Collecting Data from a Map with ArcGIS Field Maps

Tutorial Overview

ArcGIS Field Maps comprises a mobile app that allows you to view and collect data from the map or in the field using an Android or iOS smartphone or tablet, and a web app that allows you to configure web maps for use in the mobile app. In this tutorial, you will learn how to create and configure a web map for data collection in ArcGIS Online and the ArcGIS Field Maps web app, then collect data from the map using the ArcGIS Field Maps mobile app.

Skills

By completing this tutorial, you will become comfortable with the following skills:

- Creating a web map that contains reference and editable layers for data collection.
- Configuring a web map in the ArcGIS Field Maps web app for use in the ArcGIS Field Maps mobile app.
- Using a map to collect points, lines and polygons in the ArcGIS Field Maps mobile app.

Time Required

The following classroom time is required to complete this tutorial:

- 45 minutes

Materials Required

Technology:

- Creator or GIS Professional ArcGIS Online account with Publisher or equivalent role.
- Smartphone or tablet running Android 8.0+ or iOS 13.5+ with the ArcGIS Field Maps mobile app installed.

Data:

- Reference data used in this tutorial are available in ArcGIS Online.

Data Sources

- Town of Ajax Open Data Portal: https://opendata.ajax.ca/

Production Date

The Education and Research Group at Esri Canada makes every effort to present accurate and reliable information. The Web sites and URLs used in this tutorial are from sources that were current at the time of production but are subject to change without notice to Esri Canada.

- Production Date: October 2021.

Background Information

The ArcGIS system includes multiple apps for mobile devices that perform different functions. ArcGIS Field Maps is the newest mobile app, combining the features of ArcGIS Explorer, ArcGIS Collector and ArcGIS Tracker in one app. These three apps will be retired at the end of 2021 for the Android and iOS platforms but will continue to be available for Windows devices since Field Maps is not available for the Windows platform.

Field Maps has two component apps: a mobile app and a web app. The mobile app is designed to work with web maps that were already available in Collector and Explorer and the user interface is very similar to the interfaces for Collector and Explorer to allow for easy migration. However, some configuration may be needed in the Field Maps web app to make the best use of the features of the Field Maps mobile app.

The Field Maps mobile app uses a device's Global Navigation Satellite System (GNSS) receiver to determine the collection location. By default, the collection accuracy is set to 10 m in Field Maps, which is suitable for most applications although you may see a warning about GPS accuracy in the mobile app if you try collecting data while indoors. Note that GPS (Global Positioning System) is a specific type of GNSS but it is often used as a generic term because it is more familiar to users. The Field Maps web app allows you to change the required location accuracy setting, either increasing the allowable distance, e.g., to allow collection while indoors or in other poor accuracy conditions, or decreasing the allowable distance, e.g., if you will be connecting a high-accuracy GPS receiver to your mobile device.

If the editable layers in your web map have feature templates, users who open the map in the mobile app will be able to select which template to use when they are collecting a data point. The web app allows you to modify and add feature templates but it also allows you to create a smart form to display only selected fields and use Arcade expressions to make a field visible in the form only if specific conditions are met, for example, if a specific value has been entered in another field. This can help improve the user experience, by helping users focus only on the fields that are relevant.

Field Maps is designed to collect data in the field, i.e., when you are on site, and will automatically zoom to your current location when you use the add button in the mobile app. The Collect Here feature action, which is enabled by default, allows you to create a new feature at the location of a search result, a dropped pin, or an existing feature from any layer in the map. The Copy Shape feature action, which can be enable through the web app, allows you to copy the geometry of an existing feature to create a new feature.

References and Reading

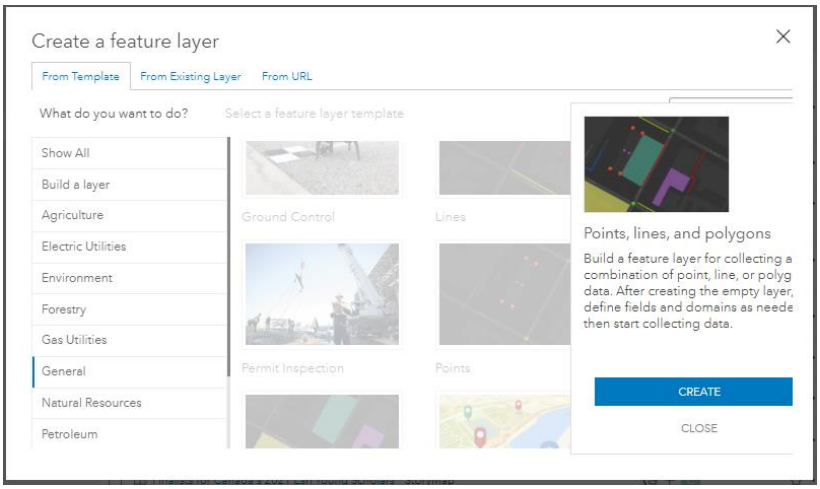
- Field Operations
  https://www.esri.ca/en-ca/products/capabilities/field-operations
- ArcGIS Field Maps at a Glance
- https://resources.esri.ca/news-and-updates/arcgis-field-maps-at-a-glance
- ArcGIS Field Maps Resources
  https://www.esri.com/en-us/arcgis/products/arcgis-field-maps/resources
- Migrate to ArcGIS Field Maps
  https://www.esri.com/arcgis-blog/products/field-maps/field-mobility/migrate-to-arcgis-field-maps/
- ArcGIS Field Maps: Post-Esri 2021 User Conference Resources
  https://www.esri.com/arcgis-blog/products/field-maps/field-mobility/arcgis-field-maps-post-esri-2021-user-conference-resources/

Part 1: Creating an editable layer in ArcGIS Online

Any map that you create or that has been shared with you can be viewed and marked up in the Field Maps mobile app. However, a map needs to have at least one editable layer if it is to be used for data collection. You can use an existing layer that has editing enabled or create a new feature layer to collect your data. For this tutorial, you will create a new feature layer using a template in ArcGIS Online.

Creating a feature layer from a template in ArcGIS Online

1. Go to https://www.arcgis.com/ and sign in to your ArcGIS Online account.
2. Click **Content** in the menu bar, then the **New item** button at the top-left.
3. In the pop-up window, click **Feature Layer**.
4. In the **From Template** tab, scroll through the list of categories, if necessary, and select the **General** category.
5. Scroll down to and select the **Points, lines, and polygons** template, then click **Create**.



6. Click on the point layer in the **Create a feature layer** window and rename it **Tree Observations**. Rename the line layer **Observation Route** and the polygon layer **Observation Area**. Click **Next**.
7. Pan and zoom the map to centre on Ajax, Ontario (east of Toronto, approximate map extent longitude -79.15 to -78.885, latitude 43.87 to 43.805), then click **Next**.

   You will change the map extent for the layer to centre on your current location in a later section of this tutorial.
8. For the title, enter **Tree Observations at Ajax Waterfront**. Add the tags **trees**, **Ajax**, and **Field Maps**. For the summary, enter **Data collection layer for ArcGIS Field Maps tutorial**.
9. Click **Done**.

   You will be taken to the item page for your feature layer when the layer has been created. You can edit the title, summary, and tags; add a description, terms of use and credits; and configure settings for the layer from the item page.

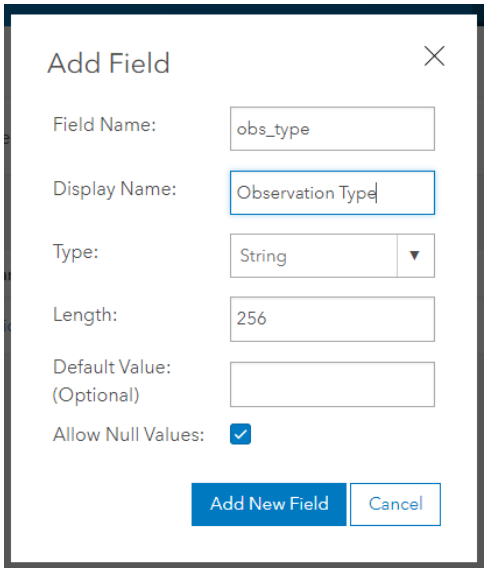
Adding fields to a feature layer in ArcGIS Online

10. In the **Layers** section of the item page, click on the **Tree Observations** point layer to see its details. Ensure that the **Enable Attachments** toggle is on.
11. Return to the main item page and click on the **Settings** tab. In the **Feature Layer** section, ensure that **Enable editing** and **Enable Sync** are checked.

    There are many other editing settings for the feature layer, such as allowing editors to see or edit only their own features. Since you won't be sharing this layer with anyone, you can leave the default settings, but you should review and change the edit settings as needed any time you create a layer that is shared with others.
12. Click on the **Data** tab. Ensure the **Tree Observations** layer is selected in the selection box on the left side of the window then click **Fields** on the right side.

    You should see fields for information about when the feature was created and last updated and a field for attachments. You will add fields to collect tree observations.
13. Click **Add**. In the **Add Field** pop-up window, enter **obs_type** as the **Field Name** and **Observation Type** as the **Display Name**. Leave the default values for the other parameters. Click **Add New Field**.
14. Click the display name for the new **Observation Type** field in the field list to open its field settings.
15. Click **Edit** beside **Field Value Type**. Select **Type or Category**. Click **Save**.

    Setting the field value type is optional but it does help a person using the data or apps loading the data, such as the ArcGIS Online Map Viewer, determine how the field should be represented.
16. Click **Create List**. Add the following values:



Label	*Code*
New Planting	New
Mature Tree	Mature
Unhealthy/Damaged	Unhealthy
Dead Tree	Dead
Stump	Stump

A list of values gives users a set of options to choose from. You can add or delete list items, or delete the whole list, as well as edit item labels and codes and reorder items at any time from the field settings. Modifying the list will not affect any data that have already been collected but if you do edit a code or delete a list item, you will need to decide how to handle any data that were assigned the edited or deleted value.

Since the **Allow Null Values** box was checked when you created the Observation Type field, users will also be able to leave the field blank when they collect an observation point. The Allow

Null Values setting cannot be changed after the field has been created. If you want to ensure that a value is always entered for a field, uncheck the Allow Null Values box when creating the field.

17. Click **Save** to close the list then click the **X** near the top-right to close the field settings.
18. **Add** the following fields to the layer:

Field Name	*Display Name*	*Type*	*Length*	*Default Value*	*Allow Null Values*
year_planted	Year Planted	Integer	N/A	2021	Yes
species_common	Species Common Name	String	256		Yes
comments	Comments	String	1000		Yes

Note: If you are completing this tutorial after 2021, set the default value for the Year Plated field to the current year.

19. Open the field settings for the **Year Planted** field. Click **Edit** for the **Minimum/Maximum Value** setting. Set the minimum to **2015** and the maximum to **2025**. Click **Save**.

    Setting or editing a value range for a number field will not affect data that have already been collected but will restrict the values that can be entered for new data.

20. Optionally set the **Field Value Types** as follows:
    - Year Planted - **Date and Time**
    - Species Common Name – **Type or Category**
    - Comments – **Description**
21. Change the selected layer in the **Data** tab to **Observation Route** and add a Comments field. Repeat for the **Observation Area** layer.

Part 2: Creating a web map for field data collection

You need to add your editable layer to a web map before you can start collecting data in the Field Maps mobile app. The Field Maps web app allows you to add the layer to one of your existing web maps but for this tutorial, you will create a new web map that includes reference layers from an open data source and will customize the appearance of the map for data collection.

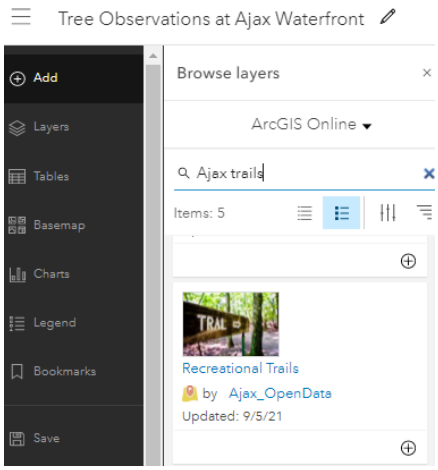
Adding layers to a web map

1. Click on the **Overview** tab in the item page for the **Tree Observations at Ajax Waterfront** layer. Click the down arrow beside **Open in Map Viewer Classic** and select **Open in Map Viewer** to open the map in the latest version of the Map Viewer.
2. In the menu panel at the far left, select **Save and Open** then **Save**. Use the same title and tags that you used for the layer. For the summary, enter **Data collection map for ArcGIS Field Maps tutorial**. Click **Save map**.

   If you only see the icons in the left panel, click at the bottom of the panel to expand it.
3. In the menu panel, select **Basemap** to open the **Basemap** panel then select **Imagery Hybrid** from the available basemaps.

A basemap provides spatial context for the data in the map. Since you will be collecting tree observations, the imagery basemap is the most relevant spatial context. **Note**: On smaller screens, you may need to click **...** (More) to see additional tools, including the basemap selector.

4. In the menu panel, select **Add** then select **Browse layers**.
5. In the **Browse layers** panel, change the search option from **My Content** to **ArcGIS Online**. Type **Ajax trails** in the search box and press *Enter*.
6. Find the layer **Recreational Trails by Ajax_OpenData** in the list of results. Click the ⊕ button on the card to add the layer to your map.
7. Type **owner: Ajax_OpenData** in the search box and press *Enter* to see all open data layers created by the Town of Ajax. Find the **Town Trees** layer and add it to the map.
8. Scroll through the search results and add any other layers that you think might be useful as reference layers for the data collection. Click on a card to see information about the layer. To remove a layer that you've added, click the ⊖ button on its card.
9. Close the **Browse layers** panel when you have finished adding layers, then save the map.



Note: In the new Map Viewer, a blue dot beside the Save and Open button indicates there are unsaved changes to the map.

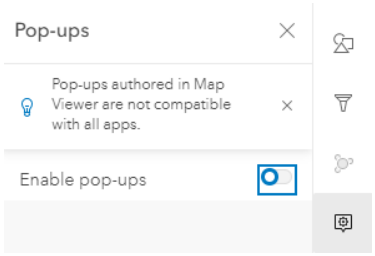
Configuring layers in a web map

10. In the menu panel, select **Layers** to open the **Layers** panel.
11. In the **Layers** panel, drag and drop layers to rearrange the order, as needed. Any polygon layers should be below line and point layers.
12. In the **Layers** panel, click **...** (Options) for the **Recreational Trails** layer and select **Rename**. Rename the layer **Trails**. You may choose to rename other layers you added from Ajax Open Data but do not rename the Town Trees layer.
13. Select the **Trails** layer in the **Layers** panel then **Configure pop-ups** in the menu panel at the far right.

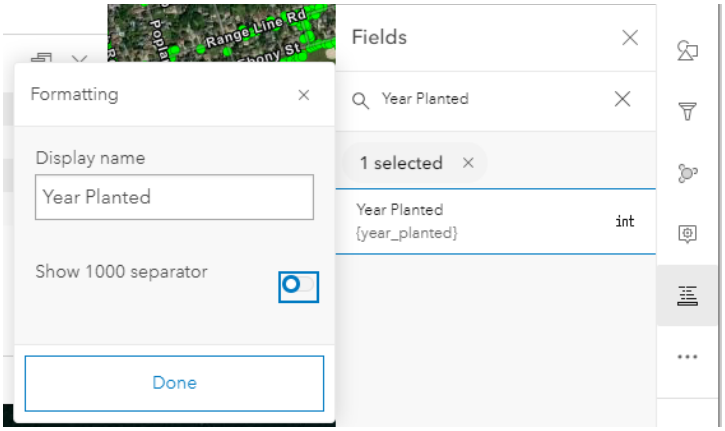
    Note: The new Map Viewer has a contextual interface, similar to ArcGIS Pro. You need to be sure to select the layer you want to configure in the Layers panel before selecting an item in the right menu panel.
14. In the **Pop-ups** panel, click **Fields list** to expand the list of fields that will be displayed in the pop-up. Remove all fields except **Trail Name**, **Amenities**, **Lighting**, **Surface Type**, **Trail/Path Section Length**, and **Year Built/Constructed**.
15. Click **Fields list** to collapse the list. Expand the pop-up **Title**. Delete the existing title text and enter **{TRAIL_PARK_N}**.

Pop-ups are configured by default to display a list of fields, but this might not be the best choice for your application and not all fields will be relevant or understandable to the user. **You should always take the time to configure the pop-ups in your map to be relevant to your application.** In the new Map Viewer, you have the option to add a title and description to the fields list; use multiple fields lists to group related fields together; and add text, charts, and images. See Configure pop-ups (Map Viewer) for more information.

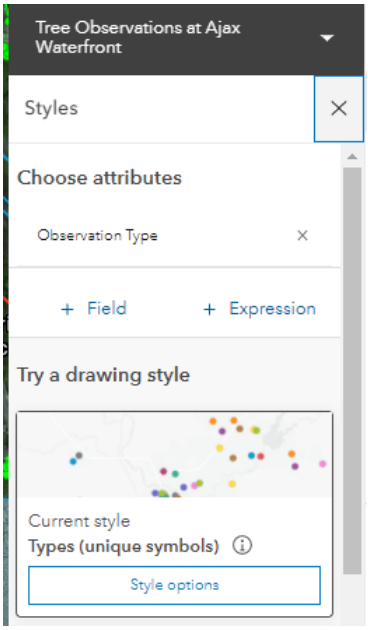
16. Configure the pop-up for the **Town Trees** layer to include the fields **Type, Status, DBH, Landuse, Survey Date** and **Comments**, and any other fields you think are relevant. Set the pop-up title to **{SPCODE}**.
17. Configure the pop-ups for any other open data layers you added to the map. If a layer doesn't have any relevant information, you can toggle **Enable pop-ups** off to hide pop-ups for that layer.



18. Rename each of the **Tree Observations at Ajax Waterfront** layers include only the sublayer name and configure the pop-ups to display only the fields you added, namely **Observation Type**, **Year Planted**, **Species Common Name**, and **Comments** for the **Tree Observations** point layer and **Comments** for the **Observation Route** line layer and **Observation Area** polygon layer.
19. With the **Tree Observations** point layer selected in the **Layers** panel, select **Configure fields** in the right menu panel.
20. In the **Fields** panel, search for **Year Planted**. Select the field and in the **Formatting** window, toggle **Show 1000 separator** off. Click **Done**.



21. Select **Styles** in the right menu panel.
22. In the **Styles** panel, click **+ Field** to choose an attribute to use for the style, then select and **Add** the **Observation Type** field. Click **Done** to close the **Styles** panel.



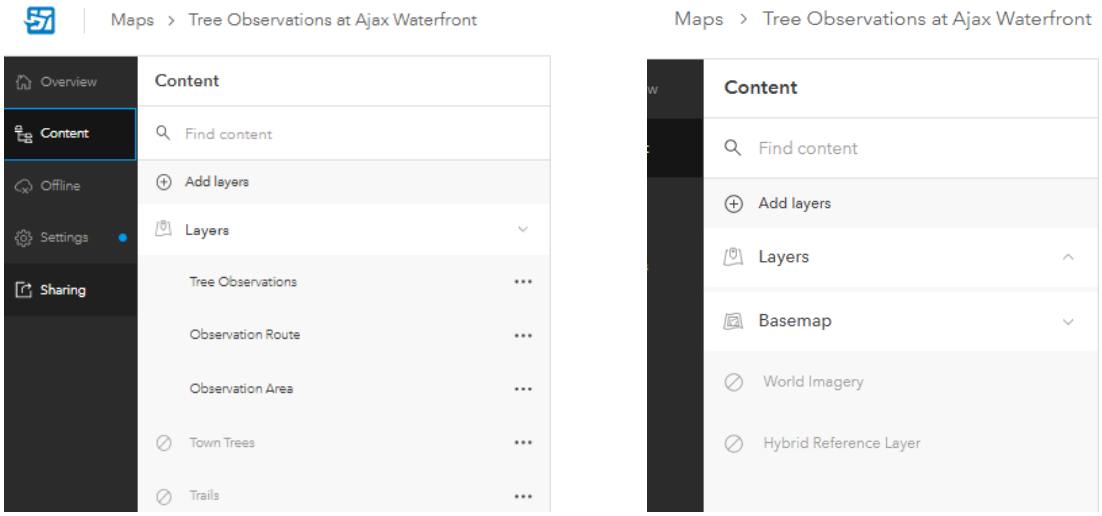
Since there aren't any data in the Tree Observations layer, you won't see any changes in the map when you set the style. However, once you start collecting points, they will be styled based on the observation type.

23. Optionally, change the style options for the layers you added from Ajax Open Data, e.g., increase the fill transparency for polygon features, change the symbol size for point features or change the line width for line features. See Apply styles (Map Viewer) for more information.
24. Save the map.

Part 3: Configuring a web map in the Field Maps web app

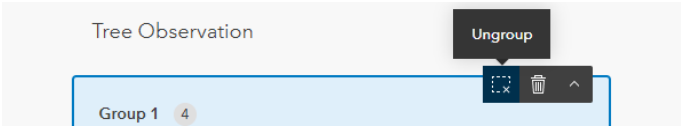
Although web maps can be opened and used in the mobile app directly without any additional configuration, you can use the Field Maps web app to create templates, set up a smart form, and enable offline mode.

1. Click on the app launcher on the right side of the browser window, above the map, and find the **Field Maps** icon . Click on it to launch the Field Maps web app.
2. Click on the card for the **Tree Observations at Ajax Waterfront** map in the maps list.
3. In the left menu panel, select **Content**. Expand the **Layers** and **Basemap** in the **Content** panel to verify the contents of the map.



4. Select the **Tree Observations** layer in the **Layers** section.
5. In the **Form** tab, click the **Convert pop-up** button to build a form from the pop-up you configured in the web map.

   Converting your pop-up is the simplest way to build a smart form for data collection but you can also drag attributes into the form area to build the form. Only attributes that the user can edit, i.e., the fields that you added, are available to use in the form.
6. Click on the group element and then click the button to ungroup.

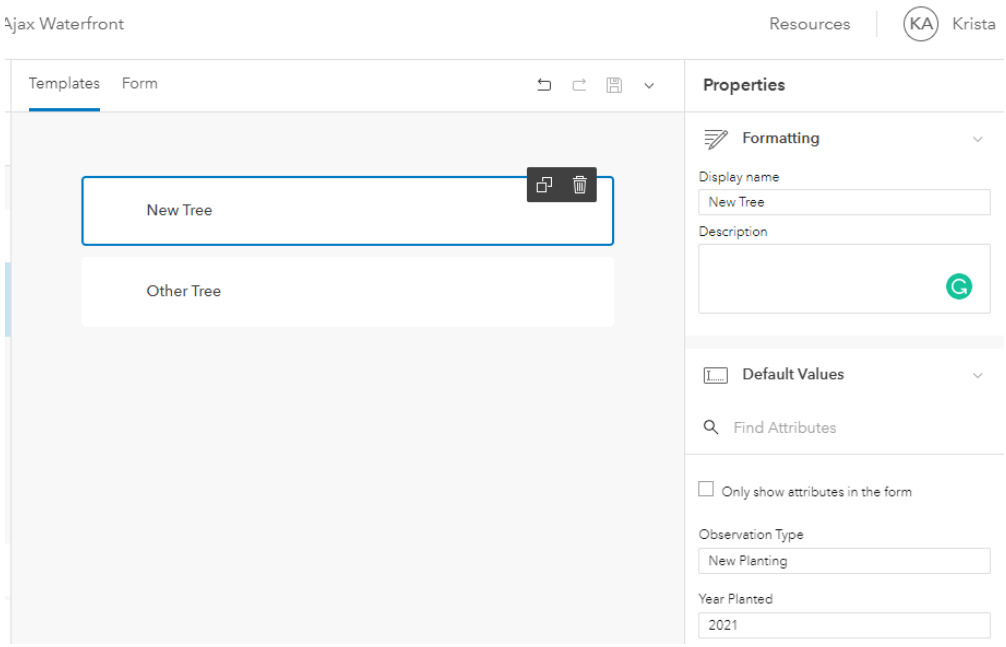


When you have a lot of fields in your form, grouping them can help with the user experience, because groups can be collapsed when they are not needed so that the user does not need to scroll as much. Since you only have four fields in this form, grouping them is unnecessary.

7. Select the **Year Planted** field. In the **Properties** panel, in the **Conditional Visibility** section, click **Add expression**.
8. In the Arcade window, change the expression name to **Not New Planting**. Enter the following code as the expression:

   ```
   $feature["obs_type"]!="New"
   ```

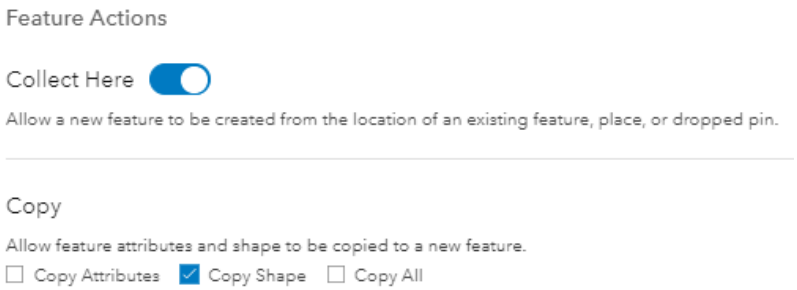
   The above expression is a test of the value in the Observation Type field. If the value in the field is the coded value for New Planting, the expression will evaluate to **false** and the field will not be displayed. If it is any other value, the expression will evaluate to **true** and the field will be displayed. This means that in the New Tree template, the Year Planted field will not appear, but it will appear in the Other Tree template. However, the user can cause the Year Planted field to appear/disappear in either template by changing the value for Observation Type.
9. Click **OK** to save the expression and close the Arcade window.
10. Click the save button at the top to save the form.
11. In the **Templates** tab, click on the **New Feature** template to open the feature properties.
12. In the **Properties** panel, change the display name to **New Tree**. For the Default Values, set **Observation Type** to **New Planting** and verify that **Year Planted** is **2021.**
13. Click the **Duplicate** button on the template to add a feature template. Change the display name for the second template to **Other Tree** and clear all default values.



Feature templates can help speed up data collection by having values pre-populated in some or all of the fields. You could set up a template for each of the observation types or for new plantings of specific tree species, or any other combination of default values that you want to have available for data collection.

14. Click the save button to save the feature templates.
15. Select the **Observation Route** layer in the **Layers** section. Drag the **Comments** attribute from the Form builder panel into the form area then click the save button. Repeat for the **Observation Area** layer.
16. In the left menu, select **Offline**.

    You will see a warning message in the Content section that several items need to be updated to enable offline mode. Since the items that need to be updated are the reference layers, none of which are content that you created, you will not be able to update them and so you will not be able to enable offline mode for this map. The next tutorial in the learning path will guide you through the process of creating a map that can be taken offline.
17. In the left menu, select **Settings**.
18. Expand the **Feature Actions** section. In the **Copy** section, uncheck **Copy Attributes** and check **Copy Shape**.



19. Scroll back to the top of the Settings and click the save button to save your changes.

Part 4: Collecting data with the Field Maps mobile app

If you've used the Collector or Explorer apps, the Field Maps mobile app interface should be familiar but there may be some different features. See the first tutorial in the learning path, Introduction to ArcGIS Field Maps, to learn about the tools available in the mobile app.

1. Open the ArcGIS Field Maps app on your mobile device and sign in to your ArcGIS Online account.
2. Find the **Tree Observations at Ajax Waterfront** card in the list of maps.

If you have a lot of web maps in your ArcGIS Online account, you may have to scroll down to find the map, since maps are listed alphabetically. To narrow down the options, click in the search box

and select **Editing** to see only your maps that have editable layers. You can also start typing the name of the map in the search box but note that this will return results from ArcGIS Online as well as your own maps.

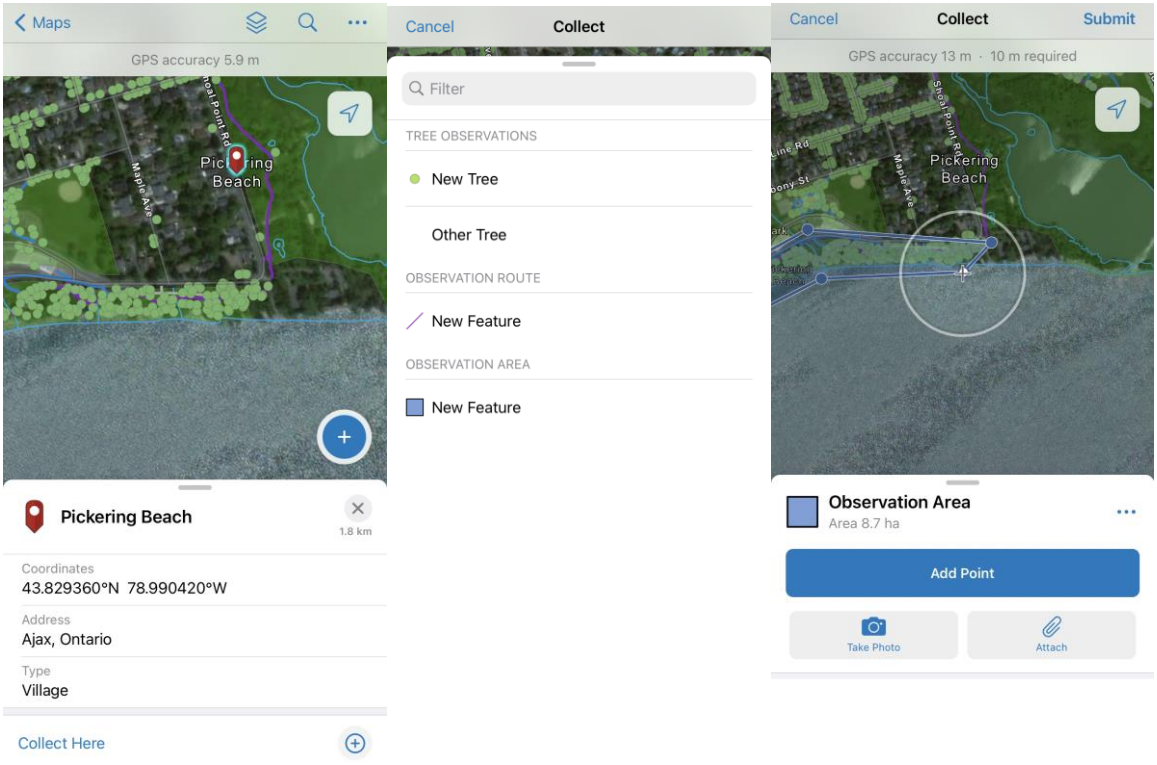
Another way to reduce the number of maps you see in the mobile app is to identify maps in the Field Maps web app that you don't want in the mobile map and toggle switch "Hide in Field Maps mobile" on their sharing page.

3. Tap **Overflow** (**…** on iOS, ⋮ on Android) on the card for the **Tree Observation at Ajax Waterfront** map. Tap **Favorite** to add the map to your Favorites list so it is displayed at the top of the map list, where it can be easily found then tap the card to open the map.

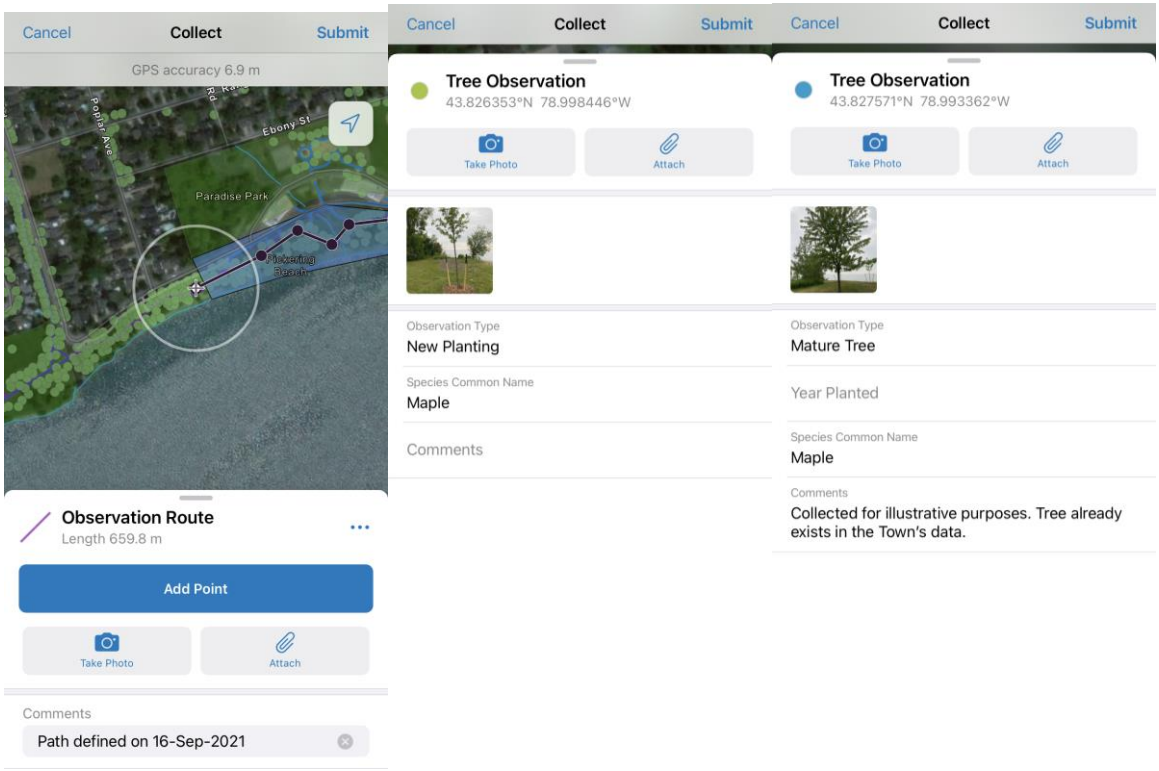
   When a map is the current map open in the app, you will also see the **Reload Map** action. This will update the map on your mobile device with any changes that have been made to it in ArcGIS Online or the Field Maps web app.

4. Tap the search button, enter **Pickering Beach, Ajax** and tap Search. If there is more than one search result, tap on each to see its location then choose the one closest to the lake. See the image below, left, for location details.

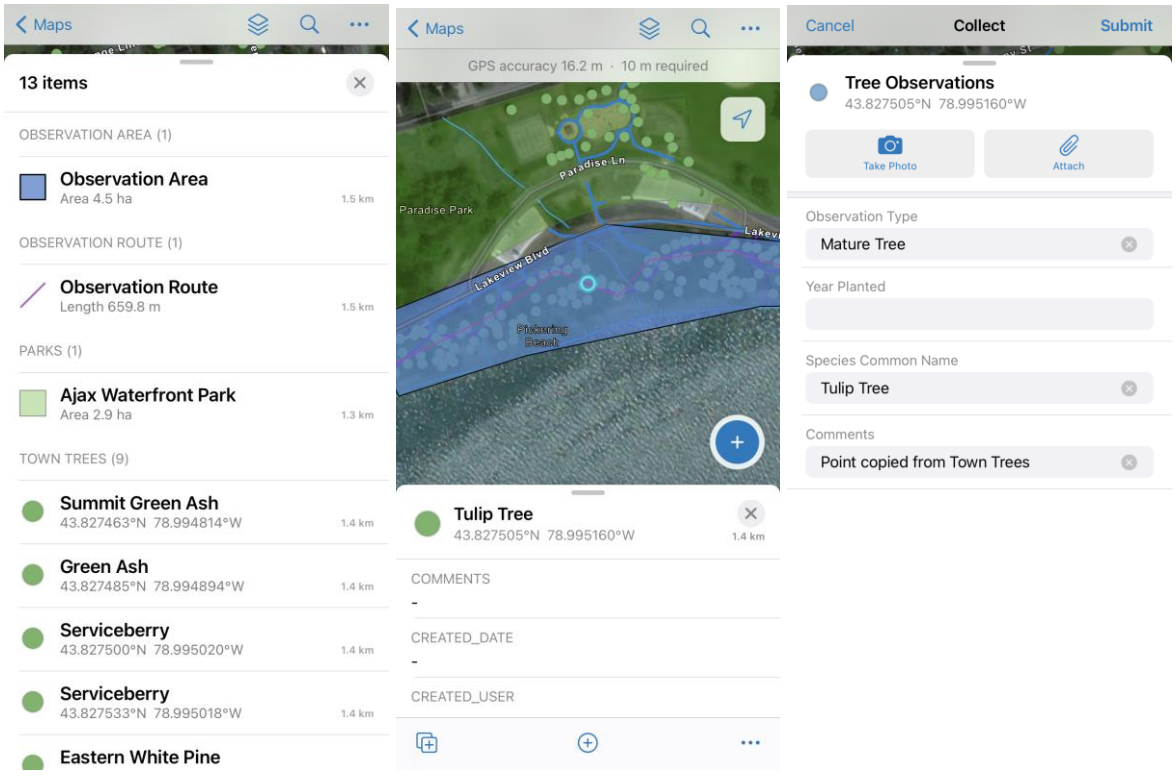
5. Tap **Collect Here**. Pan the map to position the crosshairs closer to the waterfront. Slide the template panel up to see all the available templates then tap the template under **Observation Area**.



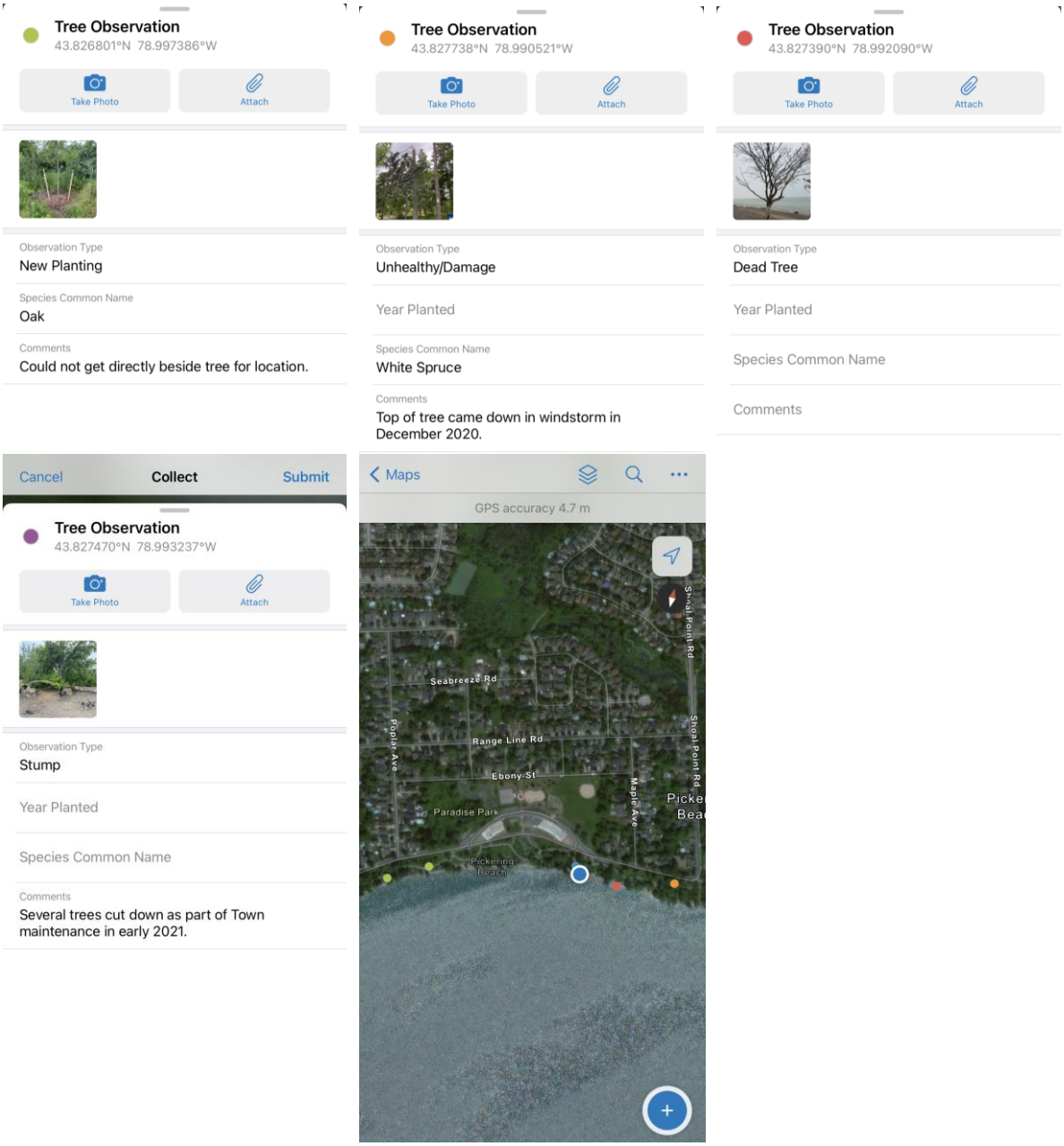
6. Tap **Add Point**. Pan the map to another point along the waterfront and tap **Add Point** again. Continue adding points to define an area for observations around Pickering Beach. In the **Comments** field in the data collection form, enter **Area defined on <today's date>.**
7. Tap **Submit** to save the polygon.
8. Repeat your search for Pickering Beach and again tap **Collect Here**. Pan the map to place the crosshair on the edge of the observation area you defined and close to a waterfront trail feature. Tap the template for **Observation Route** then tap **Add Point**.
9. Pan the map to a point along the trail within the observation area and tap **Add Point** again. Continue adding points to define an observation route in the observation area that approximately follows the waterfront trail. Enter **Path defined on <today's date>** in the **Comments** field, then tap **Submit**. See the image below, left, for an example.
10. Long press a point on the map within your defined observation area to drop a pin at that location. Tap **Collect Here** then tap the **New Tree** template.
11. Slide the data collection form up to enter your observations. Optionally, attach a photo to the point (you will need to allow Field Maps to access the photo library on your device) and then click **Submit** to record the data point.
12. Repeat Steps 10 and 11 using the **Other Tree** template. See the images below for examples of point collection using the New Tree template (centre) and the Other Tree template (right).



13. Tap the map on or near a feature in the Town Trees layer that is within your defined observation area. Slide the items panel up to see a list of all the features that intersect or are near the map location that you tapped.
14. Tap one of the matches in the **Town Trees** layer to select it. Make a note of the tree species then tap **Copy** (on iOS, on Android devices).
15. Tap the **Other Tree** template. Select **Mature Tree** as the **Observation Type**. Enter the species name and the comment **Point Copied from Town Trees** in the appropriate fields then tap **Submit**.



16. Collect additional points for different observation types. Use the Comments field to add notes about the point being collected. See the images below for further examples.
17. To see the points you have collected, as in the last image below, tap the **Layers** button above the map and toggle all the reference layers off. Pinch the map to zoom in or out.



Summary

In this tutorial, you have learned how to create an editable layer and add fields to it, configure a map in the Map Viewer and the Field Maps web app to use for data collection, and collected data from the map with the Field Maps mobile app.

Future Considerations

The “field” part of the name ArcGIS Field Maps implies that the app is meant to be used out in the field at the site where data are to be collected, rather than in a classroom, computer lab or office. You could use the map you created in the tutorial to collect field data from any location, although if you are outside the boundaries of the Town of Ajax, you won’t see any features from the reference layers on the map near your current location. However, before you take the Field Maps app out into the field, you need to consider whether you will have an internet connection at the data collection site and what adjustments you need to make to the map if you need to enable it for offline mode. You also need to consider whether you want GPS receiver information to be captured. In the next tutorial in the learning path, you will learn how to configure a map for use in offline mode and how to collect data in the field.

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