Collector as a Tool for Field Data Collection

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AKA “The Holminator”
Contents

Creating a Collector Geodatabase using ArcGIS: Pre-work and Definitions .............................................................. 2
  License Requirements: .............................................................................................................................................. 2
  Service Credits: ........................................................................................................................................................ 2
  The Collector Application: ...................................................................................................................................... 2
  Helpful Definitions: ................................................................................................................................................ 2
  Form Design: .......................................................................................................................................................... 3

Creating a Collector Geodatabase using ArcGIS: Instructions Booklet ................................................................. 8
  Steps 1-3: Creating a place to store your Geodatabase .......................................................................................... 8
  4. FEATURE CLASS ................................................................................................................................................. 11
  5. CREATING DOMAINS .................................................................................................................................... 15
  Steps 6-8: Preparing to publish your Geodatabase as a service .............................................................................. 21
  9. SERVICE EDITOR .............................................................................................................................................. 26
  Steps 10-20: Analyzing/sharing your service and ArcGIS online ......................................................................... 29

Long Term Management of your Collector gdb .................................................................................................... 48
  Part I: Viewing and manipulating your data in ArcGIS Online ............................................................................. 48
  Part II: Exporting and backing up your data by layer ............................................................................................ 53
  Part III: Exporting and Backing up your data: THE WHOLE GDB ....................................................................... 57
  Part IV: Preparing for Year Two of data collection ............................................................................................... 61
  Part V: Helpful Tips ................................................................................................................................................ 67
Creating a Collector Geodatabase using ArcGIS: Pre-work and Definitions

License Requirements:
ArcGIS Desktop Advanced with Extensions Single Use Nonprofit Organization Program Fee and Term License. (*you will not be able to create a collector map with an individual account).

Service Credits:
Make sure you have enough “Service Credits”; this will allow you to publish your geodatabase as a service and maintain its availability online. If you find that you do not have enough credits, contact an ESRI specialist to have them write you a quote for a Non-profit service credit bundle (it’s about $100 for 1,000 service credits). Your use of service credits, which are ‘spent’ daily, is proportional to the amount of data that you have stored in your online account. For example, if you add the soils for an entire County, you’re going to quickly burn through credits. If you only store small files on your account, 1,000 credits will last many, many years.

The Collector Application:
Unlock your phone and navigate to your “App Store” => Search “Collector for ArcGIS” => Download this application to your phone; you will need it later.

Helpful Definitions:
- **Geodatabase (GDB)**- A collection of geographic datasets (for example, a geodatabase might contain a dataset, known as a ‘feature class’, for “Owned Preserves” another for “Trails” that are on those preserves, and another for “Picnic Tables”) of various types held in a common file. Geodatabases can vary in size and complexity depending on user requirements.
  - **Feature class**- Essentially this is a “layer” or “shapefile” that you create within your Geodatabase.

- **Domain**- Lists that you link to your GDB to serve as a “drop down menu” within your feature class. *What’s a domain?* A fancy word for a collection of potential inputs that both simplifies and limits the inputs that can populate the record. That sounds a bit like gobbledygook, so here’s a simple example: Say you have a field that specifies whether or not you own the property on which a plant that you’re recording is located. Let’s call it “Owned”. Without a domain, the user can provide any input they like; from “Yep” to “Nope” to “Definitely!” If you created a domain, you might include two options; “Yes” and “No”. A user would then be able to select either of those options (or leave the field blank), but couldn’t add their own text.
Domains can be super useful if, for example, you’re tracking a set group of plant species.

- **Coded values** - your personalized drop down list values (these coded values are linked to your “Field Names”).
- **Code=description** - That is to say, the description of each coded value will often, indeed usually be the code as well. For example, you might have a coded value of “Garlic mustard”, with a description to match. You could also have a code of “GM” and a description of “Garlic mustard”, but we’ve found it to be a lot simpler to just keep ’em identical in most cases.

- **Field names** - Categories within your form. Essentially column headings. Imagine a spreadsheet of data that you might maintain about some sites. One column might be “Name of site”, another “Acreage”, another “Steward”, and so on. Each of those would be a Field in the GDB.

- **Data type** - Type of data (text, numerical, etc.) that you will specify in each feature class/layer of your GDB. You do this twice. First, you tell the computer what type of layer each Feature Class will be; a point, line, or polygon. Then, you specify what type of data each Field (those columns described above) will contain; text, a whole number, a decimal, a date, etc.

- **Database properties** - The place where you create and edit your domain; your domains also live here.

- **Web map** - An interactive display of geographic information that you can use to tell stories and answer questions. May contain a base map; layers; an extent; a legend; and navigation tools such as zoom, pan, place finders and bookmarks. Maps can be opened in standard web browsers, mobile devices, and desktop map viewers. They can be shared through links, embedded in websites and used to create browser-based and device-based apps. You’ve probably used these in your daily work, even if you didn’t know it. The I-View map of protected natural lands is a web map, as are a lot of County services that you can use to visually locate and identify specific parcels.

**Form Design:**
In our example, we create a very simple form for data collection where we might collect information on:

- Collector: (name of person collecting data)
- Species: (name of species being collected)
We linked both of these categories to “domains”; drop down lists in which the user can select an item from a list.

However if you do not link a domain to your category you can select the kind of data that a user can enter from a series of options including: text, long integer, short integer, date. See “Data type” above.

Most forms will be more complicated than our example and may include some of the below categories.

It is important to design your forms ahead of time to ensure that the organization of your forms is laid out in a user-friendly way that benefits your organizations’ goals.

Say you want to collect data on:

- Native Seed- Location
- Native Seed- Collection
- Invasive Plants- Location
- Invasive Plants- Removed
- Easement Violations- Location

These will become the names of the “Feature Class(es)” within your “GDB” *

<table>
<thead>
<tr>
<th>FEATURE CLASS/LAYER</th>
<th>TYPE OF DATA COLLECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native Seed- Location</td>
<td>Polygon</td>
</tr>
<tr>
<td>Native Seed- Collection</td>
<td>Polygon</td>
</tr>
<tr>
<td>Invasive Plants- Location</td>
<td>Polygon</td>
</tr>
<tr>
<td>Invasive Plants- Removed</td>
<td>Polygon</td>
</tr>
<tr>
<td>Easement Violations- Location</td>
<td>Points</td>
</tr>
</tbody>
</table>

The sub-category data collection may vary for each “Feature Class” and make up the “Feature Class Properties” (*refer to step 4g in the instruction booklet)

Below are “Feature Classes” with their associated “Feature Class Properties” (*Field name : Data Type*)
## Designing your forms for Collector

<table>
<thead>
<tr>
<th>KEY</th>
<th>FORM ORGANIZATION/LAYOUT</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color key/Collector Code:</td>
<td>Native Seed-Location</td>
<td>Who is collecting your data? Will it be the same individuals? You can make a list (domain) of the people who will be collecting your data. In the field you will be able to select for a drop down list.</td>
</tr>
<tr>
<td><strong>Name of Feature Class/Layer</strong></td>
<td>Collector</td>
<td>Text</td>
</tr>
<tr>
<td><strong>Feature class properties (Field name: Data Type)</strong></td>
<td>Species</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Long integer</td>
</tr>
<tr>
<td></td>
<td>Notes</td>
<td>Text</td>
</tr>
<tr>
<td><strong>Native Seed-Collection</strong></td>
<td>Collector</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Species</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Date</td>
<td>Long integer</td>
</tr>
<tr>
<td></td>
<td>Volume</td>
<td>Text</td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td>Long integer</td>
</tr>
<tr>
<td></td>
<td>Number of volunteers</td>
<td>Long integer</td>
</tr>
<tr>
<td>Notes</td>
<td>Text</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
</tbody>
</table>

**Invasive Plants - Location**

<table>
<thead>
<tr>
<th>Collector</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>Text</td>
</tr>
<tr>
<td>Location</td>
<td>Text</td>
</tr>
<tr>
<td>Date</td>
<td>Long integer</td>
</tr>
<tr>
<td>Notes</td>
<td>Text</td>
</tr>
</tbody>
</table>

**Invasive Plants - Removed**

<table>
<thead>
<tr>
<th>Collector</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>Text</td>
</tr>
<tr>
<td>Location</td>
<td>Text</td>
</tr>
<tr>
<td>Date</td>
<td>Long integer</td>
</tr>
<tr>
<td>Hours</td>
<td>Long integer</td>
</tr>
<tr>
<td>Number of volunteers</td>
<td>Long integer</td>
</tr>
<tr>
<td>Notes</td>
<td>Text</td>
</tr>
</tbody>
</table>

**Easement Violations - Location**

<table>
<thead>
<tr>
<th>Collector</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Text</td>
</tr>
<tr>
<td>Date</td>
<td>Long Integer</td>
</tr>
<tr>
<td>Notes</td>
<td>Text</td>
</tr>
</tbody>
</table>
***Designing these forms ahead of time is helpful for when you get to step 4 in the instructions booklet.

Sources:

www.arcgis.com
Creating a Collector Geodatabase using ArcGIS: Instructions

Booklet

Steps 1-3: Creating a place to store your Geodatabase

1. Create a “New Folder” in the location that you want to store your Geodatabase (GDB).

2. Open ArcCatalog and Navigate to that folder
a. Right click your folder, select: new, file geodatabase.

b. Now you have an empty GDB.
3. Right click the file GDB, select: “New, Feature Class”
4. FEATURE CLASS
   a. Name the feature class and give it an “alias”
   
   b. Choose the “Type” of feature you want to collect by clicking the drop down menu and select the type of data you want to collect (Polygons, points, lines etc.).
   
   c. Click Next.
d. Set your geographic coordinate system – choose what you normally use for your region. In Illinois, you’ll likely use Illinois State Plane East (NAD 83) if you’re in the eastern half of the state, Illinois State Plane West (NAD 83) if you’re in the west, or Illinois State Transverse Mercator if you operate in both regions. If you’re of a metric bent, you probably use UTM Zone 16 (NAD 83).

e. Click next when the XY Tolerance window pops up (it will automatically populate).
f. Click next (default will automatically be selected) when specifying the database storage configuration.
g. Here you will type in as many “Field Names” as you want, depending on the data you want to collect. *Refer to the forms you created in the Pre-Work Section of your packet.

*Additionally, you will specify the “Data Type” for each field (drop down menu), which dictates the type of information you want to collect (number, text etc.).

**Simply click on the box to permit typing.
h. SIDE NOTE******You can always type in the name of the species you are collecting BUT If you want a drop down list of “Species” (or any other category) you can create a “Domain” so that you can select choices from a drop down list (that you customized) in the field. Remember though that it’s an either-or proposition. You can either type in information or you can select from pre-determined selections via a drop down menu. 

What’s a domain? A fancy word for a collection of potential inputs that both simplifies and limits the inputs that can populate the record. That sounds a bit like gobbledygook, so here’s a simple example: Say you have a field that specifies whether or not you own the property on which a plant that you’re recording is located. Let’s call it “Owned”. Without a domain, the user can provide any input they like; from “Yep” to “Nope” to “Definitely!” If you created a domain, you might include two options; “Yes” and “No”. A user would then be able to select either of those options (or leave the field blank), but couldn’t add their own text. Domains can be super useful if, for example, you’re tracking a set group of plant species.

5. CREATING DOMAINS
   a. Open ArcCatalog and navigate to you GDB, right click the GDB (not the Feature Class you just created!) and select “properties”
b. The “Database Properties” window will appear.

   i. The description can be whatever you want it to be.
c. In section two of this popup box (Domain Properties) => change your “field type” to text or long integer, etc., etc. depending on what type of dropdown list you are making. (i.e. DEPENDING ON THE FORMS YOU MADE EARLIER)

***The “Field Type” in database/domain properties should be the same as the “Data Type” in the Feature Class field that you want to link to (from step 4g).

*In our example both are set to “Text”*

**Important note** in the image below you can see that the first row of the top section is selected. This gives you access to edit the “CODED VALUES” within that domain/list (3rd section in the image)

**Important note** when typing your “CODED VALUES” type THE SAME THING into the description box (view 3rd section in below image) (**technically you don’t have to type identical names but it seems to be a good practice)

**Important Note** you can have as many coded values in your list as you want (I.E. YOU CAN HAVE THOUSANDS OF SPECIES IN YOUR LIST)
d. You can create multiple domains! The image below shows a “Collector” domain and a “Species” domain; each of which have their own dropdown list/coded values.

*Make sure to apply changes during editing so your lists are saved.*
e. Add any and all information you want to collect, in the “Field Name” and “Data Type” columns (based on the forms you made during the pre-work section)

* If you don’t associate a field with a domain, the user can fill in the field with whatever input they want, so long as it’s the right ‘type’ of input. For example, if you’ve got a field where the type of data is set to a number, the user won’t be permitted to add “Sunny” or even “Thirty-two”. They could only add numerals; like “43.6”.

f. Once you have completed the Field Name, Data Type and Domain lists (and applied all changes to save your work) close ArcCatalog.
Steps 6-8: Preparing to publish your Geodatabase as a service
6. Open ArcMap and add/import the GDB you just made and from there the Feature Class(es).
7. Sign into your online account
8. Click File => Share As => Service => Next
a. PUBLISH YOUR SERVICE (*REMEMBER YOU HAVE TO HAVE AN ORGANIZATIONAL ACCOUNT FOR THIS!!!)

i. Choose a connection (You will choose your organization)
ii. Name your GDB by filling in the “Service Name” section.
iii. Click Continue
iv. A “Service Editor” will popup
9. SERVICE EDITOR

a. Parameters => NA/do nothing

b. Capabilities => NA/do nothing
c. Feature Access => You will likely want to click all of the boxes here (depending on what you want to allow users to do when collecting this data)
d. Item description => Fill in the blanks

3. Sharing => Share with your organization and EVERYONE. Sharing the service with everyone allows you to freely use the collector GDB in the field and as a Map Service on ArcGIS online.
Steps 10-20: Analyzing/sharing your service and ArcGIS online

10. Analyze your service for sharing by clicking the “Analyze” button on the top menu bar of the Service Editor window.

   a. This ensures there are no errors in the service you are trying to publish.
   b. Address any errors that pop up; you can publish the service with minor errors but will not be allowed to publish the service if major errors are present (ArcMap will categorize the errors for you).
c. Below you can see that a low severity error was found; you can still publish the service with this error and have no problems!

11. If you don’t get any *major* warnings or errors, you should be able to “Publish” the file.
a. ArcMap will let you know if publishing was successful.

b. Once you have successfully published your GDB, navigate to your ArcGIS online account and sign in.

12. Once you are signed in to your online account, navigate to the “Content” tab.

   a. You should see the GDB you just uploaded as a “Feature Layer (hosted)”
b. Click on the title of your “Feature Layer” to open the “Overview” page

13. On the overview page for the feature layer, you can change some settings.
   
a. Scroll down to “Layers” and choose “Enable Attachments” => this will allow users to take photos and attach them to the data they are collecting.
14. Open your Feature Layer in “Map Viewer”

   a. Click “Open in Map Viewer” on the right side of your screen.

   b. Once you open your GDB in Map Viewer, you will see something like the below photo:

   *you are now in the process of creating a “Web Map”
   **Creating a Web Map will allow you to bring in other layers of data that will compliment your GDB for data collection (i.e. property layer/shapefile)
15. Add more content to your Web Map by selecting the “Add” button on your screen.

a. You can add different types of data: Search for layers, Browse living atlas layers, add layer from the web (which includes thousands of publicly available datasets, including, depending on your location, things like wetlands, watersheds, protected properties, zoning, etc.), add layer from a file or add map notes.
b. Here we are going to “Search for Layers” that we need to add to the web map in order to collect our data.

   i. For this example, we will be adding a property shapefile, which will dictate where our data is going to be collected.

   ii. *This property shapefile was added to our ArcGIS online account by following steps 6-11 above (just switch out the file name of whatever data you are adding)

   c. Click on the plus button to add desired layers to your web map.

   d. Now you have added another layer of information to your web map!
16. Navigate back to the details/content to view all of the layers in your web map (add as many layers as desired).

17. Once you have added all desired layers to the web map, save and name your web map!
18. Share your web map by clicking on the “Share” button
a. Select who you want to share your map with and then click “Done”

****Important note!!! You must share your map with “Your Organization” in order to utilize the map in the collector app.

*****You can also share it publicly if you want!!!!! (we did in this example!)

******When accessing the map on the collector app, the user will be prompted to sign in with the “Organizational Account” credentials.
19. Navigate back to your “Content” page

a. If all went as it is supposed to... you should see your new web map at the top of your content page.
20. You should now have full access to your collector map!!! *Go to the app you downloaded* onto your phone or tablet, and sign in! You should automatically see this map you created!

a. Select your map
b. Click the “Add” button to collect data
c. Select your layer for data collection.
d. Once you select your layer, the empty fields you created earlier will pop up!
e. Fill out each section!

<table>
<thead>
<tr>
<th>Collector</th>
<th>John Smith</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>blazing star</td>
</tr>
<tr>
<td>Date</td>
<td>12,122,020</td>
</tr>
<tr>
<td>Location</td>
<td>Mars</td>
</tr>
<tr>
<td>Notes</td>
<td>NA</td>
</tr>
</tbody>
</table>
f. Add your data points and “Submit” your data.

<table>
<thead>
<tr>
<th>Collector</th>
<th>John Smith</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species</td>
<td>blazing star</td>
</tr>
<tr>
<td>Date</td>
<td>12,122,020</td>
</tr>
<tr>
<td>Location</td>
<td>Mars</td>
</tr>
<tr>
<td>Notes</td>
<td>NA</td>
</tr>
</tbody>
</table>
g. Once your data is submitted, it will be automatically synced from your phone/tablet to your online account and be available for viewing on any device.
Notes for the future:

You can do a lot of stuff with this program! You can download and export your shapefiles, or the data you collect as a spreadsheet, lock certain layers etc. etc.

Long Term Management of your Collector gdb

Part I: Viewing and manipulating your data in ArcGIS Online

1. Sign into your ArcGIS online account and navigate to the “My Content” Tab
2. Click on the map you have been using to collect data:

3. “Open in Map Viewer”
4. In “Map Viewer” Choose the “Details” tab in the left menu bar; then choose “Content” and then choose a layer you want to look at (i.e. Monitoring Invasives2019).
   a. Below the layer name, you will see multiple symbols or pictures, hover your mouse over each to view a popup description window.
   b. Choose the “Table” image (circled in red below) to view the data you have collected in a table format, on your screen.
5. View the data in table format:
   a. Here you can view all of the data entered into your layers over time
   b. By selecting the three horizontal lines in the top right corner of your table, you can filter fields out, select individual features and even add fields to your table.
Analysis: In ArcGIS online, there is an “Analysis” tool which will allow you to look at your data in various ways. Explore and see what you find!

**The “Analysis” tool USES SERVICE CREDITS!!!!!!! #FYI****
Part II: Exporting and backing up your data by layer

1. Navigate to the “Overview” page of your web map.

   a. Scroll down and select the layer/data you want to export.
b. Other layers linked to your selected layer (i.e. they’re all from the same gdb) will appear on the screen.

c. Scroll down to select the layer you want to export data from.
   i. Select “Export To”
   ii. A popup window will allow you to select from various formats to export your data.
d. Another window will pop up; you can label your layer with identifying tags; then select “Export” *You can only export one layer/one file type at a time.

2. You will automatically be re-directed to a new page where you can: Download, Publish, Update, or Share the individual layer you just exported.
a. Download the data to your computer and open in the appropriate program to view! (i.e. if you download a csv, open the file in excel; if you download a shapefile, open the file in ArcMap).

b. The data you downloaded will appear as a “file” in your ArcGIS Online “Content” page.
   i. *You can erase this after you have saved the downloaded file to a backup drive, otherwise it will use up your online Service Credits.

c. Data downloaded from ArcGIS Online as a CSV file, opened in an Excel Word document.
Part III: Exporting and Backing up your data: THE WHOLE GDB

1. Navigate to “My Content” and select the gdb you collected in all year long.

2. You will be directed to the “Overview” page of the gdb layer.
   a. Select “Export Data” a dropdown menu will appear; allowing you to select the type of file export you want to make (csv, shapefile, etc).
3. Name your export, then select “Export”

4. You will be re-directed to a page which allows you to “Download”, “Publish”, “Update” or “Share” your data:
5. Select “Download” and the file will download to your computer just as any other file would! Save it in a safe place!

6. Files downloaded on your computer (I downloaded a shapefile so I could open these files in ArcMap)
7. Don’t forget to delete the file you just created during this download in “My Content” => *because it will use up service credits*
Part IV: Preparing for Year Two of data collection

1. Locking layers and moving into a second year of data collection.

   a. Once you have downloaded and saved all of your files, navigate to the “Overview page” of your web map and select the layer that you have been working with and that you want to lock (*you have to lock each layer individually).
b. After you select your layer, you will be led to the layer “Overview page”; click on the “Settings” tab.

c. Select “Feature Layer (Hosted)”
d. Uncheck “Enable Editing”

- After you have finished disabling the editing capability of all the “old” layers; you will want to upload a NEW gdb to collect data on for the New Year.
  i. Simply upload the SAME gdb that you used last year, just change the file name to the updated year.
2. Uploading a new gdb to your existing collector map.

   a. Navigate to ArcCatalog and find your original gdb; update the file name to display the current year.

      i. Edit any feature classes/layers here, edit domains etc. etc. (refer to document “Creating a Collector Geodatabase using ArcGIS” as needed)
b. Follow the instructions in the “Creating a Collector Geodatabase using ArcGIS” to publish your gdb as a service to ArcGIS Online.

i. The new gdb will show up on the “Content” page of your ArcGIS Online account.
c. Navigate to your collector web map and “Open in Map Viewer”
   i. Select “Add” on the left menu bar
   ii. Select “Search for Layer”
      ii. Add your new gdb by clicking on the “(+) sign” (circled below)

   d. You should now be ready to collect data for another year!
      iii. Make sure layer editing is enabled on your new layers (they should be as long as you followed the correct service publishing steps)
      iv. Make sure you enable attachments on each layer you want to be able to attach photos to. (*see instructions from “Creating a Collector Geodatabase using ArcGIS” guide if you forgot how to do this)
Part V: Helpful Tips

Share your gdb to share your domains!!!!

-If you share your gdb with someone, they will automatically have access to your domain lists; it can be helpful to share long species domains/lists with your fellow conservationists.

Backup your data regularly from online to a safe backup location!