

**Geographic Information Systems and Remote Sensing for Natural Resource
Management
School of Forest Resources and Environmental Science
Michigan Technological University
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**Laboratory Exercise 6
Attribute Entry and Editing
Creating a Cartographically Correct Map**

Introduction

Attribute tables for the DLG thematic layers for Indian Town (boundaries, hypsography, hydrography and transportation will be edited and additional attribute information entered into the database. Create a lab6attrib folder for this work. **BE SURE TO CREATE A .mxd file early on and save your work after each step as ArcMap is known to frequently hang-up during this exercise.**

Joining Tables

In lab 2 you joined tables to the hypsography and hydrography coverages. If that linkage has been lost you will need to redo it. You should also join the appropriate attribute tables to the roads and boundary coverages. Refer to the lab 2 handout and your flowchart for instructions if needed. The important thing to remember is that “Joins” are NOT permanent- the linking of multiple tables is only temporary and, if not saved in the .mxd, is lost when ArcMap is shut down.

Making Joins Permanent

To make a “Join” permanent, the Arc Coverage with the Joined Table(s) must be converted to a shapefile. This is considered an Export function. **Right-click on the layer for the drop down menu, click Data, then Export Data.** Export all the DLG coverages to shapefiles and place them in the lab6attrib folder. To assure a common naming convention use the following names for the shapefiles: roads, boundpoly, boundarc, contours, hypsopoly and hypsoarc. If you have already exported some of the DLG data to shapefiles, use ArcCatalog to rename them to the specified naming convention.

Edit Attribute Tables Beginning with the Roads Polyline Shapefile

Begin editing with the roads shapefile. Open the attribute table (**Right-click on layer name > Open Attribute Table**). Notice within the table there are a lot of empty columns (fields) containing information we do not want. To delete unwanted fields: **right-click** on the unwanted **field name** and click **Delete Field/Yes**.

NOTE: deleting a field is permanent.

Delete the following fields: Rowid_, MODN_ID_1; ARBITRARY_; RELATION_T;
VERTICAL_R OPERATIONAL; ACCESS_RES; WITH_RAILR; COVERED; HISTORICAL;

LIMITED_AC; PHOTOREVIS; BEST_ESTIM; and FUNCTIONAL. **DO NOT DELETE THE OLD_RAILROAD Field.** If you delete this field by accident, go back to the coverage and export it again.

To add a new field, Click the **Options** button at the bottom of the table window, and then click **Add Field**. Create a new field labeled “DLG_Code” and make it a short integer. The DLG_Code field will consist of the last three digits from the entity label column. For example, if the entity label is 1700211, you will enter 211 under the DLG_code column.

The most efficient way to enter data into multiple records is to use the query builder (**Options > Select by Attributes**) and build a SQL (sequential query language) expression to select all entity_labels with the same value.

Once the appropriate records are selected, use the field calculator (**right-click on DLG_Code > Field Calculator**), to add the last three digits into the appropriate record, click **OK**. Repeat for all unique entity label values.

In the lab 6 folder on the P:drive/FW3540 is a .pdf file of the DLG codes. Add a field called “**Description**” (text, width 35) to the attribute table. Translate the DLG_Code to Descriptive names in the text field. Be sure to check your spelling (misspellings are treated like separate attributes, i.e. deciduous and decidous are not the same attribute as far as ArcMap is concerned). Remember- text added to the Field Calculator must be enclosed with double quotes.

Every DLG coverage or shapefile will have boundary lines designating the edge of the Indian Town quad. For those thematic layers which are polylines, delete the boundary arcs. Be sure you are not deleting road arcs. This is best done by selecting the boundary arcs in the viewer and then deleting the associated record selected in the attribute table. You must be in edit mode to delete data. Save your edits (**Editor Menu > Save Edits**, then select **Stop Editing**).

Why would you not want to delete boundary line segments in a polygon thematic layer?

If there are road segments with no associated DLG code, overlay the roads on the orthophotos, interpret the road type from the photo and fill in the attribute table accordingly. Editing is complete when there no empty cells in the DLG-Code and Description fields, and there are no misspellings of the descriptive names.

Create a detailed roads legend in the Table of Contents and rename the codes with the actual road descriptions.

The road segment length computed automatically by ArcMap is based on the linear distance units of the projected coordinate system, which in this case are meters. Having a field, which

expresses the length in miles, would be more useful. Add a field labeled “MILES” using a float designation.

Calculate the miles for each road segment, in the new MILES field, by using the field calculator and building an expression (HINT: miles = LENGTH field / conversion factor). What is the conversion factor from meters to miles? _____

Total road mileage can be determined by opening the attribute table, going to **Select by Attributes** and query a specific road class, then **right-click** on the **MILES** column heading and select **statistics**. This gives the sum and other statistics of ONLY the selected rows. How many miles are there of each road class? _____

Editing Attributes of Hydrography Polygon Shapefile

You should already have a completed the table join and created a shapefile in lab 2 for the hydrography polygon coverage. If not, you need to join the table (.ahyf) and export it to a shapefile. The hydrography layer, when displayed as polygons, and joined with the supporting tables, makes the distinction for water classes by entity label

Add a new field (**Options > Add Field**) to the table labeled “DLG_code” and add the last three digits from the entity label column to the DLG_code column, as in the roads layer above. Use the query builder (**Options > Select by Attributes**) and **Field Calculator** to quickly and accurately fill in the field values.

In the lab 6 folder on the P:drive/FW3540 is a .pdf file of the DLG codes. Add a field called “**Description**” (**text, width 35**) to the attribute table. Translate the DLG_Code to Descriptive names in the text field. Be sure to check your spelling. Remember- text added to the Field Calculator must be enclosed with double quotes.

NOTE: you can not be in edit mode to add or delete a field.

Develop an appropriate legend in the symbology using the DLG Description. Be sure to use the USGS wetlands symbol for the wetlands, and an appropriate blue for the lakes. “USFS green” is suggested for the upland areas, which has an entity label value of zero.

Add two more new fields to the hydrography polygon layer, **Acres** and **Hectares**. Perform the appropriate calculations with the **Field Calculator** to convert square meters to acres and hectares. Answer the following:

1. How many acres of lakes are found within the Indian Town Quadrangle? _____
2. What is the size, in acres, of the smallest lake (sort the acres column)? _____

3. What is the size, in hectares, of the largest lake (sort the hectares column)?

Editing the Hydrography Polylines Shapefile

Use the same procedure as utilized for editing the hydrography polygon shapefile.

Editing Attributes of the Boundary Polygon and Arc Shapefiles

The challenge with the boundary file is trying to figure out who owns what. You will need to evaluate several fields including entity labels, civil_town, national_f and city. Decide if you can accomplish this just using the legend editor or would it be best to create an additional field with ownership combinations? You may also want to view the Digital Raster Graphic (DRG) located in the lab6 folder in a DLG folder on the P: drive. It will display as a .tif files and is literally a scanned images at 300 DPI of the quad sheets for the western half of Alger County.

Repeat the process for the Boundary Arc file as well.

Creating a Cartographically Correct Map

How to make map outputs and display data in an informative way is a critical component of GIS. We will be working this week with the layout view of ArcMap and will be going over the different map elements that separate a map from a textbook illustration. You will be creating a map of your land use/cover shapefile. The map is not yet finalized, but the evaluation of interim maps is very common.

Humans associate certain colors with various features. For example, blue for water and green for trees. Hence, it is important to take the time to develop a meaningful color scheme that matches the data you are working with. This is true for all types of data, but especially for land use/cover classes. A good technique for selecting colors is simply to think about the colors you associate with different land cover types and use those colors, look at several map examples or easiest of all use the same colors used by the USGS- the color .pdf file is on the class website. Develop a meaningful color scheme for your land use/cover using a combination of colors and symbols. For this map, the wetlands will only be displayed in 2 classes- emergent wetlands and woody wetlands

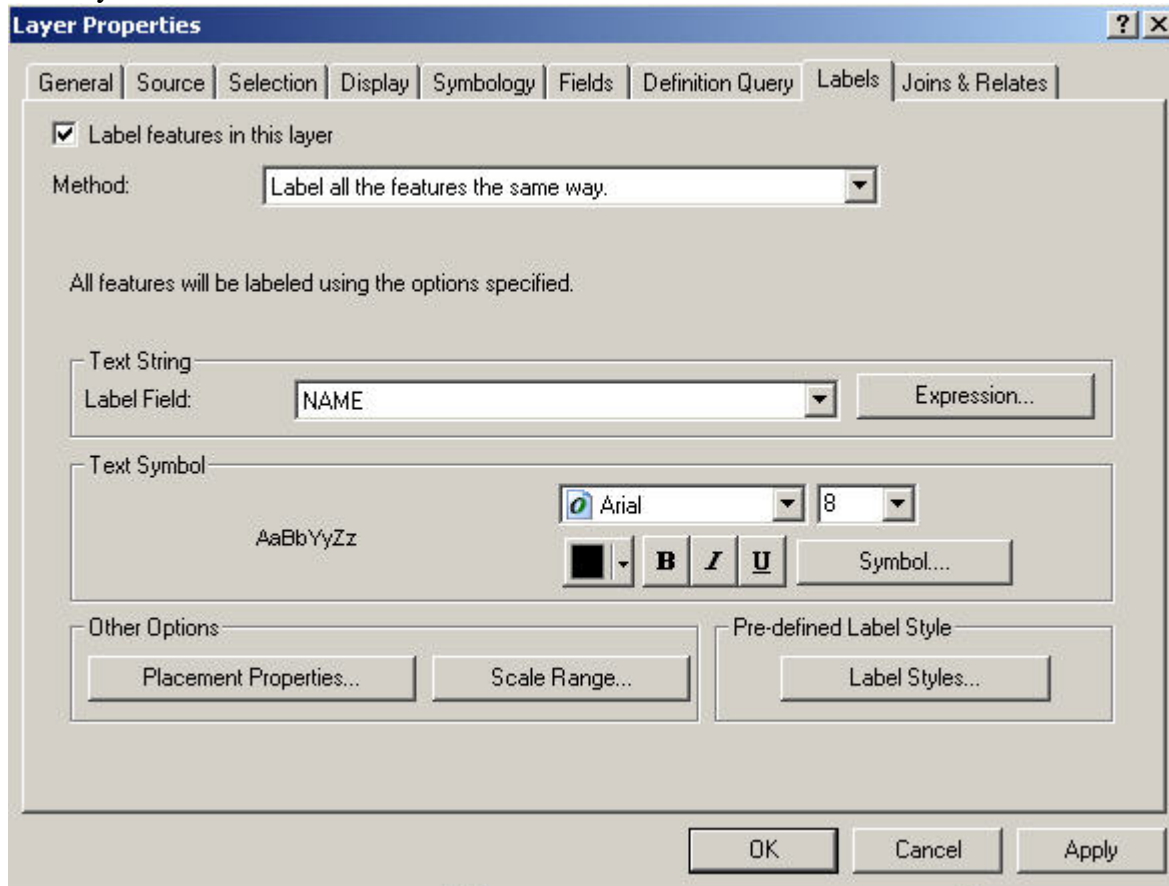
Display the Data

Open a new window in ArcMap and add the following layers: hillshade, roads and your land use/cover file. Right click on your land use/cover file and go to **Properties/ Display/ Transparency**. Change the 0 in transparency to 50. Click OK. Display the land use/cover over the hillshade and the roads on top of the land use/cover. This will create a pseudo 3D display. Change the symbol of the roads to either a black or red line. For this map the roads are providing locational or place holder information only. Think back to our discussion in lecture about place holder information.

Adding Labels

Open the attribute table for the land use/cover file. You have a field of land use/cover descriptions and will display those on the map. We do this by going to the **Labels** tab in the Layer Properties window (see illustration on the next page). Check the box "label features in

this layer”, leave the method as “label all the features the same way, and make sure “NAME” or whatever you labeled



the descriptive field, is in the label field. Change the font to Arial Black and the font size to 10. Click OK. You will see that the labels appear on the top right corner of the symbols.

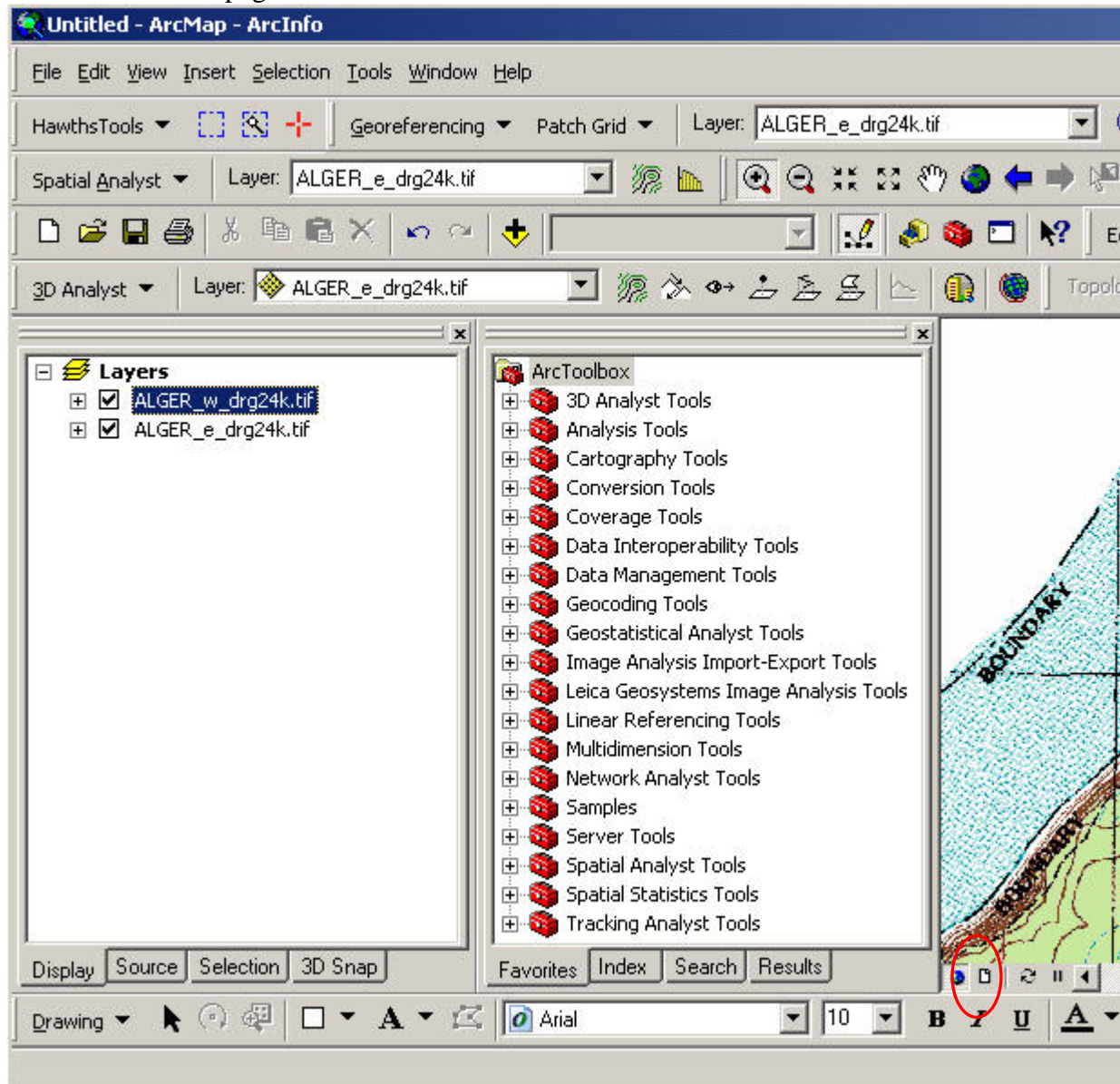
We can control where the labels appear. Go back to the **Labels** tab and click “placement properties” (see illustration above). The current label location is shown. By clicking “Change Location” we can pick another label location. On the Bottom of the initial point placement window you see 0=Blocked, 1=Highest, 3=Lowest. These are label weights used only when there is a conflict, that is, an overlap between a label and a feature. For more information on labels, search for them in the help section of ArcMap.

Working with the Layout View

Click on the layout view icon at the bottom of the display. See location circled in red on illustration on the next page.

You will notice that the map layout that you are familiar with is still there but is displayed differently. First step is change the layout view from portrait to landscape. Go to **File>Page and Print Setup**. In the paper section of the page and print setup window check the box next to landscape and click OK. The layout view changes from portrait to landscape, but the layer box does not. Resize the layer box by clicking on a corner and dragging

it. You will find that you still have the same tools in layout view as you had in data view. See illustration on next page.



Adding Elements of a Map

There are several key elements to a map:

- Scale Bar
- North Arrow
- Legend
- Title
- Text description
- Context
- Neatline

Most of these elements can be added using Insert from the main menu.

Title

Go to **Insert** on the top Menu Bar and select **Title**. A text box appears in your layout view. Click outside the text box and then right click on the text box once. The layout border should turn blue. Now right click on the text box and go to **Properties**. Enter your map title in the text box. Go to change symbol and select “Times New Roman” size 20 and change to bold.

Scale Bar

Go to **Insert** and select **Scale Bar**. In the **Scale Bar Selector** window select the “**Alternating Scale Bar 2**” and click **OK**. The scale bar will appear in the middle of the layout view. Right click it and go to **properties**. The Scale and Units tab should be shown. Change the division unit from meters to miles. Change resizing to “Adjust number of divisions”. You should now be able to adjust the division value enter 2 miles and change the number of subdivisions to 3.

Change the label from miles to mi. Click **OK**. Now insert another scale bar. This time change divisions units to kilometers and adjust all other fields the same way you adjusted miles, but instead of mi change the label to km. Press ok. You now have two scale bars. one in kilometers and one in miles. Adjust the lengths so they show the same number of divisions. Move them below the map layer.

North Arrow

Go to **Insert** and select **North Arrow**. Select any north arrow symbol you like. Keep in mind your scale bar should reflect the type of text you are using. You should not use a fancy scale bar with italics if your map title is Times New Roman.

Legend

Go to **Insert** and select **Legend**. The legend wizard will be launched. In this step you select which layers you want to include in our legend. For this map we are only interested in Land Use/Cover classes and the roads. Use the direction button to remove the hillshade gray scale from the legend.

Note that a double arrow adds or removes all layers while a single arrow adds or removes a single item that is highlighted. Press next. Press next in all the subsequent windows and press finish in the end. You now have a legend in your layout view.

Right click on the legend and go to **Properties**. Click on the items tab. Highlight roads in legend items and select style. What appears are the different styles that we can display the layer in the legend. Horizontal Single Symbol Layer Name and Description works well for displaying data such as points and lines. Select it the aforementioned and click ok. This works well for symbolized data because it shows the symbol name as well as the layer name. Select it and press ok.

Metadata Description

There are five types of metadata shown as text that are important to include in every map you make: Data Source (what agency or agencies supplied us with our data), Coordinate System (the projection not of the layers but of the data frame we are using), Description (a sentence or two

describing map content), Author (who you are and what you made the map for), and Date (when you made the map). These five components insure that we as map makers do not need to be present when the map is being utilized in paper or digital format.

Go to **Insert** and select Text **box**. Click off of the text box then left click on it and then right click properties. This window should look familiar from when we added the map title. You can enter the five types of text descriptions in one text box or create a new text box for each. Formatting a text box can be tricky; you may need to try several times to get it just right.

What are your data sources ? _____

What is your data frame projection? _____

Neatline

We need to add a neatline that encompasses all of the map information. Go to **Insert Neatline**. The neatline box is launched. Select the placement, style and color.

Due next week- Flow chart explaining how to add and delete fields in an attribute table, questions in lab handout, and a map of your interim land use/cover data.