

USING DNR GARMIN PROGRAM

The DNR Garmin Program was created by the Minnesota Department of Natural Resources (DNR), MIS Bureau - GIS Section. This document will describe how to use the DNR Garmin program to download and save Garmin GPS data to text and GIS shape files. It works as both a stand alone program and also as an extension within ArcGIS 9.x software. The DNR Garmin extension no longer works in ArcGIS 10.x, but can be run as a stand-alone application to meet your needs. It also will not interface with newer Garmin GPS units, but the newer DNRGPS application will. Other features of the program can be found in the detailed documentation which can be accessed by selecting **DNR Help File Index** in the **Help** menu of the program. Both DNR Garmin and DNRGPS can be downloaded from the Minnesota DNR website at:

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

To download the latest version of DNR Garmin, click the appropriate link at the bottom of the DNR Garmin web site. If you have a previous version of DNR Garmin installed on your computer, there is no need to uninstall prior to installing the new version. The latest version will install over the previous version.

Installing DNR Garmin and DNRGPS Programs

1. The DNR Garmin setup ZIP file contains three files that are used for program installation. You must unzip these files into the same folder to ensure proper execution of the installation program.
2. Once unzipped, double-click the .exe file that contains the words setup in its file name to start the installation process.
3. Let the installation program place all the files in the default directory that it recommends.
4. The installation program will create an icon on the desktop for starting the program.
5. DNRGPS is a stand-alone executable application and no installation is necessary, but for quick access, it's best to store it and all accessory folders/files in a permanent folder and then create a shortcut to the "dnrgps.exe" file.

Features of the DNR Garmin Program and Extension

1. Downloads and uploads waypoint, track and route data from and to GPS.
2. Users can save downloaded GPS data as text, shapefiles, .dbf, KML, GPX files.
3. Works with most older Garmin GPS units (60 and 76 series, first generation eTrex, and other older models).
4. Functions as a stand-alone program to work independent of ArcGIS.

Setting Up the DNR Garmin Properties

1. Start the DNR Garmin program.
2. You must first set the desired projection for shapefiles or to match text files that will be loaded into DNR Garmin.
 - A) To set the projection, in the DNR Garmin program window, select **File → Set Projection**. This opens the DNR Garmin Properties dialog box where the properties for the projection, waypoint, track and other settings can be set.

IMPORTANT NOTE: The desired projection must be set prior to downloading GPS data from a GPS in order for it to properly project in the shape, text KML or GPX file. When loading a

shape, text, KML or GPX file that was created by DNR Garmin, the projection set when the file was created must be set prior to loading the file into DNR Garmin, otherwise it will not project properly in any file types created from the data that was loaded.

B) The **DNR Garmin Properties** window will open with the **Projection** tab selected.

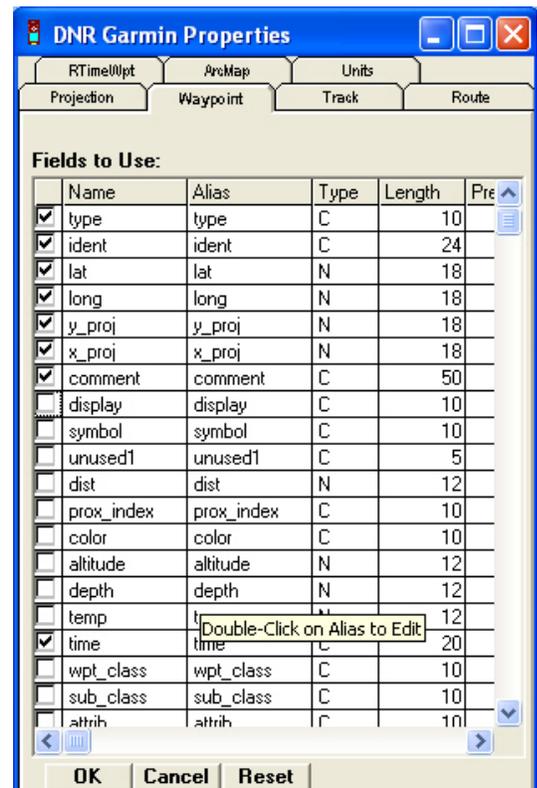
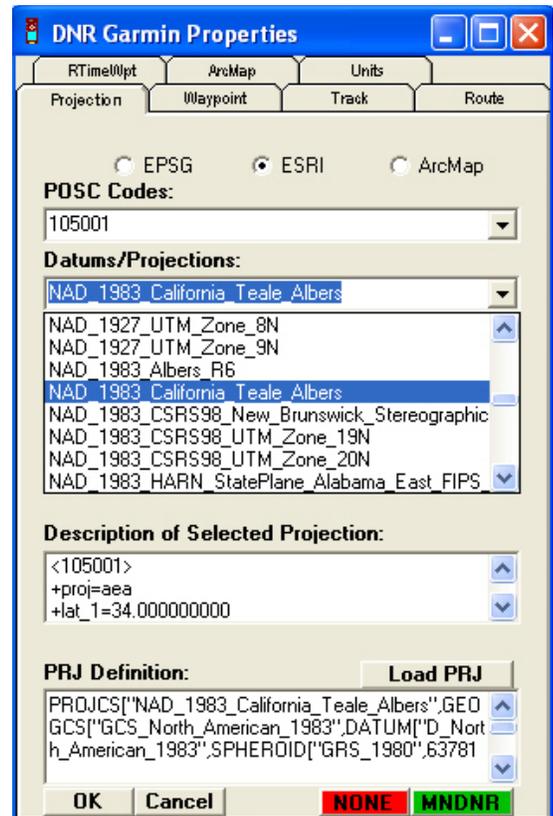
1) There are three projection lists to choose from, EPSG, ESRI and ArcMap. The **EPSG** option lists projections based on their datum. The **ESRI** list contains the standard projection list that comes pre-loaded with ArcGIS. The **ArcMap** option uses whatever projection is loaded into the **PRJ Definition** box. It is recommended to use the **ESRI** option if you expect to change projections on a regular basis. From that list, choose the desired projection (example: NAD1983_California_Teale_Albers).

2) In order to have DNR Garmin generate a projection file (.prj) for shapefiles created by the program, you must have the ESRI projection file for the desired projection saved on your computer.

- To load a projection file, click the **Load PRJ** button on the lower right side of the **Projection Properties** dialog box.
- Navigate to the folder where the projection is stored, select the desired projection file and then click the **Open** button (the Teale Albers projection is the **NAD 1983 California (Teale) Albers.prj** file in the **\Projected Coordinate Systems\State Systems** folder).
- The projection parameters from the .prj file will be loaded into the window below the **Load PRJ** button. Once a projection is loaded for a specific projection, the projection parameters will be saved and always be displayed in the window below the Load PRJ button when that projection is set.
- If window below the **Load PRJ** is empty, no projection is loaded and a .prj file will not be created for exported shapefiles.

C) See instructions at the end of this document for accessing ESRI .prj files in ArcGIS 10.1 or later and information on using DNRGPS with newer GPS units.

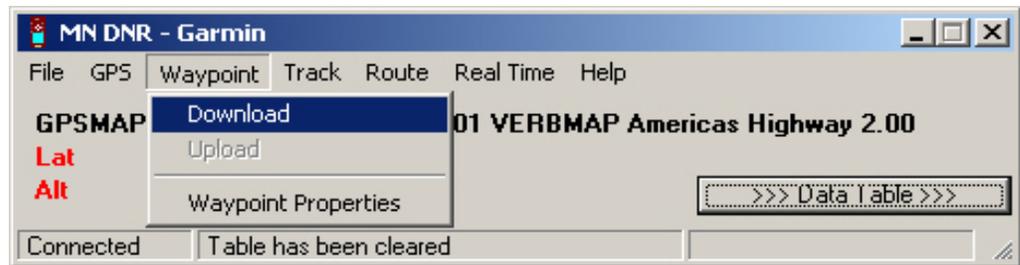
3. You can select the fields that you want to have in the shapefile tables or text files for Waypoints, Tracks, Routes and Real Time data (RTIMEWpt). The default is for all to be selected, which is more than you probably want.



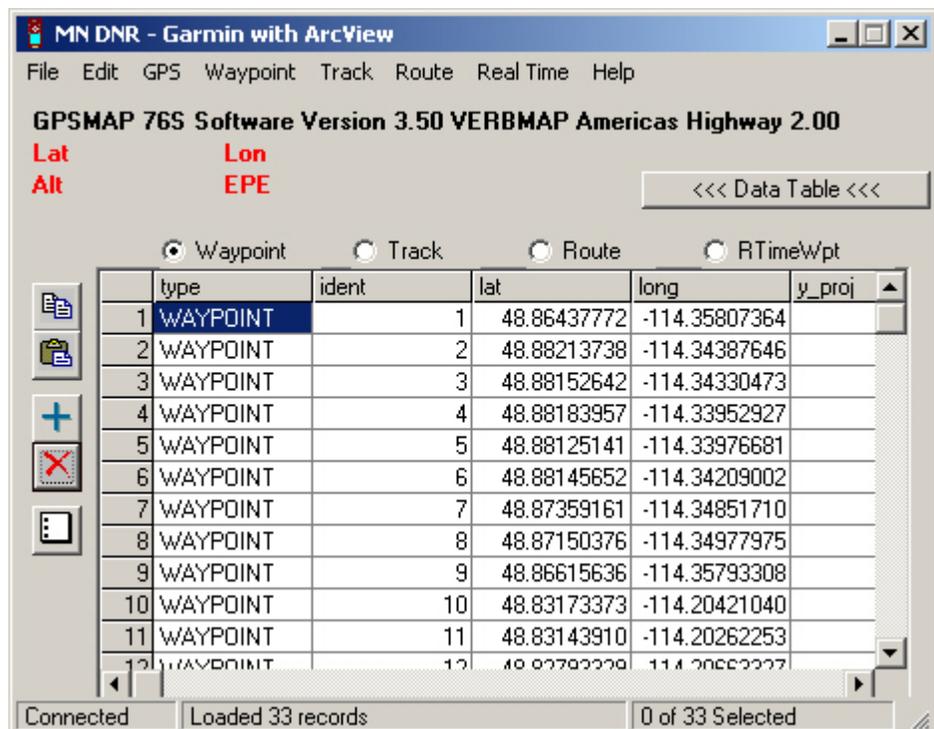
- A) If not open, open the DNR Garmin Properties window by selecting **Waypoint Properties**, **Track Properties**, **Route Properties** or **Real Time Properties** (not available after ArcGIS 10.1) from the respective feature type drop-down menu.
 - B) Select a feature type by clicking the respective tab.
 - C) Place a check in the boxes to the left of each field that you want in the table. Some of the fields are “required fields” which can’t be excluded from the table.
 - D) Reducing the number of fields will result in a smaller table for easier viewing and smaller DBF files.
 - E) Perform this task for each feature type that you intend to download.
 - F) In the **ArcMap** tab, do not check the *Calculate Area* option since it is not recommended to save tracks as polygons. Checking the *Calculate Length/Perimeter* option may not result in accurate calculations.
 - G) Keep the default options in the **Units** tab.
 - H) Click OK when done.
4. If the projection that was selected is not displayed in the box to the right of the Connection Status box (bottom left corner of program window), select **Get Projection** from the **File** drop-down menu. The current projection will now be displayed.

Downloading Waypoint Data

1. Once a GPS is connected to your computer, waypoints can be downloaded by selecting **Waypoint** → **Download**.



- A) The bottom center window in the program window will display the number of waypoints received as it downloads.
- B) Once all of the waypoints have been downloaded, a message window will pop up displaying the number of records received. Click **OK** in this window to close it.



2. If the table is not already visible, you can view the waypoint table by clicking the <<< **Data Table** <<< button on the right side of the program window.

A) Entries in the table cells can be changed as follows (normally not recommended):

- 1) Double-clicking the desired cell.
- 2) Entering the new information in the **Modify Cell Value** window.



3) Then click **OK** to implement the change.

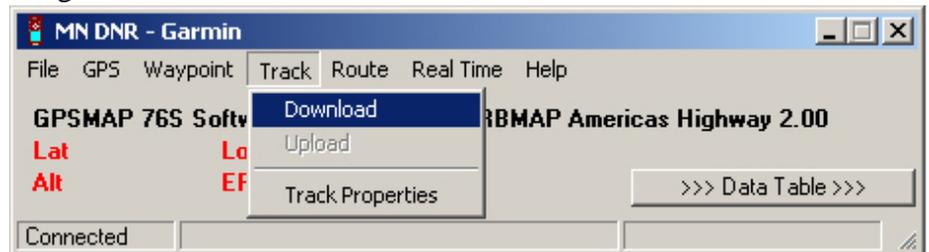
B) Waypoints can be selected and deleted by:

- 1) Select waypoints by clicking on the number in the left column.
- 2) Multiple adjacent waypoints can be selected by first selecting one waypoint and then hold down the shift key.
- 3) Click on the desired waypoint above or below the first waypoint to select all those between the two.
- 4) Click the **Delete selection** button at the left side of the table to delete the waypoint(s).
- 5) To delete columns or rows in the table, use the same process as used to delete a waypoint, but select the columns by clicking on the field name at the top of the column or rows by clicking the record number.

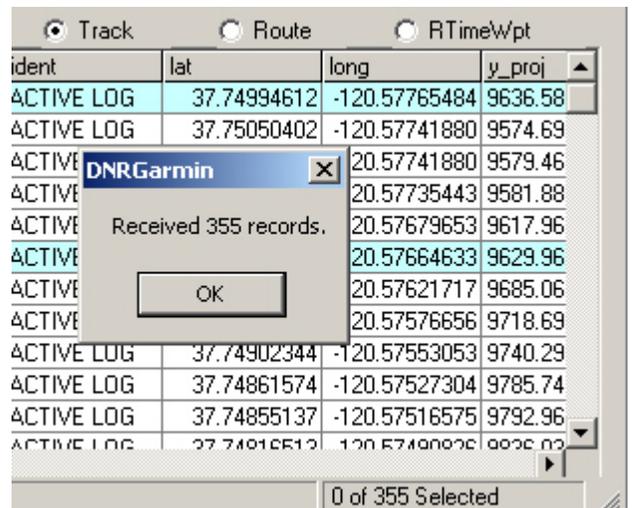


Downloading Track Data

1. GPS track files can be downloaded by selecting **Track → Download**.



- A) The bottom center window in the program window will display the number of track points received as it downloads.
- B) Once all of the track points have been downloaded, a message window will pop up displaying the number of records received. Click **OK** in this window.



- If not displayed, you can view the track table by clicking the >>> **Data Table** >>> button on the right side of the program window.

	type	ident	lat	long	y_proj	x_proj	new_seg	t
1	TRACK	ACTIVE LDG	37.74994612	-120.57765484	9636.58436670	0738.45268319	True	-
2	TRACK	ACTIVE LDG	37.75050402	-120.57741880	9574.69212712	0717.30667101	False	-
3	TRACK	ACTIVE LDG	37.75046110	-120.57741880	9579.46330927	0717.33569364	False	-
4	TRACK	ACTIVE LDG	37.75043964	-120.57735443	9581.88337708	0711.68643536	False	-
5	TRACK	ACTIVE LDG	37.75011778	-120.57679653	9617.96145017	0662.81549185	False	-
6	TRACK	ACTIVE LDG	37.75001049	-120.57664633	9629.96864997	0649.67213098	True	-
7	TRACK	ACTIVE LDG	37.74951696	-120.57621717	9685.06136968	0612.24447400	False	-
8	TRACK	ACTIVE LDG	37.74921656	-120.57576656	9718.69611358	0572.79863249	False	-
9	TRACK	ACTIVE LDG	37.74902344	-120.57553053	9740.29034457	0552.16086936	False	-
10	TRACK	ACTIVE LDG	37.74861574	-120.57527304	9785.74976925	0529.77947848	False	-
11	TRACK	ACTIVE LDG	37.74855137	-120.57516575	9792.96271291	0520.38245486	False	-
12	TRACK	ACTIVE LDG	37.74816512	-120.57490076	9826.03644075	0497.89620005	False	-

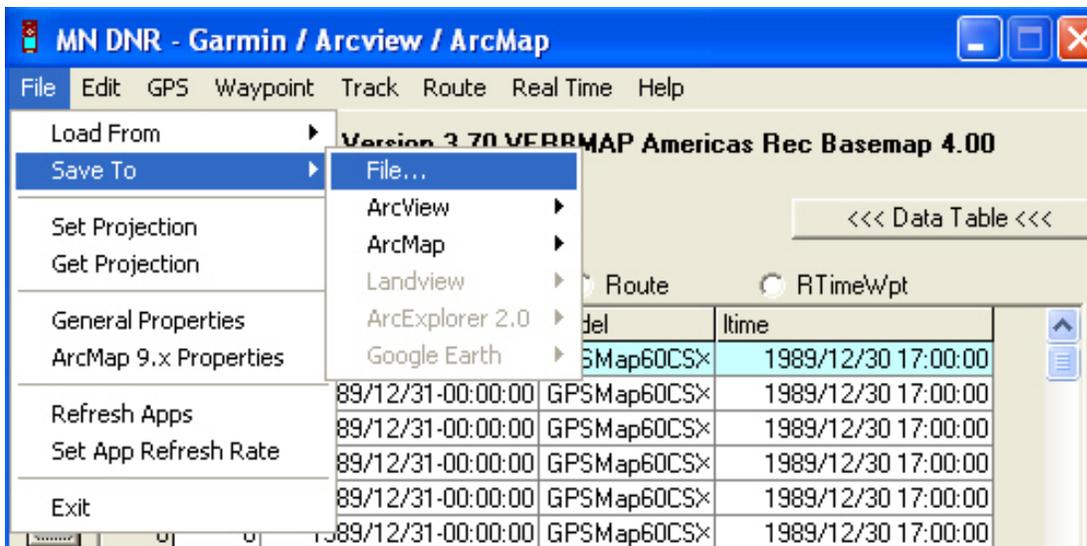
- Records (Rows) that are lightly shaded blue denote the first track point of a new track line segment and will have the word **True** in the **new_seg** column.
- This occurs when:
 - The GPS was turned off and then on again while the track function is turned on.
 - Satellite signal was lost and regained.
 - Active track recording was turned off and then on again.
- When the data is saved to a shapefile, new line segments will start at this point and end the record before the next shaded record in the table.
- If you would like to join adjacent segments into one feature, follow these steps:
 - In the column titled **new_seg**, double-click the word **True** in the record that starts the new segment that you would like to join to the previous segment.
 - In the **Modify Cell Value** window that appears, type **False**, then click **OK**. The blue shading will then disappear.
 - The adjacent segments will now form one feature when saved to a shape file.
 - Track points can be selected and deleted by using the same method as discussed in the waypoint section above.
- Columns in the table can be deleted using the same method as discussed in the waypoint section above.

Saving GPS Waypoint or Track Data to Text and Shape Files

Having the capability to run DNR Garmin as a stand-alone program is a very useful capability when trying to gather GPS data from personnel that don't have GIS training and/or are collecting GPS data from a distant location. Downloaded data can be saved to text files, which then can be attached to an email or posted to FTP sites for quick retrieval. Text files created by the DNR Garmin program are

software specific and probably won't work with other GPS data export/import programs without being edited. It is also recommended to use text files to backup original GPS data just in case shape or other files created by the data become corrupt. DNR Garmin waypoint and track text files can be loaded back into the DNR Garmin program to create new shapefiles to recover data that was corrupted or to upload data back into the GPS (**Waypoint → Upload** or **Track → Upload**). This is useful if you want to check up on things in the same area later (using **Goto** or **TracBack** GPS functions).

1. Follow the instructions noted above for downloading and editing waypoint or track data in the DNR Garmin Program. Once you have finished editing the table, use the following steps to save the GPS data as text, dbf or shape files. **Remember that the desired projection must be set prior to downloading GPS data from the GPS. If it is changed after downloading GPS data, it may not be projected properly in the files that are created.**
2. The steps below show how to save GPS data to text or shape files.
 - A) Select **File → Save To → File** to open the **Save As** window.



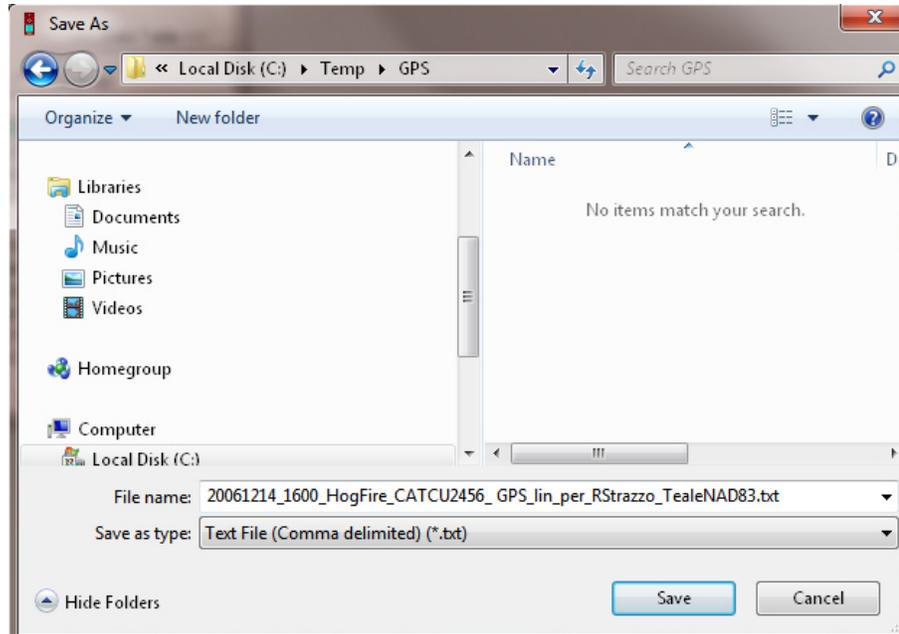
- B) In the **Save As** window:
 - 1) Select the desired folder that you would like to save the file.
 - 2) Name the file in the **File name:** box – Place the following information in the file name inserting underscores (**_**) between each item in the file name:
 - a) Date (YYYYMMDD)
 - b) Time (HHMM)
 - c) Incident name and number (no need to include zeros before #) if incident data or project name if data is for a project.
 - d) GPS feature type (for track data, use GPS_lin and waypoints use GPS_pnt)
 - e) What you GPSed – fire perimeter (per), dozer line (dzt), hand line (hand), etc.
 - f) Your position on incident (FOBS, DIVS, etc.) and name – person using GPS (First name initial and last name).
 - g) Abbreviation of the projection and datum used for the data (example: TealeNAD83 for the NAD 1983 California (Teale) Albers projection). **As noted before, include the projection in all file names (shape, text, KML, GPX, DBF) so it can be set and project properly if loaded into DNR Garmin or DNRGPS in the future.**

Track GPS text file name example:

20061214_1600_HogFire_CATCU2456_GPS_lin_per_fobs_JDoe_TealeNAD83.txt

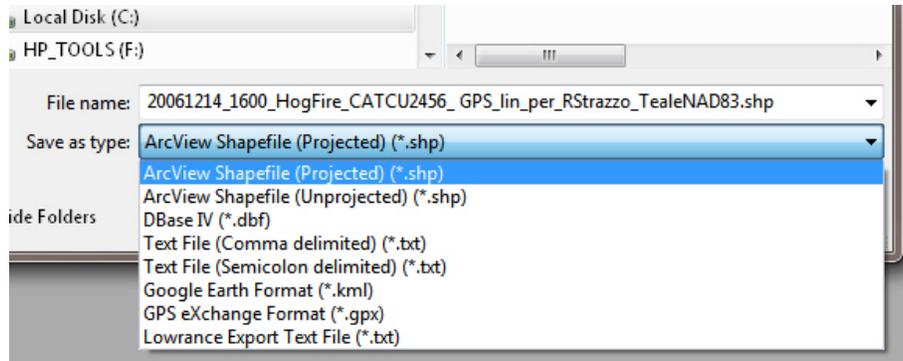
Waypoint GPS file name example:

20061214_1600_HogFire_CATCU2456_GPS_pnt_origin_fobs_JDoe_TealeNAD83.txt

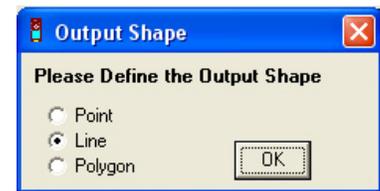


- 3) To save GPS data to a text file – In the **Save as type:** box at the bottom of the **Save As** window, click the down arrow and select **Text File (Comma delimited) (*.txt)**.
 - 4) You can save to the other file formats later by selecting the desired format listed in the “Save as Type” list. If you are saving to a projected shapefile, you must select the desired projection and load the PRJ prior to using this option.
 - 5) Then click the **Save** button to save the GPS data to the desired file type.
 - 6) Click **OK** in the following window that notes the file was successfully saved.
 - 7) If the data was saved to a text file, it can be loaded into the DNR Garmin program at a later time and saved to another file type. If it was saved to a projected shapefile, it can be loaded into any GIS software product that supports shapefiles.
3. Saving GPS data to projected shapefiles. The process shown below is for tracks, which has the additional Output Shape options to choose. Exporting waypoints excludes these options.
- A) Select **File** → **Save To** → **File ...** to open the **Save As** window again.
 - B) When the **Save As** window opens, select the desired folder and name the file using the procedures described above, but make sure the file extension is **.shp** at the end of the file name.

- C) In the **Save as type:** box at the bottom of the **Save As** window, click the down arrow and select **ArcView Shapefile (Projected) (*.shp)** and then click the **Save** button, which will open the **Output Shape** dialog box.



- D) When the **Output Shape** dialog box opens, it should already have **Line** selected as the output shape type. If not, select **Line** and then click the **OK** button. Saving GPS track data to a line shape file is the recommended, unless you would rather use points. Never select Polygon since the errors that may be present in the data may result in creating multi-part polygons, which may be difficult to edit.



- E) When the message stating that the shapefile was successfully created appears, click the **OK** button.

Uploading Data from DNR Garmin Program to a GPS

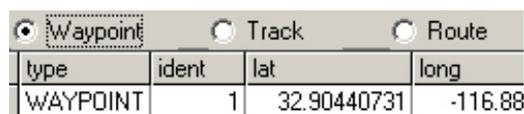
DNR Garmin can be used to upload waypoint, track or route data that has been loaded into the program to a GPS that is connected to your PC.

IMPORTANT: As mentioned before, prior to loading the data into DNR Garmin, you must set the projection in DNR Garmin to match the actual projection used by the GIS data. Otherwise the data may not project properly when uploaded to the GPS or saved to other file types.

1. To upload track data, select **Track** → **Upload**.



2. To upload waypoint data, select **Waypoint** → **Upload**, and to upload route data, select **Route** → **Upload**.
3. If you would like to have your track or route data uploaded as waypoints, click the **Waypoint** radio button to convert data to waypoints. You can use this method to convert waypoint, track or route data to any other type prior to uploading.



4. You can also load data from a shapefile and then upload the data to a GPS (or use DNR Garmin to save it to a different file type).

Using DNRGPS and Accessing ESRI .prj Files in ArcGIS 10.1 or Later

DNR Garmin can be used with older GPS receivers, but many newer models no longer work with DNR Garmin. DNRGPS, the latest release of the software, can be used for downloading newer models. The look and way both programs run is very similar. The main difference is found when setting the projection. In DNRGPS, you must first select the desired datum in order for the list of projections to display in the **Projections** window. Because issues have been found with DNRGPS when working with some projections and there have been problems associated with saving GPS data to some file types, the recommended software is DNR Garmin. To ensure proper “project on the fly” functionality in ArcGIS for data created by DNRGPS, it may be necessary to redefine the appropriate coordinate system in ArcCatalog or the Catalog in ArcMap. Doing this will ensure the coordinate system name in the PRJ file matches the names recognized by ArcGIS. When GPS receivers fail to connect using DNR Garmin, use DNRGPS.

The ESRI Coordinate systems files (.prj) used by the **Load PRJ** function in the **Set Projection** options in DNR Garmin are no longer easily accessible in ArcGIS 10.1 and later versions. They were normally stored in a subfolder of the “\Program Files (x86)\ArcGIS” folder, but are now stored in the software code. These files when loaded into DNR Garmin with the **Load PRJ** tool are used to create the .prj files for shapefiles created by DNR Garmin. If you don’t use the **Load PRJ** function to load the PRJ, no .prj file will be created for projected shapefiles created by DNR Garmin. In order to access the ESRI .prj files in ArcGIS 10.1 or later, you must add the desired coordinate systems to your **Favorites** coordinate systems list by right clicking on the desired coordinates system in the coordinate systems list and selecting **Add to Favorites**. Once this is done, you can access the .prj file under your user profile in the “Users\{your user name}\AppData\Roaming\ESRI\Desktop10.1\ArcMap\Coordinate Systems” folder. With versions of ArcGIS other than 10.1, change the version in the above path to the version installed on your computer.