GPS Myths
Extracted from USDA Website
http://www.fs.fed.us/database/gps/collection/gpsmyths.htm

This document will attempt to dispel GPS collection myths and give sound advice for digitizing with GPS receivers that use GIS software.

Myth: My recreational grade GPS always gets data when my expensive receiver does not. Is it worth to keep this expensive rock around any longer?

Reality: GPS units vary in the ability to see GPS signals and allow a position to be collected. Usually, for GIS data collection purposes (at least in the NPS), the horizontal position needs to be within a couple of meters from the true location. More expensive mapping/resource grade receivers can be set to automatically filter out poorer quality positions. Recreational grade receivers will allow a position to be collected at any level of horizontal positional accuracy and do not store any estimates of error.

Myth: The GPS unit is the most important item to purchase. Software is secondary.

Reality: Not anymore. With Windows CE-based dataloggers the choices of mix/matching the GPS receiver, the datalogger, CE-based GPS software and PC software must be considered before deciding on a "GPS unit". A GPS unit may be cheap, but after you add the software, training and cabling to get a "system" to work you may equal the amount of money on a more expensive GPS system that pre-plans, structures the attribute collection, collects and filters the GPS data and post-processes for the GIS. Don't get caught up in going cheap, since the real work begins AFTER you have collected the GPS data. Some GPS solutions leave you with limited means to pass into the corporate GIS, high quality data and accuracy statements for documentation.

Myth: Now that I purchased a receiver with WAAS, I don't need to augment GPS positions with realtime DGPS equipment or post-processing.

Reality: Relying on WAAS for 100% of your DGPS needs is not realistic. WAAS is designed by the FAA to guide aircraft down to 200' above the surface of the earth. WAAS differential will not work effectively under tree canopy and when the southern sky is occluded. Relying on WAAS for your DGPS needs will introduce data into your corporate datasets that may be more accurate sometimes and not so accurate other times. How will you know? A better solution is investing in real-time differential systems or those systems that utilize post-processing differential. Using equipment that post-processes ensures 100% differential processing for your GIS needs.

Myth: All I need is the GPS receiver and no external antenna.

Reality: The key to receiving high quality GPS data is a clear view of the sky and an un-interrupted strong signal from at least 4 satellites in a good geometric pattern overhead at any one time. Since many mapping missions may be in hilly or mountainous regions, under tree canopy or from within a moving vehicle, holding a GPS unit in your hands can block crucial access to satellites. An external GPS antenna placed above a mapper's head will maximize the greatest number of satellites to be used in a GPS solution, and often times increase your efficiency in poor GPS environments. An external antenna also allows you to free up your hands to write things down or place the GPS receiver in a storage location (like a pocket) during long stretches of monotonous terrain. We encourage buyers to research the accuracy differences between their GPS receiver's internal and external antenna and buy the best one available.

Myth: With GPS accuracy getting better and better, there is no reason to average a point location. Just collect an instantaneous position and move on.

Reality: Averaging more than one GPS position while standing still will generate a more accurate position due to simple math. GPS errors are still present and fluctuate; averaging these multiple positions provides a more accurate point.

Stand still, but wiggle! This may sound silly, but when averaging a position, you must be not moving. However, in poor GPS environments, like a dense forest, a small movement of the antenna may provide you a position that a few seconds ago was not possible. These subtle antenna movements can provide the crucial signal that allows a position when other GPS quality filters (like PDOP/HDOP, SNR, Elevation Mask) are set appropriately for the situation.

Myth: I simply don't trust storing my GPS locations on the GPS. I write all my locations down and transfer them into GIS when I get back to the office. I think this is the best route:

Reality: This is a bad idea. Not electronically storing a GPS position places one in the situation where datum's, coordinate formats and accuracy can all be dropped or confused when entering into a GIS. User error now vastly exceeds GPS error especially since electronic storage of GPS data in receivers is tightly controlled in certain coordinate formats, significant digits and datums allowing for the best position possible. Once the data is stored internally in the GPS, the appropriate software used back in the office will ensure that the data is transferred in the highest quality possible. Contact your park's GIS coordinator to find out what software should be used to download the GPS. If you must write down a coordinate, then you must write down the datum chosen on the GPS screen display, units and estimated error during collection.

Myth: I don't need to worry about coordinate systems and datums when using ArcPad.

Reality: Three questions must be ascertained about coordinate systems and datums before you invest in an ArcPad solution for your GIS needs. Not asking these questions first will cause considerable heartache, pain and errors when merging ArcPad data back into your GIS.

Question 1: What is the datum of your GIS Layers?

You should have PRJ (Projection) file assigned for all your GIS layers BEFORE using ArcPAD and they must be all in the same projection. This is because ArcPad "listens" to the PRJ file to assign how to transform GPS input on-the-fly into a shapefile. If you add a layer with no projection (.prj file) to a map with a geographic projection, ArcPad checks if the data appears to be lat-long (geographic) and will assign those data a datum from the apDatums.dbf file. If multiple datums exist with the same name (there are 21 variants of NAD27), then you must use the Select Default Datum tool in the Layers dialog box to select the datum you want. Incorrectly defining the layer's datum in the field can cause transform errors in relation to the GIS layers back in the office. Be very careful and ensure you use ArcGIS to change the projection of your data BEFORE adding it to your ArcPad map.

Question 2: What is the datum of your incoming GPS positions from the GPS receiver?

ArcPad has no control over incoming GPS data, but relies on GPS manufacturer protocols to send data in certain formats and datums. Garmin receivers set to NMEA protocol are dependent on the screen display of the datum. Altering the datum on the Garmin can alter the GPS input so that ArcPad receives data in the wrongly assumed datum! Always set any Garmin in NMEA protocol to WGS84 Datum and never change!. You do not need to worry about TSIP protocol receivers (Trimble), or PLGR's since GPS input is always WGS84.

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