Michigan Technological University
School of Forest Resources and Environmental Science
Introduction to Geographic Information Systems and Remote Sensing for Natural Resource Management
FW3540
Spring Semester 2009

Laboratory Exercise 9
GIS Analysis Functions- An Introduction

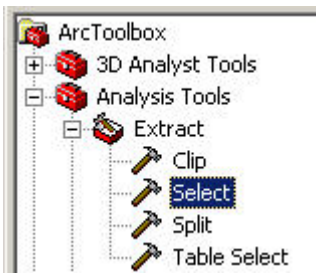
Getting Started

This lab exercise focuses on basic GIS analysis functions within ArcMap. The analysis functions will use thematic data in your file geodatabase. So… to start, set-up a new feature dataset in the geodatabase you built in last week's lab and label it "wetlands".

Double check that the NWI wetlands (latest version should be in your lab 4 folder) and the DLG hydrography polygon (hydropoly) shapefiles (latest version should be in your lab 6 folder) have the same coordinate system as your geodatabase. If not, reproject to the geodatabase's coordinate system. Refer to your previous lab handouts and flowcharts for guidance if needed.

Import your NWI wetlands shapefile and the DLG hydrography (hydropoly) thematic layer to feature classes within the "wetlands" feature data set. Refer to the lab 8 handout for instructions if needed.

Subset the wetland polygons from the DLG hydrography layer into a new feature class called "DLG_wetlands" using the **SELECT** command. Select was discussed in class lecture 21.



Area and Distance Analysis Functions

To start, let's review the skills and knowledge you gained in lab 6 for setting up attributes. Determine the following:

1) How many acres and hectares of Palustrine and acres and hectares of Lacustrine wetlands are found within the NWI mapped wetlands contained within the Indian Town quad?

_____

_____

2) Consider the Lacustrine wetlands- how many acres are permanently flooded, how many acres are intermittently flooded?

_____

_____

Create a new feature class containing just the Lacustrine wetlands which are permanently or intermittently flooded. Later, you will create a cartographically correct map highlighting these 2 water regime classes.

3) How many acres/hectares of forested wetlands are present? _____

Do any of these wetlands contain wetland conifers (4= Needle-Leaved Evergreen)? ____

If so, how many acres/hectares are present? _____

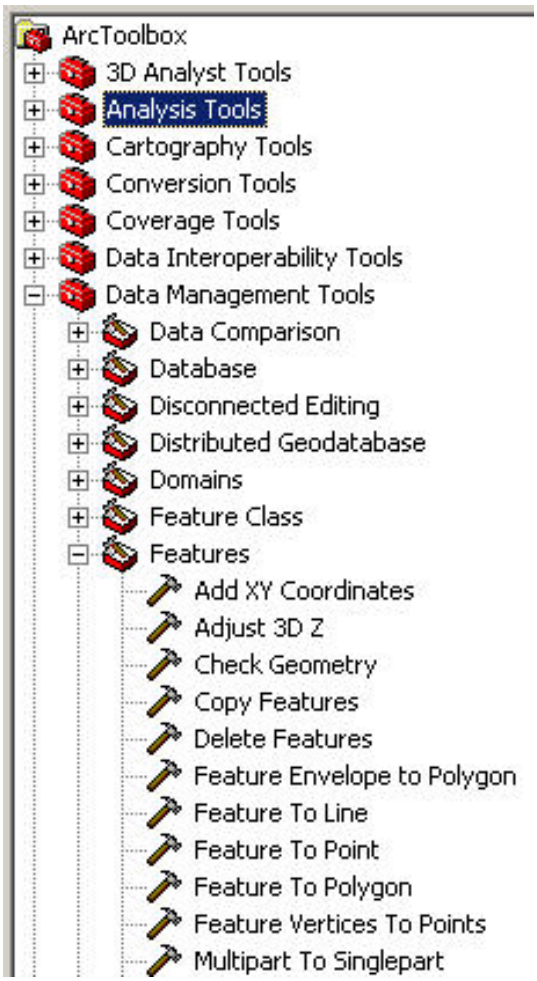
Visual Comparison and Union of Wetlands Maps

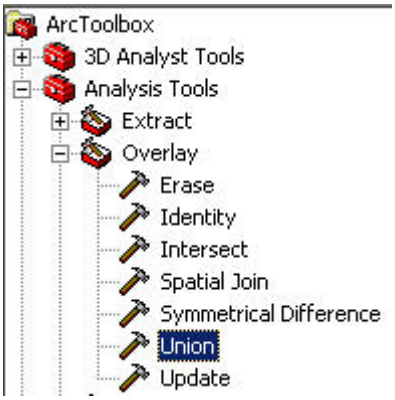
Display the NWI and DLG wetlands data. Not that they do not match due to differences in mapping procedures, source data and the date of creation. Assume that applying the UNION function ("OR" membership) will produce a fairly accurate wetland thematic layer. If we were truly interested in creating an accurate wetland thematic layers, we will need to field check these maps and determine what wetland boundaries are correct and which ones need to be changed.

Some of the DLG wetlands polygons maybe multipart polygons. As noted in lecture, multipart polygons are many polygons related to only 1 field in the attribute table. If all the parts are upland, having to only change 1 record is great. However, if one or more of the parts is wet and the remainder dry- editing is an issue. In the **Data Management Tools** toolbox, click on **Features** and **Multipart to Singlepart.** See toolbox location on next page.

It is very important to remember that when a multipart feature is exploded the record in the attribute is just copied as many times as there are exploded parts.

In Arc Toolbox, click **Analysis Tools\Overlay\Union** and union the DLG_wetlands and NWI feature classes. See toolbox location on next page.





Open the attribute table of the output file from the **UNION** operation. Create two new fields in the table: **New_System** and **New_Class**.

There are quite a few fields which are not needed. Delete all “area” fields, Rowid, entity_lab, fid_nwi_wetlands, fid_wetlands, perimeter, code_err ,any empty fields and other fields you believe are not needed.

Carefully consider what information the attribute table now contains. It is important to remember that ALL of the attribute information from both inputs is now contained in the table. What query expression will select the areas classified as upland in both input files?

Upland query expression:_____

Perform this query and in New_System and New_Class enter “Upland” using the field calculator.

What query expression will select the areas classified as Palustrine wetlands in both files?

Palustrine query expression: _____

Perform this query and in New_System enter “Palustrine” using the field calculator.

Construct a similar query operation for the Lacustrine wetlands. Fill in the appropriate attribute field in the table.

Lacustrine query expression: _____

Consider what needs to be done with areas classified as uplands in the DLG input and wet in the NWI input. Assume that all the NWI wetlands are in actuality “true” wetlands. Therefore you can transfer the information for these wetlands from the System and Class Fields to the New_System and New_Class fields.

NWI wet and DLG dry expression:_____

Not all of the areas mapped as DLG wetlands are really wet. You must decide if these areas are wet or dry and reclassify appropriately.

DLG wet and NWI dry expression: _____

To aid in your decision making display the hillshade and the orthophoto mosaic. Drape the wetland composite feature class on top. Change the transparency of the orthophoto mosaic to approx. 50%. Be sure the mosaic is displayed on top of the hillshade. Check for elevation changes and slopes with the hillshade.

If the wetland polygon in question is deemed to be dry enter “Upland” in the New_System and New_Class fields. If the polygon is deemed to be wet, enter “Palustrine” in the New_System field if the wetland is inland, or if it is along the Lake Superior shoreline it is entered as “Lacustrine”.

Once all of the DLG wetlands have been assigned a value in the New_System field, you will need to assign a new value in the New_Class field. Base your decision on the vegetation present on the orthophoto, and any surrounding NWI wetlands classes.

Add DLG Roads to the Geodatabase and Analysis

Next, analyze relationships between roads/trails and the wetlands. You will need to **CLIP** (refer to previous lab handout and flowchart if needed) the roads thematic layer with the wetlands polygons.

How many miles of roads have been placed through the wetlands? Calculate total mileage as well as mileage by road class.

_____

_____

Now think about how **CLIP** and **INTERSECTION** differ? **CLIP** gives us information about the roads running through the wetlands, but provides no information about what type of wetlands

the roads are running through since the wetland polygons are serving strictly as a cookie cutter. How would you develop a table showing each wetlands class and how many miles of roads are running through them? Do it!

Due next week in the lab: Answers to questions in the lab handout. A cartographically correct map of highlighting Lacustrine wetlands with the 2 water regime classes. Table of wetlands classes and miles of roads in each class. No Flowchart is required this week- however, be sure you know how to do clips, unions, intersections and editing the attributes in the output files. If you need a flowchart to help you remember these construct one on your own for future reference.