Standard Operating Procedure
Arc Collector for Invasive Species Management
US Army Corps of Engineers, Invasive Species Management Branch, Jacksonville District
US Army Corps of Engineers, GIS, CADD & Mapping Section, Portland District
2 January 2019

A collaboration between a Portland District geographer and a Jacksonville District invasive species biologist has resulted in an innovative new tool for invasive species data collection. Arc Collector is an ESRI app that provides a revolutionary approach to data collection, which eliminates the need for much of the tedious post-processing of field collected data. This Standard Operating Procedure (SOP) will detail the two Arc Collector projects that were developed for the Jacksonville District Invasive Species Management Branch and explain how you can customize them to your project needs.

This SOP includes two variations, Terrestrial Invasive Species and Aquatic Invasive Species. Each has a different approach to data collection and can be considered for terrestrial or aquatic surveys. Please review the two approaches and determine which geodatabase best fits the needs of your project. You will be provided with instructions on how you can edit the geodatabases to include data relevant to your District.

This SOP was written using ArcCatalog and ArcMap version 10.6.0.8321, using Advanced licensing level, as well as the Arc Collector Classic app. This project strives to be Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) compliant and SDSFIE names, field definitions and domains were used when relevant.

Steps to Acquiring and Adapting the Invasive Species Arc Collector Projects to your Corps Project

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SECTION 1 - Acquire Materials

1.1. Acquire the reference Geodatabase and associated Excel Spreadsheet from Jacksonville District, Invasive Species Management Branch or Portland District, GIS, CADD & Mapping Section at the contacts below:
- CESAJ Biologist: Jessica Spencer, Jessica.e.spencer@usace.army.mil, 904-318-9110
- CENWP GIS: Douglas Swanson, Doug.c.swanson@usace.army.mil, 503-808-4858

This SOP will begin with the Terrestrial GDB because it has a broader reach than the Aquatic GDB. Aquatic will begin in SECTION 8 below.

This geodatabase (GDB) contains plant species specific to Jacksonville District Area of Responsibility (AOR) and will require modification to meet your specific needs. This SOP will define the process for modifications. Additional help is available from the contact POCs above.

1.2. Using Arc Catalog, browse to the newly added GDB and change the name to comply with your organization's naming conventions. Note, incorporating TR into the file names for terrestrial and AQ for aquatic is a recommended best practice. This GDB comes with one example record for each point, line and polygon feature class and the record can be deleted when an example record is no longer needed.

The TR GDB contains a number of files, defined below:
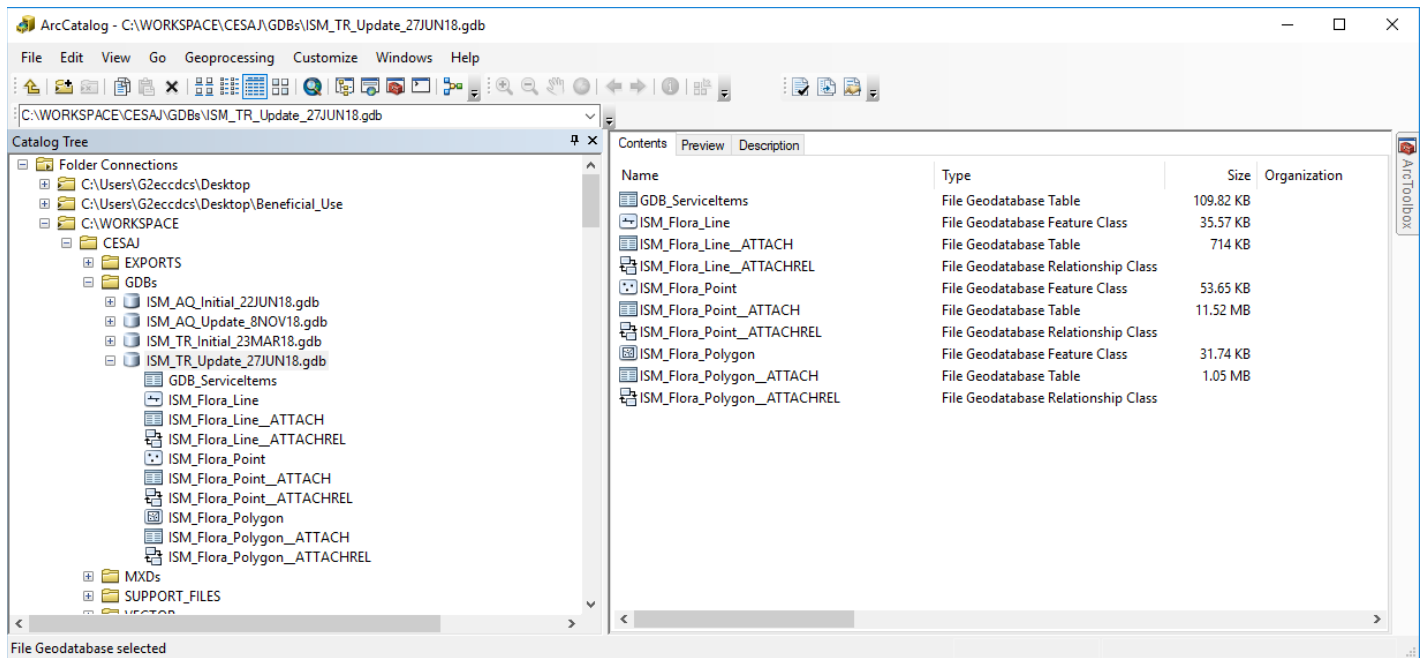
GDB_ServiceItems - Used by ArcGIS to internally manage features within the GDB.
ISM_Flora_Line - The feature class for collecting linear data
ISM_Flora_Line_ATTACH - Non-spatial table that stores photos associated with each line record
ISM_Flora_Line_ATTACHREL - Table that manages the relationship between the photo and the record
ISM_Flora_Point - The feature class for collecting point data
ISM_Flora_Point_ATTACH - Non-spatial table that stores photos associated with each point record
ISM_Flora_Point_ATTACHREL - Table that manages the relationship between the photo and the record
ISM_Flora_Polygon - The feature class for collecting polygon data
ISM_Flora_Polygon_ATTACH - Non-spatial table that stores photos associated with each polygon record
ISM_Flora_Polygon_ATTACHREL - Table that manages the relationship between the photo and record

1.3. Bring up the following window by selecting the GDB in Arc Catalog, then Right-Click and select Properties.
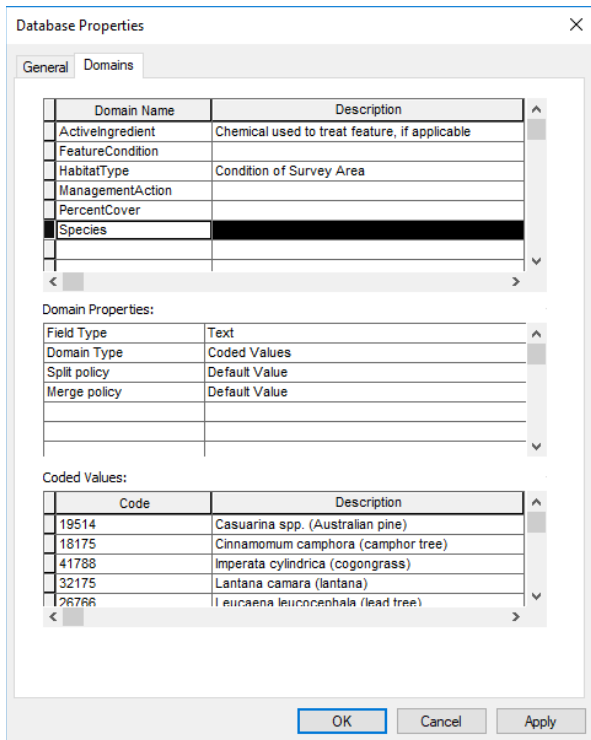
The database contains domains, associated drop-down lists and descriptions. The example on the left has the Species domain highlighted, showing its associated drop-down list (Coded Values). Note the Code field has a number and the Description field has text. In this case, the Code is the Taxonomic Serial Number (TSN) associated with each species listed in the Description column. The user will see the text in the Description column when they select the drop-down, but the TSN Code is being collected behind the scenes and will be present in any data exports. The TSN Code ensures compatibility with the EDDMapS database, to include the Corps EDDMapS module (www.EDDMAPS.org/USACE).

Select OK then minimize ArcCatalog.

SECTION 2 - The Spreadsheet

2.1.   Open the Excel Spreadsheet and rename it in accordance with your organization's naming conventions. Update the Excel Spreadsheet to reflect your requirements. It is critical to spend adequate time and effort determining your data needs in the spreadsheet and getting familiar with the existing information. Changes or additions after implementation can be difficult and may require coding. The SOP spreadsheet (screen capture below) identifies all the fields and domains that were meticulously determined to simultaneously meet the needs of the field biologist, the GIS analyst and be compatible with third-party databases, so modifications should be minimized.

2.2.   Review each tab in the spreadsheet, specifically the terrestrial GDB and Domains tabs. Note the existing fields and their associated Drop-Down Lists (Domains). You will most likely have to change the existing drop-down list for the Species Domain, but there may be others that you want to modify as well. The existing drop-down lists are thorough but you may need to add or delete some of the options, for instance, there may be an Active Ingredient you use in your region that is not covered in the current drop-down list.

Refer to Spatial Data Standards for Facilities, Infrastructure and the Environment (SDSFIE) for DoD standardized fields and field properties at www.sdsfieonline.org.

Note Observer, Observation Date and Global Unique ID during your review; these are fields that are populated automatically and require no additional selections while in the field.

2.3. Evaluate Column A to determine if you want to add a field that captures additional data not listed here. For example, you may be required to identify the Campground or Property Unit where you are operating. Note, we chose not to include Property Unit because a GPS location is captured and can easily be overlaid with other data sets in GIS. You should carefully consider the value of each data field collected versus the time and redundancy of collecting that data for each feature. We considered many aspects regarding the fields you see below and recommend leaving it as is, or at least keeping it as simple as possible. However, if you do need to add a field, instructions are included below.

You can see from column G that the flow of the fields are process-based, designed to collect information in a logical order. Ensure any additional fields are placed in the order you'd like them collected in the field.

ISM_Flora_Point — Point

NAME	TYPE	Characters	Description	Source	Comments	ORDER
Species	Text	47	Field Biologist enters a description of the feature (Salt Cedar or Tamaricaceae)	CESAJ	14 Domain names	1
TSN *(NOT A FIELD)*	~	~	Taxonomic Serial Number - Unique Identifer for each	ITIS.GOV	Tied to Species through CODE/DESCRIPTION relationship in Domain Properties	~
FeatureCondition	Text	20	Life-stage, health or reproductive activity of Plant	EDDMAP	SDS name with EDDMAPS domains	2
ManagementAction	Text	17	The practice used in response to the feature	SDSFIE		4
ActiveIngredient	Text	24	The chemical used to treat the invasive species	CESAJ		5
HabitatType	Text	12	The condition of the area being surveyed	CESAJ		3
Notes	Text	255	Free flow for comments	ALL	SDS uses "FeatureDescription" EDDMAPS uses "Comments". "Notes" is shorter word for iphone form?	6
ObservationDate	Date	~	Date the feature was GPS'd	EDDMAP	Autopopulated	~
Observer	Text	14	auto-populate with G2ECCDCS or USACE_NWP_DCS			~
GlobalUniqueID	GUID	~	A unique alphanumeric designation for each and every individual record	SDSFIE	All agree on the value of GUID	~

ISM_Flora_Polygon — Polygon

NAME	TYPE	Characters	Description	Source	Comments	ORDER
Species	Text	47	Field Biologist enters a description of the feature (Salt Cedar or Tamaricaceae)	CESAJ	14 Domain names	1
TSN *(NOT A FIELD)*	~	~	Taxonomic Serial Number - Unique Identifer for each	ITIS.GOV	Tied to Species through CODE/DESCRIPTION relationship in Domain Properties	~
FeatureCondition	Text	20	Life-stage, health or reproductive activity of Plant	EDDMAP	SDS name with EDDMAPS domains	2
ManagementAction	Text	17	The practice used in response to the feature	SDSFIE		5
ActiveIngredient	Text	24	The chemical used to treat the invasive species	CESAJ		6
HabitatType	Text	12	The condition of the area being surveyed	CESAJ		4
Square_Feet	INT	6	Calculated from Area of Poly			~
Percent_Cover	Text	11	Trace (<1%), Etc.			3
Notes	Text	255	Free flow for comments	ALL	SDS uses "FeatureDescription" EDDMAPS uses "Comments". "Notes" is shorter word for iphone form?	7
ObservationDate	Date	~	Date the feature was GPS'd	EDDMAP	Autopopulated	~
Observer	Text	14	auto-populate with G2ECCDCS or USACE_NWP_DCS			~
GlobalUniqueID	GUID	~	A unique alphanumeric designation for each and every individual record	SDSFIE	All agree on the value of GUID	~

ISM_Flora_Line — Line

NAME	TYPE	Characters	Description	Source	Comments	ORDER
Species	Text	47	Field Biologist enters a description of the feature (Salt Cedar or Tamaricaceae)	CESAJ	14 Domain names	1
TSN *(NOT A FIELD)*	~	~	Taxonomic Serial Number - Unique Identifer for each	ITIS.GOV	Tied to Species through CODE/DESCRIPTION relationship in Domain Properties	~
FeatureCondition	Text	20	Life-stage, health or reproductive activity of Plant	EDDMAP	SDS name with EDDMAPS domains	2
ManagementAction	Text	17	The practice used in response to the feature	SDSFIE		5
ActiveIngredient	Text	24	The chemical used to treat the invasive species	CESAJ		6
HabitatType	Text	12	The condition of the area being surveyed	CESAJ		3
Width_FT	INT	~	Distance in feet FROM observer of typical species/condition/action	CESAJ		4
Notes	Text	255	Free flow for comments	ALL	SDS uses "FeatureDescription" EDDMAPS uses "Comments". "Notes" is shorter word for iphone form?	7
ObservationDate	Date	~	Date the feature was GPS'd	EDDMAP	Autopopulated	~

Tabs: NOTES | **ISM_TR_GDB** | ISM_AQ_GDB | ISM_TR_DOMAINS | ISM_AQ_DOMAINS | SDSFIE

2.4. If required, add a new field. Decide on the new field name and consider its length based on the amount of space you have on your field device (smart phone or tablet). Avoid using spaces as they can cause problems in ArcGIS. Decide on the GIS field "type" (Text, Integer, Date, etc.). Decide on the maximum number of characters your responses will have. Type a description of the field to explain the type of data being captured. Identify the source. Make any comments that may be helpful. Determine the order in which you want the field to appear in the app while in the field. Determine if the field will be auto-populated, have default values or have a drop-down pick list (Domain).

2.5. If drop-downs (domains) are required for your added field, select the Domains tab in your spreadsheet. See example below. Add your domain name in a new COLUMN. Indicate which feature types it applies to (point, line, polygon). List your new drop-down selections in the order you want to see them appear in the drop-down list on your device. Consider the device size and note that having a large number of drop-

down selections will require additional scrolling in the field. This can lead to wasted time, so you should consider placing the most commonly used selections near the top of your list or consider setting a default.

The spreadsheet shows the following data:

SPECIES	TSN for SPECIES	FEATURE_COND	MANGT ACTION	Percent_Cover	ActiveIngredient	HabitatType
Feature Type: ALL	ALL	ALL	ALL	POLYGON	ALL	ALL
Casuarina spp. (Australian pine)	19514	In Flower	Basal Spray	Trace (<1%)	Triclopyr - T	Disturbed *(default)
Cinnamomum camphora (camphor tree)	18175	In Fruit	Cut Stump	1-5%	Glyphosate - T	Natural Area
Imperata cylindrica (cogongrass)	41788	Resprouting	Hand Pull	6-25%	Triclopyr - AQ	Other
Lantana camara (lantana)	32175	Seedling	Foliar Spray	26-50%	Glyphosate - AQ	
Leucaena leucocephala (lead tree)	26766	Immature	Biological	51-75%	Imazapyr - T	
Lygodium japonicum (Japanese climbing fern)	17983	Mature	Hack & Squirt	76-95%	Imazamox - AQ	
Lygodium microphyllum (Old World climbing fern)	17984	Dead	Girdle	96-100%	Aminopyralid	
Melia azedarach (Chinaberry)	29024	Seeds	Survey		Aminocyclopyrachlor	
Ricinus communis (castor bean)	28393	Mixed Stand	Other		Other	
Schinus terebinthifolius (Brazilian pepper)	28812	Not Present			N/A *(default)	
Tamarix spp. (Saltcedar)	22303					
Triadica sebifera (Chinese tallow)	522777					
Urena lobata (caeasarweed)	21759					
Melinis repens (Natal grass)	565301					
Other	~					

2.6. Change the Species and TSN entries to reflect the invasive plants in your region. Change the "TSN for SPECIES" codes to match your newly added species. Go to https://ITIS.GOV and search your species to obtain the Taxonomic Serial Number. Note, using the Taxonomic Serial Number will ensure compatibility with EDDMapS and other similar systems that use TSN for record identification.

SECTION 3 - The Geodatabase

Now it is time to transfer changes in the spreadsheet to the geodatabase. Open Arc Catalog and browse to your geodatabase.

3.1. MODIFY DROP-DOWN LIST CHOICES - These steps will demonstrate how to change the drop-down list for Species. The process will be the same for other changes you may wish to make.

3.1.1. Right-click on the GDB and select Properties to get the following dialog box to pop up. Select the "Domains" tab at the top.
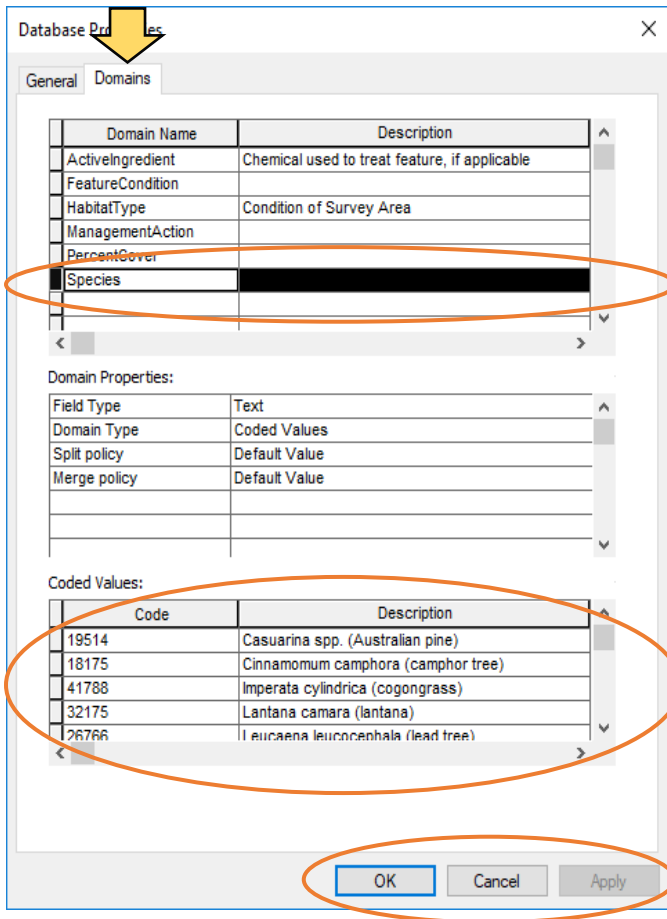
3.1.2. Select Species in the Domain Name column.

3.1.3. Transfer your TSN numbers from your spreadsheet to the CODE column and the corresponding SPECIES names to the DESCRIPTION column, using format "Scientific Name (Common Name)" and then delete unwanted values. Note: leaving blank rows is OK when deleting unwanted values.

When completed select Apply and OK.

3.1.4. Make any other changes to the existing Domains and their associated Code and Description values per your Excel Spreadsheet. For example, add and remove chemicals from the ActiveIngredient Domain now.

3.2.   ADD A NEW FIELD (With No Domain)

3.2.1. If you've determined that you need an additional field that does not require a domain, begin by opening ArcMap and adding the Point, Line and/or Polygon feature classes you want to add a new field to. If you want to add a field *with a domain (drop-down),* then proceed to step 3.D. below.

3.2.2. Right click on the feature class and select Open Attribute Table.

3.2.3. Select the Table Options icon (shown below with yellow arrow) and then ADD FIELD.
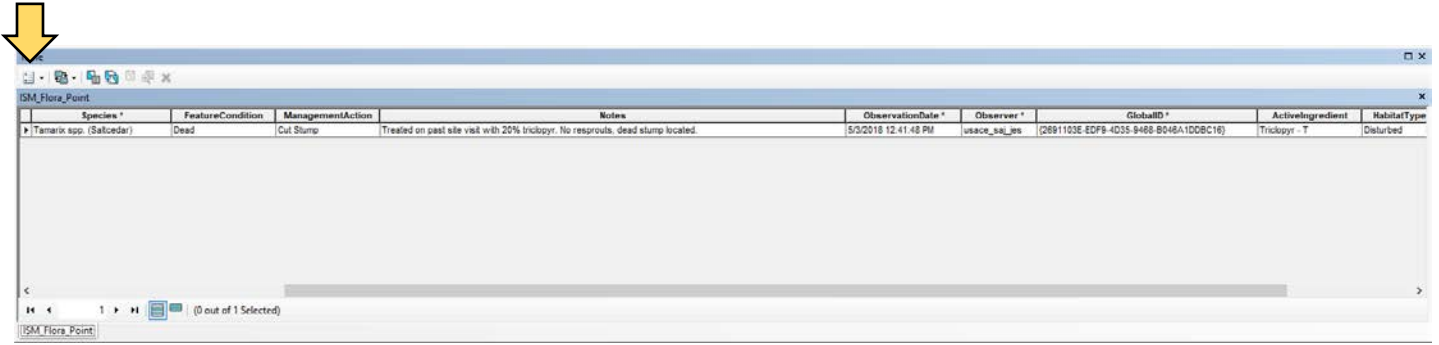
3.2.4. When the following dialog box appears, enter the information from your spreadsheet.

Name of your new field

Data type of your new field
If you select "text" indicate the length (number of characters) in Field Properties (not shown here because Short Integer is selected)

Default Value of your new field (if needed)

OK

3.3. DELETE A FIELD.

3.3.1. To remove an unwanted field, right click on the field name in the table in ArcMap and select Delete Field.

3.4. ADD A NEW FIELD WITH A DOMAIN

3.4.1. Create the Domain in ArcCatalog first. Right-click on the GDB and select Properties to get the following dialog box to pop up. Select the "Domains" tab at the top and add the following information from your spreadsheet:
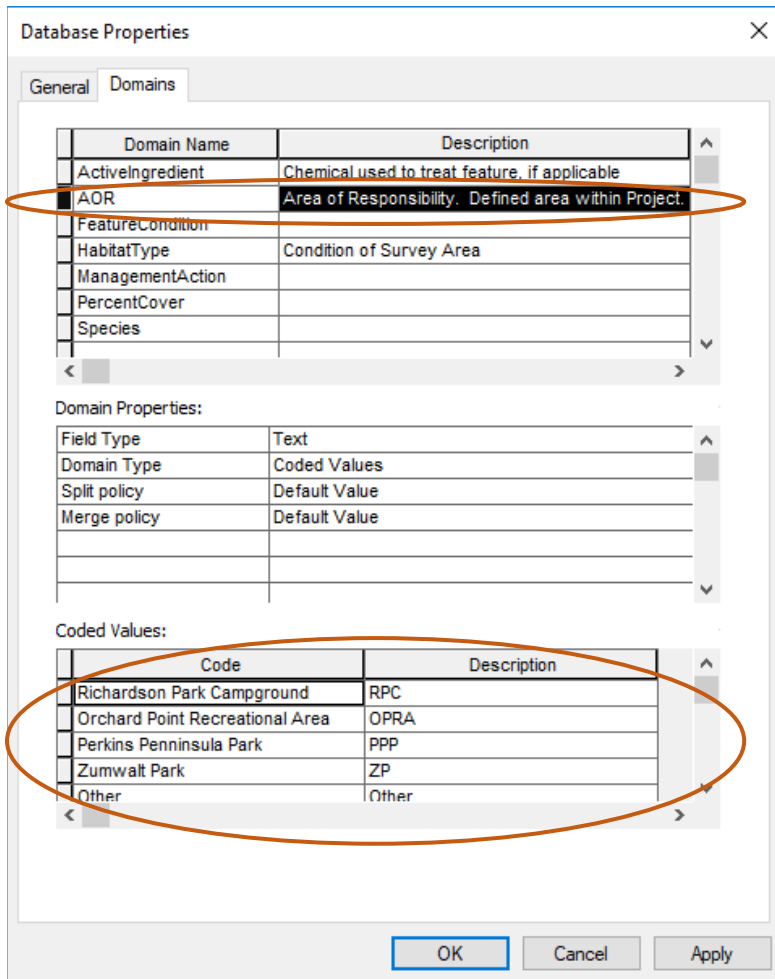
Name and description of the new Domain

Fill in your Coded Values (Code and Description) from the DOMAINS TAB in your spreadsheet. This will be the drop-down list seen on the app while collecting data in the field.

Click Apply, then OK. Close ArcCatalog.

Note: DESCRIPTION will be what is seen on the app. Assigning a unique code to your Descriptions allows you to use that code to link to other databases, or abbreviate names (as seen here), but is not common practice as most CODE entries will be the same as DESCRIPTION entries. In this example, the abbreviated Description names will fit better on the device screen in the field, but the Code column provides the full name for clarification and is stored in the database.

3.4.2. Open ArcMap and add the feature class that contains your new field. Right click on the feature class and select Open Attribute Table.

3.4.3. Select the Table Options icon and then ADD FIELD.

3.4.4. When the following dialog box appears enter the information from your spreadsheet.

Referencing the changes made in your spreadsheet, add the name into the NAME field, define its TYPE (text, integer, etc.) and if you'd like to set a default value, type it in the DEFAULT VALUE box.

For DOMAIN, select the drop-down and pick the domain you created in the previous step.

Note: If you have required fields, you may want to disable NULL values, which will force the data collector to input an answer to the question. **You must delete the example record first.** Then enter "No" for "Allow NULL Values" in the Field Properties section.

Input the Length (number of characters) from your spreadsheet.

OK
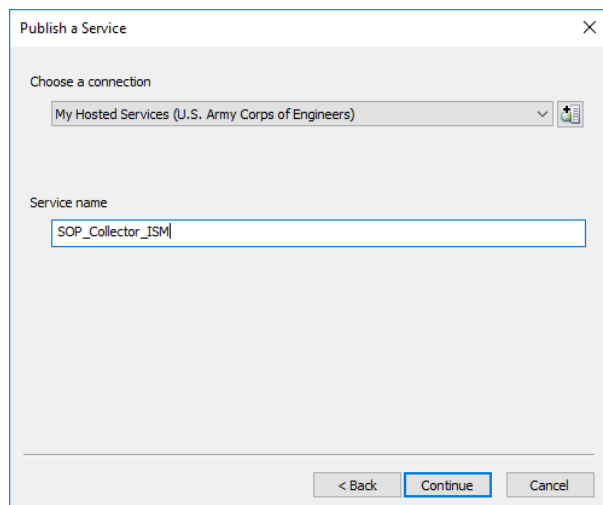
4.1. PREPARE YOUR DATA FOR THE CLOUD

4.2. Add any modified feature classes to ArcMap and generate Symbology. This includes your modifications to the SPECIES field. Careful consideration was given to symbol colors, matching plant characteristics if possible. As a Best Practice, we recommend saving your symbology to a Layer file (right click, Save as Layer File) to capture your symbology changes.

4.3. Sign in to ArcGIS On-Line (AGOL) within ArcMap: Select FILE, then SIGN IN. If you do not have a USACE AGOL account contact your District or Division GIS Administrator or the National AGOL Administrator, Irven Ingram or Zach Travis (as of the writing of this document). This can take more than a day so plan accordingly.

4.4. Select FILE, SHARE AS, SERVICE. Ensure Publish a Service is selected, then Next.

The Default connection should be: My Hosted Services (U.S. Army Corps of Engineers). If this is not the case, ensure you are logged in or contact your District or Division GIS Administrator.

Type a Service Name. "Invasive Species - Terrestrial - CESAJ" and "Invasive Species - Aquatic - CESAJ" were used for this project.

Click Continue

4.5. In the SERVICE EDITOR dialog box, use the defaults except:
- Feature Access: Check all boxes under "Operations allowed"
- Item Description: Write a thorough Summary, Tags (keywords to locate your project in a search) and a thorough Description. For "Access and Use Constraints" consider the following: "This data set represents the results of data processing for a specific U.S. Army Corps of Engineers activity and indicates the general existing conditions. As such, it is only valid for its intended use, content, time, and accuracy specifications. The user is responsible for the results of any application of the data for other than its intended purpose." Credits should be your organization (e.g. CESAJ-OD-A).
- Sharing: Check the boxes of the organizations with which to share. Share with "US Army Corps of Engineers" if everyone in the Corps can use your Collector project. If you wish to limit access to just your District, select your District only.

4.6. Select the ANALYZE button at the top of the window. Resolve the listed issues. (Note only issues with a High Severity must be resolved to proceed).

4.7.   Select the PUBLISH button next to the ANALYZE button at the top of the window.

<div align="center">

SECTION 5 - ARCGIS On-Line (AGOL)

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5.1.   Sign in to AGOL at www.arcgisonline.com and go to the CONTENT Tab.

5.2.   Select your new Feature Layer.

5.3.   Select OPEN IN MAP VIEWER.

5.4.   Zoom to the general area where you want to your Collector project. Change your basemap if desired. Note, Imagery may be the best choice for several applications.

5.5.   Select SAVE and provide a Title, Tags and Summary. SAVE MAP.

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SECTION 6 - Using the Arc Collector App on your Device

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For the purposes of this SOP, we are using the Arc Collector Classic app (available for free in the app store or through Google Play).

6.1.   Download Collector Classic to your device. Open Collector, sign in to ArcGIS Online with your AGOL account information. Go to Maps, Click on All, then you should see a list of maps available, including your project. Click on the cloud icon with a down arrow to download the project to your device. Chose a basemap (imagery is recommended), then set your work area (the area where you expect to collect data). This will limit the amount of storage space used but will also limit the area within which you can collect data. It is recommended to identify your work area and then add a little more map around it. Then select Download. Once the download completes select the Collector Project to open.

6.2.   When you are ready to collect field data, select the large "**+**" on your screen (location varies by device).

Note: If you need better accuracy than your phone can provide, you can use an external GPS device that will Bluetooth to your phone. If you need more information on this, contact Jessica Spencer or Douglas Swanson (contact information listed at the beginning).

6.3.   Select each field and provide the relevant data, selecting DONE after each selection.

6.4.   Select the Camera Icon to record a photograph at your current location. Then Add. Then choose either "Take Photo or Video" or "Choose From Library." Select "Use Photo" if applicable. You can take multiple pictures per record, just select "Add" again. Once you have added all your photos, select DONE. Note: DONE may be difficult to see depending on your device. (On Apple devices, the word "Done" is light blue on a blue background at the top of the screen.)

6.5.   Select Submit to record the point.

6.6.   When you are finished collecting data, click on Maps to return to the maps page and click the sync icon (the cloud with two arrows pointing up and down). It should have a red number indicating the number of records that you collected that need to be "Synced" to the Cloud.

7.1.   Return to the office and review your field collection data.

7.2.   Sign in to AGOL and browse to your project in My Content and select the WEB MAP then OPEN IN MAP VIEWER.

7.3.   Review your data and make edits as needed. Please refer to ESRI help for additional functionality.

Note that this section is very similar to the Terrestrial information above. Many of the steps will be redundant, but the variations in the process for the Aquatic GDB approach are described below.

The Aquatic geodatabase has two primary features that set it apart from the Terrestrial database; one, the Track log, and two, pre-determined Areas of Operation, or Areas of Responsibility (AOR). It also contains different fields and Domains.

TRACK LOG
The Track Log is a capability that allows the route of a field biologist to be tracked and recorded.   This point file, shown in the Dashboard below as small green dots, delineates the survey route and provides absence data, indicating areas that were surveyed but no invasive species were found.
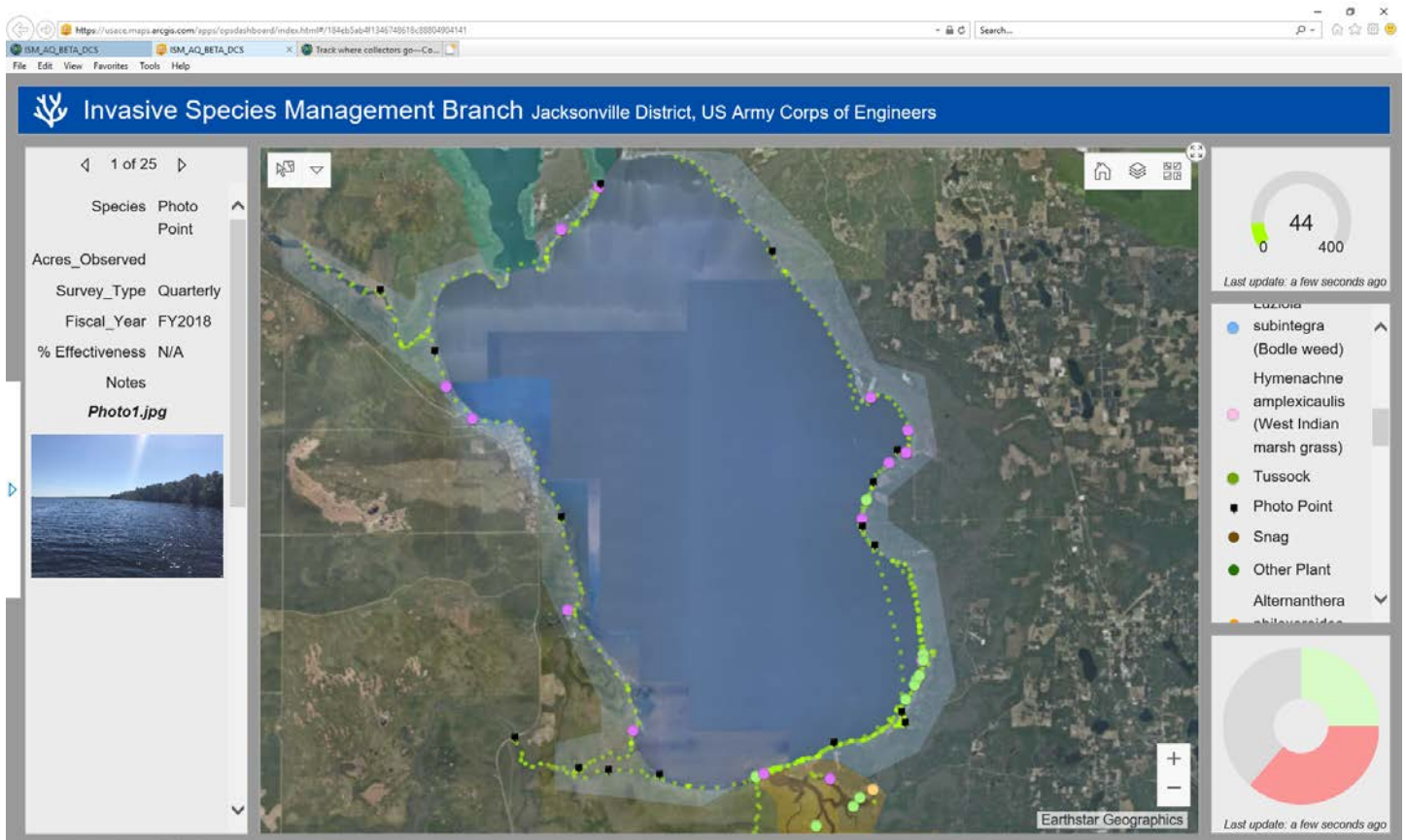
The Track Log is active any time the map is open in the Collector App. It is being collected behind the scenes and no additional input is needed. Track Log can be turned on and off within the App under the Layers icon. It can also be turned on and off while viewing your data in AGOL Web Map and in a Dashboard, as seen above.

Note the use of Track Log will decrease battery life on your device. Also, if you open a different app on your phone (weather, text messaging, etc.), the Track Log will not collect points until you open the Arc Collector map again.

For information on adding Track Log to your Terrestrial geodatabase go to the ESRI help site at: https://doc.arcgis.com/en/collector-classic/ios/create-maps/track-where-collectors-went.htm

The link above will provide the following instructions on how to add a Track Log:

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1.   Go to the My Content tab of the content page.

2.   Click Create and click Feature Layer.

3.   On the From template tab, type location tracking in the search text box.

4.   Choose the Location Tracking template from the search results.

5.   Click Create.

6.   If you want a custom name for your tracking layer, set the name.

7.   Click Next.

8.   Provide the extent for the layer and click Next.

9.   Specify a title, any additional tags, a summary, and the folder in which to save the layer.

10.   Click Done to publish the layer.

You now have an editable, add-only layer. You are ready to add the layer to your map, and it will record the tracked locations.

Areas of Operation with a Non-Spatial Table

The second unique feature in the Aquatic Geodatabase is the use of pre-determined Areas of Operation, or Areas of Responsibility (AOR), within which new records can be added. The image below shows different colored polygons, each representing an AOR, called Waterbodies in CESAJ, with each Waterbody having an associated four digit code (circled on the right), used for managing and reporting purposes.
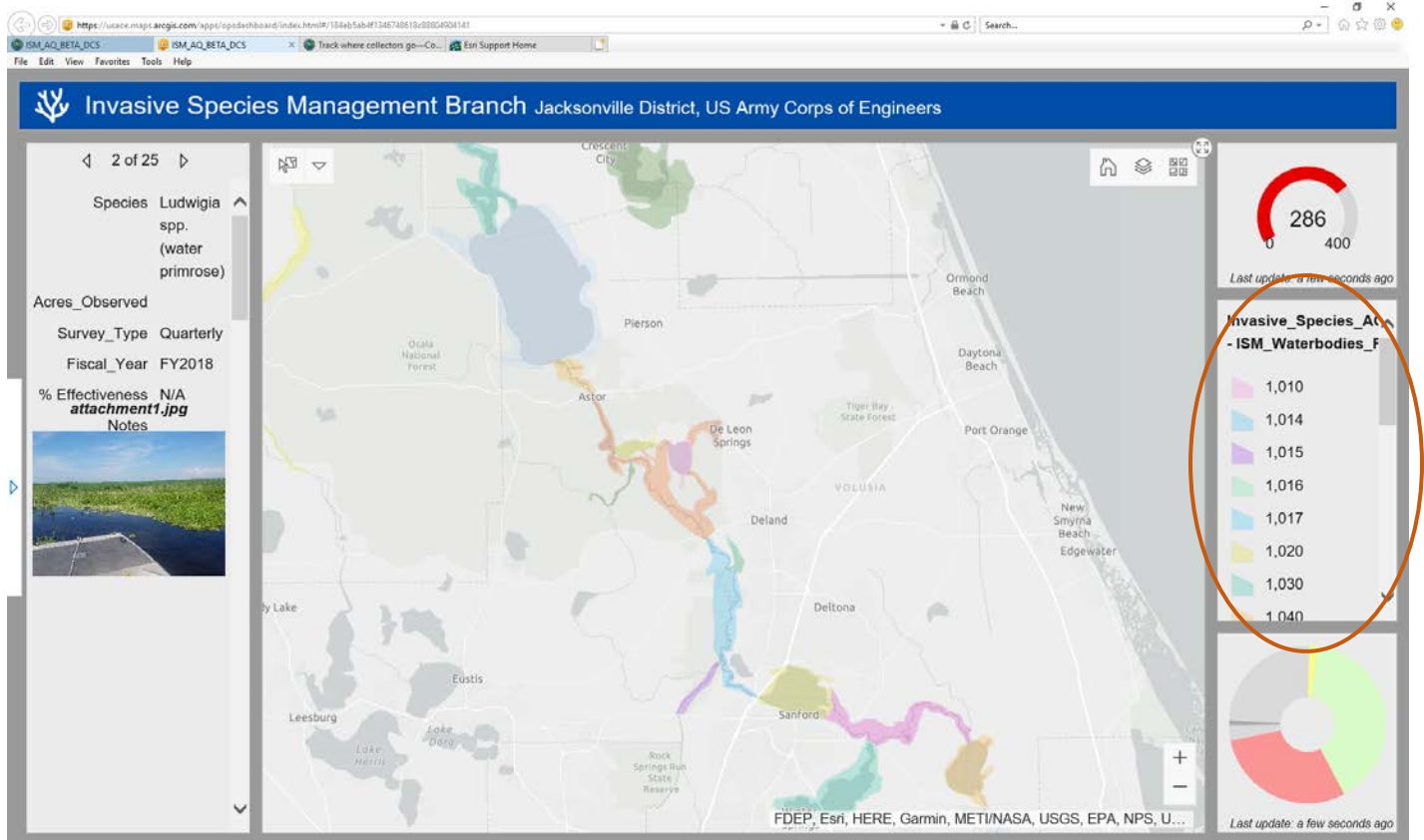
These Waterbodies are predetermined polygons so there is no need for their geospatial location to be changed or edited in any way. Therefore a NON-SPATIAL TABLE (NST) was linked to the Waterbodies polygons allowing records to be added to the NST table, without altering the Waterbodies table. In the case of CESAJ, a table was needed to record overall estimated acreages and AOR-wide observations, not related to any one point, but to the entire AOR polygon. Therefore, by linking the non-spatial table to each individual Waterbody, several records can be added to one polygon (a spatial feature) without duplicating that polygon. This allows estimated acreage records for several different species and on several different surveys to be recorded for one Waterbody.

The AQ GDB contains a number of files, defined below:
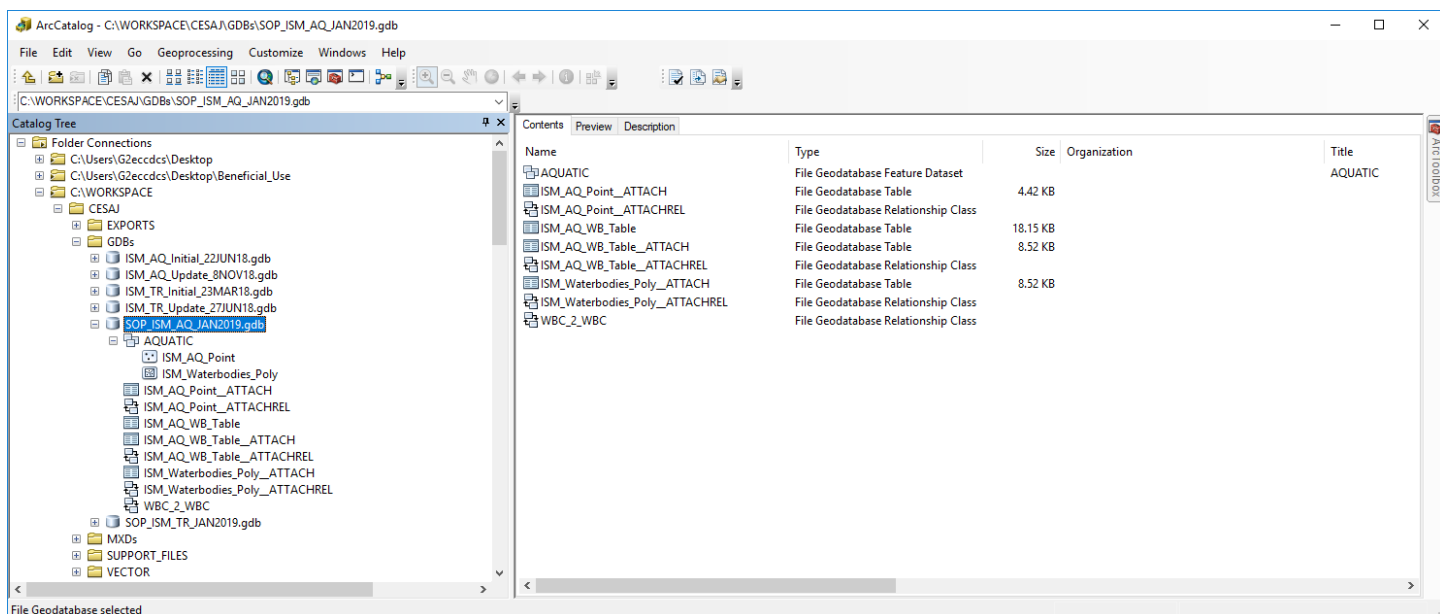
AQUATIC - This is a Feature Data Set used to store multiple Feature Classes. It is currently storing two: ISM_AQ_Point and ISM_Waterbodies_Poly.

ISM_AQ_Point - The Feature Class for collecting point data.

ISM_Waterbodies_Poly - The Feature Class for storing CESAJ's AORs.

ISM_AQ_Point_ATTACH - Non-Spatial table that stores photos associated with each point record.

ISM_AQ_Point_ATTACHREL - Relationship Class that manages the relationship between the photo and the record

ISM_AQ_WB_Table - The Non-Spatial Table for collecting records related (many-to-one) to the waterbodies.

ISM_AQ_WB_Table_ATTACH - Non-Spatial table that stores photos associated with each WB tabular record.

ISM_AQ_WB_Table_ATTACHREL - Relationship Class that manages the relationship between the photo and the record

ISM_Waterbodies_Poly_ATTACH - Non-Spatial table that stores photos associated with each polygon record.

ISM_Waterbodies_Poly_ATTACHREL - Relationship Class that manages the relationship between the photo and the record.

WBC_2_WBC - Relationship Class that manages the relationship between ISM_Waterbodies_Poly and ISM_AQ_WB_Table.

8.1.   Open the Excel Spreadsheet and rename it in accordance with your organization's naming conventions. Update the Excel Spreadsheet to reflect your requirements. It is critical to spend adequate time and effort determining your data needs in the spreadsheet and getting familiar with the existing information. Changes or additions after implementation can be difficult and may require coding. The SOP spreadsheet (screen capture below) identifies all the fields and domains that were meticulously determined to simultaneously meet the needs of the field biologist, the GIS analyst and be compatible with third-party databases, so modifications should be minimized.

8.2.   Review each tab in the spreadsheet, specifically the aquatic GDB and Domains tabs. Note the existing fields and their associated Drop-Down Lists (Domains). You will most likely have to change the existing drop-down list for the Species Domain, but there may be others that you want to modify as well. The existing drop-down lists are thorough but you may need to add or delete some of the options, for instance, there may be a ManagementAction you use in your region that is not covered in the current drop-down list.

Note Observer, Observation Date and Global Unique ID during your review; these are fields that are populated automatically and require no additional selections while in the field.

8.3.   Evaluate Column A to determine if you want to add a field that captures additional data not listed here. You should carefully consider the value of each data field collected versus the time and redundancy of collecting that data for each feature. We considered many aspects regarding the fields you see below and recommend leaving it as is, or at least keeping it as simple as possible. However, if you do need to add a field, instructions are included above in Section 3.

8.4.   If required, add a new field. Decide on the new field name and consider its length based on the amount of space you have on your field device (smart phone or tablet). Avoid using spaces as they can cause problems in ArcGIS. Decide on the GIS field "type" (Text, Integer, Date, etc.). Decide on the maximum number of characters your responses will have. Type a description of the field to explain the type of data being captured. Identify the source. Make any comments that may be helpful. Determine the order in which you want the field to appear in the app while in the field. Determine if the field will be auto-populated, have default values or have a drop-down pick list (Domain).

8.5.   If drop-downs (domains) are required for your added field, select the Domains tab in your spreadsheet. See example below. Add your domain name in a new COLUMN. Indicate which feature types it applies to (point or polygon). List your new drop-down selections in the order you want to see them appear in the drop-down list on your device. Consider the device size and note that having a large number of drop-down

selections will require additional scrolling in the field. This can lead to wasted time, so you should consider placing the most commonly used selections near the top of your list or setting a default.

8.6. Change the Species and TSN entries to reflect the invasive plants in your region. Change the "TSN for SPECIES" codes to match your newly added species. Go to https://ITIS.GOV and search your species to obtain the Taxonomic Serial Number. Note: using the Taxonomic Serial Number will ensure compatibility with EDDMapS and other similar systems that use TSN for record identification.

Update the AOR polygons to your AOR boundaries.

8.7. Update your spreadsheet based on your needs and reference those changes in the following steps. For example, you may want to change Waterbody_Code to AOR_Code. See below. This will be the field that ties the spatial polygon to its non-spatial records.

8.8. In ArcCatalog, import your AOR polygons to the AQUATIC (rename as needed) Feature Data Set within the AQ GDB.

8.9. Allow pictures to be attached (if desired) by right-clicking on the newly added feature class, then Manage, then Create Attachments.

8.10. Open ArcMAP and add a field that will tie your spatial polygons to your non-spatial table. For example, "AOR_Code" as a Short Integer or "Reach" as Text (see example below). Refer to SECTION 3.2, "Add a New Field Without Domains" on page 6. Reference your spreadsheet when adding your new field and remember this field will be duplicated in your Non-Spatial Table to allow for a "many to one" relationship to tie them together.

Now that your spatial data is done we will create the non-spatial data.

8.11. Create your Non-Spatial Table. Right-click on the GDB and select NEW then TABLE. Name your Table (ie: AOR_NST) then NEXT.

8.12. Ensure the Default Configuration Keyword radio button is selected then NEXT.

8.13. Add the fields and associated information from your spreadsheet.

Finish

8.14. To allow photos to be associated with each non-spatial record (if desired), right-click on your new table and select MANAGE then CREATE ATTACHEMENTS.

Join your non-spatial table to your spatial polygon data.

8.15. Right Click on the GDB and select NEW then RELATIONSHIP CLASS.

8.16. Provide a name (REL_AOR_2_NST) then select your NON-SPATIAL TABLE in the Origin table/feature class box. Select the POLYGON feature class in the Destination table/feature class box (You may need to open the Feature Data Set to find it). Then NEXT.

8.17. Select the SIMPLE relationship then NEXT.

8.18. Use default labels then ensure the NONE radio button is selected. Then NEXT.

**8.19.** Select the 1 - M (One to Many) radio button. Then NEXT.

8.20. Select the NO to add attributes radio button. Then NEXT.

8.21. Select the field you created in both your polygon and NST tables to tie them together (ie: AOR_Code or Reach). Select this field name for both drop-down boxes. Then NEXT.

8.22. Review your summary then select FINISH.

Now follow the steps listed above in SECTION 4 (Prepare Your Data for the Cloud) and SECTION 5 (ArcGIS On-Line), then return here to Add Data to the Non-Spatial Table.

9.1. Open Collector, sign and browse to your new Collector project. Then Select it.
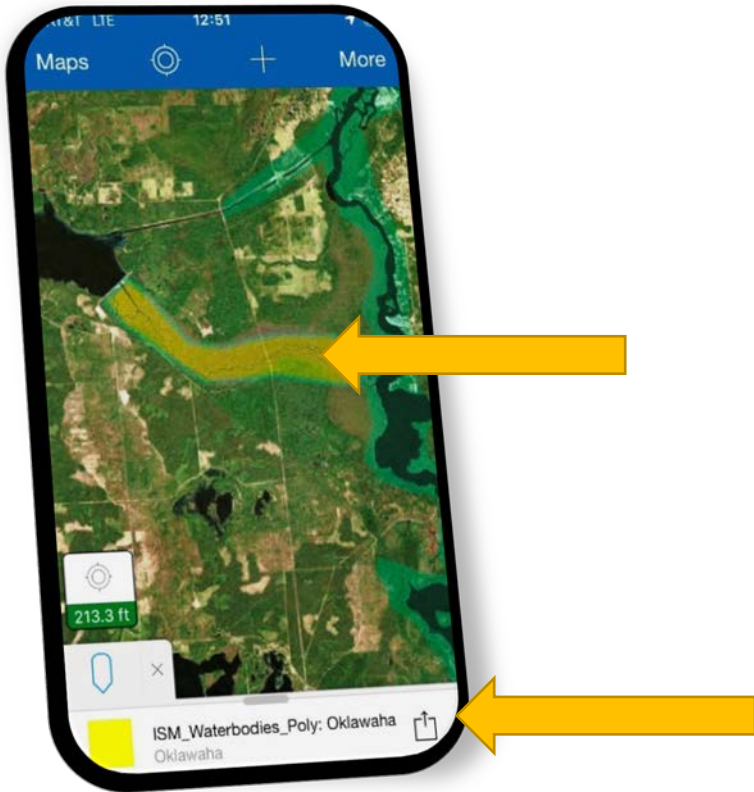
9.2. When you are ready to collect field data for your Non-Spatial Table, Select the polygon AOR you want to add a non-spatial record to. This will highlight the polygon and bring up a small window with the polygon color, name and a "More" icon. See Bottom Arrow.

9.3. Select the NAME to bring up a window with both the Polygon record and the NST record.

9.4. Under the NST name you will see VIEW and NEW. Select NEW.

9.5. You can now fill in your attributes for the non-spatial table, related to the AOR Polygon. You can also add a photo by selecting the Camera icon.

9.6. When you have finished adding information, select SUBMIT.

9.7. Once you are finished collecting data, click on Maps to return to the maps page and then click on the sync icon (cloud with up and down arrows). A red number on the cloud will indicate the number of records to sync.

COMPLETE

This concludes the Standard Operating Procedure and associated instructions. For additional information contact the POCs listed below:

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