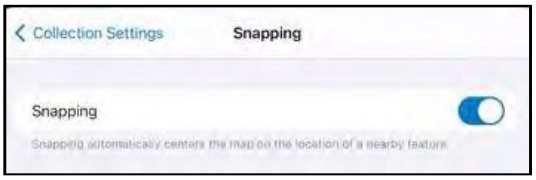
- Under Location --> select Provider --> Add --> select the name of the GPS unit (e.g., Bad Elf #153293) --> set Antenna Height (m) to 2 by tapping on the number --> ensure that the blue check mark is now next to the name of the GPS unit.

GPS accuracy – this is a threshold that must be met to capture locations and create features in Field Maps. The default is 30 ft (9.144m), meaning GPS accuracy must be below 9.144 meters to create features. This should be changed to 3 to ensure that users are capturing adequate location data.

- Open Collection Settings --> select Accuracy --> set Distance (meters) to 3 by tapping on the number and ensure the blue check mark is to the right of Meters.

Snapping – when creating features, snapping will automatically connect a point or vertex to other points or vertices of previously created features. This can cause issues when creating certain features because the point will be pulled from the desired location. Alternatively, snapping may be useful for connecting certain features that should share a border, such as the low marsh and high marsh zones. The user can turn snapping On or Off.

- Open Collection Settings --> Snapping --> tapping the circle will turn Snapping On (circle to the right with blue fill) or Off (circle to the left with no fill).



DOWNLOAD OFFLINE AREAS

While monitoring and data collection can be performed in the ShoreWatch Map (online map), it is best to download an offline area to your device. This downloads a selected portion of the ShoreWatch Map to the device for use in the field without the need for a data plan. When using the online map in the field, if there is an unexpected loss of internet connection while creating features, there is a potential for data loss. By using an offline area, users can avoid potential loss of data while creating features, as data will be stored to the offline map on the device. Collected data will then auto-sync to the online map when connected to WiFi.

Things to consider about offline areas:

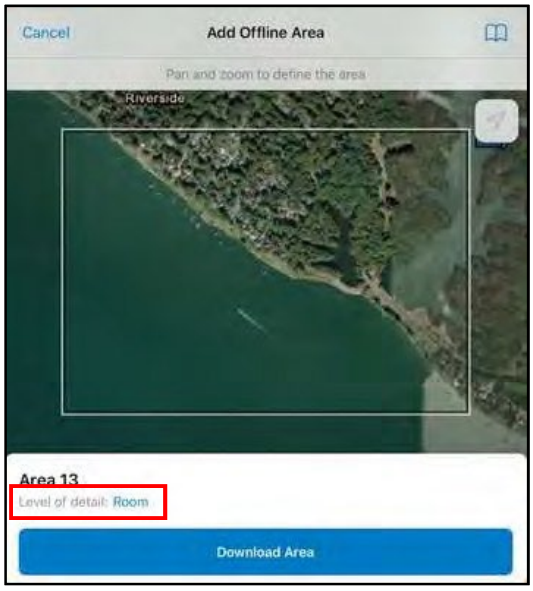
- Offline areas should be refreshed and reloaded before each monitoring site visit.
    - First, offline areas will automatically become obsolete after two months of inactivity. If sites are only being monitored quarterly at the most, then offline areas will be automatically removed from the device in Field Maps before subsequent visits.
    - Second, it is good practice to reload offline areas after periods of inactivity (> one month) to capture any updates that have been made to the online map by CCRM.
- Download offline areas in the office, or other location, while connected to WiFi.
    - Offline area downloads can take a substantial amount of time to complete (2-5 minutes) depending on resolution. Offline area downloads can take much longer to complete, if it works at all, if not connected to WiFi. While the offline area is downloading, leave the screen open and do not exit the app until download is complete.

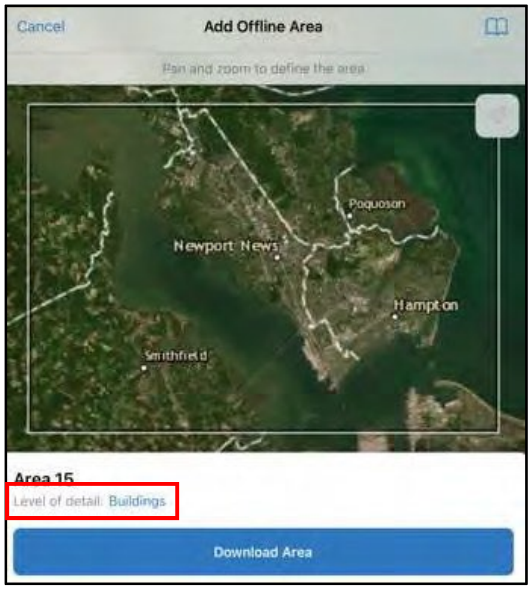
To download an offline area from the ShoreWatch Map:

1) From the Maps Screen, on the ShoreWatch_2.0 Map select the three blue dots on the map ribbon and select Add Offline Area.

2) This will open an Add Offline Area window, centered on your current location. Zoom out until you see the black and white box on the screen.

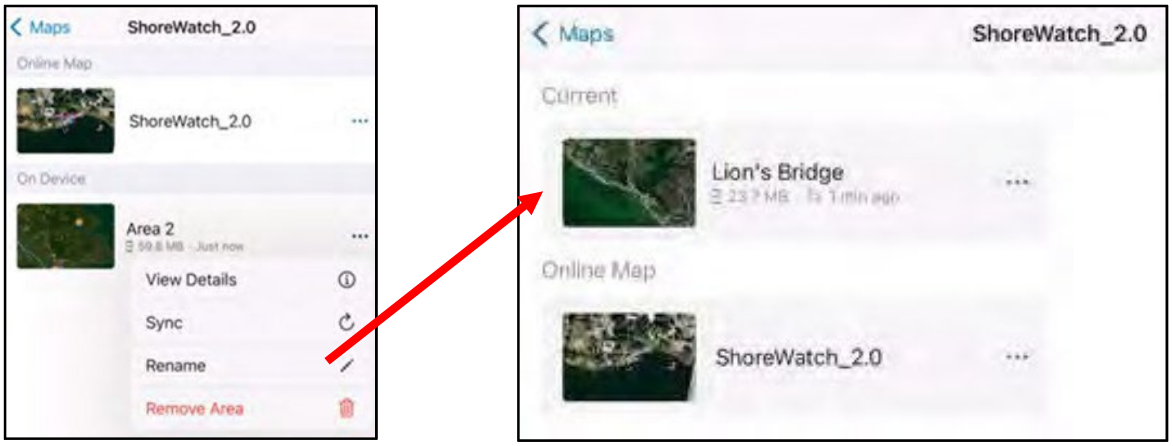
The portion of the ShoreWatch map that will be downloaded is the extent inside this box. To change the level (size of the box), select Room which opens the Level of Detail list. More detail (e.g., Room) lets you see more detail on the map when you zoom in, but is a larger download size. Less detail (e.g. Buildings) will not provide as much detail when zoomed-in, but is a smaller download size and provides a larger map extent. Choose the level of detail based upon your needs: the extent of the map you require (how larger your site is); how much detail you want on the map when zoomed in; and how much of the device storage you are willing to commit to the download.



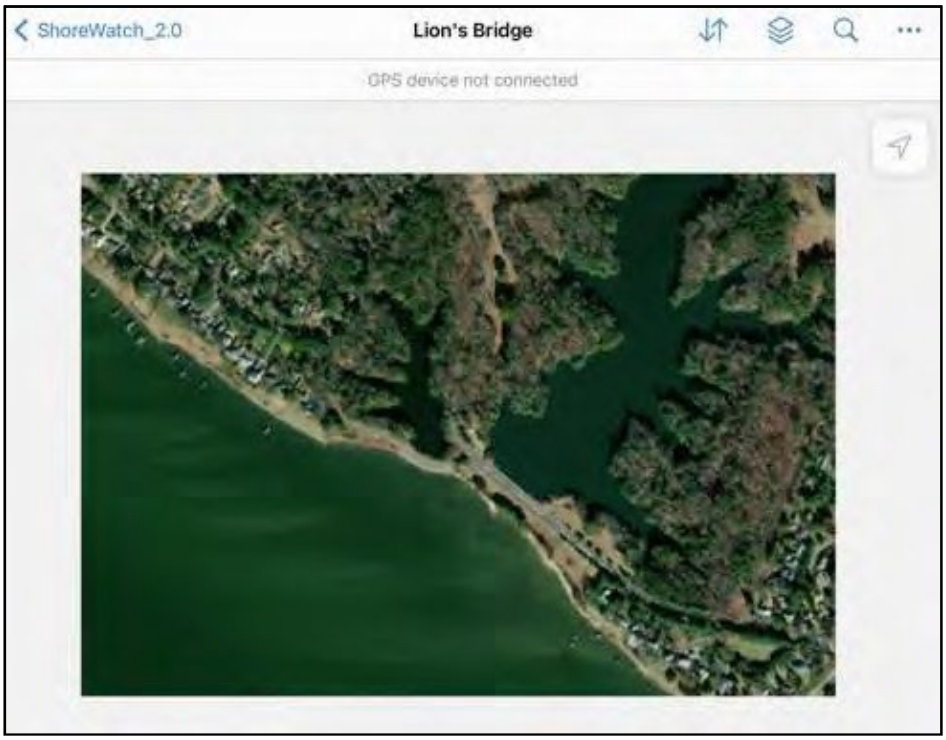


3) Select the desired Level of Detail. Pan and zoom the map as needed to ensure that the site is within the map area (box), and click Download Area to begin download. This may take several minutes, and it's recommended to not use the device for other tasks until the download is complete.

4) After download completion, your offline area will appear under the On Device section. You can rename the offline area by selecting the three buttons and selecting Rename. Name your offline area something relative to your Site Name or organization. Click OK.



The Offline Map is now ready to be used for delineation and data collection in the field without the need for an internet connection. The data and features will be stored to this map on the device until reconnected to WiFi. When a connection is established, the data will automatically sync to the online map (and continue doing so at 15-minute intervals). You can also manually sync data by selecting the blue up and down arrows above the map and tapping the Sync Now button.



USING SHOREWATCH IN THE FIELD

OVERVIEW

The following section provides a brief overview of working with ShoreWatch in the field including achieving adequate GPS accuracy, creating element features, entering data in both Field Maps information fields and Survey123 forms, and editing features. This section is meant to introduce the broad concepts of using ShoreWatch; more detailed instructions on creating specific features are provided in the Initial Set-Up Site Visit section.

CREATING FEATURES

In ShoreWatch, features are created to represent elements of your Living Shoreline project on a map. The three types of features used in ShoreWatch are points, lines and polygons. Each feature has associated attributes that provide additional information and will be used to access the Survey123 forms for monitoring data collection.

Feature Type	Definition	ShoreWatch Example
Point	A map feature that has neither length nor area at a given scale (Esri)	Fixed Photo Station, Erosion Points
Line	A map feature that has length but not area at a given scale (Esri)	Structure, Protected Shoreline Length
Polygon	A map feature that bounds an area at a given scale; a feature that represents a place or thing that has an area at a given scale (Esri)	Low/High Marsh Vegetation Zones, Living Shoreline Treatment

Note that in the following instructions for creating features in this document, lines and polygons are created by adding points, or vertices, to form the shape or boundary of the line or polygon.

GPS ACCURACY AND CREATING FEATURES

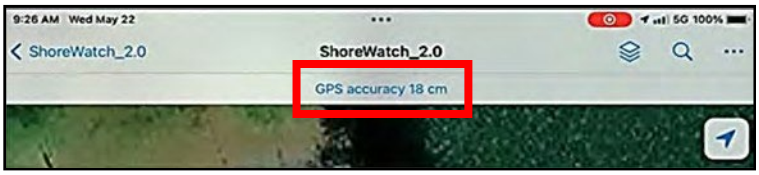
In order to capture the most accurate location for your features, you must ensure that you are within an adequate range of GPS accuracy. The GPS accuracy is displayed above the map in Field Maps. The desired GPS accuracy for creating features is < 1 m. Cloud cover and trees can affect accuracy by disrupting satellite signals.

When walking around your site, GPS accuracy will vary as the GPS unit adjusts to your position. When collecting points, whether it is for creating point features or capturing points to create line and polygon features, it is critical to stand still at the location of your point until GPS accuracy is < 1 m. This generally takes about 10 seconds depending on coverage at the site. Hold the unit still at around breast height with the internal antenna facing the sky for best accuracy. For additional details on using the Bad Elf GPS units see Appendix B: Bad Elf Instructions.

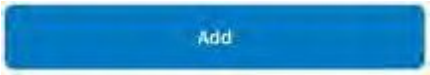
To capture GPS points:

1) Walk to the location of the point you want to capture. The blue dot on the map screen will follow your movement.

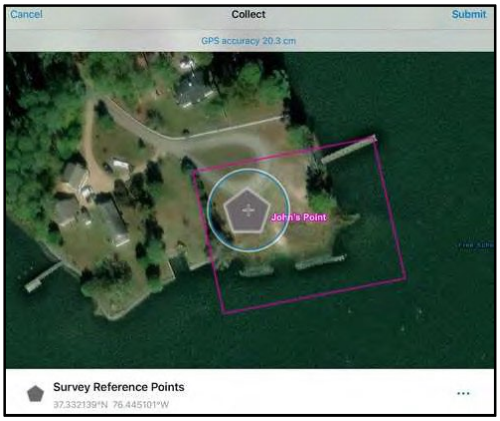
2) Stand for ~10 seconds with GPS unit held still and upright until GPS accuracy is within the desired range.



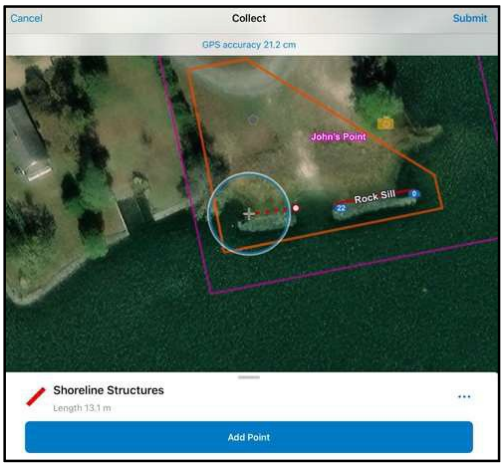
3) Select Add on the feature tab to capture a point or vertex.



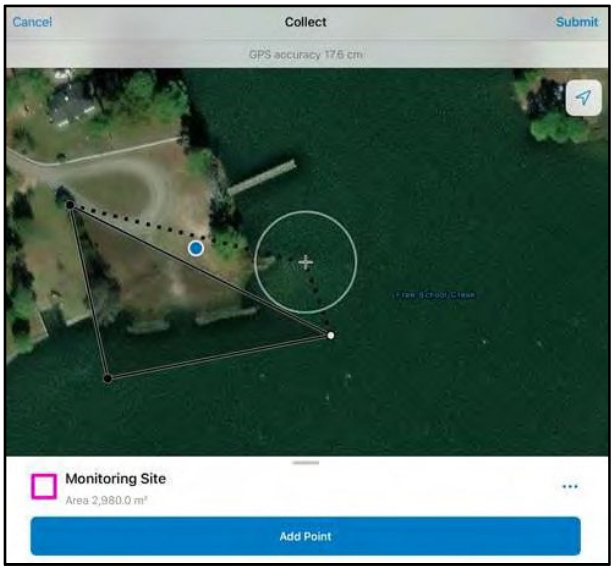
For **point** features, the point feature will be created at that location.

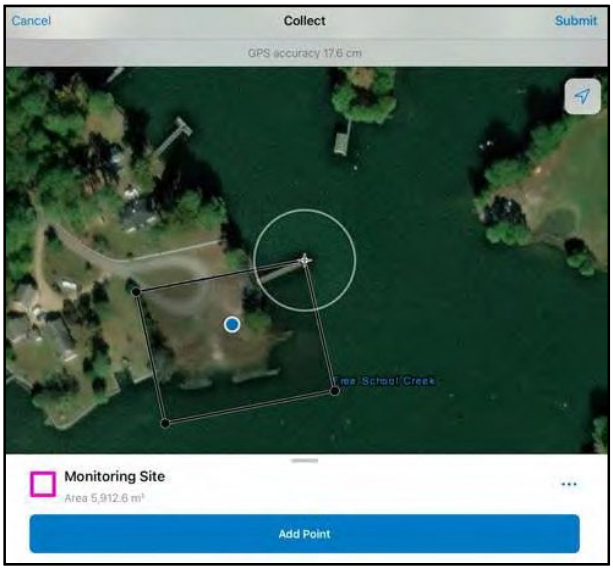


For **line** features, a point (vertex) will be added at that location. As you move to the next location, a dashed line will appear between your GPS location and your last added point, showing the next segment of your line that will be created. As you add points, line segments will become solid.



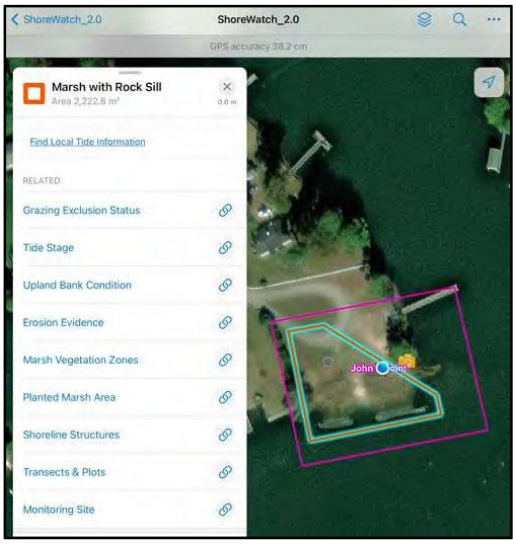
For **polygon** features, a point (vertex) will be added at that location. A dashed line will appear between your GPS location and your last added point, showing the next segment of your polygon that will be created. A dashed line will also appear between your GPS location and your first point, showing the last segment of your polygon that will be created if you choose to hit Submit. As you add points, the line segments between points will become solid, showing the shape or boundary of your polygon as it is being created.





Submit

When you have delineated your feature and entered all desired information (if applicable) in Field Maps, select Submit to create the feature. The created feature will be highlighted on the map and the feature's tab will appear.

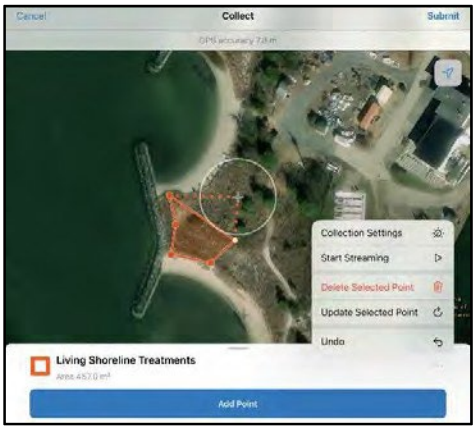


Cancel

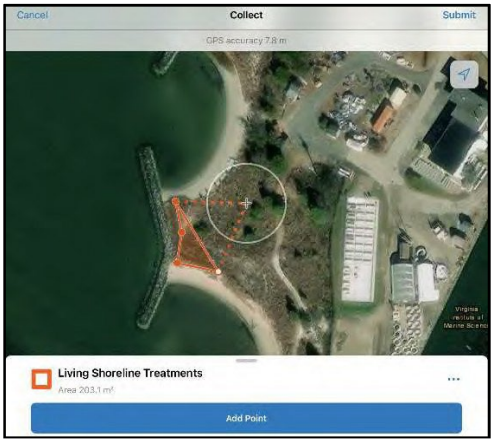
If you are not satisfied with the delineated feature, you can select Cancel in the upper left-hand corner of the map. Then select Discard to discard the feature. Note that any information entered for that feature will also be discarded.

Delete or Update Vertices (Points)

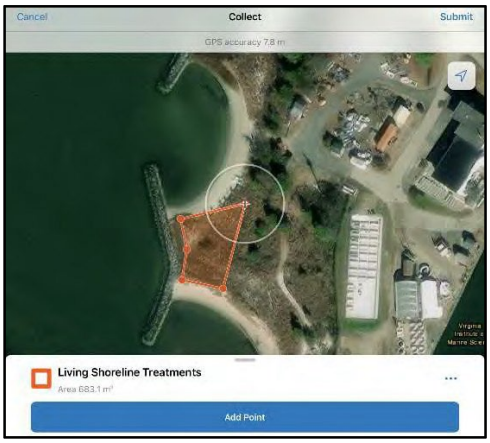
While delineating line or polygon features, you can adjust or delete vertex points without affecting the entire feature. To do this, tap on the three blue dots on the right corner of the feature tab. The point on which the action will be performed is white with a colored border. The crosshairs show your current location.



To delete the vertex, select Delete Selected Point. The vertex point, and the associated line or polygon segment, will be deleted. You can then continue to add points to delineate your feature as desired.



To adjust the location of the vertex, Select Update Selected Point. The vertex point will be moved to the location of the crosshairs and the line segment of the feature will adjust to the new location of the point. You can then continue to add points to delineate your feature as desired.

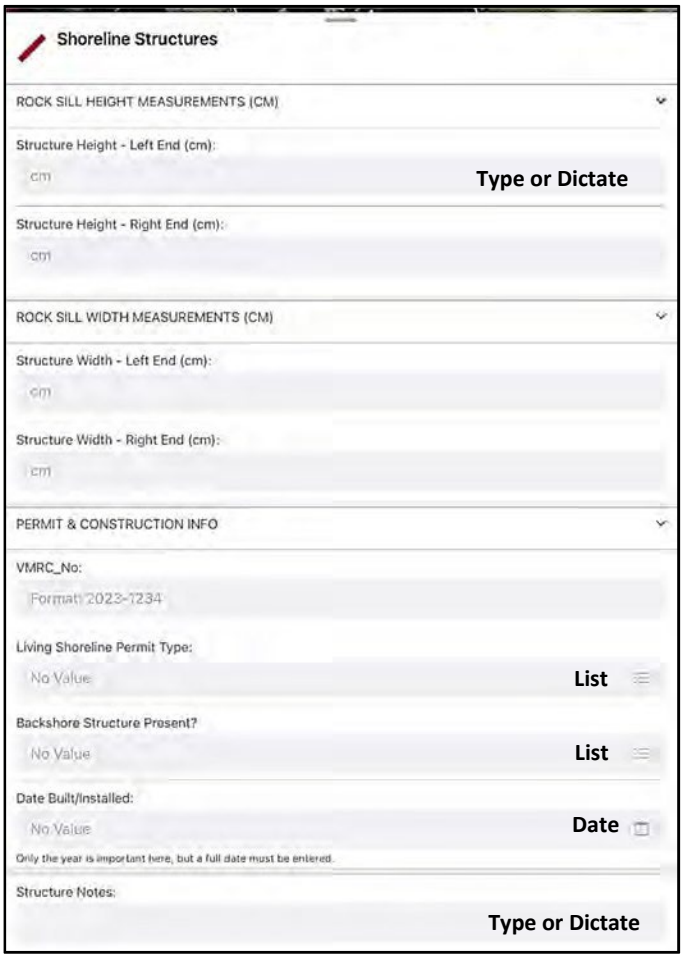


ENTERING DATA

Field Maps

Baseline information will be recorded while creating certain features in Field Maps. Depending on the level of monitoring being done, some information fields may not need to be filled out. Fields that are required to be filled out before features can be submitted are signified with an asterisk on the information field name.

The information fields may be broken up into sections that can be opened and closed to save time scrolling through information fields that the user has opted not to use. Tapping the arrow to the right of the section heading will open (arrow down) or close (arrow left) each section.



Some information fields require the user to type or dictate the information. Tap the information field and type out the information using the keyboard or select the microphone icon to dictate the information.

Some fields have pre-made lists from which to select, indicated by the list icon on the right side of the field. Tap the icon to open the list and select the desired information.

Note that additional information fields may appear based on selections made from lists. Selecting “Other” from a list will open a Specify other field in which users can manually enter information that is not on that particular list.

Some fields require a date and are indicated by a calendar icon. Tap the information field and select the date from the calendar that appears.

In the following instructions, information fields from Field Maps are denoted with bold blue text.

Survey123

Survey123 forms will be accessed through Green buttons on feature tabs in Field Maps. Selecting the Green button will open the relevant form to record data.

The forms are divided into sections which can be opened or closed by tapping their heading title. A down arrow indicates the section is open while an arrow pointing right indicates that the information for that section is being hidden.

Certain fields require the user to type or dictate the information. Tap the information field and type out the information using the keyboard or select the microphone icon to dictate the information. Some fields require a date. Tap the information field and select the date from the calendar that appears.

Some information fields are lists from which to make a single selection. These lists are indicated by circles next to the choices. Selecting the circle next to the desired answer will fill that circle. Some lists allow the user to select multiple choices from the list. These lists are indicated by boxes next to the choices. Selecting the box next to the desired answer will add a check mark to the box, showing that it has been selected. Add check marks to all desired boxes to record the information. These “select all that apply” sections will have subheadings that alert users to select all choices that apply to that section. On some forms, images appear next to possible selections on lists for help identifying plants species or fauna types. Tap on any of these images to enlarge.

Note that additional information fields may appear based on selections made from lists. Selecting “Other” from a list will open a Specify other field in which users can manually enter information that is not on that particular list.

Photos can also be captured through Survey123 forms using the camera icon in the Take Photo section of each form. Tapping the camera icon will open the device's camera through the form. It is recommended to take photos while holding the device horizontally to capture as much area as possible in the photo. Tapping the white button will capture the image and the photo will appear on the form.

Use the camera icon to take additional photos if desired. The Trash icon can be used to delete a photo if the image is not sufficient. You can rename photos by selecting the three dots and choosing Rename.

To submit a form, after all desired information has been entered, tap the Check Mark in the lower right had corner and select Send now. The form will be submitted, and you will be returned to Field Maps. To cancel a form without submitting, tap the X at the top left of the form and select Close and lose changes. The form will be discarded, and you will be returned to Field Maps.

In the following instructions, information fields and sections from Survey123 formsare denoted with bold black text. Sections of the forms are denoted with arrows (➢).

EDITING FEATURES

There are some instances where you may need to adjust or edit your features after they have been created. For example, if the high marsh and low marsh polygons overlap due to slight GPS inaccuracy when creating those features, you will need to adjust the boundaries to correct the overlap. This should only be done as needed.

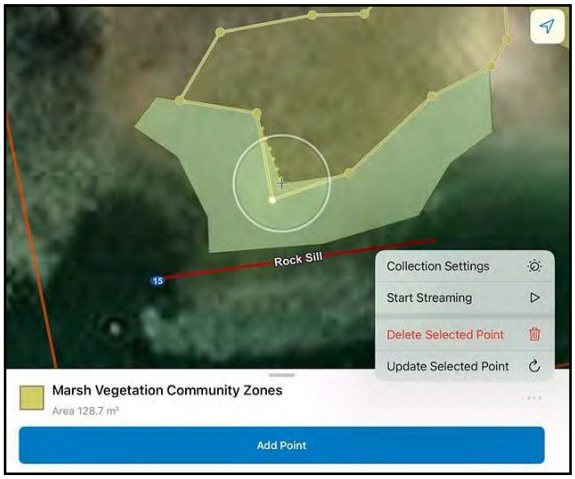
To edit features:

1) Select the feature to be edited (it willbe highlighted on the map and the feature tab should be open).

2) Scroll down the feature tab and choose Edit (pencil). This will highlight thepoint (point features) or display the vertices (lines and polygon features). The information fields can also be edited at this point, if desired.

3) Tap the point on the screen that you want to edit. The vertex point onthe line and polygon feature will appear white.

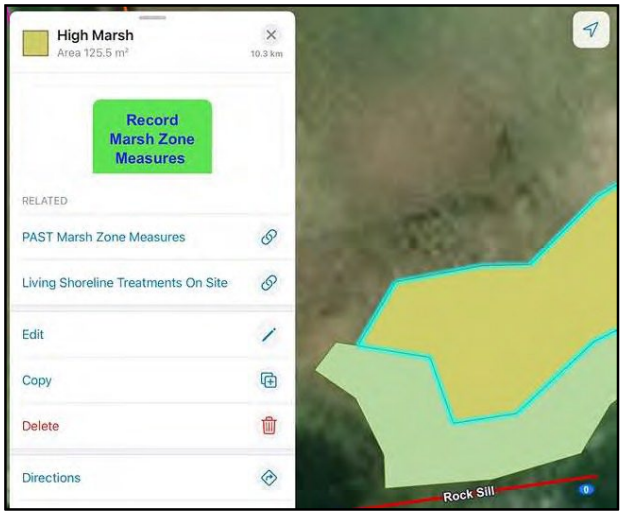
4) Move the point to the new desired location. When editing certainfeatures in this manner, it may help to have Snapping turned On to adjoin to neighboring features.



5) Tap the three blue buttons at the top right corner of the feature tab and select Update Selected Point. The point will move to the new location of the crosshairs.

6) When finished editing points, tap Submit to complete edits.

7) The location of your point, or the shape of your line or polygon feature, will now be updated on the map.



INITIAL SET-UP SITE VISIT

OVERVIEW

Now that your device settings have been adjusted, all apps have been installed, and offline maps have been downloaded, you are ready to take ShoreWatch into the field to create and delineate features on the Initial Set-Up Site Visit. The following section will cover instructions on using the ShoreWatch app for your Initial Site Set-Up visit. This includes the first steps to take when arriving at your site, how to create features that will be the foundation for your monitoring data collection, and other tips for navigating the ShoreWatch app. For a complete list of all materials needed for monitoring, reference the Equipment Lists section of the Monitoring Protocol Manual.

ON-SITE

CONNECT TO GPS DEVICE

Upon arriving at your site, the first step that should be taken is to connect to the GPS unit. More detailed instructions for performing this task with the Bad Elf GPS units can be found in Appendix B. Note that it can take a few minutes for the GPS unit to acquire satellite connection, so it is recommended to start this process first thing upon arrival, then set the device and GPS unit somewhere off the ground with clear view to the open sky (i.e., roof/hood of vehicle). Meanwhile, you can unload other monitoring materials until the connection process is complete.

MAP START

Open your offline area map (preferable) or the ShoreWatch_2.0 map. The map will open on your current GPS location.

GPS Accuracy: Shows the estimated GPS accuracy (will match GPS accuracy shown on GPS unit). When GPS accuracy is not within the required range, text will appear red and required accuracy will be shown. Features cannot be created if minimum GPS accuracy is not met.

Search: Search for a location by address or pan to the location on the map. For sites that have already been set-up, the Monitoring Site Name or VMRC number can be used to search for the site.

Layers: Turn layers on or off to view on the map. To create or edit a feature, that layer must be turned on (indicated by circle to the right with blue fill).

GPS Location: This blue dot shows your GPS location. When connected to an external GPS unit, this blue dot will follow the movement of the GPS unit, not the device. If GPS accuracy is not within the required range, this dot will become gray.

Collect: Create and add the Monitoring Site to the map.

MONITORING SITE CHARACTERIZATION

DELINEATE MONITORING SITE

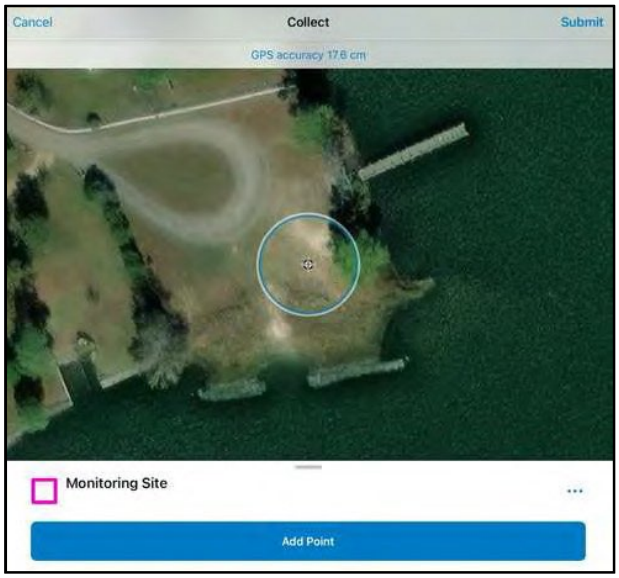
The Monitoring Site Polygon is the main feature in which all other features and data for your site will be stored. Data collected through the Living Shoreline features will be linked together by being created through this Monitoring Site. The polygon should be drawn so that it will spatially capture the entire site and all associated features. The polygon should extend channelward beyond structures and landward beyond any riparian upland area. The Monitoring Site Polygon will include the unique Site Name and basic information about the site.

The Monitoring Site Polygon will be drawn manually on the device screen by the user. It is not necessary to create this polygon by walking the boundary of the site.

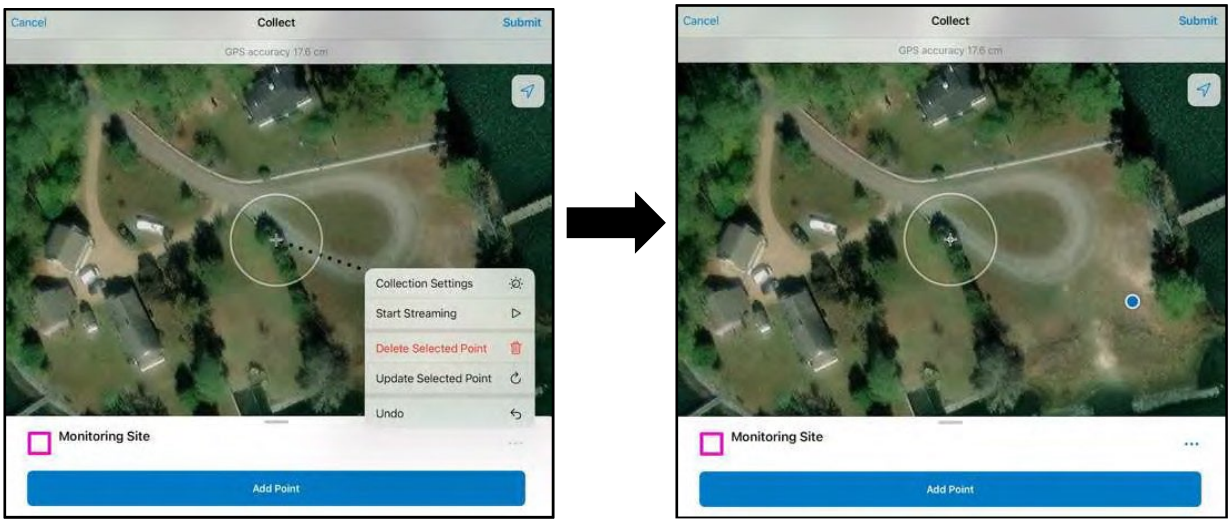
To draw the Monitoring Site Polygon:

1) Tap the Collect button.

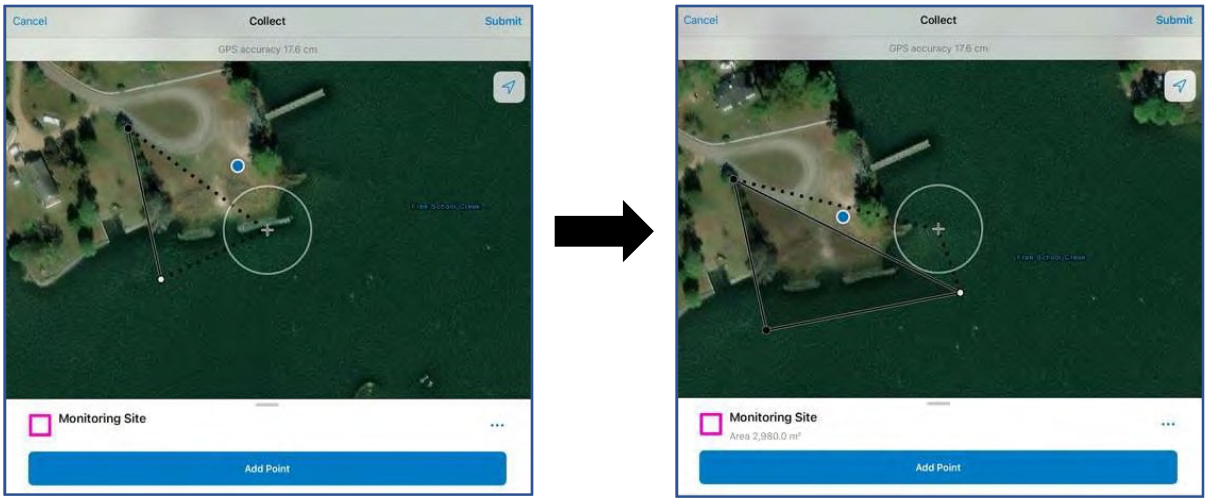
This automatically creates the first vertex of the polygon, and crosshairs will appear at your GPS location. These crosshairs signify where points will be created in the following steps. The vertex will need to be manually moved to the desired location to begin creating your polygon.



2) Move the Crosshairs to the desired location of your first point. Tap the three blue dots to the right of the Monitoring Site heading. Select Update Selected Point. The first point of the polygon has been moved to that location.



3) Move crosshairs to the next desired location and click Add Point to add the next point of the polygon. Repeat adding points until the polygon is drawn completely.

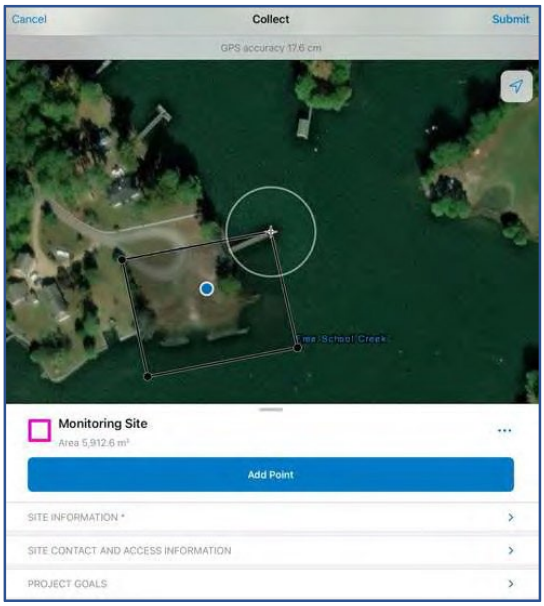


4) When the last point of the polygon has been created, enter information into the information fields.

There are three sections with information fields that should be filled out:

SITE INFORMATION*
SITE CONTACT AND ACCESS INFORMATION
PROJECT GOALS.

Use the drop-down arrows to the right side of section titles to show or hide information fields.



SITE INFORMATION

Monitoring Site Name* - name your site something unique to the site and/or your organization. Names should be kept short (e.g., John's Point, Norfolk Zoo). Names cannot be duplicated.
Street Address - street address of the site.
Locality - locality of the site.
Land Use - type of land use associated with the site.

Owner Type - whether the site is on publicly or privately-owned land.

SITE CONTACT AND ACCESS INFORMATION

Site Contact – Name - full name of Site Contact. This is the person or organization that needs to be contacted to gain access to the site, which may be different from the person or organization performing the monitoring.

Property Owner Name, if different from the Site Contact - full name of Property Owner, if necessary.

Site Contact – Phone - phone number for Site Contact. Use (XXX) XXX-XXXX format.

Site Contact – Email - email address of site contact.

Site Access Instruction/Notes - instructions for gaining access to the site (e.g., "call site contact 24 hours before accessing property", "park along fence on street", gate codes, etc.)

PROJECT GOALS

Erosion Control - is the project intended to reduce or control erosion?

Flood Mitigation - is the project intended to reduce impacts from flooding?

Water Quality - is the project intended to improve water quality?

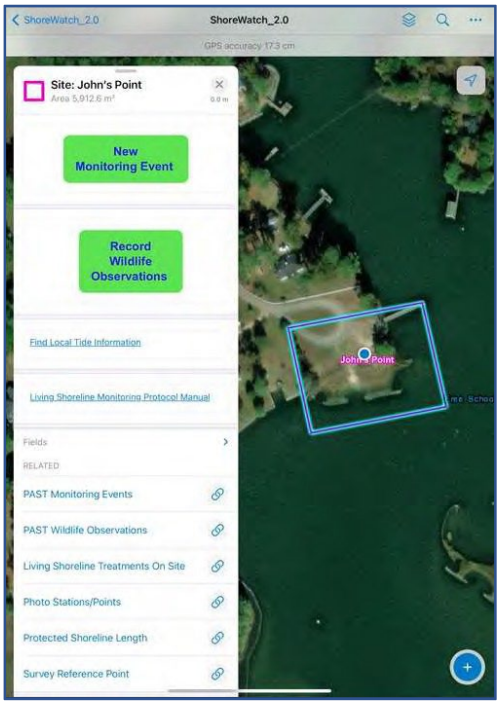
Fish and Wildlife Benefits - is the project intended to provide fish and wildlife benefits?

Beautification - is the project intended to enhance aesthetics of the area?

5) When all information has been entered, click Submit to finish creating the Monitoring Site polygon.

The Monitoring Site polygon will be highlighted, and a tab will appear showing the Monitoring Site information.

- Condense or expand the tab by tapping the gray bar at the top of the tab.



New Monitoring Event – button to open the Monitoring Event Info form (for Routine Monitoring Events).

Record Wildlife Observations – button to open the Wildlife Observations form (for Routine Monitoring Events).

Find Local Tide Information – link to NOAA website to find your local tide.

Living Shoreline Monitoring Protocol Manual – link to an online version of the Protocol Manual.

Fields – list of site information entered while drawing the Monitoring Site polygon. Hide these fields by tapping the blue arrow on the right of the Fields heading so that it is pointing to the right.

Related - a list of related feature layers that are linked to the Monitoring Site. These links will be used to create the other element features of the Living Shoreline project.

SURVEY REFERENCE POINTS

Survey Reference Points are created at any pre-existing points from construction. Survey Reference Points should be created by capturing the point with the GPS location.

To create a Survey Reference Point(s):

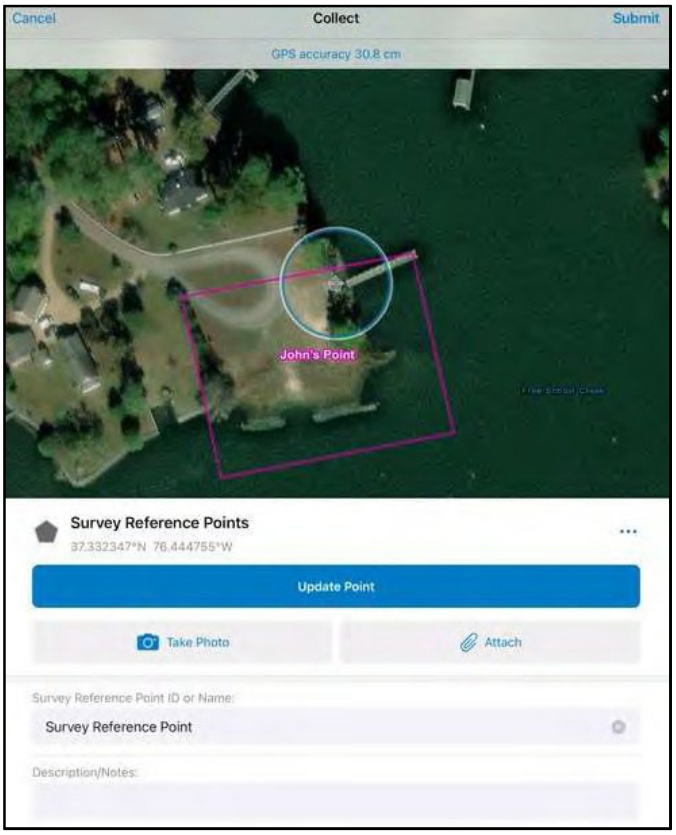
1) Select the Survey Reference Points link.

2) While standing at the desired location, tap Add. This will create the point at the current GPS location.

There are two information fields for Survey Reference Points:

Survey Reference Point ID or Name* automatically populates as Survey Reference Point. Tap the X on the right of the information bar to add a unique name if desired.

Description/Notes add any relevant information about the survey point (e.g., Point on upland boundary, established by contractor during construction).



3) When all information has been entered, click Submit to finish creating the Survey Reference Point.

Select the Monitoring Site link to return to the Monitoring Site polygon. Repeat the above steps to create more Survey Reference points if necessary.

FIXED PHOTO STATIONS

Photo Stations are points at which photos will be taken during Routine Monitoring Events to capture changes of your site over time. These points should be created by capturing the point with GPS location.

To create a Photo Station point(s):

1) Select the Photo Stations/Points link.

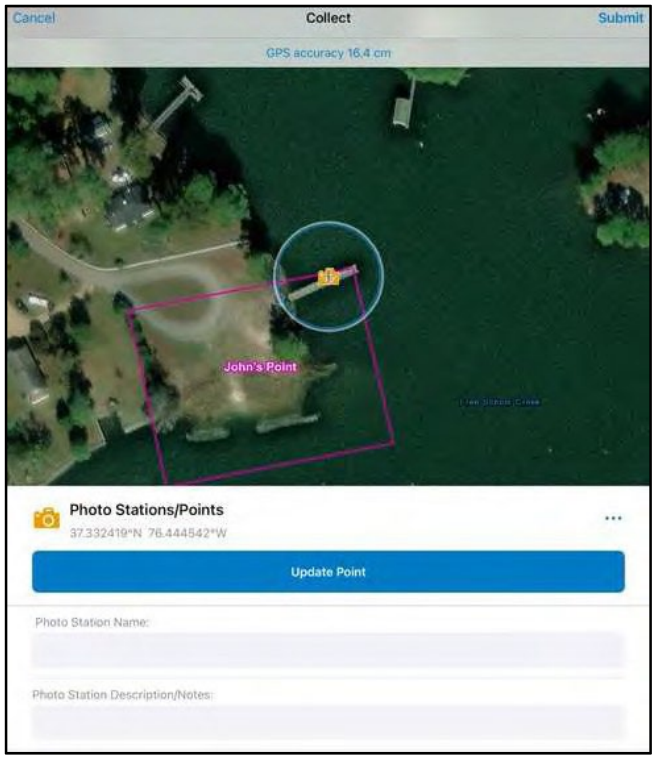
2) While standing at the desired location of the Photo Station, tap Add.

This will create a Photo Station point at the current GPS location.

There are two information fields for Photo Stations/Points:

Photo Station Name add a unique name for the Photo Station Point.

Photo Station Description/Notes add any relevant information about the Photo Station (e.g., Photo Station on dock adjacent to project. Take photos facing east towards project site).



3) Select Submit, to create the Photo Station Point

Select the Monitoring Site link to return to the Monitoring Site tab. Repeat the above steps to create more Photo Station/Points if necessary.

LIVING SHORELINE TREATMENTSCHARACTERIZATION

There are several features linked to the Living Shoreline Treatment including structures, marshes, and planted areas. These features must be created through the links under the Living Shoreline Treatments layer that was created within the Monitoring Site polygon. The following section will go through the steps to create these features.

DELINEATE LIVING SHORELINE TREATMENTS

The Living Shoreline Treatment is a polygon that distinguishes the type of Living Shoreline treatment(s) present within the site. There are six possible types of treatments determined by the type of structure that is utilized: Marsh with Rock Sill, Marsh with Oyster Structure, Marsh with Coir Log, Marsh with Mixed Treatments, Beach with Breakwater, and Marsh. The Living Shoreline Treatment polygon will encompass all structure(s), marsh(es), transects, sampling plots, and riparian area(s) associated with that treatment. Data collected through these Living Shoreline features will be linked together by being created through this Living Shoreline Treatment layer.

The Living Shoreline Treatment polygon will be drawn manually on the device screen by the user. It is not necessary to create this polygon by walking the boundary of the site. The Living Shoreline Treatment polygon should be drawn within the Monitoring Site polygon, and like the Monitoring Site polygon, should extend channelward of the structures and landward of any riparian uplands.

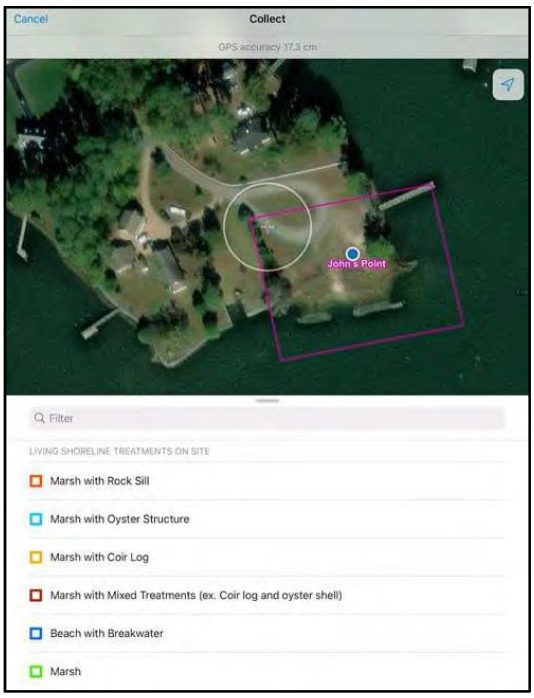
Note: it is possible to have multiple Living Shoreline Treatment polygons within a single Monitoring Site polygon. For example, a project site that has a rock sill and an oyster bag sill (that is up-shore or down-shore of the rock sill) will have both a Marsh with Rock Sill polygon and a Marsh with Oyster Structure polygon. Projects that consist of multiple structures (i.e., coir log with oyster shells), or structures channelward/landward of one another (i.e., oyster castles with coir logs behind them) will fall under a single Mixed Treatment polygon.

To draw Living Shoreline Treatments polygons:

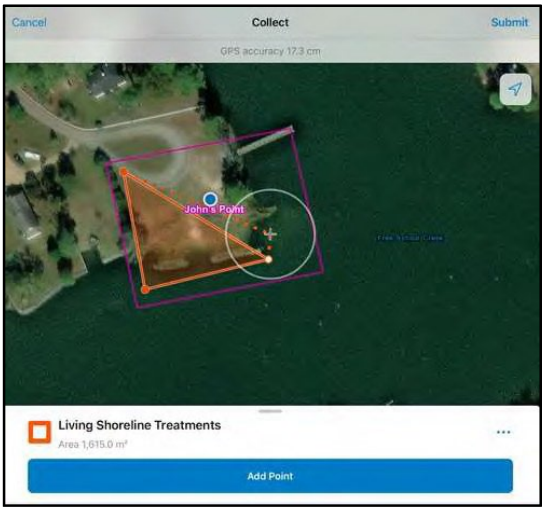
1) Select the Living Shoreline Treatments On Site link.

2) Tap Add. The Crosshairs will appear on your GPS location and the list of Living Shoreline Treatment types will appear.

3) Move the Crosshairs to the desired location of the point from which you want to start drawing the polygon. Select the desired Living Shoreline Treatment type from the list to create the first vertex point of the polygon.
Crosshairs must be moved to the desired location before selecting the Treatment type.
If this is not done, the first point will be created at the current GPS location.

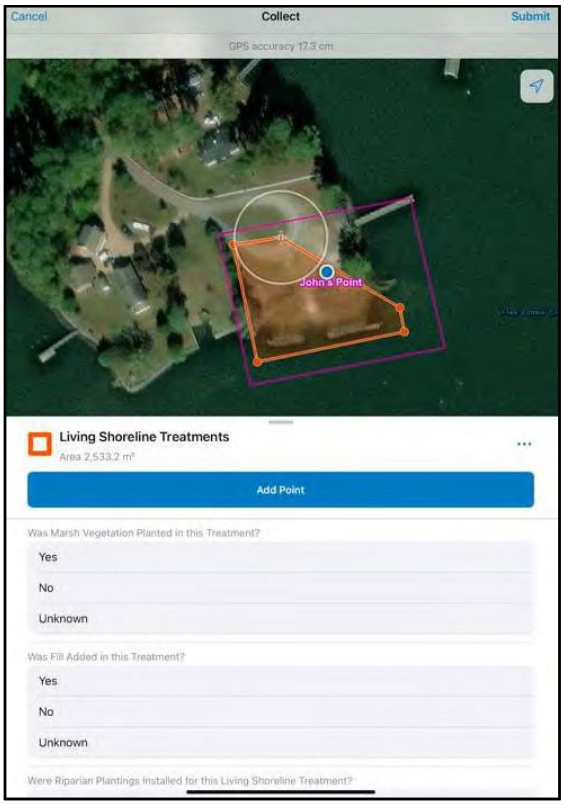


3) Move the crosshairs to the next desired vertex location and click Add Point to add the next vertex point of the polygon.



4) Repeat adding points until the polygon is drawn completely.

5) When the last point of the polygon has been created, answer the three questions pertaining to the Living Shoreline Treatment, if known:



Was Marsh Vegetation Planted in this Treatment? select whether the treatment included planting marsh vegetation.

- If Yes, enter the date that marsh vegetation was planted in the **Date of Marsh Planting, if known** information box that appears.

Was Fill Added in this Treatment? select whether the treatment included the addition of sand fill, if known.

- If Yes, enter the date that sand fill was added in the **Date of Fill Added, if known** information box that appears.

Were Riparian Plantings Installed for this Living Shoreline Treatment? select whether the treatment included planting riparian vegetation, if known.

- If Yes, enter the date that riparian vegetation was planted in the **Date of Riparian Plantings, if known** information box that appears.

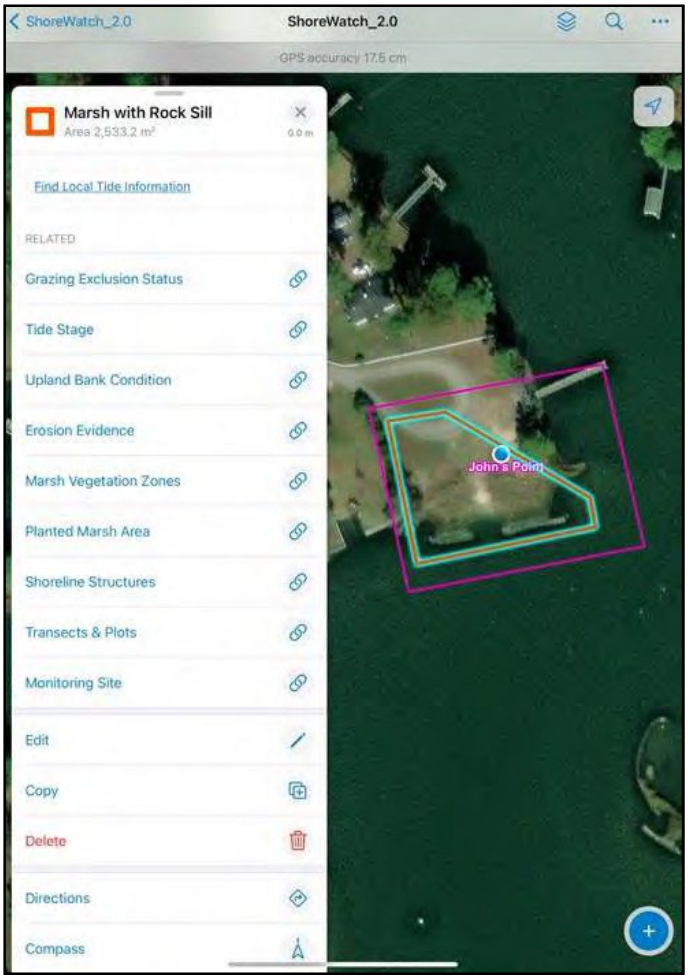
5) Select Submit to complete and create the Living Shoreline Treatment polygon.

Once the Living Shoreline Treatment polygon has been created, the Living Shoreline Treatment tab will appear. The Living Shoreline Treatment will be highlighted.

Find Local Tide Information – link to NOAA web site to find your local tide. Can be used to enter information under Tide Stage.

The links for the features that will be created within this treatment are listed under the **RELATED** heading.

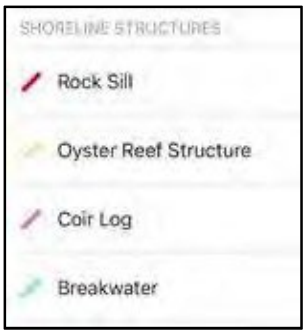
The **Monitoring Site** link will return you to the Monitoring Site level.



DELINEATE SHORELINE STRUCTURES

Shoreline structures are the engineered component of the living shoreline, typically landward and parallel to the shoreline. Structures will be delineated by capturing GPS points while walking along the structure to create line features. Recall that points are captured by the location of the GPS unit. You do not need to walk on top of the structure to create the lines, but instead hold the GPS unit in your outstretched arm over the top of the structure while standing next to the structure. If it is not safe to walk along the structure, such as a large rock sill or breakwater, the structure line can be drawn manually, similar to the Monitoring Site and Living Shoreline Treatment polygons.

There are four shoreline structure types:



The structure type selected should coincide with the treatment type in which it is created.

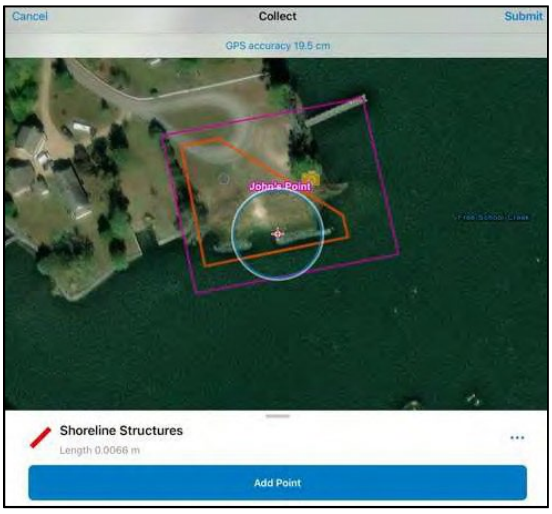
For example, the Rock Sill structure type will be used for Marsh with Rock Sill treatment.

To create the Shoreline Structure line:

1) Walk to one end of the structure and select the Shoreline Structures link

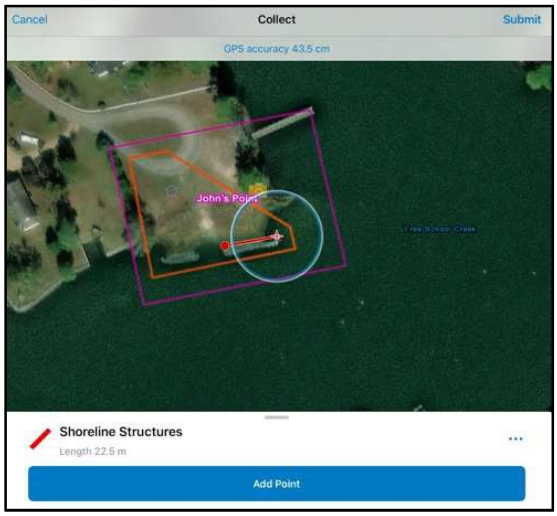
2) Tap Add then select the desired structure type.

Selecting the structure type will automatically add the first point of the structure line so be sure you are at the desired location with adequate GPS accuracy before selecting the structure type.



3) Walk along the structure and capture additional vertex points by selecting Add Point where the structure meanders or changes direction. As you add points, segments of the line will become solid.

4) When you reach the opposite end of the structure, add a final point. The solid line will be your structure line.



5) Enter the necessary information into the information fields. Note that there are unique fields for the Rock Sill and Oyster Reef Structures.

Rock Sills:
ROCK SILL HEIGHT MEASUREMENTS (CM)
Structure Height – Left End (cm): enter height measurement for the left end of the sill.
Structure Height – Right End (cm): enter height measurement for the right end of the sill.
ROCK SILL WIDTH MEASUREMENTS (CM)
Structure Width – Left End (cm): enter width measurement for the left end of the sill.
Structure Width – Right End (cm) enter width measurement for the right end of the sill.

Oyster Structures:
Specific Oyster Structure Type: select the type of oyster structure from the list.

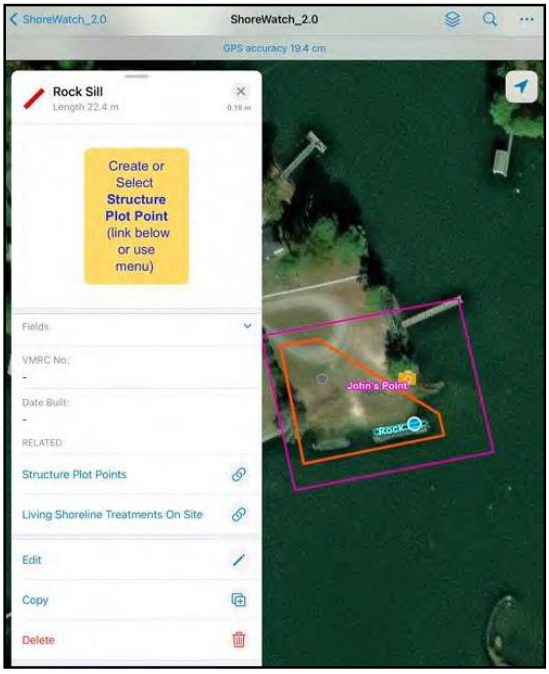
- **Arrangement of Oyster Structure:** select the arrangement of the oyster structure. This information box will only appear if something other than Loose Shell or Bagged Oyster Shell is selected above.

All structures:
PERMIT & CONSTRUCTION INFO
VMRC_No: VMRC permit number associated with the project.
Living Shoreline Permit Type: type of VMRC permit associated with the project.
Backshore Structure Present? type of structure that is backshore of thecreated treatment structure.
Date Built: only the year is important here, but a full date must be selected.
Structure Notes: enter any relevant information about the structure.

6) When all information has been entered, select Submit to create the Shoreline Structure feature.

The Structure tab will appear. The Structure Plot Points link under the RELATED section will be used to create Structure Plot points along the structure (next Section).

If Structure Plot Points are not being created for later monitoring, the Living Shoreline Treatments On Site link can be used to return to the Living Shoreline Treatment layer.



CREATE STRUCTURE PLOT POINTS

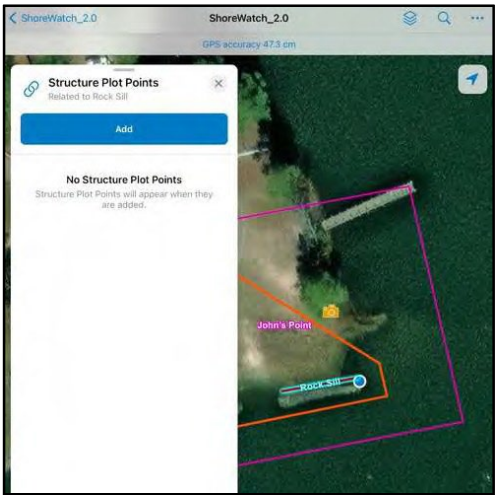
Structure Plot Points are created at locations along the structure where structural information will be recorded during Routine Monitoring events. Multiple Structure Plot Points can be created along a structure at set intervals but should ideally encapsulate the ends and middle of the structure. These points will be differentiated by labeling them with the distance of the point from the left end of the structure.

A separate Structure Plot Point will be labeled with the distance 9999 to record Percent Cover of Oysters over the entire structure. The location of this point is not critical as with the other Structure Plot Points because the information is being recorded for the entire structure, not for a specific plot. It is recommended to locate this point with an adequate space from other plot points to avoid confusion and overlapping on the map.

To create Structure Plot Points:

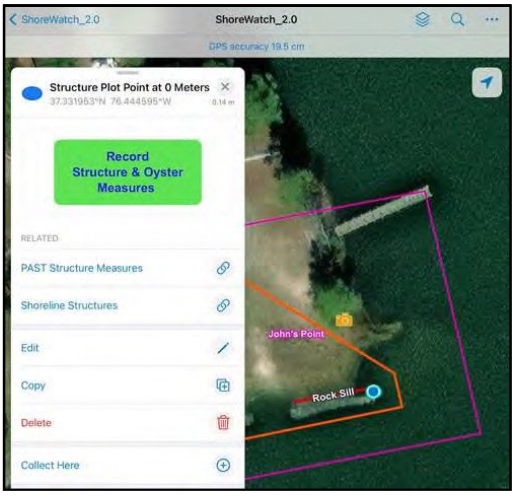
1) With the newly created Shoreline Structure still selected, select the Structure Plot Points link.

This will open the Structure Plot Points tab (the related structure under the heading).



2) Walk to the left end of the structure, when facing the water, which will be your first point. Holding the GPS unit over the desired location of the point, tap Add.

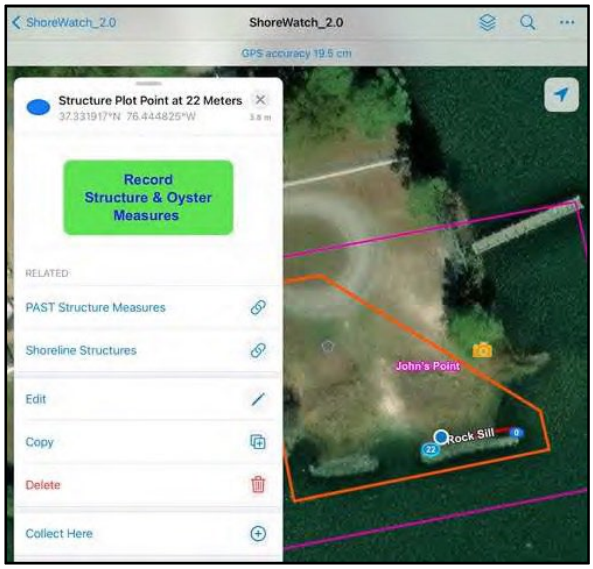
3) Enter the Distance in Meters from left end of structure (if the point is on the far-left end of the structure, it will be 0). Tap Submit to create the point. This will open the Structure Plot Point at 0 Meters tab. The Record Structure & Oyster Measures button will be used to collect data at this point during later Routine Monitoring events.



4) Tap the X at the top right of the Structure Plot Point at 0 Meters tab to return to the Structure Plot Points tab. You will now see your recently created plot point listed here.

5) Walk to the next location along the structure to create your next point. Holding the GPS unit over the desired location of the point, tap Add to create the plot point.

6) Enter the measured Distance in Meters from left end of Structure. For example, if the point is 22 meters from the left end, enter 22. Select Submit to create the point. This will open the Structure Plot Point at 22 Meters tab. Again, the Record Structure & Oyster Measures button will be used to collect data at this point during later Routine Monitoring events.



7) Tap the X at the top right of the Structure Plot Point at 22 Meters tab to return to the Structure Plot Points tab.

8) Continue this process to create additional Structure Plot Points along the structure.

9) For the Structure Plot Point that will be used to record Percent Cover of Oysters over the entire structure, walk to a location along the structure that is spaced between your other Structure Plot Points, and tap Add.

10) Enter 9999 in the Distance in Meters from left end of structure field. Type of Structure Entry: Oyster Percent Cover will appear below the field to signify that this will be the Oyster Percent Cover point. Select Submit to create the point.

When all desired Structure Plot Points have been created, tap the X at the top right of the Structure Plot Point tab, or select the Shoreline Structures link, to return to the Structure tab. From the Shoreline Structures tab, select the Living Shoreline Treatments link to return to your Living Shoreline Treatment layer.

DELINEATE MARSH VEGETATION ZONES

Marsh Vegetation Zones are polygons that will capture the areal extent of the marsh vegetation zones within the Living Shoreline Treatment and will be used to collect data on these communities during Routine Monitoring events. There are two types of Marsh Vegetation Zones to choose from: Low Marsh and High Marsh. The type of zone that is selected is outlined in the Protocol Manual.

There are a few things to be aware of when delineating the Marsh Vegetation Zone polygons:

- While a site will typically have both a low marsh and high marsh zone, it is possible for a site to have only one zone. If this is the case, you only need to create a polygon for the marsh zone that is present at your site.
- Any planted marsh vegetation areas should be included in the delineation of the respective Marsh Vegetation Zone polygons. For example, if a small area was planted within *Spartina alterniflora* within an already established low marsh zone, it should be included within the Low Marsh delineation boundary.
- You may have to create multiple polygons for the same marsh vegetation zone. For example, if the low marsh is disconnected by infrastructure (e.g., piers, boat ramps) or large sandy areas, then multiple Low Marsh polygons will need to be created.
- It is recommended to start with the Low Marsh polygon and then move to the High Marsh polygon as rising tides may make delineating the Low Marsh polygons more difficult.
- Due to limitations in GPS accuracy, marsh polygons may overlap or end up spaced too far apart from one another. If this issue arises, see Editing Features section for guidance.

To create Marsh Vegetation Zones:

1) From the Living Shoreline Treatment tab, select the Marsh Vegetation Zone link 

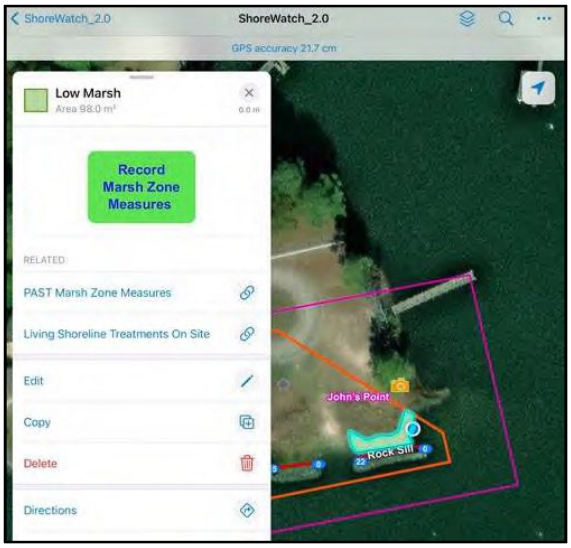
to open the Marsh Vegetation Zone tab.

2) Facing the water, walk to the far-left point of the low marsh zone.

3) Tap Add. Select Low Marsh. This will create the first point of your polygon. Selecting Low Marsh will automatically create your first point, so it is important to be at the location where you want to add the first point and to be within the desired GPS accuracy range before selecting Low Marsh.

4) Walk along the boundary of the low marsh zone and add points wherever the vegetation line meanders or changes direction dramatically by tapping Add Point.

5) When you have created the final point of your polygon, tap Submit. This will create your Low Marsh polygon and the Low Marsh tab will appear. Note that the area and length of the polygon are automatically calculated. The Record Marsh Zone Measures button will be used to collect data about this Low Marsh Zone during Routine Monitoring Events.

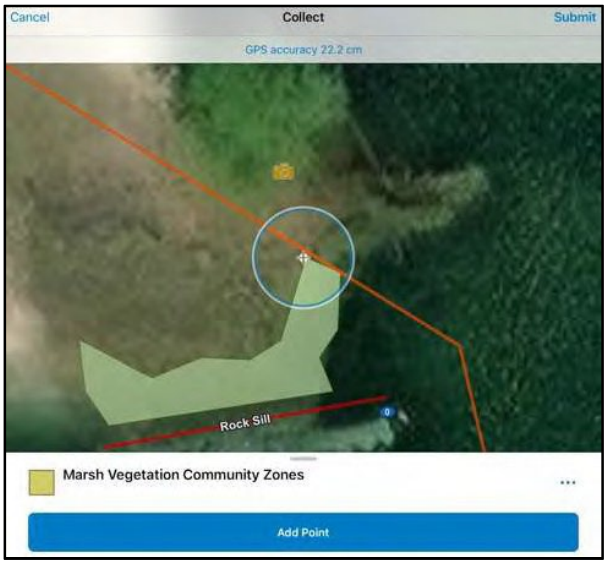


6) Tap the X at the top right of the Low Marsh tab to return to the Marsh Vegetation Zone tab. Note that your recently created Low Marsh now appears in the list on this tab.

7) To create the High Marsh, tap Add.

8) Facing the water, walk to the far-left point of the high marsh that is closest to the water. Select High Marsh. Selecting High Marsh will automatically create your first point, so it is important to be at the location where you want to add the first point and to be within the desired GPS accuracy range before selecting High Marsh.

9) Follow the same steps as the low marsh zone of adding points for the high marsh zone.



10) When you have added the last desired point of your polygon, tap Submit. This will create your High Marsh polygon and the High Marsh tab will appear. The Record Marsh Zone Measures button will be used to collect data about this Low Marsh Zone during Routine Monitoring Events.

11) Tap the X at the top right of the High Marsh tab to return to the Marsh Vegetation Zone tab. Note that your recently created High Marsh now appears in the list on this tab.

12) Repeat these steps to create additional Low Marsh and/or High Marsh polygons, as necessary.

When all the desired Low Marsh and High Marsh zones have been created, tap the X at the top right of the Marsh Vegetation Zone tab to return to your Living Shoreline Treatment tab.

DELINEATE PLANTED MARSH AREA

Planted Marsh Areas are polygons that will capture the areal extent of areas that were planted with marsh vegetation as part of the Living Shoreline treatment. They are created in the same manner as the Marsh Vegetation Zone polygons, and they also have two types: Low Marsh and High Marsh.

There are a few things to be aware of when delineating the Planted Marsh Area polygons:

- You only need to create a Planted Marsh Area polygon for the type of marsh vegetation that was planted as part of your treatment. If only low marsh vegetation (e.g., *Spartina alterniflora*) was planted, then you only need to create a Low Marsh polygon.
- You may have to create multiple polygons for the same Planted Marsh area type. For example, if low marsh vegetation was planted in separate, distinct locations, then you will need to create multiple Low Marsh planted area polygons.
- Planted Marsh Areas can be created within the previously delineated Marsh Vegetation Zone polygons if they were planted within that zone.
- On a rising tide, it is recommended to start with the Low Marsh planted areas and then move to the High Marsh planted areas as inflowing tides may make delineating the Low Marsh polygons more difficult.
- Due to limitations in GPS accuracy, marsh polygons may overlap or end up spaced too far apart from one another. If this issue arises, see the Editing Features section for guidance.

Planted Marsh Areas are unique in that data will be recorded during the Initial Site Set-Up Visit as opposed to the Routine Monitoring visits, as with all the other features. This is because the data for Planted Marsh Areas is information that will not change over time and does not require additional monitoring. The additional monitoring for these areas will be captured through the Marsh Vegetation Zone polygons.

To create Planted Marsh Areas:

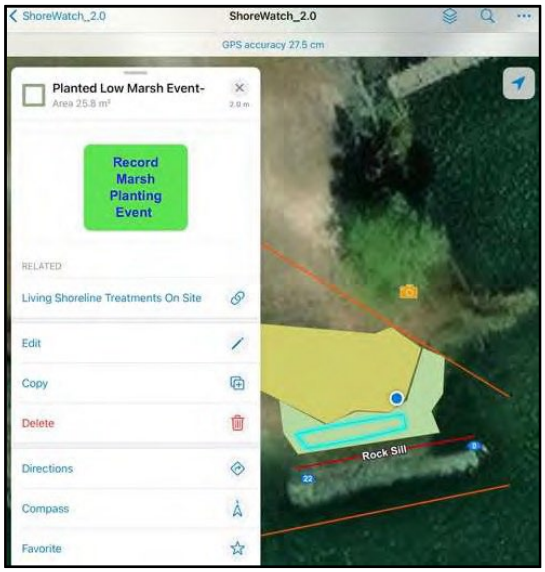
1) From the Living Shoreline Treatment tab, select the Planted Marsh Area link to open the Planted Marsh Area tab. 

2) Facing the water, walk to the far-left point of the planted low marsh area that is closest to the water on the shoreline.

3) Tap Add. Select Low Marsh. This will create the first point of your polygon. Selecting Low Marsh will automatically create your first point, so it is important to be at the location where you want to add the first point and to be within the desired GPS accuracy range before selecting Low Marsh.

4) Walk along the boundary of the planted low marsh area and add points wherever the vegetation line meanders or changes direction dramatically by tapping Add Point.

5) When you have created the final point of your polygon, tap Submit. This will create your Low Marsh planted area polygon and the Planted Low Marsh Event- tab will appear. Note that the area and length of the polygon are automatically calculated.



6) Select the Record Marsh Planting Event button to open the Planted Marsh Areas form.

Marsh Zone: Low Marsh

- **Date of Low Marsh Planting**

Date Planted: select the date that low marsh vegetation was planted.

- **Phase of this Planting**

Phase: select whether the plantings are new (Initial Plantings), the area has been replanted after the initial planting (Replanting), or if the phase is Unknown.

- If Replanting is selected, specify the reason for replanting by selecting all that apply from the list that appears.

- **Extent of New Plant Coverage in Low Marsh**

Coverage in marsh: select whether the plantings cover the complete area of the Low Marsh Planted Area (Complete Coverage), were only applied in specific areas (Spot plantings), or coverage is Unknown.

- **Configuration of Plantings**

Configuration: select whether low marsh vegetation was planted in rows, clumped, or if configuration is Unknown.

- **Who planted the Low Marsh?**

Planting Labor: select all the planting labor types that apply.

- If Other is selected, specify the labor type in the Specify other information box that appears.

- **Source of Plantings**

Where were the plantings sourced?

- If Nursery stock is selected, specify all the Nurseries that apply from the Nurseries list that appears.
  - If Other is selected, specify the Nursery(s)in the Specify other information box that appears.

- **Species Planted in Low Marsh**

Species Planted: select all the species planted from the list.

- If Other is selected, specify the species planted in the Specify other information box that appears.

- **Sand Fill**

Was Sand Fill Applied? select whether sand fill was applied to the Low Marsh Planted Area.

- **Substrate of Low Marsh Planting Area**

Material Type: select the type of substrate that is most prevalent in the Low Marsh Planting Area.

- **Low Marsh Planting Area Notes**

Notes - record any relevant information about the Low Marsh Planting Area.

- **Take Photos of Low Marsh -** use the camera icon to take photo(s) of the Low Marsh Planting Area

When all known information has been entered, select the checkmark, and choose Send now to submit the Planted Marsh Areas form for the Low Marsh Planted Area. This will submit the form and return you to the Planted Low Marsh Event- tab.

7) Tap the X at the top right of the Planted Low Marsh Event- tab to return to the Planted Marsh Area tab. Note that your recently created Planted Low Marsh Event now appears in the list on this tab.

8) To create the High Marsh planted area, tap Add.

9) Facing the water, walk to the far-left point of the planted high marsh area that is closest to the water on the shoreline. Select High Marsh.

   It is important to be at the location where you want to create your first point and to be within the desired GPS accuracy range before selecting High Marsh.

10) Follow the same steps as the Low Marsh Planted Area of adding points for the High Marsh Planted Area.

11) When you have added the last desired point of your polygon, tap Submit.

    This will create your High Marsh planted area polygon and the Planted High Marsh Event- tab will appear.

12) Select the Record Marsh Planting Event button to open the Planted Marsh Areas form.

Marsh Zone: High Marsh

- **Date of Low Marsh Planting**

Date Planted: select the date that high marsh vegetation was planted.

- **Phase of this Planting**

Phase: select whether the plantings are new (Initial Plantings), the area has been replanted after the initial planting (Replanting), or if the phase is Unknown.

- If Replanting is selected, specify the reason for replanting by selecting all that apply from the list that appears.

- **Extent of New Plant Coverage in High Marsh**

Coverage in marsh: select whether the plantings cover the complete area of the High Marsh Planted Area (Complete Coverage), were only applied in specific areas (Spot plantings), or coverage is Unknown.

- **Configuration of Plantings**

Configuration: select whether high marsh vegetation was planted in rows, clumped, or if configuration is Unknown.

- **Who planted the High Marsh?**

Planting Labor: select all the planting labor types that apply.

- If Other is selected, specify the labor type in the Specify other information box that appears.

- **Source of Plantings**

Where were the plantings sourced?

- If Nursery stock is selected, specify all the Nurseries that apply from the Nurseries list that appears.
  - If Other is selected, specify the Nursery or Nurseries in the Specify other information box that appears.

- **Species Planted in High Marsh**

Species Planted: select all the species planted from the list.

- If Other is selected, specify the species planted in the Specify other information box that appears.

- **Sand Fill**

Was Sand Fill Applied? select whether sand fill was applied to the High Marsh Planted Area.

- **Substrate of High Marsh Planting Area**

Material Type: select the type of substrate that is most prevalent in the High Marsh Planting Area.

- **High Marsh Planting Area Notes**

Notes - record any relevant information about the Low Marsh Planting Area.

- **Take Photos of High Marsh -** use the camera icon to take photo(s) of the Low Marsh Planting Area

When all known information has been entered, select the checkmark, and choose Send now to submit the Planted Marsh Areas form for the High Marsh Planted Area. This will submit the form and return you to the Planted High Marsh Event- tab.

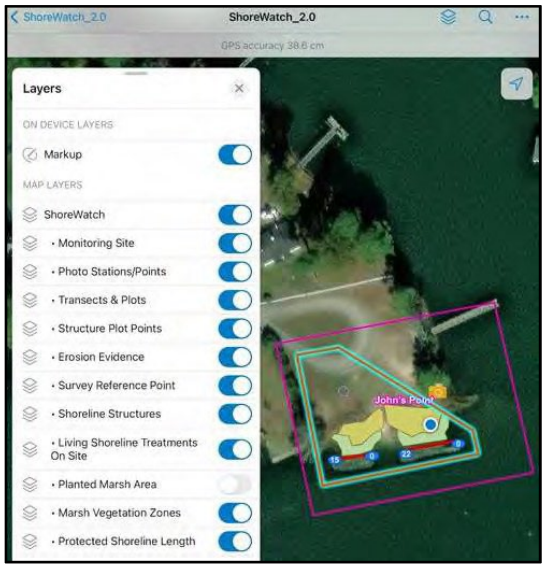
13) Tap the X at the top right of the Planted High Marsh Event- tab to return to the Planted Marsh Area tab. Note that your recently created Planted High Marsh Event- now appears in the list on this tab.

14) Repeat these steps to create additional Low Marsh and/or High Marsh planted area polygons, as necessary.

When all the desired Low Marsh and High Marsh planted areas have been created, tap the X at the top right of the Planted Marsh Area tab to return to your Living Shoreline Treatment tab.

The Planted Marsh Area polygons can be toggled off to avoid clutter and confusion on the map. To accomplish this, tap the layer icon in the top right corner of the app screen. On the Layers tab, tap the circle next to the Planted Marsh Area layer so that it slides to the left and no longer has a blue fill.

Any layer can be toggled off in this manner at any time, but a layer must be toggled On to create or edit that feature.



TRANSECT & PLOTS

Sample plots along permanent set transects are used to track and evaluate the performance of a living shoreline. Creating Plot Points along these transects in the ShoreWatch app will allow you to track changes in the same location during Routine Monitoring Events. These plot points will be created at the locations of your poles/stakes where quadrats are used for sampling.

There are a few things to be aware of when creating Transect Plot Points:

- The number of transects is up to the person performing the monitoring, but you can create points for up to 10 transects in the app. Transects will be labeled 1-10 starting with, while facing the water, the left most transect (1) and ascending numbers for additional transects moving right.
- There are six possible Plot Location ID's that will be used along each individual transect: LM0, LM1, HM0, HM1, Rip, Rip + Trees.

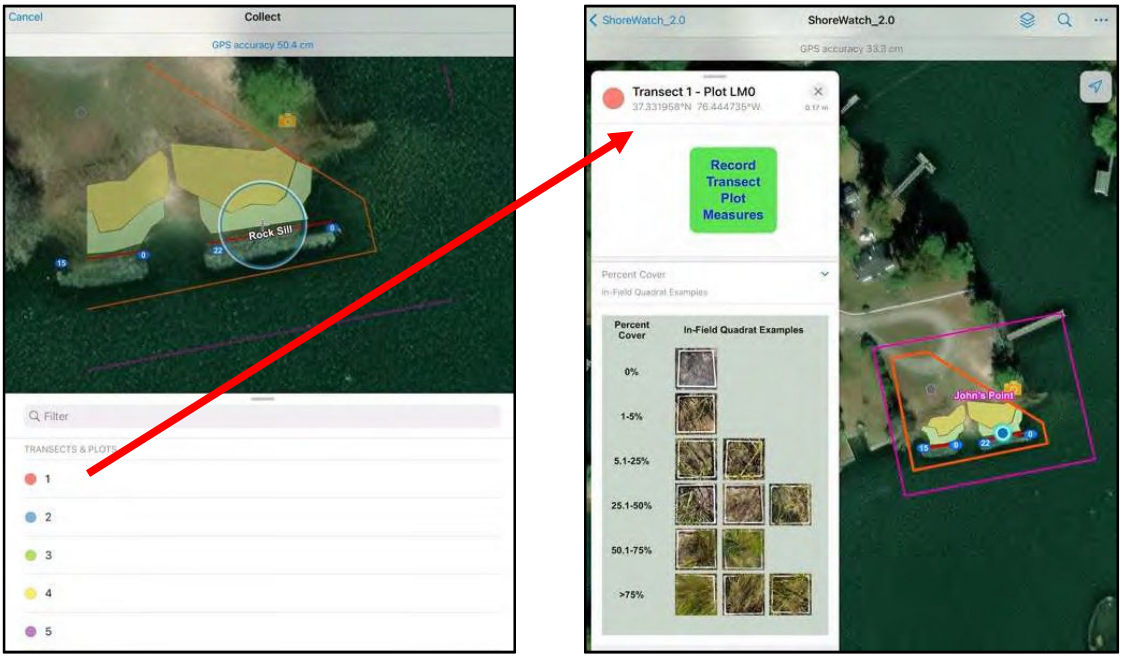
- Facing the water, start with your far left transect (1) and create points moving from the low marsh edge to the riparian area. Repeat adding plot points in that order moving to the right for additional transects.

To create Transect & Plot Points:

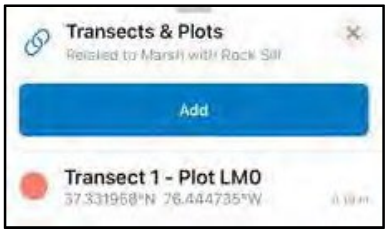
1) From your Living Shoreline Treatment tab, select the Transects & Plots link. This will open the Transects & Plots tab. 

2) Walk to the location of your first point – LM0 of Transect 1.

3) Tap Add. Select O 1 from the Transects & Plots list. Under Plot Location ID, select LM0. Tap Submit to create the Transect Plot point, which will pull up the Transect 1 – Plot LM0 tab.
   - Selecting O 1 will automatically capture the location of your point, so it is important to be at the location where you want to add the point and to be within the desired GPS accuracy range before selecting O 1.
   - The Record Transect Plot Measures button will be used to collect data for this LM0 plot on Transect 1 during Routine Monitoring Events.
   - The In-Field Quadrat Examples and the Relative Patch Aggregation figures can be used as a reference for calculating Percent Cover during Routine Monitoring Events.

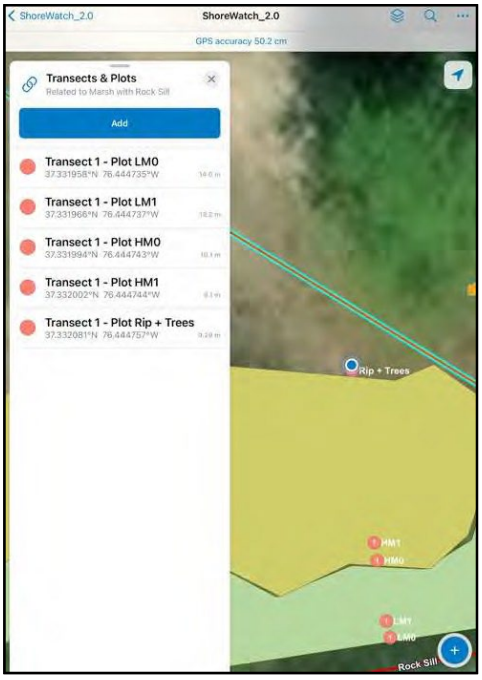


4) Tap the X at the top right corner of the Transect 1 – Plot LM0 tab to return to the Transects & Plots tab.
    - You will now see your Transect 1 – Plot LM0 point listed here.



5) Walk to the location of your next plot point, which will be LM1. Repeat the above steps, selecting Transect Number 1 and LM1 from the list under Plot Location ID.

6) Continue this process to create the additional Plot points for Transect 1.
    - For Rip and Rip + Tree plots, record the distance from the structure (start of transect) to the Rip or Rip + Tree plot.



On the map, the Transect 1 plot points now appear in a line reflecting the transect line in the field. The Transects & Plots tab now has the list of these created points. These points, and their respective location in the field, will be used to collect data during Routine Monitoring Events.

7) When all Plot points have been created for Transect 1, walk to the location of the LM0 point for your next transect and repeat the above steps, choosing the appropriate number from the Transects & Plots list when adding points.

When all the desired Transect & Plot points have been created, tap the X at the top right of the Transects & Plots tab to return to your Living Shoreline Treatment tab.

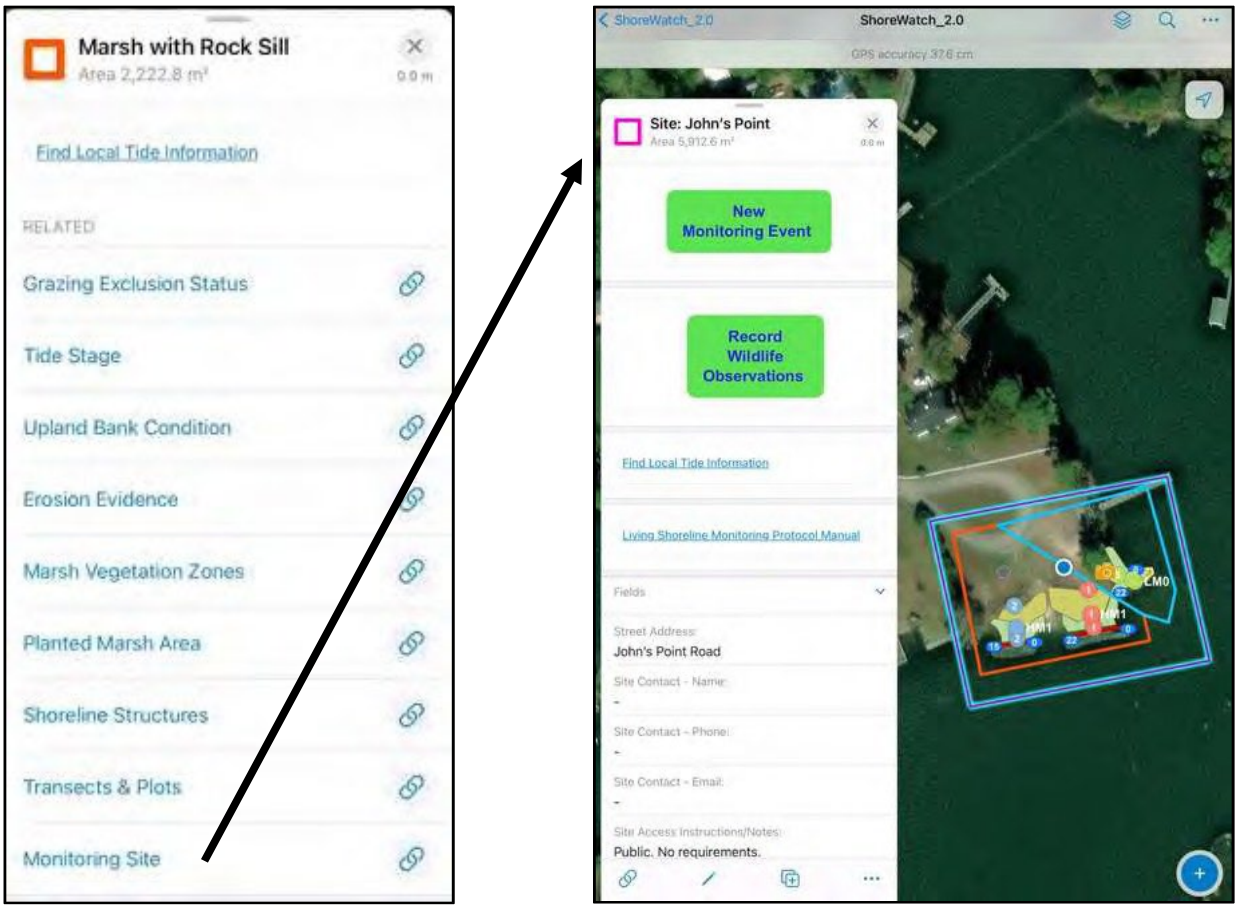
All the features within the Living Shoreline Treatment layer have now been created for this treatment. If the site has multiple Living Shoreline Treatments, repeat the steps above to create the features for that treatment.

Below is an image of a site that has multiple treatments with associated features. Note:

- There are multiple Living Shoreline Treatment polygons (Marsh with Rock Sill and Marsh with Oyster Structure) with the respective Structure types (Rock Sill and Oyster Structure, respectively).
- On the ground, there is no high marsh behind the Oyster Structure, so only a Low Marsh polygon has been delineated.
- Because there is no high marsh, the Marsh with Oyster Structure treatment does not have HM0 and HM1 Plot points along the transect.

When all the Living Shoreline Treatments and associated features have been created, the last site feature to delineate is the Protected Shoreline Length. This feature is created within the Monitoring Site layer.

From the Living Shoreline Treatment tab scroll down the list of links under the Related section and select the Monitoring Site link to return to your Monitoring Site tab. On the map, the Monitoring Site polygon should be highlighted.



DELINEATE PROTECTED SHORELINE LENGTH

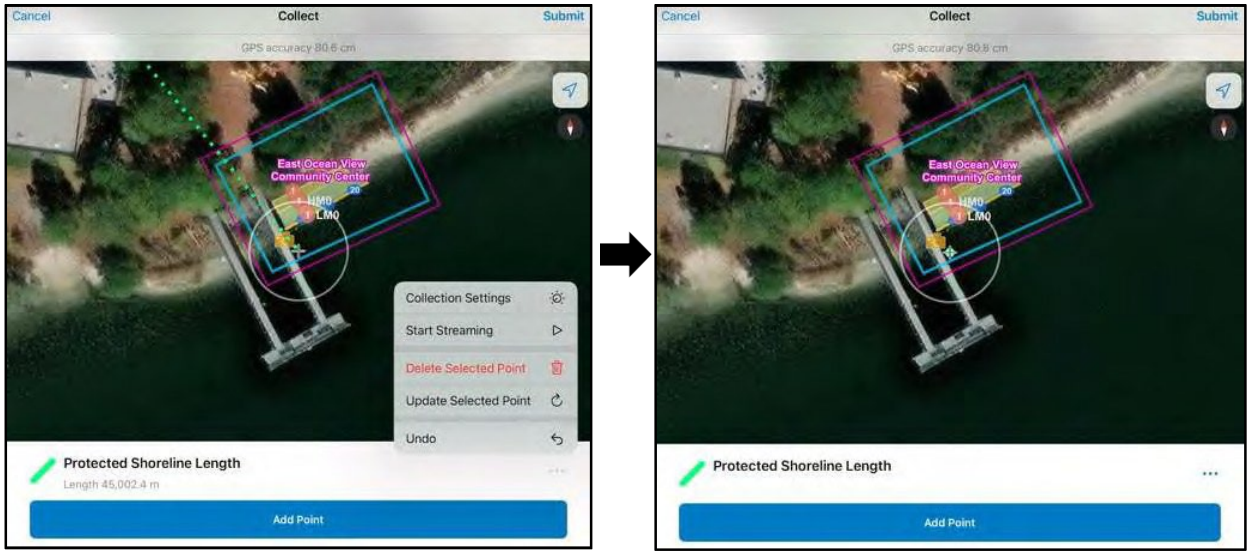
Protected Shoreline Length is a line feature that captures the length of shoreline that is being protected by the elements that compose the Living Shoreline. These elements are the marsh zone and structure features that have been delineated in the above steps. The Protected Shoreline Length line will be drawn channelward of all structures and/or marsh zones associated with the Monitoring Site. While the Protected Shoreline Length will be within the Monitoring Site polygon, it should be outside of any Living Shoreline Treatment polygons.

To create the Protected Shoreline Length line:

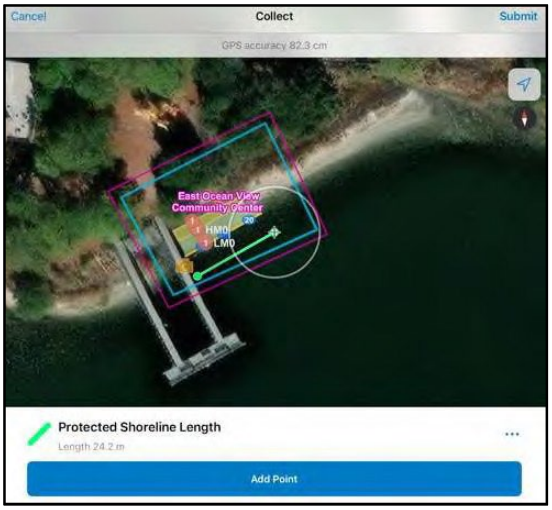
1) Ensure that the Monitoring Site polygon is selected and select the Protected Shoreline Length link Protected Shoreline Length under the Related Section of your Site tab. This will pull up the Protected Shoreline Length tab.

2) Tap the Add button.
   - This will automatically create the first point of the line at the current GPS location. This point must be manually moved to the correct starting point for the Protected Shoreline.

3) Move the crosshairs to the correct location for the start of the Protected Shoreline line. Tap the three blue dots at the top right of the Protected Shoreline Length tab and select Update Selected Point.
   - This will move the point from the current GPS location to the location of the crosshairs.



4) Move the crosshairs to the end of the length of shoreline protected by the Living Shoreline and tap Add Point.
   - If the shoreline meanders, additional points may be needed while creating the line to capture the change in direction.



5) When finished adding points, tap Submit to create the Protected Shoreline Length line.
    - This will bring up the Protected Shoreline Length tab. There is no information to enter for Protected Shoreline Length.

6) Tap the Monitoring Site link to return to the Monitoring Site layer.

END OF INITIAL SET-UP VISIT

That concludes the delineation and creation of features for the Initial Set-Up Visit. The next step will be to perform Routine Monitoring of the Living Shoreline project using these features in ShoreWatch. A reminder that features can be edited at this point to correct any errors that may have occurred during set-up and that new features can be created at any time.

ROUTINE MONITORING

Now that the Monitoring Site has been set up in the ShoreWatch App, with the elements of the living shoreline treatment delineated and plot points established, routine monitoring protocols may be followed for data collection during Routine Monitoring Events. You will use your created features to access forms in Survey123 where you will enter your data for those features.

A suggested order for Monitoring Events is outlined below. All monitoring data collection fields are optional except for select required fields that are denoted by an asterisk *. If you choose not to take measurements for a particular element, simply skip that step.

All measurements in the ShoreWatch App must be recorded in metric units. Each information field on the data forms will indicate whether to use centimeters (cm) or meters (m), and specific measurement instructions can be found in the Monitoring Protocols.

Steps 1, 2 and 10 will be performed using links under the Monitoring Site layer.

Steps 3 – 9 will be performed using links under the Living Shoreline Treatments On Site layer.

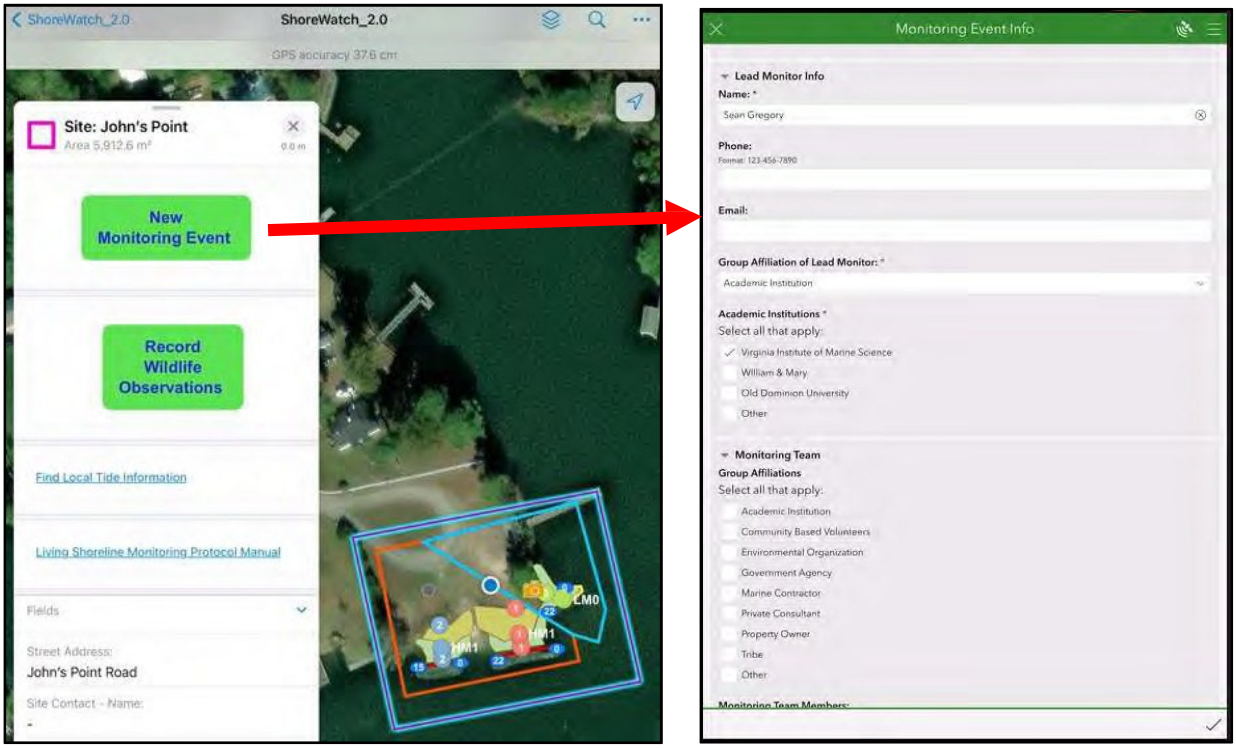
MONITORING EVENTS

There are three types of Monitoring Events based on the type of monitoring being conducted.

As-Built: the initial routine monitoring event following the Site Set-Up Visit, ideally within 1 year after the living shoreline project installation.
Long-Term: subsequent routine monitoring events of a completed living shoreline project. May be done once or multiple times a year.
Post-Storm: monitoring event of a completed living shoreline project following a significant storm event.

To record a New Monitoring Event:

- Select your Monitoring Site to open the Monitoring Site tab. Tap the New Monitoring Event button.
    - This will open the Monitoring Event Info form in Survey123.



Monitoring Site: auto populated with Site Name
Monitoring Date: auto populated with current Date

➢ **Monitoring Event**

Select Type: * select the type of Monitoring Event (As-Built, Long Term, Post Storm)

- More information fields will appear based on the type of Monitoring Event selected:

The following sections will appear for ALL Monitoring Event types:

- **Lead Monitor Info**

Name: * full name of the Lead Monitor
Phone: phone number of the Lead Monitor (use 123-456-7890 format)
Email: email address of the Lead Monitor
Group Affiliation of Lead Monitor: * select the type of group with which the Lead Monitor is affiliated or Specify Other

- More information fields will appear if the following Group type is selected:
  Academic Institutions select all academic institutions that apply to the Lead Monitor or specify Other
  Community-Based Volunteers select all groups that apply to the Lead Monitor or specify Other
  Environmental Organization select all groups that apply to the Lead Monitor or specify Other
  Government Agencies select all groups that apply to the Lead Monitor or specify Other

- **Monitoring Team**

Group Affiliations – select all the groups with which members of the Monitoring Team are affiliated

- More information fields will appear if the following Group type is selected:
  Academic Institutions select all academic institutions that apply to the Lead Monitor or specify Other
  Community-Based Volunteers select all groups that apply to members of the Monitoring Team or specify Other
  Environmental Organization select all groups that apply to members of the Monitoring Team or specify Other
  Government Agencies select all groups that apply to members of the Monitoring Team or specify Other
  Tribes select all tribes that apply to members of the Monitoring Team or specify Other

Monitoring Team Members: enter the full names of Monitoring Team Members, separating with commas

The following sections will appear for Post Storm Monitoring Event ONLY:

- **Storm Information**

Storm Name: name of the Storm if known
Date of Storm: choose the date from the calendar that opens
Storm Impacts – select all the impacts to the Living Shoreline from the Storm Event
Storm Notes – add any relevant information about the Storm Event and/or its impact on the Living Shoreline
Location of Highest Wrackline – select where the highest wrackline is located at the site
Identify Debris in Storm Wrackline – select all debris types observed in the Storm Wrackline, if any, or Specify Other

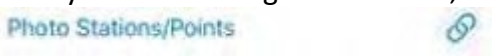
2) When all known information has been entered, select the check mark at the bottom right of the form. Tap Send now to submit the form.

PHOTO OBSERVATIONS

Photos taken at fixed photo stations established during the Initial Site Set-Up Visit will allow you to visually track changes at the site over time. Photos should be taken from the same location, at the same angle, and, preferably, at the same time of year to keep photos consistent and comparable.

The capture Photo Observations:

1) With your Monitoring Site selected, select the Photo Stations/Points link.



2) On the Photo Stations/Points tab, your previously created Photo Stations will be listed.

3) If the Photo Station was marked in the field during the Set-Up Visit, return to that marked location. Otherwise, use the GPS dot on your map screen to navigate to the location of your Photo Station on your site.

4) Select your Photo Station from the list. It will now be highlighted on your map and the Photo Station tab will appear.

To see previous photos taken at this point, scroll down and select the Past Photos link to bring up a list of previously submitted photos. Select a listed photo.

The Fields section provides the date and time the photo was captured, and any notes left by prior users on how the photo was taken. The image is found under the Attachments section. Tapping the image will enlarge the photo.

Viewing previously taken photos will help ensure that you are capturing photos from the same angle and vantage point each time. To return to your photo station, tap Done in the top right corner, scroll down and tap the Photo Stations/Points link.

5) Select the Take Photo button which will open the Photos form.

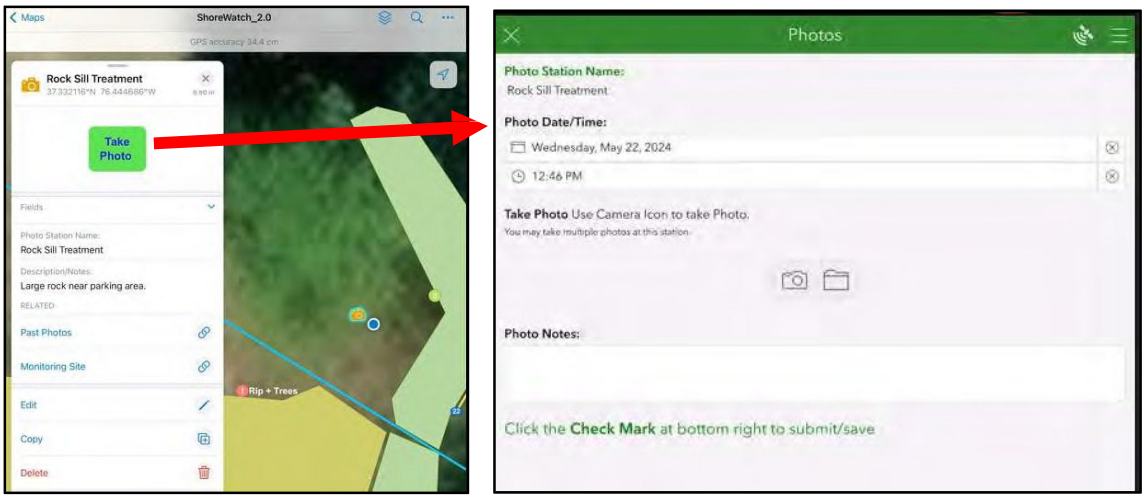


Photo Station Name: auto populated with the name of the photo station
Photo Date/Time: auto populated with current Date and Time
Take Photo - use the camera icon to take photo(s)
Photo Notes: add any relevant information about the photos

6) Tap the check mark and select Send now to submit the Photos form.

Repeat the above steps to capture photos at any additional Photo Stations.

When you have captured all desired photos, select the Monitoring Site link to return to your Monitoring Site tab.

FIELD MEASURES FOR EACH LIVING SHORELINE TREATMENT

The following steps will be performed under the Living Shoreline Treatments on Site Layer. With your Monitoring Site selected, select the Living Shoreline Treatments on Site link to bring up the Living Shoreline Treatments On Site tab. Select your previously created Living Shoreline Treatment from the list to open your Living Shoreline Treatment tab.

INDICATE TIDE STAGES

Note that Tide Stages will be recorded in Field Maps, not on a Survey123 form.

To record the Tide Stage at the time of the Monitoring Event:

1) Select the Tide Stage link 

to open the Tide Stage tab. Previously recorded tide stages will be listed here. If there have not been any recorded tide stages, this will be blank.

2) Select Add to record the tide stage.

Date/Time auto populates with the current date and time.
Current Tide Stage select the current tide stage from the list.
Predicted Low Tide select the information box. The date will automatically be the current date. Select the Time box and scroll through the numbers to indicate the time of the predicted low tide.
Tide Notes add any relevant information about the tide.

3) When all information for the tide stage has been entered, select Submit. This will record your Tide Stage information.

Select the Living Shoreline Treatments On Site link from the resulting recorded Tide Stage tab to return to your Living Shoreline Treatment tab.

RECORD STRUCTURE AND OYSTER MEASURES

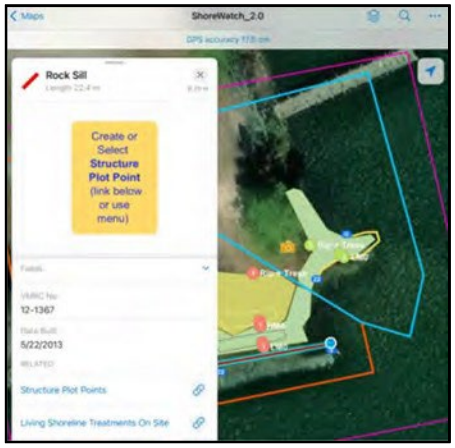
Structure and Oyster measures will be recorded at your previously created Structure Plot Points. Start with your leftmost point on the structure and move right along the structure, collecting data at points in ascending order.

To record Structure and Oyster Measures:

1) With your Living Shoreline Treatment highlighted, select the Shoreline Structures link.

3) Select the Structure on which the Plot point is located.

4) Select the Structure: Plot Points & Oyster Percent Cover link.

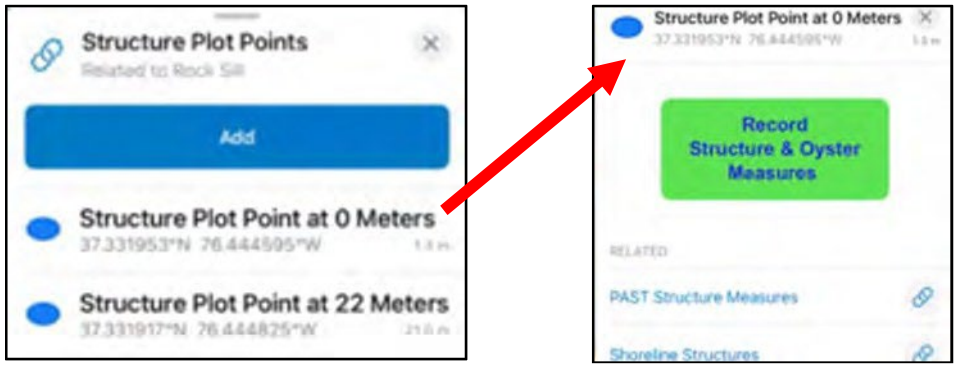


5) Using your GPS dot on the map, navigate to the Structure Plot point.

- If the point was marked with a pole or stake during the initial site set-up, use this mark to find the exact location of the plot.

6) Select the appropriate Structure Plot point from the list at which you will be recording data.

7) Tap the Record Structure & Oyster Measures button.



This will open the Structure Plot Point Measures form. Note that information on forms differ depending on the type of structure.

<u>Oyster Structure</u>

Date/Time: auto populated with current date and time
Shoreline Structure Type: auto populated with Structure Type
Plot Point Location (Meters from left end of structure): auto populated with distance

- **Structural Integrity**

Structure Status: select the status of structure from list
Structural Integrity Notes: record relevant information about the structural integrity

- **Structural Measurements (cm)**

Height (cm) enter measured height of structure
Width (cm) enter measured width of structure
Height above High Water Mark to Top of Structure (cm) enter measured vertical distance (cm) between the high water line and the top of structure

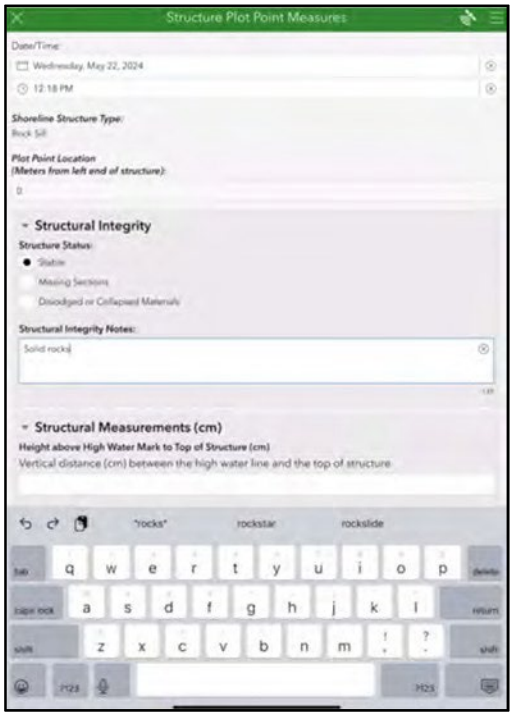
- **Oyster Measures on Structures**

Size of Quadrat (Plot) select the size of the quadrat (m^2) used to take measurements
What side of the structure are measurements taken? select side from list
Where on the structure are measurements taken? select area from list
Fauna Present on Structure select all fauna types that apply

- Selecting a fauna type from this list will bring up a new section:
- **Oyster & Other Fauna Counts (Optional)**
  Count the Number of Live Oyster Recruits: enter count
  Count the Number of Live Adult Oysters: enter count
  Count the Number of Live Mussels: enter count
  Percent Cover of Attached Algae: select percent range from list

- **Plot Photos** use the camera icon to take photo(s) of the structure plot

Rock Sill



Date/Time: auto-populated with current date and time
Shoreline Structure Type: auto populated with Structure Type
Plot Point Location (Meters from left end of structure): auto populated with distance

- **Structural Integrity**

Structure Status: select the status of structure from list
Structural Integrity Notes: record relevant information about the structural integrity

- **Structural Measurements (cm)**

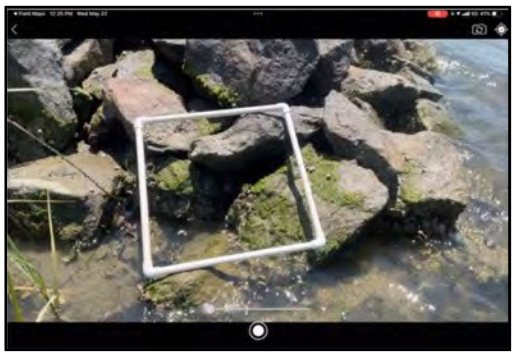
Height above High Water Mark to Top of Structure (cm) enter measured vertical distance (cm) between the high water line and the top of structure

- **Oyster Measures on Structures**

Size of Quadrat (Plot) select the size (m^2) of the quadrat used to take measurements
What side of the structure are measurements taken? select side from list
Where on the structure are measurements taken? select area from list
Fauna Present on Structure – select all fauna types that apply

- Selecting a fauna type from this list will bring up a new section, asking for counts of the fauna type:
- **Oyster & Other Fauna Counts (Optional)**
  Count the Number of Live Oyster Recruits: enter count
  Count the Number of Live Adult Oysters: enter count
  Count the Number of Live Mussels: enter count
  Percent Cover of Attached Algae: select percent range from list

- **Plot Photos** use the camera icon to take photo(s) of the structure plot



Coir Logs

Date/Time: auto-populated with current date and time
Shoreline Structure Type: auto populated with Structure Type
Plot Point Location (Meters from left end of structure): auto populated with distance

- **Structural Integrity**

Structure Status: select the status of structure from list
Structural Integrity Notes: record relevant information about the structural integrity

- **Structural Measurements (cm)**

Height (cm) enter measured height of structure
Width (cm) enter measured width of structure

- **Coir Log Information**

Type: select whether the coir log is the one that was originally installed, installed as reinforcement, installed as a replacement to the original, or unknown if status is not known
Status: select whether the coir log is present or decayed/absent
Grade: select the grade quality of the coir logs
Arrangement: select the arrangements of the coir logs

- **Plot Photos** use the camera icon to take photo(s) of the structure plot

8) When all desired information has been entered, tap the check mark, and select Send now to submit Structure Plot Point Measures form.

9) Move to your next Structure Plot point and repeat steps 5 through 8 as needed for all Structure Plot points on this structure.

10) Lastly, select the point at which Percent Cover of Oysters on Structure will be recorded (Distance: 9999) and tap the Record Structure & Oyster Measures button to open the Structure Plot Point Measures form.

Date/Time: auto-populated with current date and time
Shoreline Structure Type: auto populated with Structure Type
Plot Point Location (Meters from left end of structure): 9999
Percent Cover of Oysters on Structure: enter the percent cover of oysters for the entire structure
Notes: record relevant information about the oyster cover on the structure
Photos use the camera icon to take photo(s) representative of oyster cover on the structure

11) When all desired information has been entered, tap the check mark, and select Send nowto submit Structure Plot Point Measures form.

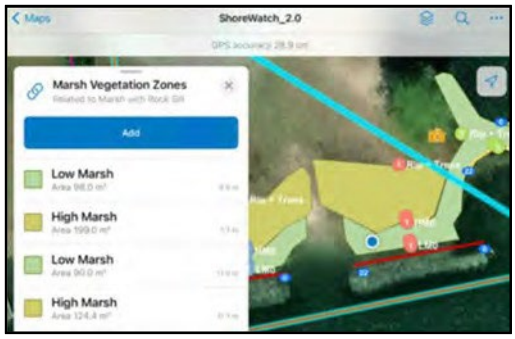
When measurements have been recorded at all desired plot points on the structure, move to the next structure, if necessary, and repeat all steps to record Structure Plot Point data for that structure. When completed, on the Structure Plot Point at XX Meters tab, scroll down and select the Shoreline Structures link and then select the Living Shoreline Treatments On Site link to return to your Living Shoreline Treatment tab.

CHARACTERIZE MARSH VEGETATION ZONES

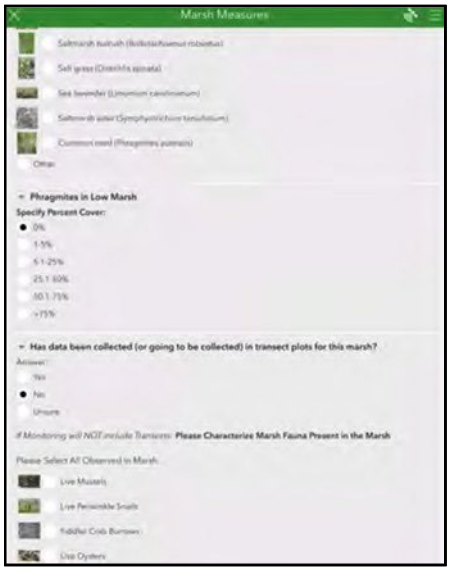
Characteristics of the Marsh Vegetation Zones will be collected using the Marsh Vegetation Zone polygons delineated during the Initial Site Set-Up Visit. It is recommended to start with the Low Marsh Zone(s) and then move to the High Marsh Zone(s).

To characterize Marsh Vegetation Zones:

1) With your Living Shoreline Treatment selected, scroll down and select the Marsh Vegetation Zones link.
The Marsh Vegetation Zones tab will open, listing your previously created Marsh Vegetation Zone polygons.



2) Select Low Marsh and then tap the Record Marsh Zone Measures button to open the Marsh Measures form.



Date/Time: auto-populated with the current date and time
Marsh Zone: Low Marsh

- **Vegetative Cover in Low Marsh**

Specify Total Percent Cover: select the total percent cover range from the list

- **Dominant Plant Species in Low Marsh**

Specify the DOMINANT Plant Species: Select the dominant plant species in the Low Marsh

  - If Other, record the name in the Specify other info box

- **Phragmites in Marsh**

Specify Percent Cover: select the percent cover range of phragmites present in the Low Marsh

- **Has data been collected (or going to be collected) in transect plots for this marsh?**
  - If Yes is selected, move on to next section – **Low Marsh Notes**
  - If No or Unsure is selected, **Characterize Marsh Fauna Present in the Marsh** by selecting all fauna observations that apply to the Low Marsh from the list that appears below
- **Low Marsh Notes** record any relevant information about the Low Marsh
- **Photos of Low Marsh** use the camera icon to take photo(s) of the Low Marsh

3) When all desired information has been entered, tap the check mark, and select Send now to submit the Marsh Measures form for the Low Marsh.

4) Tap the X at the top right of the Low Marsh tab to return to your list of Marsh Vegetation Zone polygons.

- If you have multiple Low Marsh Zones, repeat the above steps 2 and 3 as needed; otherwise, move on to High Marsh Zones

5) Select High Marsh and then tap the Record Marsh Zone Measures button to open the Marsh Measures form.

Date/Time: auto-populated with the current date and time
Marsh Zone: High Marsh

- **Vegetative Cover in High Marsh**

Specify Total Percent Cover: select the total percent cover range from the list

- **Dominant Plant Species in High Marsh**

Specify the DOMINANT Plant Species: Select the dominant plant species in the High Marsh

- If Other, record the name in the Specify other info box

- **Phragmites in High Marsh**

Specify Percent Cover: select the percent cover range of phragmites present in the High Marsh

- **Trees Present in High Marsh** select whether live and/or dead/dying trees are present in the High Marsh
- **Has data been collected (or going to be collected) in transect plots for this marsh?**
  - If Yes is selected, move on to next section – **High Marsh Notes**
  - If No or Unsure is selected, **Characterize Marsh Fauna Present in the Marsh** by selecting all fauna observations that apply to the High Marsh from the list that appears below
- **High Marsh Notes** record any relevant information about the High Marsh
- **Photos of High Marsh** use the camera icon to take photo(s) of the High Marsh

6) When all desired information has been entered, tap the check mark, and select Send now to submit the Marsh Measures form for the Low Marsh.

7) If you have multiple High Marsh Zones, tap the X at the top right of the High Marsh tab to return to the list of Marsh Vegetation Zone polygons and repeat steps 5 and 6.

When you have recorded the appropriate data for all Marsh Vegetations zones, select the Living Shoreline Treatments On Site link to return to the Living Shoreline Treatment layer.

RECORD MARSH AND RIPARIAN ZONE PLOT MEASURES ALONG TRANSECTS

Marsh and Riparian Zone Plot Measures along the transects will be recorded in ShoreWatch using the Transect & Plots points delineated during the Initial Site Set-Up Visit. In the field, transects should be laid out with a tape measure, and data for plots should be recorded within a sampling plot as described in the Monitoring Protocol Manual.

If the location of transect plots was marked by stakes or poles in the field, use these to navigate to plots for sampling. The GPS location on ShoreWatch can also be used to navigate to sampling locations marked by the points on your map.

It is recommended to start with the leftmost transect and work to the right across the marsh. Within each transect, start with the Low Marsh points (LM0), and move towards the upland (riparian point).

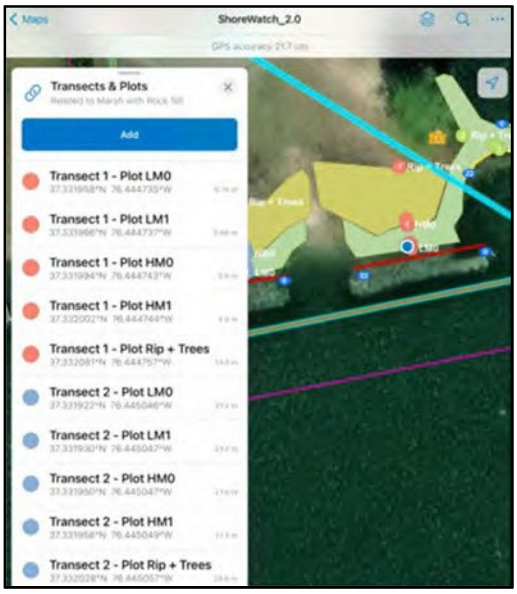
To record Marsh and Riparian Zone Plot Measures:

1) With your Living Shoreline Treatment selected, scroll down and select the Transects & Plots link. This will open the list of the created Transect & Plots points.

2) Walk to the location of Plot LM0 of transect 1 and lay down your quadrat with the upper left-hand corner of the quadrat flush with the stake, when facing the water.

3) Select Transect 1 – Plot LM0 from the list on the Transects & Plots tab.

4) Tap the Record Transect Plot Measures button to open the Plot Measures form.



Note that Percent Cover examples can be found on each Transect – Plot tab for help selecting percent cover ranges for sampling plots.

Date/Time: auto-populated with the current date and time
Transect: 1
Plot ID: LM0

- **Quadrat (Plot) Size Used**

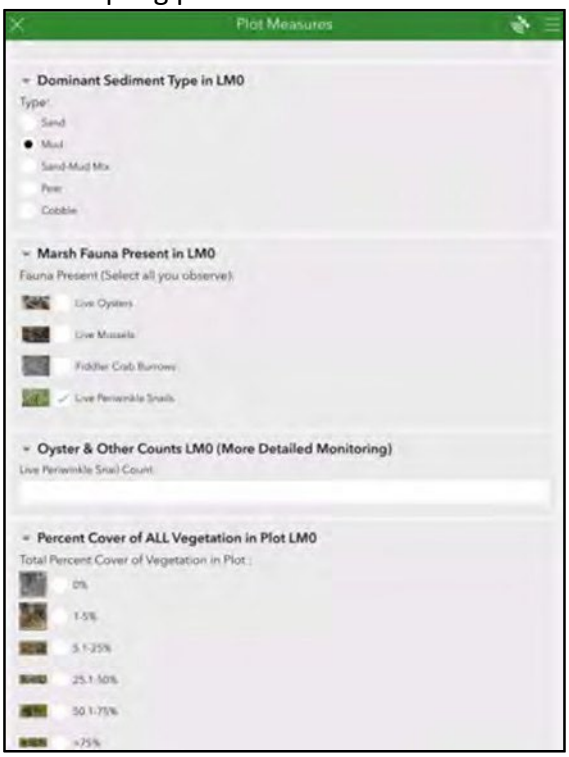
Select size: select the size of the quadrat (plot) being used for sampling

- **Dominant Sediment Type in LM0**

Type: Select the dominant sediment type within the sampling plot

- **Marsh Fauna Present in LM0**

Fauna Present: select all marsh fauna observed within the sampling plot



- Selecting an option from the fauna list will open a new section for optional counts of observed marsh fauna within the sampling plot
- **Oyster & Other Counts LM0 (More Detailed Monitoring)**
  Live Oyster Recruit Count: number of live oysters between ≥10 mm and < 25 mm
  Live Adult Oyster Count: number of live oysters > 25 mm
  Live Mussel Count: number of live mussels (any size)
  Live Periwinkle Snail Count: number of live Periwinkle Snails
  Fiddler Crab Burrow Count: number of fiddler crab burrows (not live crabs)

- **Percent Cover of ALL Vegetation in Plot LM0**

Total Percent Cover of Vegetation in Plot: select the percent cover range of ALL vegetation present in the sampling plot

- **Plant Species Observed in Plot LM0**

Select ALL Plant Species Observed: select ALL species types observed within the sampling plot

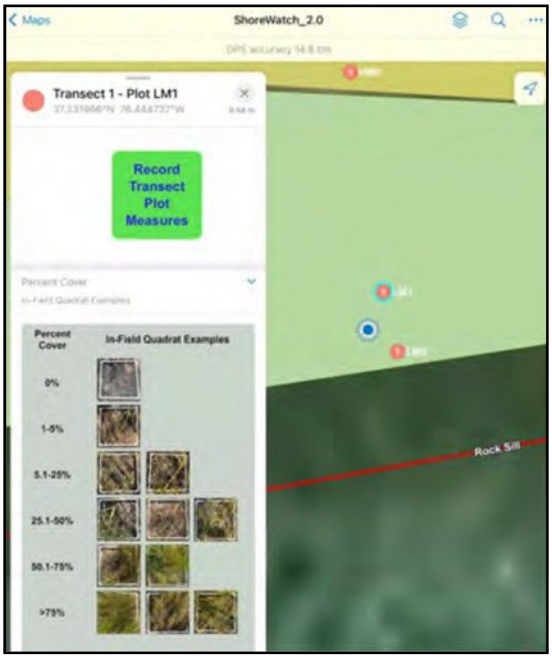
- If Spartina alterniflora and Spartina patens are selected, two additional sections will also appear for optional, more detailed monitoring information
- **Stem Count in Plot LM0 (More Detailed Monitoring)**
  Species Scientific name
  Stem Count in Plot: record the number of stems counted for that species
- **Height of Plant Species in Plot LM0 (More Detailed Monitoring)**
  Species Scientific name
  Height Measurement 1 (cm): enter first height measurement for that species
  Height Measurement 2 (cm): enter second height measurement for that species
  Height Measurement 3 (cm): enter third height measurement for that species
  - Note that all three measurements must be entered to generate an average height for that species

- **Plot Notes** record any relevant information about the sampling plot
- **Take Plot Photos** use the camera icon to take photo(s) of the sampling plot

5) When all desired information has been entered, tap the check mark, and select Send now to submit the Plot Measures form for the LM0 point.

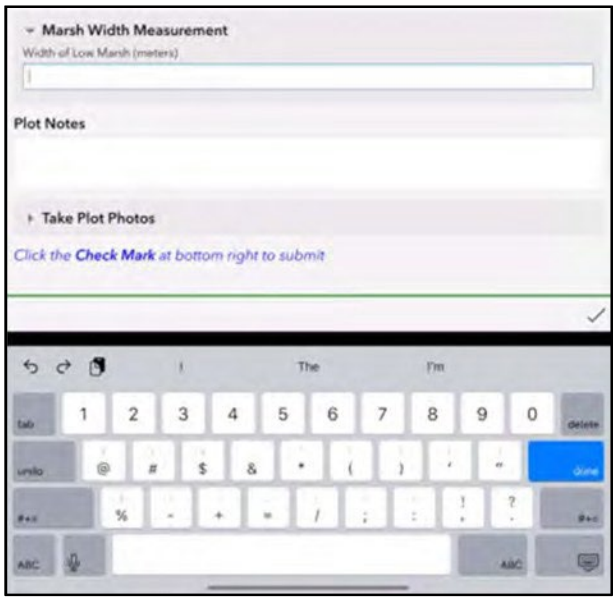
6) Tap the X on the Transect 1 – Plot LM0 tab to return to the list of Transects & Plots.

7) Move to your next point along the transect, which should be Plot LM1. Set up your quadrat at that point in the field, then select Transect 1 – Plot LM1 from the list.



8) Tap the Record Transect Plot Measures button to open the Plot Measures form.

- The Plot Measures form for Plot LM1 is identical to the Plot Measures form used for Plot LM0 except for the addition of one section.
  - **Marsh Width Measurement**
    Width of Low Marsh (meters): enter the length of the low marsh for this transect (using the tape measure in the field)



9) When all desired information has been entered, tap the check mark, and select Send now to submit the Plot Measures form for the LM1 point.

10) Tap the X on the Transect 1 – Plot LM1 tab to return to the list of Transects & Plots.

11) Move to your next point along the transect which should be Plot HM0. Set up your quadrat at that point in the field, then select Transect 1 – Plot HM0.

12) Tap the Record Transect Plot Measures button to open the Plot Measures form.

- the Plot Measures form for Plot HM1 is the same as the Plot Measures form used for Plot LM0 except for two differences:
  - **Meters from structure (start of transect)** auto-populated with the measurement recorded during Set-Up Site Visit
  - There are additional plant species to choose from in the **Plant Species Observed in Plot HM0** section

13) When all desired information has been entered, tap the check mark, and select Send now to submit the Plot Measures form for the HM0 point.

14) Tap the X on the Transect 1 – Plot HM0 tab to return to the list of Transects & Plots.

15) Move to your next point along the transect which should be Plot HM1. Set up your quadrat at that point in the field, then select Transect 1 – Plot HM1.

16) Tap the Record Transect Plot Measures button to open the Plot Measures form.

- The Plot Measures form for Plot HM1 is identical to the Plot Measures form used for Plot HM0 except for the addition of one section.
  - **Marsh Width Measurement**

  Width of High Marsh (meters): enter the length of the high marsh for this transect (using the tape measure in the field)

17) When all desired information has been entered, tap the check mark, and select Send now to submit the Plot Measures form for the HM1 point.

18) Tap the X on the Transect 1 – Plot HM1 tab to return to the list of Transects & Plots.

19) Move to your next point along the transect which should be either Plot Rip or Plot Rip + Trees depending on the transect. Plot HM1. Select Transect 1 – Plot Rip (or Plot Rip + Trees).

20) Tap the Record Transect Plot Measures button to open the Plot Measures form.

- Note that forms will be different for Plot Rip and Plot Rip + Trees.

Plot Rip + Trees

Date/Time: auto-populated with the current date and time

Transect: 1

Plot ID: Rip + Trees

Meters from structure (start of transect) auto-populated with the distance recorded during Set-Up Site Visit

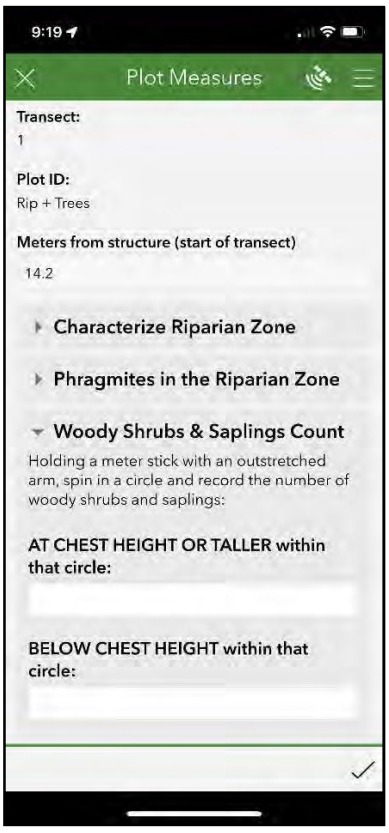
- **Characterize Riparian Zone**

General Condition of the Riparian Zone: select all that apply to the entire riparian zone

Ground Condition of the Riparian Zone: select all that apply to the entire riparian zone

- **Phragmites in the Riparian Zone**

Is Phragmites Present? select whether Phragmites is present in the entire riparian zone at the site



- **Woody Shrubs & Saplings Count**

AT CHEST HEIGHT OR TALLER within that circle: record the number of woody shrubs and saplings taller than chest height within the circle formed by holding a meter stick with an outstretched arm and spinning

BELOW CHEST HEIGHT within that circle: record the number of woody shrubs and saplings below chest height within the circle formed by holding a meter stick with an outstretched arm and spinning

- **Cruz Angle Tree Count**

Count Number of Live Trees: record the number of live trees, counting at breast height using Opening No 10 on the Cruz Angle

- **Additional Tree Monitoring in Riparian Zone (More Detailed Monitoring)**

Are Dead or Dying Trees Present in the Riparian Zone? Select Yes or No

Record up to 5 of the most dominant riparian tree species within the count area: list the most dominant tree species within the count area from most to least dominant

- **Invasive Plant Monitoring in the Riparian Zone (More Detailed Monitoring)** select all the invasive plants present in the Riparian Zone
- **Plot Notes -** record any relevant information about the riparian zone

Take Plot Photos - use the camera icon to take photo(s) of the riparian zone

Plot Rip

Date/Time: auto-populated with the current date and time

Transect: 1

Plot ID: Rip

Meters from structure (start of transect) auto-populated with the distance recorded during Set-Up Site Visit

- **Phragmites in the Riparian Zone**

Is Phragmites Present? select whether Phragmites is present in the entire riparian zone at the site

- **Woody Shrubs & Saplings Count**

AT CHEST HEIGHT OR TALLER within that circle: record the number of woody shrubs and saplings taller than chest height within the circle formed by holding a meter stick with an outstretched arm and spinning

BELOW CHEST HEIGHT within that circle: record the number of woody shrubs and saplings below chest height within the circle formed by holding a meter stick with an outstretched arm and spinning

- **Plot Notes -** record any relevant information about the riparian sampling area
- **Take Plot Photos -** use the camera icon to take photo(s) of the riparian sampling area

21) When all desired information has been entered, tap the check mark, and select Send now to submit the Plot Measures form for the Riparian Plots.

22) Tap the X on the Transect 1 – Plot Rip (or Plot Rip + Trees) tab to return to the list of Transects & Plots.

23) If you have additional transects, move to the next transect and repeat steps 2 - 22.

When you have finished recording plot data across all your transects, tap the X on the Transects & Plots tab to return to the Living Shoreline Treatment layer.

CHARACTERIZE UPLAND BANK CONDITIONS

Record the conditions of the upland bank. This information will be recorded in Field Maps and does not have an associated feature. Upland Bank Conditions will be general measurements and observations about the bank conditions within the Living Shoreline Treatment.

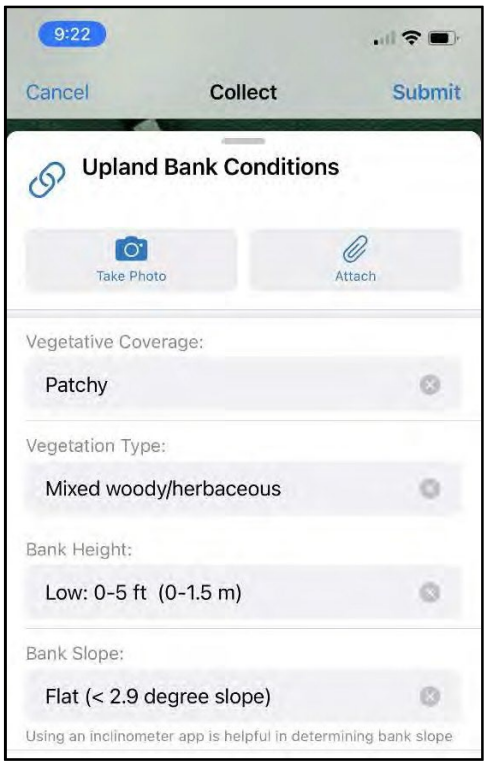
To record Upland Bank Conditions:

1) Select the Upland Bank Condition link to open the Upland Bank Condition tab.
   - Previously recorded Upland Bank Conditions will be listed here and can be viewed by selecting one from the list.

2) Select Add to record the Upland Bank Condition

Vegetative Coverage: select whether the vegetative coverage of the Upland Bank is Dense, Patchy or Absent.
Vegetation Type: select whether the vegetation on the Upland Bank is Trees only, Trees/Shrubs only, All herbaceous or Mixed woody/herbaceous.
Bank Height: making a visual estimate, select whether the bank height is Low (0 - 1.5 m), High (1.5 - 9.1 m) or a Bluff (>9.1 m)
Bank Slope: following the instructions from the Protocol Manual, record the category of the bank slope.
Take Photo: Use this icon to capture photos of the Upland Bank Condition.

- Tap the Take Photo icon, take photo and select Use Photo. The image will appear above the information fields. Multiple photos can be taken if desired.



3) When all known information has been entered, select Submit.

- The tab now has the heading Bank Observations: Date observations were recorded. The information appears under the Fields section and any photos taken are in the Attachments section.

Select the Living Shoreline Treatments link to return to your Living Shoreline Treatment layer.

RECORD EVIDENCE OF EROSION

Tracking signs of erosion will indicate if the site is improving or if the project is not performing as well as hoped. Evidence of Erosion will be recorded by creating an Erosion Evidence point, of which there are two types depending on where the erosion is occurring:

Marsh Edge Erosion – evidence of erosion along the low marsh edge (low marsh/water interface).
Bank Erosion – evidence of erosion along the upland bank.

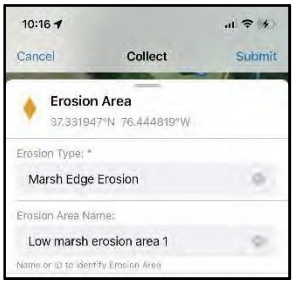
To create Erosion Evidence points for Marsh Edge Erosion:

1) Walk to an area of evident erosion along the low marsh edge.

2) Select the Erosion Evidence link and select Add.

- This will automatically create the Erosion Evidence point, so be sure that you are at the desired location with adequate GPS accuracy before selecting Add.

Erosion Type: * select Marsh Edge Erosion
Erosion Area Name: enter a relevant name for the erosion point (e.g., "Low Marsh Erosion Area 1" if creating multiple erosion points along the low marsh edge).



3) When all information has been entered, select Submit.

4) On the Marsh Edge Erosion tab, select the Record Evidence of Erosion button to open the Record Evidence of Erosion form.

Date: auto-populated with the current date and time
Erosion Type: Marsh Edge Erosion

- **Status of Marsh Edge Erosion Area**

Current Erosion Status: select whether the marsh edge is currently Eroding or Stable

- **Marsh Edge Erosion Evidence**

Marsh Erosion Evidence Observed: select all the erosion evidence types that apply

- **Marsh Edge Erosion Notes** record any relevant information about the erosion alongthe Marsh Edge (should reflect whether the marsh edge is currently eroding or stable)
- **Take Photos of Marsh Edge Erosion** use the camera icon to take photo(s) of the Marsh Edge Erosion area

5) When all desired information has been entered, tap the check mark, and select Send now to submit the Record Evidence of Erosion form.

6) Tap the X on the Marsh Edge Erosion tab to return to the Erosion Evidence tab.

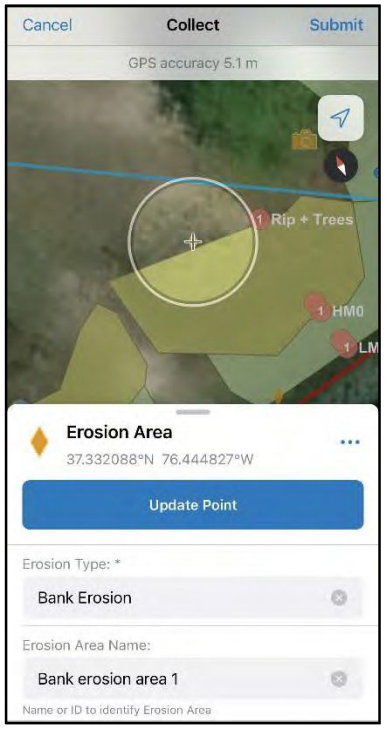
- If you want to create multiple Marsh Edge Erosion points, repeat steps 1-5.
- If you do not want to create Bank Erosion points, tap the X to return to the Living Shoreline Treatment layer.

To create Erosion Evidence points for Marsh Edge Erosion:

7) Walk to an area of evident erosion along the upland bank.

8) On the Erosion Evidence tab select Add.

- This will automatically create the Erosion Evidence point, so be sure that you are at the desired location with adequate GPS accuracy before selecting Add.



Erosion Type: * select Bank Erosion
Erosion Area Name: enter a relevant name for the erosion point (e.g., “Bank Erosion Area 1” if creating multiple erosion points along the low marsh edge).

9) When all information has been entered, select Submit.

10) On the Bank Erosion tab, select the Record Evidence of Erosion button to open the Record Evidence of Erosion form.

Date: auto-populated with the current date and time
Erosion Type: Bank Erosion

- **Status of Bank Erosion Area**

Current Erosion Status: select whether the bank edge is currently Eroding or Stable

- **Bank Erosion Evidence**

Bank Erosion Evidence Observed: select all the erosion evidence types that apply

- **Bank Erosion Notes** record any relevant information about the erosion along the Bank (should reflect whether the bank is currently eroding or stable)
- **Take Photos of Bank Erosion** use the camera icon to take photo(s) of the Marsh Edge Erosion area

11) When all desired information has been entered, tap the check mark, and select Send now to submit the Record Evidence of Erosion form.

12) Tap the X on the Bank Erosion tab to return to the Erosion Evidence tab.

- If you want to create multiple Bank Erosion points, repeat steps 7-11.

When all Erosion Evidence points have been created and associated information has been recorded, tap the X on the Erosion Evidence tab to return to the Living Shoreline Treatment layer.

RECORD GRAZING EXCLUSION STATUS

Temporary grazing exclusion devices are meant to prevent grazers from eating freshly planted and growing marsh plants in the project area. Grazing Exclusion Status will be recorded in Field Maps and there will be no need to create a point or fill out a form.

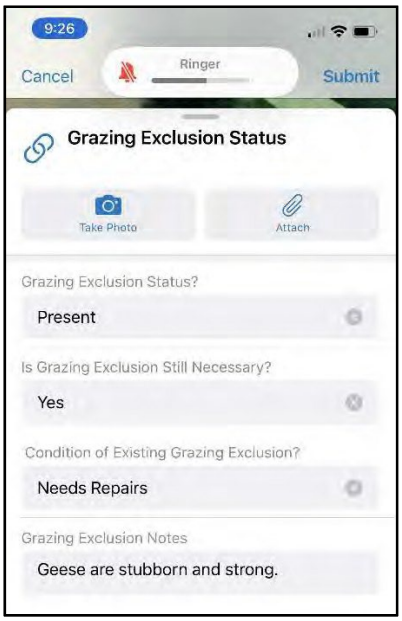
To record Grazing Exclusion Status:

1) Select the Grazing Exclusion Status link to open the Grazing Exclusion Status tab and select Add.

Grazing Exclusion Status? select the status of grazing exclusion devices on site from the list. Depending on the status selected, additional information fields may appear.

- Not Applicable (select if grazing exclusion devices were never used)
  - No additional information required.
- Removed
  - **Grazing Exclusion Notes** record any relevant information on when and/or why the grazing exclusion devices were removed.
- Present
  - **Is Grazing Exclusion Still Necessary?** select Yes or No depending on whether grazing exclusion devices are still necessary or if they can be removed because the plantings are well enough established.
    - If No, then move to Grazing Exclusion Notes.

    - If Yes, select whether the grazing exclusion device(s) are in Good Condition or Needs Repair in the **Condition of Existing Grazing Exclusion?** information field that appears.
  - **Grazing Exclusion Notes** record any relevant information on the condition of the existing grazing exclusion device(s).
- Not Present, But Needed (select if the plantings show signs of damage from grazers)
  - No additional information required.



2) When all desired information has been entered, select Submit to complete.
This opens a tab for the new Grazing Exclusion Status that will be labeled with the updated status and the date the status was recorded.

Select the Living Shoreline Treatments On Site tab to return to the Living Shoreline Treatment layer.

RECORD WILDLIFE OBSERVATIONS AND EVIDENCE

Wildlife Observations are general observations of wildlife and wildlife indicators present at the site. They will be recorded on the Monitoring Site layer. If still on the Living Shoreline Treatment layer, select the Monitoring Site link to return to the Monitoring Site layer.

To record Wildlife Observation and Evidence:

1) On the Monitoring Site tab, select the Record Wildlife Observations button to open the Wildlife Observations form.

Observation Date/Time: auto-populated with the current date and time

- **Wildlife Observations** select all wildlife directly observed at any time while on site
- **Evidence of Wildlife Presence** select all evidence of wildlife presence observed at any time while on site
- **Wildlife Observation Notes** record any relevant information about wildlife or evidence of wildlife observed while on site
- **Take Wildlife Photos** use the camera icon to take photo(s) of wildlife observations across the site

2) When all desired information has been entered, tap the check mark, and select Send now to submit the Wildlife Observations form.

FUTURE MONITORING

All information has now been recorded for the Routine Monitoring Event. With the site delineated, consistent data can be recorded during future Monitoring Events at the same locations to track changes in the Living Shoreline over time.

Some things to remember during future Routine Monitoring Events:

- Additional features (i.e., Structure Plot Points, Transects, Planted Marsh Areas, Erosion Evidence, etc.) can be created at any time to track additional information based on changes observed in the Living Shoreline over time.
- Information recorded at previous Routine Monitoring Events will be listed on the respective feature tabs with the date that it was recorded. You can view the information by selecting them from the list. This is helpful for comparing Fixed Photo Station photos, seeing how quadrats were laid for recording Structure Plot Point data in the same location on the structure, etc.

A special note on using the ShoreWatch App. As you become more familiar with the app through repetition and practice, you will likely find alternative ways to navigate through the feature links and layers. In some instances, there are multiple ways to achieve the same outcome. It is recommended to follow the above instructions as you familiarize yourself with how the app functions. Ultimately, you will be able to determine certain steps that work best for your situation.