

AGOL, ArcGIS Collector, Survey 123 & Google Earth Mobile Apps

Tutorials for Fish and Wildlife Land Management and Restoration



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Available to Download and distribute from: <http://skralston.com/USFWS/>

This tutorial was developed as a guideline and training tool for specific applications in a Fish and Wildlife office. You may use any part of this tutorial and adapt to your specific needs. Although used and created by a USFWS employee it is not considered official training, methods or policy supported by the agency and is only reference material. Feel free to share and distribute. We all benefit by working together and sharing knowledge.

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Purpose of Arc Collector:

- ArcGIS Collector app is used as a mobile GIS map to take with you in the field on a smart phone or tablet. It can be used in 2 directions.
- Collect data in the field to use back in the office. Map locations of points, lines or polygons and input data about those features to be used in ArcMap or other GIS software. Example is in the field locating and identifying drainage systems that will be used in developing a wetland restoration plan for a site.
- Put data into it and use the on-screen map to navigate to certain features or points such as a map of an underground drain tile system you will navigate to in the field with a contractor to excavate and break the tile to restore a wetland.
- Limitations – This does not substitute survey grade instruments as GPS accuracy for most mobile devices ranges from 2-20ft depending on reception, hardware and settings. However for general preliminary surveys and maintenance needs this is sufficient and is fast and convenient.
- Instant feedback and multi-user– Assuming you are using a device with a constant internet connection like a smartphone, any additions or changes to the database are instantly updated across all users so multiple people can use it at the same time. Information you put in can be seen back in the office instantly or vice versa so can coordinate between all levels of a project in real time. Those devices that don't have constant internet connection will synchronize easily once they return to a wi-fi connection.
- Exporting GIS files to Google Earth App can be good for end users to easily share map data.
- If you data needs only a spatial point but a lot more information about that point consider Survey123 app instead. May be more appropriate when data is more important than complex mapping. See page 44.

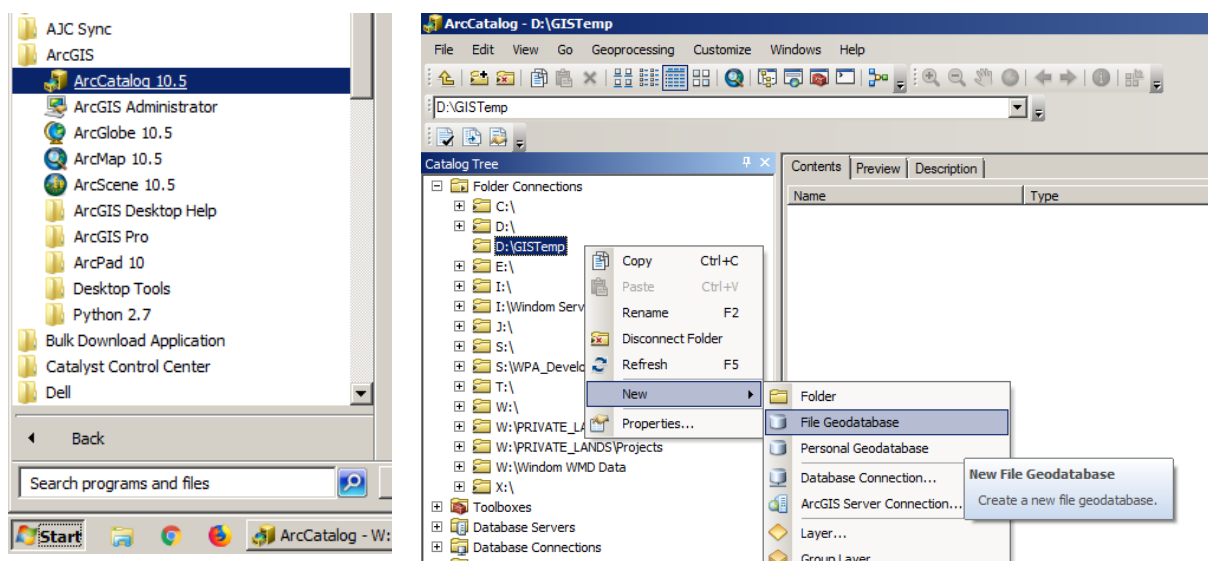
What you need to Get Started

- ArcGIS (10.2 or later) with ArcMap and ArcCatalog or ArcGIS Pro
- Internet connection for both your PC and your mobile device
- ArcGIS Online Account (AGOL) – All USFWS employees have an account. To activate you just have to log in with your Active Directory information at the step outlined below. Non-FWS users you would have to register an account with ESRI.
- Mobile Device – Can be a smartphone or Tablet. Works on Windows Mobile, Android or Apple. Needs to have a built in GPS or connection to an external GPS, best to have cellular data for instant connection to server data but can also work with intermittent Wi-Fi/internet connection if you pre-plan your work area and check out data before you leave your internet connect. See the section below for checking out data.
- ArcCollector app- Free app available on most platforms from your designated app store.

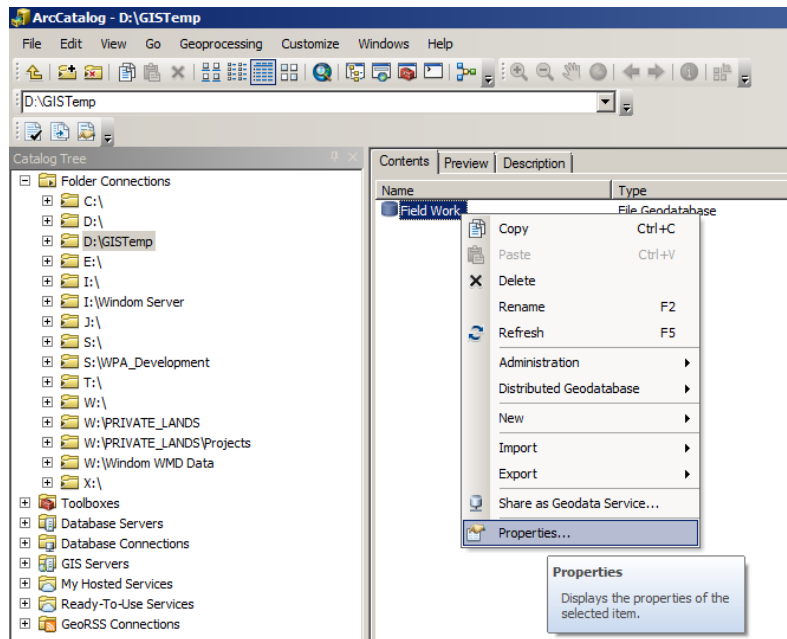
Creating a Geodatabase to store your data

If someone has already created a map for you to use you can skip this step and just move down to using the app. If you like the Example database used here you can download a copy of it, modify any specifics you need and start at the Publishing your database section. Copy Available at: <http://skralston.com/USFWS/> next to the link for this tutorial.

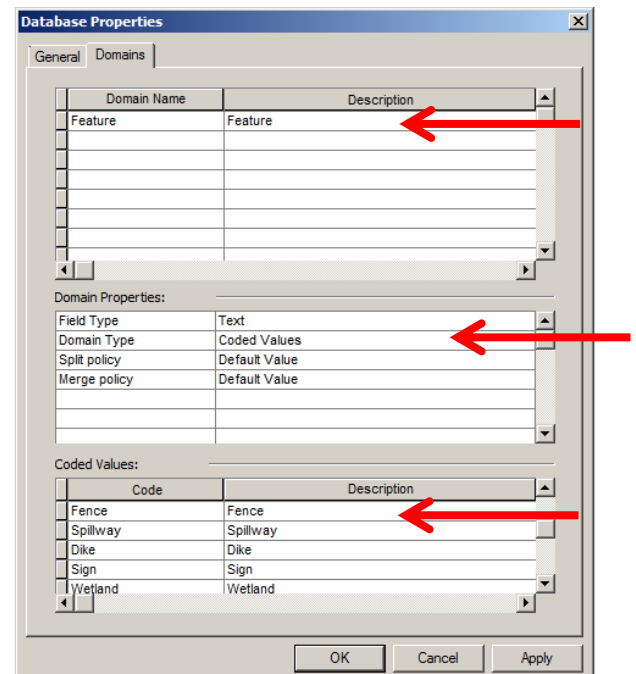
- You will need to create a database to store the types of information you want to collect. Put plenty of time and thought into the design of the information you want to collect. It is more difficult to change and add more once everything is already built. If you have a very specific purpose you can build a very narrow database. However for the purposes outlined here I suggest a very broad database than can be used for most refuge management or restoration purposes. Be set up to collect data about almost any activity you would need in day to day field work.
- In the example here we will make a map that we can collect any point, line or polygon data and label it with common feature types we have in our field work.
- Open Arc Catalog
- Navigate to wherever you want to store your data. Right click on the folder and choose New - File Geodatabase and name it whatever you want.



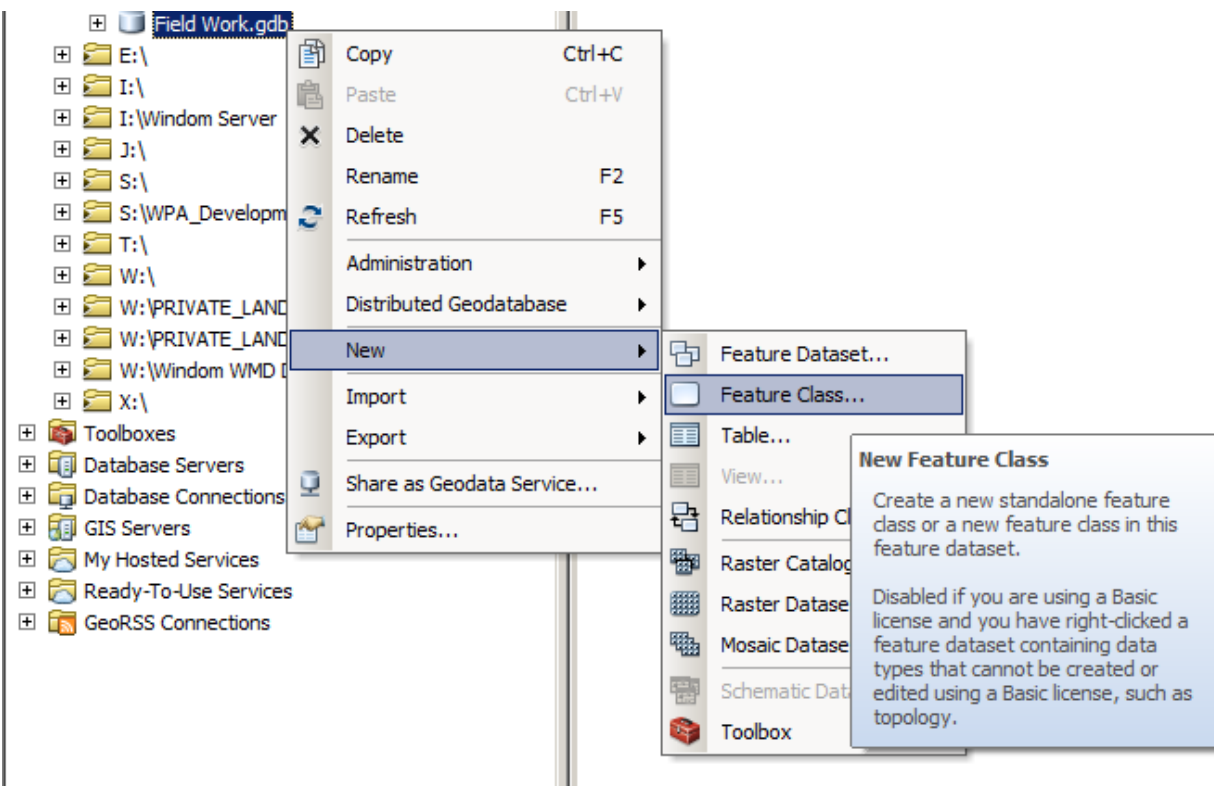
- If you want to make drop down pick lists for your data collection follow these steps to create “Domains”.
If you don't need drop down lists then skip this step.
- A Domain is just a list of options you can choose from. It will make collection much faster and more consistent to choose from a list than to type in values every time.
- Right click on your new database and choose “Properties”



- In the Domain Tab in the first blank in the Domain Name column type a name of a field then next to it a description which could be the same as the name. For this example our Domain will be called “Feature”
- In the Properties box choose what type of data it is.
 - o For this example it will be text which is numbers and or letters. You will specify later the maximum number of characters
 - o All other types are number only values and the difference is just in how many digits and decimal points you store. Plan ahead and choose the maximum digits and decimal places you would ever want to store for this data type. Only downside to over estimating your need is bigger numbers make large file sizes.
 - o Short integer is only up to 5 digits with no decimals
 - o Long integer is only up to 10 digits with no decimals
 - o Float is only up to 6 digits with decimals if you want



- Double is numbers only with as many digits and decimal places as you want to specify
- For Float and Double options you may have options to input precision and scale.
 - Precision is the maximum total number of digits you plan to store both above and below the decimal point
 - Scale is the number of decimal places
 - 12,345.678 would be precision 8 and scale 3.
- Numeric values you can specify a maximum or minimum range if you want or below in the code values you can type or list of specific numbers to choose from
- In the Coded values section is where you type your pick list along with a description which can be the same as the Code unless you want write more details. In this example we will list features that we commonly will find in our area refuge and restoration management:
 - Survey/Sample, Tile Line, Tile Intake/Outlet, Tile Investigation, Tile Install/Reroute, Tile Break, Blowout/Hole, Ditch, Culvert/Bridge, Dike, Ditch Plug/Fill, Spillway, Structure, Wetland, Sediment Removal, Spoil Pile, Borrow Area, Planting/Seeding, Invasive Plant, Boundary, Burn Area, Access, Crossing, Fence, Sign, Utility Line, Species Sighting, nest, Hazard or Maintenance, LE Violation.
- You can create as many different Domains/lists as you need. In this case we only have 1 list. Hit OK when done
- Next create Point, Line or Polygon layers in the database. Right click on your database and chose New, Feature Class



- Give it a name and an Alias which can be the same or more descriptive and choose the type, point, line or polygon then hit Next.
- Next Define a coordinate system for your data. I would suggest WGS84 with your UTM zone. It is usually easiest to use the same coordinate system across most of your map data so be consistent. Unless you are dealing with a very large geographic range like nation wide data, typically it would be best to choose a UTM system. NAD83 or WGS 84 systems are most common. Both are very similar and would likely work. By default many GPS systems use WGS84 and are sometimes slightly more accurate than NAD83 in some applications. The more localized system is often better but don't get too narrow such as an individual county system, then later you may want to collect data outside of that county and it won't work well.
 - o Look under Projected Systems, UTM, WGS 1984, Northern Hemisphere, Your UTM zone, MN is in Zone 15N.



New Feature Class

Name:

Alias:

Type

Type of features stored in this feature class:

- ☐ Point Features
- ☐ Polygon Features
- ☐ Line Features
- ☒ Point Features
- ☐ Multipoint Features
- ☐ MultiPatch Features
- ☐ Dimension Features
- ☐ Annotation Features

Geometry Properties

☐ Coordinates include M values. Used to store route data.

☐ Coordinates include Z values. Used to store 3D data.

< Back Next > Cancel

New Feature Class

Choose the coordinate system that will be used for XY coordinates in this data.

Geographic coordinate systems use latitude and longitude coordinates on a spherical model of the earth's surface. Projected coordinate systems use a mathematical conversion to transform latitude and longitude coordinates to a two-dimensional linear system.

Type here to search

- Favorites
 - NAD 1983 UTM Zone 15N
 - WGS 1984 UTM Zone 15N**
- Geographic Coordinate Systems
- Projected Coordinate Systems
 - ARC (equal arc-second)
 - Continental
 - County Systems
 - Gauss Kruger
 - National Grid

Current coordinate system:

WGS_1984_UTM_Zone_15N
WKID: 32615 Authority: EPSG

Projection: Transverse_Mercator
False_Easting: 500000.0
False_Northing: 0.0
Central_Meridian: -93.0
Scale_Factor: 0.9996
Latitude_Of_Origin: 0.0
Linear Unit: Meter (1.0)

< Back Next > Cancel

- Hit Next, Next, Next to get to the Field Name window. This is where you define the fields (columns in your attribute table) or input boxes you will fill out in Collector.
- Field Name enter a heading name such as “Features”.
 - o Then in Data Type choose text or number type. In this example we use Text.
 - o In Field Properties below chose “Allow Null Values” – “Yes” which means you can leave it blank if you want.
 - o If you want a default value fill it in but usually leave blank
 - o Length, enter the maximum characters you want
 - o Domain is where if you created a pick list earlier then you can choose it here and you will have that pick list for that field.
 - o In this example I create 3 fields: Features (which has the pick list of feature types from the Domain we created), Size (which I have as a Numeric Double type so I can manually enter numbers with decimal points), and Notes which is a 250 character text field for writing a description of whatever I marked.

New Feature Class

Field Name	Data Type
OBJECTID	Object ID
SHAPE	Geometry
Features	Text
Size	Double
Notes	Text

Click any field to see its properties.

Field Properties

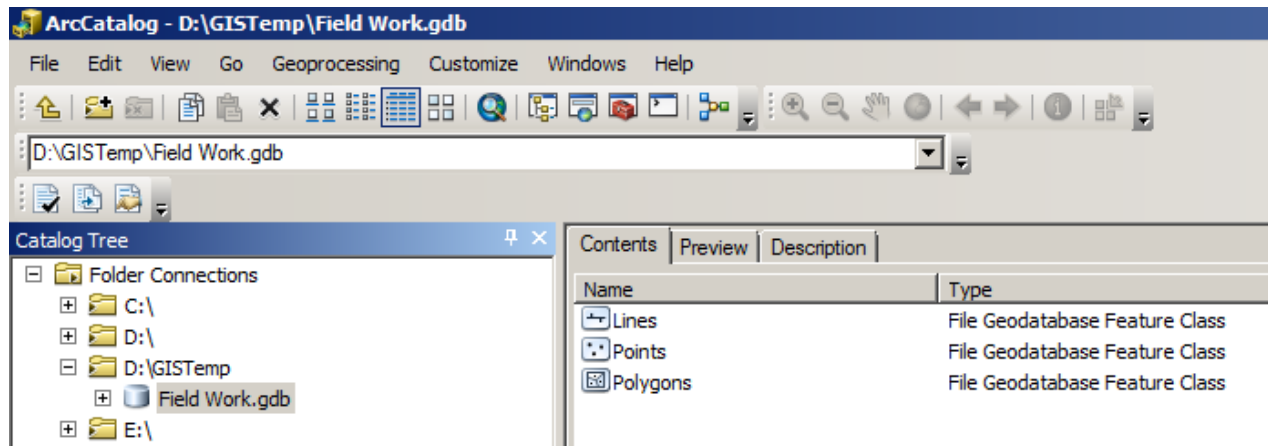
Alias	Features
Allow NULL values	Yes
Default Value	
Domain	Feature
Length	25

Import...

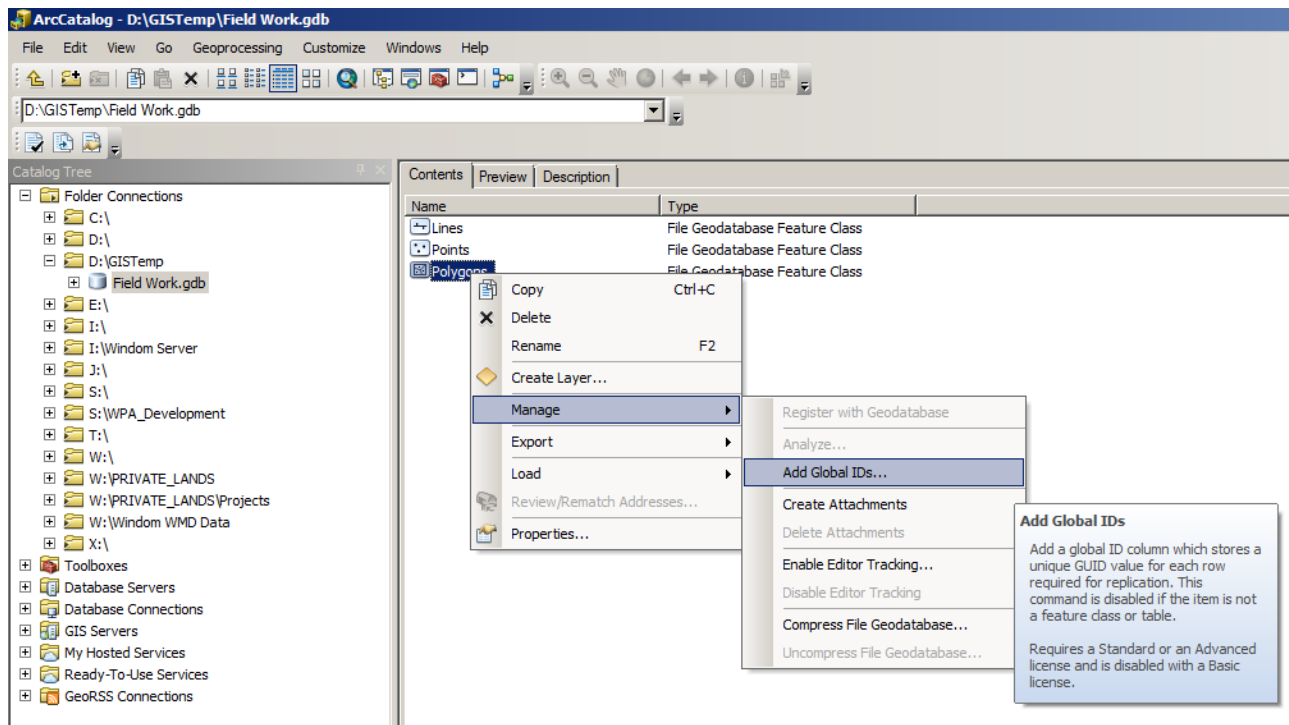
To add a new field, type the name into an empty row in the Field Name column, click in the Data Type column to choose the data type, then edit the Field Properties.

< Back Finish Cancel

- Hit Finish to create the layer. Repeat this if you want more layers. For this example we create layers called Points, Lines, Polygons for each of those feature types and I use the same fields in each one.



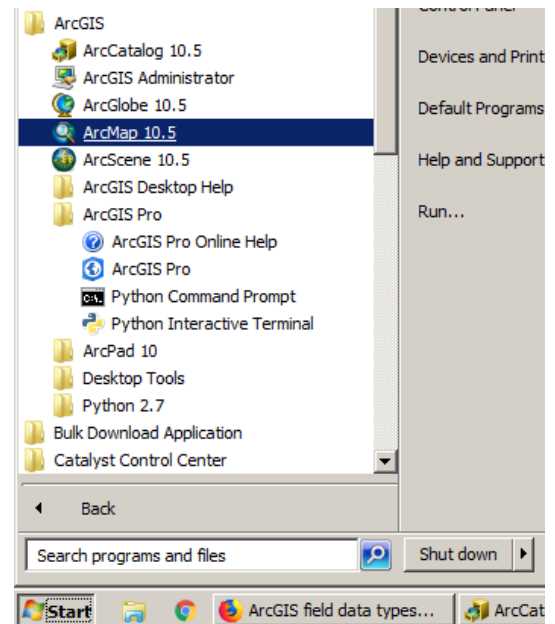
- Next for each of these layers we will add a couple settings needed for use in the collector app. Right click on each layer you created and chose Manage then:
 - o Add Global IDs – This puts a unique ID to each feature you create
 - o Enable Editor Tracking – Which tracks who created it, when etc.
 - o Create Attachments – Which allows you to attach other files to your features like taking a point of a bird nest and attaching a picture of the nest to the file.
 - o Repeat for all your layers.



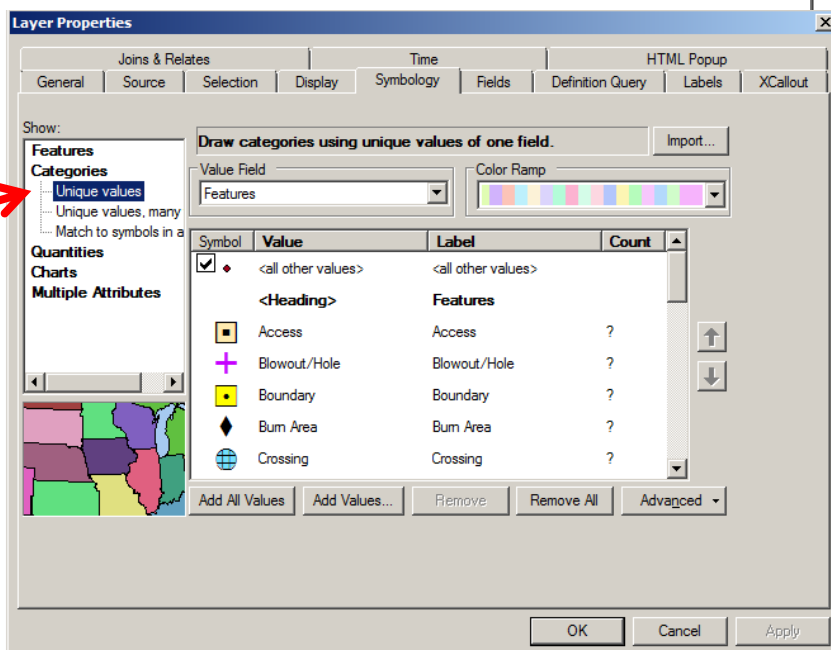
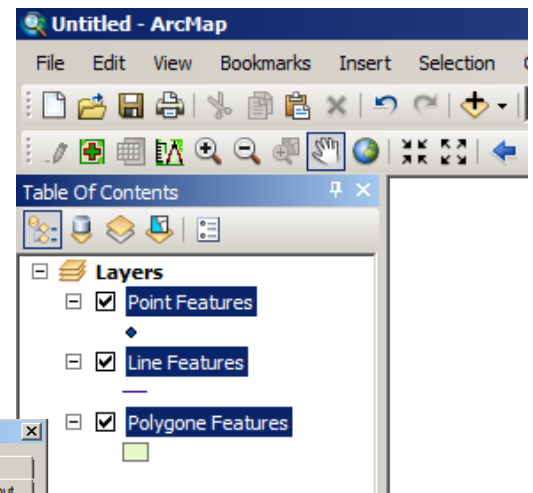
- You are now done creating your database. Review and make any changes now as it is more difficult to add anything later after it has already been published to an AGOL server.

Publish your database as a AGOL Service

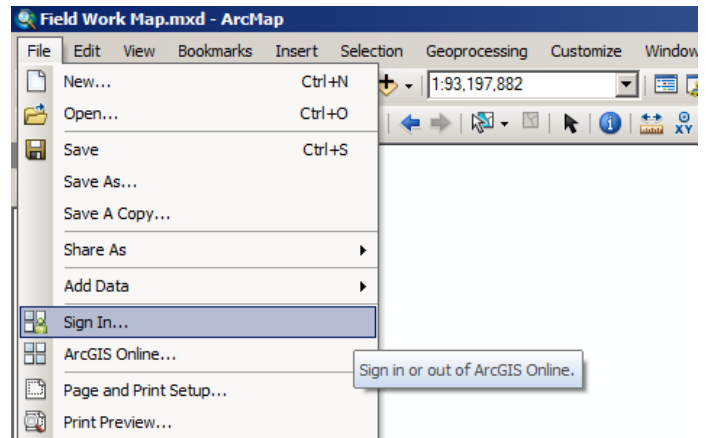
- Open ArcMap or ArcGIS Pro
- Hit the Add Data button and add the layers you created:
example here is the 3 Point, Line and Polygon Layers.



- Change the symbols now if you wish or you can do that later in ArcGIS Online. It might be easier in ArcMap if you are more familiar with that program. If you want different symbols for each of the feature types Double click on the Layer to bring up the Layer Properties box and go the Symbology tab. Under Categories hit Unique values and Add all Values. Then customize the symbols for each of those values. Only use basic standard symbols or more complex symbols may not translate to AGOL.



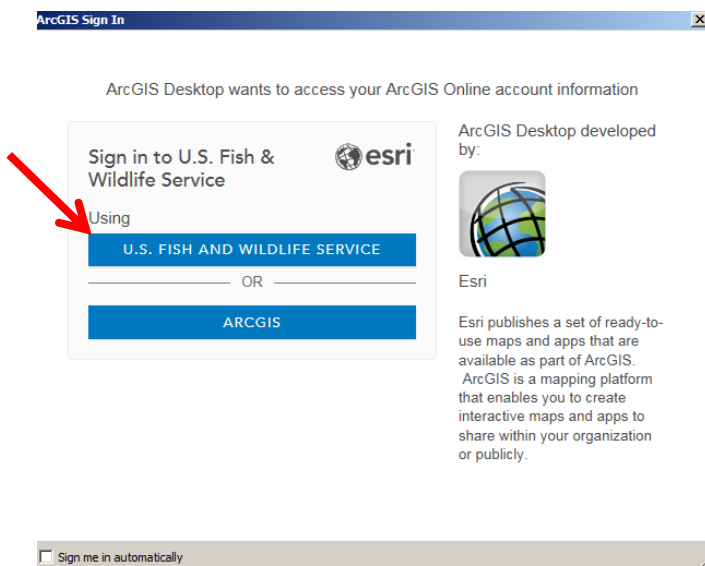
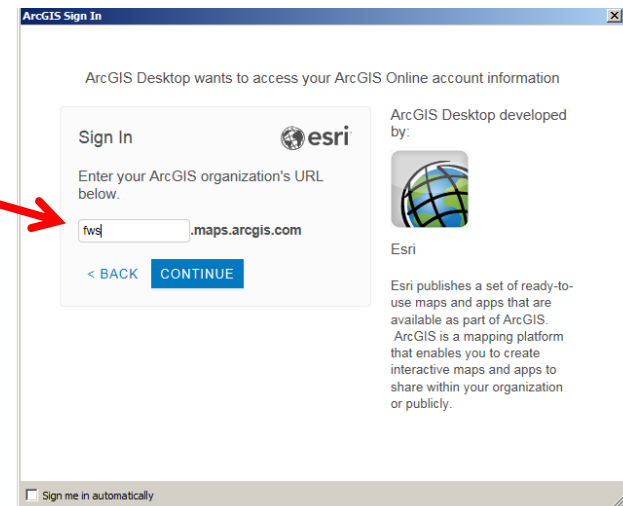
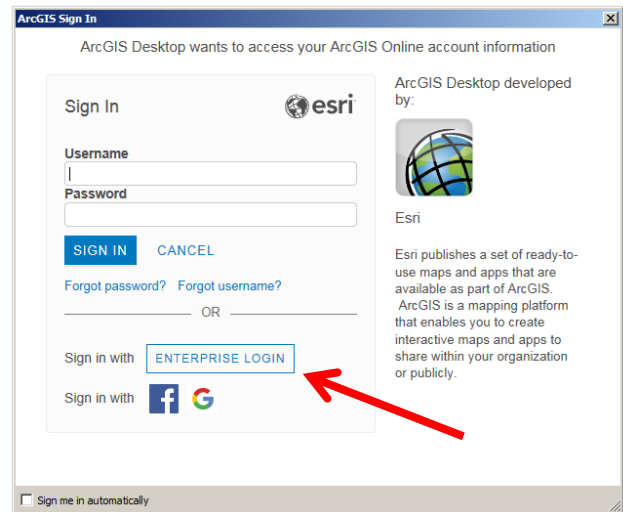
- Sign in to AGOL. From ArcMap in the File menu chose Sign In.



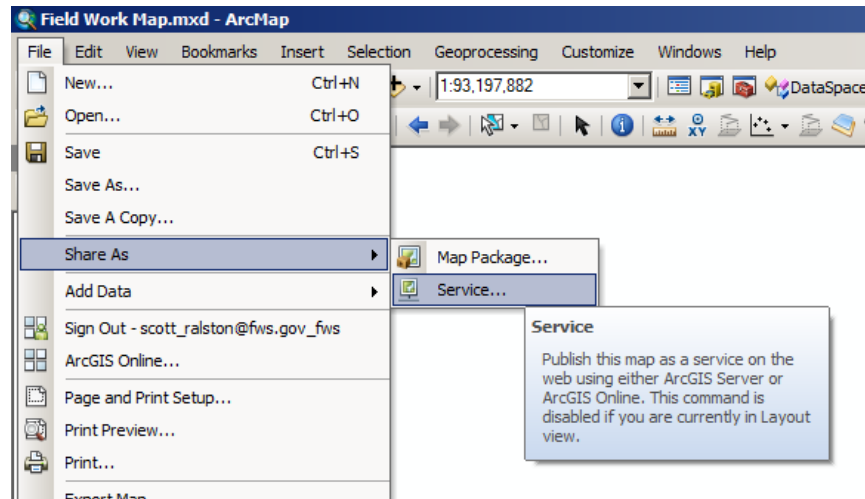
- With this screen don't enter a Username if you are a FWS employee, Just go down lower and hit "Enterprise Login". Other non-FWS users sign in to your regular AGOL account.

- Enter **FWS** in the box and hit continue

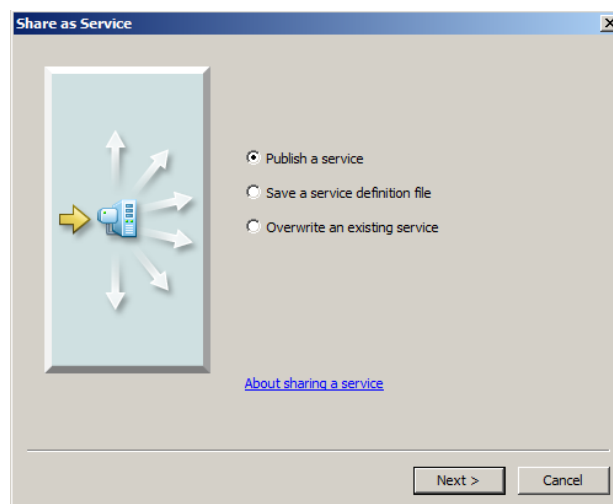
- Hit the top option for USFWS. Assuming you are on a government computer already logged in with your Active Directory account/smartcard it will automatically log you in with no further user name or password. If you are not on a AD computer it will ask you for your Active Directory log in (email and AD password)



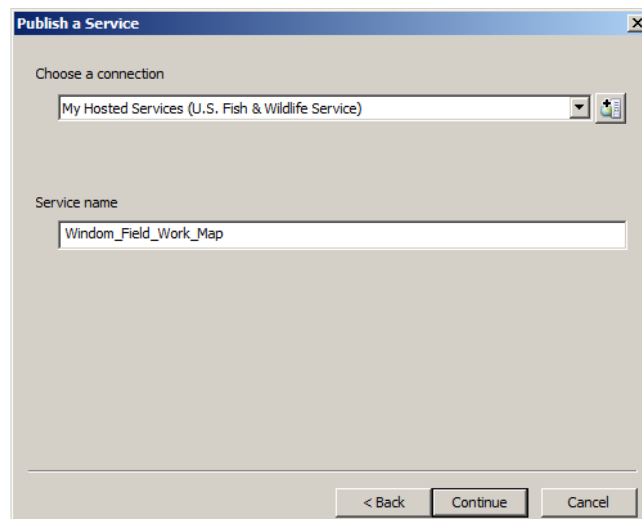
- Publish your feature class service to AGOL using these steps.
- From the file menu go to Share As - Service



- Hit Publish a service and Next



- Give your service a name (with no spaces)



- In the Capabilities tab Un-Check the “Tiled Mapping” option.
- Under Feature Access select All options
- Under Item description fill in at least some basic information. Better description and key words will help if others need to search to find your maps.

The image displays three screenshots of the Service Editor application, illustrating the configuration steps for a service named "Windom_Field_Work_Map".

Top Screenshot: Capabilities Tab
 The "Capabilities" tab is selected in the left sidebar. The main area shows a list of capabilities with checkboxes:

- ☐ Tiled Mapping (indicated by a red arrow pointing to it, suggesting it should be unchecked).
- ☒ Feature Access

 The top bar shows the connection "My Hosted Services" and the service name "Windom_Field_Work_Map". Buttons for Import, Analyze, Preview, and Publish are visible.

Middle Screenshot: Feature Access Tab
 The "Feature Access" tab is selected. The "Operations allowed" section shows several checkboxes, all of which are checked:

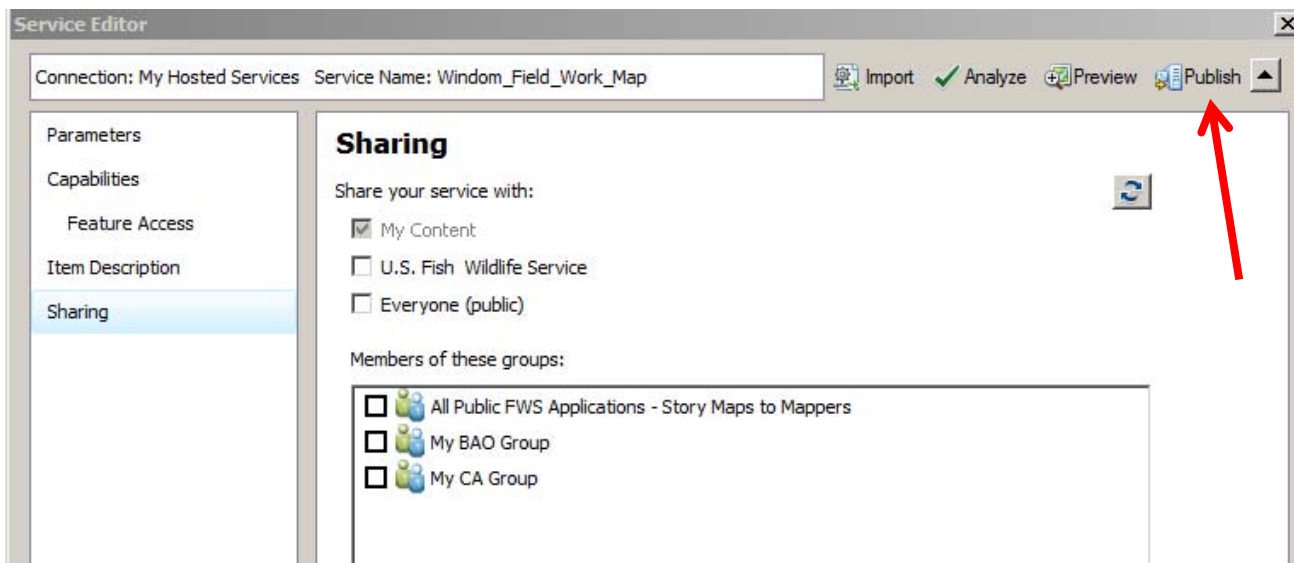
- ☒ Create
- ☒ Delete
- ☒ Query
- ☒ Sync
- ☒ Update (indicated by a red arrow pointing to it).

 The "REST URL" field contains the text: "The REST URL will be defined once the service is published".

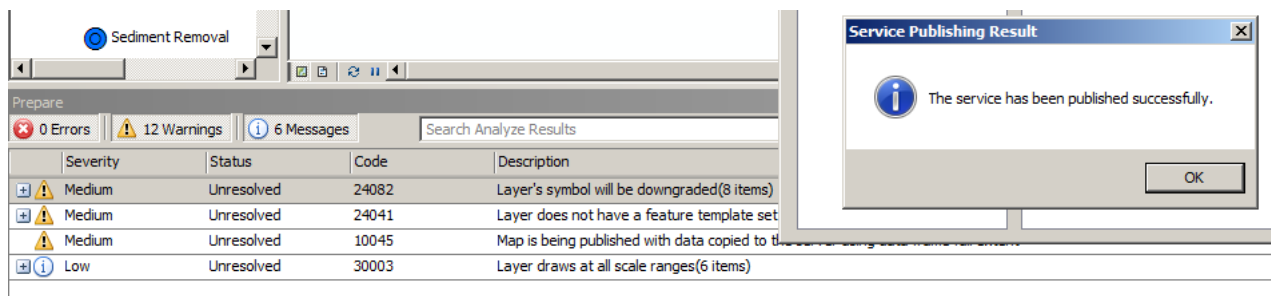
Bottom Screenshot: Item Description Tab
 The "Item Description" tab is selected. The form contains the following fields:

- Summary (required):** A text area containing "Arc Collector map for field work at USFWS Windom Wetland Management District. Identifying and locating common features found in refuge management and restoration activities."
- Tags (required):** A text area containing "Windom, Refuge, Wetland, Management, Field, Restoration, Prairie, upland". Below it is a button labeled "Choose Your Tags...".
- Description:** A text area containing the same text as the summary.
- Access and Use Constraints:** An empty text area.
- Credits:** A text area containing "Scott Ralston".
- ☒ Update missing metadata in document based on item description.

- Sharing tab leave for now. We will update sharing permissions later in AGOL unless you already have a group made and want to share at this stage.



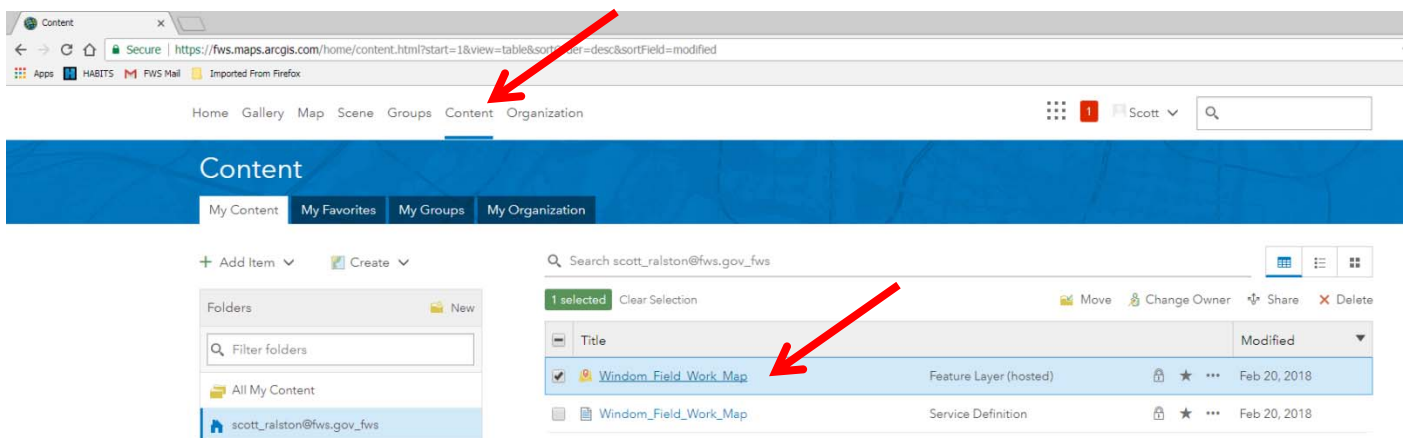
- Hit Publish button in the top right corner.
- It will take a few minutes but should end with service has been published successfully.
- There might be a few minor errors like some symbols didn't translate over which can be fixed later in AGOL.



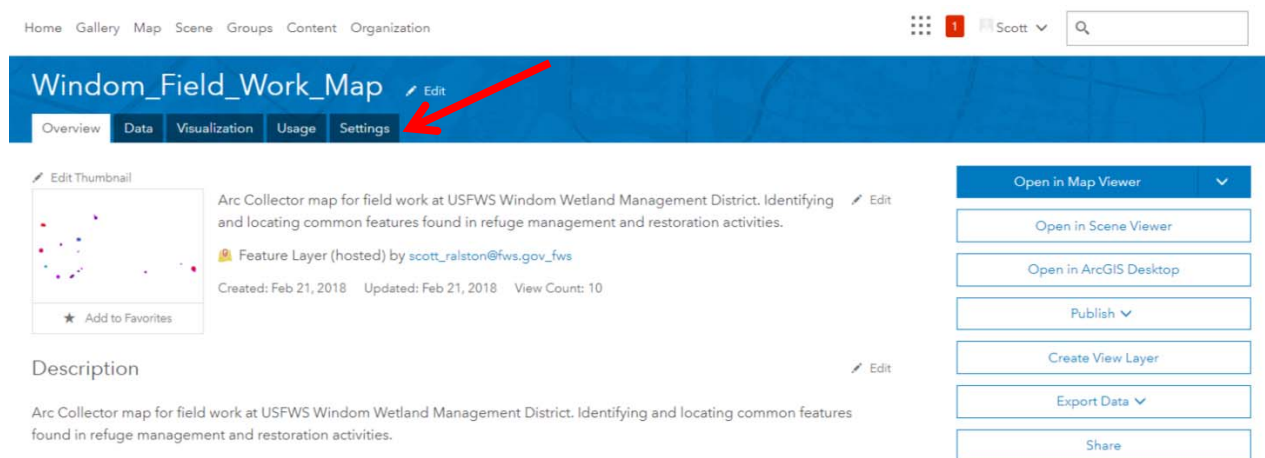
- Your data is now online. You will no longer use the database you created on your hard drive so that can be discarded. Any changes to the copy on your hard drive will not change the online version.

Set Up Maps in AGOL

- Open a web browser such as Chrome, Firefox or IE and go to <https://www.arcgis.com> If you use Chrome it will recognize your AD account if you are on a FWS computer and make log in quicker.
- Hit Sign In on the top right of the web page.
- Same sign in as before, from Page 10
 - o USFWS staff hit the Enterprise Login button on the bottom right
 - o Type FWS in the blank and hit Continue
 - o Hit USFWS button.
- Across the top of the page you will see menus. Go to the “Content” tab. And you will see your Feature layers there. You will see 2 files, one called Feature Layer and one called Service Definition. Ignore Service Definition.



- Click on the Feature Layer for the file you just uploaded.
- Notice by each of the description areas there is an edit button if you need to make any changes or edits to any boxes.



- Go to the Settings tab. You may want to check the box “Prevent this item from being accidentally deleted”. You will have to go in and uncheck this manually before you could delete the layer.

- Scroll down and look at other options as needed. Mostly leave as default.
 - o Any time you make a change hit the blue save box in that section to save the change.
 - o **Important** - Check box for Enable Sync which will allow you to download the data and work offline if you don't have an internet connection.
 - o Under what kind of editing is allowed the top option allows most flexibility but can be restricted if you only want people to add stuff and not delete or change.
 - o Very bottom option "Export Data" should be checked. It is not by default. This will allow you to export the data in various formats like a shapefile.

Delete Protection

☒ Prevent this item from being accidentally deleted.

Delete Item

Feature Layer (hosted) Settings

Editing

☒ Enable editing.
☐ Keep track of created and updated features.
☒ Keep track of who created and last updated features.
☒ Enable Sync (disconnected editing with synchronization).

Who can edit features?

Share the layer to specific groups of people, the organization or publicly via the Share button on the Overview tab. This layer is not shared.

What kind of editing is allowed?

☒ Add, update, and delete features
☐ Add and update features
☐ Add features
☐ Update features
☐ Update attributes only

What features can editors see?

☒ Editors can see all features
☐ Editors can only see their own features (requires tracking)
☐ Editors can't see any features, even those they add

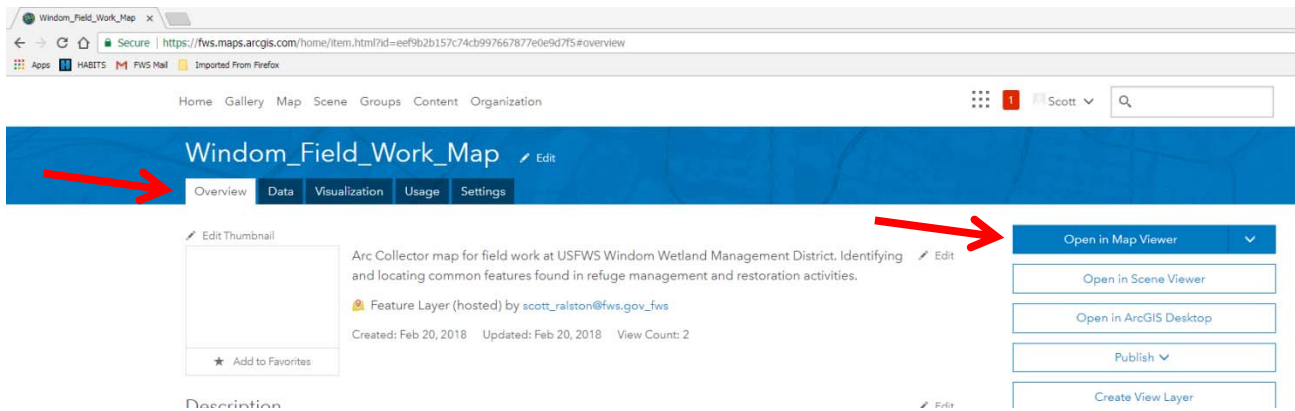
Export Data

☒ Allow others to export to different formats.

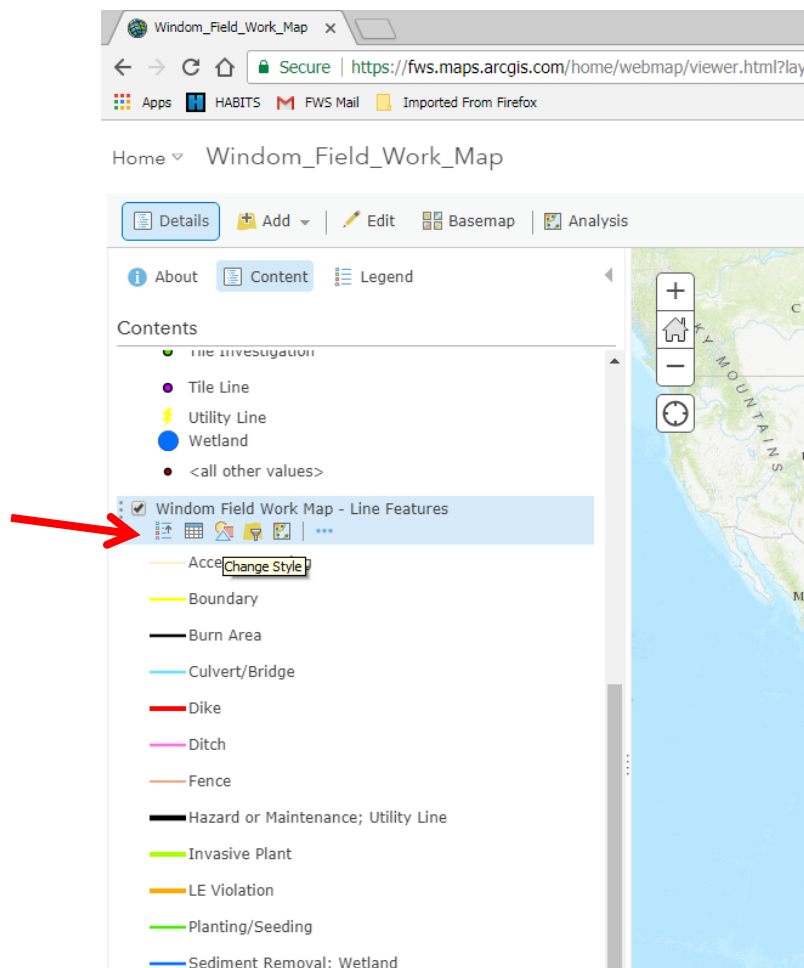
Save

Cancel

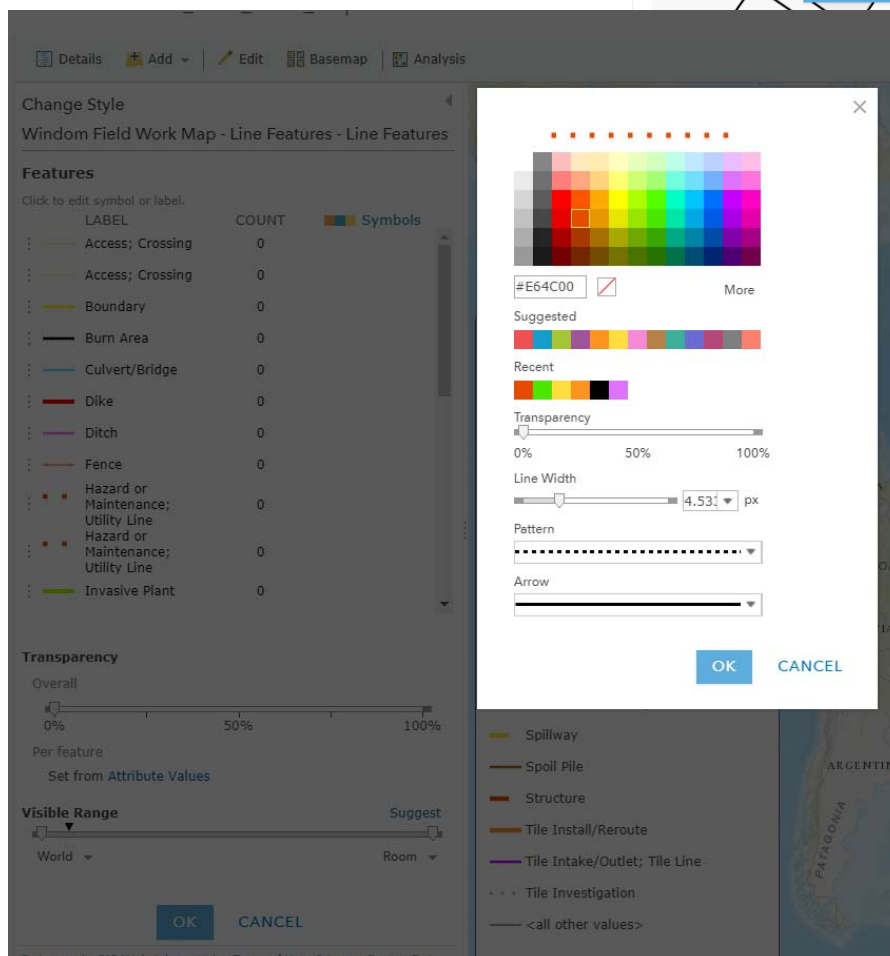
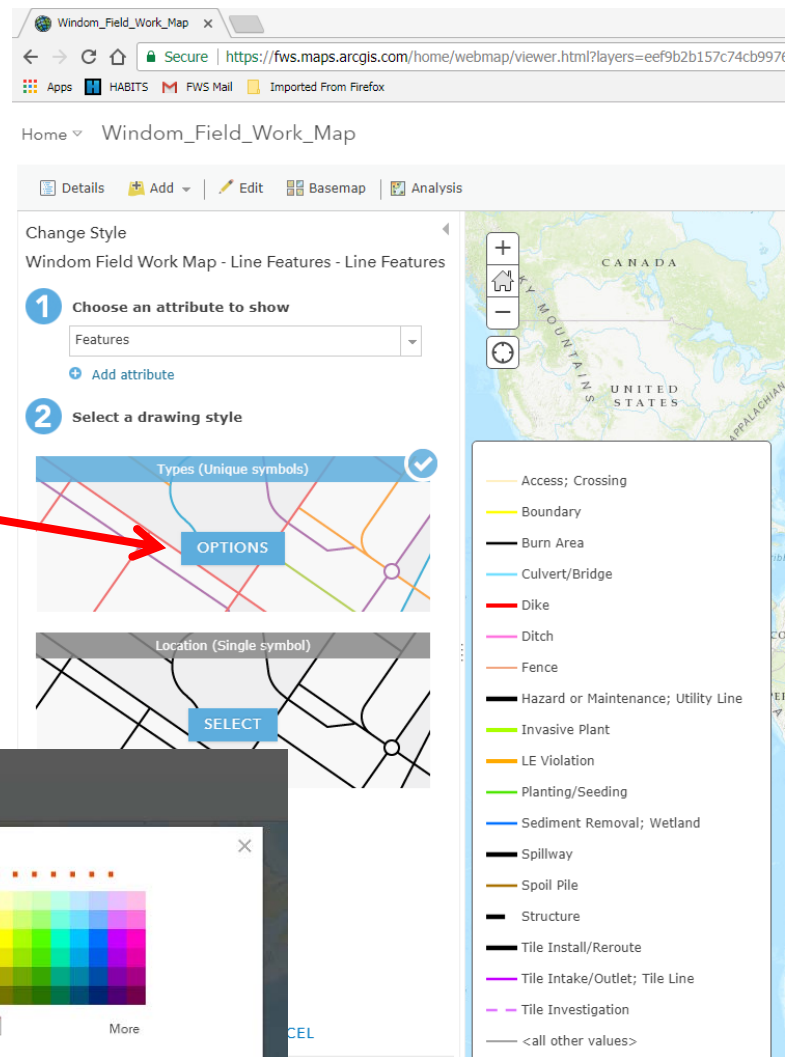
- Go back to the Overview Tab on the menu bar and hit Open in Viewer



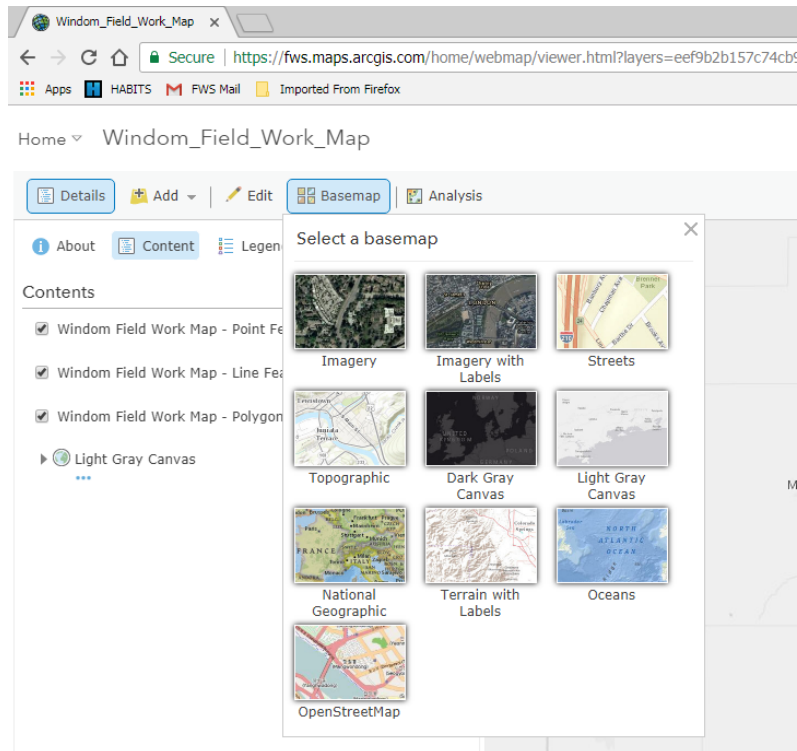
- You should now see your layers in a map. Below each layer are several buttons. The first one is the symbol legend. Expand it to see your symbols. If you previously defined it in Arc Map the symbols would have tried to copy over. Review them to see if any did not translate. If you have to fix symbols hit the 3rd button called “Change Style”



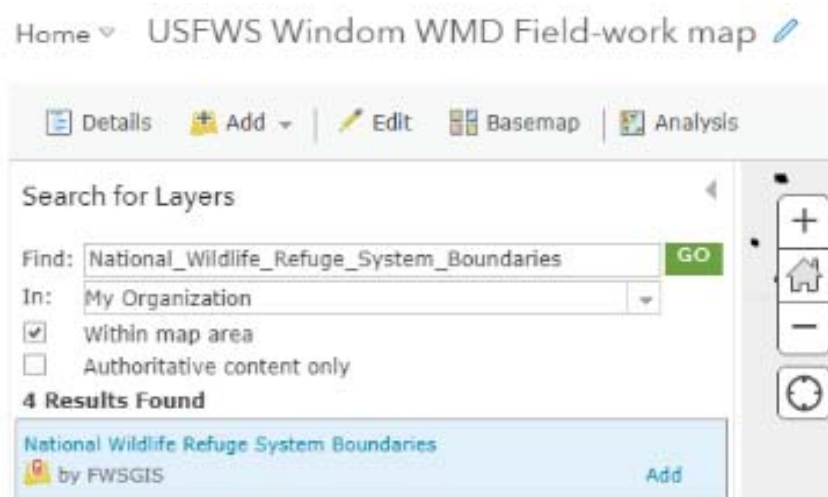
- Then Hit Unique Symbols to differentiate between feature types and the Options Button
- Click on the symbol next to each item to change it.



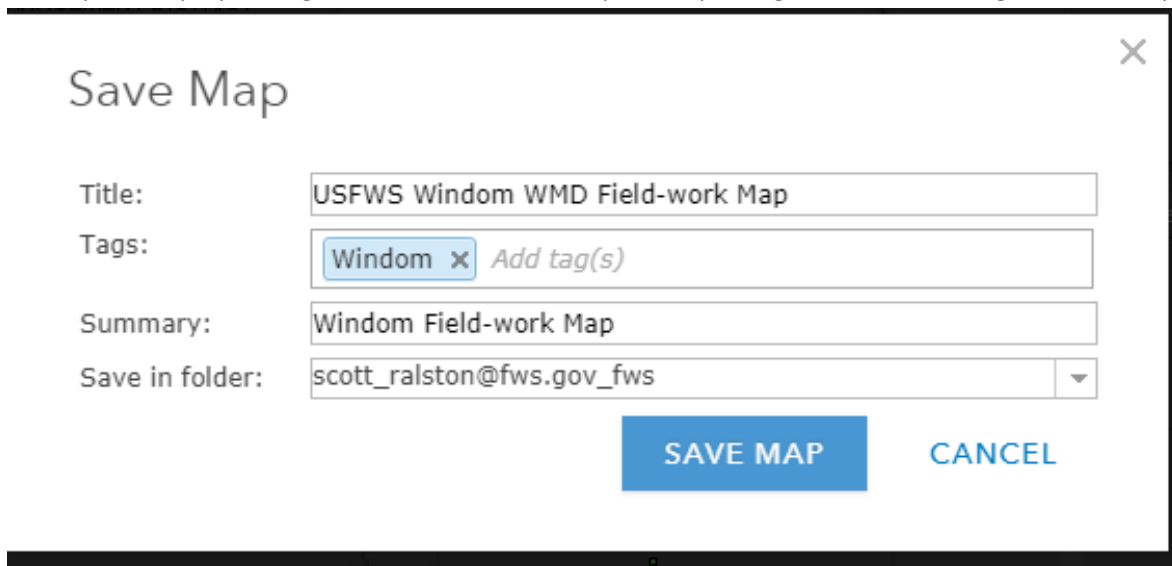
- The map requires some type of background basemap. You can choose from many options including aerial imagery, however keep in mind this is on a mobile device so the simplest map will have the smallest file size and load the fastest and use less data. I prefer the Light gray canvas option or Dark gray if you need more contrast in bright sun.



- Add any other layers you want. Hit the Add button and search for layers. Remember simpler is faster. “National Wildlife Refuge System Boundaries” is generally good to add for our application.
 - o **Important note:** If you plan to use your map offline (without a cellular connection) ALL layers in the map have to be set to Enable synchronize. Since you can’t control the settings on 3rd party data like the refuge boundary layer you have to find a layer that already had Sync enabled or it won’t allow you to download offline. For refuge boundaries use the one shown here “by FWSGIS” as this one works.

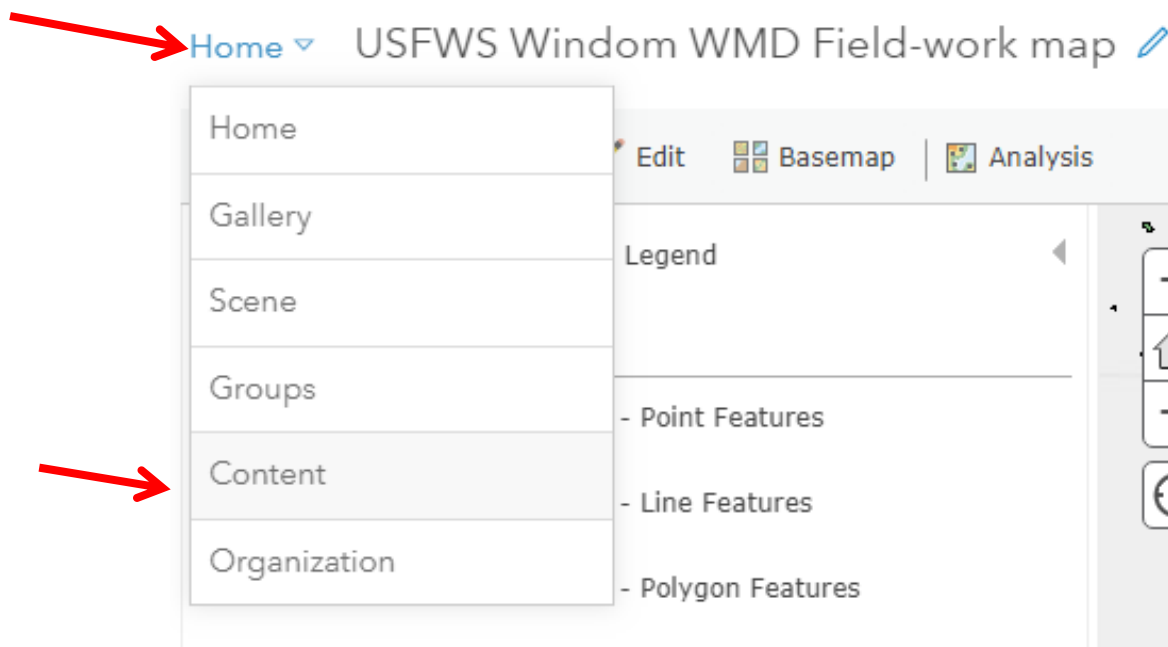


- Save your map by hitting the save button. Name your map and give it at least 1 Tag or search keyword.



A 'Save Map' dialog box with a close button (X) in the top right corner. It contains four input fields: 'Title' with the text 'USFWS Windom WMD Field-work Map', 'Tags' with a tag 'Windom' and a placeholder 'Add tag(s)', 'Summary' with the text 'Windom Field-work Map', and 'Save in folder' with a dropdown menu showing 'scott_ralston@fws.gov_fws'. At the bottom right are two buttons: 'SAVE MAP' (blue) and 'CANCEL' (light blue).

- At this point your map is ready to use and you could open it right now in Arc Collector. If you ever need to make changes such as change symbols, change the basemap or add/remove different layers then return here and open your map, make changes and save again. Your limitation at this stage is you as the creator are the only one that can see, view and edit this map right now. Our next step will be to share it so others on your team may also use it.
- Return to the Content Tab by hitting the Home button in the top left corner



Sharing a AGOL map

If you are the only person collecting and using data for the map and layers you made you can skip this step. However collaboration is often the best use of resources. Sharing the map and layers will allow others to contribute and use the same data.

- How you share is up to you but the most flexibility will often be best as long as all users understand the data is shared and not to delete anything that is not theirs. Deleting things in bulk is not very easy in the collector app so it is rare to accidentally delete more than just one point you are working on at a time and even then you usually have to confirm your actions.
- Consider what type of information you are collecting when issuing permission. Any sensitive information or PII is not allowed on open unsecured servers without restricted access. Restrict data to those that are relevant and even non-sensitive data doesn't necessarily need to be share with the entire FWS unless it is nationally relevant.
- To share a map in collector you must share both the Map and the Data layers within it which are separate actions. If you only share the map they may be able to open it and see your base map but no collection layers in it.
- Log in to your AGOL account and go to the Content tab. You will see the Map you made as well as the Feature Layer. Initially they would have a lock next to them that says not shared.

The screenshot shows the AGOL Content interface. At the top, there's a navigation bar with 'Home', 'Gallery', 'Map', 'Scene', 'Groups', 'Content', and 'Organization'. The 'Content' tab is active. Below the navigation bar, there's a blue header with 'Content' and tabs for 'My Content', 'My Favorites', 'My Groups', and 'My Organization'. On the left, there's a 'Folders' panel with a search bar and a list of folders. The main area shows a list of items. Two items are selected: 'USFWS Windom WMD Field-work Map' (Web Map) and 'Windom_Field_Work_Map' (Feature Layer (hosted)). A red arrow points to the lock icon on the first item, with a tooltip that says 'Shared: Not Shared'.

Title	Type	Modified
USFWS Windom WMD Field-work Map	Web Map	Feb 20, 2018
Windom_Field_Work_Map	Feature Layer (hosted)	Feb 20, 2018

- If you already have a group created that you want to share, skip the next step for creating a new group and go straight to the sharing section.
- If you want to join a group that already exists you can search for that group in the My Groups tab and request to join or contact the Group manager listed and request to share data/maps to their group.

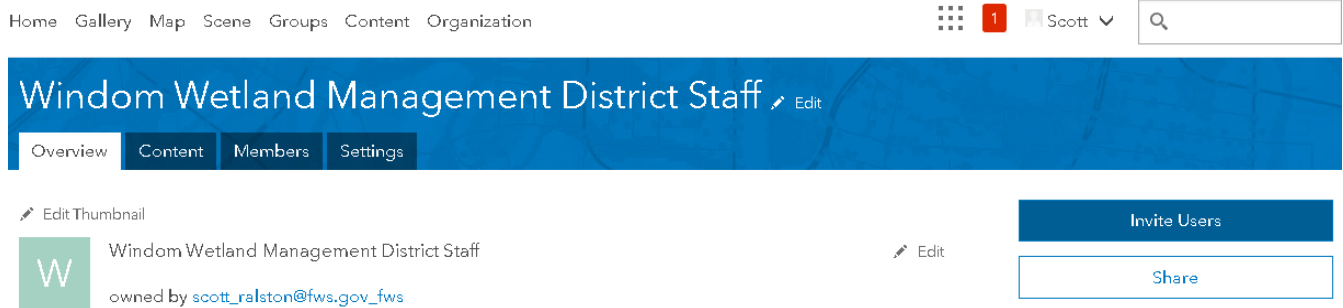
- If you need to create a new Group such as your office group, Go to the Groups tab on the very top of the web page. Hit the Create New Group Button

The screenshot shows the ArcGIS Groups interface. At the top, the 'Groups' tab is active. Below it, there are tabs for 'My Groups', 'Featured Groups', and 'My Organization's Groups'. A blue button labeled '+ Create New Group' is visible. To the left, there is a filter section with a toggle switch for 'Only show groups with new membership requests'. The main area displays a list of groups, including 'All Public FWS Applications - Story Maps to Mappers', 'My BAO Group', and 'My CA Group'. The browser's address bar at the bottom shows the URL 'https://fws.maps.arcgis.com/home/group.html'.

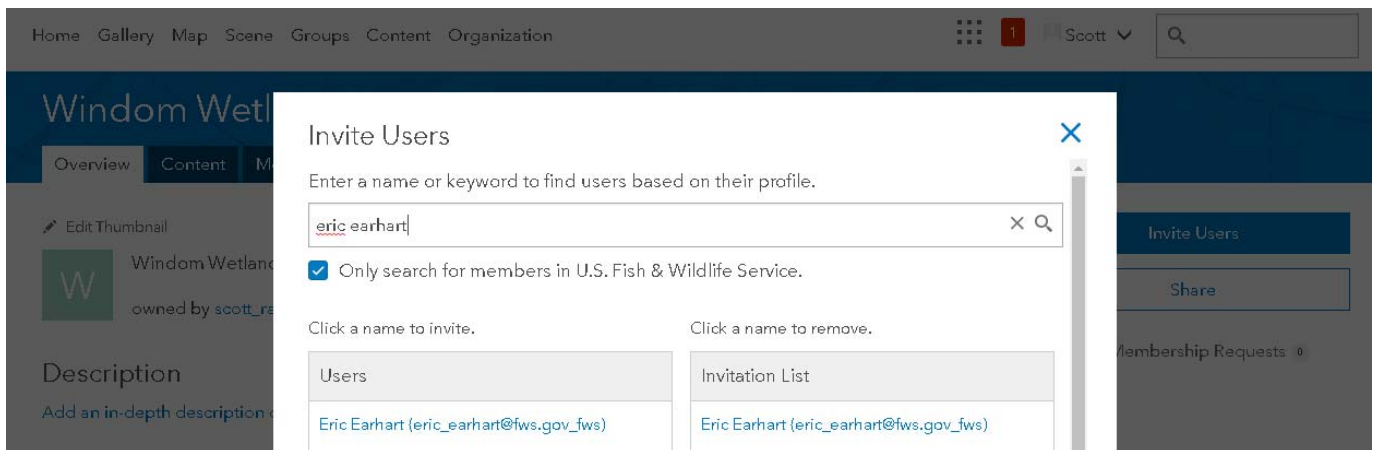
- Fill out a group name and other details

The screenshot shows the 'Create New Group' form. The form has a header 'Create New Group' and a section for 'Group Details'. The 'Group Name' field is filled with 'Windom Wetland Management District Staff'. The 'Summary' field is also filled with 'Windom Wetland Management District Staff'. The 'Tags' field has a tag 'Windom' and a placeholder 'Add tag(s)'. On the left, there is a section for uploading a thumbnail with instructions: 'Drag and drop a JPEG, PNG, or GIF. Use 400x400 pixels or larger for best results.' and an 'Upload Thumbnail' button.

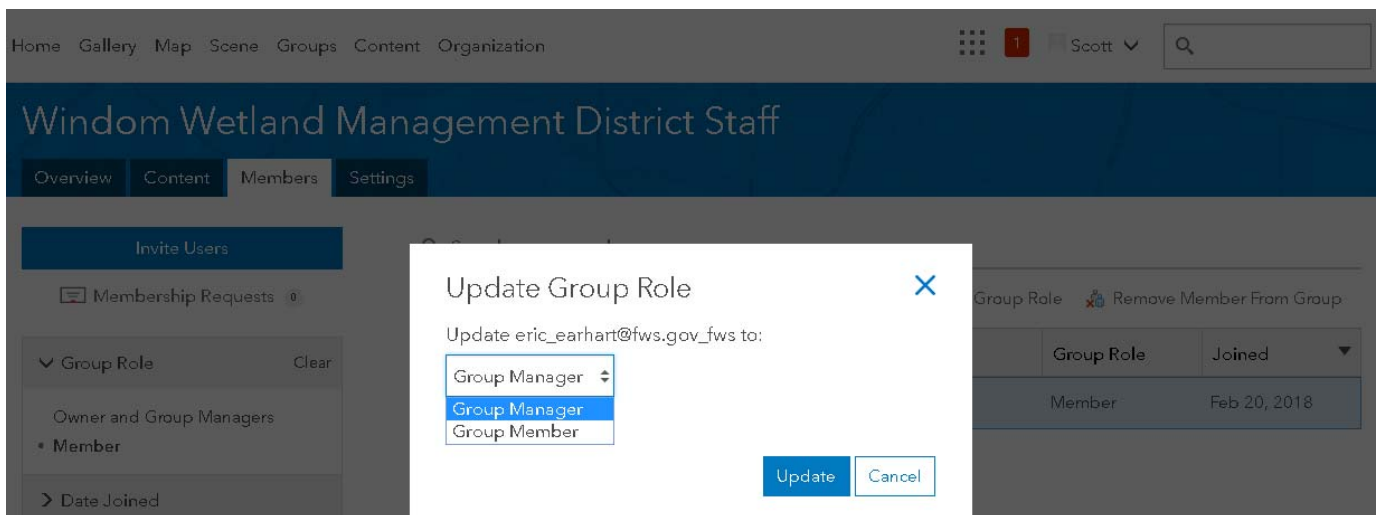
- After you create your group you can manage it and add members. Hit the Invite Users button.



- Search for people by name. If they haven't created an AGOL account by logging in for the first time then they will not show up in the list. Alternatively members can search for a group and request to join if the group manager did not already add them.



- Once members are added they can be viewed in the Members tab. You can change their status from member to manager if you want them to have more control.



- After the group is created, return to the content tab at the top of the web page.
- Check the boxes next to the map and the feature layer you want to share and hit the share button on the upper right

Home Gallery Map Scene Groups **Content** Organization

Content

My Content My Favorites My Groups My Organization

+ Add Item Create

Search scott_ralston@fws.gov_fws

2 selected Clear Selection Move Change Owner Share Delete

Title	Modified
<input checked="" type="checkbox"/> USFWS Windom WMD Field-work Map Web Map	Feb 20, 2018
<input checked="" type="checkbox"/> Windom_Field_Work_Map Feature Layer (hosted)	Feb 20, 2018

Filter folders

All My Content

scott_ralston@fws.gov_fws

- Click who you want to share with which in this example is the group we just created for your office staff.

Share

Share the item(s) with:

☐ Everyone (public)

☐ U.S. Fish & Wildlife Service

☒ These groups:

- ☐ All Public FWS Applications - Story Maps to Mappers
- ☐ My BAO Group
- ☐ My CA Group
- ☒ Windom Wetland Management District Staff

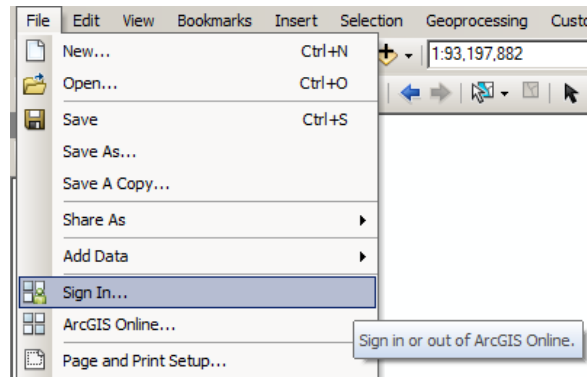
These settings will replace the current settings.

OK Cancel

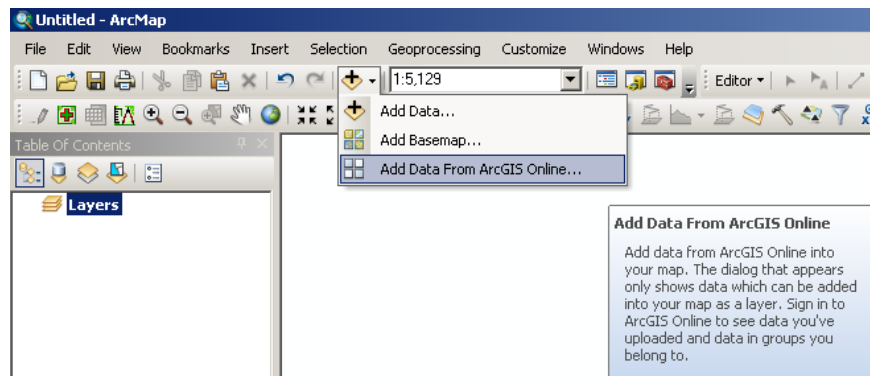
- This map should now be available for all those in the group. They can open it in ArcMap or ArcGIS Pro on the desktop, on AGOL online or in the Collector app.

Using AGOL data on the office desktop.

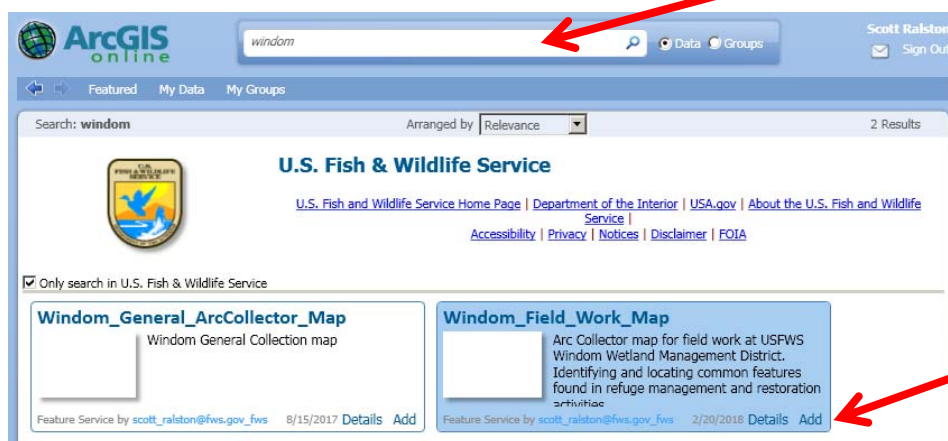
- Open ArcMap . Either a new map or an existing document you want to work in.
- Sign in to AGOL. FWS employees remember to log in using the enterprise button, Type FWS and USFWS login. From Page 10



- Hit the drop down arrow next to the Add data button and choose Add Data from ArcGIS Online

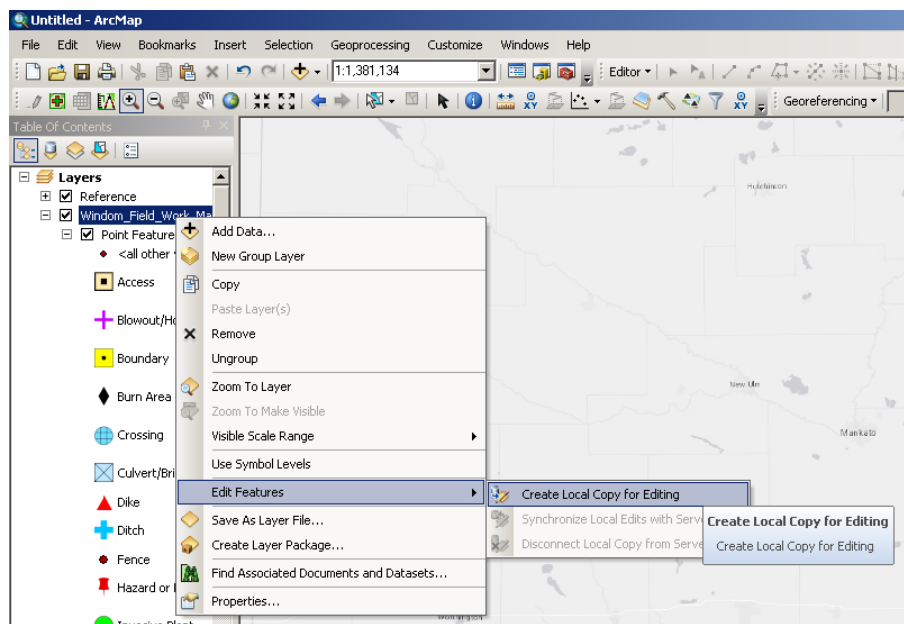


- Search using a key word from your tag description. Your map should show up in the search results.

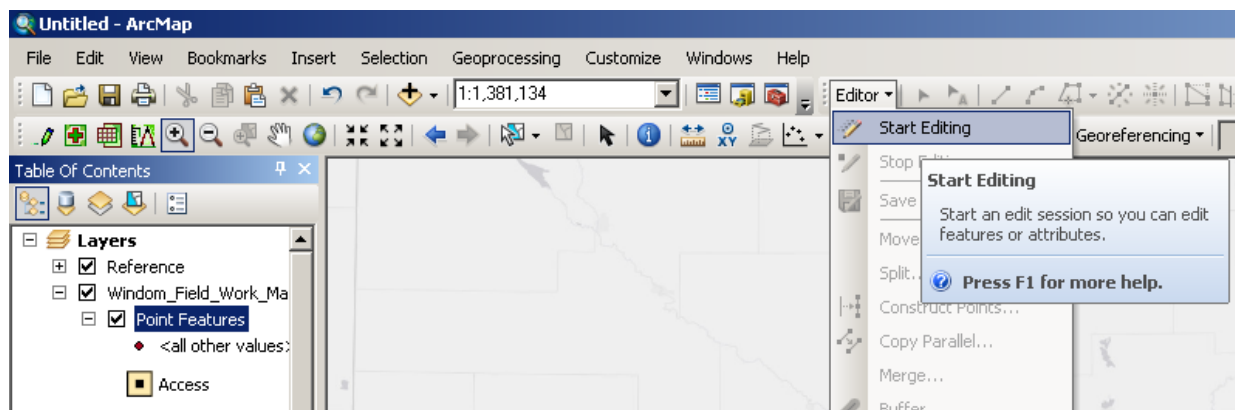


- Hit the **Add** button and it will add the feature layers from AGOL to your data frame. You can display and manipulate this like any other GIS Data.

- Editing this data is slightly different than local data. You need to check out the data from the server, make changes, then synchronize edits back to the server. To edit AGOL data in your maps do the following:
 - o **Important!** - Zoom to the full extent of the data you want to edit. It will only check out the data from the server that is in view at the time of the checkout. Anything that is not in view will not be checked out and also will not be displayed if you later zoom to the area.
 - o Right Click on the group layer that contains the feature classes you want to edit. Go down to Edit features, and Create Local Copy for editing

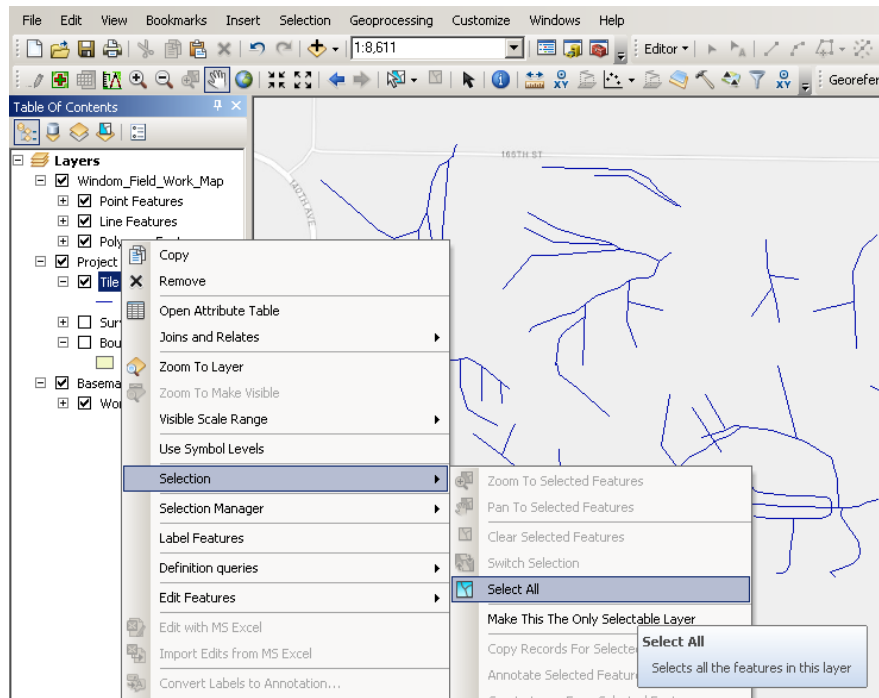


- You can now edit like any other layer

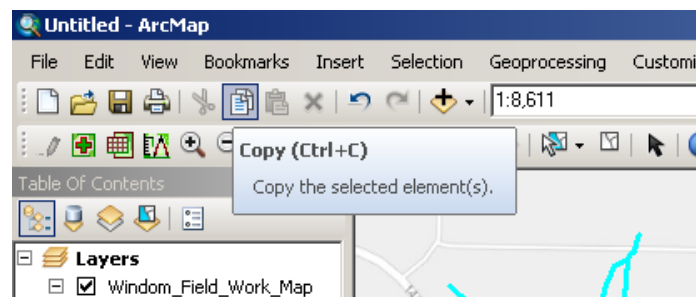


- One way to use this Application is to Collect data in the field then use it back in the office for planning, reporting etc.
- Another way is to copy data from the office into the application to be used in the field. Example is you mapped drain tile in ArcMap using air photo signatures and Lidar topography and you want to use Collector to help locate the underground tile in the field to break it for a restoration

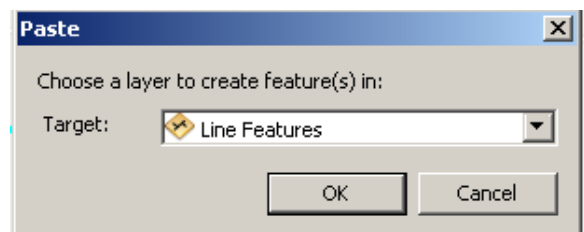
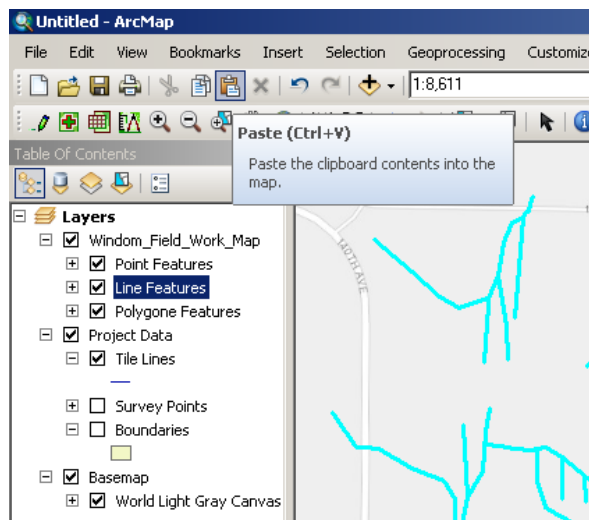
- Start with nothing selected. Then select the features you want to import into your AGOL map.



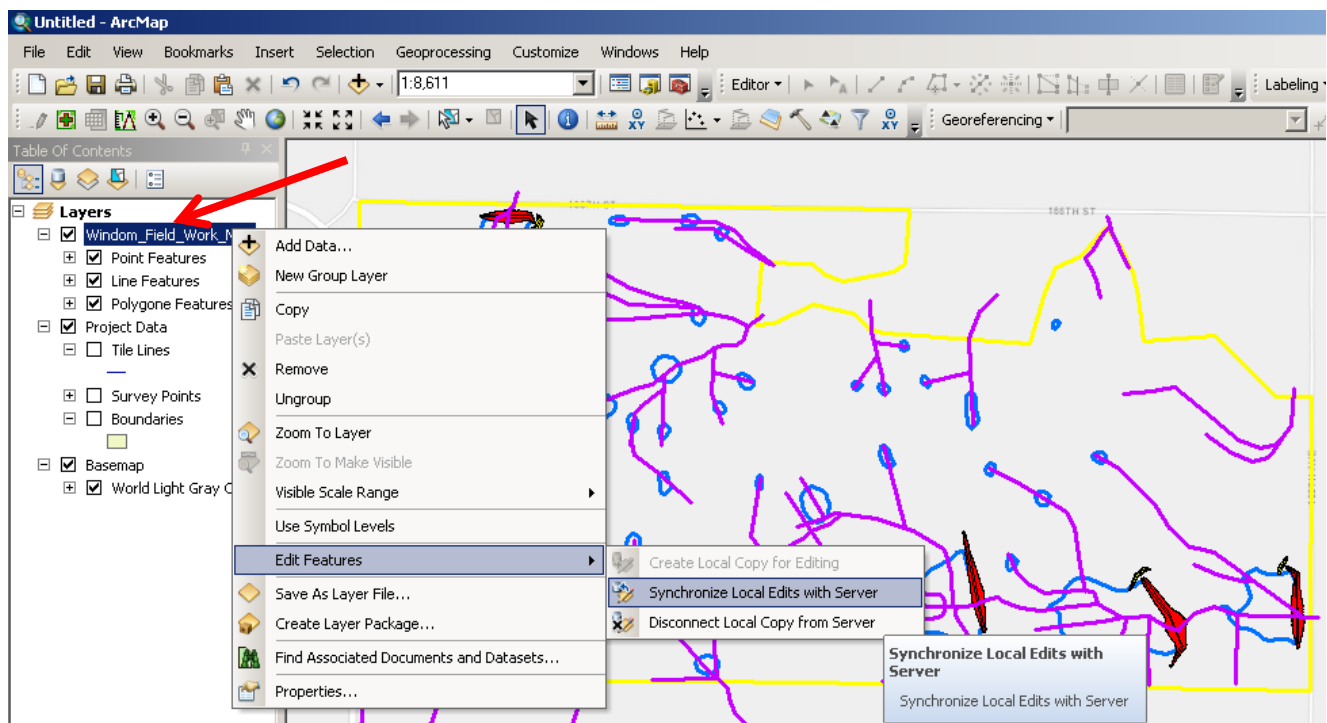
- Hit the copy button on the toolbar



- Start editing you AGOL Layer and Hit paste. Make sure it is the same feature type so if you are copying lines you have to paste into a line file, points to points etc.



- If the attribute table fields were the same in the copy layer and the paste layer then the attributes will copy over. If the field headings were different they will not copy over. You will have to edit the attribute table to label the new features appropriately.
- When done editing, stop editing, save your edits.
- Synchronize your edits back with the server. Right click on the Group layer for your AGOL data and Go down to Edit features, and Synchronize Local Edits with Server
- Do not leave data checked out for extended periods. Check-in/Synchronize your data at the end of each work session or day. Particularly if you have multiple users, you or others are not seeing changes being made while data is checked out. 2 users could be trying to edit the same data at the same time and overwriting each other.



Making a Copy of the AGOL Database

If you want a copy of the entire database to work with on your desktop you can download a copy. Log into AGOL web page and go to the Content tab and click on your Feature Layer. On the right side there is an option to Export Data in various formats. FGDB (File Geodatabase) would be the best to retain the full functionality of the database.

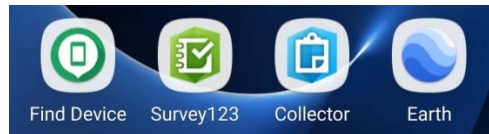
The screenshot shows the AGOL web interface. At the top, there is a navigation bar with links: Home, Gallery, Map, Scene, Groups, Content, and Organization. A red arrow points to the 'Content' link. Below the navigation bar, the main header displays 'Windom_Field_Work_Map' with an 'Edit' link. Underneath the header are tabs: Overview, Data, Visualization, Usage, and Settings. The 'Overview' tab is active. On the left, there is a thumbnail of a map and a description: 'Arc Collector map for field work at USFWS Windom Wetland Management District. Identifying and locating common features found in refuge management and restoration activities.' Below the description, it says 'Feature Layer (hosted) by scott_ralston@fws.gov_fws' and 'Created: Feb 21, 2018 Updated: Feb 21, 2018 View Count: 3'. On the right, there is a menu with options: 'Open in Map Viewer', 'Open in Scene Viewer', 'Open in ArcGIS Desktop', 'Publish', 'Create View Layer', and 'Export Data'. The 'Export Data' option is selected, and a dropdown menu is shown with options: 'Export to Shapefile', 'Export to CSV file', 'Export to KML', 'Export to Excel', 'Export to FGDB', 'Export to GeoJSON', and 'Export to Feature Collection'. A red arrow points to the 'Export to FGDB' option.

The copy will show up in the My content tab which you then click on to download. Notice the downloaded file is only a copy. Changes you make to this downloaded copy will not change what is still on the server and new additions on the server will not show up in this downloaded copy. The downloaded file will just be named a string of numbers so you may want to rename it before you open it.

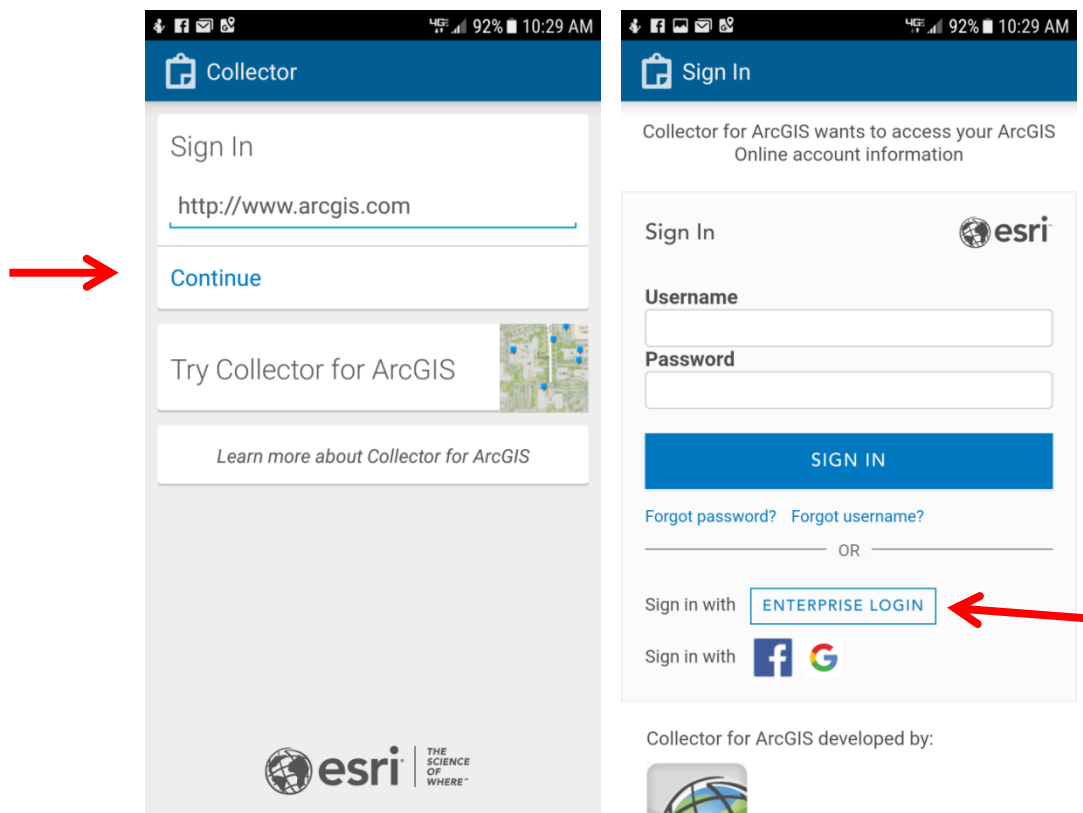
The screenshot shows the AGOL web interface. At the top, there is a navigation bar with links: Home, Gallery, Map, Scene, Groups, Content, and Organization. Below the navigation bar, the main header displays 'Windom_Field_Work_Map' with an 'Edit' link. Underneath the header are tabs: Overview, Usage, and Settings. The 'Usage' tab is active. On the left, there is a thumbnail of a map and a description: 'Arc Collector map for field work at USFWS Windom Wetland Management District. Identifying and locating common features found in refuge management and restoration activities.' Below the description, it says 'File Geodatabase by scott_ralston@fws.gov_fws' and 'Created: Feb 21, 2018 Updated: Feb 21, 2018 View Count: 0'. On the right, there is a menu with options: 'Download', 'Publish', 'Update', and 'Share'. The 'Download' option is selected.

Using Arc Collector on Mobile Device

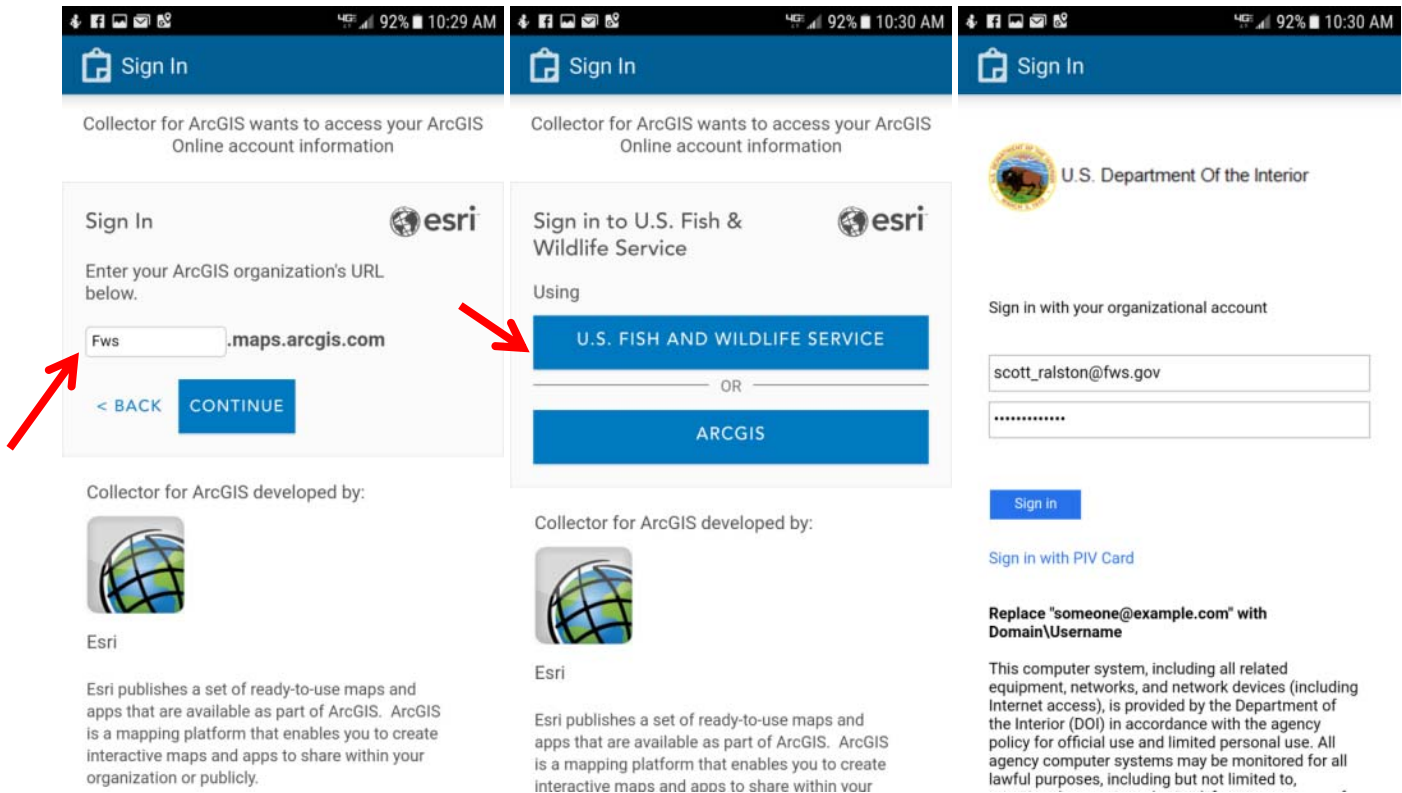
- General Guidelines – Extended use can drain a battery. Especially in bright sun you may need to have the screen brightness turned up all the way. Make sure your device is fully charged and you may want to carry an external USB battery pack as a backup. Also you may want to set your screen timeout to a longer interval so it doesn't lock out between short intervals between screen taps.
 - o FWS users this will work on any mobile device government secured or not including personal devices as long as you have an AGOL account. Thus if government equipment is unavailable but users are willing to use their personal device they may do so (seasonal employees). Use the data checkout feature to avoid using personal data plan quotas. Contract employees can also get AGOL collaborator licenses. Check with your regional GIS representative for details.
- For increased accuracy on some devices you can get an external Bluetooth GPS. Some can clip to a visor of a hat or Velcro for better reception than a device held low or close to the body.
- Download and install Arc Collector from your devices App store. This is a Free App.



- You will need a cellular or wifi internet connection for log on and initial map setup.
- Open collector and hit Continue to sign in. FWS users sign in using the Blue Enterprise Log on button on the lower part of the screen (Do not enter User & PW here).

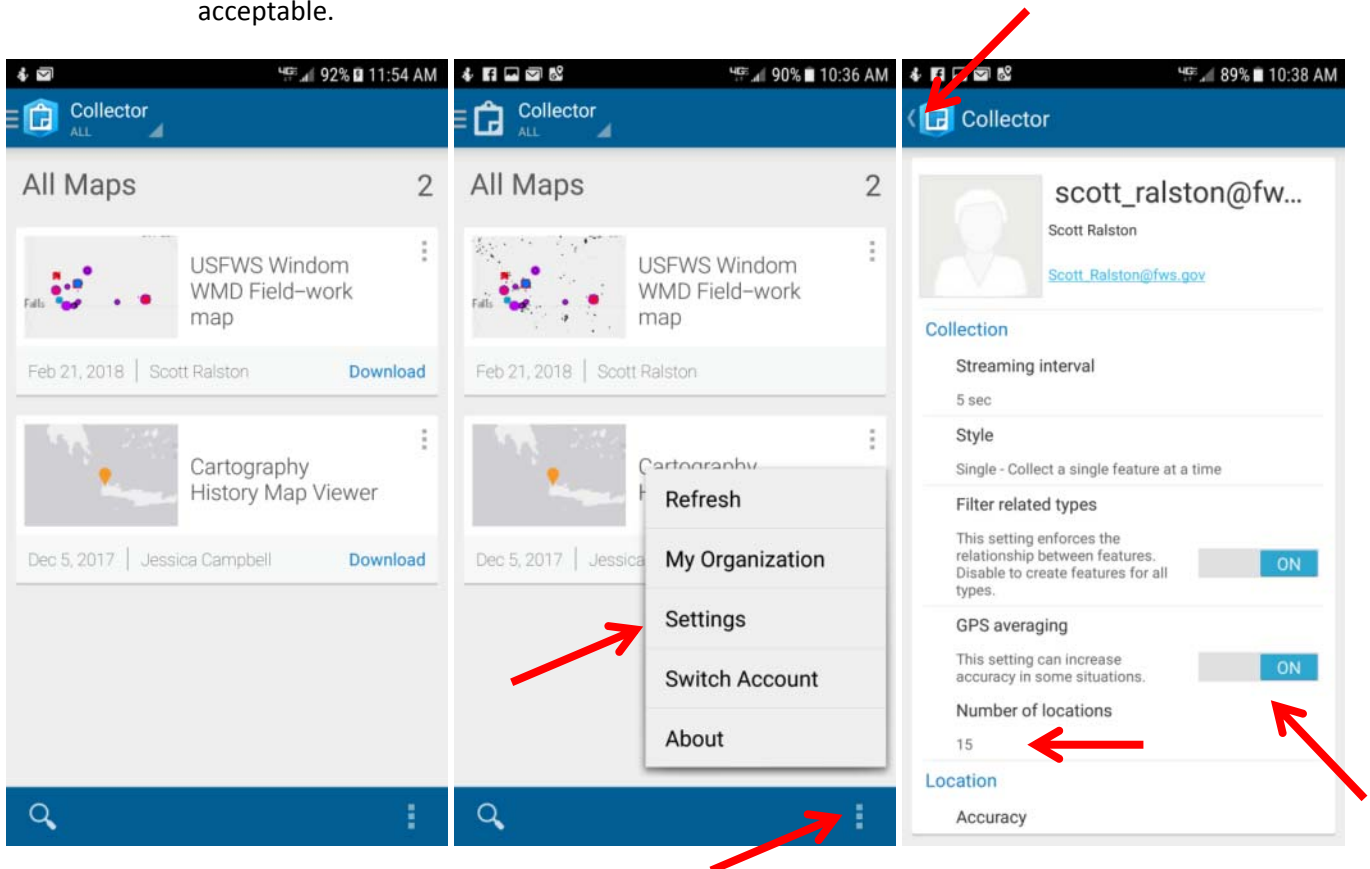


- Enter FWS in the blank and Continue. Then hit the USFWS Sign in and on the last screen enter your active directory email and password



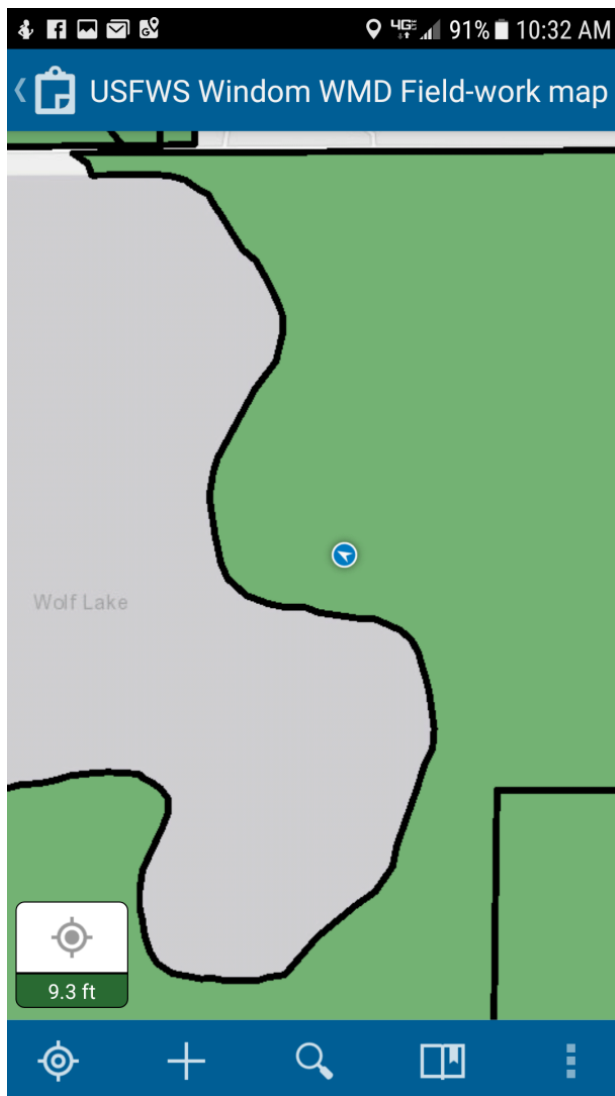
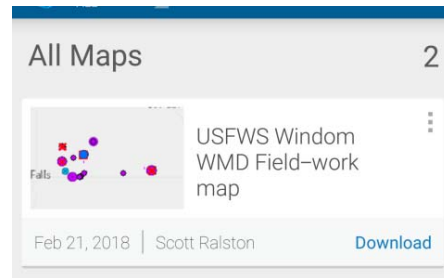
- After logging in you will see Collector maps that are available for you.
- You can decide if you want to work in live mode (if you have a constant internet connection) or in Download/Sync mode (for working-off-line). *See the bottom of this section for offline mode.*

- First time use, setup your general settings. Hit the menu button at the bottom right of the screen and go to settings. Review all settings and modify as needed.
 - o The Main setting you should change is GPS Averaging. Turn it on and set number of locations to something like 15 (about 15 seconds). Since mobile devices don't have super accurate GPS the signal tends to drift a little. Taking multiple readings and averaging them will help increase the accuracy. Your Device may say it has accuracy within 10ft but by averaging your actual point collected may be half that. Longer/more points you average the better but it takes longer and you must stand still while it collects the point.
 - o A short test run at the Windom office compared a Trimble survey grade GPS with accuracy within 0.05ft used as a benchmark against a Samsung Galaxy S7 smart phone with Collector. The on screen displayed accuracy was 9.3ft during this test. 15 Location point average was run 3 times and varied from the benchmark 11.6ft, 6.6ft and 5.2ft for an average of 7.8ft variance. Longer test runs were done with a 200point average coming in at 7ft from the benchmark and a 240point average came in at 2.3ft from the benchmark. As you can see longer averages do help bring the accuracy in but for most field applications we are using this for within 10ft is acceptable.

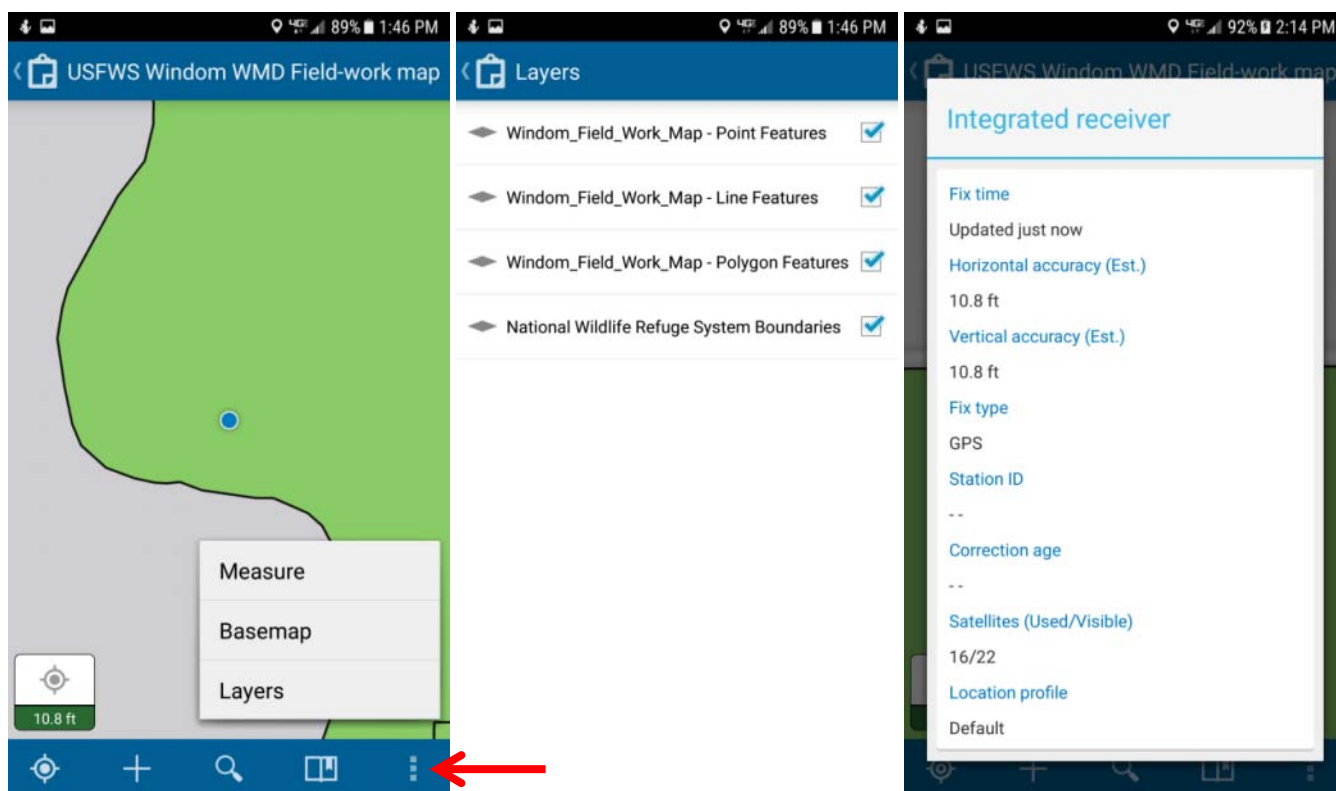


- Return to the Main Screen by hitting the Arrow at the top right of the screen.

- Open the map by tapping on the map. By default it will zoom to your location. Your location is the Blue dot. If you move it will turn to an arrow indicating direction of travel.
- Zoom in or out by pinching and expanding 2 fingers on the screen. Pan by swiping a finger. If you loaded previous data you can use this to navigate around your project.

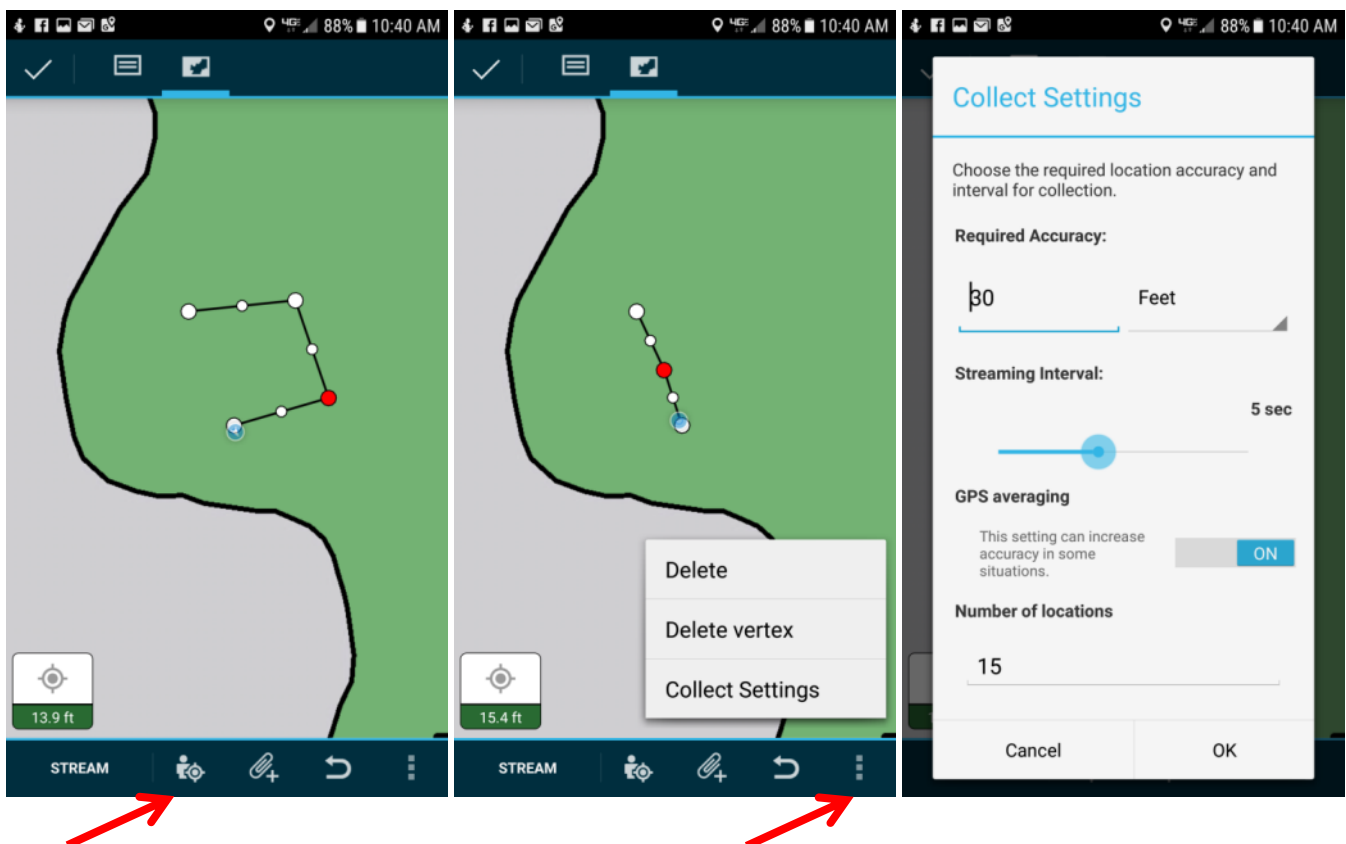
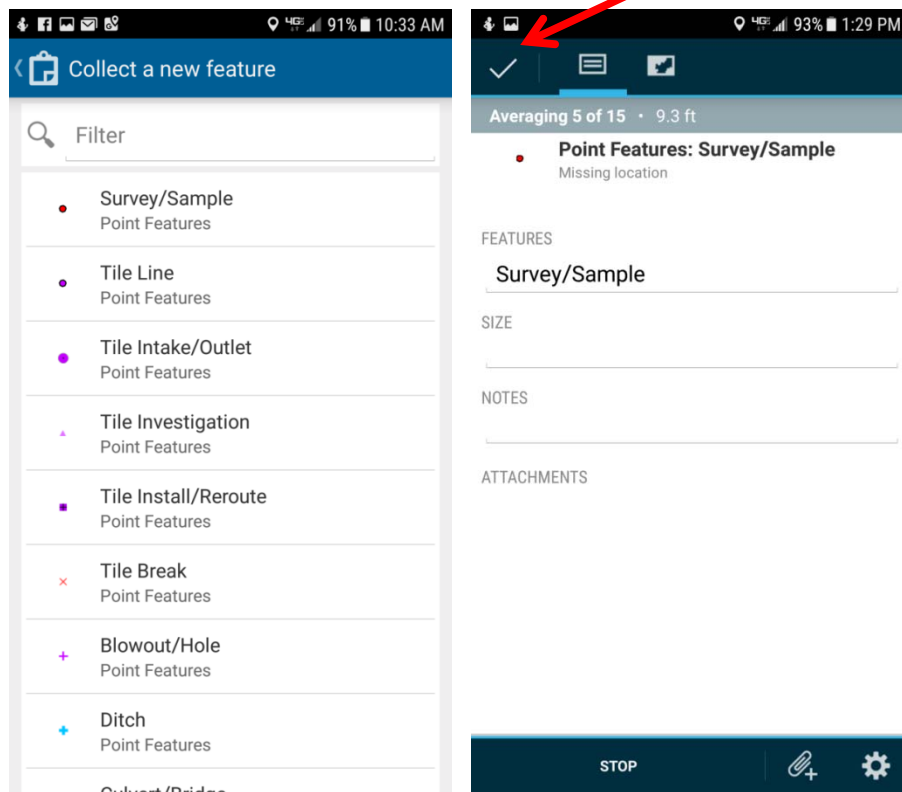


- In the bottom right corner there is a menu button (3 vertical dots) where you will find options for layers in your map such as turning on or off certain layers or changing your basemap. There is also a measure tool you can use either with GPS position or tapping points on the map.
- On the bottom left is the GPS centering button. If you panned and zoomed to another location and want to recenter the map on your location press the bottom left button.
- The GPS box in the bottom left just above the menu bar tells you your GPS accuracy and tapping on it will give you GPS information.

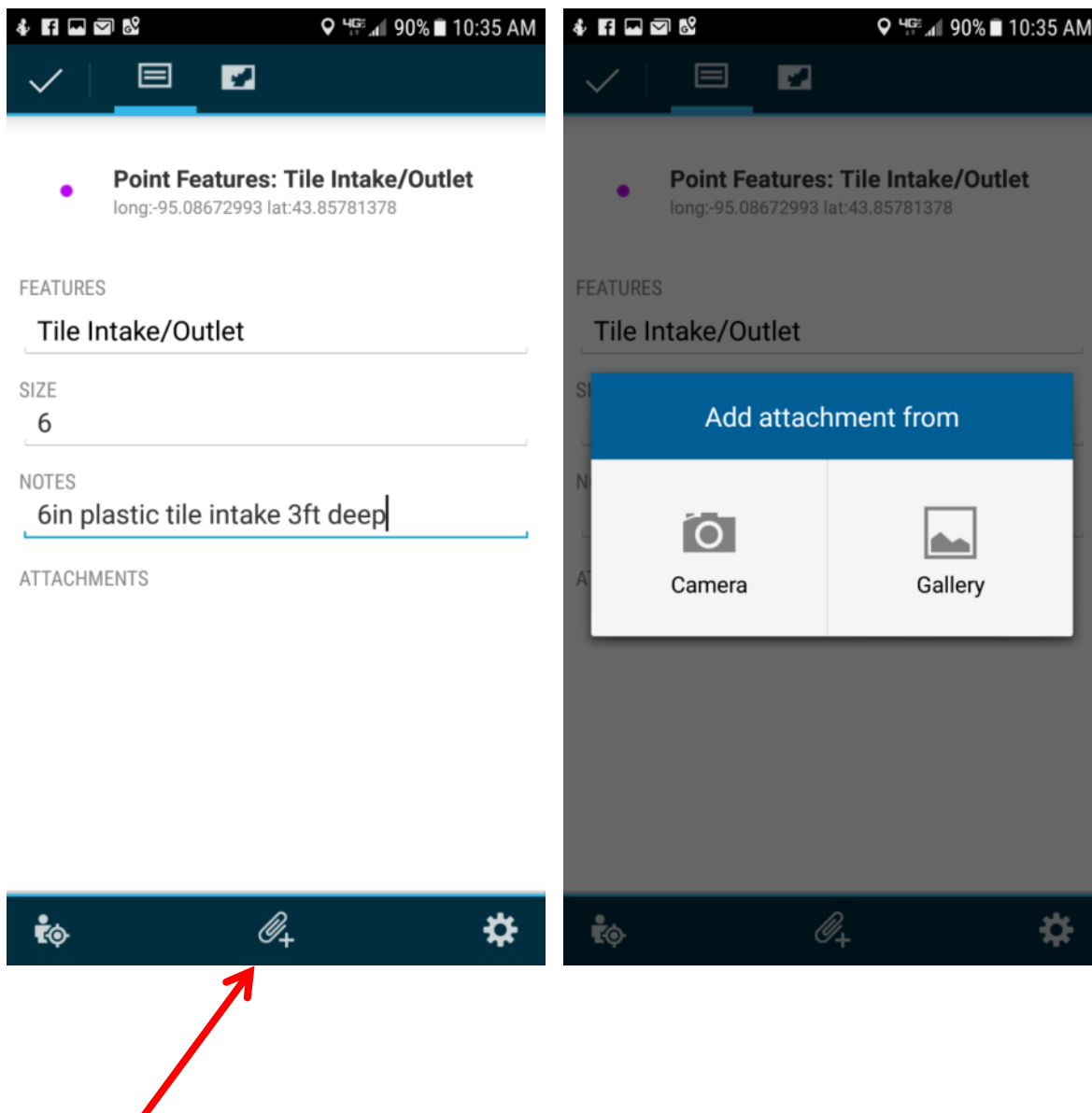


- To take a point or vertex with your GPS position stand over your desired point and hold relatively still and tap the + button on the bottom toolbar.
 - o You will see a list of all the feature types you created in your Domain list. Scroll through to find the type of point you want.
 - o For a simple point just tap the point type and it will start collecting that point. Fill out the form for any additional information you want to store for that point.
 - o You will notice on the top of the screen it will count through the GPS averaging. Keep the GPS still until it has finished.
 - o For a Line or Polygon you need multiple points so tap the type you want. On the next screen, fill out the data form if you want. Then at the bottom bar you have an option to stream which will just keep taking vertex points as you walk or use the person with the GPS icon to manually take vertex points at set locations/corners. You can also manually draw vertex points by going to the map (Top right button that looks like a map icon) and tapping on the screen. Use any one of these or combination to draw your line or polygon vertex.

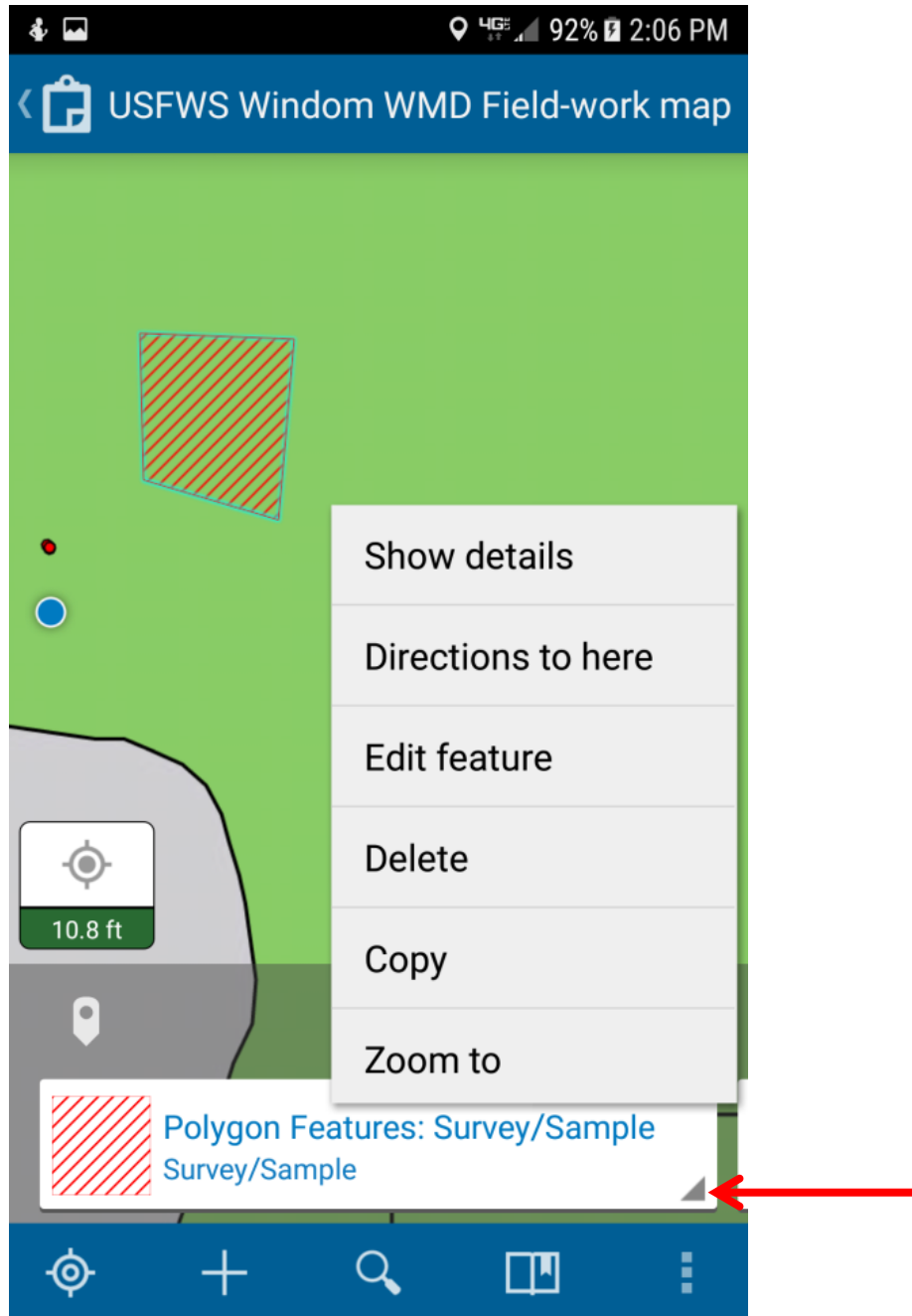
- When done collecting or drawing your point, line or polygon, save it by pressing the top left Check button.



- You do have an option to attach photos, video or other files to a feature you created such as take a point for an interpretive sign then attach a photo to it. During the collection process, just tap the paperclip icon on the bottom toolbar and it will give you the option to either take a live photo or choose one you already took from your gallery on your device.
 - o Caution: While attaching photos can be useful and convenient in some circumstances it may not always be the most practical. Many photos in your database will make very large files sizes making it slower and harder to manage. Also photos in the geodatabase are more difficult to get out an use outside of a GIS program. Generally I would recommend taking a photo outside of the collector application and store it separately as a JPG file. You could log in your notes for that location that you took a picture to reference along with the time and date as most mobile devices name their photos based on the time stamp. Turn on the Geotag option on your devices camera and it will store the GPS location in the metadata of the photo file so you can later reference where the photo was taken if needed.



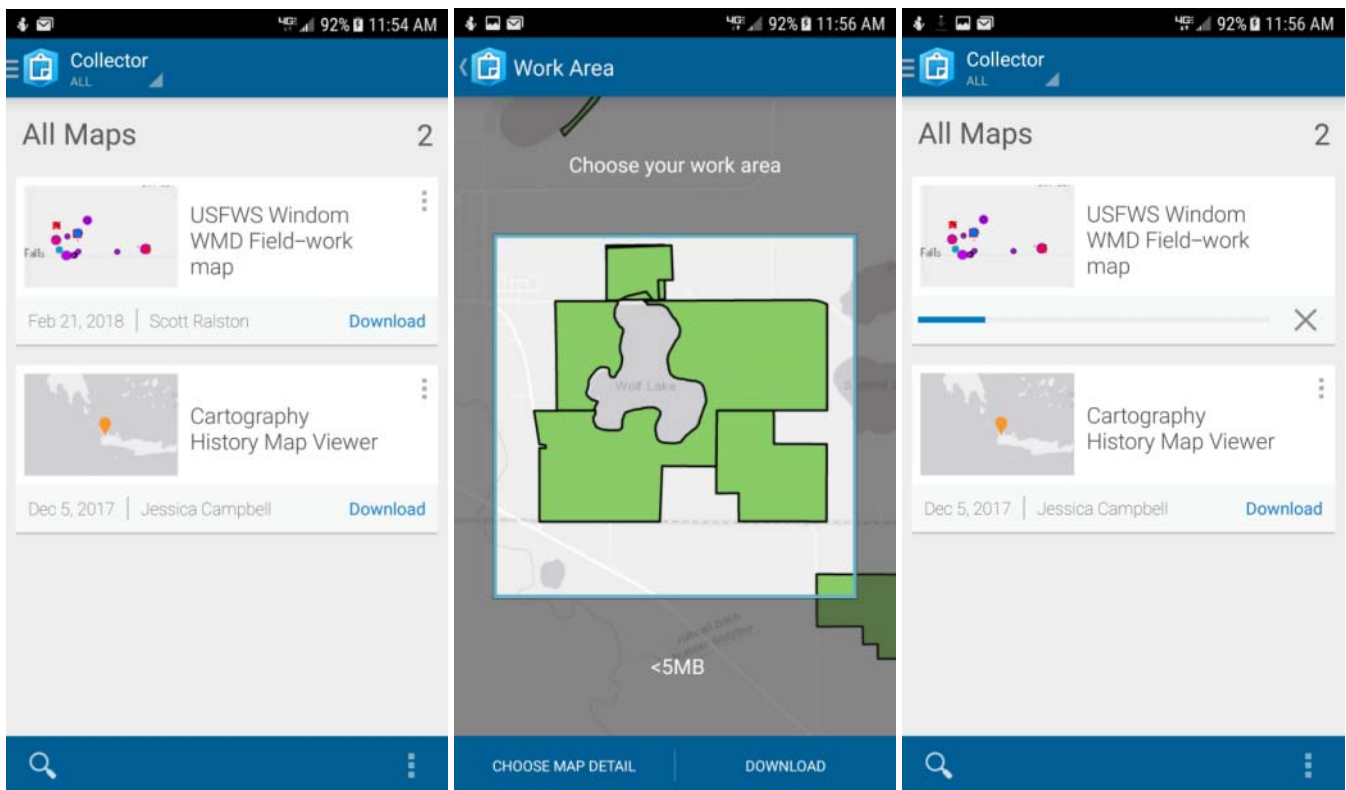
- To edit or delete an item, zoom to it on your map. Tap it which a box will pop up at the bottom of the screen. Tap the bottom right corner of that box for options including delete.



- This is the basics of collecting data using this app. Assuming you were collecting in live mode. Anything you collected has instantly synchronized with the server. Any other user on other devices or in the office would be able to hit refresh on their screen and see the changes you made in real time.

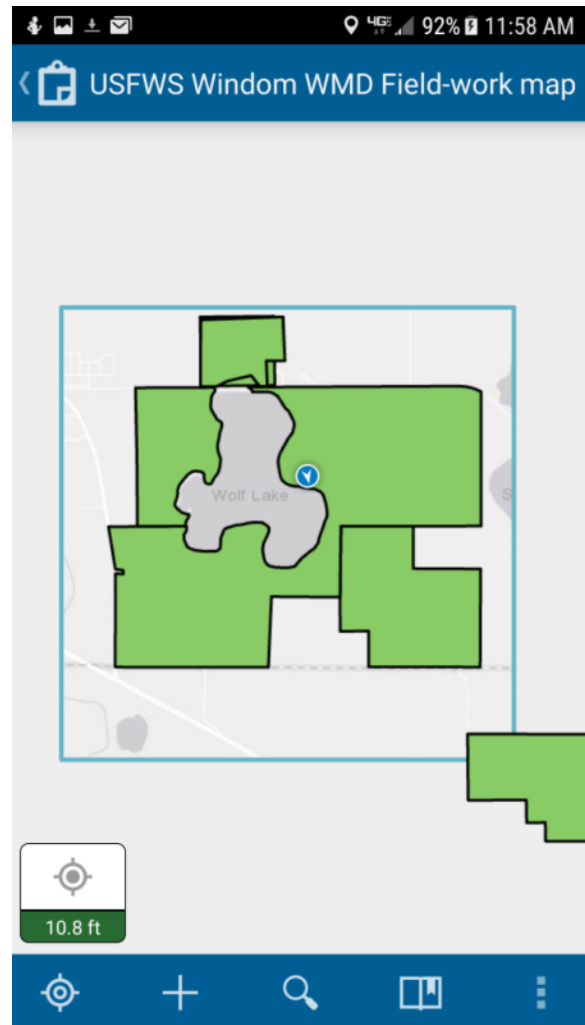
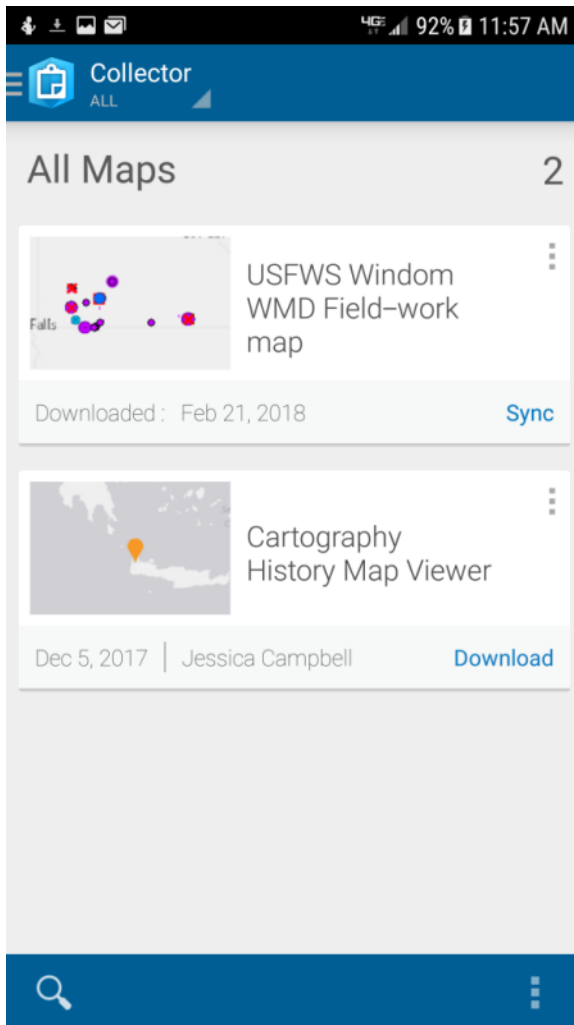
Working with Collector data offline.

- If you will not have an internet connection during field use you can download data to your device to use it off-line however you need to plan ahead before you leave your internet connection.
- While you have internet access, open collector and log in as normal. On your map screen you should notice the Download option in the bottom right corner of the maps listed on your screen. Press Download to setup your off-line map.
 - o If this Download does not show up it is because one or more of your layers in the map was not set up to enable synchronization. Refer to the tutorial section above on AGOL Content settings for your feature layer or the section on adding additional data layers to your map. (Pg. 15 & 18)
- It will show you a map and ask you to identify your work area. Zoom in or out so the entire work area you will be using is in view. It will display an estimated amount of storage space needed for the area you select. When in offline mode you can only view and edit the areas you downloaded so pre-plan carefully. Then choose Download and it will download a copy of the data to your device.



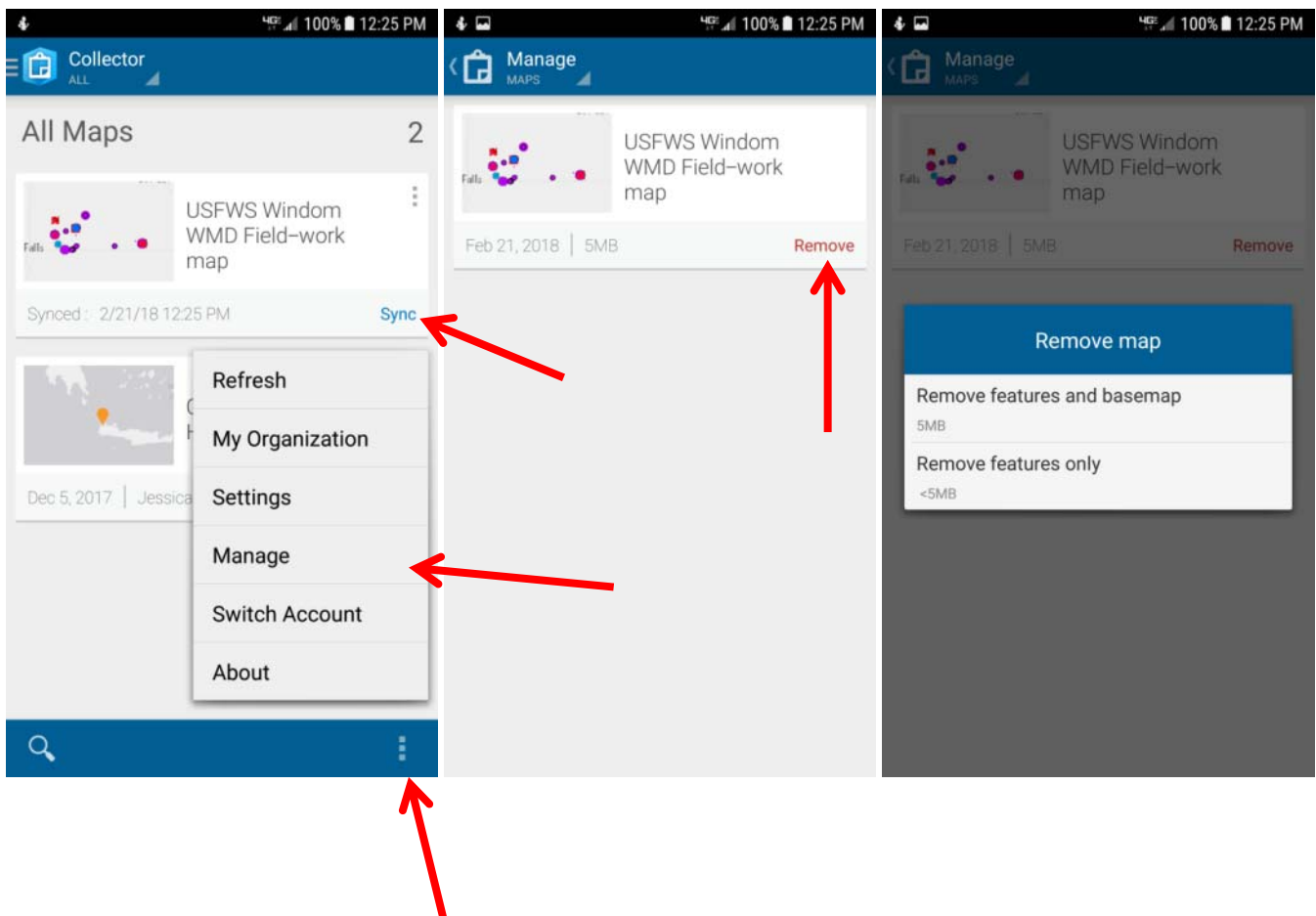
- When Done it will show a Sync Icon in the corner of your map.

- The map is now ready to use offline. Use all the same functions as in on-line mode but only the area you download will display and you will not be able to change your basemap.



Sync Data when you return to the office

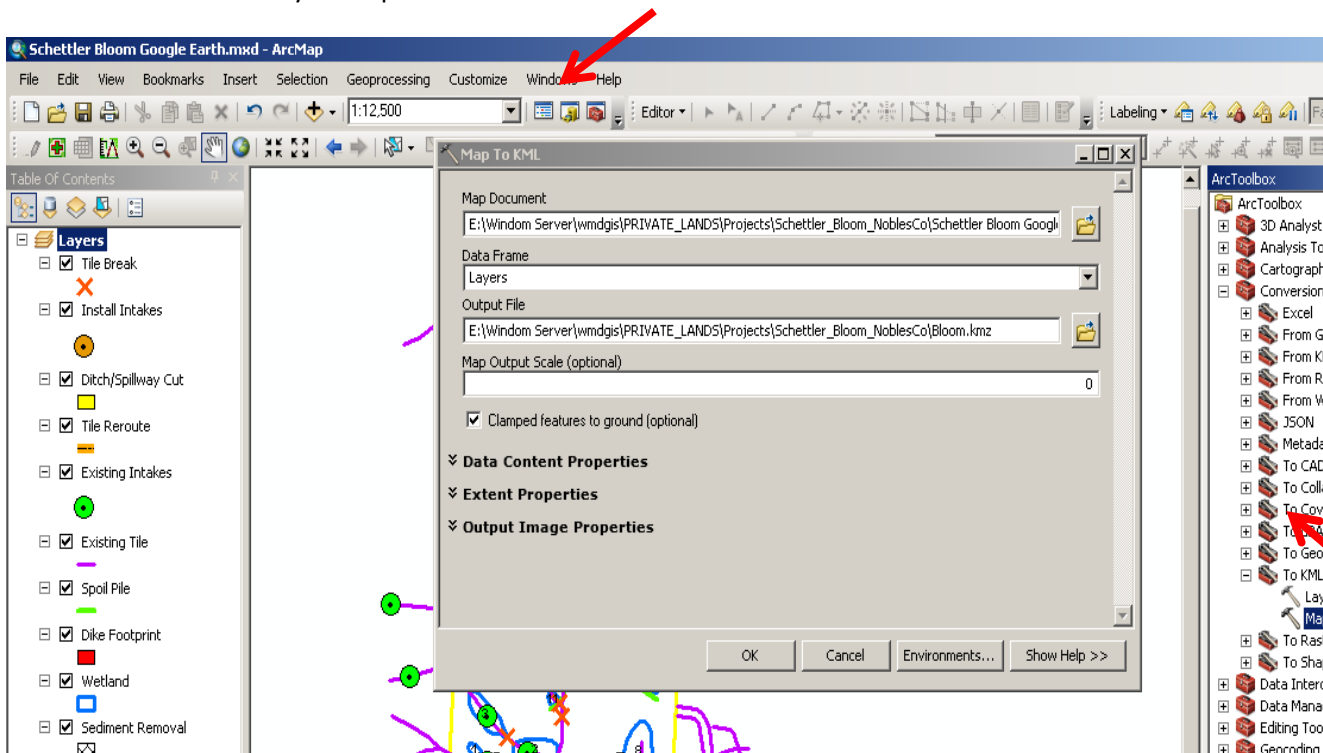
- When you return to the office or active internet connection, press the Sync button on the main map screen. It will synchronize all changes back with the server. It is recommended you re-sync whenever you have an active internet connection to avoid accidental data loss or conflicts with others editing the same data you were while off-line.
- The Sync option will remain even after you just did a synchronization because a copy of the off-line map is still stored on the device. It can be used again if you are returning to the same work area.
- If you are done with this work area it is best to remove the local copy of the data on your device and re-download again later if you need to work offline again in a different location.
- To Delete the local copy, go to the main map screen where it lists your maps, In the bottom right corner of the screen press the menu button (with 3 vertical dots) and select manage. You will see the downloaded map you have available listed. Press the Remove button then Remove features and basemap button.



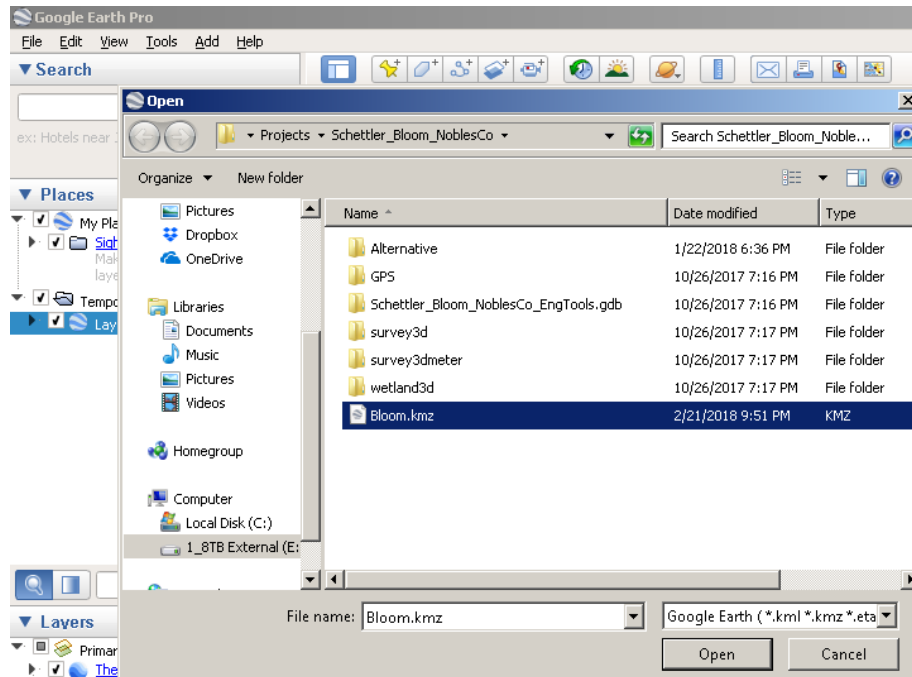
Export ArcMap to Google Earth KML file

Google Earth can be a good simple display tool for exporting your GIS files to a mobile device. Not used for collection of data just end user display. Advantages is it is simple to use, familiar by many existing users and is free. This may be a good option for sharing map layers with contractors or other consumers of maps you have created. I use this in wetland restoration where I design the project in GIS and give my contractors a copy of the map in Google earth that they can pull up in their smart phone while running equipment to navigate the job site. Often things like sediment removal boundaries are hard to see pin flags in tall grass until you get right up to it or drain tile is buried underground so this helps the contractor get close to the location to excavate it. Remember this data is one time export so unlike Collector app it does not update changes to the data.

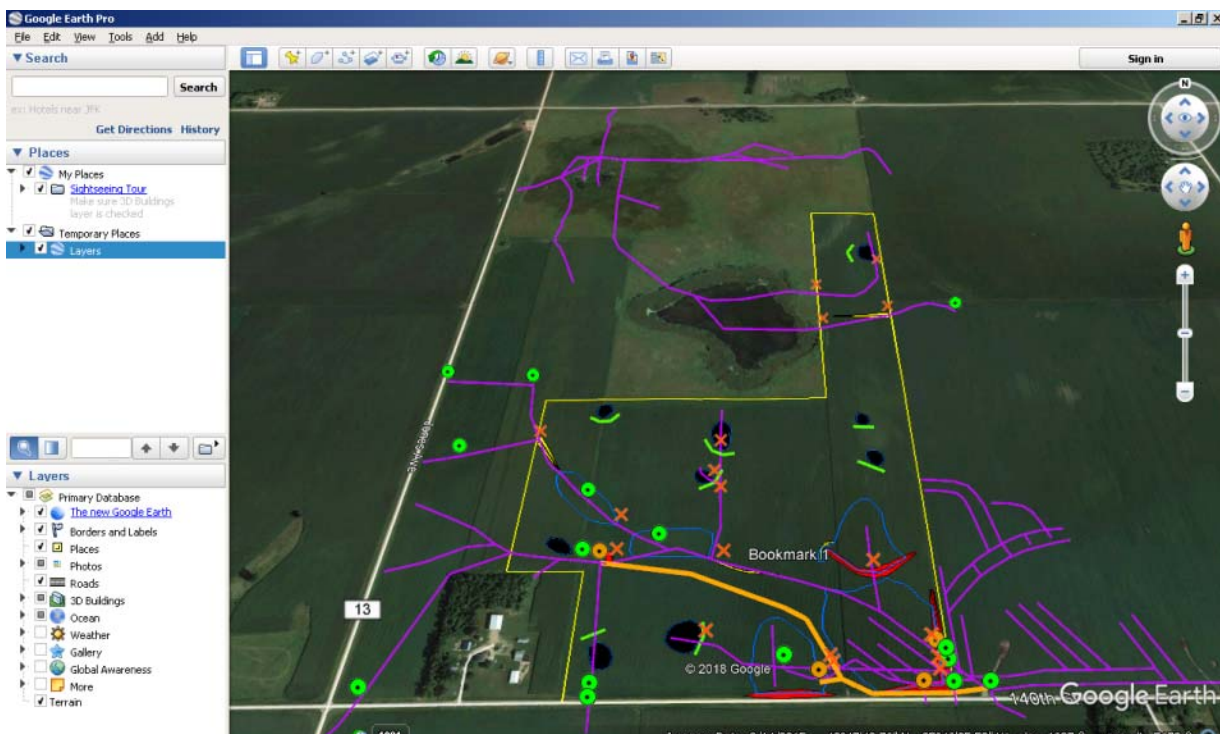
- Open Arc Map or ArcGIS Pro and Add data layers you want in the eventual map.
- Make sure this is a new blank map with no legend in the Layout view. If you have a legend it will try to export that and display it on the screen, which on a small mobile scree there isn't room and it is just in the way. Also don't include any layers that you don't want displayed on the mobile device.
- Google Earth runs on WGS 1984 Coordinate system so set your coordinate system to WGS84 with your UTM zone.
- Adjust the symbols for your layers. Keep the symbols fairly simple as Google earth may not translate more complex icons or symbols. Just basic colors and outlines, no textures.
- Save your mxd Map
- Open ArcToolbox and go to Conversion Tools - To KML and open the Map to KML tool.
 - o Select your new map Document
 - o Dataframe will auto fill or select one if you have more than one data frame in the document
 - o Choose your export location and name for the KMZ File and hit OK



- On a Desktop computer you can open google earth and go to File – Open and open your new KMZ file.

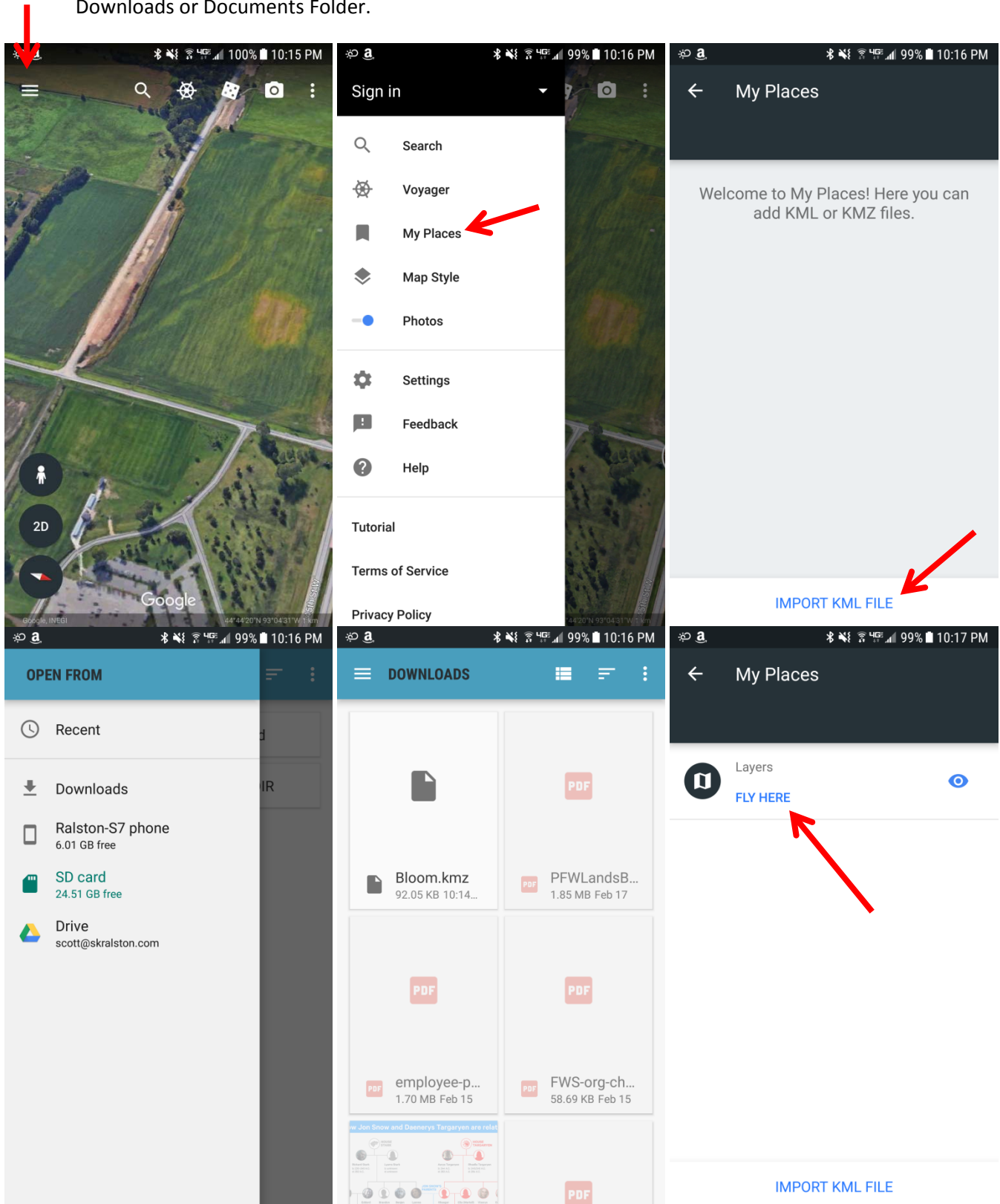


- Your data layers should display on the google earth map similar to what it looked like in GIS.

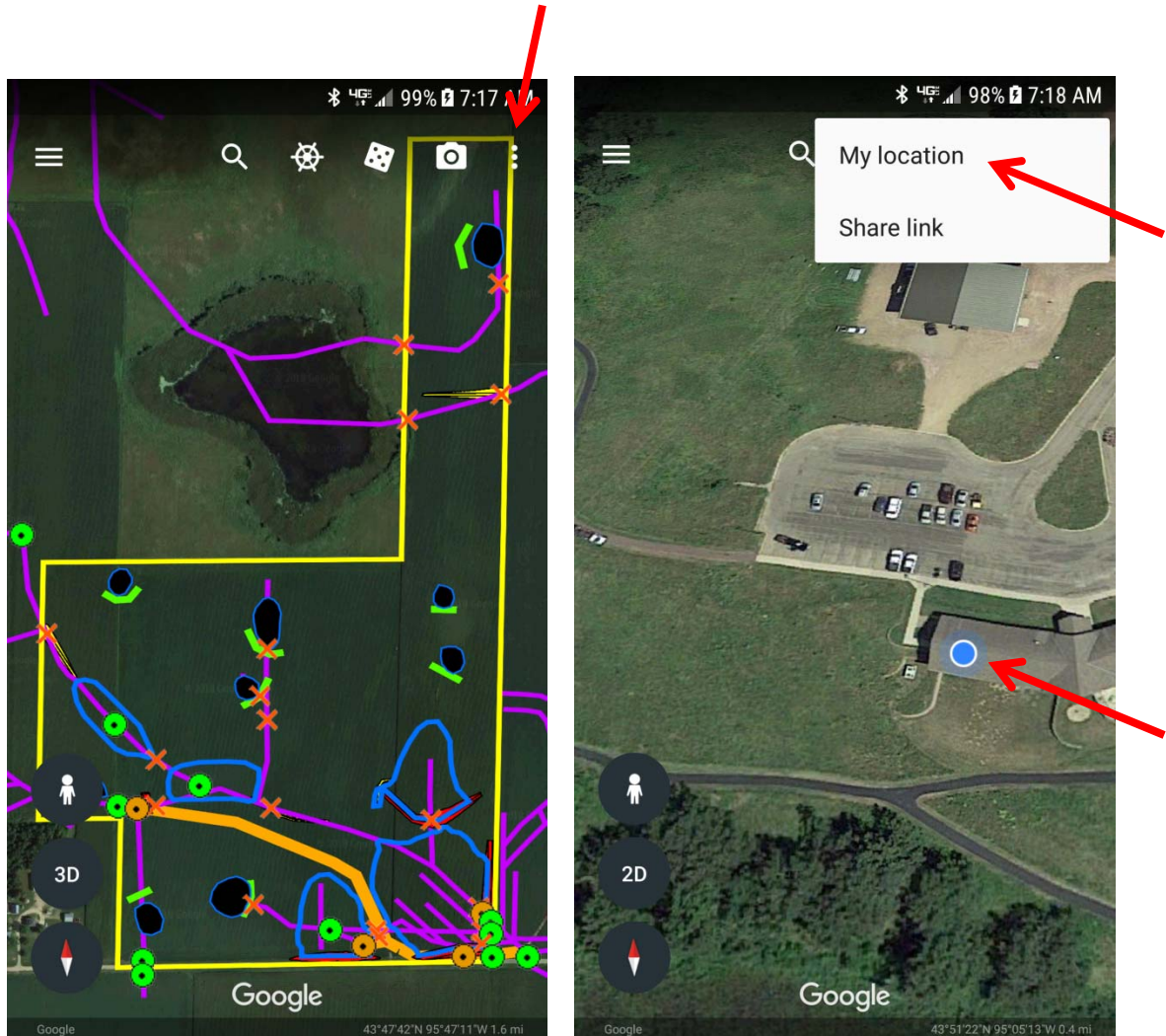


- On a mobile device copy the KMZ file to your mobile device. Location is up to you but a Downloads or Documents folder is an easy place to navigate to.
- Open the Google Earth App or just Click on the KMZ file in your File Manager folder

- On the top left there is a menu button (3 horizontal bars). Tap it and go down to “My Places”
- In My Places tap the Import KML file at the bottom and navigate to where you saved the file such as the Downloads or Documents Folder.



- If you have multiple layers you can tap the Blue eye button next to your layer to turn it on or off when not in use.
- Tap the Fly Here button to Bring up the map location for your layers
- Navigate by swiping or pinching to zoom.
- The top right button (vertical 3 dots) has an option to center on your GPS position which is shown as a blue dot.



- **Note for government secured IPHONE users.** On some phones the security settings don't allow you to browse to a file stored on your device within the Google earth app and tries to direct you to the iCloud which is also disabled. In this case, outside of Google Earth use your file manager to view where the file is stored on your phone. Tap the file to open it and use the "Open With" option to choose google earth. It will then add itself to the My Places in Google Earth.

Survey 123 for ArcGIS

Purpose:

Use this tutorial for introductory basics of using Survey 123. It is an extensive program with many options to customize components or data. Once you understand the basics here you can seek the many online resources and youtube videos on more specific advanced options.

What is the App Used for:

Survey 123 is a fillable survey form program which you can design a survey or data entry sheet for data collection input. It basically operates in a Microsoft excel database table in the background that you use a more user-friendly front interface. It can incorporate spatial data locations but doesn't necessarily have to be spatially oriented like Arc Collector. For example, you can develop a survey form like a refuge sign inventory where you collect a simple location point, then input data about the sign like, condition, content, size etc. If you need more complex location information than a single point you should use ArcCollector for lines, polygons or areas. Alternatively, you might have non-spatial surveys like public input meeting where you gather opinions on a new policy proposal and want to record answers in a standardized format that could be summed and reported in a database table later.

What Device does it work on & user requirements:

Survey 123 works on most platforms so can be used on android or iOS mobile devices (tablets and smartphones) but also works on Mac OS X, Windows or Linux so can be loaded to a desktop or laptop computer. Download of the app on all platforms is free. Your device must have at least an intermittent internet connection. It can work offline but at least needs a connection to download the initial survey file such as a table on wifi in the office before leaving for the field. The user needs a ArcGIS Online account and if you are a form creator you need an AGOL account with publishing permissions. If you are a USFWS user you already have an account and it is activated the first time you log in. If your account isn't setup with publishing permissions contact your regional GIS coordinator to add that option.

Multiple Users/Devices:

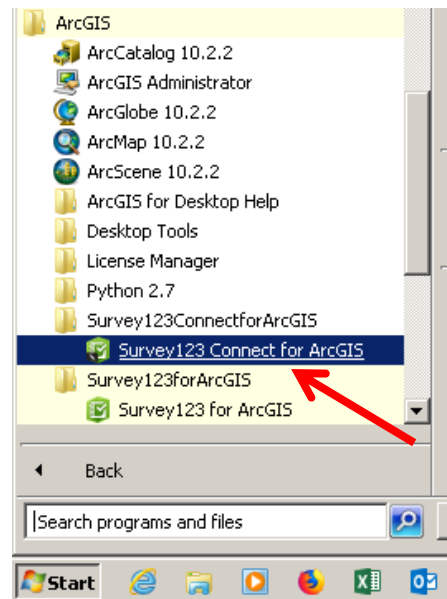
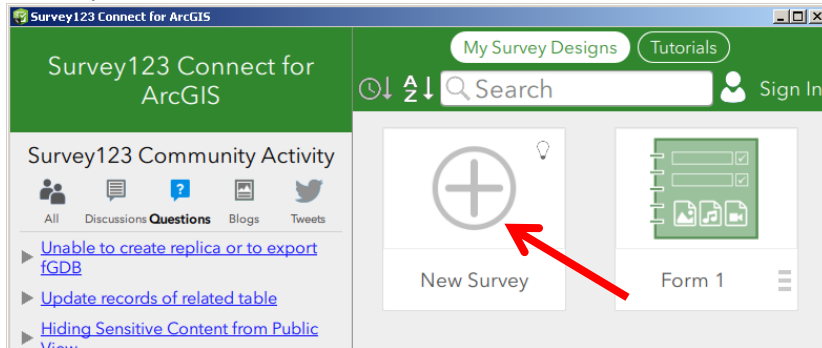
Survey 123 can be used on multiple devices at the same time. Unlike ArcCollector, Survey 123 is offline by default so once it is loaded on a device you can take and use it anywhere even without an internet connection. However because of this you will not see live changes on other concurrent devices unless you actively synchronize it.

Install:

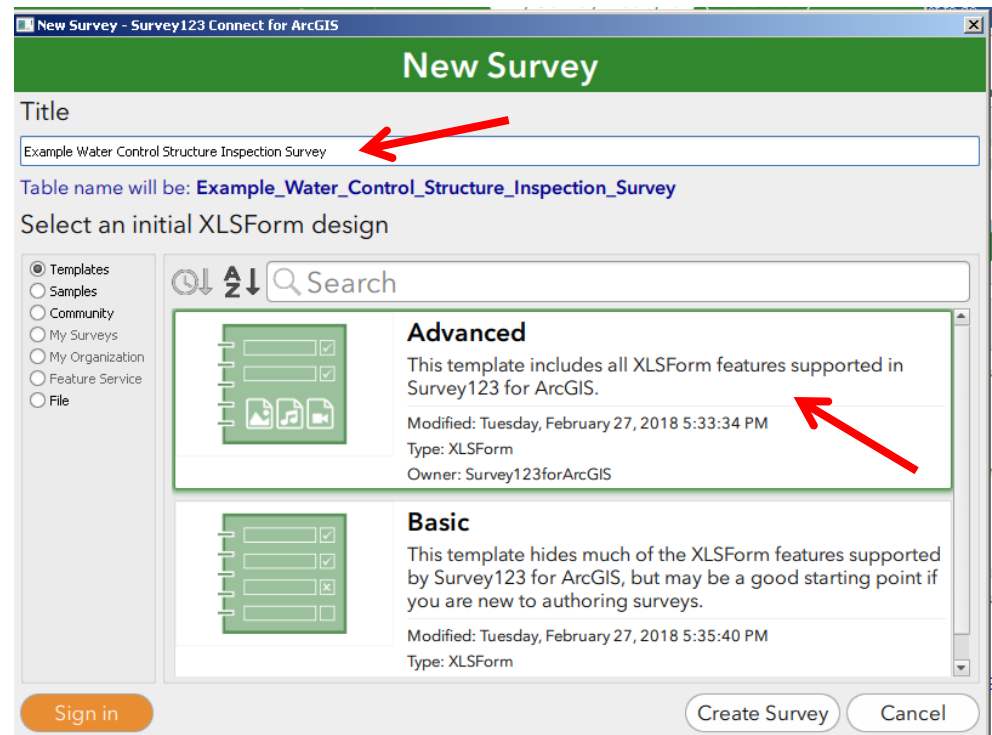
There are 2 parts to the program. "Survey 123 Connect" is used to create your new survey forms and databases. "Survey 123 for ArcGIS" is the collection app once someone has already created a survey database for you. Download and install Survey 123 Connect from: <https://doc.arcgis.com/en/survey123/download/>. Microsoft office isn't listed in the software requirements but is common on most computers and I assume you at least need Microsoft excel or other compatible database table editing software to run Survey 123 connect as that is where the database is created. If you are a USFWS user, this software is pre-approved and you should be able to install yourself. Download and install Survey 123 for ArcGIS for your mobile device from your designated app store or from the same link above.

Creating a new Survey:

- Open "Survey 123 Connect" preferable on a desktop or laptop computer.
- The program has many good tutorials for specific tasks built in.
- Hit the Tutorials button at the top to review their topics.
- Hit the New Survey Button
- Think of a unique identifying name. You will need to be able to easily search for it.

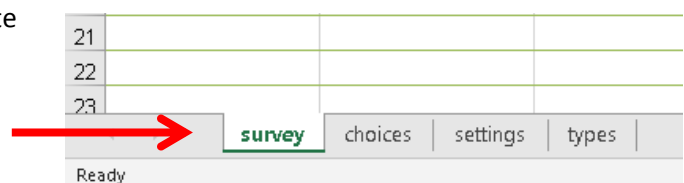


- At the top of the new survey screen type a name for your survey where it says Title.
- You will see several options on the left side. To create your own new blank survey use either basic or advanced. In this tutorial example we will choose "Advanced". Another good option is look through the many pre-made surveys under Sampler or Community. If you log in first with your AGOL account you will also see options



for surveys from your organization or ones you saved online already. These premade surveys may be a good time saving option if they cover the same basic format you need you can open it and just change names, heading s or other minor things and be ready to go.

- For this example hit Advanced and hit the Create Survey button at the bottom
- It will create a form and open and Excel table.
- Notice the 4 spreadsheet tabs it creates



- The Survey tab is the main tab you will create all your forms and their parameters in. The first 3 columns are the required fields and the rest are options of how it will be formatted. We will cover more details later.

	A	B	C
1	type	name	label
2	text	site_name	Name of Site
3	dateTime	Survey_date	Date & Time of the Survey
4	username	user_name	Surveyor Name
5	geopoint	gps_point	GPS Location
6	select one structure type	structure_type	Structure Type

survey choices settings types ...

- The Choices tab is where you will create and store any pick lists that you choose to use. Making lists is easy
 - Column A put the name of the list. Everything with the same list name will show up in your pick list. Don't use spaces
 - Column B is the Name or code value. Short value with no spaces
 - Column C is the descriptive name that will appear on the form. You can use spaces or special characters here.

	A	B	C	D	E
1	list_name	name	label	image	label::language1
5	rating		1 1 Star		
6	rating		2 2 Stars		
7	rating		3 3 Stars		
8	rating		4 4 Stars		
9	rating		5 5 Stars		
10					
11	structure_type	Agdrain_Inline	Agdrain Inline PVC Box		
12	structure_type	Agdrain_Intake	Agdrain Intake PVC Box - Open Intake Face		
13	structure_type	ADS	ADS PVC Round		
14	structure_type	CMP_Inline	CMP Inline		
15	structure_type	CMP_Intake	CMP open face intake half-round		
16	structure_type	Cement_Inline	Cement Inline Structure		
17	structure_type	Cement_Weir	Cement open face weir		
18	structure_type	Metal_Weir	Metal Open Face Weir		
19					
20	maintenance_needs	coupling	Leaking Coupling		
21	maintenance_needs	seep	Seepage along pipe		
22	maintenance_needs	dike	Holes or leaks in dike		
23	maintenance_needs	pipe	Collapsed or damage pipe		
24	maintenance_needs	corrosion	Rusted or corroded structure		
25	maintenance_needs	stoplogs	Damaged stoplogs		
26	maintenance_needs	plugged	Plugged with debris		
27	maintenance_needs	fish	Needs fish removal		
28	maintenance_needs	spillway	Emergency spillway needs repair		
29	maintenance_needs	erosion	Erosion needs fill, grading or repair		
30	maintenance_needs	vegetation	Need vegetation or brush clearing		
31	maintenance_needs	cover	Cover needs repair or replacement		
32	maintenance_needs	Other	List other needs in Notes		

survey choices settings types ...

- Settings tab controls the settings of the Form. Not much to change here other than the title. A few advanced options if needed.

	A	B	C	D	E	F	G
1	form_title	form_id	instance_name	submission_url	default_language	version	style
2	Water Control Structure Inspection						
3							
4							
5							
6							

survey choices settings types ...

- Types tab lists command names and descriptions for commands you may use. Unlike normal excel function you will be using these commands not standard excel commands and will not be using “=” before entering commands or formulas. Reference the types tab a lot for command names and definitions. Don’t change anything here.

	A	B	C
32		Leave blank if field is not read-only	
33	yes	Field is read-only. Any values cannot be edited.	
34			
35	Appearance		
36	signature	Applies to image fields. Presents a UI for signature capture. The signature will be added to the feature as an attachment.	
37	draw	Applies to image fields. Allows user to open a canvas window to sketch on.	
38	annotate	Applies to image fields. Allows user to open a canvas window to sketch on. Also supports annotation on images.	
39	minimal	Applies to select_one, select_multiple, and barcode fields, as well as repeats. Presents answers in a more space-efficient manner.	
40	multiline	Applies to text fields. Will make the text box multiple lines long.	
41	likert	Applies to select_one. Makes the answer choices appear as a Likert scale.	
42	month-year	Applies to date fields. Select a month and year only for the date.	
43	year	Applies to date fields. Select only a year for the date.	
44	week-number	Applies to date fields. Select a week number.	
45	distress	Applies to integer. A highly specific widget to measure distress.	
46	calculator	Applies to integer and decimal fields. Displays a custom calculator widget.	
47	numbers	Applies to integer and decimal fields. Displays a custom keyboard.	
48	spike	Requires a Spike device and Spike app, applies to image fields. Uses Spike integration to measure distance and location in a plot.	
49	spike-full-measure	Requires a Spike device and Spike app, applies to image fields. Uses Spike integration to measure distance, location, area and	
50	spinner	Applies to integer and decimal fields. Adds buttons to increase and decrease value.	
51	horizontal	Applies to select_one and select_multiple fields. Displays answer choices horizontally, but in columns.	
52	horizontal-compact	Applies to select_one and select_multiple fields. Displays answer choices horizontally.	
53	autocomplete	Applies to select_one fields. Answer choices appear in a pull-down menu, with text input to narrow down options.	
54	compact	Applies to groups and repeats. Group of questions will appear collapsed on startup.	
55	minimal compact	Applies to repeats. Group of questions is displayed both collapsed and hidden.	
56	field-list	Applies to groups and repeats, when style is set to pages. Displays group of questions on a separate page.	
57	hide-input	Applies to geopoint fields. Collapses the coordinate entry section of the widget in web form.	
58			
59	Default Values		
60	today()	Set the default date to today's date, at midnight. Applies to date questions.	
61	now()	Set the default value to the current date and time. Applies to time and dateTime questions.	

- Popup boxes will appear on input areas and give you hits and directions of what goes in the space

1	type	name	label
2	text	site_name	Name of Site
3	dateTime	Survey_date	Date & Time of the Survey
4	username	user_name	
5	geopoint	gps_point	
6	select_one structure_type	structure_type	
7	decimal	dike_elevation	
8	decimal	spillway_elevation	
9	decimal	structure_elevation	

Database Field Name

This will be the field name in the resulting database. Eg: first_name, survey_date. This field must contain:

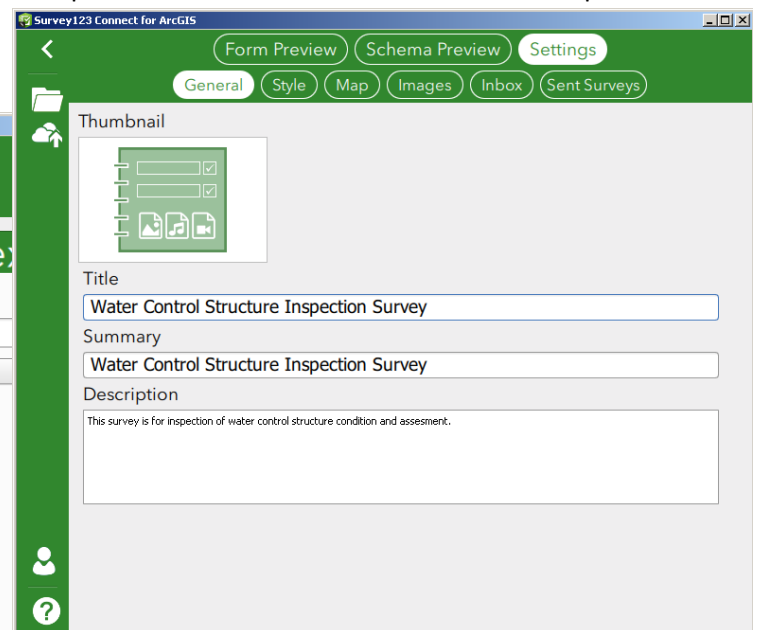
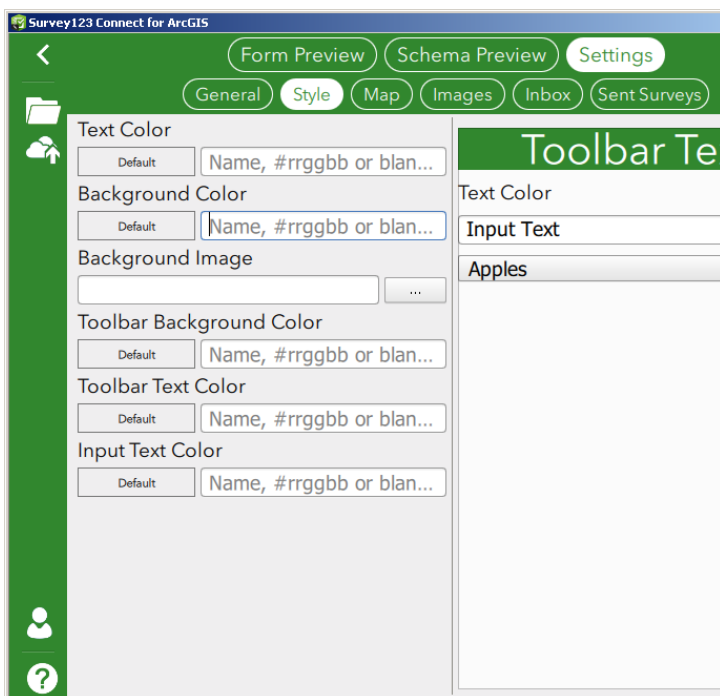
- unique values
- no spaces or non-ascii characters
- no reserved keywords or special symbols (these are listed on the type worksheet).

- Go to the Survey tab
- Each row is a new entry in your survey form or new question to answer. Type them in the order you want them to appear. You can create whatever fields you want but for good data management there are a few general categories you should try to always include such as Date & time, User/Surveyor, Location if it is spatially relevant, Possibly for site specific data a unique code or location title.

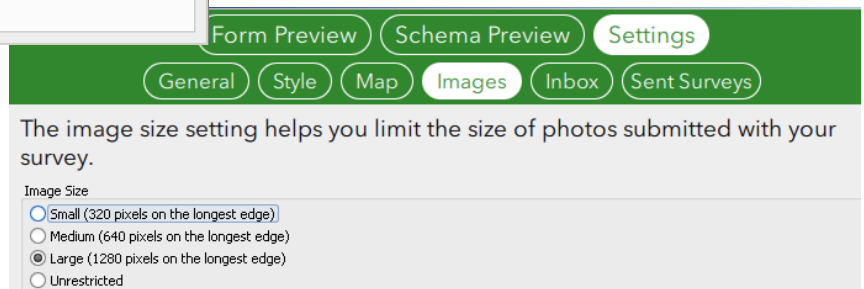
	A	B	C	D	E	F	G	H	I	J
1	type	name	label	hint	constraint	constraint_message	required	required_message	appearance	default
2	text	site_name	Name of Site				yes	Enter a name for the site		
3	dateTime	Survey_date	Date & Time of the Survey				yes	Enter Date & Time		now()
4	username	user_name	Surveyor Name							
5	geopoint	gps_point	GPS Location				yes	Use GPS Location or select on on map		
6	select_one structure_type	structure_type	Structure Type						minimal	
7	decimal	dike_elevation	Average Elevation of top of Dike	MSL or Local datum Feet & 10ths						
8	decimal	spillway_elevation	Elevation of emergency spillway	MSL or Local datum Feet & 10ths						
9	decimal	structure_elevation	Elevation of top of stoplog channel/structure	MSL or Local datum Feet & 10ths						
10	decimal	structure_depth	Depth of stoplog channel (feet)	Feet & 10ths (manual input or measure inches/12)					calculator	
11	integer	count_stoplogs	How Many stoplogs are in		.>=00 to 50				spinner	
12	decimal	weir_length	Width of stoplogs (inches)	Inches						
13	decimal	top_to_stoplogs	Top of Structure to top of Stoplogs	Feet & 10ths (manual input or measure inches/12)					calculator	
14	decimal	water	Water Level in Wetland	Staff Gauge or subtract ft from top of structure elevation					calculator	
15	calculate	stoplog_elevation	Calculated Elevation of Stoplogs							
16	select_one percent	percent_veg	Percent Vegetation in wetland 0- Open Water, 100-All Veg						likert	
17	select_one rating	condition_rank	Condition: 1=Total Failure, 5= Good as new						horizontal	
18	select_multiple maintenance	maintenance	Maintenance Need(s)	May select more than one or none						
19	image	image	Take photo & draw or annotate on if needed						annotate	
20	text	notes	Additional Notes:						multiline	

- Column A – Type: This specifies the type of data you are collecting for their question. Text, date/time, numbers, choice/lists, audio clip, image etc. Reference the types tab or definitions of the field types. This field is required (*See note on bottom of page 49 on images, not recommended for most users*).
- Column B – Name: This will be a field/column heading name in the final database table. Simple names, short with no spaces. This field is required
- Column C – Label: This is the descriptive name that appears on the form. This would be the question you want answered. It can be a word a sentence or whatever. Spaces and special characters allowed. Remember if this is to be on a mobile device keep it simple and short for space. This field is required
- Column D – hint: This is subtext that will appear below the main label to give additional direction. For example your label may be “Enter the size of the pipe” and the hint would be “in inches”.
- Column E – constraint: setting limits for your input. Most often a limit or range of numbers. Refer to the types tab under Formula Operators to see a list of acceptable operators. For a range of 0-100 enter .>=0 and .<=100 notice put a period before the operator.
- Column F - constraint_message: If you have a constraint this would be the error message to display if a value is out of range.
- Column G is the field required or can it be left blank then H would be the error message
- Column I – appearance: This is how the question will be displayed. Refer to the types tab or appearance options specific to each data type. Examples would be:
 - o In pick lists/choices you can have a drop down menu, horizontal list, vertical list, scale bar
 - o In numeric values you have options to include just direct typing a number or use a spinner (+ or -) button, you can have a calculator pop up if the value is something that might require addition.
 - o If you data type is an image, you can tap the button and either draw on the screen blank canvas like making a diagram or sketch or capture a signature or use the camera button to take a picture then further draw or type on the picture if you want. The image is stored and linked to your survey. For this example we may want to take a picture of the water control structure and draw a circle to point out where a leak is forming.
- Column J – default: This gives a default value to a field. It can be changed but gives you a starting point.

- Once valuable option here is for a date or time entry use the command now() and it will autofill the current data and time.
- The remaining times are a bit more advanced and not commonly used for basic survey forms. See popup descriptions or search ESRI tutorials for more details on those setting
- Any time you want to see the results of an entry or change you made, hit the save button in excel and switch over to the Survey 123 Connect program. It will run a validation and let you know if there is any errors. If none it will display your sample entry form. Where you can fill in fields to see if they work correctly.
- Save and close the excel spreadsheet when you are done.
- In Survey 123 Connect go to the Settings button on the top right.
- General Tab Enter the Title and description – Be unique and identifiable with a name and description so it can easily be found in a search
- Style tab you can change colors

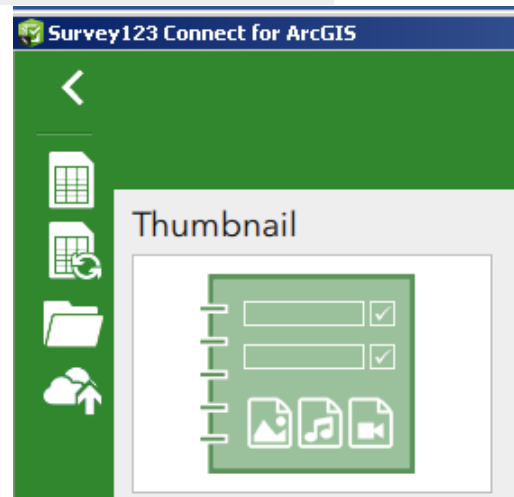


- Images tab sets the file size of the any images you capture in the survey
- **Note on Images:** Although seems like a good option the practical application doesn't work well storing images in a database. It is hard to get the images back out to actually use and view later. It can also make your database file size large and hard to transfer. It stores the files as an integrated part of the database not as separate files like jpg's. I would highly recommend instead of using the integrated image option to have a spot on your form with a check box or text field where you can check off that you took a picture and possibly reference a data and time or photo number. Just use the normal camera feature on your mobile device to take a picture. Most devices store the photo using a time/date stamp for the file name. Then offload and store those files separate.



- Map tab is where you set up the map.
 - o Choose the base map type (roads, topo, aerial imagery etc)
 - o Zoom to the general extent of the area you will be working such as the county or district or if it is a specific site you could zoom closer. Generally try to capture the entire potential work area in the default map area
 - o Coordinate format choose your style. Most often I would suggest using **decimal degrees**. It would require the least conversion or formatting depending on where this data is used in the future. Change again the display coordinate format to the same thing at the bottom.

- Inbox and Sent Surveys are more specific setting. Look up more advanced tutorials for those options.
- On the left side are a few other menu buttons to be aware of
 - o Top right will open the excel spreadsheet if you need to edit your form.
 - o Second from the top will refresh the form preview. Saving the excel file does the same thing
 - o The folder icon open the folder where the data is stored
 - o The bottom button publishes your survey.
- At this point your survey is finished and ready to be published and used.



Publish the Survey

- To **publish a survey** you must first sign in. Hit the sign in button on the bottom left
- USFWS users you have to sign in with the Enterprise account NOT the normal log in.
 - o Hit the Enterprise button
 - o Next Screen Type fws and continue
 - o Next screen hit US Fish and Wildlife Button
 - o Last screen enter your AD email and password or use your smart card to log in if on a government computer



Sign in to ArcGIS Online

Survey123 for ArcGIS wants to access your ArcGIS Online account information

Sign In

Username

Password

SIGN IN CANCEL

Forgot password? Forgot username?

OR

Sign in with ENTERPRISE LOGIN

Sign in with f g

Survey123 for ArcGIS developed by: Esri

Esri publishes a set of ready-to-use maps and apps that are available as part of ArcGIS. ArcGIS is a mapping platform that enables you to create interactive maps and apps to share within your organization or publicly.

Sign in to ArcGIS Online

Survey123 for ArcGIS wants to access your ArcGIS Online account information

Sign In

Enter your ArcGIS organization's URL below.

fws .maps.arcgis.com

< BACK CONTINUE

Survey123 for ArcGIS developed by: Esri

Esri publishes a set of ready-to-use maps and apps that are available as part of ArcGIS. ArcGIS is a mapping platform that enables you to create interactive maps and apps to share within your organization or publicly.

Sign in to ArcGIS Online

Survey123 for ArcGIS wants to access your ArcGIS Online account information

Sign in to U.S. Fish & Wildlife Service

Using

U.S. FISH AND WILDLIFE SERVICE

OR

ARCGIS

Survey123 for ArcGIS developed by: Esri

Esri publishes a set of ready-to-use maps and apps that are available as part of ArcGIS. ArcGIS is a mapping platform that enables you to create interactive maps and apps to share within your organization or publicly.

Sign in to ArcGIS Online

Survey123 for ArcGIS wants to access your ArcGIS Online account information

U.S. Department Of the Interior

Sign in with your organizational account

Scott_Ralston@fws.gov

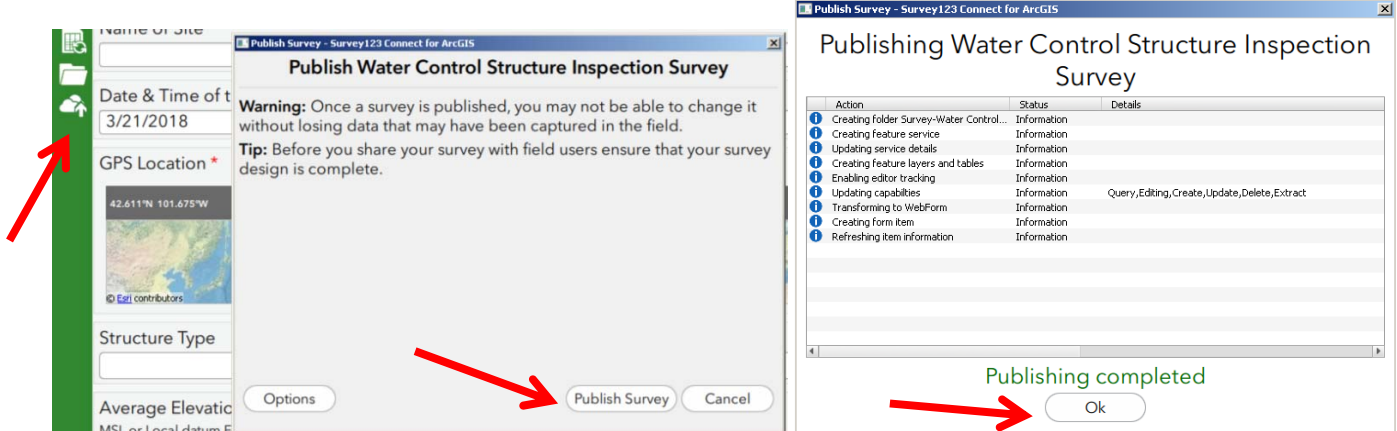
.....

Sign in

Sign in with PIV Card

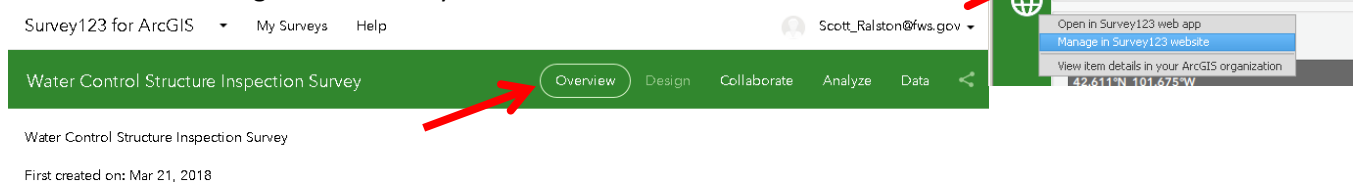
Replace "someone@example.com" with Domain\Username

- Hit the publish button which is the cloud with the arrow on the left side
- Hit the Publish Survey button. It will upload the survey and tell you when complete



Manage your Survey Online

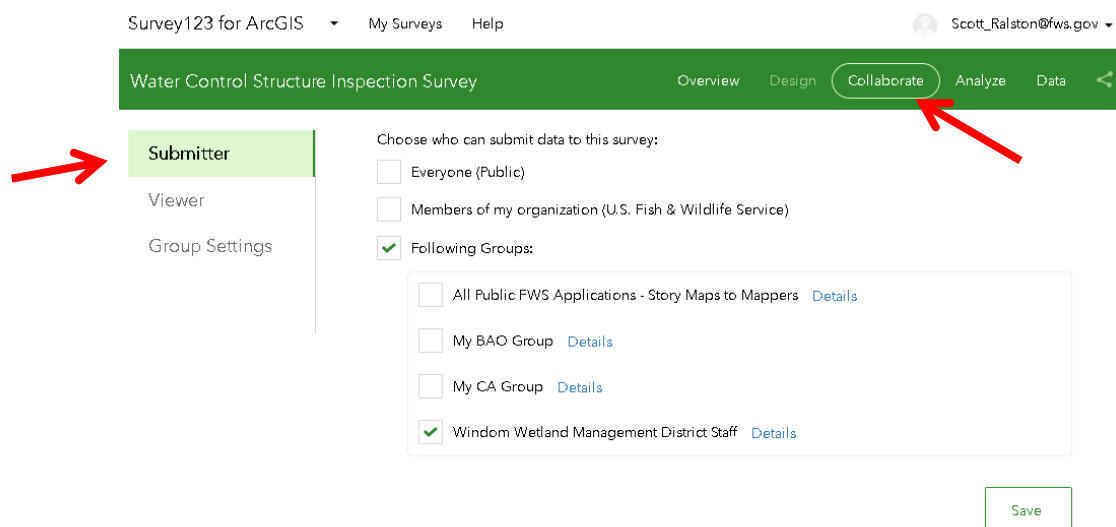
- Hit the Globe icon and hit Manage Survey or use the link.
<https://survey123.arcgis.com>
- You will log in to the web page the same as you did before with FWS users use the enterprise log in.
- Look at the tabs across the top. Overview to start is blank but after data is entered it gives a summary



The survey is **private now**. No one except you can submit data to the survey.

The survey has no records yet. Please check again later.

- Hit the Collaborate button. See page 20 & 21 in the tutorial above for creating new groups. Select who has access to this survey. Change setting for Submitter and Viewer options and hit save.



Survey link:

<https://survey123.arcgis.com/share/203a8eda946e4372936e4ffe58a3e09d?>



- ☐ Open the survey in browser directly
- ☒ Ask the user how to open the survey, in browser or in the Survey123 field app
- ☐ Open the survey in the Survey123 field app directly. [\(Learn more about this option\)](#)

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- It will give a link if you want to conduct this survey online. However some options won't work the same online as they do in the app so if you have a choice use the Survey 123 App.

Survey123 for ArcGIS ▾ My Surveys Help

Scott_Ralston@fws.gov ▾

Water Control Structure Inspection Survey

Overview Design Collaborate Analyze Data <

Submitter

Viewer

Group Settings

Choose who can view results of this survey:

- ☐ Everyone (Public)
- ☐ Members of my organization (U.S. Fish & Wildlife Service)
- ☒ Following Groups:

- ☐ All Public FWS Applications - Story Maps to Mappers [Details](#)
- ☐ My BAO Group [Details](#)
- ☐ My CA Group [Details](#)
- ☒ Windom Wetland Management District Staff [Details](#)

Save

Survey results link:

<https://survey123.arcgis.com/share/203a8eda946e4372936e4ffe58a3e09d/>



- See the tutorial above on page 20 to reference creating or joining groups.

Survey123 for ArcGIS ▾ My Surveys Help

Scott_Ralston@fws.gov ▾

Water Control Structure Inspection Survey

Overview Design Collaborate Analyze Data <

Submitter

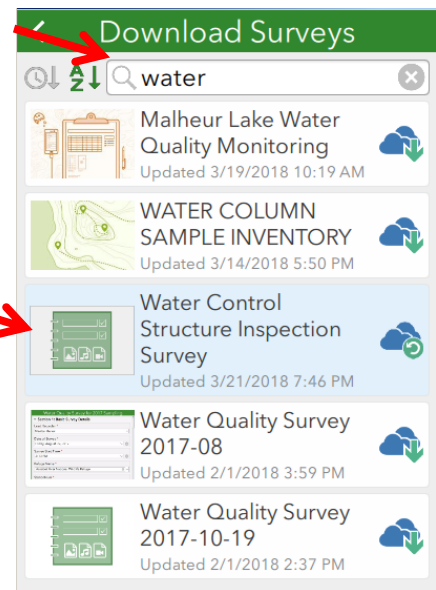
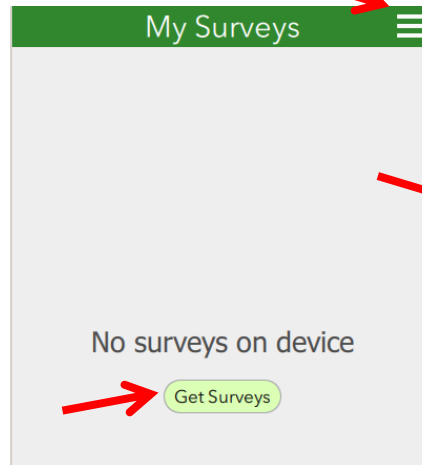
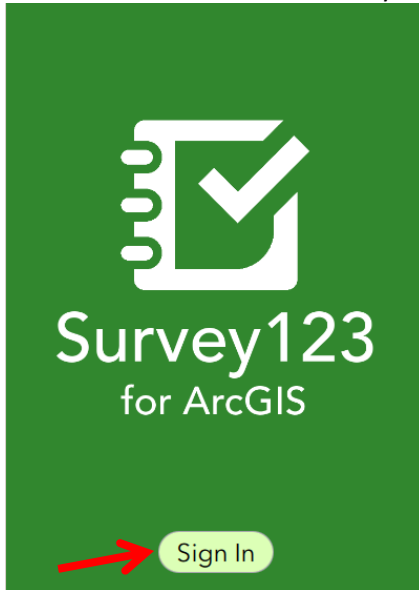
Viewer

Group Settings

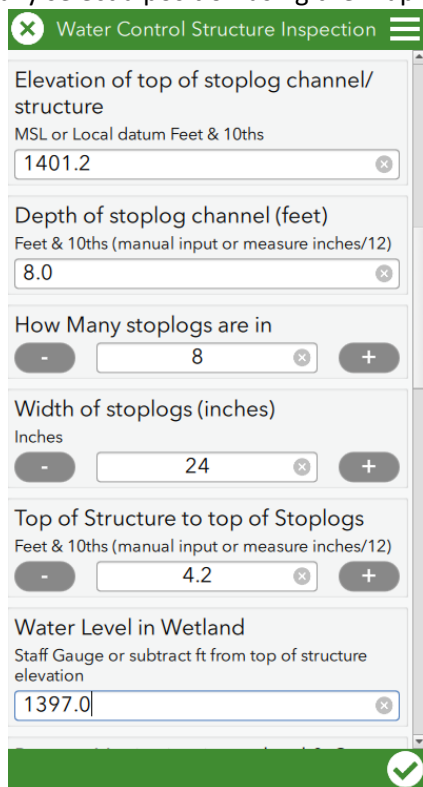
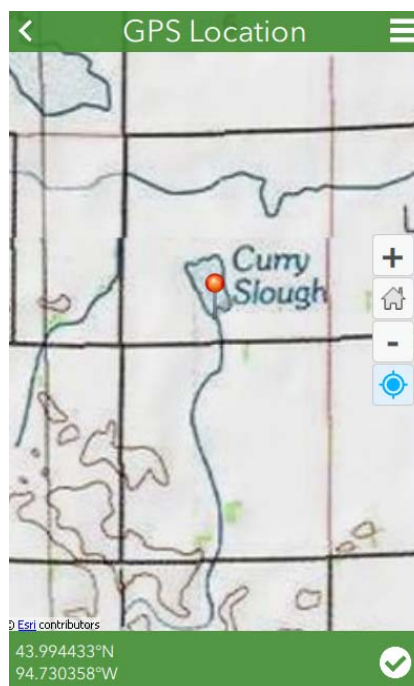
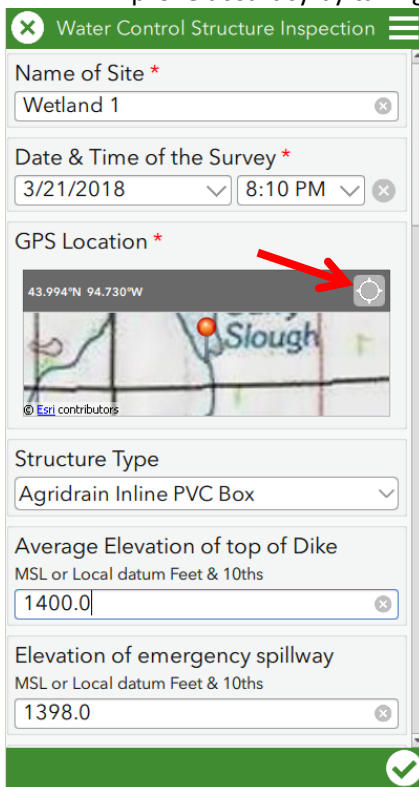
Currently, you can manage groups in the [Group page of ArcGIS Online](#) . For more information on setting groups, please see the [Group topics](#) in ArcGIS Online Help.

Using/Collecting the Survey Data

- Open the Survey 123 app
- Sign in – USFWS use the enterprise log in
- If you have surveys already on your device it will show on screen. Otherwise hit the download button. Download is also available on the top right menu button
- Search for the name of your survey and tap to download it.



- Using the survey is pretty straight forward. Go down the list of the questions you created in the survey.
- GPS Location hit the target icon to take a point or press and hold the icon to do GPS averaging which will improve accuracy by taking multiple readings. You can also manually select a position using the map.

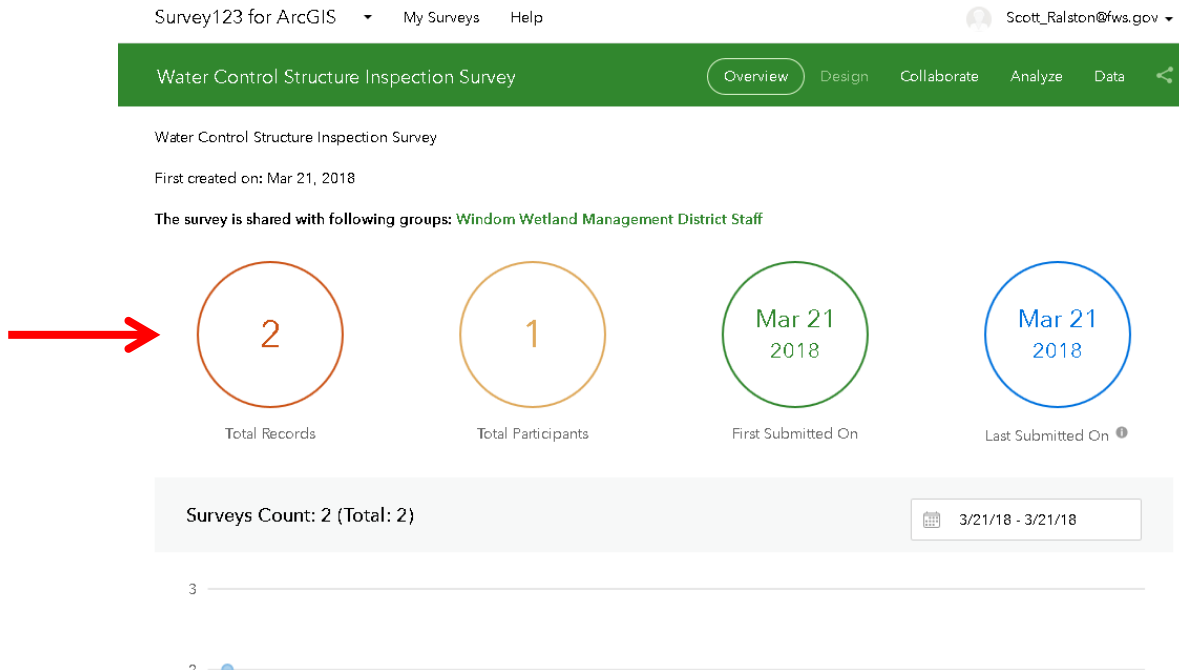


- Photos in the form are not recommended for most users because it is hard to use the photo later stored in the database. Better to just use your device camera and record/reference a field in your survey to note you took a photo and record a photo number or data and time. If you do decide to use the photo feature hit the button. You can capture an image and draw or annotate on it.
- When you filled everything out you can hit the check mark at the bottom to save. You will get a confirmation to save. If you have an internet connection you can immediately upload or choose to send later.

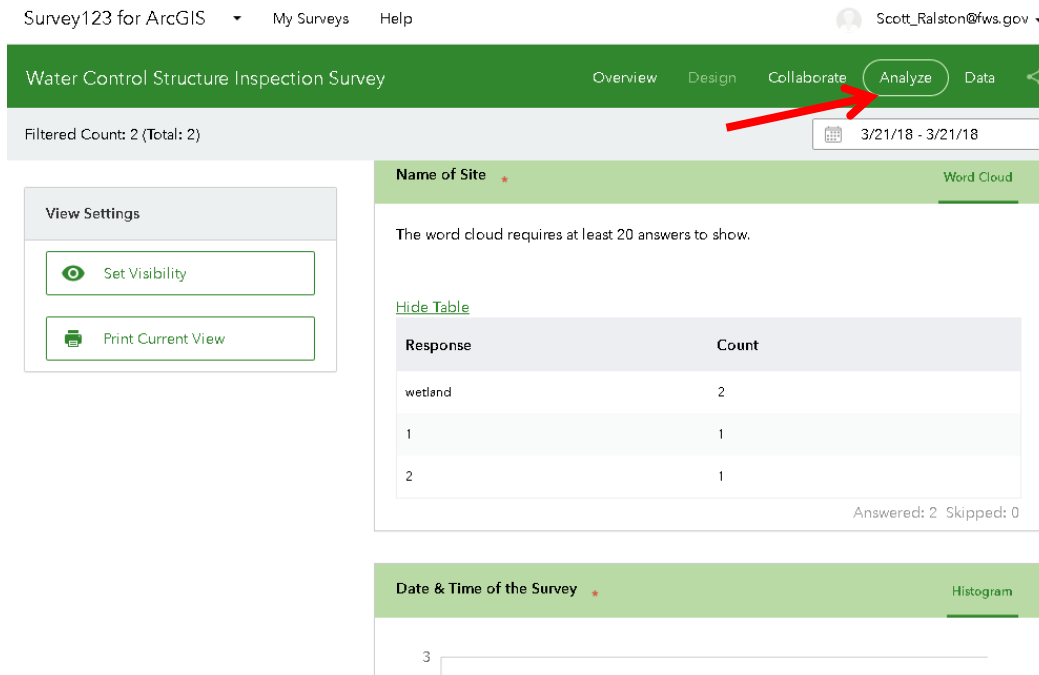
- If you want to Sync Later you will have see an Outbox button on the home screen. Hit that button to upload surveys when you have a internet connection.
- Hit Collect to start another survey
- If you are totally done with the survey and will not use it again, save space on your device by deleting the survey. Hit the top right menu button and choose delete

Managing and Using your Data

- Log in to your Survey123 account. <https://survey123.arcgis.com>
- The home screen now shows summary of how many records were taken. This will continue to tally as long as you use it. You can go back and add more to the survey any time you want. As many users as you want could be contributing in real time.



- On the Analyze tab it will give you statistics of all the records



- On the data tab you will see a table with all the records.
- If you want to export the data choose export and choose the format such as an excel table or if you want it in GIS choose a shapefile or geodatabase and the data will be in points with fields in the attribute table.
- In ArcGIS/ArcMap you can choose Add data from ArcGIS Online, search for your survey and view the survey data directly on your map. If you want to manipulate the data you would have to Export it.

Survey123 for ArcGIS ▾ My Surveys Help Scott_Ralston@fws.gov ▾

Water Control Structure Inspection Survey Overview Design Collaborate Analyze **Data** <

3/21/18 - 3/21/18 Report (Beta) ▾ Export ▾ Open in Map Viewer Show individual response ☒

Selected records only ☐

CSV
Excel
KML
Shapefile
File Geodatabase

Name of Site	Date & Time Of The Survey	user_name		Elevation of top of Dike	Elevation of emergency spillway	Elevation of top of stoplog channel/structure	Depth of stoplog channel (feet)	How many are in
Wetland 1	Mar 21, 2018	scott_ralston@fws.gov	Agdrain Inline PVC Box	1,400	1,398	1,401.2	8	8
wetland 2	Mar 21, 2018	scott_ralston@fws.gov	Metal Open Face Weir					

- If you are completely done with your survey and will not use it again you can clean up your AGOL account and delete the survey once you have your final copy of data downloaded.
- Further customization and advanced features can be found using ESRI built in tutorials, web searching or many YouTube videos. This is a very versatile application with many potential uses.

Making Surveys Online – From the My Surveys web page (<https://survey123.arcgis.com/surveys>). There is an option to “+Create a New Survey”. For Simple easy surveys this is a great tool to build a new survey with a graphical interface instead of a spreadsheet in Connect. Interface is fairly intuitive to use.

Mobile Accessories:

Accessories you might find useful for your mobile devices:

- Backpack for field gear. Better to carry in a bag than to have it bounce around inside a truck. Get one with a computer or tablet compartment. Keep all cables, chargers and other accessories in the backpack so they are always with you ready to go. <http://a.co/5t5F0i3> or <http://a.co/7PdbfR4> are good
- As rugged of a case as possible. There are many options. LifeProof NÜÜD series is popular and is supposed to be rugged and waterproof, however it seals around the edge of the screen but leaves the screen itself uncovered and vulnerable to scratches and impacts. You could try to put a tempered glass protector over it but then the case may not seal well over the tempered glass. The Joy Factory aXtion Pro M case is supposed to also be rugged and waterproof but does include a screen protector. It also has various mounting options. As of this tutorial it is only made for the larger 12.9” ipad but they have the aXtion Bold MP model for smaller



ipads which is water “resistance”. Either way I wouldn’t intentionally submerge either so I chose aXtion over lifeproof for the screen protection. <http://a.co/5gtMvwR>

- Portable battery pack – Battery power in long field use may be limited. There are many options for portable battery packs. Some are ruggedized and also include solar charges to help supplement power. Solar alone would take a long time to charge but is better than nothing and help keep the battery pack topped off without being plugged in unless it is majorly drained. ZeroLemon 26800mAh SolarJuice is a good model.



<http://a.co/cSdUcXC>

- 12v car charger is good to have with. Get one with just the USB ports not the all in one with the cable built in. Having USB ports makes it more versatile and can charge more devices. Just have a USB cable for your devices. Larger 2.4amp models will charge faster. <http://a.co/eM3oSSt>



- USB charging station is good for in the office so you can charge multiple USB device without needing many separate plugs. Leave a charging station with cables set up in the office and a separate set in your field pack so you never forget to grab the cables and chargers when you go. They will always be in the field gear ready to go. <http://a.co/c1gaRST>



- Bluetooth GPS – Some areas and some devices have better GPS reception than others. An external Bluetooth GPS receiver can improve accuracy and reception. Multiple models available. Garmin makes a good one that has about a 12hr battery and again can be charged with a USB plug.

<http://a.co/ftRIUSz> get the belt clip on it which you can clip on to a hat visor for better reception up higher <http://a.co/igrQsMP>

- Spare cables - Keep spare USB cables for all your devices so you keep one set in the office and one in the field bag

- Tablet Stylus pen – Using gloves or dirty hands or even just big fingers can be hard with mobile devices. Use a tablet stylus pen. They make fancy ipens but they are very expensive and require being charged. For most purposes the non-electronic stylus works just fine for a fraction of the cost. <http://a.co/3SWdvls> I would get one with a hook on the end to use with a lanyard.



Also a pencil holder to stick on the back of the case makes it convenient

<http://a.co/2LDczqY>

- Audio/Video adapter is handy to have with a mobile device. For doing demonstrations, or collaborating with a team on a larger screen. Plugs into your device with an adapter for other screen or projector outputs. This version is for ipads or iphones but others are available for android. <http://a.co/0IUibh2>



Check back for updates to the tutorial and will be posted on <http://skralston.com/USFWS/>