



UI Extension Forestry Information Series II

Technology No. 1

Choosing a GPS Receiver

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Many forest owners, recreationists, and other people who work and play in forests are interested in global positioning systems or GPS. A dizzying array of devices that use GPS technology are available to consumers, from standard handheld receivers, to wrist-wrapped receivers for runners, to automotive receivers that will give you blow-by-blow instructions to navigating city streets. You can even purchase GPS technology for your dog! How do you choose the GPS receiver that is right for you?

What will you use GPS for?

When shopping for a receiver, the first thing to consider is what you will use the receiver for. Prices for GPS receivers can range from less than \$100 for a basic used model to thousands of dollars for receivers used for specialized engineering applications.

Most family forest owners will probably be looking at what are sometimes called “recreational” or “consumer-grade” GPS receivers - the ones you see in stores for recreationists or sportsmen. The accuracy and number of features on these receivers have improved consistently over the last few years, so many foresters and firefighters have been purchasing these kinds of receivers as well.

Accuracy?

When you listen to people who own GPS receivers comparing their models they often describe them in terms of their accuracy (within how many feet or meters). In the 1980's GPS receivers were typically only accurate to within 100 meters. When selective availability was turned off by the U.S. Department of Defense in 2000, GPS accuracy improved to 15-25 meters. Soon after, the Wide Area Augmentation System (WAAS) became available and that increased accuracy to within 3 meters.

Most people want their GPS to be as accurate as possible. Presuming you are with the majority, make sure you purchase a receiver that is “WAAS capable”.

In forestry, getting GPS signals under a canopy is always an issue. One way of improving reception is to purchase an external antenna. But to use an external antenna you must purchase a receiver with a jack for an external antenna - not all of them do.



Scientists using GPS units to gather field data.

Photo by Robert L. Andersojn, USDA Forest Service, Bugwood.org.

Accuracy can also be improved by the sensitivity of the electronics in the receiver. For example, some manufacturers are now selling what are sometimes called “high sensitivity” GPS receivers. In recent UI Extension field programs on GPS, participants using these newer receivers commonly got twice the number of satellites as people with older models of the same receiver, particularly under a canopy. In some cases, reception can be so good an external antenna isn’t necessary.

Screen quality?

Screen quality is often one of the first things people notice when looking at GPS receivers. Many people like mapping GPS receivers (the receiver screen looks like a map), because they are accustomed to locating geophysical features through a map. These receivers typically come with some simple base maps pre-loaded.

Do you want a color or black & white screen? Many people simply like the way color screens look, but color also has the practical advantage of helping you discern different map features more quickly (e.g., is that line a road or a river?)

Larger screens allow you to see more map features at once, and are particularly useful for receivers you will be using in a vehicle. But they make the receiver less portable. Also check for other screen features. How sharp is the screen resolution? How bright is the screen? Does the screen reverse colors at night? Can you modify these screen settings if needed?

Data storage capacity?

Memory is used to store the waypoints, tracks, or other records you collect while using a GPS receiver. Memory is even more critical if you want to load maps or other data sets to the receiver for use in the field.

GPS receivers come with some memory hardwired into the receiver. If you aren’t loading many maps into the receiver and don’t need to store thousands of waypoints, tracks, etc. on the receiver at any one time, this memory may serve just fine.

However, if you want the option of loading a lot of data into the receiver, look for a receiver with expandable memory. If you are using a mapping receiver with limited memory, you may need to unload old

maps from the receiver and load maps for the site you are going to. This can be tedious. If you have more memory, you can download every map you would conceivably need into the receiver and not have to think about loading up additional maps for location changes.

Typically expandable memory comes in the form of “flash cards” - the same removable memory devices typically used in digital cameras. They are available in many different forms - as large as a quarter to as small as a child’s fingernail. You can find a whole variety of them in any store that sells digital cameras or computer supplies, and they can store as much as 2 GB of data, with promises of even greater storage capacity in the future. If a receiver takes flash cards, you can also load different cards with different combinations of map sets you might use, and then change out flash cards as needed.

Software?

There are a number of different sets of software that can be used with GPS. All GPS receivers have some software on the unit. This software can vary from the menu-driven software similar to the screens on your cell phone, to touch-screen software or software that gives you audible directions in automotive GPS. Stopping into stores that carry a range of GPS receivers, and trying out their software (“pushing buttons”) can help you identify which receivers’ software is more intuitive for your use.

Most receivers also come with some basic mapping software that is loaded onto a personal computer to help you store, display, and interpret the GPS data (e.g., waypoints) you collect. For people using a geographic information system (GIS) system, this software is not usually needed, but for everyone else, the usability of this software may affect your decision.

It is also good to look at what types of supplemental data sets are available (and how much they cost). There are maps that show topographic lines, nautical data, locations of hotels and restaurants, and many other useful data. Some GPS receivers only use maps and other data sets specific to the GPS manufacturer. Others can use third party data.

An increasing amount of data for GPS can be obtained from online sources such as Google Earth. If these data sources are designed to interface with specific GPS receivers, they are more likely to be targeting the

most commonly used manufacturers and models, so going to a more mainstream GPS manufacturer may be advisable.

Other Features

Electronic Compass

People who frequently use compass bearings often like a GPS receiver with an electronic compass. This allows you to get a bearing even if you are standing still (you can get a bearing on other GPS receivers, but if you stand still, the virtual needle points erratically, as the receiver takes GPS readings with different directions of inaccuracy relative to the point where you are standing). Note that this compass still only works if you have batteries. If you hike into a wilderness area, bring along a standard magnetic compass as a back-up!

Altimeter – GPS or barometric?

Most GPS receivers will give you an elevation reading. If a very accurate elevation measurement is important (e.g. recording the elevation of a tree you are collecting seed from), barometric altimeters are usually more accurate than a GPS-based altimeters, particularly on consumer grade GPS. Some GPS receivers have a barometric altimeter built in.

Cabling?

Most GPS receivers communicate with personal computers via some type of cable. The types of cables used in this process matter. The newer USB cables allow transfer of large data sets in a matter of minutes, as opposed to hours with some other cables. There are probably GPS receivers coming that communicate with PCs via wireless technologies such as Bluetooth.

Size, weight, and durability?

A GPS receiver doesn't do much good if you do not have it with you. Some people are willing to sacrifice features such as screen size, etc, in favor of a receiver that fits comfortably in their pocket.

How durable is the receiver? In particular, how water resistant is it? If there is a chance you will be using GPS in open water (e.g. fishing, sea-kayaking, stream-related data collection), some receivers actually float!

Service?

With the growing popularity of GPS, GPS manufacturers have proliferated. How do you choose? Ask around and check online buying guides for information on the reliability and customer service of various manufacturers.

Accessories

Batteries

Perhaps the most important accessory to a GPS receiver are batteries - it won't function without them. Most recreational GPS receivers take conventional household batteries, rather than proprietary batteries, which gives you more flexibility (you can pick batteries up at any convenience store rather than having to special order them).

Do you want regular batteries or re-chargeable batteries? The former may have a longer life, but rechargables don't contribute as much to the waste stream. There are also highly portable solar battery chargers available (google "solar battery chargers") which can be handy if you are in a remote location. Rather than heading all the way into town for batteries, you can just re-charge what you have on site.

How the receiver uses those batteries is also important. If you tend to forget to turn electronic devices off, you may want to take a closer look at various receivers' power management software. For example, does the receiver automatically turn off if not used for some time period?

Antennae

GPS reception can be improved significantly (especially on older models) by using an external antenna. These come in a variety of forms, from a matchbook sized antenna you can clip to the top of your hat to more elaborate antennae mounted on poles. Remember, your receiver has to have an external antenna jack to use one.

Carrying case

Some receivers come with a carrying case. Others do not. Either way, check out some of the after-market GPS carrying cases. It is particularly nice to have a case with a separate compartment for spare flash cards or spare batteries that you should always bring along if you are depending on GPS.

Combination GPS receivers?

You can get GPS receivers combined with mp3 players, audible street directions, XM radio reception, heart rate monitors, palm computers, 2-way radio, and other functions. There is some risk that devices that do many things don't do any of them well, but if you like the idea of consolidating all your electronics to one device, these options are worth exploring.

The "combination" device many foresters use is a GPS receiver with rich data-logging capabilities. Most GPS receivers allow you to collect some basic data about a waypoint or a track. But if you want one device to log geo-referenced timber cruise data, you are probably looking beyond the capabilities of a recreational GPS. More sophisticated receivers have more data-logging capabilities, can integrate aerial photos and GIS data, and frequently have handheld computer software (and hardware) combined in the same receiver.

Short of buying one of these much more expensive receivers, you could buy a recreational receiver that can be connected to a palm computing device with basic GIS software loaded onto it. For more information, go to the National Geospatial Technology Extension Network web site (see end of this article), Click on "resources", then "cool tools", then "Geospatial Tool Kit", then "Pocket PC HGIS Tutorial".

Where to purchase a GPS?

With the growing popularity of GPS, even drug-stores are carrying receivers. It is a good for the local economy to keep your purchases local, but make sure the receiver meets your expectations. If a store is just keeping a couple of GPS receivers to sell to tourists, they may be dated, very basic models. Otherwise, most stores that carry products for recreationists or sportsmen carry GPS receivers.

Don't presume that buying a GPS receiver at a store means you will be able to bring it there for service. They may tell you to contact the manufacturer directly, online or on the phone. For that reason, many people prefer to shop online for GPS receivers, and there are many places online to shop for them. If you aren't picky about having the most current model, you can also get some good deals on used receivers through online auction sites.

How long before my GPS receiver becomes out-dated?

With the rapid changes in all types of electronic technology it is natural to ask questions about the longevity of a specific piece of technology. With computers, many people advise to buy the fastest, most current computer you can afford. That same principle applies to GPS receivers somewhat. In part, it depends on what you plan to use it for. If your only use is to call in a location for someone who is injured and you are working in relatively open terrain, an older used model may be perfectly adequate. If you want to use more maps, do more data entry, work under forest canopy, and have the flexibility that comes with removable data storage cards, you should probably look at purchasing a newer model.

For more information . . .

GPS is here to stay. If you would like to learn more about using a GPS receiver, we will be offering workshops titled "Using Your GPS" over the next year throughout northern Idaho. For dates and locations, see the calendar included with this issue of Woodland Notes, and check the University of Idaho Extension forestry web site for the program registration flyer. These sessions have limited enrollments, so register as early as possible for the individual session you wish to attend.

GPS manufacturers' web sites also have a lot of good information online. Simply enter the manufacturer's name into a search engine to locate their web site. Otherwise, you can also access these sites for additional information on GPS technology:

- National Geospatial Technology Extension Network (www.geospatialextension.org/)
- GPS World (gpsworld.com)

Disclaimer: Mention of specific manufacturers neither constitutes recommendations for their use nor excludes the possibility that other manufacturers' products may be equally or more effective.