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Incorporating GPS into GIS

Exercise 1: Incorporate GPS into GIS
Estimated time: 20 minutes

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The purpose of this exercise is to learn how to import raw GPS data into ArcMap and ArcGIS Explorer Desktop.

You will learn how to utilize GPS data by incorporating it into a GIS geodatabase for mapping and analysis purposes.

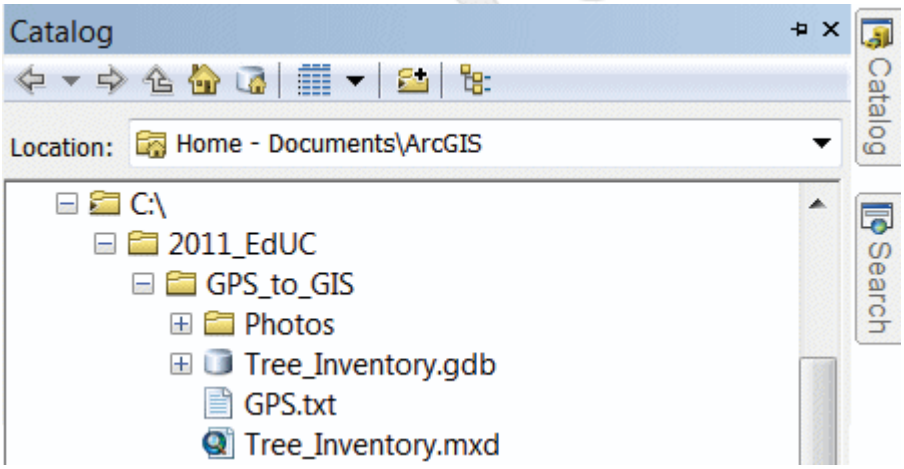
Step 1: Open ArcMap

☐ Open ArcMap.

On the right side of the ArcMap interface, you should see two tabs: one for the Search window and one for the Catalog window.

> ***Note:*** If you don't see the tab for the Catalog window, you can open the window by clicking the Windows menu and choosing Catalog.

☐ In the Catalog window, browse to the C:\2011_EdUC\GPS_to_GIS folder.



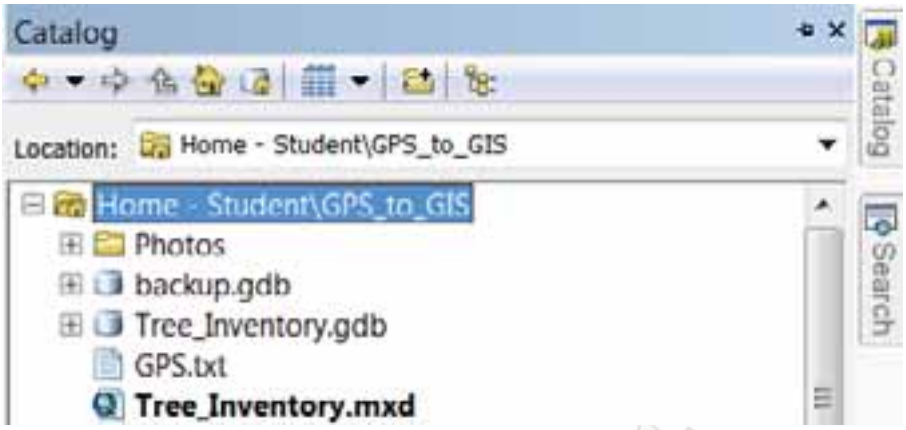
☐ Double click Tree_Inventory.mxd to open it.

☐ A map displays showing the Esri Denver Campus in Broomfield, Colorado.

> ***Note:*** The Aerial Imagery is a basemap provided by Bing that was previously added to the map via ArcGIS Online.

☐ From Bookmarks menu, choose Denver Campus.

☐ In the Catalog window, find the Home folder.

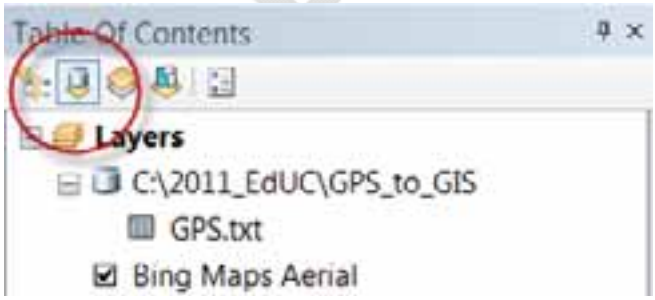


☐ Right-click the Tree_Inventory.gdb and choose Make Default Geodatabase.

Step 2: Add GPS data into ArcMap

☐ Drag GPS.txt into the map display.

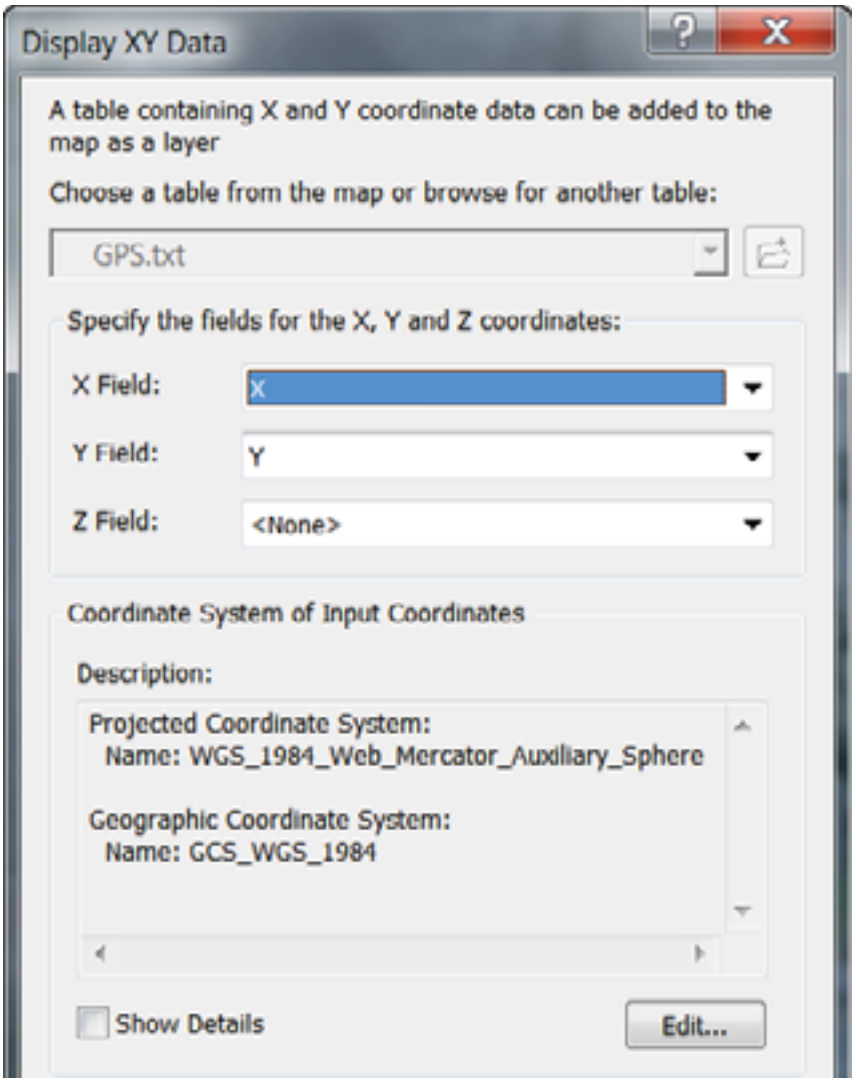
Notice that the Table Of Contents window view has now changed to List by Source because GPS.txt is a non-spatial table.



☐ Right-click the GPS.txt layer and choose Open.

> ***Note:*** This is where good data collection will be important. Any errors with the X or Y and/or attributes can be fixed later in an edit session. Mission planning upfront, before GPS data collection, will save time and effort when importing GPS data into ArcMap.

☐ In the table of contents, right-click the GPS.txt layer and choose Display XY Data.

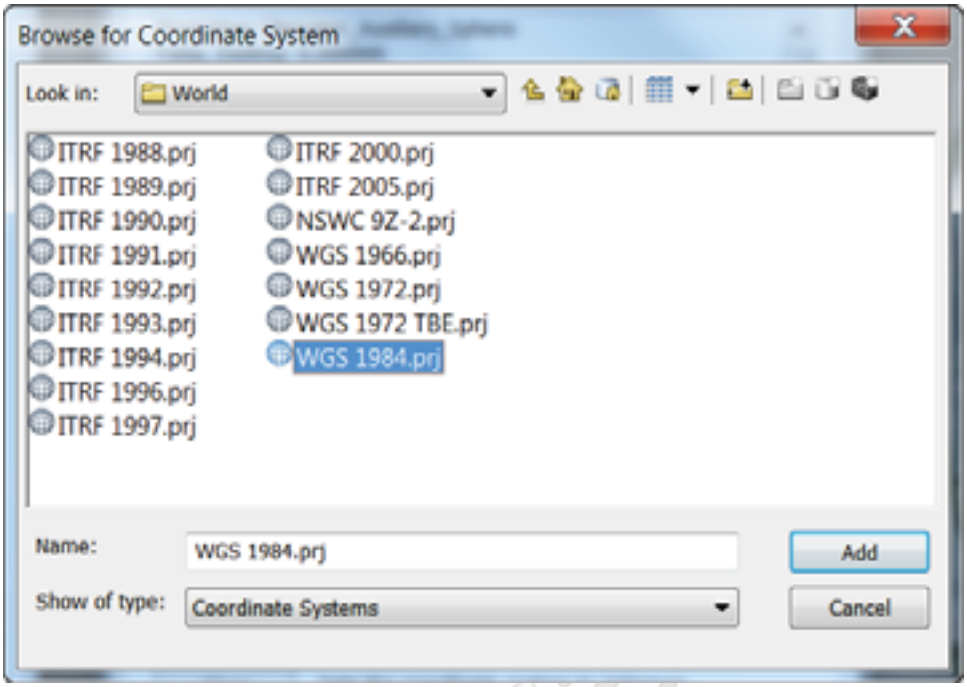


☐ In the Display XY Data dialog box, under Coordinate System of Input Coordinates, click Edit.

You will select a predefined coordinate system.

☐ In the Spatial Reference Properties dialog box, click Select.

☐ Navigate to Geographic Coordinate Systems > World, select WGS 1984.prj (as shown below), then click Add.

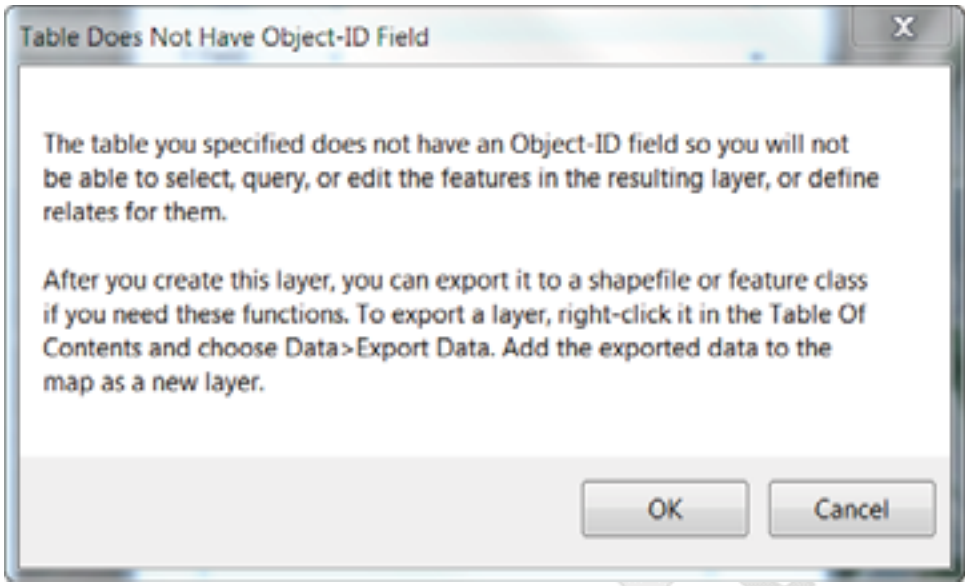


☐ Click OK.

☐ In the Display XY Data dialog box, make sure you have the X and Y fields mapped correctly.

> **! When working with latitude and longitude, it is important to specify this correctly here. Otherwise, your GPS points will not appear where they should. The X field is the longitude and Y field is the latitude.**

☐ Click OK.



A warning message displays indicating that the table does not have Object_ID field.

☐ Click OK.

The table of contents now contains an Event layer called GPS.txt Events, which displays your GPS Points.

> ***Note:*** An event layer is only a representation of the points from the text file. Events cannot be queried or selected.

In the next steps, you will learn how to import the GPS data into a geodatabase to use for analysis.

Step 3: Export as a new feature class

☐ Open the attribute table of the GPS.txt Events layer.

☐ Scroll to the right and notice that the Shape* field has been added.

> ***Note:*** ArcMap has taken the X and Y field attributes for each feature and is storing the geometry as a point in the Shape field. The X and Y fields have become attributes. To make this truly spatial data, you will need to export the event theme as a feature class to add Object IDs.

☐ Right-click the GPS.txt Events layer and choose Data > Export Data.

☐ Accept the defaults for All features and this layer's source data.

☐ Click the browse button for the Output feature class.

☐ In the Saving Data dialog box, click the Go To Default Geodatabase button  to go to the Tree_Inventory.gdb.

> ***Note:*** If you didn't specify the Tree_Inventory.gdb as the default geodatabase, navigate to that folder location of the geodatabase.

☐ Save the feature class as **Tree_Inventory**, click Save and then click OK.

☐ When asked if you want to add the exported data to the map as a layer, click Yes.

Step 4: Symbolize data

Now that the GPS points have been converted into spatial data and have attributes, you can use that to symbolize, label, and even do analysis.

☐ In the table of contents, change the view to List by Drawing Order.

☐ In the table of contents, right-click and remove the GPS.txt Events layer.

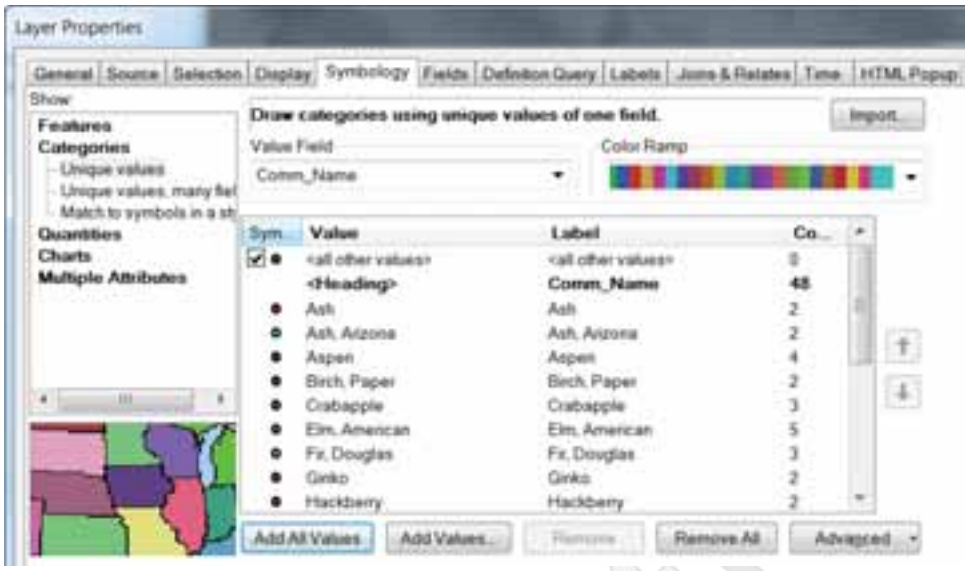
☐ Right-click the Tree_Inventory layer and choose Properties.

☐ Click the Symbology tab.

☐ Under Show, select Categories > Unique values.

☐ Under Value Field, select Comm_Name.

☐ Click Add All Values.



Step 5: Edit GPS data

Sometimes GPS data needs to be corrected once it has been brought into ArcMap. Editing is a great way to fill in attributes and/or make minor changes to the geometry due to GPS errors made while being collected.

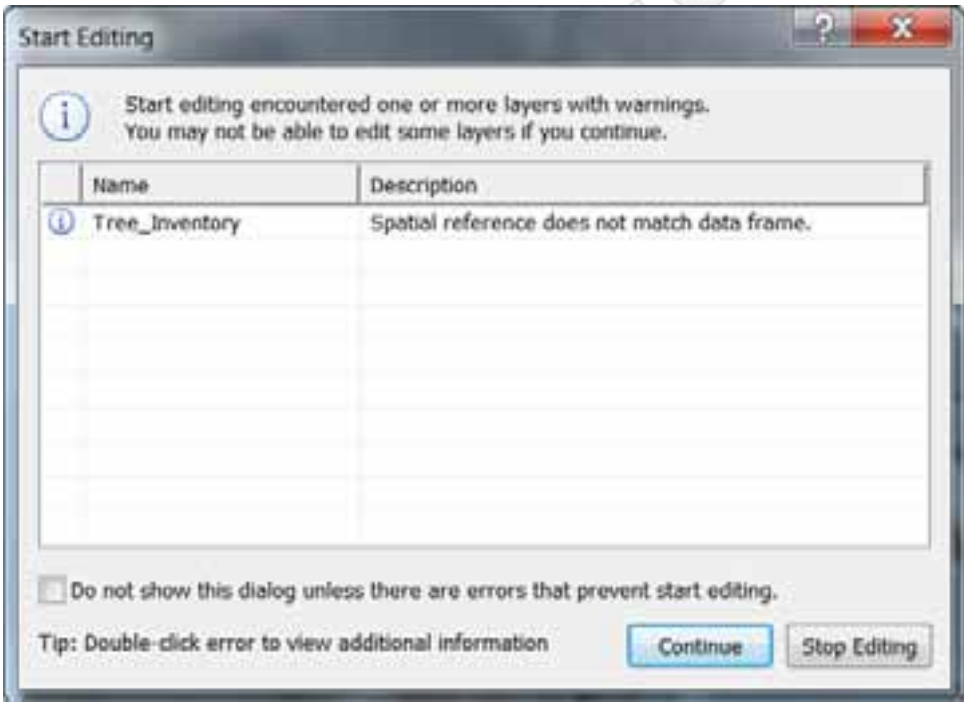
☐ Add the Editor toolbar, if necessary.

☐ Start an edit session (from the Editor menu, choose Start Editing).

☐ In the Start Editing dialog box, select Tree_Inventory.

Note: This map contains two workspaces. One is the folder for GPS.txt and the other is the Tree_Inventory.gdb. Editing will only allow you to edit in one workspace at a time.

☐ Click OK.



☐ When the Start Editing layer warning displays, click Continue.

☐ Close the Create Features window.

There are two trees next to the circular driveway near the building. One is an Ash and the other is an Aspen.

☐ Use the Identify tool to find them (use the graphic below as a guide).

☐ Use the Edit tool to select the Aspen and move the point to the center of the circle.

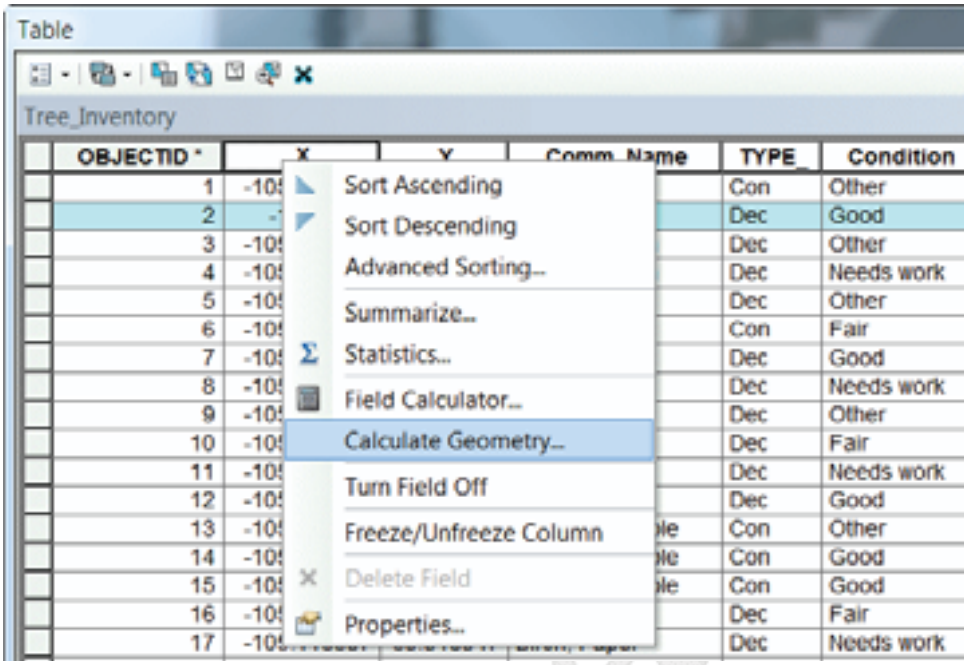
> ***Note:*** By moving the vertex of the point, you are affecting the X and Y of the Shape field and not the X and Y fields that are attributes.

☐ Right-click the Trees_Inventory layer and open the attribute table.

☐ Make sure you have the Aspen tree that was just moved selected.

☐ Scroll to the right and type in a name for the Inspector field (e.g., Ken).

☐ Right-click the heading of the X field and select Calculate Geometry (as shown below).



☐ In the Calculate Geometry dialog box:

- For Property, select X Coordinate of Point.
- For Units, select Decimal Degrees.
- Verify that the box next to Calculate selected records is checked.
- Click OK.

☐ Do the same to calculate the geometry for the Y field, selecting Y Coordinate of Point for the Property setting.

☐ Close the attribute table.

☐ From the Editor menu, choose Stop Editing. When asked if you want to save edits, click Yes.

Editing is a good way to fill in attributes as well as make updates to fields that have changed after the GPS data has been converted into a feature class.

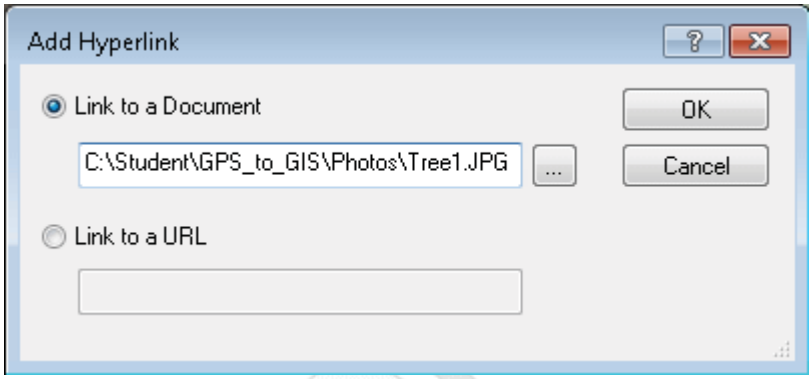
Step 6: Add hyperlinks

In many cases, it is helpful to take pictures of the features or observations while in the field. With GIS, you can incorporate and store the photos in many ways. In this exercise, you will learn how to add photos as hyperlinks within a map document

☐ Using the Identify tool on the Tools Toolbar, identify a tree feature.

☐ In the Identify window, right-click the identified tree and choose Add Hyperlink.

☐ In the Add Hyperlink dialog box, click the ellipsis button to Link to a Document, navigate to the C:\Student\GPS_to_GIS\Photos directory, and choose a photo.



☐ Click OK.

☐ On the Tools toolbar, click the Hyperlink button .

☐ Click the tree feature on the map to see the hyperlinked photo.

Step 7: Challenge ~ Bring GPS data into ArcGIS Explorer Desktop

☐ Open ArcGIS Explorer Desktop.

☐ Click Add Content and choose Text Files.

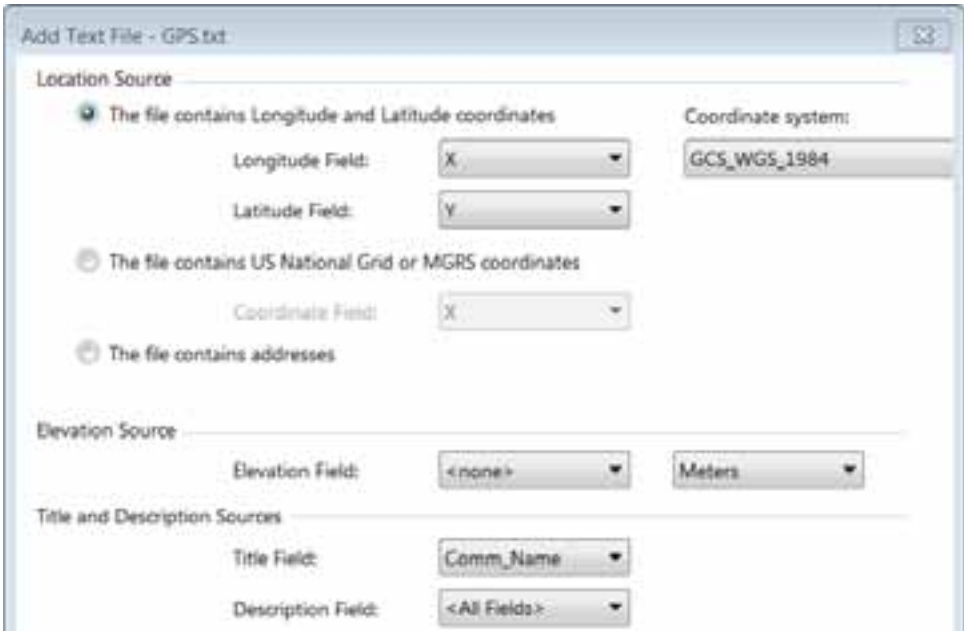
> ***Note:*** If you work with GPS programs or GPS units that export the data as a *.gpx file, you can choose GPS Data Files.

☐ Browse to the C:\2011_EdUC\GPS_to_GIS folder location.

☐ Select the GPS.txt file and click Open.

☐ In the Add Text File dialog box:

- Under File Delimiters, select Tab and click Next.
- Under Location Source:
  - Select "The file contains Longitude and Latitude coordinates."
  - For Longitude Field, select X.
  - For Latitude Field, select Y.
  - Verify that Coordinate system is set to GCS_WGS_1984.
- Under Title and Description Sources:
  - For Title Field, select Comm_Name.
  - For Description Field, select <All Fields>.



☐ Click Finish to import the GPS points into ArcGIS Explorer Desktop.

Conclusion

In this exercise, you learned how to take GPS data from a raw format, such as a text file, and bring it into the GIS. First, you displayed the x,y coordinates for features as Events in ArcMap and then created a new feature class in a file geodatabase. Then, you were able to make a map with symbology based upon attributes brought in with the GPS points and added hyperlinks to images of the trees.