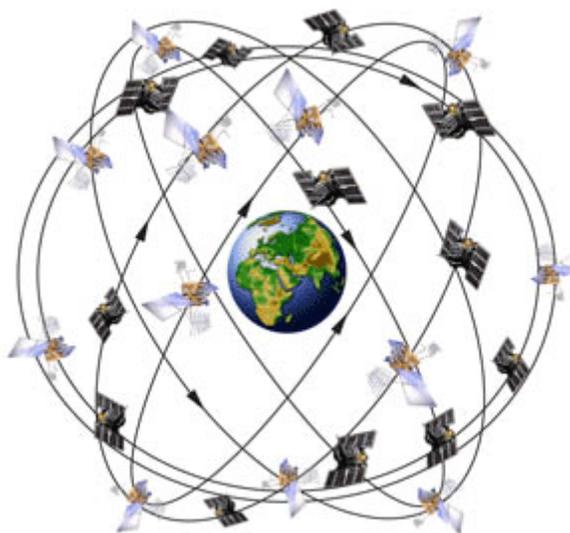


Cookbook 16 September 2013 *Online GIS (Part 3)*

Overview

1. GPS Mapping
2. GPS Mapping in the Field
3. Getting GPS Data into ArcGIS (Desktop or Online)
4. GPX Files
5. GPS and Google Earth
6. Mapping in ArcGIS
7. Map Perfection in Adobe Illustrator
8. Alternatives to Esri and ArcGIS
9. Homework for Wednesday



Savage Chickens

by Doug Savage



www.savagechickens.com

Bill Clinton and GPS: http://clinton4.nara.gov/WH/New/html/20000501_2.html

1) GPS Mapping

Great Overview: <http://youtu.be/YGKbmRqYw6k>

The Four Steps in GPS Mapping:

1. Data Collection: GPS mapping in the field with GPS receiver.
2. Download GPS data and import into ArcGIS (Desktop or Online), Google Earth, etc.
3. Data Analysis: Mapping in ArcGIS Desktop or Online), Google Earth, etc.
4. (Optional): Map perfection in Adobe Illustrator.

Tutorials and Resources

- Free tutorials from UNH Extension: GPS Basics, GPS and Google, and more
<http://extension.unh.edu/GISGPS/Training-Materials>
- GPS and DNR Garmin section
<http://www.westfield.ma.edu/cbraun/resources/gis-resources/>

2) GPS Mapping in the Field

There are two general types of GPS mapping and GPS receivers: survey-grade and mapping-grade.

Survey-Grade GPS

- Main manufacturers: Trimble, Leica, etc.
- Requires a lot of money, time, and electricity.
- Often uses external antennas, tripods, back packs, base stations, and post-processing.
- Accuracy: sub-inch and better.



Mapping-Grade GPS

- Main manufacturers: Garmin, Magellan, etc.
- Quick, simple, and inexpensive.
- Usually hand-held or attached to back pack, external antenna is optional.
- Accuracy: usually better than 10 feet.



Questions for Success!

- Do I *know* how to use this gizmo properly?
- Did I test gizmo before going out on a long day of mapping?
- Do I have the user manual?
- Did I fully *charge* the gizmo?
- Do I have *spare* batteries?

- Did I set the datum to WGS84?
- Did I set the units to decimal degrees?

- Do I have good sky view?

Most Importantly!

1. Do I really need to map with a GPS or can I digitize it from an existing base layer?
2. Do I have the appropriate technology for what I'm mapping?

It makes no sense financially to spend a day in the field when you could have achieved the same thing in a few hours in the office. Likewise, it makes no sense to survey property lines with a cheap mapping-grade GPS receiver. On the other hand, it can be inefficient to map simple hiking trails with a survey-grade GPS receiver.

3) Getting GPS Data into ArcGIS (Desktop or Online)

The details will differ depending on your GPS receiver...but somehow you need to:

1. Download the files from your GPS receiver to your computer.
2. Save them or convert them into a file format useable by ArcGIS.
3. Import or open them in ArcGIS.

General Tips!

- It all depends on what you are using!
- *Learn* and *test* whatever you are using!
- Some download software programs can save your tracks and way points directly as ArcGIS shapefiles or Google Earth KML files.
- Otherwise, save your tracks or way points as a text files, process as needed in MS Excel, and add to ArcGIS or Google Earth as (X,Y) coordinate files.

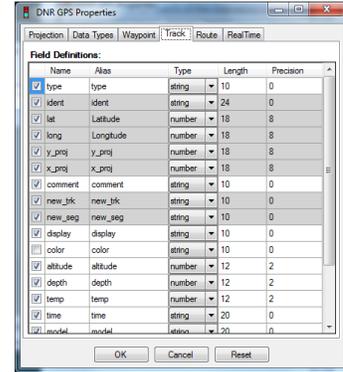
For Garmin GPS receivers we have two great and free software packages!

DNRGPS

DNRGPS is an update to the popular DNRGarmin application. It was initially built to provide users the ability to transfer data between Garmin handheld GPS receivers and GIS software.

DNRGPS is released as Open Source software with the intention that the GPS user community will become stewards of the application, initiating future modifications and enhancements.

<http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>



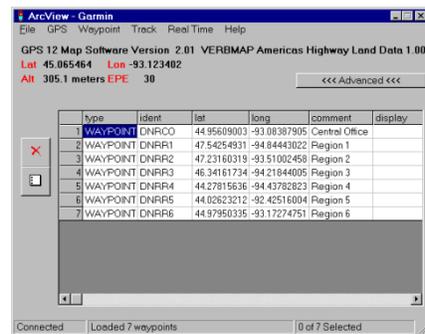
DNRGPS was released March 2012 as the successor to the wildly-popular and effective DNR Garmin.

- DNRGPS Documentation and Help:
<http://maps1.dnr.state.mn.us/dnrgps/index.html>
- Setting GIS projection using DNRGPS:
<http://vimeo.com/40163949>
- Update Garmin drivers using DNRGPS:
<http://vimeo.com/40163094>
- Download GPS to ArcGIS 10 using DNRGPS:
<http://vimeo.com/40166067>
- 30-Minute Webinar on DNRGPS
<http://www.dnr.state.mn.us/mis/gis/training.html>

DNR Garmin

This application was built to provide users the ability to directly transfer data between Garmin GPS handheld receivers and various GIS software packages. Using this program a user can use point features (graphics or shapefile) and upload them to the GPS as Waypoints. Line and Polygon Graphics or shapes can be uploaded to the GPS as Track Logs or Routes.

Conversely, Waypoints, Track Logs, and Routes collected using the GPS can be transferred directly to ArcView/ArcMap/Google Earth/Landview and saved as Graphics or Shapefiles.

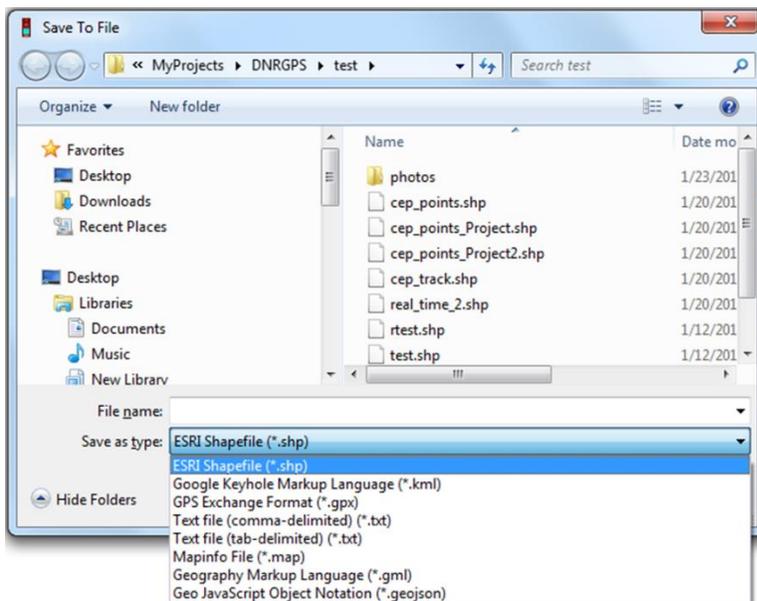


<http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html>

The latest version of DNR Garmin (5.4.1) works great, but not necessarily with the newest Garmin GPS receivers – check the documentation for your specific model or simply test it! The DNR

Garmin toolbar is not compatible with ArcGIS 10, but you can just as easy use DNR Garmin ‘stand-alone’.

- Download here:
<http://www.dnr.state.mn.us/mis/gis/tools/arcview/extensions/DNRGarmin/DNRGarmin.html>
- Nice tutorial:
http://www.calfish.org/portals/0/Resources/docs/DNR_Garmin_Tutorial_DFG_Region1.pdf
- Nice tutorial: <http://www.fs.fed.us/database/gps/documents/DNRGarmin.pdf>
- DNR Garmin Wiki:
http://www.assembla.com/spaces/dnrgps/wiki/Old_DNRGarmin_Home



DNR Garmin (and especially DNRGPS) offer a lot of capabilities – consult the documentation and Help as needed. Most fundamentally you will use them to download your collected way points and tracks from your GPS receiver to your PC and here you have a choice in formats:

- ESRI Shapefile. That makes sense if you further map your data in ArcGIS.
- Text file. That’s a useful file format for import into MS Excel. Afterwards you can add your MS Excel data to ArcGIS as a (X,Y) coordinate file.
- Google Earth KML. This allows you to open the data immediately in Google Earth. That’s useful for a quick check of your mapping, but it is usually better to get the data into ArcGIS and then save as Google Earth KML.

➔ Always save your GPS tracks as points and edit them later in ArcGIS!

4) GPX Files

GPX (the GPS Exchange Format) is a popular XML-based data format for the interchange of GPS data (waypoints, routes, and tracks) between software applications and a wide variety of GPS receivers. GPX is a great file format and can be used in many software applications. You may need to deal with GPX data at some point!

For example: you can add GPX files directly to ArcGIS Online!

More Information about GPX files: <http://www.topografix.com/gpx.asp>

GPX and ArcGIS

- GPX To Features (Conversion) for ArcGIS Desktop
<http://resources.arcgis.com/en/help/main/10.1/index.html#//001200000050000000>
- GPX file importer for ArcMap
<http://www.arcgis.com/home/item.html?id=b2e4f42e170849828e58d13bbdd34a58>
- YouTube video: GPX files into ArcGIS: http://youtu.be/F9E-Tn8_iKo
- Import GPX file into ArcGIS Explorer Online
<http://help.arcgis.com/en/arcgisexplorer/help/index.html#//01560000005q000000>

Tools and Scripts

- Convert GPS Files (KML, GPX, WPT, PLT) to Shapefiles
<http://resources.arcgis.com/gallery/file/Map-Template-Gallery/details?entryID=BC061D5E-1422-2418-7FCE-CC0FBB0C0825>
- Convert GPS Files (KML, GPX) to Shapefiles
<http://arcscripts.esri.com/details.asp?dbid=16797>

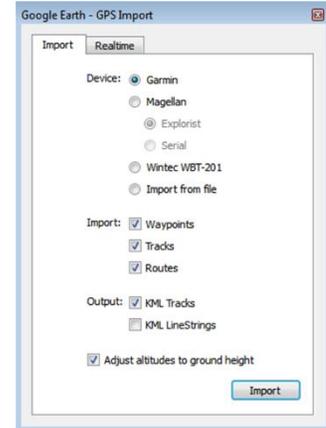
GPSBabel = the best software ever!

- GPSBabel: Convert anything GPS-related: <http://www.gpsbabel.org/>
- Download GPSBabel: <http://sourceforge.net/projects/gpsbabel/>
- Online Version: <http://www.gpsvisualizer.com/gpsbabel/>

5) GPS and Google Earth

It is a good idea to upload your GPS files to Google Earth – that’s a quick and easy way to look at your data. There are several ways this can be done:

Google Earth can import GPS data in two ways: through a direct connection to your handheld GPS device, or through a GPS file, such as a .gpx file, downloaded to your computer by other third-party software like GPS Babel.



Importing Global Positioning Systems (GPS) data in Google Earth

<http://www.google.com/earth/outreach/tutorials/importgps.html>

Importing data from GPS devices

<https://support.google.com/earth/answer/148095?hl=en>

In addition – when using DNR Garmin or DNRGPS – you can save your tracks or waypoints directly as KML files and open them in Google Earth.

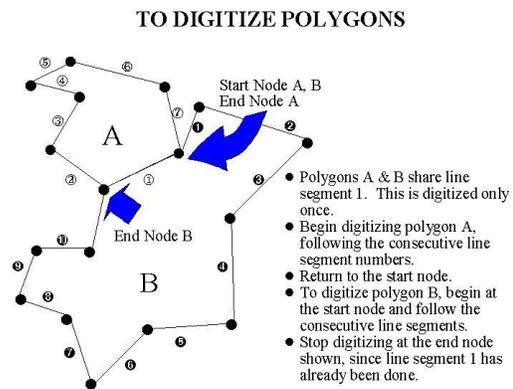
6) Mapping in ArcGIS

In general it is best to treat the GPS data points as raw data and then digitize the actual lines for your trails or boundaries in ArcGIS based on these raw data – generalizing as needed!

➔ *Always save your GPS tracks as points and edit them later in ArcGIS!*

- Create a dedicated file geodatabase for your mapping project.
- Import your raw GPS tracks and way points as new feature classes.
- Include the date of your data collection in the file name!

- Select an appropriate base layer for your map!
- Create a new feature class for the trails and digitize the polyline based on the raw GPS track points! In general it is much better to bring you tracks into ArcGIS as points and then to manually digitize the polylines.
- In general it is better to bring your tracks and way points first into ArcGIS and then export them as Google Earth KML files as needed.



- Add fields to your attribute table to name your trails and assign a color via symbology.

7) Map Perfection in Adobe Illustrator

This is optional, but for truly beautiful maps (e.g. for publication in books, journals, or magazines) the layout and design options of ArcGIS are insufficient.

- Export your map as Adobe Illustrator format.
- Open in Adobe Illustrator and perfect the layout.
- Or use <http://inkscape.org/> = a free open-source alternative!



8) Alternatives to Esri and ArcGIS

There are alternatives to Esri and ArcGIS!

- Students at colleges and universities with an Esri campus-wide site license can get free ArcGIS Desktop 1-year Education licenses.
- Selected workbooks published by EsriPress include a free 180-day trial of ArcGIS Desktop.

More Information: http://esripress.esri.com/display/dsp_ArcGIS10Eval.cfm

Quantum GIS

Quantum GIS (QGIS) is a powerful Open Source Geographic Information System (GIS) that runs on Linux, Unix, Mac OSX, and Windows. QGIS supports vector, raster, and database formats.

- Main website
<http://www.qgis.org/>
- Excellent user guide and introduction
<http://www.qgis.org/en/documentation/manuals.html>
- Quantum GIS Tutorial and Exercises from UNH Extension
<http://extension.unh.edu/GISGPS/Training-Materials>



MapWindow

MapWindow is an open source “Programmable Geographic Information System” that supports manipulation, analysis, and viewing of geospatial data and associated attribute data in several standard GIS data formats. MapWindow is a mapping tool, a GIS modeling system, and a GIS application programming interface (API) all in one convenient redistributable open source form

- Main website
<http://www.mapwindow.org/>
- Users manual and tutorials
<http://www.mapwindow.org/apps/wiki/doku.php?id=mapwindow4>
- MapWindow Tutorial and Exercises from UNH Extension
<http://extension.unh.edu/GISGPS/Training-Materials>



9) Homework for Wednesday

Map something!

Bring your mapped something into ArcGIS Desktop, ArcGIS Online, and Google Earth.
Send me the link to your map.

Install DNRGARMIN and/or DNRGPS on your computer.

Install GPSTabel on your computer.

Savage Chickens

by Doug Savage

