Complete Training

This step in the digitization of localities process requires the use of ArcGIS Pro, which is not an intuitive program for first time users. Thus, before starting, it might be wise to become familiar with some of the basics of ArcGIS Pro through one or both useful training options listed below. For each of these options, make sure to download the exercise files/data and complete or attempt the various exercises, challenges, and/or on your own sections to gain practice and experience using ArcGIS Pro.

Option 1: ArcGIS Pro Essential Training on Linkedin Learning

This training option can be accessed via the campus portal (my.cu.edu). Log-in, open the dropdown menu at the top of the screen, and select Training. Then select the Linkedin Learning tile. Linkedin.com/learning will open in a separate window. Once in Linkedin.com/learning, search for "ArcGIS Pro 2.4 Essential Training" to start the training session. Note that this training might be outdated depending on which version of ArcGIS Pro you are using. Regardless, most of the content in the training module is still relevant and useful. Chapters that you should focus on when taking this training include:
- Introduction
- 1. Understanding ArcGIS Pro
- 2. Vector Data
- 3. Raster Data
- 4. Styling Data
- 5. Labeling Features
- 7. Printing with Map Layouts
- 8. Creating Data

Option 2: Getting to Know ArcGIS Pro 2nd Edition by Michael Law and Amy Collins

This training option is a book and can be checked out from the Toohey Library. Note that a lot of the exercises and on your own sections work with ArcGIS Online. ArcGIS Online is not used in this step of the digitization of localities procedure, thus, feel free to skip those parts of the book. Chapters that you should focus on when taking this training include:
- Preface
- 1. Introducing GIS
- 2. A first look at ArcGIS Pro
- 3. Exploring geospatial relationships
- 4. Creating and editing spatial data
- 10. Presenting your project

Here are the file paths (where to find them) for the various resources that are mentioned below.
- No Data Localities Excel Worksheet
  - W:\\Section Files\Collections Management\Localities
- Localities Not Mapped Excel Worksheet
  - W:\\Section Files\Collections Management\Localities

- Localities ArcGIS Pro Project
  - W:\\Section Files\Collections Management\Localities\GIS\Localities
- Georeferenced Localities Excel Worksheet
  - : W:\\Section Files\Collections Management\Localities

Step 1: Determine if the Locality Should be Mapped

Pull all the documents for a locality out of the binder and read them over. As mentioned in the previous step of the digitization of localities procedure (Step 2_Georeferencing Localities), there are several localities that are no data localities. These no data localities do not have any geographical information for them to be mapped. Double check to make sure that this locality was written in the No Data Localities Excel Worksheet. Then skip ahead to the filing localities step of the digitization of localities procedure (Step 4_Filing Localities.docx).

Furthermore, several localities only have enough geographical information to indicate that they are in a country, state, or county. The resolution of these localities is too poor for it to be worth mapping. For example, if a locality stated that it is in Wyoming and you have no other information, then you would end up drawing the border of the state of Wyoming and labeling it as a single locality, which isn't very useful. Therefore, if the locality only has country, state, and/or county data and nothing else DO NOT map the locality. Instead, write this locality down on the Localities Not Mapped Excel Worksheet. Make sure to give a reason in the Reason field of the Localities Not Mapped Excel Worksheet as to why this locality was not mapped. Otherwise, no one will understand why you listed it in the worksheet. Then skip ahead to the filing localities step of the digitization of localities procedure (Step 4_Filing Localities.docx).

Step 2: Determine Vector Type of Locality

If you determined that the locality can be mapped, then the next step is to determine what vector type the locality should be mapped as. In other words, is the locality a point, a line, or a polygon. Usually, looking at the map document included in the locality documents and reading the descriptions and other additional information will tell what type of vector the locality is. This is important, as it will tell you which feature class layer in ArcGIS Pro to create the locality in. Some tips:

- Localities georeferenced with geographic coordinates are usually points.
- Localities georeferenced with PLSS information are usually polygons, where the township-range set, section, or quarter section is drawn as the polygon.
- Localities georeferenced with GEOLocate can be any three and depends on the locality description:
  - Points are usually:
    - A city, town, or village (e.g. Boulder, CO)
    - A street address (e.g. 1777 Broadway, Boulder, CO 80302)
    - A junction, intersection, or crossing (e.g. junction of Broadway and Pearl St.)
    - A name of a cave (e.g. Mallory Cave)
    - A mouth or headwaters of a river, confluence of waterways, or a trailhead (e.g. confluence of South Boulder Creek and Boulder Creek)

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- Near a named place (e.g. vicinity of Boulder, CO)
- Offset in a particular direction and distance from a named place (e.g. N of Boulder, 5 km outside Longmont, or 50 miles W of Louisville)
- Offset along a path from a named place (e.g. 7.9 mi N Boulder, on US 36)
- Offset in multiple directions and distances from a named place (e.g. 6 km N and 4 km W of Boulder)
- Offset along multiple paths from a named place (e.g. 1.5 mi E CO HWY 119 and 2 mi S CO HWY 157 of Boulder)
  - Lines are usually
    - A name of a river, stream, road, or path (e.g. Boulder Creek)
    - Between two places (e.g. between Longmont and Boulder, Colorado)
  - Polygons are usually
    - A name of a ranch or farm (e.g. Boulder Valley Ranch)

Please note that the above tips are only suggestions. The only true way to figure out whether a locality is a point, line, or polygon is to read over the locality documents.

Step 3: Map the Locality

Now begins the fun part of mapping a locality into ArcGIS Pro. Remember that there are three vector types, point, line, or polygon, and the locality being mapped should fall into one of those types. The ArcGIS Pro Project containing all the localities is called Localities.

Mapping Point Localities
- Inside the Contents window on the left, check the checkbox next to the Locality Layers group and the Locality Points feature class layer to make them visible on the map.
- Select the Edit ribbon from the top
- Inside the Features group of the Edit ribbon, select the Create button
  - The Create Features window should appear on the right
- Inside the Create Features window, expand the Locality Layers: Locality Points group (if it's not already) and select Locality Points
- Click Point to highlight the Point tool (if it's not already)
- Inside the map frame, right click and select the Absolute X, Y, Z.. option
- Inside the Absolute X,Y box, use the drop down menu on the right to select "dd" (dd, stands for decimal degrees)
- Open the Georeferenced Localities Excel Worksheet and find the row containing that locality's georeference data.
- Enter the coordinate found in the Map_Coordinates_lat field of the Georeferenced Localities Excel Worksheet into the latitude box and enter the coordinate found in the Map_Coordinates_long field of the Georeferenced Localities Excel Worksheet into the longitude box.
- Press the Enter key on the keyboard to add the point to the map.
- Zoom in to the new point and compare its placement with that of the point on the map in the locality documents.

- o If you notice that the point is plotted in the wrong place, then there are two things that may have gone wrong.
  - ▪ You mistyped the coordinates into the latitude and/or longitude boxes. In this case, simply delete the point and repeat the steps above.
  - ▪ The georeference might be bad. Flag this record in some fashion in the Georeferenced Localities Excel Worksheet to indicate that the georeference for the record should be double checked or redone.
- Inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
- Select the Save button at the top of the window to save the project
- Move on to "Step 4 – Editing the Attributes" below before mapping any more localities.

Mapping Line Localities - Freehand
- Inside the Contents window on the left, check the checkbox next to the Locality Layers group and the Locality Lines feature class layer to make them visible on the map.
- Select the Edit ribbon from the top
- Inside the Features group of the Edit ribbon, select the Create button
  - o The Create Features window should appear on the right
- Inside the Create Features window, expand the Locality Layers: Locality Lines group (if it's not already) and select Locality Lines
- Click Line to highlight the Line tool (if it's not already)
- Zoom into the area where the locality is located
- Start drawing your line, remembering to double-click to finish the line.
  - o You can also use the same Absolute X, Y, Z… option that was used to map point localities if one end of the locality line has specific geographic coordinates. See the Mapping Point Localities section above on how to use this option.
- Zoom in to the new line and compare its placement with that of the line on the map in the locality documents, edit as necessary.
- Inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
- Select the Save button at the top of the window to save the project
- Move on to "Step 4 – Editing the Attributes" below before mapping any more localities.

Mapping Polygon Localities - Freehand
- Inside the Contents window on the left, check the checkbox next to the Locality Layers group and the Locality Polygons feature class layer to make them visible on the map.
- Select the Edit ribbon from the top
- Inside the Features group of the Edit ribbon, select the Create button
  - o The Create Features window should appear on the right
- Inside the Create Features window, expand the Locality Layers: Locality Polygons group (if it's not already) and select Locality Polygons
- Click Polygon to highlight the Polygon tool (if it's not already)
- Zoom into the area where the locality is located

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- Start drawing your polygon, remembering to double-click to finish the polygon.
  - You can also use the same Absolute X, Y, Z… option that was used to map point localities if one end of the locality polygon has specific geographic coordinates. See the Mapping Point Localities section above on how to use this option.
- Zoom in to the new polygon and compare its placement with that of the polygon on the map in the locality documents, edit as necessary.
- Inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
- Select the Save button at the top of the window to save the project
- Move on to "Step 4 – Editing the Attributes" below before mapping any more localities.

Mapping Line or Polygon Localities – Tracing

Another way of mapping line or polygon localities is to import a JPG version of the map in the locality documents into ArcGIS Pro and use it as a template to trace the line or polygon of the locality. This is handy, as trying to draw the line or polygon freehand can be tricky. There are several steps to do this:

1. **Create a JPG Version of the Map in the Locality Documents**
   - Open the digital version of the locality documents in Adobe Acrobat Pro.
   - Select the Organize Pages option from the right side of the window.
   - Select the page containing the Map
   - Click the Extract button from the top of the window
   - Leave the checkboxes unchecked and then click Extract.
     - This will then extract the page containing the map and place it into its own tab along the top of the window.
   - Export the extracted map document by going to File > Export To > Image > JPEG.
   - Navigate to the W:\\Section Files\Collections Management\Localities\JPG Maps folder, name the file with the locality number (e.g. 68001), and save it as a JPEG type.
   - Close Adobe Acrobat Pro without saving any of the changes.

2. **Determine Latitude and Longitude Coordinates for the JPG Map**
   - On the map in the locality documents, find four distinct points on the map. It is preferred that these points be spread out, where one is in the upper left corner, one is in the upper right corner, one is in the lower left corner, and one is in the lower right corner.
   - For each of the selected points, determine their latitude and longitude coordinates in decimal degrees format. Convert the latitude and longitude into WGS84 if necessary.
   - Make sure to write these coordinates down and indicate which point they go to.

3. **Import the JPG Map into ArcGIS**
   - Open the Localities ArcGIS Pro project

- Inside the Catalog window on the right, navigate to the W:\\Section Files\Collections Management\Localities\JPG Maps folder and add the JPG version of the map document to the map frame.
- Inside the Contents window on the left, right click the imported JPG Map layer and select Zoom to Layer
- With the imported JPG Map layer selected, select the Imagery ribbon from the top
- Inside the Alignment group of the Imagery ribbon, select the Georeference button
   - This will then open the Georeference ribbon
- Inside the Prepare group of the Georeference ribbon, select the Set SRS button
- For the Map Properties: Localities dialog box, make sure the Current XY box is filled with GCS WGS 1984 and then click OK.
   - This then updates the JPG file, assigning it to the WGS84 datum.

4. **Set Control Points and Transform the Imported JPG Map Layer**
   - Inside the Adjust group of the Georeference ribbon, select the Auto Apply button to unhighlight it.
   - Inside the Adjust group of the Georeference ribbon, select the Add Control Points button
   - Zoom in on the imported JPG Map layer to the location of the upper left corner point you selected from Step 2 above.
   - Use your mouse to click on the upper left point on the imported JPG Map layer
   - Move your mouse away from the point and right click to bring up the Target Coordinates box.
   - Inside the Target Coordinates box, type in the longitude of the upper left point into the X box and the latitude of the upper left point into the Y box. Make sure to give the latitude a negative sign (-) if the locality is in the southern hemisphere and/or give the longitude a negative sign (-) if the locality is in the western hemisphere. Click OK, once finished.
      - Go back to the bullet that begins with "Zoom In…" and repeat the above steps to set the control points for the upper right corner, lower left corner, and lower right corner points you selected from Step 2.
   - Once all the control points are set, inside the Adjust group of the Georeference ribbon, select the Transformation button drop down arrow.
   - Select the 1st Order Polynomial (Affine) option from the list
      - This then moves the imported JPG Map layer to where it should be on the base map.
   - Zoom in and/or out on the imported JPG Map layer and check the accuracy of its placement.
      - Adjust the transparency of the imported JPG Map layer by selecting the Appearance ribbon, inside the Effects group, move the slider at the top to the right. This makes the imported JPG map layer "invisible" to some extent so you can compare it to underlying features on the base map.

- It may also help to change the base map to match that of the imported JPG Map layer. In other words, if the imported JPG Map layer is a scan of a topographic map, then changing the base map to a topographic map may help in checking the accuracy.
- If need be, start from the beginning of this step and repeat it to get a better position. Adding more control point locations may help in improving accuracy.

5. **Map the Locality**
   - Inside the Contents window on the left, check the checkbox next to the Locality Layers group and either the Locality Lines or Locality Polygons feature class layer to make them visible on the map.
   - Select the Edit ribbon from the top
   - Inside the Features group of the Edit ribbon, select the Create button
     - The Create Features window should appear on the right
   - Inside the Create Features window, expand the Locality Layers: Locality Lines or Locality Layers: Locality Polygons group (if it's not already) and select Locality Lines or Locality Polygons
   - Click Line to highlight the Line tool or click Polygon to highlight the Polygon tool (if it's not already)
   - Zoom in to the area where the locality is located
   - Start drawing your line or polygon by tracing the line or polygon from the imported JPG map layer, remembering to double-click to finish the line or polygon.
   - Turn off the imported JPG Map layer, zoom in to the new line or polygon and compare its placement with that of the line or polygon on the map in the locality documents, edit as necessary.

6. **Clean Up Layers**
   - In the Contents window on the left, remove the imported JPG Map layer.
   - Navigate to W:\\Section Files\Collections Management\Localities\JPG Maps folder and delete the JPG Map document for the locality.

7. **Save the Project**
   - Inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
   - Select the Save button at the top of the window to save the project
   - Move on to "Step 4 – Editing the Attributes" below before mapping any more localities.

Adding Quarter Sections to the Map

If the locality contains quarter section data and this is what needs to be mapped as a polygon in the ArcGIS Pro geodatabase, then you will need to use the quarter section boundary as a guide to create the polygon. Unfortunately, there is not a layer that contains all the quarter

sections for the PLSS grid. This means that all quarter section boundaries must be hand drawn in before the locality can be mapped. There are several steps to do this:

1. **Get Coordinates for a set of Quarter Section Reference Points**
   - Inside the Contents window on the left, check the checkbox next to the PLSS Grids group and all the feature class layers inside this group to make them visible on the map.
   - Zoom in to the PLSS section where the locality is located.
   - Select the Map ribbon from the top.
   - Inside the Inquiry group of the Map ribbon, select the Measure button.
     - The Measure Distance window will pop-up on the left side of the map.
   - Inside the Measure Distance window change the units from Imperial to Miles.
   - Using the Measure tool, measure the distance (in miles) between the upper left corner of the section and the upper right corner of the section. Divide this distance in half.
   - Using the Measure tool, figure out where half the distance (in miles) between the upper left corner of the section and the upper right corner of the section is located. Near the bottom of the map frame, there should be a set of Lat-Long coordinates in decimal degrees displayed. If the measure tool is located at this "half distance" spot, then the Lat-Long coordinates being displayed near the bottom of the map are the coordinates for this "half distance" spot. Write those down before moving your mouse.
   - Repeat this step to find Lat-Long coordinates for the "half distance" spots between the upper right corner of the section and lower right corner of the section, between the lower right corner of the section and lower left corner of the section, and between the lower left corner of the section and the upper left corner of the section.

2. **Map the Quarter Section Reference Points**
   - Select the Edit ribbon from the top
   - Inside the Features group of the Edit ribbon, select the Create button
     - The Create Features window should appear on the right
   - Inside the Create Features window, expand the PLSS Grids: Quarter Section Reference Points group (if it's not already) and select Quarter Section Reference Points
   - Click Point to highlight the Point tool (if it's not already)
   - Inside the map frame, right click and select the Absolute X, Y, Z.. option
   - Inside the Absolute X,Y box, use the drop down menu on the right to select "dd" (dd, stands for decimal degrees)
   - Enter the latitude coordinate of one of the "half distance" spots into the latitude box and enter the longitude coordinate of this "half distance" spot into the longitude box.
   - Press the Enter key on the keyboard to add the point to the map

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- o If necessary, move the point so that it rests along the line (boundary) of the section.
- Repeat these steps to map the other three "half distance" spots.

3. **Map the Quarter Section Boundaries**
   - Inside the Create Features window, expand the Quarter Section Layers: Quarter group (if it's not already) and select Quarter.
   - Click Line to highlight the Line tool (if it's not already)
   - Using the "half distance" spots you mapped in Step 2 above as guides, draw one line connecting the northern "half distance" spot and the southern "half distance" spot and a second line connecting the western "half distance" spot and the eastern "half distance" spot.
   - You have now drawn the boundaries for the quarter section. Don't worry if the lines are not straight. Not every section square is even/straight, as some of them have been slightly warped to account for the datum being used in ArcGIS Pro.

4. **Map the Quarter-Quarter Section and Quarter-Quarter-Quarter Section Boundaries**
   - Start the process over from Step 1 above, to draw the boundaries for the Quarter-Quarter or Quarter-Quarter-Quarter sections.
   - For the Quarter-Quarter section boundaries, remember
       - o Measure the distances (in miles) between the corners of the quarter section. For example, if the locality is in a quarter-quarter of the NW quarter of a section, then you should be measuring the distances (in miles) between the corners of the NW quarter and the Quarter Section Reference Points should be mapping along the boundaries of this NW quarter.
       - o When drawing the quarter-quarter lines, make sure to select Quarter Section Layers: Quarter Quarter group and select Quarter Quarter from the Create Features window.
   - For the Quarter-Quarter-Quarter section boundaries, remember
       - o Measure the distances (in miles) between the corners of the quarter-quarter section. For example, if the locality is in a quarter-quarter-quarter of the NW quarter of the NW quarter of a section, then you should be measuring the distances (in miles) between the corners of the NW quarter of the NW quarter and the Quarter Section Reference Points should be mapping along the boundaries of this NW quarter of the NW quarter.
       - o When drawing the quarter-quarter-quarter lines, make sure to select Quarter Section Layers: Quarter Quarter Quarter group and select Quarter Quarter Quarter from the Create Features window.

5. **Clean Up Layers**

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- In the Contents window on the left, right click the Quarter Section Reference Points layer, and select Attribute Table
- Inside the Quarter Section Reference Points attribute table, delete all the items.

6. **Save the Project**
   - Inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
   - Select the Save button at the top of the window to save the project.

Step 4: Editing the Attributes

Once you have created a new point, line, or polygon locality it is now time to edit the attributes for that locality. It is recommended that you perform this step before mapping a different locality so that you don't confuse which locality gets what attributes.
- Select the Edit ribbon
- Inside the Selection group of the Edit ribbon, select the Select button to activate the Select tool
- Use your mouse to select the point, line, or polygon of the locality.
- Inside the Selection group of the Edit ribbon, select the Attributes button
  - o This will open the Attributes window to the right
- Inside the Attributes window, start filling in all the attributes for the locality
  - o See the table on the last pages of this document to figure out what to enter into each of the attribute fields.
  - o Blank or Null values in the fields are acceptable.
- Once finished adding in attributes for the locality, inside the Manage Edits group of the Edit ribbon, select the Save button to save your edits
- Select the Save button at the top of the window to save the project.

Field Name	Data Format	What to Enter into the Field
Locality_Number		The number for the locality
Locality_Name		The name of the locality. 255 max character length.
Country	No abbreviations, use entire country name (e.g. United States of America)	- The country the locality is found in. 255 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the country the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
State	No abbreviations, use entire state name (e.g. Colorado)	- The state/province/territory/canton/department/district/prefecture the locality is found in. 255 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the state the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
County		- The county/borough/department/district/division/region/unit the locality is found in. 255 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the county the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
Period		Use the drop-down list to select the period of the locality.
Epoch		Use the drop-down list to select the epoch of the locality.
Age		Use the drop-down list to select the age of the locality.
NALMA		Use the drop-down list to select the NALMA of the locality.
Group		- The stratigraphic group of the locality. 100 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the correct stratigraphic unit the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
Formation		- The stratigraphic formation of the locality. 100 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the correct stratigraphic unit the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
Member		- The stratigraphic member of the locality. 100 max character length. - Using ArcGIS Pro, double check to make sure the locality is plotting in the correct stratigraphic unit the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.
Number_of_Specimens		For vertebrate, trace, and eggshell localities, open the Microsoft Access database, count the number of specimens that are tied to this locality. For

Field Name	Data Format	What to Enter into the Field
		invertebrate and paleobotany localities, email Talia Karim for the number of specimens tied to this locality. Enter that number into this field.
Taxa_Represented		Use the drop-down list to select which collection(s) has(have) specimens at this locality.
Discoverer	First initial and full last name (e.g. T. Karim)	The person who discovered (1st UCM collector) of the locality.
Year_Discovered		The year the locality was discovered
Date_Last_Collection	No words, include leading 0s for single digit numbers (e.g. 1998, 05/1998, 05/03/1998)	For vertebrate, trace, and eggshell localities, open the Microsoft Access database, look up the specimens that are tied to this locality. In the collection date field, find the most recent date. For invertebrate and paleobotany localities, email Talia Karim for the date of last collection tied to this locality. Enter that date into this field.
Datum_georeference		Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Datum_georeference field into this field.
Map_Coordinates_lat	Coordinates in decimal degrees (e.g. 41.66523 N). No degree symbol.	Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Map_Coordinates_lat field into this field.
Map_Coordinates_long	Coordinates in decimal degrees (e.g. 107.54207 W). No degree symbol.	Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Map_Coordinates_long field into this field.
Uncertainty_meters		Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Uncertainty_meters field into this field.
Verbatim_Datum		• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Verbatim_Datum field into this field. • If the Verbatim_Datum field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Verbatim_UTM_Zone		• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Verbatim_UTM_Zone field into this field. • If the Verbatim_UTM_Zone field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Verbatim_Coordinates_y	Lat-Long coordinate should have the hemisphere designation (e.g. N or S). No degree symbol. Minute and	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Verbatim_Coordinates_y field into this field.

Field Name	Data Format	What to Enter into the Field
	second symbols are allowed. UTM coordinate should have mN written after it.	• If the Verbatim_Coordinates_y field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Verbatim_Coordinates_x	Lat-Long coordinate should have the hemisphere designation (e.g. E or W). No degree symbol. Minute and second symbols are allowed. UTM coordinate should have mN written after it.	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Verbatim_Coordinates_x field into this field. • If the Verbatim_Coordinates_x field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Township	The township designation should have the cardinal direction (e.g. N or S) and leading 0s for single digit numbers (e.g. 03N, 25S)	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Township field into this field. • Using ArcGIS Pro, double check to make sure the locality is plotting in the correct township the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents. • If the Township field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Range	The range designation should have the cardinal direction (e.g. E or W) and leading 0s for single digit and double digit numbers (e.g. 003W, 021W 125E)	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Range field into this field. • Using ArcGIS Pro, double check to make sure the locality is plotting in the correct range the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents. • If the Range field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Section	The section number should have leading 0s for single digit numbers (e.g. 03, 21)	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Section field into this field. • Using ArcGIS Pro, double check to make sure the locality is plotting in the correct section the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents. • If the Section field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Quarters	Use only three quarters, write the smallest quarter first, SE/SE/NW	• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Quarters field into this field. • Using ArcGIS Pro, double check to make sure the locality is plotting in the correct section quarters the documents say it's in. If a discrepancy is found, add "_locality suspect" to the name of the PDF version of the locality documents.

Field Name	Data Format	What to Enter into the Field
		• If the Quarters field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Locality_String		• Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Locality_String field into this field. • If the Locality_String field is blank in the Georeferenced Localities Excel Worksheet, then leave this field blank as well.
Georef_by	First initial and full last name (e.g. J. Van Veldhuizen)	Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Georef_by field into this field.
Georef_date		Open the Georeferenced Localities Excel Worksheet, find the entry for this locality, and enter what was entered into the Georef_date field into this field.

To use ArcGIS pro to double check for:
• Country, State, County
  o Turn on and off the various layers in the Political Boundary Layers Group to make them visible
• Group, Formation, Member
  o Turn on and off the various layers in the Geology Layers Group to make them visible
• Township, Range, Section, and Quarters
  o Turn on and off the various layers in the PLSS Grids Group to make them visible