USDA NRCS Natural Resources Conservation Service

Cartographic and GIS Technical Note No. MT-5
January 2007

Procedures for Utilizing a Garmin *GPSmap 76* for Field Data Collection in Montana

This document was initially modified from the Nebraska Technical Note and revised December 2006 for use with DNR Garmin 5.1.1 and ArcGIS 9.x.

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Conventions

Bold = Menu option, Page title, or action.

[name] = keypad or button on GPSmap 76 unit.

Introduction

This document contains information on how to:

- -- Setup a Garmin GPSmap 76 so that the data collected in the field matches projection parameters and map accuracy standards of current NRCS GIS layers.
- -- Setup the Garmin GPSmap 76 for use with the DGPS Beacon Receiver.
- -- Use the DNR Garmin software to download GPS data into ArcMap and upload ArcMap data to the GPS for use in the field.
- -- Navigate to Waypoints with the Garmin GPSmap 76.

Users should first read the **Garmin GPSmap 76 User Manual** to become familiar with the unit and its features. For more information on the DNR Garmin software, refer to the program's help file.

Required Software

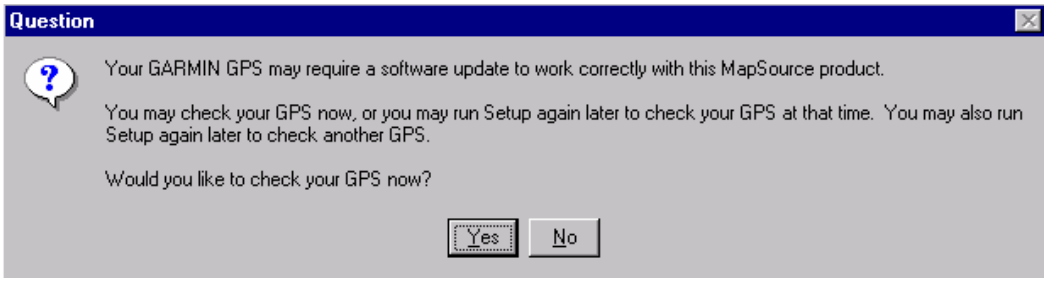
In order to use the procedures contained in this document, the following software needs to be obtained and installed:

- -- ArcGIS 9.x
- -- DNR Garmin GPS interface 5.1.1
- -- Garmin MapSource (optional, may impact storage capability in Garmin receiver).

NOTE: The mention and/or use of any software contained in this document should not in any way be considered as an endorsement by USDA-NRCS.

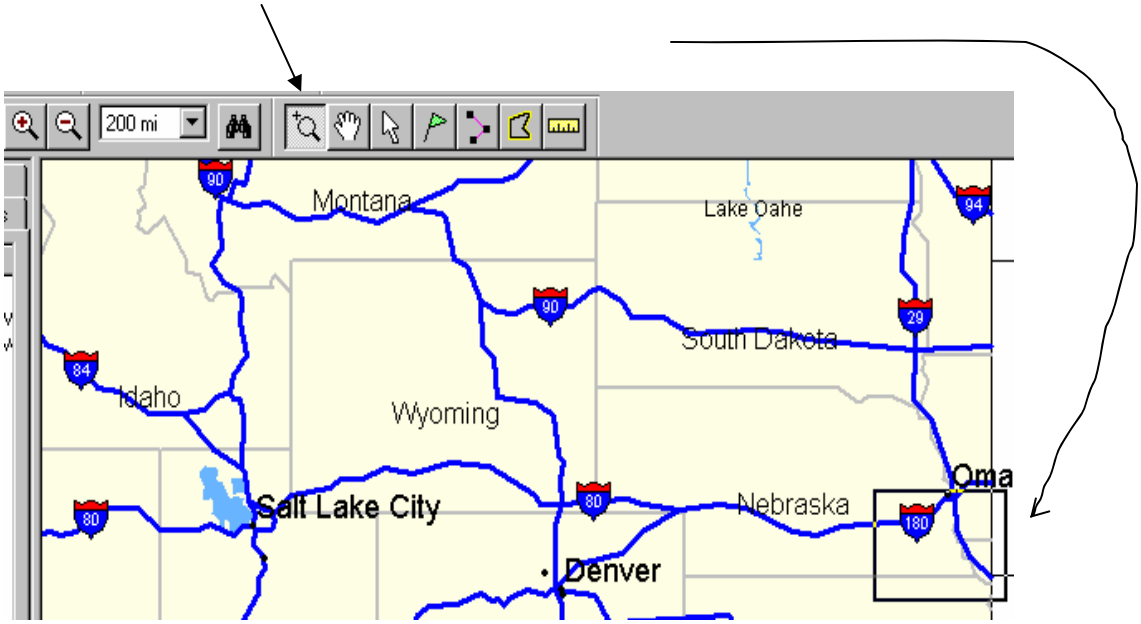
Using MapSource to Load Background Maps (optional)

Login as an Administrator and **install MapSource** (if not already installed). When installing Mapsource, the setup program will ask if you would like to check your GPS for the latest firmware. Select **No** and continue with the installation of Mapsource.

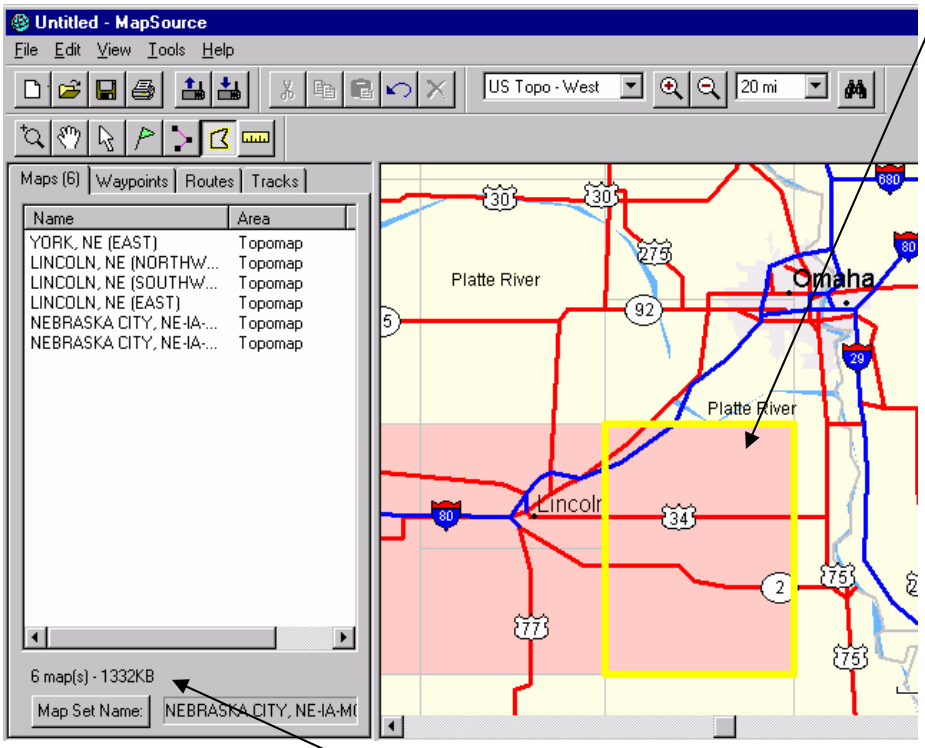


Login as a regular User.
Insert the Western US CD (Disk 1 of 3) of MapSource TOPO into the computer.

Start MapSource program.
Use the **Zoom Tool** to draw a box around the area that you want to load the detailed maps from.



Use the **Map Tool** to click on sections of the map to load into the GPSmap 76. When you click on a "block" of maps the area is outlined in yellow and the area that will be loaded becomes shaded. The name of Map block is listed under the Maps tab.

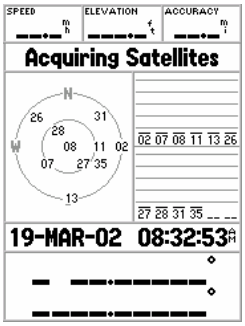


The GPSMap 76 can hold 8mb of map data, approximately 30-35 maps.

Connect the GPSmap 76 to the computer.

Turn On GPSmap 76 and Start Simulator Mode

Turn on the GPSmap 76 (**[red]** key).
Press the **[Enter]** key (2 to 3 times) until you see the **Acquiring Satellites** GPS Information Page.



Press **[Menu]** key once. **Start Simulator** is highlighted.
Press **[Enter]** key.

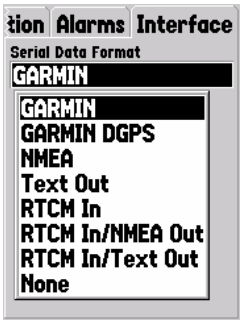
The GPSmap 76 is now in simulator mode. Always enter simulator mode when working with the GPSmap 76 indoors (downloading, uploading data and configuration).

Verify the **GARMIN** interface is selected:

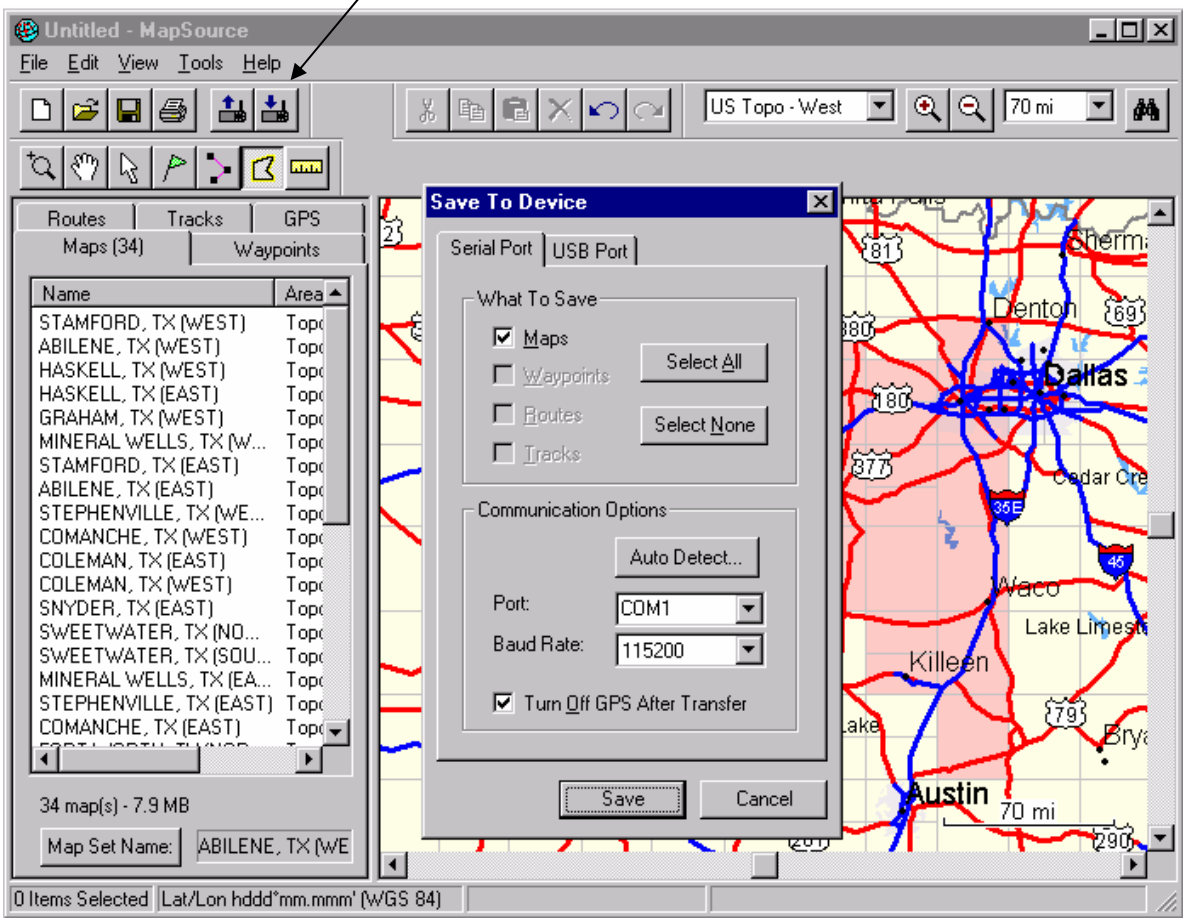
-- Press **[Menu]** key two times, the Main Menu appears.

-- Toggle ([rocker] pad) up or down to select the **Setup** menu and press **[Enter]** key.

-- Toggle ([rocker] pad) left or right to select the **Interface** menu. Verify **Serial Data Format** is set to **GARMIN**. If not, toggle down and change the setting.



In MapSource click the **Save to GPS** button.



A pop-up window will appear with Maps checked. Click the **Save** button.

If you selected Maps between US Topo – West and US Topo – East, you will be prompted to insert the different CDs.

After transfer is complete, **Exit** MapSource.

Garmin GPSmap 76 Setup

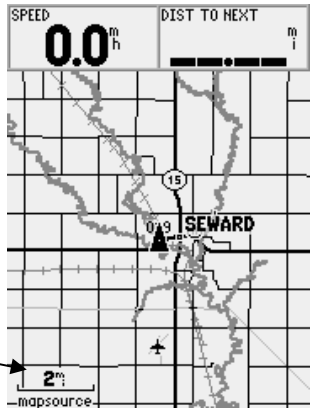
The following procedure should be used to set up a Garmin GPSmap 76 receiver to insure that data collected in the field is consistent with GIS data and imagery currently available to USDA Service Centers. Users should first follow the Garmin GPSmap 76 Owner's Manual and Reference for initial setup and in order to become familiar with the unit and its features.

Map Background Setup

Turn on the GPSmap 76 and enter simulator mode (see bottom of Page 4).

Press the **[Page]** key until you see the Map page.

Use the **[IN] [OUT]** keys to zoom in and out. As you zoom in different feature labels will appear, such as town names, stream names, and so forth. The current zoom scale is displayed in the lower left corner of the screen.

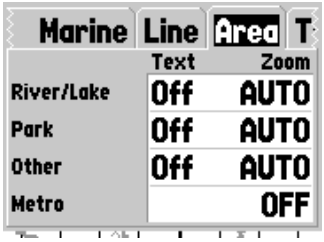


Turn off the unwanted map features and labels.

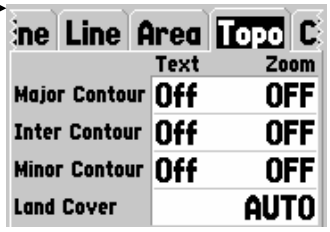
While looking at the Map page, press the **[Menu]** key.

Toggle up or down, highlight the **Setup Map** menu and press the **[Enter]** key.

Toggle Right to the **Area** Tab.
Set the **Text** to **Off** for all options.
This requires users to toggle ([rocker] pad) down and highlight the Text option, press the **[Enter]** key, and toggle ([rocker] pad) up to find the **Off** option. Press **[Enter]** when **Off** is highlighted to select.



Toggle Right to the **Topo** Tab.
Set the **Zoom** to **OFF** for all Contours.
This requires users to toggle down and highlight the Zoom option, press the **[Enter]** key, and toggle up to find the **OFF** option. Press **[Enter]** when **OFF** is highlighted to select.



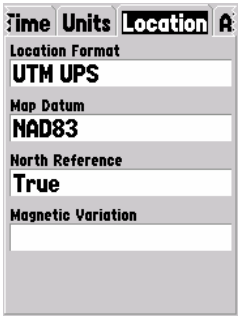
You might want to edit other settings. For example under the **Other** Tab, turn **Off** Railroad **Text**, and so forth.

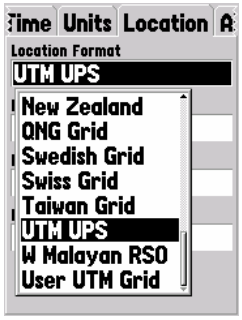
Press the **[Quit]** key when finished.

Position Setup

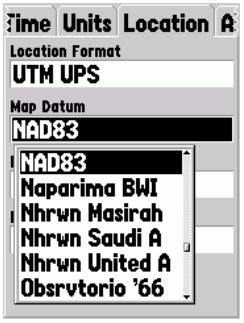
With the Garmin GPSmap 76 turned on, press the **[Menu]** key twice and select **Setup**.

After selecting **Setup** use the [rocker] pad to arrow over to the **Location Tab**. Press the [rocker] pad down to highlight the **Location Format** and press the **[Enter]** key on the unit to bring up the list of formats. Scroll through the list and select **UTM/UPS** (UTM coordinates) and then press the **[Enter]** key.



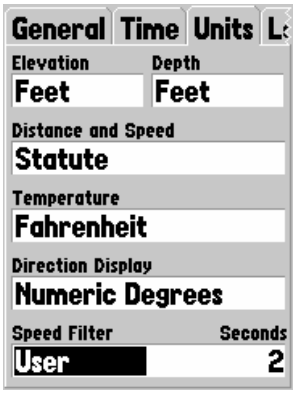


After selecting the desired **Location Format**, use the [rocker] pad to move down to the **Map Datum**. Press the **[Enter]** key on the unit to bring up the list of formats. Scroll through the list and select **NAD83**. Press the **[Enter]** key on the unit to accept NAD83.



Press the [rocker] pad to move up to the **Location Tab**. Press the [rocker] pad to move left to the **Units Tab**. Press the [rocker] pad to move down to the **Speed Filter**. Press the **[Enter]** key on the unit to bring up the list of options. Select **User** for Speed Filter and **Seconds** should be set to a value of **2**. *The speed filter setting is important when collecting track data using the Auto Record Method.*

Press the **[Quit]** key on the unit to return to the previous screen on the unit.

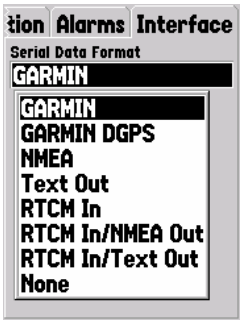


GPSmap 76 Setup for Use Without the DGPS Beacon Receiver

The Garmin GPSmap 76 can be used without attaching the GPS to the DGPS Beacon Receiver in instances where maximum accuracy is not a requirement. Such instances might include conducting resource inventories, conservation planning, navigation, and so forth. The following items need to be set on the Garmin GPSmap 76 Setup page when the unit is not attached to the DGPS Receiver.

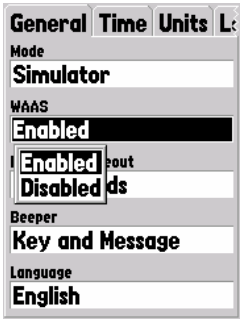
With the Garmin GPSmap 76 turned on, press the **[Menu]** key twice and select **Setup**.

After selecting **Setup** use the [rocker] pad to arrow over to **Interface Tab**. Press the [rocker] pad down to highlight **Serial Data Format** and press the **[Enter]** key on the unit to bring up the list of formats. Scroll through the list and select **Garmin** and then press the **[Enter]** key on the unit.



Enabling WAAS:

Enabling WAAS reserves slots 11 and 12 for the two WAAS geostationary satellites that act like beacon stations. The first time you get a WAAS signal you should remain stationary for 15 minutes. One of the last two bars on the satellite view page will be gray when first receiving WAAS and turn black after the almanac has been downloaded (15 minutes). The second satellite should then be displayed in the other slot. Your position will then be 3D Differential.



To Enable WAAS, after setting the Interface, press the [rocker] pad up to the **Interface Tab** and then right to the **General Tab**. Press the [rocker] pad down to highlight **WAAS** and press the **[Enter]** key on the unit to bring up the choices. Use the [rocker] pad to select **Enabled** and then press the **[Enter]** key on the unit. **Note:** Be aware that the WAAS signal is not always available. It is generally recommended to leave WAAS **Enabled**.

GPSmap 76 Setup for Use With the DGPS Beacon Receiver

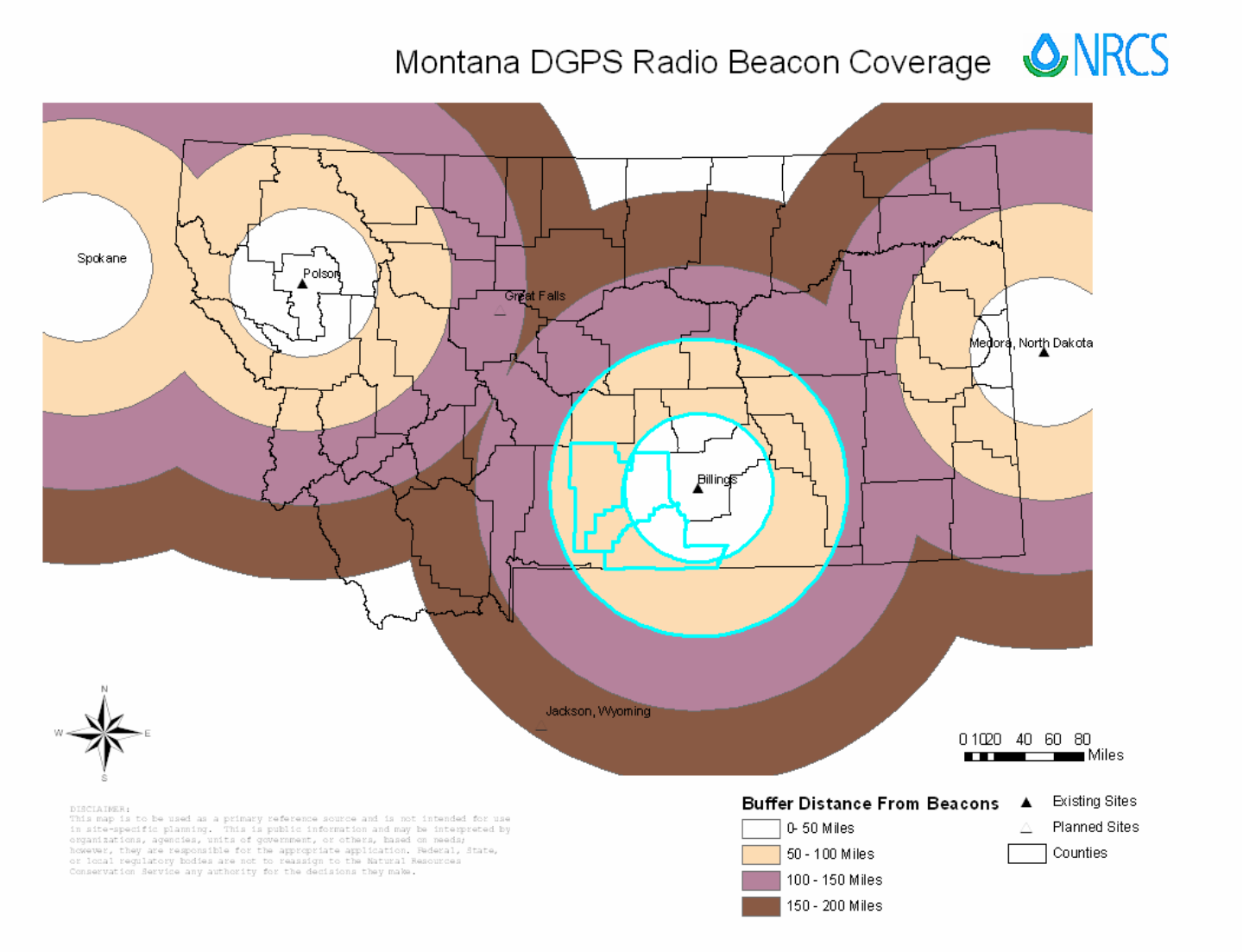
The Garmin GPSmap 76 can be used with the DGPS Beacon Receiver in instances where maximum accuracy is required. Such instances include certifying conservation practices for payment, precise layout of conservation practices in the field, precise navigation, and so forth. **Note:** does **not** include legal easements or surveys!

The following items need to be set on the Garmin GPSmap 76 Setup page when the unit is to be attached to the DGPS Receiver:

With the Garmin GPSmap 76 turned on, press the [Menu] key twice and select **Setup**.

After selecting **Setup** use the [rocker] pad to arrow over to **Interface**. Press the [rocker] pad down to highlight **Serial Data Format** and press the **[Enter]** key on the unit to bring up the list of formats. Scroll through the list and select **RTCM IN/NMEA OUT** and then press the **[Enter]** key on the unit. Press the [rocker] pad down to highlight **Beacon** and press the **[Enter]** key on the unit to bring up the list of tuning modes. Select **User** from the list and then press the **[Enter]** key on the unit. Use the [rocker] pad to arrow over to **Freq** and press the **[Enter]** key on the unit to change the Beacon frequency to the setting of the Beacon closest to your location and press the **[Enter]** key on the unit. Use the [rocker] pad to arrow over to **Bit Rate** and press the **[Enter]** key on the unit to change the Bit Rate to that of the previously selected Beacon and press the **[Enter]** key on the unit. Refer to the map on the next page to find the DGPS Beacon closest to your location. When a DGPS signal is detected, the **Status** will say Receiving and the **SNR** and **Distance** fields will have values in them.

Refer to the following map to determine the beacon closest to your location.



Before going to the field, it is a good idea to check the current status of the Beacons at the following website: http://www.navcen.uscg.gov/ADO/DgpsSelectStatus.asp

Spokane, Washington = 316 KHz / 100 bit rate
Polson, Montana = 287.0 KHz / 100 bit rate
Billings, Montana = 313.0 KHz / 100 bit rate
Great Falls, Montana = planned
Medora, North Dakota = 325 KHz/ 100 bit rate
Jackson, Wyoming = planned

Procedure for Collecting GPS Data in the Field

Data can be collected in the field as waypoints, tracks or both. It is important to first look at the feature to be measured before deciding which technique to use to collect data. Features that consist of well-defined points (that is field boundaries, fences, pipelines, and so forth) can, in most cases, be captured more efficiently and accurately as individual waypoints. Points that are not well defined or that are Non-linear (curved) (that is treatment areas, wetland boundaries, and so forth) are generally more accurately and efficiently captured using the track function.

Required Accuracy Levels

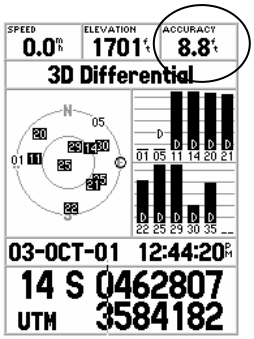
When collecting data with GPS in the field, certain accuracy levels need to be maintained in order to collect data as precisely as possible. This level of accuracy will depend on the type of data being collected:

Using GPS to Certify Conservation Practices or Official Field Acreage

When collecting data with GPS for use in certifying conservation practices or official field acreage, every attempt should be made to maximize accuracy. In order to make this possible, it is **required** that the Garmin GPSmap 76 be connected to the DGPS Beacon Receiver where beacon coverage is available. Data collected using DGPS is inherently more accurate and consistent than data collected by autonomous GPS (unit by itself with out the beacon).

The user should only collect data when the following parameters have been met in the field:

The Accuracy, which is found on the GPS Information Page, should always be less than or equal to 12 ft.



Using GPS for Conservation Planning, General Resources Inventory, and so forth

In instances where absolute accuracy is not a requirement (that is Basic Conservation Planning, Resource Inventories, Navigation, and so forth) the Garmin GPSmap 76 can be used without being connected to the DGPS Beacon Receiver. However, the following accuracy level should be maintained for best results:

The **Accuracy**, which is found on the GPS Information Page, should always be less than or equal to 40 ft. This matches the U.S. Map Accuracy Standard for 1:24,000 scale topographic reference maps used as a base for general resources mapping.

Collecting GPS Data as Waypoints

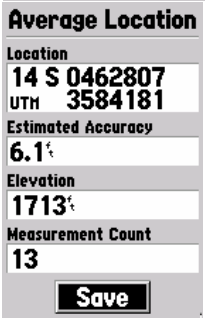
Points that are well defined (that is wells, pipelines, fences, field boundaries, and so forth) can, in most cases, be more accurately and easily obtained by collecting GPS data as waypoints. Use the following procedure to collect waypoint data:

Place the GPS antenna (either the Beacon antenna when connected to the DGPS Receiver, or the Garmin GPSmap 76 internal antenna (when not connected to the DGPS) directly over the point at which data is to be collected (that is well head, fence post, and so forth). The Garmin GPSmap 76 internal antenna is the top portion of the unit where the Globe image appears above the word "Zoom".

Press and hold the **[Enter]/ [Mark]** key. The **Mark Waypoint** page will appear with a default 3-digit number for the new waypoint. The user can either change this number or accept the default. Use the [rocker] pad to arrow down to **[OK]** and press the **[Enter]/ [Mark]** key again to accept this value.

Go to the next location and repeat this process.

Positional accuracy can be improved by using the averaging feature in the Garmin GPSmap 76. From the **Mark Waypoint** page, press the **[Menu]** key on the GPSmap 76 and press the **[Enter]/[Mark]** key. The unit will begin to average the position. The **Measurement Count** will increment by one each second. When you feel that enough measurements have been recorded to get a good average of your position, press the **[Enter]/[Mark]** key to save the position and then press the **[Enter]/[Mark]** key again to accept this value.



Most importantly, keep good notes in the field! Keeping notes of which waypoints go where will make data handling much easier when you get back to the office.

Deleting Downloaded Waypoints:

After downloading and archiving waypoint data, clear the waypoints from the GPSmap 76 unit. Press **[Menu]** two times to bring up the **Main Menu**. Toggle ([rocker] pad) to the **Points** menu and press **[Enter]**. The **Waypoints** menu is selected, press **[Enter]**. From the **Nearest Waypoints** screen, press **[Menu]**. Toggle (rocker pad) down to **Delete All** and press **[Enter]**. Toggle ([rocker] pad) to **Yes** and press **[Enter]**. The GPSmap 76 will beep two times. Press **[Quit]**.

Collecting GPS Data as Tracks

Points that are not well defined (that is wetland boundaries, treatment areas, and so forth) or that are Non-linear (curved) can, in most cases, be more accurately and easily obtained by collecting GPS data as Tracks. When collecting data as Tracks, setup the Garmin GPSmap 76 as follows:

With the Garmin GPSmap 76 turned on, press the **[Menu]** key twice and select **Tracks** then press the **[Enter]/[Mark]** key.

From the **Tracks** Page, press the **[Menu]** key and select **Setup Track Log** by pressing the **[Enter]/[Mark]** key.

From the **Track Log Setup** Page, set **Recording** mode to **Stop When Full** (or **Wrap When Full** if you're sure you won't collect more then 2024 points), the **Record Method** to **Auto,** and the **Interval** to **Most Often**. Scroll down to **OK** when finished and press the **[Enter]/[Mark]** key. **Note:** Verify that you followed instructions to set the Speed Filter to User and Seconds to 2 (see Page 7).

When collecting data in track mode it is important to keep the antenna as close as possible to the boundary to be marked. Separate features (that is different fields) can be captured using the Track Mode by simply turning the track record mode off and on at the start and finish of each feature. Tracking can also be turned on/off when obstacles are encountered while collecting data that prevent the user from staying on the intended course. Turn tracking off when the obstacle is reached, go around the obstacle and turn tracking back on when you get back on course. Use DNR Garmin to join different track segments of the same feature.

The GPSmap 76 has the ability to calculate the area of a single track or multiple tracks that make up the same feature. However, the GPSmap 76 **does not** have the ability to

compute the area from individual waypoints. Follow these steps to compute the area of a Track:

Refer to the three screen shots below. From the **Tracks** Page toggle ([rocker] pad) over to **Save** and press the **[Enter]/[Mark]** key. You will be given the choice to save the entire track log, or if you have multiple segments, you can choose how far back to save. Make your choice and press the **[Enter]/[Mark]** key. The next screen displays the **Area** calculation. After viewing the area calculation of the Track, toggle ([rocker] pad) over to **Delete** and press the **[Enter]/[Mark]** key to remove this saved track from the GPS. The original track will remain stored in the GPS internal memory. Only save a track to get an infield estimate of the acreage and then immediately delete it.

IMPORTANT: In the process of saving a track, the GPS filters the track data. Be aware that the area calculated may vary somewhat from the area calculation you will get in ArcMap from the unfiltered (original) track data. This variation will depend on how complex the original track data is. When certifying a conservation practice, individual program policy will determine if the saved track may be used as the official acreage.

Again, keep good notes in the field! Keeping notes of which track segments go where will make data handling much easier when you get back to the office. Remember that each time you turn **Recording Off**, you just ended a track segment. The next time you turn **Recording On**, the GPSMap 76 unit will internally mark a new segment has started. You can incrementally keep a record of each track segment by counting by one each time you turn **Recording** from **On** to **Off**.

Deleting Downloaded Tracks:

After downloading and archiving track data, clear the tracks from the GPSmap 76 unit. Press **[Menu]** two times to bring up the **Main Menu**. Toggle ([rocker] pad) to the **Tracks** menu and press **[Enter]**. From the **Tracks** screen, toggle ([rocker] pad) to **Clear** and press **[Enter]**. Toggle ([rocker] pad) to **Yes** and press **[Enter]**. The **Tracks** page will now display Track Log **0%** Full. Press **[Quit]**.

Utilizing DNR Garmin to Download GPS Data

DNR Garmin (© 2001 Minnesota Department of Natural Resources) is a combination Visual Basic program that communicates with the GPS receiver and converts the information received into shapefiles or graphics for use in ArcMap. Refer to the DNR Garmin help file for more information.

See also: http://servicecenter.usda.gov/release/#M (to download)

Garmin GPSmap 76 Setup for Downloading

Use the Serial port cable that was supplied with the GPS to **connect it to the computer**.

Turn on the GPS.

From the **Satellite** page, press the **[Menu]** key, **Start Simulator** is selected, press the **[Enter]** key. The GPSmap 76 is now in simulator mode. This will stop the unit from trying to acquire satellites and conserve battery power.

IMPORTANT: The GPSmap 76 interface setup **MUST** always be returned to the **Garmin** format before attempting to download to ArcGIS using DNR Garmin!!!

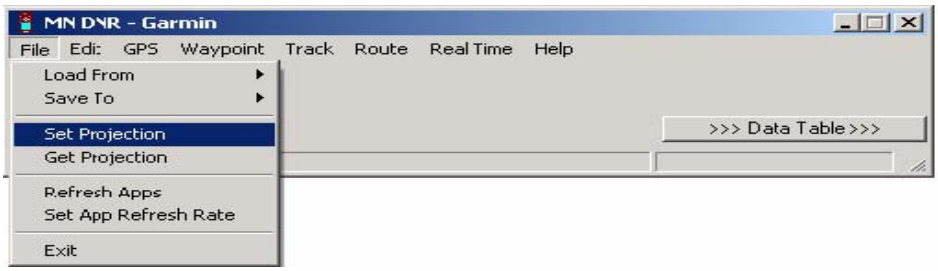
Press the **[MENU]** key two times. Select "Setup"; then press the **[Enter]** key. Move left or right to select the Interface tab. Verify ***Serial Data Format*** is set to **GARMIN**. If not, toggle down and change the settings.

DNR Garmin Setup

From the **Start** button on the desktop, go to **All Programs** - **DNR Garmin** - **DNR Garmin** or click on the DNR Garmin desktop icon.

The first time DNR Garmin is started, a window will appear asking if you want to use the Default Projection (NAD83 – UTM Zone 15). Answer "**No**" and change the projection.

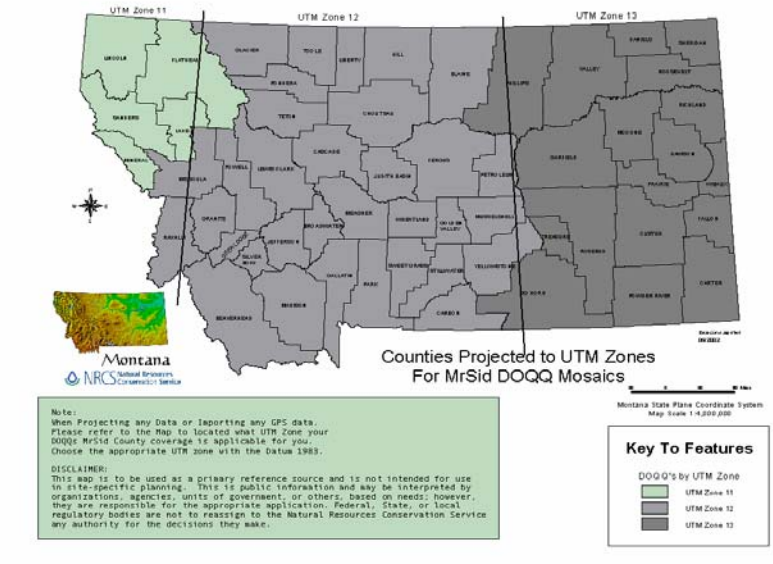
Set the default projection by selecting **File - Set Projection**.

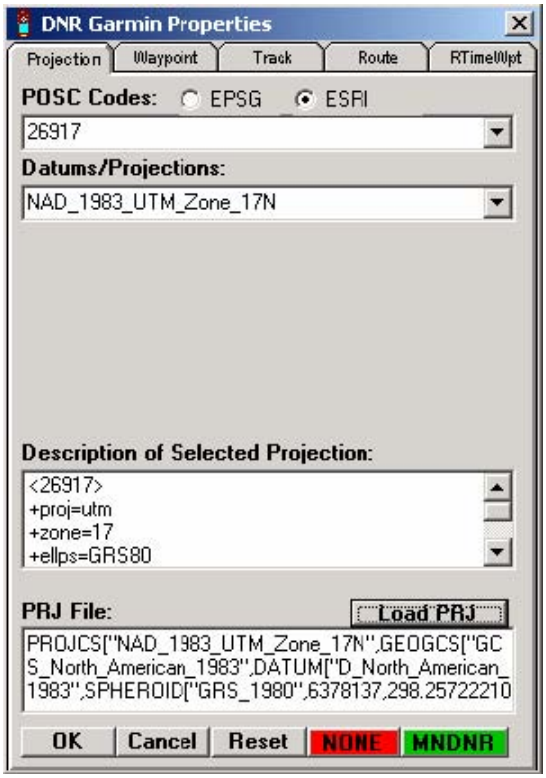


Use **File - Get Projection** to see the projection. Even if your projection is already set, change it to something else, save it and go back to **File - Set Projection**.

Click on the pull down list for projection and change it to the correct projection, for example **NAD_1983_UTM_Zone_11N**.

Refer to the following map to determine the appropriate UTM zone.





Do not click on the [OK] button yet.

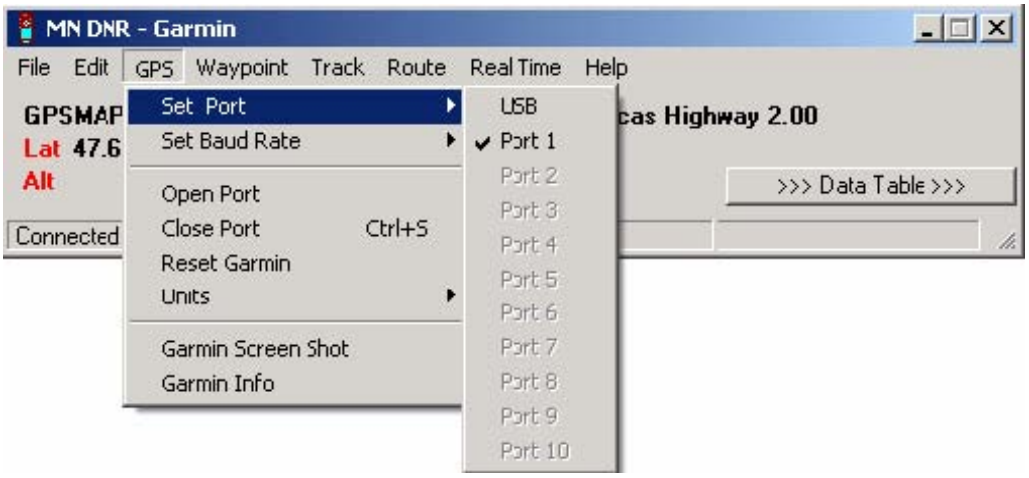
Now select **[Load PRJ]**.

The first time you click on the **[Load PRJ]** a window will open where you will browse to **C:Program files\ArcGIS\Coordinate Systems\Projected Coordinate Systems\UTM\Nad 1983**.

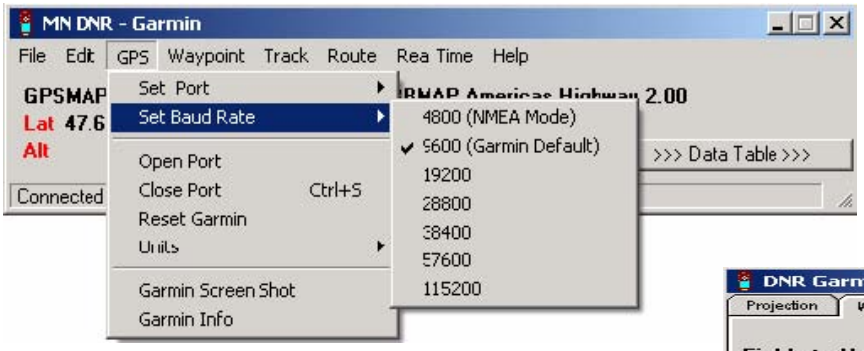
Select the appropriate projection file for your UTM zone. Setting the projection in this manner will ensure that a projection file is created each time a shapefile is made with DNR Garmin.

Downloading GPS Data

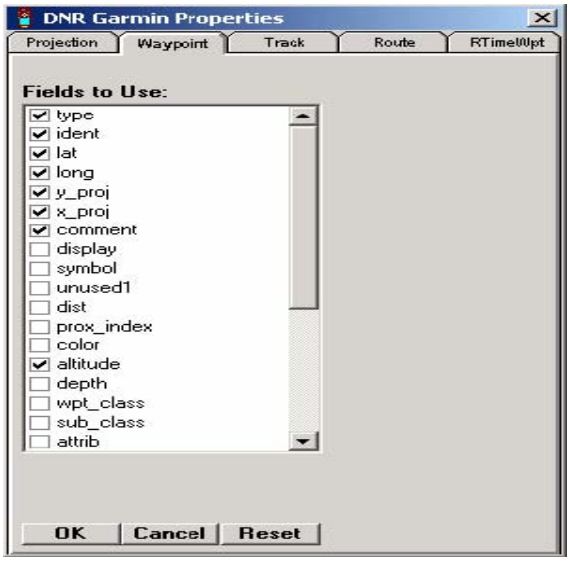
Select **GPS - Set Port** from the GPS top menu. (Different COM Ports may be available on different computers).



If the Garmin does not connect, select **GPS - Set Baud Rate** and check that the correct port and baud rate (9600) are selected.



Select the **Waypoint** tab and then **Waypoint properties**. Uncheck the columns you do not want saved in your attribute table. Required fields: type, ident, lat, long, y_proj, x_proj, comment, altitude, model. Select **Track** and then **Track properties** if downloading tracks.



Select **Waypoint Download** to download waypoints or **Track Download** to download tracks from the GPS.

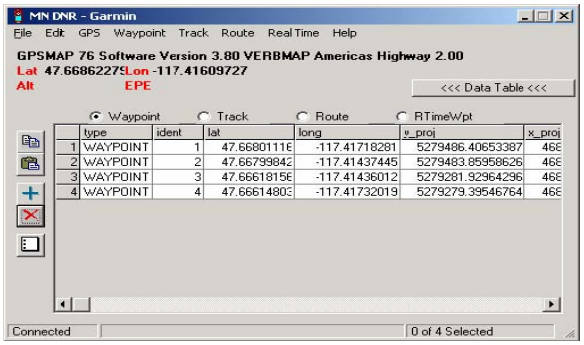
The program will begin retrieving all waypoints or tracks stored in the GPS memory. When all records have been retrieved, a dialog box will appear that tells how many records have been received. Click **[OK]** to close the dialog box.

Note: If you are finished downloading, you can shut off the GPS unit to conserve battery life. Simply hold down the Power key.

Editing GPS Data Using DNR Garmin

Once you have successfully downloaded the data from the GPS, you can then edit and import the data into ArcMap as a shapefile, a geodatabase feature class, a graphic, or a text file.

Editing the Data



In DRN Garmin, double click on a cell to change its value.

Deleting Records

In DNR Garmin, Select a single row by clicking on the row number to the left of the desired row. Hold down the mouse button and drag to select multiple rows. Press the Delete button to delete highlighted record(s).

Deleting Columns

Select a single column by clicking on the heading above the desired column. Hold down the mouse button and drag to select multiple columns. Press the Delete button to delete highlighted columns(s).

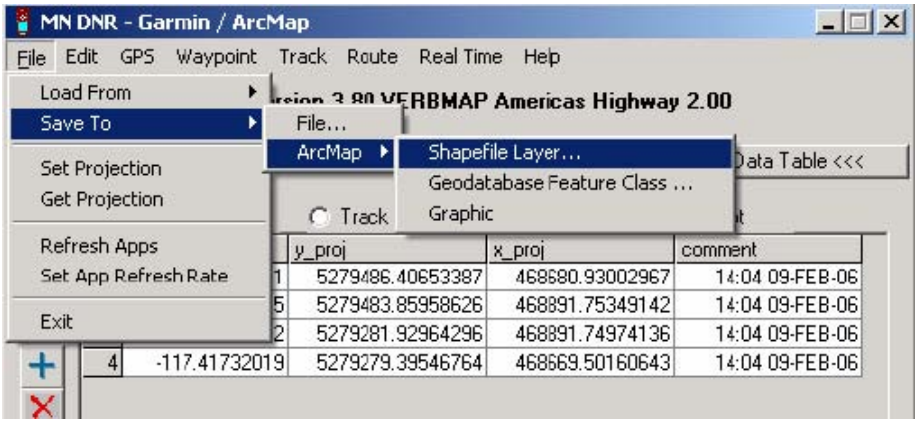
Saving Waypoints and Tracks as Shapefiles

After downloading and making appropriate edits to waypoints and tracks, the data can be saved. Waypoints can only be saved as points. Tracks can be saved as points, lines or polygons.

Saving Waypoints and Tracks to a Point Shapefile

Start ArcMap if it isn't already open. If ArcMap is open, your shapefile will automatically load in ArcMap after you save it.

Select **File** - **Save To** - **ArcMap** - **Shapefile Layer**

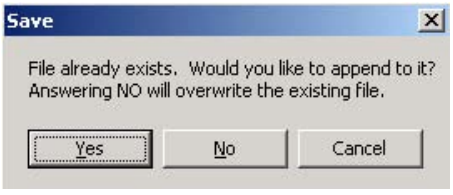


Note: To save the data as a text file click **File** - **Save to** – **File**

If creating a new shapefile, navigate to the drive and folder where you would like to store the new shapefile, give it a descriptive **File Name** (no spaces) and click **[OK]**.

The new layer is added as a layer in ArcMap.

If you choose a file name that already exists, you may append the new points to an existing shapefile by answering **[Yes]** to the question about appending to an existing file.

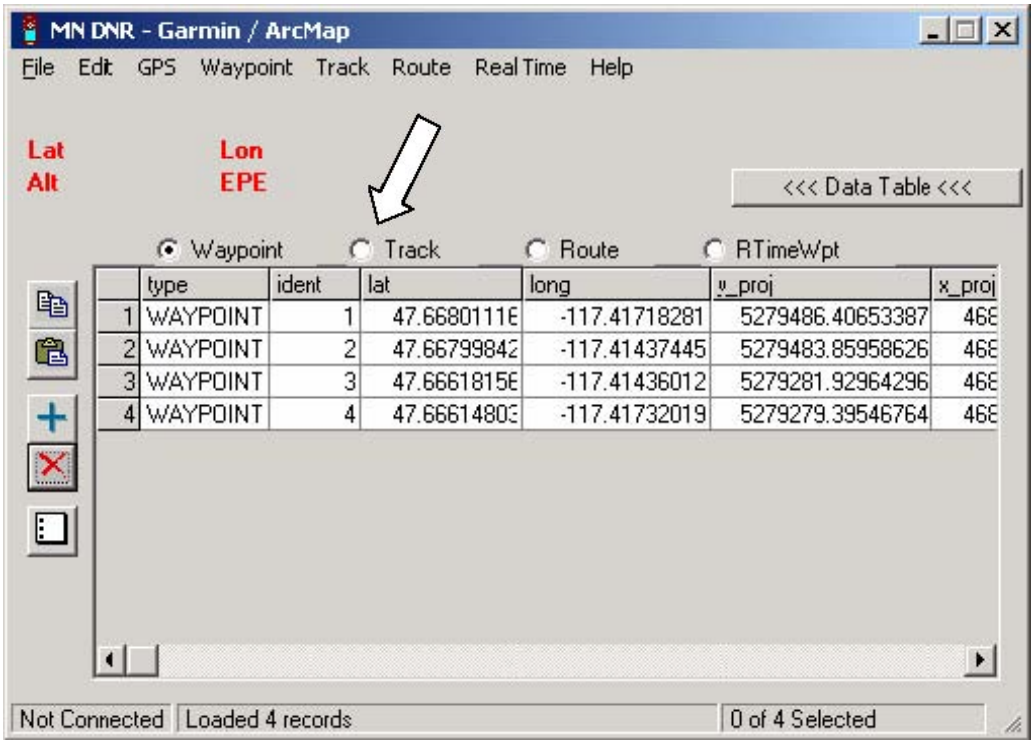


Saving Tracks to Lines or Polygons

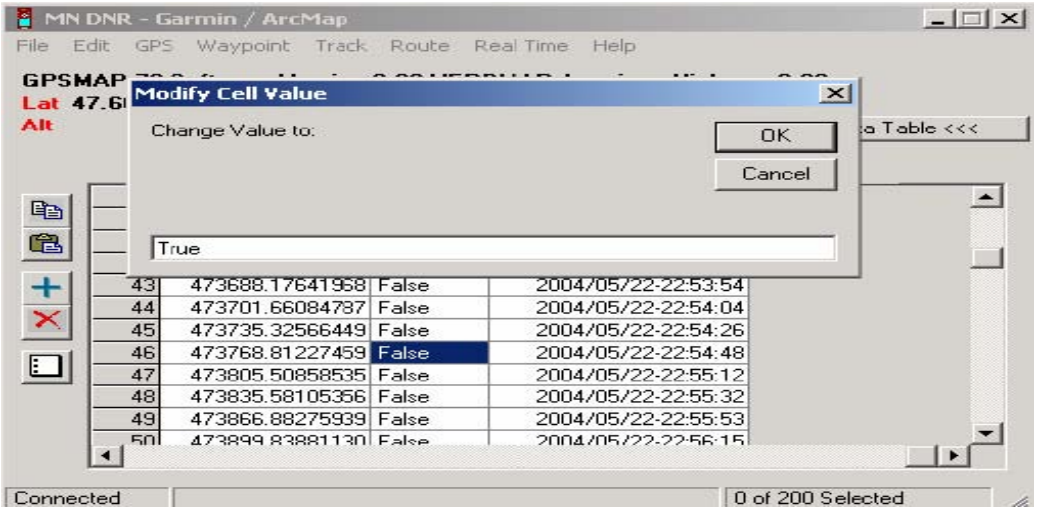
A user may need to develop a line or polygon layer from the points obtained via GPS. One method of doing this is with heads-up digitizing using the points as a guide (that is creating the layer and connecting the desired "dots"). This method

allows the user to determine the order of the vertices in the line or polygon and also to ignore bad points. Another method is to convert tracks to lines or polygons using DNR Garmin.

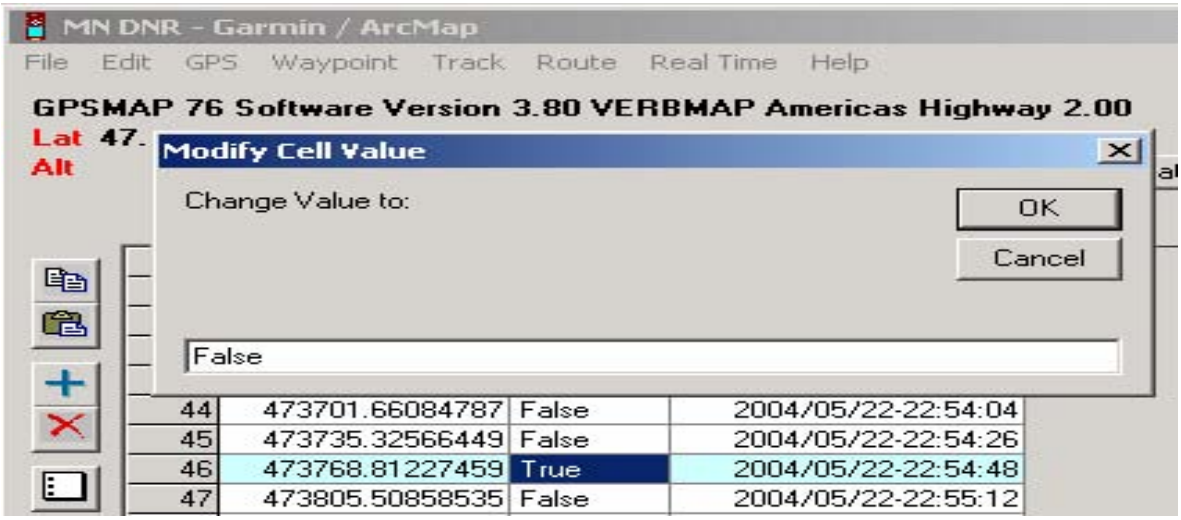
In DNR Garmin, click on the radio button next to **Track**.



If you have multiple tracks that make up the same polygon, you need to merge these tracks together before saving. In the DNR Garmin Table, the start of each track is highlighted in blue. To merge two or more tracks, double click on the cell in the new seg column which corresponds to the beginning of the track that you want to merge with the previous track. Change the value from True to **False**.

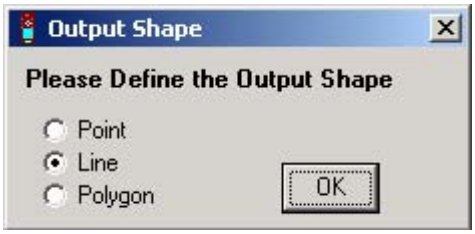


To split one track into two, change the value from False to **True**.

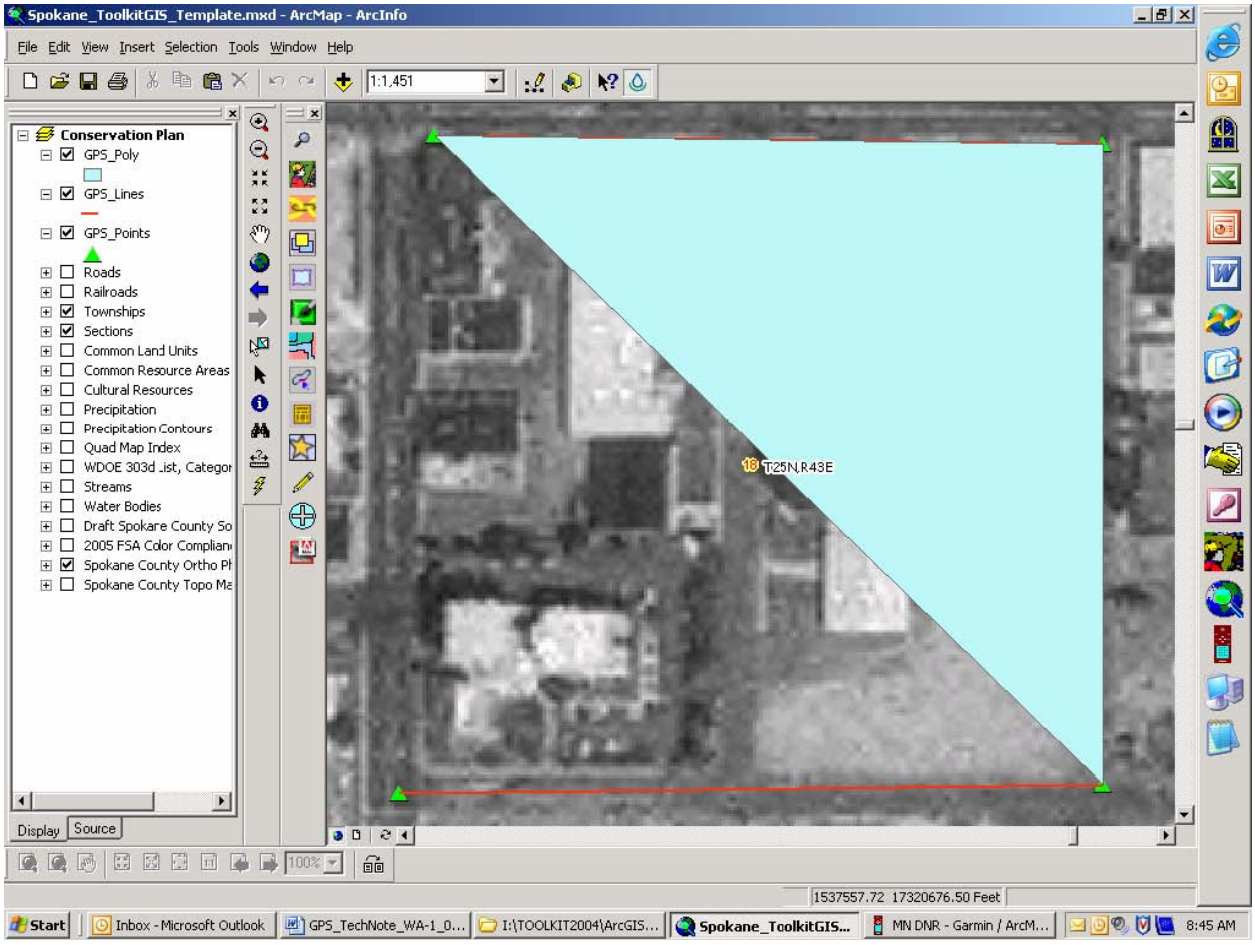


Next, go to **File - Save To - ArcMap Shapefile**. You will be prompted to name the file. Navigate to the drive and folder where you would like to store the new shapefile, give it a descriptive **File Name** and click **[OK]**. Normally this would be the appropriate folder under *c:**customer_files*\ < *your customers file*>\. For example, put in *Resource_Maps* if generic, *Determinations,* if wetland. Then the following dialog box will open:

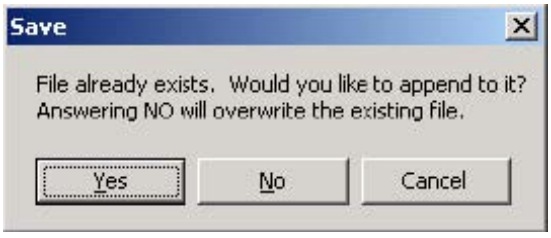
Select the appropriate shape and click **[OK]**.



The new layer will be added to the ArcMap view.



Each individual track imported from DNR Garmin will be a separate polygon or line feature. If appending to existing layer, when prompted to give a name for the layer, select the file you would like to append to and click **[OK]**. Answer yes to this question:

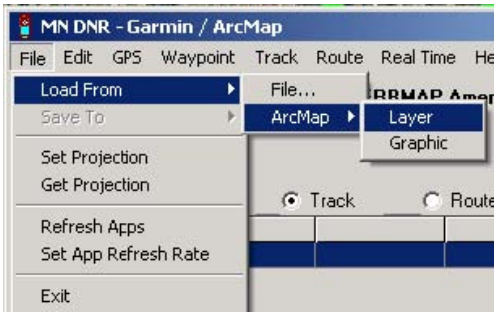


Uploading ArcGIS Data to the GPS Using DNR Garmin

Using DNR Garmin, waypoints and tracks can be loaded into the GPS from shapefiles or graphics in the current ArcMap view.

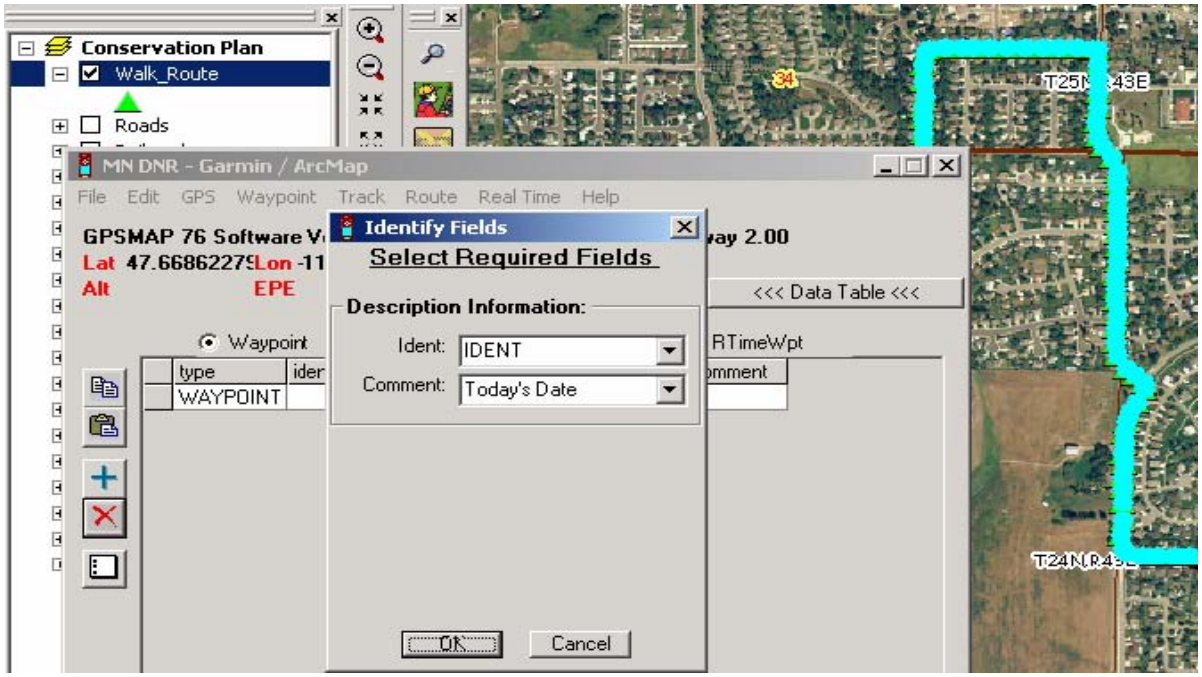
Uploading Waypoints

1. In ArcMap, select the points to upload and highlight the name of the layer in the table of contents. If no points are selected, DNR Garmin will upload all points in the shapefile or graphic layer.
2. To begin the upload, in DNR Garmin, select **File – Load From – ArcMap** and select **Layer** or **Graphic**.



3. Before the upload is complete, waypoints can be named based on a field in the existing attribute table. In the **Identify Fields** dialog box, select a field in the attribute table using the **Ident** drop down choice list, otherwise select the default. If you are loading graphics as waypoints they will automatically be assigned sequential idents and the comment field will default to the current date/time, since graphics do not have attributes.

   Caution! The program will overwrite any waypoints on the GPS unit that have the same *ident* as a waypoint being uploaded.



4. Before uploading the waypoints to the GPS, the waypoints can be edited in the DNR Garmin table (see Page 18 – “Editing GPS Data Using DNR Garmin”).
5. After editing, select **Waypoint – Upload**. A message box will appear once the download has been completed. Press the **[OK]** button.

The data has been loaded to the GPS.

Uploading Tracks

Tracks can be loaded into the GPS from line or polygon shapefiles or graphics in the ArcMap view. In order to upload tracks from shapefiles, the shapefile must be the active layer.

1. In ArcMap, highlight the layer in the table of contents. Select all polygons and lines that you want to upload as tracks to the Garmin GPSmap 76. If there are no selected features in the active layer, all features will be uploaded.
2. In DNR Garmin, click on **File – Load From – ArcMap – Layer**. The track(s) are loaded into DNR Garmin.
3. Go to **Track – Upload**. A confirmation screen will appear showing that the upload to GPSmap 76 was successful. Each vertex of the polygon is loaded as a point.

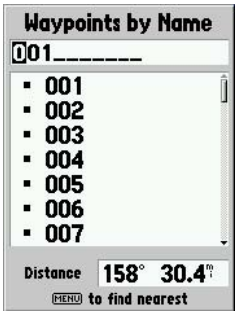
Navigating with the Garmin GPSmap 76

The Garmin GPSmap 76 can be used to navigate to any stored points (for example, those uploaded in the previous section). This can be very useful for locating features such as well heads, wetland boundaries, and so forth, or for laying out conservation practices such as fences, brush management, or grass plantings.

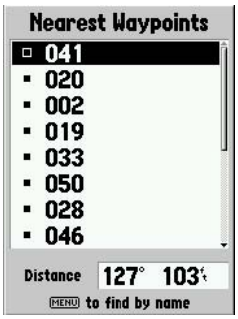
Navigating to a Point

1. To navigate to a point, press the **NAV** key.
2. Highlight "**Go to Point**" and press the **ENTER** key.
3. Highlight "**Waypoints**" and press the **ENTER** key.
4. One of two screens will appear, *Waypoints by Name* or *Nearest Waypoints*. Use the **Menu** key to switch between the two. (**Note:** The bottom of each screen shows direction and distance to highlighted point).

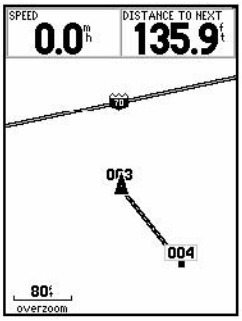
Waypoints by Name
Points are sorted by name.
Select desired point
Press the **ENTER** key.



Nearest Waypoints
Points are sorted by distance from your current position
Highlight desired point using up/down of **ROCKER** key.
Press the **ENTER** key.



5. The Waypoint screen will appear. Highlight **[Go to]** and press the **ENTER** key.
6. Use the **PAGE** key to switch to the *Map Page*.

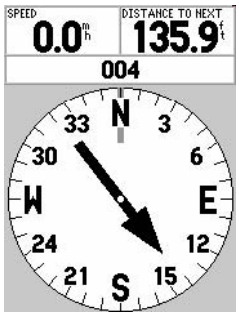


7. The *Map page* shows your current location as a triangle near the center of the screen and a line to the point you are navigating to. The line indicates the direction you need to go (North is toward top of screen). The Zoom In and Out keys can be used to change the scale of the map. Example at right instructs you to move southeast 135.9 feet.

8. An alternative to the *Map Page* is the *Pointer Page*. Use the **PAGE** key to switch to the *Pointer Page*.

   This shows a compass ring. The vertical line near the top of the ring indicates your direction of travel. The large pointer indicates the direction you need to travel to reach the navigation point.

   Example at right shows that you are moving north and that you actually need to be moving southeast 135.9 feet.



9. Once point is found, press the NAV key and select "**Go To Point**" to find another point, or "**Stop Navigation**" to end.

10. Press the **ENTER** key to exit.