

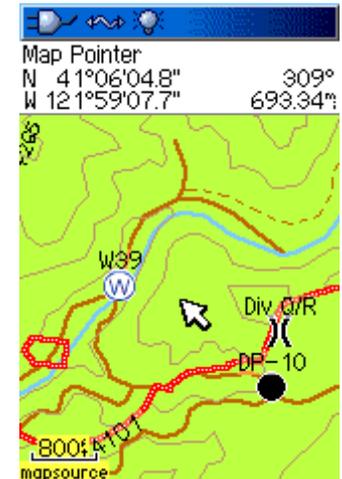
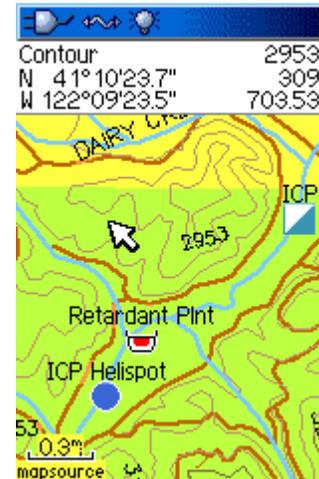
Convert FIMT AssignmentBreak And FirePoint Features To Symbolized Garmin Waypoints – A Workflow And Python Script Tool

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Background – Fireline personnel may find it convenient to have the incident's fire points displayed with standard NWCG symbology on their Garmin GPS receivers for purposes of reference, safety, and navigation. The workflow and script tool described here provide a 4-step process to accomplish that result.

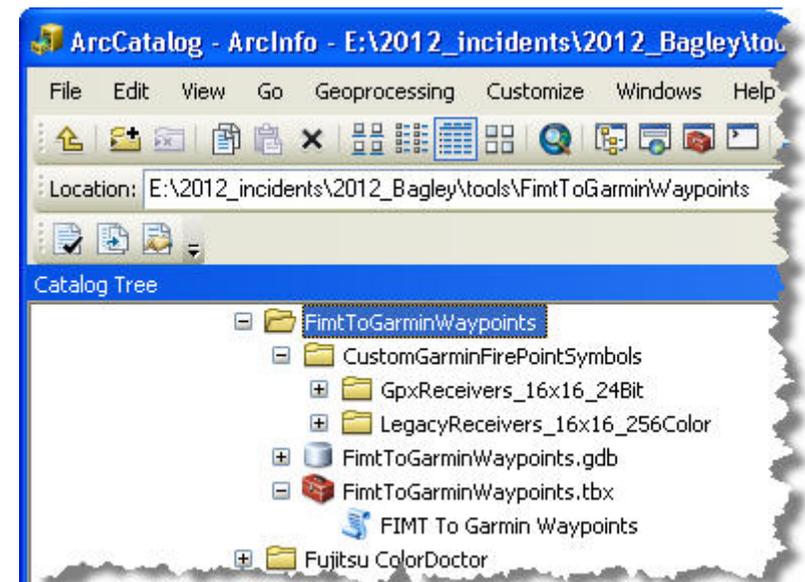
Requirements – Six items are required to complete this workflow.

1. ArcGIS 10.
2. A FIMT geodatabase containing AssignmentBreak and FirePoint features.
3. Custom Garmin fire point symbols (provided with this distribution).
4. DNR GPS software (free from <http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>).
5. Garmin xImage software (free from <http://www8.garmin.com/support/agree.jsp?id=545>).
6. A supported Garmin GPS receiver.



Step 1, Setup – Extract the contents of **FimtToGarminWaypoints.exe** to the FIMT incident's **tools** folder. The result should be a **FimtToGarminWaypoints** folder containing these items, as illustrated at right.

- A **CustomGarminFirePointSymbols** folder containing point symbols for both the newer GPX-based receivers, and the older legacy receivers. Examples of newer GPX-based receivers include the Montana, Oregon, 62, and 78 series. Older legacy receivers include the venerable 60C and 76C series. Some receivers within these series may not support custom waypoint symbols, the Oregon 400t, for instance.
- A **FimtToGarminWaypoints** geodatabase that will contain the script tool's output feature class(es).
- A **FimtToGarminWaypoints** toolbox and associated script tool.

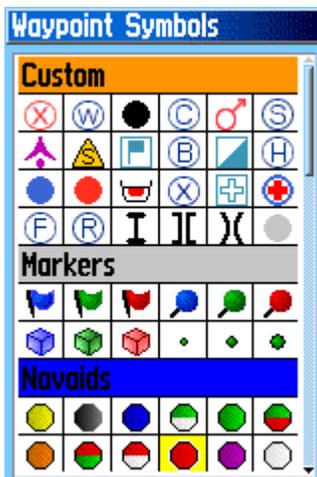
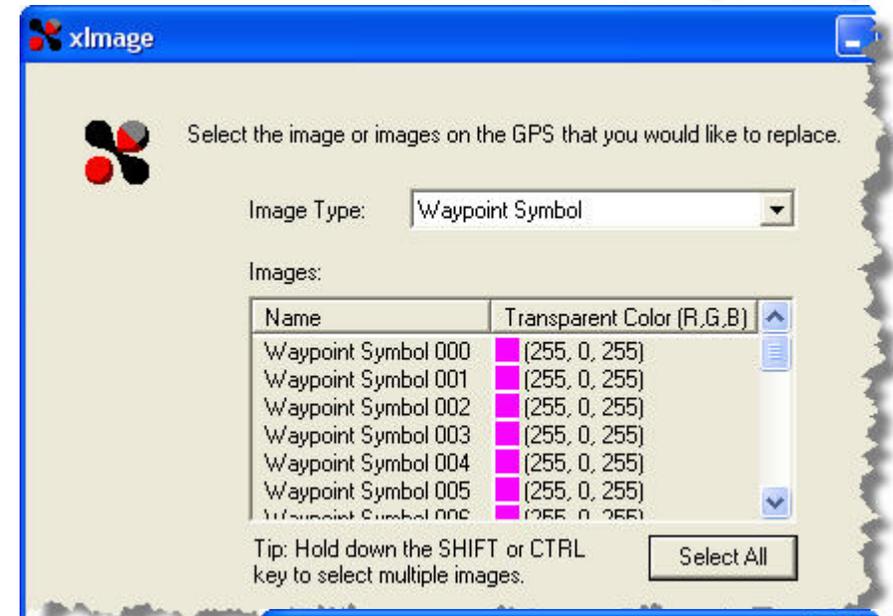


Step 2, Install Custom Garmin Fire Point Symbols – Many Garmin GPS receivers support installation of custom waypoint symbols. Installation is a one-time process, and does not need to be repeated unless a new selection of custom symbols is needed. Two procedures are described below, one for older legacy receivers, and another for newer GPX-based receivers.

Procedure for older legacy receivers - Older legacy receivers support up to twenty four 16 x 16 pixel 256-color bitmap images, and installation requires use of the Garmin xImage software.

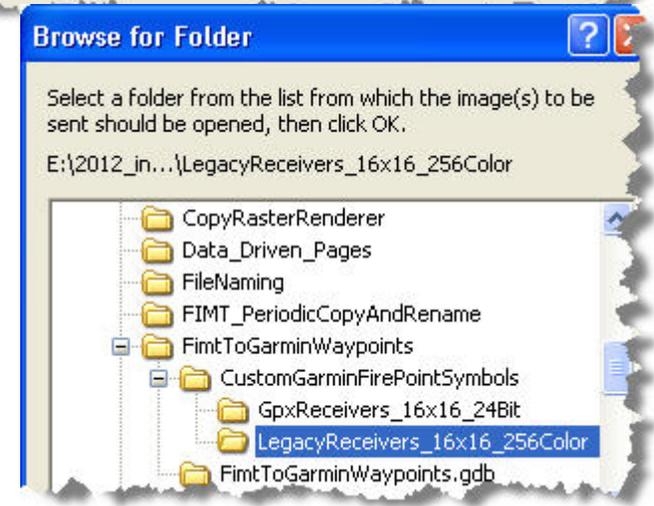


1. If it is not already installed on a PC, retrieve and install the free Garmin xImage software from this link: <http://www8.garmin.com/support/agree.jsp?id=545>.
2. Turn the GPS receiver on, connect it to a PC with its USB cable, and open xImage.
3. Click **Next**, and wait for xImage to discover the attached receiver.
4. Click **Next**, and then select **Send images to the GPS**, above right.
5. Select **Waypoint Symbol** as the Image Type, click the **Select All** button, and then click **Next**, right.
6. Browse to the PC's folder that contains custom fire point symbols for legacy receivers (...\\LegacyReceivers_16x16_256Color), and click **OK**, below right.
7. Wait for the upload to occur, and then click **Finish**.



The result will be the presence of these 24 fire point symbols in the legacy receiver's Custom symbol library.

Fire point types not represented in the Custom symbol library will be symbolized with the "Other" point type symbol, a grey circle.



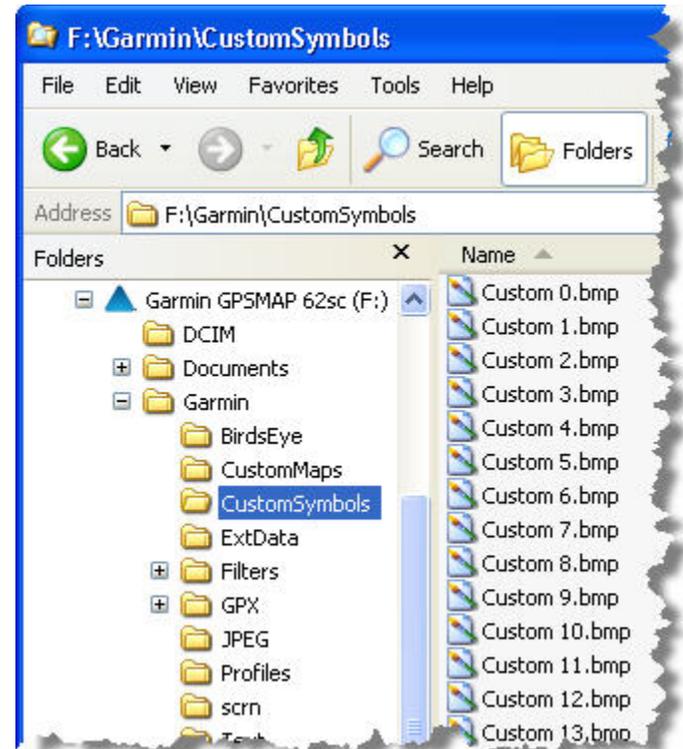
Procedure for newer GPX-based receivers – Newer GPX-based receivers support up to fifty six 32 x 32 pixel 24-bit bitmap images, and installation does not require use of the Garmin xImage software.

1. Turn the GPS receiver on and connect it to a PC with its USB cable. This will put the receiver into USB mass storage mode.
2. Use Windows Explorer to copy and paste all of the .bmp image files from the PC's ...**GpxReceivers_16x16_24Bit** folder to the receiver's **CustomSymbols** folder, as at right.



The result will be the presence of these 24 fire point symbols in the GPX-based receiver's Custom symbol library, as at left

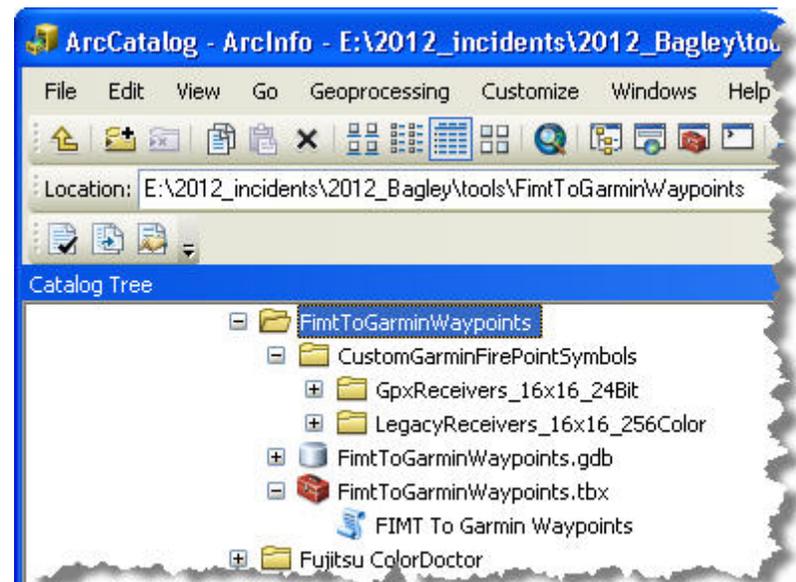
Fire point types not represented in the Custom symbol library will be symbolized with the "Other" point type symbol, a grey circle.



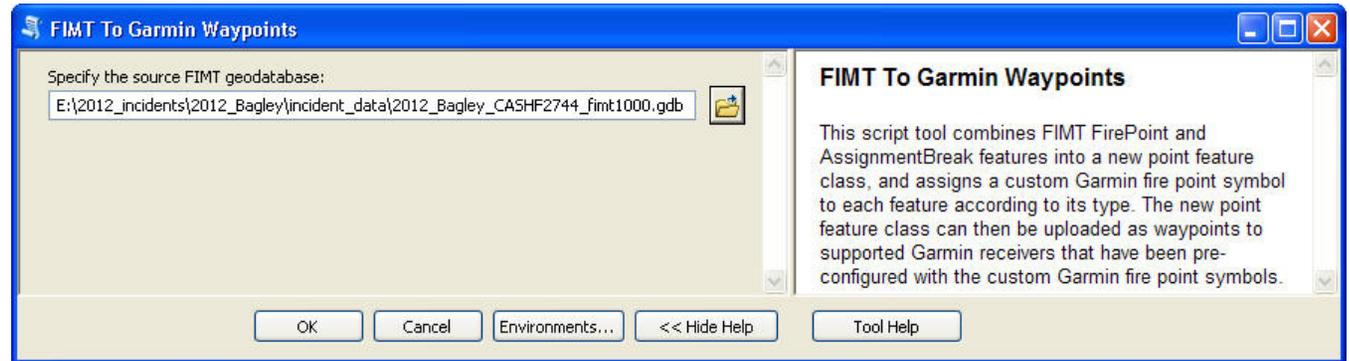
Step 3, Use A Script Tool To Create A Feature Class Containing FIMT

AssignmentBreak and FirePoint Features – Use the provided script tool to integrate AssignmentBreak and FirePoint features from a FIMT geodatabase into a single feature class, and assign a fire point symbol to each feature according to its type.

1. Start ArcCatalog, browse to the incident's ...**tools\FimtToGarminWaypoints** toolbox, and double-click the **FIMT To Garmin Waypoints** script icon, right.

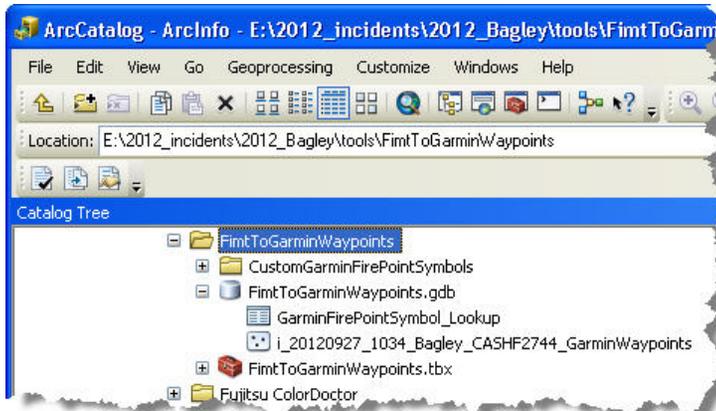


- Complete the tool's dialog by specifying the FIMT geodatabase that will be the source of AssignmentBreak and FirePoint features, as at right.
- Click **OK**, and wait a moment while the script tool executes. Run time is typically around 5 seconds when data sources are on a local drive.



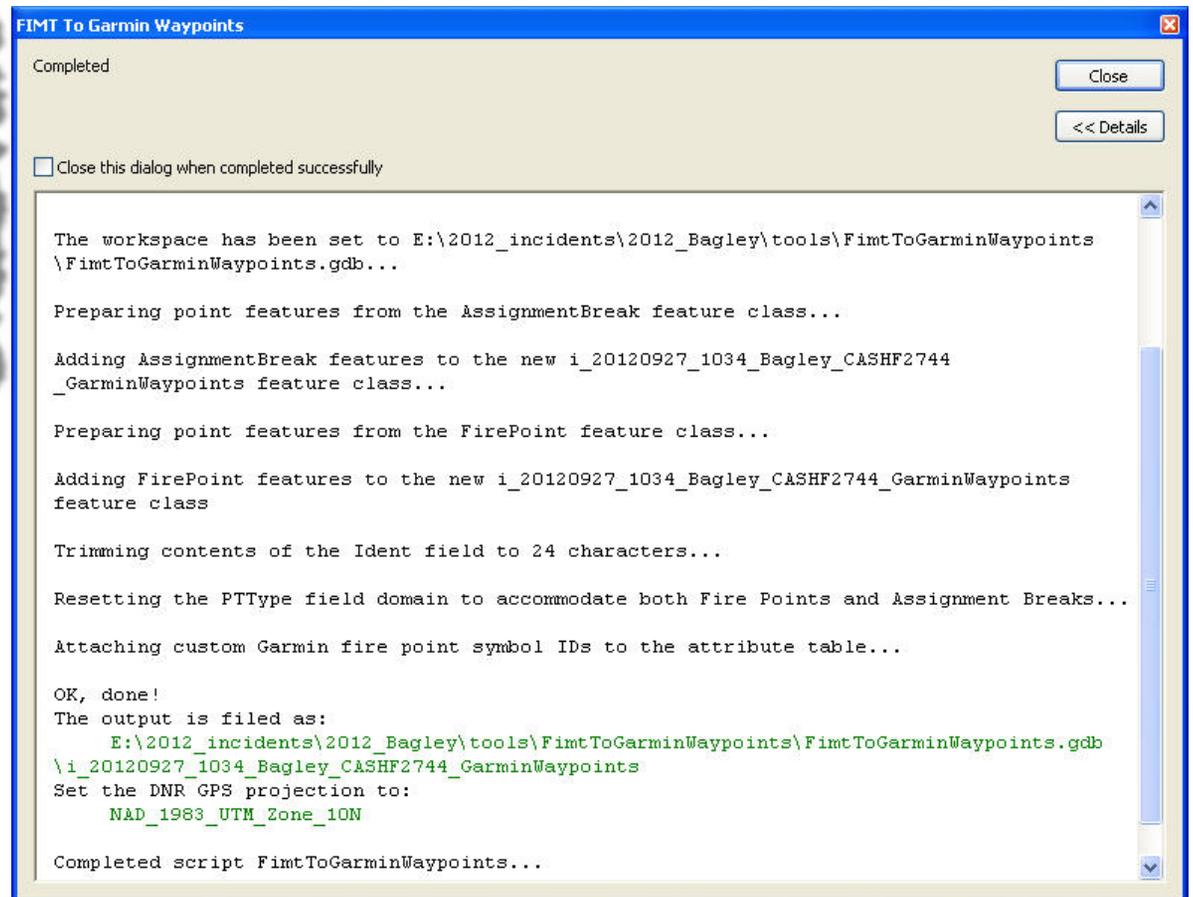
The script tool issues a process log as it runs, and reports its results, including the output's spatial reference, as illustrated below right.

The resulting time-stamped feature class will now be listed within the **FimtToGarminWaypoints** geodatabase, below left.



Notice that the feature class attribute table has been configured to integrate seamlessly with DNR GPS, below.

	PTType	ident	comment	symbol
	Helispot	ICP Helispot	From FIMT @ 20120927 1034	Custom 12
	Staging Area	McCloud Dam	From FIMT @ 20120927 1034	Custom 5
	Mobil Weather Unit	Oak Mtn RAWS	From FIMT @ 20120927 1034	Custom 15
	Retardent/Mud Pit	Retardant Plant	From FIMT @ 20120927 1034	Custom 14
	Repeater	RS-1	From FIMT @ 20120927 1034	Custom 19
	Repeater	RS-2	From FIMT @ 20120927 1034	Custom 19
	Camp	Sheep Camp	From FIMT @ 20120927 1034	Custom 3
	Staging Area	Stouts Staging	From FIMT @ 20120927 1034	Custom 5

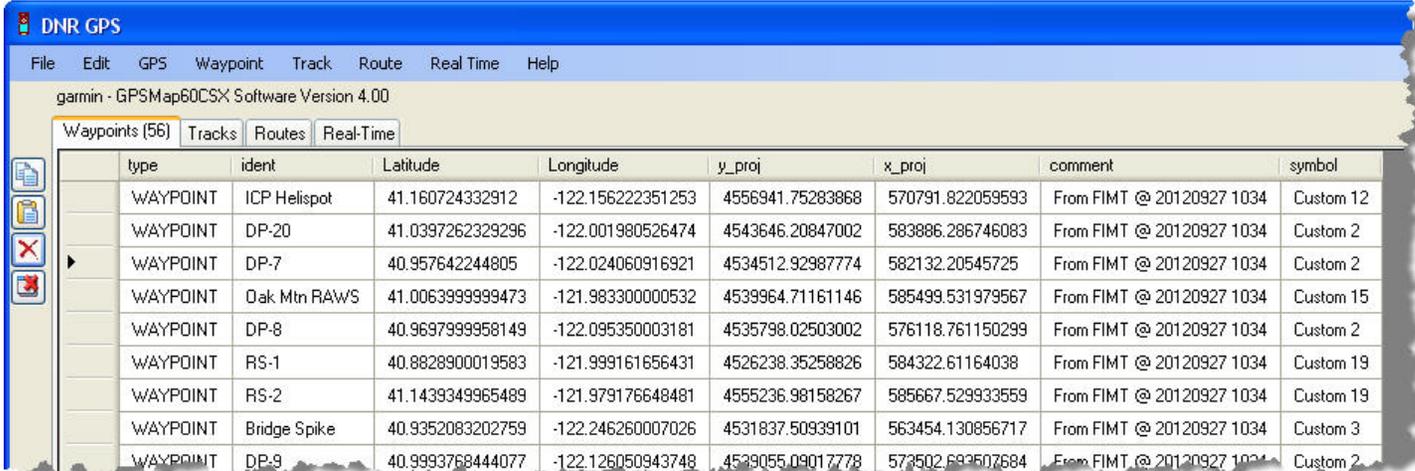


Step 4, Convert Feature Class Points To Garmin Waypoints – Use DNR GPS software to upload feature class points to a Garmin receiver as waypoints. The steps described here are just one of several possible approaches that may be employed.

1. If it is not already installed on a PC, retrieve and install the free DNR GPS software from this link:
<http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>.
2. Turn the GPS receiver on, connect it to a PC with its USB cable, and open DNR GPS. After a few moments, a green circle  will appear in the lower left corner if DNR GPS has successfully connected to the attached receiver. A red circle indicates that DNR GPS and the receiver are not communicating.
3. Click **File – Set Projection...**, and set DNR GPS to match the reported spatial reference of the **GarminWaypoints** feature class created by the script tool. DNR GPS indicates its current projection setting in the lower left corner  Projection: UTM zone 10N.
4. Open ArcMap, add the **GarminWaypoints** feature class to the data view, and make that feature class active in ArcMap's Table of Contents by clicking on it.
5. Transfer ArcMap's point features to the DNR GPS table view by clicking **File – Load From – ArcMap – Layer** in DNR GPS. The result should resemble that shown below.
6. Users may review waypoints prior to transfer by sorting them in **ident** or **symbol** order by clicking in the field's header area.

All waypoints will be transferred to the receiver if no selections are made in the DNR GPS table view. Unwanted waypoints may be selected and deleted

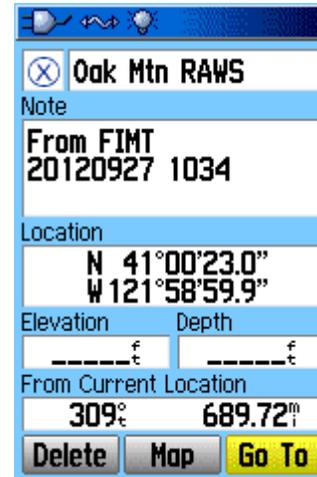
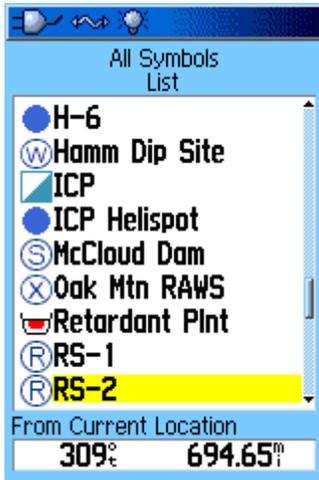
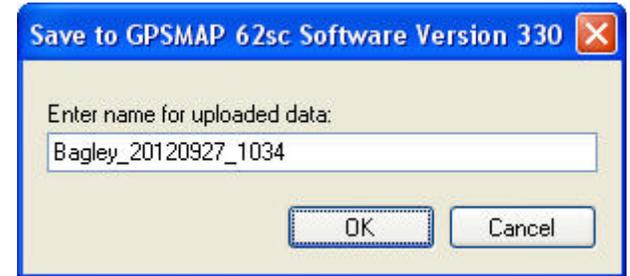
 from the DNR GPS table view without affecting the underlying ArcMap feature class.



	type	ident	Latitude	Longitude	y_proj	x_proj	comment	symbol
	WAYPOINT	ICP Helispot	41.160724332912	-122.156222351253	4556941.75283868	570791.822059593	From FIMT @ 20120927 1034	Custom 12
	WAYPOINT	DP-20	41.0397262329296	-122.001980526474	4543646.20847002	583886.286746083	From FIMT @ 20120927 1034	Custom 2
	WAYPOINT	DP-7	40.957642244805	-122.024060916921	4534512.92987774	582132.20545725	From FIMT @ 20120927 1034	Custom 2
	WAYPOINT	Oak Mtn RAWs	41.0063999999473	-121.9833000000532	4539964.71161146	585499.531979567	From FIMT @ 20120927 1034	Custom 15
	WAYPOINT	DP-8	40.96979999958149	-122.095350003181	4535798.02503002	576118.761150299	From FIMT @ 20120927 1034	Custom 2
	WAYPOINT	RS-1	40.8828900019583	-121.999161656431	4526238.35258826	584322.61164038	From FIMT @ 20120927 1034	Custom 19
	WAYPOINT	RS-2	41.1439349965489	-121.979176648481	4555236.98158267	585667.529933559	From FIMT @ 20120927 1034	Custom 19
	WAYPOINT	Bridge Spike	40.9352083202759	-122.246260007026	4531837.50939101	563454.130856717	From FIMT @ 20120927 1034	Custom 3
	WAYPOINT	DP-9	40.9993768444077	-122.126050943748	4539055.09017778	573502.693507684	From FIMT @ 20120927 1034	Custom 2

- Click **Waypoint – Upload** to transfer waypoints from DNR GPS to the attached receiver. Users of newer GPX-based receivers will be prompted to supply a name for the current set of uploaded waypoints, right. These waypoints will be grouped into a like-named GPX file in the receiver’s **GPX** folder.

When upload is complete, users may view, select, edit, or navigate to their new waypoints. Examples of waypoint lists from a GPSMap 60CSx and GPSMap 62sc, a waypoint edit page view from a GPSMap 60CSx, and a map page view from a GPSMap 60CSx are illustrated below.



If desired, users could also upload the incident’s fire perimeter to the receiver as a track to provide context for the new waypoints.

- Open ArcMap, add FIMT’s **FirePolygon** feature class to the data view, and make that feature class active in ArcMap’s Table of Contents by clicking on it.
- Transfer ArcMap’s polygon features as a perimeter track to the DNR GPS table view by clicking **File – Load From – ArcMap – Layer** in DNR GPS.
- Click **Track – Upload** to transfer the fire perimeter’s track from DNR GPS to the attached receiver, and use the receiver’s track utility to symbolize it with a thick red line, above right.

Credits – Several elements of this workflow were adapted from a ModelBuilder tool developed by Scott Powell of Redwood National & State Parks.

Contact Information – Report comments and annoyances to cbeyerhelm@fs.fed.us.