

Exercise: Sampling design using GIS

For274, October 2007

Learning objectives:

- Become familiar with the capabilities of GIS
- Delineate stand boundaries using aerial photos in a GIS
- Update the GIS database with area calculations
- Generate a stratified random sample using GIS
- Add XY coordinates to the sample points save in a spreadsheet

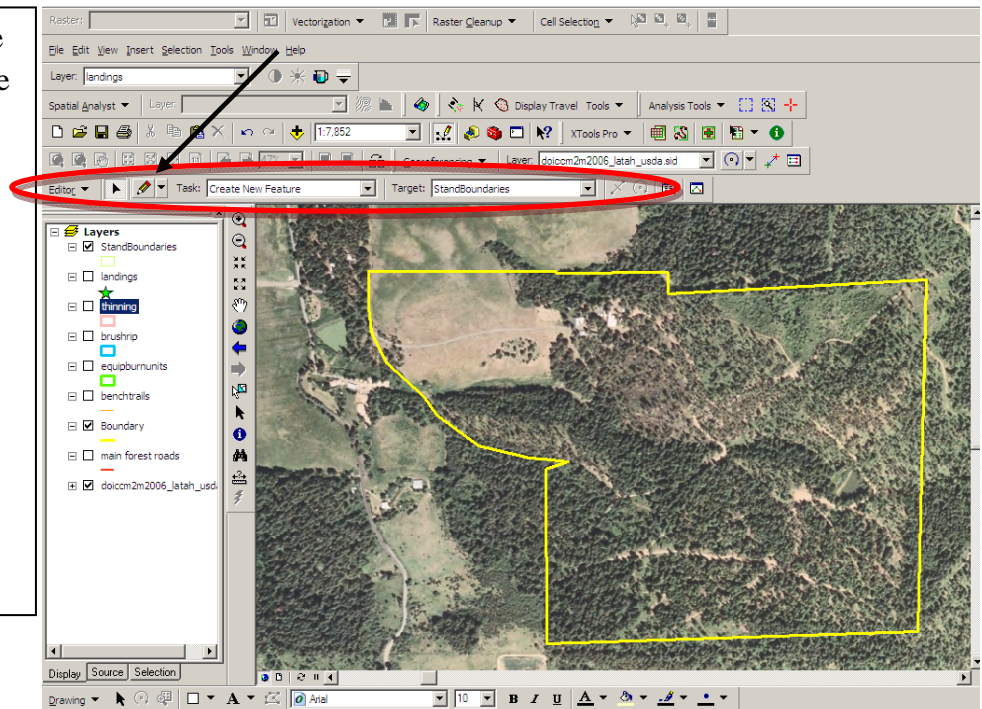
In this exercise you will be using the ArcMap software to delineate stand boundaries, calculate stand area and generate a stratified random point sample within the stands.

Digitize stand boundaries

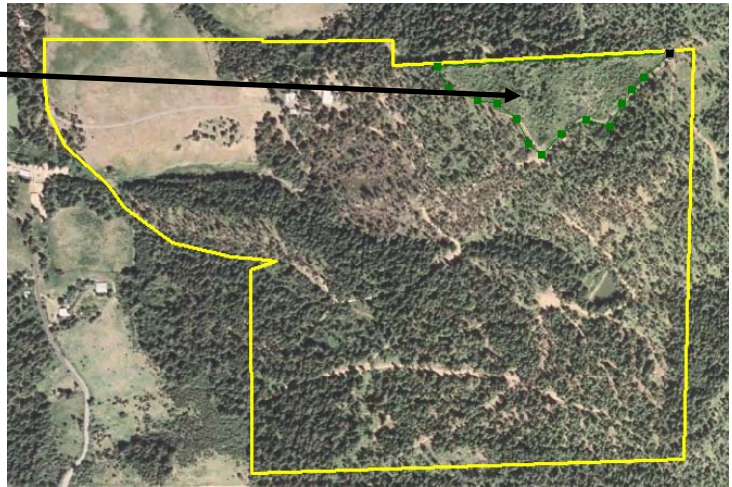
Step 1: Open the map document For274.mxd in the folder C:\For274 (simply double-click on the map file to open it). To enable editing within this document, click on View – Toolbar and make sure that there is a check mark by Editor.

Step 2: You will delineate stand boundaries using the digitizing tools in ArcMap. Select *Start Editing* in the *Editor* dropdown menu. You want to do edits in the folder c:\For274.

Make sure that your Target shapefile is StandBoundaries and that the Task is to Create a New Feature.



Step 3: Click on the PEN and begin drawing the boundary for the first stand. Click along the edge of the stand – when you have digitized all the way around the stand, double-click to end the polygon.



Step 4: Before you start digitizing the next polygon adjacent to the first polygon, change the Task on the Editor toolbar to *Auto-complete Polygon*. You have to do this to make sure that adjacent polygons (stands) share a common boundary. Start digitizing the next polygon – make sure that you start a little bit inside the first polygon. Digitize around the stand and end the second stand by double-clicking inside the first stand and the finish location. Continue to add stands, there should be 5 or 6 stands within the study area.

When you are finished, select Save Edits in the Editor toolbar and then Stop Editing.

Calculate stand area

Step 5: Open the attribute table for the StandBoundary file (right-click and select Open Attribute Table). You will see that there is a record (row) for each stand but the area is not calculated. Close the table.

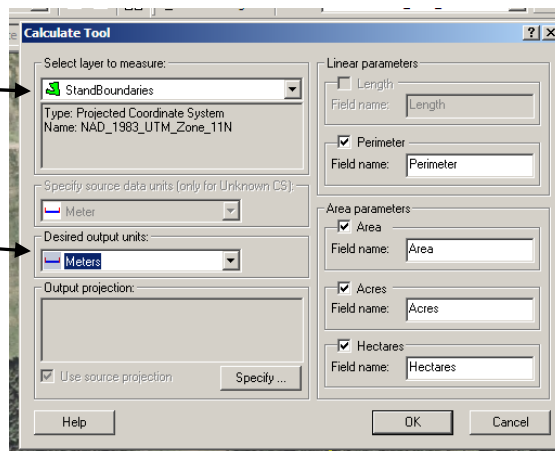
Step 6: Use Xtools to calculate the area for each stand. To do this, select Table Operations in the Xtools drop-down menu. Then select *Calculate area, length.....*

Step 7: Select **StandBoundaries** for the the layer to measure.

Select **meters** for the desired output units.

OK

Open the attribute table for the StandBoundary file and make sure that the area for each stand was calculated. Do the values make sense??



Generate random point sample

Step 8: Use the Hawth's Tool menu to generate a stratified random point sample within the stands.

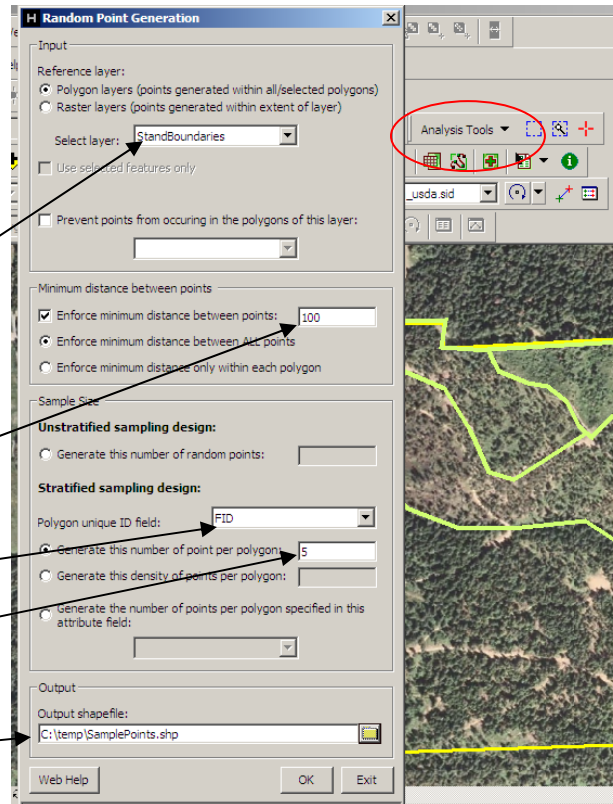
Select Generate Random Points in the Analysis Tools menu.

Select StandBoundaries for the polygon layer

You can select a minimum distance between points if desired.

Generate 5 random points within each stand.
Use the FID for the polygon ID field.

Give the output point file a name, SamplePoints, for example.



Add XY coordinates to the sampling points

Step 9: Use Xtools to add the X and Y coordinate to the sample point table. The coordinates will be in the UTM coordinate system, NAD83 datum. To do this, select Table Operations in the Xtools drop-down menu. Then select *Add XY Coordinates*. Make sure that you are adding the coordinates to the SamplePoint file.

Step 10: Open the SamplePoint file to make sure that the XY coordinates are indeed added.