



Choosing a GPS Receiver

Chris Schnepf

Many forest owners, recreationists, and other people who work and play in forests are interested in global positioning systems (GPS). A dizzying array of devices that use GPS technology are available to consumers, from standard handheld receivers, to wrist-wrapped receivers for runners, and automotive receivers that will give you blow-by-blow instructions for 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 1990’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 Federal Aviation Administration implemented the Wide Area Augmentation System (WAAS), which increased accuracy to within three 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. 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, aerial images, 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. 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

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Salvage Logging After a Wildfire

Yvonne C. Barkley

Inland Northwest forest ecosystems are extremely resilient and supremely adapted to disturbance by fire. By living in fire-based ecosystems, we become part of those ecosystems and influence the landscape by our activities in and around forests. The period after a burn can be excellent time to achieve specific management objectives for a particular piece of ground. Changing the species composition to one more suitable for the site, increasing wildlife habitat, controlling noxious weeds, and improving forest health conditions are all possible opportunities at this time.

From a management perspective, **damages** are defined as the unfavorable effects of fire-caused changes that make management objectives difficult to achieve. **Benefits** are the favorable effects that contribute to the realization of management objectives. All effects must be looked at with reference to the overall short- and long-term management objectives of any particular piece of ground. The effects of fire in an ecosystem that is being managed for wilderness or wildlife habitat may be viewed differently from those being managed primarily for timber production.

One of the first decisions to make after a forest has burned is whether to harvest your dead and dying trees. Standing dead trees (called snags) serve many purposes, the most commonly cited being habitat for many woodland species of bird and mammals. Down trees also provide nutrients and organic material to forest soils, and provide habitat for insects that, in turn, feed many different kinds of animals.

Salvage cuts are often initiated after a disturbance (fire, wind, insect or disease kill) to recover the value of damaged trees and remove hazard trees. Salvage operations are usually not done unless the material taken out will at least pay the expense of the operation. But economics and safety are not the sole factors in deciding to salvage log. Forest health considerations also play a role in the decision to harvest post-fire stands. Bark beetle populations may increase in fire-damaged trees, which then serve as reservoirs for future generations of beetles to spread into adjacent healthy stands. Standing dead and dying timber is also fuel and can increase future fire risks. If you decide to do a salvage cut, do it as soon as possible after a burn – by year three much or all of the value is lost.

Bark beetles.

Nothing loves a stressed tree more than a bark beetle – unless it's thousands and thousands of bark beetles. Several conditions must exist for bark beetles to take advantage of fire-damaged hosts and because all the conditions must be met for an outbreak to develop, beetle epidemics following wildfires are a possibility, not a given.

First, damaged trees must have sufficiently undamaged inner bark (**phloem**) to sustain new and growing beetle populations. If the phloem has been heated until dry and darkened, beetles can neither feed nor deposit eggs in it. Second, fires must occur at a time of year when beetles are in the adult stage and can quickly infest susceptible trees. And third, because bark beetles are not strong flyers, there must be beetle populations close enough to the burned area to take advantage of fire-weakened trees.

If all of the above criteria are met and a bark beetle population does move in or increase in size, damage will vary with burn severity. In areas that were lightly burned, the amount of bark beetle attraction depends mostly on the amount of root collar damage. Most thick-barked species, such as mature Douglas-fir, western larch, and ponderosa pine, will have low mortality and not attract beetles unless smoldering duff significantly damaged roots or root collars. On the other hand, thin-barked species such as true firs can tolerate little damage at ground level without significant stress, making them much more susceptible to bark beetle attack. In areas that have experienced a light burn, look for trees that have little apparent bole or crown damage, but may be completely girdled at the root collar.

Trees in moderately severe burned areas are at the greatest risk of bark beetle infestation. The degree to which mature Douglas-fir is attacked depends on the amount of damage to the root collar, though it has been found that bole scorch on more than half of the tree's circumference will likely produce a strong attraction for Douglas-fir beetles. Thick stands of ponderosa pine, lodgepole pine, Engelmann spruce, and subalpine fir are

often stressed enough to be attacked by bark beetles .

Few severely burned trees will be infested by bark beetles. Severe heating and charring destroys and dries the phloem, leaving unsuitable habitat for invading insects. Even most woodborers that feed in the sapwood require relatively fresh phloem for newly hatched larvae. Look for severely burned trees that have lost all of their foliage, as they will tend to have a higher moisture content than those with attached dead foliage. This can limit bark beetle populations – survival of beetle larvae is higher in standing trees with foliage than without.

Fungi.

As fungal spores cannot penetrate bark, insect infestations that take place after a burn often provide entry points for fungi. It is important to detect decay in fire-killed timber early, as it takes very little loss of cell wall material to significantly decrease wood strength. While insect damage and stain lower log value, decay reduces strength properties, which render the wood useless from a structural standpoint and thus decreases log volume.

Fungi require certain levels of temperature, moisture, and oxygen to become established and thrive.

When the moisture content of wood falls below 15 percent, fungi become inactive. Some species of fungi do not die at this point, but go dormant and become active again when conditions become favorable. Excessive moisture decreases oxygen supplies, and when wood is completely saturated, oxygen levels are not sufficient to sustain fungal growth. On dry sites, deterioration often occurs on the lower bole where moisture conditions are more favorable. On wet sites, moisture conditions will be more favorable higher up in the stem.



In the first year after a fire, stain is the most important form of deterioration. Blue stain in the sapwood of trees is one of the first signs of degradation in log quality, and when conditions are favorable for blue stain fungi they are also favorable for other fungi. Stains in softwoods cause little damage to the wood structurally, but do cause loss in grade, and decreased prices at the mill, because of appearance.

Other Forms of Deterioration.

Moisture and temperature also contribute to weather checking. Weather checking generally happens in the top log (top eight feet) of larger trees where there is less volume to be lost. Smaller trees and those with thin bark are more susceptible to weather checking, and checking will be more extensive on hot, dry, or windy slopes. Checking can provide an entryway for fungi.

Breakage in felling is another form of degrade that results in volume or value loss. Fire-killed trees tend to have more breakage than green trees. A decrease in pulp chip volume due to char and decay is another source of loss due to fire.

Rates of Deterioration.

Insect damage is generally classified as limited deterioration with the resulting wood products, such as lumber or veneer, being lower in grade but still usable. Stain is also classified as limited deterioration but has a major economic impact by lowering the value of products graded for appearance. The presence of decay fungi results in a classification of general deterioration with a resulting loss in volume. Each stand and each tree is unique, but some generalizations have been made:

- blue stain will appear in susceptible trees within the first year (often within a few months);
- by the second year, some of the heartwood will be decayed; sapwood decay will be increasing;
- after three years the sapwood of most softwoods has deteriorated beyond use for structural timber products.

Salvage logging is just one of several forest management activities that may be needed after a wildfire. Reforestation, weed control, and erosion control are also important management objectives and are addressed the recent publication *After the Burn: Assessing and Managing Your Forestland After a Wildfire*. Request a free copy from the UI Extension Forestry office at (208) 885-7718 or yvonnec@uidaho.edu.

Strengthening
Forest
Stewardship
Skills
2007-2008



Strengthening Forest Stewardship

Landscaping for Fire Prevention

This program helps forest homeowners make their homesite less likely to burn and easier for firefighters to access, in the event of a local forest fire.

Sessions of this program can be scheduled for interested groups of 10 or more.

Forestry Shortcourse

This multi-session program enriches private forest owners' basic understanding of forest ecology, silviculture, insects, disease, goal setting, record keeping, and other forest stewardship issues. In the process, participants work on a management plan for their forest (UI credit available).

Coeur d'Alene - Six Thursday evenings,
November 1 – December 13, 2007 (6:30 pm to 9:30 pm)

Moscow - Six Thursday evenings
January 3 - February 7, 2008 (6:30 pm to 9:30 pm)

Sandpoint - Six Wednesday mornings
June 11 - July 16, 2008 (9:00 am to 12:00 pm)

Inland Northwest Land, Water, & Fire Conference

This program, offered jointly by the UI Extension and WSU Extension is designed to give rural policy makers, local agency staff, contractors, realtors, foresters, and rural residents an opportunity to learn about current research and experience related to fire, invasive species, non-point-source pollution of streams and lakes, wildlife issues, growth, planning, rural infrastructure, sustainable development, aesthetics and apply it to policies and activities in the wildland urban interface.

Coeur d'Alene - November 7-8, 2007
(8:00 am to 4:00 pm)

Using your GPS

A Global Positioning System or GPS unit is becoming as common to work and play in forests as a compass. This one day program will introduce participants to the science underlying GPS use, and feature field exercises to acquaint them with basic tasks that can be done with a GPS, such as measuring acreages of tree planting units. All programs are from 9:00 am to 4:30 pm.

Hayden - Friday, November 16, 2007

St. Maries - Friday, April 11, 2008

Bonniers Ferry - Friday, May 2, 2008

Sandpoint - Saturday, May 3, 2008

Moscow - Friday, May 9, 2008

Current Topics in Forest Health

Animals, plants, insects, and fungi can sometimes impede forest stewardship goals. This annual program updates forest owners, operators, and natural resource professionals on methods to manage these organisms. Pesticide recertification credits will be available.

Orofino - Thursday, December 6, 2007
(8:00 am to 4:00 pm)

Coeur d'Alene - Friday, December 7, 2007
(8:00 am to 3:30 pm)

Family Foresters Workshop

This annual program, offered jointly by the UI and WSU Extension, updates consulting foresters, state-employed service foresters, and other natural resource professionals on emerging technology and knowledge applicable to family forests (also known as non-industrial private forests).

Spokane, WA - Friday, January 18, 2008
(8:00 am to 5:00 pm)

An Introduction to Conservation Easements

This 2-hour program will feature a short introduction to conservation easements followed by panel of representatives from public and private institutions that set up conservation easements and a landowner who has enrolled in one.

Coeur d'Alene - Saturday, February 9, 2008
(1:00 pm to 3:30 pm)

Backyard Forests

This program will help homeowners with less than five acres of forestland apply basic forest management concepts to "home landscape" forests.

Coeur d'Alene - Monday, February 11, 2008
(6:00 pm to 8:00 pm)

LEAP Update

This program is designed to deepen and expand the training provided in Logger Education to Advance Professionalism (LEAP). LEAP updates are co-scheduled with spring first aid training, so participants can get all 16 credits required by the Idaho Pro-Logger program within 2 days. Specific program details will be announced this winter.

Orofino - March 4-5, 2008

Post Falls - March 11-12, 2008

Troy - March 13-14, 2008

St. Maries - March 18-19, 2008

Bonniers Ferry - March 25-26, 2008

Partnership Skills - 2007-2008

Logger Education to Advance Professionalism (LEAP)

Logger Education to Advance Professionalism (LEAP) is a nationally acclaimed Extension program that helps loggers improve their skills related to forest ecology, silviculture, and water quality — through presentations, discussion, videos, and other learning experiences.

Hayden - April 16-18, 2008

Orofino - April 23-25, 2008

Adaptive Silviculture on the McGovern Forest

Dr. Karel Stoszek is an emeritus professor with the UI Dept. of Forest Resources who has long advocated approaches to silviculture that maximize flexibility in response to small scale variations in stand and site conditions. He has been experimenting with these approaches on the McGovern Forest, a property donated to the University of Idaho to demonstrate family forest management alternatives. This field day will be spent in the woods with Karel observing and discussing his adaptive silviculture treatments.

Coeur d'Alene - Friday, May 16, 2008

(8:00 am to 5:00 pm)

Measuring Your Trees

Woodland owners may have dealt with bushels of grain or tons of hay per acre but still not know how to measure the volume and value of their timber. This program will feature 2-3 hours indoors learning how to measure trees, with the rest of the day spent outdoors conducting hands-on measurements to estimate timber volume and value.

Orofino - Friday, May 16, 2008

(8:30 am to 4:00 pm)

Moscow - Friday, May 23, 2008

(8:30 am to 4:00 pm)

Thinning and Pruning Field Day

This program will feature 2-3 hours indoors discussing basic concepts of thinning and pruning, followed by a hands-on field tour, to learn about thinning, pruning, forest genetics, and chainsaw safety firsthand.

Moscow - Friday, May 30, 2008

(8:00 am to 4:00 pm)

Coeur d'Alene - Saturday, June 28, 2008

(8:00 am to 5:00 pm)

Pruning to Restore White Pine

This indoor/field program will help you reduce white pine mortality from blister rust. It will cover blister rust disease cycles, blister rust hazard assessment, canker identification, and blister rust pruning methods.

Newport, WA - Friday June 20, 2008

(8:00 am to 4:00 pm)

Managing Forest Organic Debris

There is growing discussion about leaving more material in the woods for forest nutrition. But how do you minimize fire or insect hazards? This program will feature cutting-edge science on forest organic debris, both indoors and in the field.

St. Maries - Friday, July 11, 2008

(8:00 am to 5:00 pm)

Forest Insects & Disease Field Day

This program will feature a full day giving participants first-hand contact to the variety of insects and diseases that can affect forest growth and health, integrated with discussions of related management strategies.

Coeur d'Alene - July 18, 2008

(8:00 am to 5:00 pm)

Orofino - July 27, 2008

For more specific information on these and other UI Extension Forestry programs in your locale, dial www.cnr.uidaho.edu/extforest on the World Wide Web, or see the contact listed below:

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Strengthening Forest Stewardship Skills 2007-2008

Idaho has abundant forest land. Many people do not realize that over 2 million acres (11% of Idaho's forests) are owned and managed by thousands of **family forest owners**.

Each landowner has unique goals for his or her forest property, ranging from timber income to simply "a place to get away from it all". However, one goal common to most forest landowners is to **steward** their forest land, for their own goals and future generations.

The educational programs listed herein are designed **to help private forest owners and those who work with them strengthen their forest stewardship skills.**

All programs require pre-registration (including a small fee to off-set program costs). To register for a program, contact the UI Extension office in the county where that program will be held. For specific program information, dial **www.cnr.uidaho.edu/extforest** on the World Wide Web, or see the contacts listed inside this flyer.



These educational programs are being supported in part by the **Idaho Forest Stewardship Program**, a cooperative effort of the following agencies and organizations:

University of Idaho Extension
Idaho Department of Lands
Idaho Department of Fish and Game
U.S.D.A. Forest Service
U.S.D.A. Natural Resources Conservation Service
U.S.D.I. Fish and Wildlife Service
Consulting Foresters
Idaho Association of Soil Conservation Districts
Idaho Forest Owners Association
Idaho Riparian Cooperative
Idaho Nature Conservancy
Idaho Tree Farm Committee
Idaho Association of RC&D Councils
Intermountain Forest Association
Nez Perce Tribal Forestry
Idaho Native Plant Society
Idaho Forest Products Commission
Idaho Sustainable Forestry Initiative State Implementation Committee
Associated Logging Contractors of Idaho

Seeding Forest Roads, Skid Trails, and Landings

Randy Brooks



Clean water is one of Idaho's greatest natural resources. Many of our lakes, rivers, and streams originate in forested areas. Forests assist nature in maintaining water quality by keeping soil in place, storing nutrients, and balancing water flows. They also help moderate stream water temperatures to support healthy fish populations. Idaho has state water quality standards that have been established and approved by the U.S. Environmental Protection Agency (EPA). These standards, required under the Clean Water Act (CWA) established in 1972, are designed to protect, restore, and preserve water quality in areas designated for specific beneficial uses (e.g. drinking water, swimming, recreation, fishing, salmon and trout habitat, etc.). Beneficial uses have been designated for each water body in Idaho. Best management practices (BMP's) have been established to keep pollutants out of streams and water bodies. One of the main water pollutants in Idaho waters is sediment. Sediment is any particulate matter that can be transported by fluid flow and which eventually is deposited as a layer of solid particles on the bed or bottom of a body of water.

Forest roads, skid trails, and landings are a primary source of sediment to these water bodies, especially during the first few years of their lives. Seeding these areas encourages the development of dense roots that bind the soil, holding it in place, no matter the weather. Seeding grasses and legumes controls soil erosion, creates forage for livestock and wildlife, and helps control weeds.

But successfully establishing this type of vegetation on these types of roads involves more than simply scattering the seed. Before seeding, study specific areas in which the vegetation must be established. How deep are the soils? How steep is the site? What direction does the slope face? The answers to these questions all help you estimate the effective precipitation the site receives. A site may get 20 inches of rain per year, but on a steep, thin-soiled, south-facing exposure, much of this moisture (not just soil moisture - much of it evaporates before soaking into the soil) will evaporate, leaving little moisture for shallow rooted grass species.

After examining the site, choose the desired grass species best suited for the site. Usually a mix of overstory and understory grasses mixed with

legumes is recommended. A typical seed mixture for a wetter site (over 25" effective precipitation) might include one or two varieties from each of the categories listed in Table 1. A typical seed mixture for a drier site (under 25" effective precipitation) might include one or two varieties from each of the categories listed in Table 2.

Seeding rates vary according to seed size, dryness of the site, and method of seed dispersal. Large seeds, dry sites, and broadcasting by hand or machine require more seed than small seeds, wet sites and drilling. Grass seed usually contains small percentages of crop seed, weed seed, and inert materials and not all what remains germinates. What ever varieties of seed you choose, calculate seeding rates on the basis of "pure live seed" (PLS), which is a measure of seed lot purity and germination percentage. Generally, 100-150 pure live seeds per square foot is a sufficient seeding density. This may require from 15 to 20 lbs. of seed/acre depending on the mix used (one mile of logging road 12 feet wide contains 1.5 acres). Contact your local University of Idaho Extension Office or Natural Resource Conservation Service office for specific seeding recommendations.

Before seeding, make sure the seed will have direct contact with soil. It is best to seed just after road construction because there is freshly exposed soil. Try to leave a rough surface so seeds will have a place to lodge. This is especially important on steep slopes. You may even want to create "mini-terraces" to get grass seedlings started. It is important to control and slow down water that might flow through newly seeded area with a water bar, turnout, or other water control technique.

Seed can be spread manually by hand, broadcast mechanically (ex: "cyclone spreader") or drilled (if you have a level, easily accessible seeding surface). The first two methods place the seed on the surface. Drilling places the seed at a controlled depth. You can also hire a professional who can use specialized equipment to seed in a mulch slurry ("hydromulch") or using forced air ("air seed"). Regardless of which technique is used, seed either in the fall (six weeks before freeze date) or in the early spring. If seeding in the spring, be careful not to compact wet soils.

Fertilizing the site during seeding can be very beneficial, as many of these soils have had most of the topsoil removed, leaving a less fertile subsoil. If feasible, replace the topsoil to provide a more fertile base. Test the soil for fertilizer or liming needs. Remove surface debris and spread the seed by hand or with a broadcast spreader. Generally, 250 lbs/acre of 16-20-0 fertilizer is adequate (this applies approximately 40 lbs actual N/ac).

Mulching with excelsior, clean straw, slurried wood fiber, or similar materials after spreading the seed can provide a better environment for seedling establishment and growth and helps to control erosion until after the vegetation is established. Also, once you have established the grass seeding, try to keep livestock off the site for at least a year so that the grass has ample opportunity to establish itself above and below ground.

Grass seed mixtures have been established for a variety of purposes. For more information on grass seeding, contact your local University of Idaho Extension Office.

Table 1. Typical seed mixture for a wetter site (over 25" effective precipitation).

Overstory (>50% of mix)	Understory (<50% of mix)
Slender Wheatgrass	Timothy
Intermediate Wheatgrass	Hard Fescue
Pubescent Wheatgrass	Creeping Red Fescue
Mountain Brome	Canada Bluegrass
Meadow Brome	Redtop
Blue Wildrye	Tall Fescue
Orchard Grass	Perennial Ryegrass
Legumes	
Alsike Clover	
White Dutch Clover	
Northern Sweetvetch	

Table 2. Typical seed mixture for a drier site (under 25" effective precipitation)

Overstory (>50% of mix)	Understory (<50% of mix)
Crested Wheatgrass	Streambank Wheatgrass
Intermediate Wheatgrass	Hard Fescue
Pubescent Wheatgrass	Big Bluegrass
Bluebunch or Snake	Sheep Fescue
RiverWheatgrass	Orchard Grass
Tall Wheatgrass	
Legumes	
Lewis Flax	
Alfalfa	
Yellow Sweet Clover	
Small Burnet	

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 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), 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 less expensive consumer grade GPS-based altimeters. 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 batter 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, particularly if it can be elevated above your head or other obstructions. 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 drugstores 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 outdated? 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 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 (<http://geospatialextension.org>)
- Geospatial Online (www.geospatial-online.com)
- GPS World (www.gpsworld.com)

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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