

Using DNRGarmin – A Quick Start Guide

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Coconino National Forest – Revised 11 Aug 2008

Background And Prerequisites - DNRGarmin is free software that facilitates exchange of data between ESRI's ArcMap (or ArcView) and Garmin GPS receivers. Download the current version of DNRGarmin from:

<http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html>

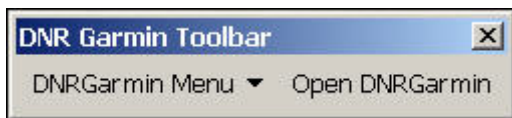
Garmin USB drivers are required if a USB connection between the Garmin GPS receiver and PC will be used. Serial connections don't require drivers. Download current Garmin USB drivers from:

http://www8.garmin.com/support/download_details.jsp?id=591

Users lacking a 9-pin serial port on their PC must purchase a serial-to-USB adapter if they are to accommodate older Garmin receivers that communicate only via serial interface.

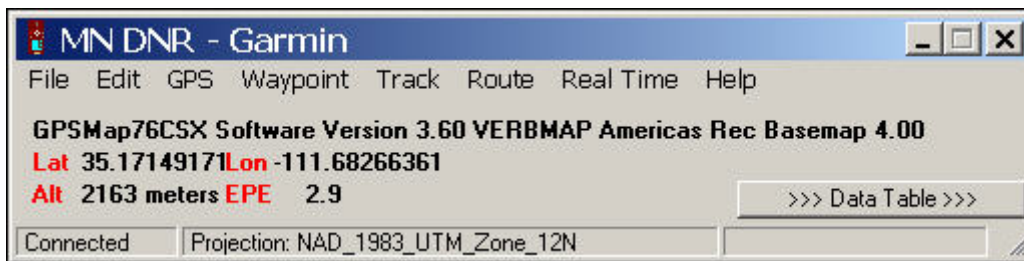
DNRGarmin can be run as a stand-alone application. ESRI ArcMap (or ArcView) augment the functionality of DNRGarmin, but are not required. Data can be exported directly to, or imported directly from, ESRI shapefiles (.shp), stand-alone feature classes of an ESRI geodatabase (.mdb), text files (.txt), and Google Earth MyPlaces files (.kml). This document assumes that ArcMap is already installed and available for use.

Install And Configure DNRGarmin - Unzip and install DNRGarmin, Garmin USB drivers, and a serial-to-USB adapter (if needed) as per their installation documentation.



Open ArcMap and activate the **DNR Garmin Toolbar** (left) by clicking **View – Toolbars – DNR Garmin Toolbar**.

Connect a Garmin GPS receiver to the PC using a serial or USB cable, and turn the receiver on.

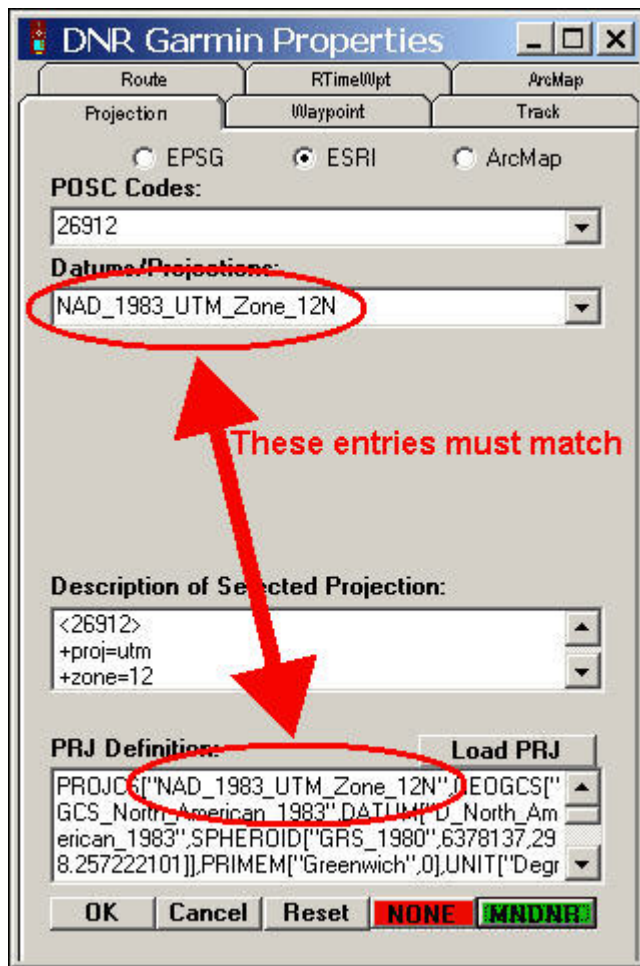


Click **Open DNRGarmin** on the **DNR Garmin Toolbar** to open the DNRGarmin application, left.

If the status bar doesn't indicate **Connected** after a few moments, check connection settings by clicking **GPS – Set Port** and **GPS – Set Baud Rate**. Typical port choices are **USB** or **Port 1** (a serial COM port). Garmin's default baud rate is **9600**. If a connection still can't be established, check that the Garmin receiver's protocol is set to **Garmin**, and not **NMEA**.

Make sure the **Projection** listed in the status bar matches that of the intended source or target GIS layer. **This is critical!** National Forests in Arizona should use **NAD_1983_UTM_Zone_12N**.

Consult a GIS or GPS specialist if unsure which projection is appropriate.



If the appropriate projection is not indicated, click **File – Set Projection** on DNRGarmin's menu. Click the **ESRI** option, and select the desired projection from the **Datums/Projections** drop-down. National Forests in Arizona should be set to **NAD_1983_UTM_Zone_12N**, left.

The correct datum and projection are critical to proper data projection and transformation! Make sure they are correct.

DNRGarmin can attach a projection file (.prj) to exported shapefiles. To facilitate this functionality, click **Load PRJ**, browse to, and select the projection file that corresponds to the selected projection. When set correctly, entries in the **Datums/Projections** drop-down and the **PRJ Definitions** box should match, left.

This process only has to be performed once for each projection selected, as it creates a permanent registry association between the selected projection and the corresponding projection file parameters.

This step is also critical to data integrity! Just like a purebred dog without AKC papers, the lineage of a shapefile without an accompanying projection file is suspect.

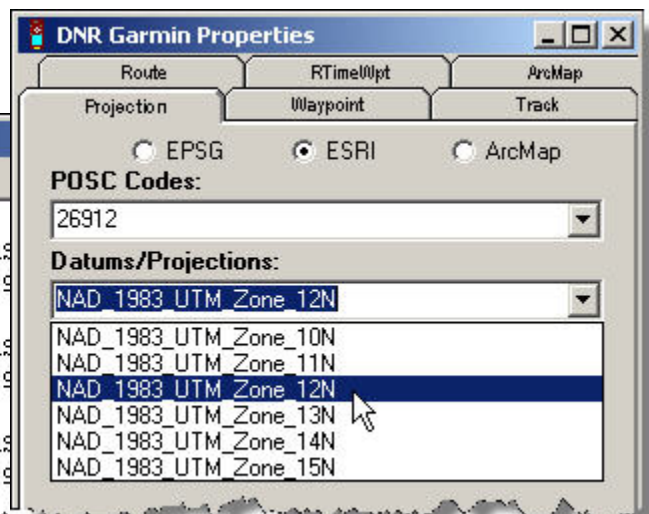
Click **OK** when entries are complete.

Users can reduce the very long list of choices in the **Datums/Projections** drop-down to only those commonly used. To do so, rename the file **C:\Program Files\dnrgarmin\proj\nad\esri** to **C:\Program Files\dnrgarmin\proj\nad\esri_original**. Open that file in a text editor, select and copy only the entries of interest, and paste them into an empty text file named **C:\Program Files\dnrgarmin\proj\nad\esri** (with no .txt file extension). The resulting file should look something like that below, left. The resulting **Datums/Projections** drop-down will now be much shorter (6 choices), and easier to browse (below, right).

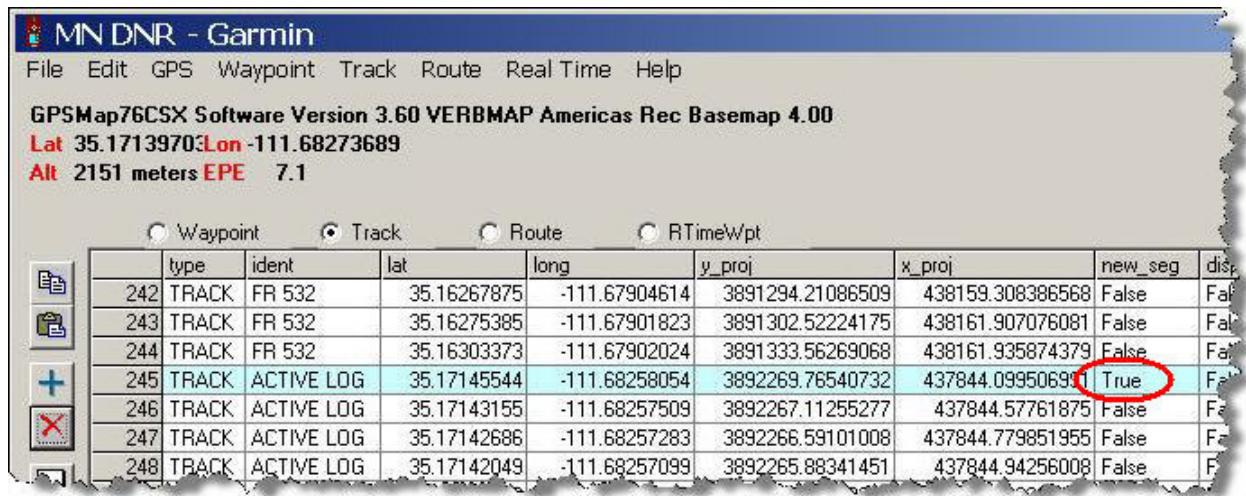
```

esri - Notepad
File Edit Format View Help
# NAD_1983_UTM_Zone_10N
<26910> +proj=utm +zone=10 +ellps=GRS80
+towgs84=-0.991,1.9072,0.5129,0.02572,0.00438,0.00117,0.00468
# NAD_1983_UTM_Zone_11N
<26911> +proj=utm +zone=11 +ellps=GRS80
+towgs84=-0.991,1.9072,0.5129,0.02572,0.00438,0.00117,0.00468
# NAD_1983_UTM_Zone_12N
<26912> +proj=utm +zone=12 +ellps=GRS80
+towgs84=-0.991,1.9072,0.5129,0.02572,0.00438,0.00117,0.00468
# NAD_1983_UTM_Zone_13N

```



Create ESRI Shapefiles From Garmin Track Logs – To download track logs from a Garmin GPS receiver, click **Track – Download**. Each track log vertex is transferred to DNRGarmin's table, as illustrated below. All track logs, or only those of interest, can be selected for export.

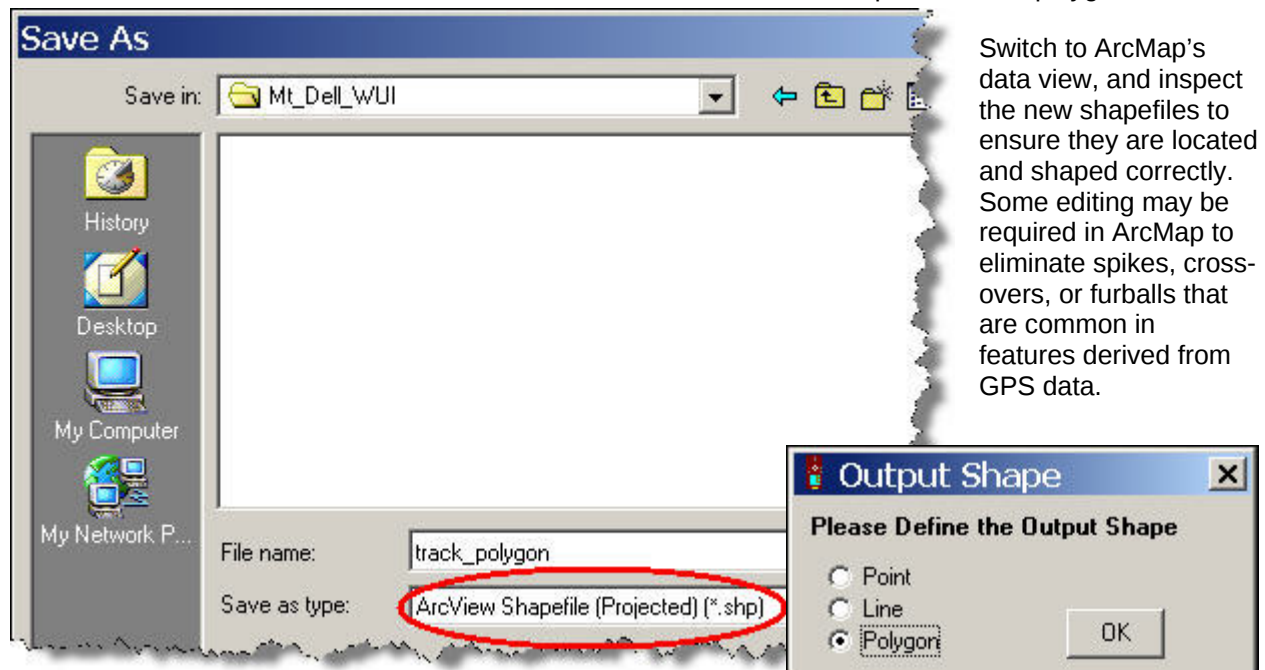


	type	ident	lat	long	y_proj	x_proj	new_seg	dist
242	TRACK	FR 532	35.16267875	-111.67904614	3891294.21086509	438159.308386568	False	Fa
243	TRACK	FR 532	35.16275385	-111.67901823	3891302.52224175	438161.907076081	False	Fa
244	TRACK	FR 532	35.16303373	-111.67902024	3891333.56269068	438161.935874379	False	Fa
245	TRACK	ACTIVE LOG	35.17145544	-111.68258054	3892269.76540732	437844.099506911	True	Fa
246	TRACK	ACTIVE LOG	35.17143155	-111.68257509	3892267.11255277	437844.57761875	False	Fa
247	TRACK	ACTIVE LOG	35.17142686	-111.68257283	3892266.59101008	437844.779851955	False	Fa
248	TRACK	ACTIVE LOG	35.17142049	-111.68257099	3892265.88341451	437844.94256008	False	Fa

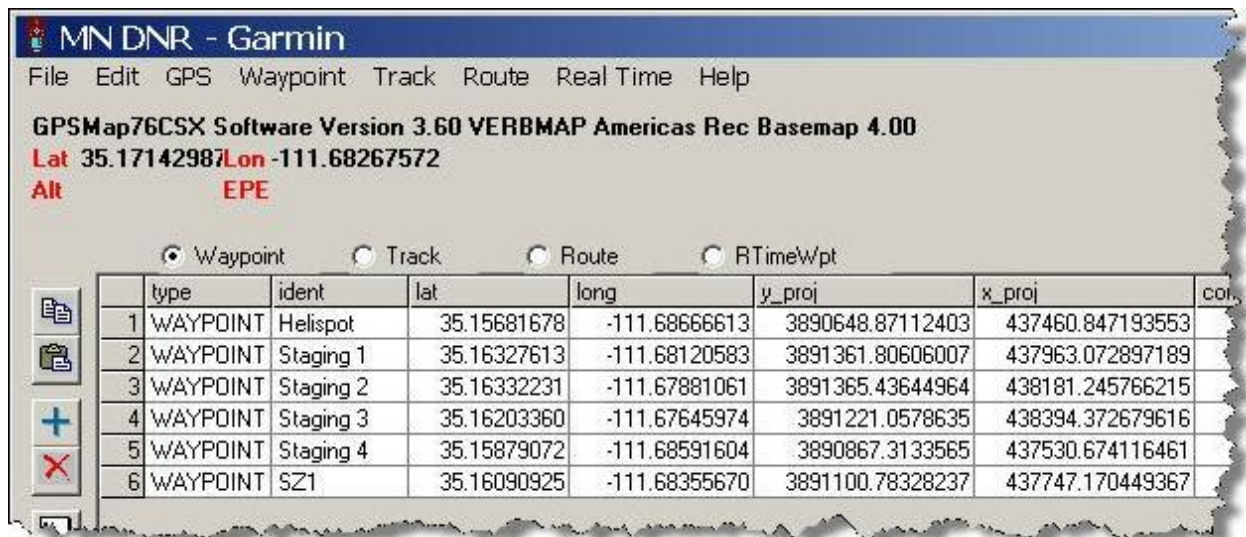
All track points collected since the active track log was last cleared are included in the **Active Log** track. Points from saved track logs, like **FR 532**, include only the generalized version of active track log points.

The first record of each track segment, is highlighted in a light blue color, and has the value “**True**” in the **new_seg** field. A new segment is created in the active track log each time the GPS receiver is cycled off and on, or each time the active track log is cycled off and on. These segments appear as separate lines when converted to GIS features. Segments can be combined into a single segment in DNRGarmin by double-clicking the “**True**” cell, and changing its value to “**False**”.

To convert these track log positions to an ESRI shapefile, click **File – Save To – ArcMap – Shapefile Layer....** Then, browse to an appropriate directory, and provide a name for the new shapefile. Make sure the saved file type is a **Projected** shapefile, and that DNRGarmin's projection matches the target GIS. Users must indicate whether track vertices are to be converted into point, line, or polygon features.



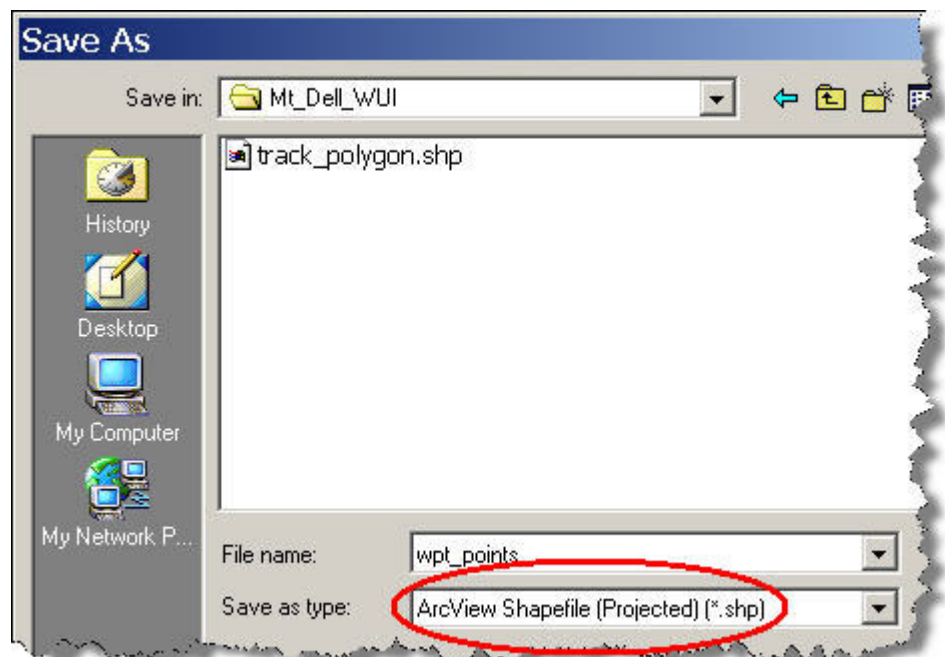
Create ESRI Shapefiles From Garmin Waypoints - To download waypoints from a Garmin GPS receiver, click **Waypoint – Download**. Each waypoint position is transferred to DNRGarmin's table, as illustrated below. Select specific waypoint records for export, or make no selection if all waypoint records are to be exported.



To convert these waypoint positions to an ESRI point shapefile, click **File – Save To – ArcMap – Shapefile Layer....** Then, browse to an appropriate directory, and provide a name for the new shapefile. Make sure the saved file type is a **Projected** shapefile, and that DNRGarmin's projection matches the target GIS.

Switch to ArcMap's data view, and inspect the new shapefiles to ensure they are located correctly.

The illustration on page 6 contains examples of point, line, and polygon features collected with a Garmin GPS receiver, and processed using DNRGarmin.



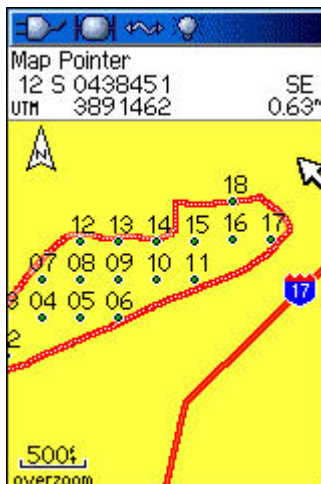
Create Garmin Waypoints From ESRI Shapefiles - Make a point shapefile active in ArcMap, ensure that DNRGarmin's current projection matches the source GIS layer, and click **File – Load From – ArcMap – Layer** to load point features to DNRGarmin's table. The contents of a user-selected field will become the waypoint's ID label.

Double-click the **Symbol** field's header and select a symbol for the waypoints. The **City (Small)** symbol is a good choice.

Then click **Waypoint – Upload** to transfer the shapefile's point features to the Garmin GPS receiver as new waypoints. New waypoints will overwrite existing waypoints if they have the same ID. These waypoints can be navigated to just like waypoints created from GPS positions in the field.

A Garmin receiver's waypoint memory is limited, so pre-select only the point features desired as waypoints using **Select By Attributes...** or **Select By Location...** in ArcMap.

Delete all unneeded waypoints from the Garmin receiver prior to making this transfer.



Create Garmin Tracks From ESRI Shapefiles - Make a line or polygon shapefile active in ArcMap, ensure that DNRGarmin's current projection matches the source GIS layer, and click **File – Load From – ArcMap – Layer** to load the line's or polygon's vertices to DNRGarmin's table.

Then click **Track – Upload** to transfer the shapefile's vertices to the Garmin GPS receiver as the active track log.

A Garmin receiver's active track log memory is limited, so pre-select only the line or polygon features desired for the active track using **Select By Attributes...** or **Select By Location...** in ArcMap.

Turn off the Garmin receiver's track log, and clear the active track log prior to making this transfer.

The uploaded waypoints and active track will now appear on the receiver's Map page, as illustrated above.

Use DNRGarmin As A Stand-Alone Application – DNRGarmin can be run as a stand-alone application. ESRI ArcMap (or ArcView) augment the functionality of DNRGarmin, but are not required. Stand-alone procedures are identical to those described above, with these exceptions.

- Create ESRI shapefiles from Garmin track logs or waypoints by clicking **File – Save To – File....**
- Create Garmin tracks or waypoints from ESRI shapefiles by clicking **File – Load From – File....**

Other Formats – In addition to the ESRI shapefiles discussed here, DNRGarmin can export directly to, and import directly from, stand-alone feature classes of an ESRI geodatabase (.mdb), text files (.txt), and Google Earth MyPlaces files (.kml).

An Example - Point location, road, and burn area features were captured with a Garmin GPS receiver and converted into projected ESRI shapefiles. Monitoring point features were created with a Python script and uploaded, along with the burn area feature, to a Garmin GPS receiver for navigation purposes during post-fire monitoring.

