

Make Your Own GPS Maps

by Doug Adomatis

Can't get the coverage you need? Here's how to map out your travels of just about anyplace in the world, using free software and on-line data resources.

The most common complaints about the maps built-in to GPS receivers is that they lack sufficient coverage and detail. There are some reasonable explanations for this [[see footnote 1](#)] and your GPS manufacturer most likely has better maps for you to purchase [[see footnote 2](#)]. Even so, one of the most frequently asked questions is "How can I download different maps to my GPS?"

For example: A lot of folks would like to download their Delorme Topo Quad, Maptech Terrain Navigator, or National Geographic Topo! map images to their Garmin or Magellan GPS receivers. These maps include a high degree of detail, like what you find on U. S. Geological Survey 1:24,000 scale topographical maps, but they are rasterized images that are incompatible with the vector graphics used in most GPS receivers.

With few exceptions [[see footnote 3](#)], you can't alter the vector maps built-in to your GPS. However, you can make your own GPS maps using map display software to create maps consisting of waypoint and track elements.

Map Display Software

There are many software programs that display maps, but the better ones allow you to do more. To make your own GPS maps, you'll want a program that lets you to import map images from a variety of sources, overlay data in various formats, and interface with your GPS receiver.

In the process of researching this article, I created a chart that compares the features of several map display software programs. Looking at the chart on http://www.travelbygps.com/articles/sftwr_compare.php, you can see that no one program does it all. Some of the programs are good at importing a variety of data formats and user map images, while others are designed to work better with digital maps from commercial providers. Often, the format of the data you want to look at determines which program you need to use. And, depending on what you're trying to do, you may need more than one program.

On-line Map and Data Resources

Finding GPS data and maps on the web can be a frustrating task, especially if you're looking for information on locations outside the United States. For starters, you can try the web sites where you found the map display software. Typically they will have a few links to other web sites with maps and data that work with their software. At sites like University of Iowa's Center for Global and Regional Research (http://www.cgrer.uiowa.edu/servers/servers_references.html) you'll find an incredible number of links to maps and data, but not all will work with the map display software discussed here.

Annoyed by time-consuming Internet searches, I decided to add another resource page to the Travel by GPS web that has descriptive links to several of the better sites that provide free map images and data for popular destinations. You are more than welcome to bookmark <http://www.travelbygps.com/authoring.php>

Trip Planning with GIS Data

A common post in the newsgroups is from people wanting waypoints for travel destinations. Let's say you are one of those people and the base map of your GPS does not cover your region of interest. Even if you are lucky enough to find someone who has a set of coordinates, a single point is a poor map.

GIS (Geographic Information System) data is available on the Internet for most anywhere on the planet. Some map display programs will import this data, allowing you to see your point of interest in relation to basic features like roads, lakes, rivers, mountains, and other features. The Penn State Online Map Room [[see footnote 4](#)] offers a "Digital Chart of the World," comprised of GIS data in Arc/INFO export (.e00) format. The data is free, cataloged by country. This and other links to GIS data sources can be found at <http://www.travelbygps.com/authoring.php#gisdataview>

Tutorial:

Do-it-Yourself GPS Map of the Galapagos Islands

Here's a short tutorial that incorporates all the elements of creating GPS maps that we've talked about here. When you've completed the tutorial, you'll have your own Galapagos Islands GPS tour guide.

For this example, I'd like to bring your attention to GPS Track Maker software. GPSTM is freeware that is very capable of doing most everything you need to do to create your own GPS maps, including:

1. [Calibrate](#) a map image
2. [Import](#) data
3. [Edit](#) data
4. [Transfer](#) to your GPS receiver

If you haven't already, go to the GPS Track Maker web site and download the software *and* the help file.

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To skip the details and see the end result of this step-by-step tutorial, visit:

<http://www.travelbygps.com/guides/galapagos/galapagos.php>

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Calibrate Map Image

Starting with a map image makes creating a GPS map easier, but it's not absolutely necessary if you have other map data. Searching the Internet for "Galapagos map" yields many results, one of which is an interesting website sponsored by the United Nations – ReliefWeb Map Centre (<http://www.reliefweb.int/w/map.nsf/home>). Look up Ecuador and you will find several maps for the Galapagos Islands.

- For this example: view the "Galapagos Islands" image dated 4 April 2002 [jpg – 214k], and save it on your computer with file name "galap_image.jpg" in a folder you've created as workspace.
- Open Track Maker and select "Insert Map Image" from the Tools menu. Open the map image file from your workspace folder.
- Click on the "Map Adjust Tool" icon. Move the cursor so that crosshairs intersect the latitude -1 and longitude -91 margin labels (tip: use the page up/down and arrow keys zoom in and move around the image). Click to insert the coordinates.
- Repeat for latitude 0, longitude -90.
- Save your work in the GPS Track Maker (.gem) format.

Import GIS Data

Download the data from the Penn State web site

- Go to the Digital Chart of the World (<http://www.maproom.psu.edu/dcw/>) and click on South America.
- Select Ecuador from the country list and click on "Continue"
- Click on "Download Data"
- Select at least the following layers.
 - Roads (rdline.e00)
 - Drainage Network (dnnet.e00)
 - Hypsography Network (hynet.e00)
- "Continue" and select data compression method: PC or Unix
- Then "Compute Data" and wait for the next screen.
- Download the data to the workspace folder on your computer.
- Unzip the files in your workspace.

Import the data to GPS Track Maker

- Click on "Merge File..." from the File Menu
- Select one of the files of the type "Arc/Info export files (.e00) from the Open File dialog box .
- "OK" the datum and coordinate system defaults in the Data Import Tool dialog box.
- For this example we will not be using all the data for the country of Ecuador, just the Galapagos Islands. So, use the Snap Tool to select all the data on mainland South America, and delete with the delete key, choosing both waypoints, tracks/routes.

- To better see the imported data, you can toggle the map image off.
- Save your work and repeat for all other layers.

Edit Data

Change, Delete Tracks

At this point, you should tidy-up your work by deleting extraneous and customizing relevant tracks. Take a moment to review Track Maker's help files relating to track selection and change features, then:

- Select track segment(s) that make up the coastline for one of the islands and use the "Change Track log Style" to give it the island's proper name. If multiple tracks make up the coastline, select the group and give them all the same name, color, line style, etc. Repeat for each island.
- You may need to cut down on the number of track points due to the track log memory limits of your GPS. Select and delete non-essential tracks.

Identify Points of Interest by Creating Waypoints

To find geographical references of places you'd like represented on your map, do a web search for information about the Galapagos. I like to find trip reports from individuals, which sometimes give details you won't find on commercial travel web sites. If you are creative with your search terms, you may even come up with a set of coordinates, or maybe even a data file. For instance, I used the keywords "Galapagos", "lat", and "lon" to find a shipmate's online journal that gave the coordinates of the anchorages along with details of their experience in the islands.

- Use the pencil tool to create waypoints. Use descriptive waypoint names and comments. The Track Maker program has an extensive set of symbols that you can use to creatively identify a location of interest.
- Need I remind you to save your work?

Transfer the GPS Map to Your GPS

All that is left to do is to download your tracks and waypoints to your GPS.

- Use the GPS "Interface" tool found on the main menu for your particular brand of GPS

Now, let's go swimming with penguins!

Footnotes:

[1] ["GPS Maps: The maps in my GPS are not accurate. Why is that?"](#)

An article by Joe Mehaffey found at <http://joe.mehaffey.com/>

[2] Garmin, Magellan, and Lowrance Cartography Products Web pages:

<http://www.garmin.com/cartography/>

<http://www.magellangps.com/en/products/software.asp>

<http://www.lowrance.com/Mapping/default.asp>

[3] There are a couple of programs program under development that make it possible for you to enhance Garmin basemaps:

MAPDEKODE (http://es.geocities.com/gps_alcarria/mapdekod.html)

GPS Mapper (http://gps.chrisb.org/gps_mapper.htm)

[4] Digital Chart of the World Server; Penn State University Libraries

<http://www.maproom.psu.edu/dcw/>