Converting GPS files (KML, GPX, PLT, WPT) to shapefiles in ArcGIS

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Inspired by: Jason Parent's Convert KML to SHP (May 3, 2008)

Toolbox Contents
- Convert KML to SHP script
- Convert GPX to SHP script
- Convert PLT to SHP script
- Convert WPT to SHP script

About the scripts...

All tools are Python (version 2.5.1) scripts designed to work from within the ArcToolbox of **ArcGIS version 9.3 or later (supports ArcGIS 10)**.

The KML script has been tested with files generated by Google Earth (version 4.2, Nov. 2007) and Android apps MyTracks, Maverick, and OruxMaps (Feb. 9, 2010)

The GPX script has been tested on files generated by the above listed Android apps, as well as a Garmin 60csx GPS.

The PLT and WPT scripts have been tested on files generated by OziExplorer Track Point File Version 2.1 and OziExplorer Waypoint File Version 1.1 respectively.

Before you can run either script in ArcGIS, you will need to load the scripts' toolbox into ArcToolbox.

Loading the GPSFiles_to_SHP toolbox into ArcToolbox:

The file that you will use to load the toolbox into ArcToolbox is GPSFiles_to_SHP. The script files kml_to_shp.py, gpx_to_shp.py, and gpsFiles.py **must always be kept in the same location as the .tbx file** so that the toolbox can find the script. Failure to do so will break the scripts!!!

To load the toolbox into ArcToolbox:

1) Start ArcMap and open ArcToolbox
2) Right-click within the open ArcToolbox window (panel)
3) Click on Add Toolbox, navigate to the GPSFiles_to_SHP.tbx and click Open
4) Click the plus symbol to the left of the Convert GPSFiles to SHP toolbox to expand

it. The toolbox will contain the Convert KML to SHP and Convert GPX to SHP scripts.

5) Double-click on a script to run it.

Troubleshooting...

- ArcGIS does not support filenames beginning with a number. If you receive the message "ERROR 000361: The name starts with an invalid character. Failed to execute", make sure your filename begins with a letter.

- The script cannot read compressed KML files (files with .kmz extensions). To convert to a KML file, open the KMZ file in Google Earth and save as a KML file. Alternatively, you can try uncompressing the KMZ file with StuffIt Expander (Mac) or WinZip (Windows). This should result in a KML file. *Note: the extracted KML probably won't have the same name as the KMZ (ie: on a Mac it's named Doc.kml)*

- The script cannot convert KML files generated in Google Maps even after resaving in Google Earth. These KML files do not contain actual data; they only contain a link to the data on Google's server. To convert a Google Map KML file to a shapefile, it would need to be re-digitized in Google Earth and then saved to a new KML file. The resulting KML file can then be converted to a shapefile.

- If you receive the error "ArcGIS Data Management Toolbox not found. Script cannot execute", then you will need to modify the script to give it the location of the Data management toolbox. Refer to the PowerPoint file called "Specifying toolbox location.ppt" for an illustration of how to do this.

- It is impossible to test all sources that generate GPX and KML files. If you experience issues, try using GPSBabel to convert your file. If that doesn't work, please e-mail me with your issue, and attach the problematic file so that I can test against it.

- Make sure you are using ArcGIS 9.3 or better.

- Reminder: If you don't know what projection your data is in, it's most likely WGS84. These scripts will not modify your projection data.

SPECIFIC SCRIPT INFORMATION

Convert KML to SHP

The purpose of the Convert KML to SHP tool is to convert Google Earth's Keyhold Markup Language (KML) files to ArcGIS shapefiles. The KML file may contain any number of points, lines, and polygons, but the script will only generate one feature type at a time. To extract the remaining feature types, you will need to rerun the script for each one. The generated shapefile contains the following attributes (if provided):

- Name;
- Description; and
- Google folder name

When digitizing in Google Earth, it is recommended that you store all features intended for a given shapefile in a single folder. You can do this by using the following procedure:

- Create a folder in the Google Table of Contents by
    1) right-clicking on My Places,
    2) clicking Add, and
    3) clicking Folder.
- Add features to the folder by clicking on the folder so that it is highlighted. Then proceed to create polygons, lines, or points.
- When finished creating features, save the entire folder as a KML file by 1) right-clicking on the folder, 2) selecting "Save As", and 3) changing type to KML. Individual features may also be saved as .kml files.

Convert GPX to SHP

The purpose of the Convert GPX to SHP tool is to convert GPS Exchange Format (GPX) files to ArcGIS shapefiles. The GPS file may contain any number of points and lines, but the script will only generate one feature type at a time. To extract the remaining feature type, you will need to rerun the script for each one. **Polygons are not supported** (if you'd like the support, send me a file with polygon data and I will work on it). The generated shapefile contains the following attributes (if provided):

- Name
- Description

Multiple tracks are now supported.

Convert PLT to SHP

The purpose of the Convert PLT to SHP tool is to convert GPS Exchange Format (PLT) files to ArcGIS shapefiles. The script will only generate polylines (tracks), and assumes the file format Latitude, Longitude, and 1/0 for beginning/continuation of track. All other fields are ignored. At this point there is no name/description assigned to each track since all files I have seen thus far do not contain such information. If you have a standard formatted file that has name/description data, please send it to me and I will add the information to the script.

Convert WPT to SHP

The purpose of the Convert WPT to SHP tool is to convert GPS Exchange Format (WPT) files to ArcGIS shapefiles. The script will only generate points (waypoints), and assumes

the file format ID, OBJECT ID (name), LATITUDE, LONGITUDE. All other fields are ignored. At this point there is no description assigned to each waypoint since all fields I have seen thus far do not contain such data. If you have a standard formatted file that has a description field, please send it to me and I will add the information to the script:

- Name (assumed to be the second field in the file)

Acknowledgements:

- Thanks to Jason Parent, who's Convert KML to SHP toolbox inspired this project, and on who's documentation this file is based

- Thanks to Martin Laloux for guiding me to the built-in Python XML parser eTree. His suggestions lead me to completely rewrite the original code, thus making the scripts more robust and increasing my knowledge of Python as a whole

- Thank to Muhammer for suggesting creation of the PLT and WPT scripts

- Thanks to everyone who's had any issues with the script for sending me their files so I can continue to improve the toolbox to work with a greater variety of files. Your feedback is most appreciated!