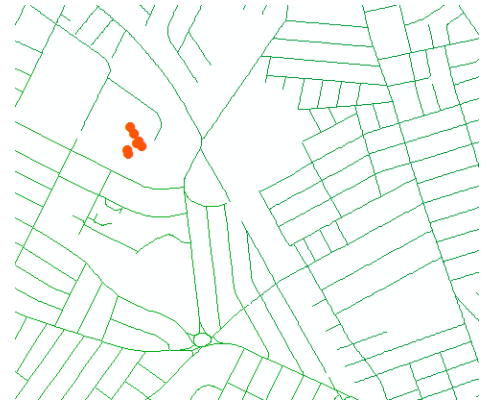Tufts GIS Center

Downloading Data with DNR-GPS & Importing to ArcMap and Google Earth

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Downloading GPS Waypoints

1. Make sure the GPS unit is turned on.

2. Plug the unit into the computer using either serial port cable or USB cable.

3. Go to Start → GIS Applications and then Open **DNR GPS**. Alternatively, you could search for the program.

4. The name of your GPS unit should appear in the title bar of the DNR Garmin Window. If it does not, make sure the GPS unit is on and connected via USB before opening DNRGPS by closing DNRGPS and reopening after checking the power and connection. If this still does not work, you can connect manually in the GPS menu by choosing USB if using a USB cable, and Port 1 if using a serial port cable.
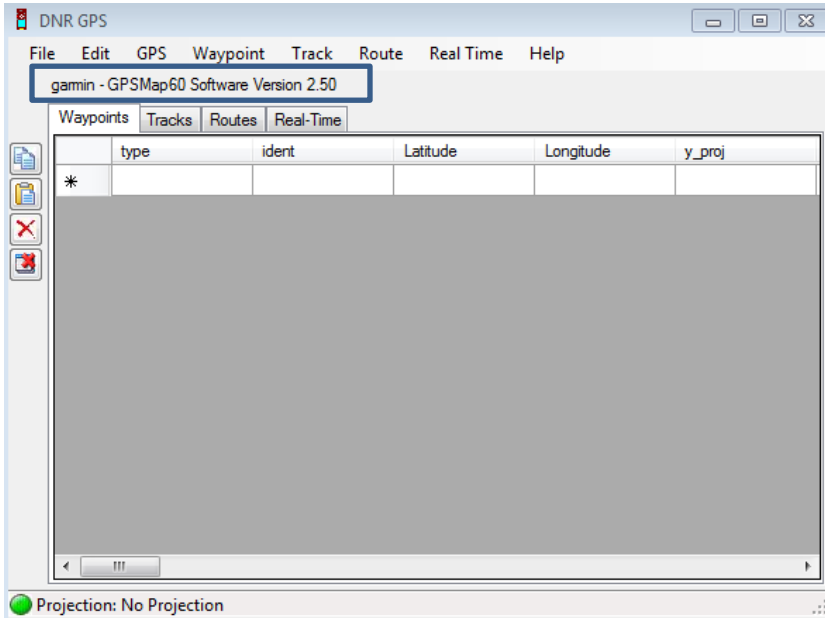
5. Click **Waypoint,** then **Download.** The points you took will appear as a list.
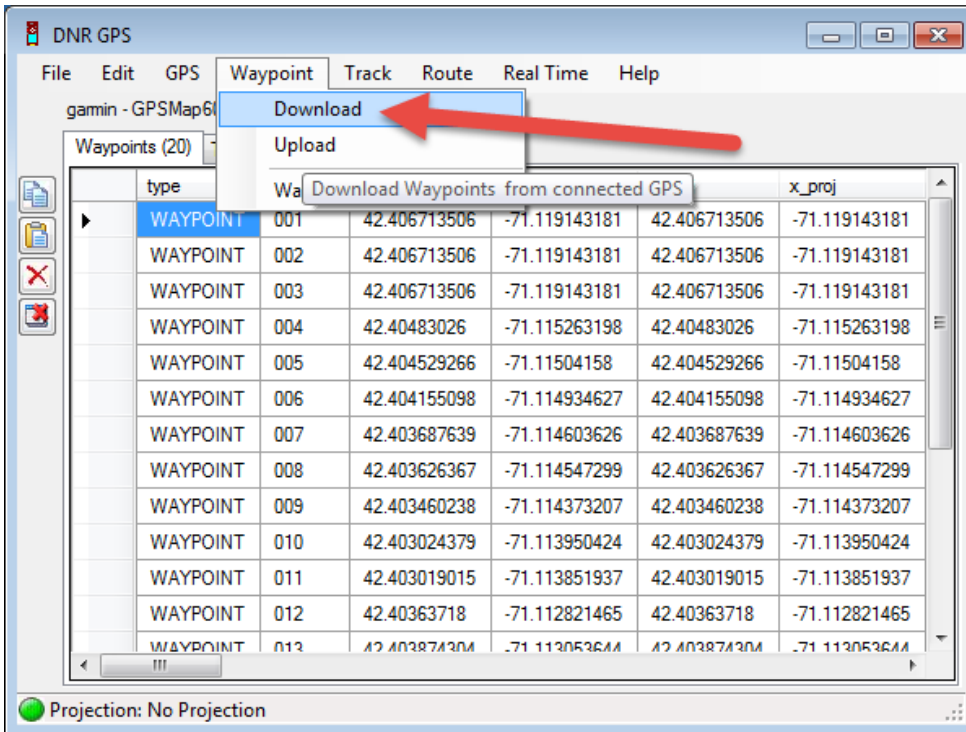
There are several ways to import your data. We are going to save the data 3 separate ways:

1. **KML File** – Google Earth Keyhole Markup Language.

2. **ESRI Shapefile** – Join excel table to point data.

3. **Excel File** – Use XY Data to import Latitudes/Longitudes

Viewing your Points in Google Earth

It's always a good idea to quickly view your points in Google Earth to ensure they are correct.

1. In DNR-GPS, click **File → Save to → File.**
2. Navigate to your H-drive or thumb/flash drive, name the file "waypoints_google" and change the "Save As type" to **Google Keyhole Markup Language.**
3. In your H Drive, double click on the KML file. It will automatically open in Google Earth- Instant gratification!
4. Google earth is fun. Take a minute to examine your points. See how accurate they are by zooming in.

The following sections will go over the two methods to import your data into ArcMap.

ArcMap Method 1: Saving your Points as an ESRI Shapefile

One way to import your data into ArcMap is to save it directly as an ESRI shapefile. This will import all the data that was collected by the GPS unit, but not the data you collected with the survey. It will include numerous fields that will most likely be empty as well. In order to save your points directly as a shapefile:

5. In DNR-GPS, click **File → Save to → File.**
6. Navigate to your H-drive and name the file "waypoints_esri". Change the "Save As type" to **Esri Shapefile (2D).**
7. Click **Save.**
8. Open a blank ArcMap session.
9. Add the shapefile through the **Catalog** or the **Add Data button**.
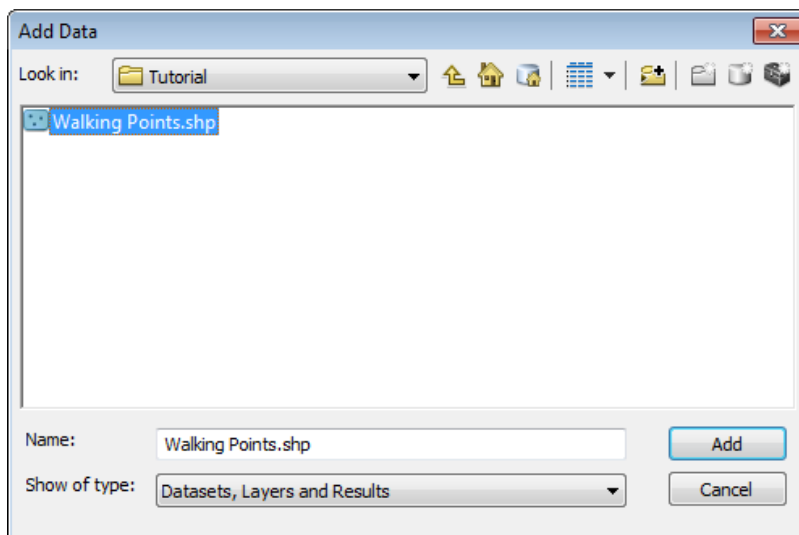
10. Your points should now display in your ArcMap.

    Note: Examine the attribute table. You will see that it has several fields. You can delete the fields that are unnecessary, but it does not have the fields you collected through survey information. You would have to **join** this data in separately.

11. Now in ArcMap add Imagery data from ArcGIS Online and check that your points display in the proper location.

ArcMap Method 2: Creating an Excel File and Importing into ArcMap using Add XY Data

Another option for importing your data into ArcMap is to save it as a tabular file and then import it using Add XY Data. The benefit to this method is you can first add your survey data in Excel, so when you upload the data into ArcMap, it has all the attributes you care about without having to join it in later.

1. Again in the DNR-GPS program, click **File → Save to → File.**

2. Navigate to your H-drive and give the file a name, this time choosing text file (tab-delimited)(*.txt) as the **Save as Type**, and click **Save.**

3. Open a blank Excel sheet and go to **File→ Open**.

4. Navigate to where you saved your file. If it does not show up, make sure to change the file type to "all files".
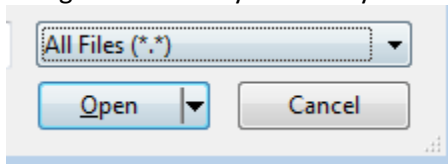
5. Select your .txt file and press open.

6. In step 1 of the Import Wizard, just click next.

7. In step 2 of the Import Wizard, make sure to **check** "**Tab**" if it isn't already checked and uncheck any other delimiters (this should be the default). This let's Excel know that your data are currently separated by tabs in the .txt file, and it will then separate them by columns. Click **Next**.

8. Then press **Finish.** All the GPS collected information will now be in the Excel sheet.

9. Enter the survey data you collected for each feature in a new column. Only include feature type and name fields. Be sure to "think like a database" and keep your field names to 10 characters or less and do not include any weird characters (hyphens, asterisk, etc) and no spaces.

10. Save the Excel file as an .xls (97 – 2003) and close excel.

11. Open ArcMap.

12. Add the .xls file you just saved, by pulling it in through Catalog, or clicking the **Add Data** button ( ) and navigating to your saved file.

13. To display the waypoints, click on **File→ Add Data→ Add XY Data**, and fill out the dialog box as follows:

    a) In **Add XY Data** select the table with your points from the drop down menu at the top.

    b) For "X Field" select "Longitude" and for "Y Field" select "Latitude".

    c) Click the **Edit** button.

    d) Scroll up to "Geographic Coordinate Systems", then "World", then select "WGS 1984".

    • Note: if your GPS unit was set to a different coordinate system such as NAD83, then you need to enter the correct coordinate system.

    e) The fields in the Spatial Reference Properties window should now look like the image below. When they do, click **Ok.**
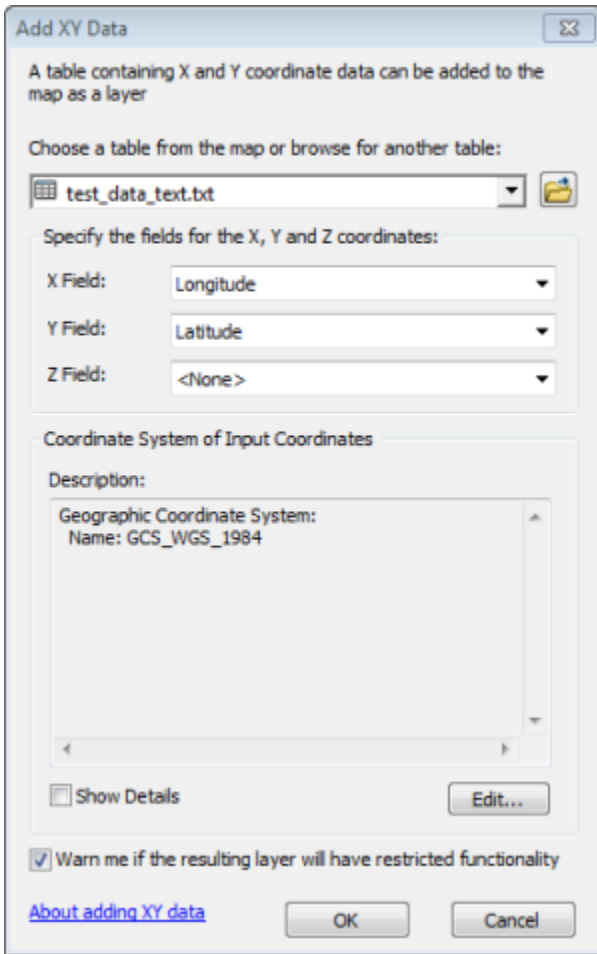
14. Your data points should now display in ArcMap.

Note: This process does not save the data points as a shapefile; it only temporarily displays them in ArcMap (that's what the warning was about). In order to permanently save these points, you must right click on the points and select **Data→Export Data**. Now you will be able to save them as a permanent shapefile in ArcMap. If you will be joining additional data, wait to do this step till after the join.

Check your points

Using the **Add Data** button, add a layer of data (i.e. a shapefile of something like streets or parcels) that will give you a good sense of whether the points are where they should be. One of the ways you can do this is adding GIS layers, below.

If your points are in the right general spots on your map, then you did everything correctly. If not, you may not have set "Map Datum" to "WGS 84" on the GPS unit. Go back to the menu and check.

Add GIS Layers

1. Navigate to *M:\Campus\Medford* in the Catalog in ArcMap. Drag in the shapefiles for Tufts Building Footprints and Walkways.
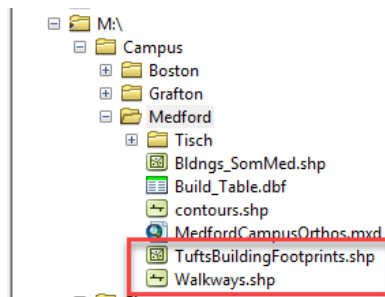
Adding Survey Data to a Waypoint Shapefile

If you saved your GPS data directly as a shapefile in DNRGPS as shown in **ArcMap Method 1**, you will have to join your survey data that you collected in the field. **You do not need to do this when using ArcMap Method 2.** Fortunately, we have the survey data populated in the Excel file you saved for ArcMap Method 2 already. (If not, this table will need to be created.)

If More Than One GPS Unit is Being Used

Individual GPS units will label their waypoints the same way. If more than one GPS unit is used to collect data, the different points must have a unique identifier that distinguishes point 1 on GPS unit A from point 1 on GPS unit B. (Note: while the rest of this tutorial assumes multiple GPS units collected data, it does not address how to combine these different units' data)

The simplest way to create a unique ID for waypoints from multiple GPS units is to combine the GPS unit's unique number with the waypoint numbers (e.g. GPS unit 14 waypoint 003 will have the unique ID 14003). Both shapefile and Excel spreadsheet with collection data need this unique ID to be joined. The following shows how to prepare the two.

1. In ArcGIS add a **new field** to the shapefile (created in ArcMap Method 1) called **UnitNumb**. Choose **text** for type.

2. Right click on the label of the column and o

3. pen up the **field calculator**. Populate the column with the correct GPS unit number. Be sure to include a leading zero if using a single digit, for instance "08." This ensures an equal number of digits for each record.
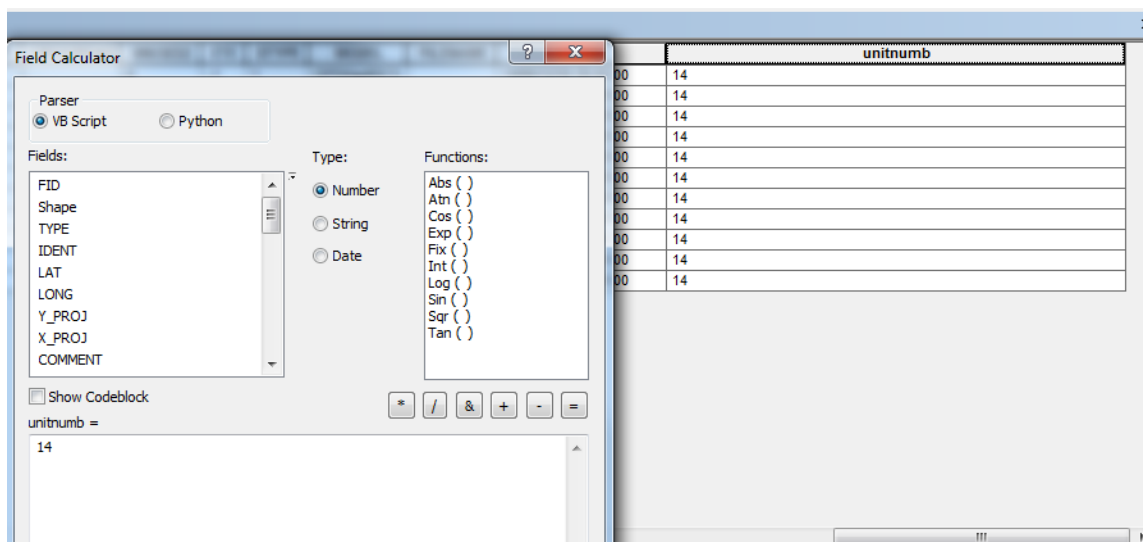
4. Next create a new text field called **GPSID** . Use the field calculator on this field and concatenate (**[Field Name] & [Field Name])** the UnitNumber with the Waypoint number (In this case the field names are UnitNumb and

IDENT). This is the unique identifier and the field we will use to join the Excel data.
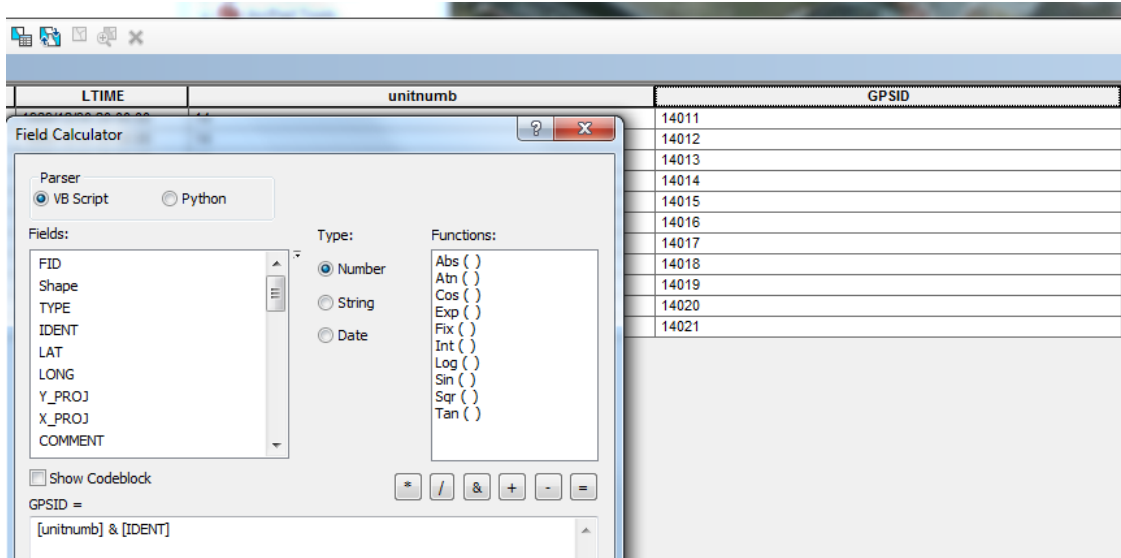
5. It's important to ensure that the **IDENT** field number of each waypoint assigned by the DNR-GPS software matches exactly with the **WaypointNum** in your Excel spreadsheet.

   a. Right click your shapefile of GPS points in ArcMap, and select **Open Attribute Table**. Note the way **IDENT** is displayed: the example below shows 001, 002, 003.. etc

   b. Ensure that the **WaypointNum** field in your Excel table is labeled in exactly the same fashion. You may convert the Excel cells to Text format in order to keep leading zeros.

6. Save and close your ArcMap session to edit your .xls file. In Excel, concatenate **GPSUnitNum** and **WaypoinNum** into a new field called **GPSID**. This function is performed in Excel by typing **=concatenate (cell1, cell2)** in a new cell. For the first row of data below, you would type A2 for cell1 and B2 for cell2. The desired cells can be clicked instead of typing A2 and B2. In the GPSID cell for row 2, it should look like: **=concatenate(A2,B2)**


7. Join the Excel and Shapefile by the GPSID field as described below. This way you can keep track of waypoints from different units.

Joining data from Excel to points in ArcMap

By joining your Excel table with the fields from the data collection worksheet to the attribute table of your GPS waypoints, you'll be able to see the additional details you created for each point besides the XY data in ArcMap.

If you are unfamiliar with Excel files and ArcMap, you might want to check out the tip sheet Working with Excel Files in ArcGIS 10

1. After you have confirmed the waypoints and GPSID are correct, save your Excel spreadsheet and close Excel.

2. Use the **Add Data** button ( ) in ArcMap to select and add your spreadsheet, making sure to select the correct *sheet* within the .xls file.
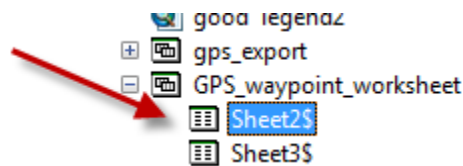
   3.

4. Once the Excel sheet appears in your left hand table of contents, right click on the shapefile of your GPS point, go to **Joins and Relates**, and select **Join…**

5. Fill out the dialog box as follows, making sure to match the fields for **GPSID** (GPS waypoint shapefile) and **GPSID** (Excel spreadsheet)
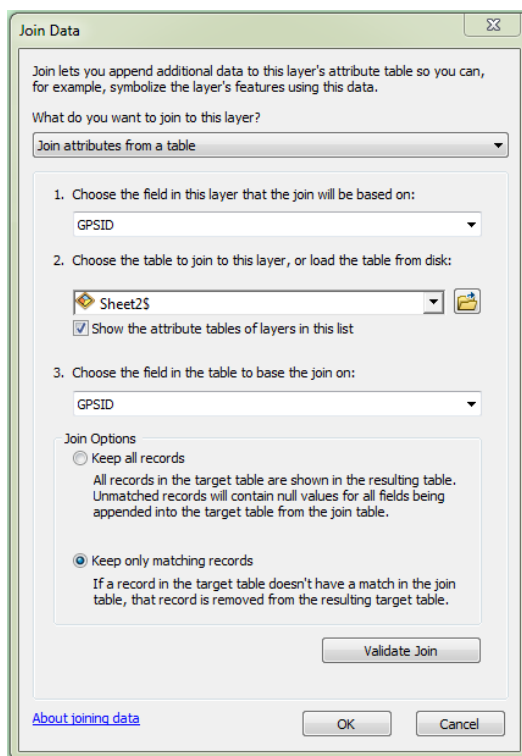
   a.

6. To create a permanent ArcGIS shape file that includes your joined table, right-click on your points layer in the ArcMap *Table of Contents* and choose **Data → Export Data** – navigate to an appropriate folder and give the new file an appropriate name. This will make it easier to work with the attribute table.

7. Click **Ok.**

8. Now when you right click on the GPS point shapefile and select **Open Attribute Table**, the additional data from the Excel spreadsheet will appear at the far right of the attribute table.

9. Finally, use appropriate symbology to represent your new GPS points by Type.