Lesson 11: Introduction to Cartographic Modeling

What You'll Learn: This lesson will primarily review and apply skills from previous lessons (especially Lessons 7, 8 and 9). In particular this lab will focus on buffering, creating binary indicators, dissolving, and union/intersection.

As a vehicle for practice, you will estimate the size of the prime ruffed grouse habitat at the Cloquet Forestry Center (CFC), Carlton County, Minnesota.

Because most is review, we provide fewer step-by-step instructions here than we have in previous lessons. You if you have questions you should look back to earlier lessons and videos.

***Data*:** L11\, including, in UTM15, NAD83, meters coordinates:

- *Cloquet_roads.shp*, a roads layer
- *Cloquet_streams.shp*, a streams/lakes layer
- *Cloquet_vegetation.shp*, a vegetation layer (attribute codes are described at the end of these instructions)
- *Iverson_drg.img*, a digital raster graphic of a USGS 7.5 topographic

***What You'll Produce*:** A map of CFC with areas of with identified areas of high quality ruffed grouse habitat.

Background: Ruffed grouse is a northern game bird species that thrives in disturbed forest ecosystems. The best grouse habitat is found in a mosaic of aspen patches burned or clear-cut every 40 to 50 years. This mosaic provides a food and cover in close proximity, and refuge from predators (see http://www.dnr.state.mn.us/volunteer/novdec06/grouse.html).

Optimum ruffed grouse habitat should include:

- Brushy areas and young aspen stands for cover and summer food,
- Mature aspen stands with an understory of hazel or ironwood that provide food in fall, winter and spring,
- Dense sapling aspen stands to provide brood cover.
- Away from areas with old tall conifers that serve as winter roosts for raptors

Note that you want areas that are near all three aspen/birch ages (this is an **AND** combination), and are not near tall conifers.

Use the vegetation layer to identify the Aspen and Birch Stands in the CFC. Refer to Lessons 8 & 9 if for a review of methods. The table at the back of this lab contains the codes for vegetation type (C_type) and for establishment year (Origin). From the establishment year you may get age, by subtraction. Assume you are doing this in 2006, the year the data were produced.

You need to identify Aspen and Birch (select by attributes) and export these stands to a separate shapefile, naming it something like *AspenBirch.shp*. Then open the *AspenBirch* attribute table and alternately select the young, intermediate, or old tree stands, respectively, exporting each to create three new shapefiles.

As a brief review, remember that you use the **Select By Attributes** menu from the table, and use species and/or age to select a specific set of polygons. Then, , right click on the source layer in the Table of Contents window, and then left click on **Data ‡ Export Data**. This saves your selected records as new layer.

Out of the 506 Vegetation records, 111 are Aspen or Birch. Of these:

- 30 records are Young; less than 18 year, from 2006 through 1988
- 25 records are Intermediate; between 19-34 years, from 1987 through 1972
- 30 records are Old; 34 years and over, from 1971 to 1888

Don't use the records with 00 values in the ORIGIN (unknown age)

After creating each AspenBirch ageclass layer:

- **Buffer** each layer at 300 meters.
- Overlay the three layers using the **Union** or **Intersect** commands to create a *CoverFood* layer.

Intersect is perhaps easiest for combining the three age class layers into the *CoverFood* layer. Check each input layer and the results after each union or intersection to verify the results are correct. Do the overlays in a serial manner, e.g., intersect the Young and Intermediate buffers, then intersect the result with the Old buffer.

You now need to subtract the areas in *CoverFood* that are near older conifers, potential raptor perches:

- Select those records of the *Cloquet_vegetation* that are White Pine, Red Pine, Jack Pine, Scotch Pine, or White Spruce (C_Type = J or C_Type = R or C_Type = W or C_Type = D or C_Type = WS).
- Save this interim layer.
- Then select those records of the interim layer that are older than 1900 (Origin > 0 and Origin < 1901).

You should have 21 records.

- Buffer this layer at 50 meters (adjacent raptor perch area)
- Erase the adjacent raptor perches from your cover/food habitat layer, via **Toolbox ‡ Analysis ‡ Overlay ‡ Erase**. If you are using ArcView, as with the Student Home Edition, remember you need to use a different method, **create/calculate an erase attribute ‡ Union ‡ Start Editing ‡ Select by Attributes ‡ delete**, as described in Lesson 9.

Summarize the result to estimate the total size of the potential grouse habitat, in acres or hectares. If you need, refer to Lab 9 near the end of part 2 for summarizing statistics of polygons.

Produce a map that includes the prime habitat, roads, streams, and topographic DRG background. Include a descriptive legend that explains the process and the total size and units (acres or hectares), of potential grouse habitat in a text box, or in the legend.

You may want to use a transparent fill for the habitat polygons to improve the appearance of the map.

Also include the usual 1) title, including a description of the map and your name, 2) north arrow, 3) scale bar, and 4) a complete, descriptive legend (no odd or filename labels).

Export a pdf or print this final map.

Here is an example of the general appearance of the final output map.