

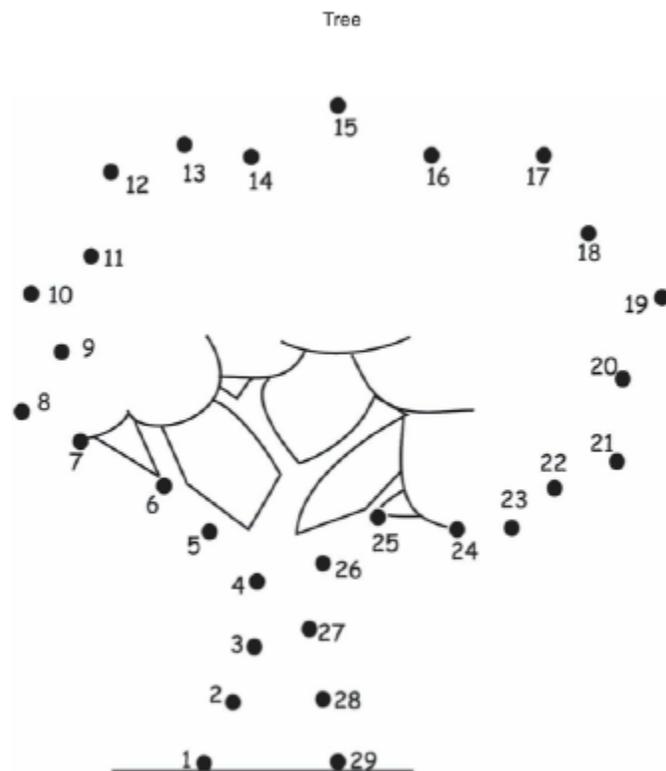
Boundary Mapping

Path tracking is one of the most useful functions when it comes to agriculture and natural resource management. For example, one of the primary operations when dealing with precision agriculture is to create a field boundary. In this activity boundary points of a field are collected and imported to ArcGIS software for analysis.

Explorer's Guide

Before You Start

Connect the picture dot to dot.

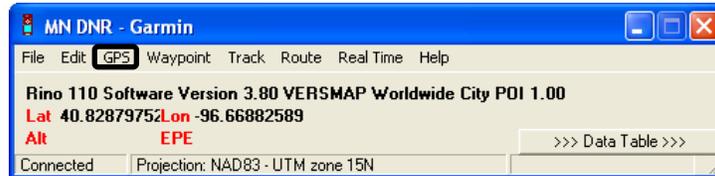


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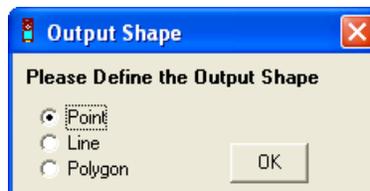
Learning by Doing

1. Using GPS receiver, navigate to the **Tracks** page, setup track log to **Time**-based using 1 s interval and turn the logging on. Walk around the perimeter of the field. Do NOT save the track in the end of your path.
2. Download the path using DNR Garmin and ArcGIS software through the following steps:

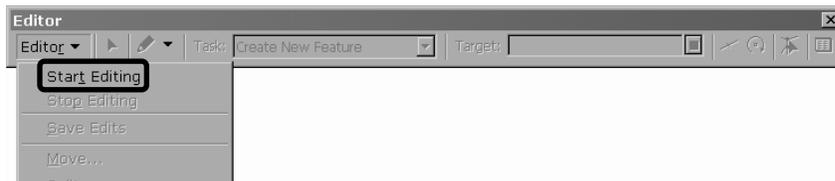
- a. Connect your GPS receiver using proper connecting cable.
- b. Turn on the GPS unit and assure proper interface setting (GARMIN).
- c. Start *ArcMap* and *DNR Garmin* software. Click *GPS > Open Port* to connect to the GPS receiver (make sure the receiver is connected to the proper port). Set the proper projection.



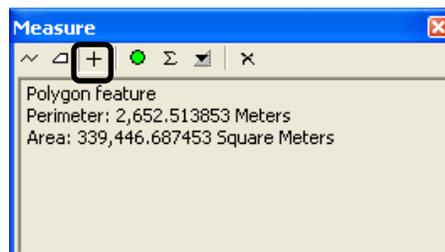
- d. Download tracks using *Track > Download* option and save the tracks to a point shapefile by defining the output shape as point. Close *DNR Garmin* software.



3. In ArcMap, add the track using the add layer  icon.
4. Activate tracks and right click to open attribute table. Use editor toolbar to start editing the attribute table, if needed. Delete unnecessary columns. Click stop editing once you finish editing. Save your ArcGIS project in the directory specified by your instructor.



5. Create a new polygon shapefile by digitizing the boundary points. It is best to digitize from one end of the feature to the other specifying each vertices as you go. You can add, delete or move a vertex while digitizing. Set the snapping environment on to snap, to attach the new polygon feature to the downloaded point features. For this, use Editor Toolbar > Snapping to turn snapping on or off. Refer activity 25 for more information about creating a new polygon shapefile.
6. Calculate area of the polygon area using the Measure tool  on the Tools toolbar in ArcMap as shown below. Save the new shapefile as boundary.shp in the designated folder.



How Does It Work

Track logging provides the ability to continuously record geographic coordinates. Recorded tracks could be downloaded as points, lines or polygons from the GPS receiver.

Such recording can be done using one of the following three options:

- **Point** option let you download the recorded data as points. Example – To map the location of fence posts around a field, data could be downloaded as points. If you set the travel distance equal to the distance between the posts we can calculate the number of posts required around the field.
- **Line** option enables you to download the data as lines. Very useful in mapping a wire fence around the field. You can calculate the amount of wire required around a field.
- **Polygon** option shows the data as polygon feature. This option is very useful to find the area of the field. By knowing area of the field, you could calculate the amount of materials needed to cover the field. Like amount of wood/concrete to be used within the area.

Additional Challenge

Find the area of the footprint of your school building using the procedures given in this activity.

Vocabulary

Track is a series of timed geographic coordinates recorded into the memory of GPS receiver or a data logger

Shapefile is a vector file format for storing the location, shape and attributes of geographic features. It is stored in a set of several files with the same name and different extensions (e.g., .shp, .shx, .dbf).

Feature is a shape in a spatial data layer, such as a point, line or polygon that represents a geographic object.

Attribute represents information about a given geographical feature, which is generally stored in a table and linked to the features using a unique identifier (for example, attributes of a lake may include name, size and maximum depth).

Digitizing means converting shapes of geographic features from paper maps or raster imagery into vector data.

Digitizer is a tablet with a pointing device used for creating/editing shapes precisely. It converts electronic signals from positions on the tablet surface to digital x, y coordinates, yielding vector data consisting of points, lines and polygons.

Vertex is a set of x, y coordinates that constitutes a line. Two lines meet at a vertex to form an angle.

Perimeter is the length of a boundary around a two-dimensional object.

Area is the number of square two-dimensional units that can fit inside a given object.

Viacheslav Adamchuk and Shana Thomas
Phone: 402-472-8431
E-mail: vadamchuk2@unl.edu
Last updated: February 12, 2009