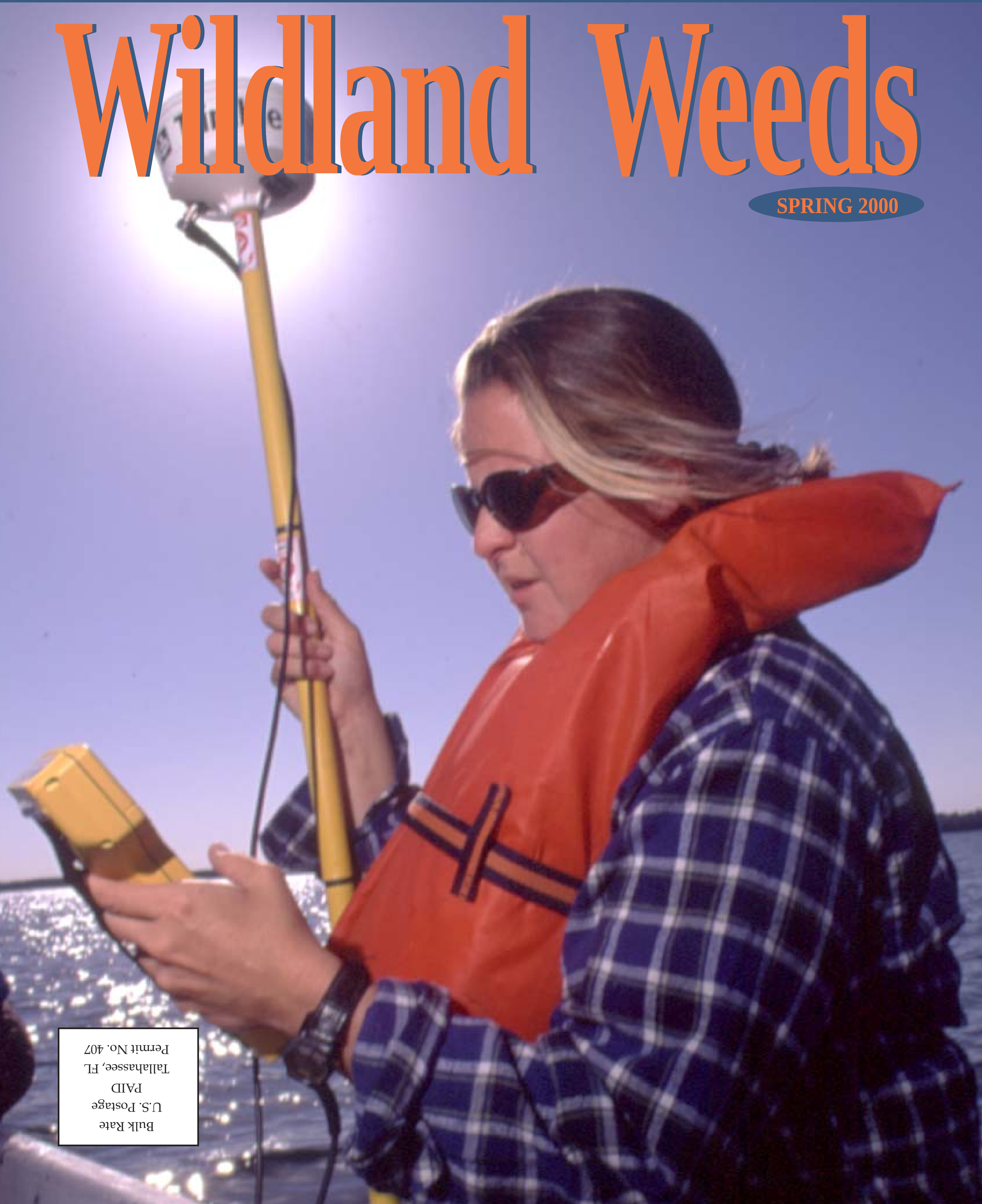
GPS Technologies – Equipment and Costs

Wildland Weeds

SPRING 2000



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Wildland Weeds

SPRING 2000, Volume 3, Number 2

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About the cover:

GPS in Action. Lourdes Rojas uses a GPS unit to track environmental features along the west coast of Florida. Photo by Pat Lynch, SFWMD.

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editor's note

Ten years ago, Global Positioning System (GPS) technology was just becoming available to the public – emerging from a shroud of covert military operations. What once kept Pentagon generals huddled in secrecy today tracks Cadillacs with flat tires and sailors aiming for Bimini. Paramedics can find you in an emergency and trucking companies know which drivers are lingering too long at roadside greasy spoons. Some applications are more notable than others, but the bottom line - it's hard to imagine what we did *before* GPS.

This technology is extremely important in the exotic plant management field. Natural areas, by definition, should not be navigable using a roadmap. GPS lets land managers navigate remote properties, inventory plant populations and track management efforts. Pat Akers offers a primer on how Global Positioning works and some tips on choosing the right equipment in his article, "GPS and Surveying of Weed Populations: Equipment and Costs" on page 10.

Also in this issue, Richard Moyroud sounds the first alarm for several plants now invading Caribbean locales (see article below). Richard is well acquainted with these invasive exotic plants in the United States, and hopes that neighboring countries will stop these invaders before they expand and seriously threaten the ecological health of the Caribbean basin. –Amy Ferriter

Exotic Weeds THAT Threaten THE Caribbean:

Colubrina asiatica in Dangriga, Belize

A BRIEF OVERVIEW AND EARLY ALARM CALL.

By Richard Moyroud

South Florida has a recent history which is highlighted by the introduction of plant species from distant parts of the world. Some of these plant importations have proven to be extremely harmful to the natural environment and human infrastructure, thus instigating work leading to a better description of the problem and control measures. Concerned individuals in Florida were the first in the United States to organize a council to identify the most serious pest plants and compare notes on control methods, if any. The Florida Exotic Pest Plant Council was established in 1984, and one of the early documents created was a checklist of the pest plants recognized at that time. Today, the list includes more than 120 species in two categories, based on oral and written field reports compiled from a wide spectrum of observers (FLEPPC 1996, 1999). Category 1 plants are considered the most serious, since these are defined as "Species that are invading and disrupting native plant communities in Florida." Category 2 species have "shown a potential to disrupt native plant communities."

An equally important issue is the effort to prevent the introduction of

any new pest plants. Many researchers agree that one of the best predictors of invasiveness is invasive behavior documented elsewhere. Caribbean Islands and the Central American coastline share a large number of native and exotic plant species with Florida. Many of the pest plants in Florida are just beginning to appear in the Caribbean, and may become pests at least as serious as they are in Florida. There are enough signs to warrant thorough research and perhaps early control efforts.

Surveys by the author throughout the Caribbean region - sometimes in the company of expert botanists, or armed with the most recent floras of the region - suggests that the disruption of native plant communities is in the earliest stages of development. Climatic or edaphic conditions, competition with other species, and existing herbivores may slow or arrest the explosive growth of some pest plant species, but it would be wise to eradicate the relatively small nuclei of the worst pest plants as soon as possible.

Bermuda has recently discovered the harmful effects of introduced exotics, and has successfully used the Florida EPPC list to evaluate species which are beginning to show pest plant behavior. This program of early recognition and prompt response is a model for other islands (Francis 1999).

In the Bahamas, there are coastal and forest plant communities similar to those in South Florida, complete with many of the same invasive species. Of the pest plant species listed for Florida, 29 of the 65 in category 1, and 26 of the 58 in category 2 occur in the Corrells' *Flora of the Bahamas Archipelago*, some with a warning of the incipient harm, based on the authors' observations of the species in Florida (Correll and Correll 1982). In addition to disruption of native plant communities, pest plants have been observed in habitats critical to endangered fauna. In the Bahamas, critically endangered rock iguanas (*Cyclura* spp.) are now restricted to small, rocky cays where they subsist on native plants, but need loose sand in which to dig nests for their eggs. Australian pine (*Casuarina* sp.) has been observed with extensive, impenetrable root systems in the only sandy spot on one such cay, thus interfering with *Cyclura* reproduction (International Iguana Society Field Expedition, March 1992). Brazilian pepper (*Schinus terebinthifolius*) has been seen on other remote islands, and could also interfere with nesting sites. Near the airport on San Salvador Island, one small population of fruiting *S. terebinthifolius* was observed in June of 1994; it may still be possible to eradicate this species from this and other islands before the populations expand to unmanageable dimensions.

In the drier islands (Turks and Caicos group, St. Croix, etc.), or on dry sides of larger islands, giant milkweed (*Calotropis procera*) and rubber vine (*Cryptostegia grandiflora*) are well established and spreading (Nellis 1997.) These highly poisonous plants add another dimension to the issue, as livestock or humans (including tourists) could be harmed by these unwanted plants.

In the Greater Antilles (Cuba, Jamaica, Hispaniola, and Puerto Rico), approximately half of both Category 1 and Category 2 of Florida's pest plants show up in recently published floras (Adams 1972, Liogier and Martorell

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1982, Borhidi 1991.) Ironically, there are a few species considered native to the West Indies which appear on the EPPC lists, but this does not alter the argument against the other species. Similarly, some species native to Central America, such as *Mimosa pigra* and *Leucaena leucocephala*, have behaved as pest plants when introduced into the Caribbean islands.

In islands with significant agricultural production, the focus has been on unintentionally introduced crop weeds, but some pest plants are known to originate from ornamental introductions. Cuba has had a long standing problem with *Dichrostachys cinerea*, a small thorny shrub introduced from Madagascar for its attractive flowers (Borhidi 1991). This species (called "aroma" in Cuba) infests many areas, displacing native plant communities and interfering with access to coastal sites. *D. cinerea* is also established in Florida, and has been found germinating in coastal strand of the lower Keys after the disturbance caused by Hurricane Georges in 1998 (Robert W. Ehrig, personal communication.) It is possible that the seeds for this most recent invasion were brought to Florida by the hurricane. The establishment of pest plants in the Caribbean has obvious implications for Florida, since the unrestricted movement of propagules by wind, water, and human transport is well known.

In Jamaica and Puerto Rico, the damage caused by pest plants may be more subtle. The exotic *Selaginella willdenovii* has invaded the understory of some forests (Proctor 1985). This species has long clambering stems and is displacing a variety of native species. *Erythrina poeppigiana* was introduced from Peru as a fast-growing shade tree, but is now spreading throughout many forests, perhaps replacing the native *Erythrina* species. Rose apple (*Syzygium jambos*) is now a common component of the understory throughout the Caribbean, but probably passes unnoticed, thus allowing the species to become firmly established. Finally, rivers such as the Rio Cobre in Jamaica are choked with *Hydrilla verticillata*, but no attention is given to the problem (George R. Proctor, personal communication).

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In the Lesser Antilles, there are many pest plants now identified as "weeds," again with an emphasis on crop pests (Fournet and Hammerton 1991). Some of these are well-known pests in Florida, but in stark contrast to the experience in Florida, Australian *Melaleuca quinquenervia* is known in the French Antilles as a pleasant ornamental which does not yet show invasive behavior. Still, approximately half of the Category 1 and half of Category 2 plants from the Florida EPPC list are included in the *Flora of the Lesser Antilles* (Howard 1979).

The nation of Belize is located on the Caribbean Coast of Central America, and is bordered to the north by Mexico and to the south and west by Guatemala. Formerly known as British Honduras, it has had a long history of British forestry activity, including the introduction of exotic species. Few exotics were noted in vegetation checklists published twenty years ago (Spellman *et al.*1975, Dwyer and Spellman 1981.) Today we can see *Casuarina* spp., *Gmelina arborea* Roxb., and teak (*Tectona grandis*), all introduced as potential forest resources, but all of seemingly limited expansion at this time. Most recently, two species have come to light which could represent the earliest phase of pest plant invasion. Latherleaf (*Colubrina asiatica*) an aggressive sprawling shrub, is now recognized as a severe problem in the southern coastal areas of Florida. One isolated population has recently been seen in a mangrove fringe in South Central Belize, where it has the potential to invade large areas, both natural and farmed (shrimp farms are currently the most important activities in this area). It may not be possible to establish how and when the first plants arrived, but the current population is small enough to be easily eradicated. Australian cajeput or paperbark trees (*Melaleuca* spp.) are evident in several regions of the country, and were certainly introduced as part of the early forestry activity. Records may exist with details of species used, origins, and planting sites. Until recently, the mature trees seemed to be confined to planted groves, and reproduction was not evident. One small population of old trees (tentatively identified as *Melaleuca leucadendron*) on a coastal sand berm may be approaching the century mark, and despite the presence of capsules with seeds, no seedlings were found anywhere in the vicinity. Unfortunately, another population near the international airport has been observed to be reproducing rapidly, with many size class individuals spreading from a core population. Given the extensive seasonal savanna areas adjacent to this site, and knowing the behavior of a related species in Florida (*M. quinquenervia*), we may be seeing the early phase of an invasion, which could easily be arrested before the cost becomes prohibitive, and before irreversible ecological damage is done.

This brief overview of exotic plants in the Caribbean offers a glimpse of a new, underestimated ecological prob-

lem. In many cases, the results of ecological abuse or alteration are quickly made visible. In the world of plants, the changes are often slow and subtle, and may escape detection until the damage is extreme. For the people who live in the islands or mainland, there will always be questions of resource use and protection. In addition, social priorities may delay any response to the pest plant issue. Given our experience in Florida, it seems that the investigation of pest plants in the Caribbean is an ideal subject for educators, researchers, agencies, and others who have an interest in the health of the ecosystems and people of our nearest neighboring lands.

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Melaleuca leucadendron in All Pines, Belize

Melaleuca leucadendron near the Belize National Airport, Belize

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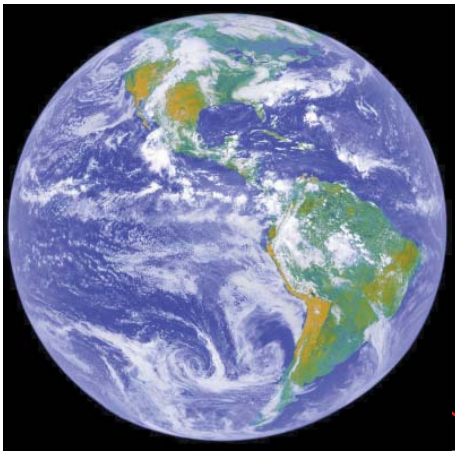


GPS and Surveying of Weed Populations

Equipment and Costs

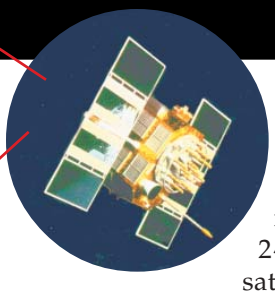
By: Pat Akers, Integrated Pest Control Branch, California Dept. of Food and Agriculture

Scott Park uses a GPS unit to measure a *Lygodium* infestation in the Big Cypress Seminole Indian Reservation in Florida. Photo by John Volin.

Nowadays most people are probably aware of the existence of the Global Positioning System, better known as GPS. Many know that it's useful for surveying, agriculture, mining, geology, navigating and locating objects on the earth. In fact, GPS has found many important uses in natural resource management, including the mapping of weed populations. This article describes the selection of GPS equipment for the mapping and management of weeds.

A Primer on How it Works

GPS has three major components. The first component is the GPS unit, which gives us access to the system. A GPS unit is a specialized radio receiver combined with electronics for filtering and calculations. The second major component is a set of 24 specialized satellites that the GPS receiver uses for calculating its position. The third component is a set of ground stations for tracking the satellites. Each satellite broadcasts several different sets of information, of which three are most important to our discussion: 1) a time signal, 2) information on the satellites' positions, and 3) a unique binary sequence code (C/A). By receiving the satellite signals, the GPS receiver can triangulate its position by calculating its distance from each satellite. *For an expanded description of different sets of information see www.cdfa.ca.gov/gps.*



Effects of the System on the Field User

The characteristics of the system have at least four major effects on its use in the field: 1) Ninety-five percent of the time, the system (itself) will estimate a position within about 22 meters of the true position. The Department of Defense adds an additional error signal to the system, degrading its accuracy to about 100 meters. This makes the accuracy of an expensive GPS about the same as a low-end model. 2)The receiver has to be able to lock onto at least four satellites in order to determine a position in three dimensions. 3) Trees, hills or buildings can obscure the satellite signals. 4) At times, the satellites will be clustered in one small part of the sky. Such an arrangement can seriously degrade the accuracy of the position calculations. Some GPS units will stop collecting data under such conditions, and all you can do is wait 20-40 minutes until the satellites move into a better arrangement.

Choosing a GPS Unit: Juggling Needs

The selection of a GPS unit will strongly depend on the needs of the user. Examples of common user needs are:

1) Accuracy for navigation.
2) Accuracy for detailed mapping (with 2-3 meter accuracy being adequate).
3) Accuracy without having to remain on a single location for more than 1 second.
4) The GPS data must be easily transferred to a mapping program (Geographic Information System or GIS).
5) The ability to record specific descriptive information along with the positional data.
6) The unit should be as convenient to use as possible.
7) Costs should be kept as low as possible. Meeting different requirements affects the cost of the GPS solution.

Low-end Systems - The absolutely lowest cost option is one of the many sportsman GPS models on the market. Many of these units are highly sophisticated, very portable, offer a number of convenient bells and whistles, and cost less than $300, sometimes as little as $200. For example, both Garmin and Eagle manufacture 12-parallel-channel GPS units which have received good

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reviews from users. These systems are limited to 100 meter accuracy unless differentially corrected. Although many of these units describe themselves as "DGPS ready," an antenna and receiver for the correction data must be added separately. They also have limited capabilities to store GPS position information, especially descriptive data.

The next important improvement is the addition of differential correction capability. There are a lot of options, with lots of trade-offs. However, the issue is further complicated because Trimble's "mapping-quality" GPS units all provide essentially a complete mapping package, including the ability to differentially correct data using PPDGPS. Since there is almost a qualitative divide between them and other GPS systems, I will treat Trimble products separately.

Trimble vs. Everybody Else: "Mapping Grade" GPS systems - Trimble mapping products are expensive, but they provide mapping data with 0.5-3 meter accuracy, using a standard computer and Internet connection. Their system includes software (Pathfinder Office) that runs on the PC computer and provides a powerful and easy PPDGPS facility. The package provides reasonably flexible data entry capabilities, the ability to record information on line-type or area-type objects (instead of just points), and flexible integration with GIS systems.

Trimble has essentially two lines that depend on PPDGPS. 1) *Trimble's GeoExplorer* is a hand-held GPS that costs about $3500 with the battery pack. It provides 1-3 meter accuracy, differentially corrected. It has a fairly flexible data entry capability and it's controlled through a series of menus, but it has only 8 buttons on the keypad. Text data is entered by scrolling through the entire alphanumeric character set, which can be quite tedious. Fortunately, the data entry screens allow the creation of menus, which can often minimize the need to enter text. 2) *Trimble's Pathfinder Pro XL* has the GPS receiver mounted in a backpack, attached to a handheld datalogger, and its 8- or 12-channel GPS engine provides accuracy to less than a meter. Trimble no longer manufactures it, but it can often be found used. The updated versions of the ProXL are the ProXR and ProXRS, which integrate RTDGPS capability and provide accuracy down to 0.5 meters. They cost $9,000 to $12,000. The "ProX" line dataloggers provides better information about the GPS status than the GeoExplorer and they have full alphanumeric keypads. *For further discussion see www.cdfa.ca.gov/gps.*

And for Everybody Else: Real Time Differential GPS (RTDGPS) - RTDGPS has one big advantage over Post-Processed Differential GPS (PPDGPS): the corrected, high-accuracy results are available immediately in the field. This makes RTDGPS extremely useful for navigation, as its accuracy is 1-20 meters, depending on the quality of the receiver and the reference data. The major disadvantage of RTDGPS relative to PPDGPS is that the accurate results depend on remaining in contact with the reference station. Any locations recorded while out of contact will

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USDA researchers use GPS technology to track the progress of the country's first melaleuca biocontrol agent, *Oxyops vitiosa* in Florida.

have only 100 meter accuracy, and there will be no way to improve that accuracy, either in the field or the office (unless you also have PPDGPS capability, or want to stay on one location for an extended period of time so you can average the results). PPDGPS does not depend on remaining in contact with a reference station. RTDGPS is also somewhat less accurate than PPDGPS, but the difference is generally negligible for all but the most demanding applications. In the past, RTDGPS had other disadvantages having to do with the complexity and expense of implementing RTDGPS relative to PPDGPS, especially for implementing the most dependable solutions. However, as with most emerging technologies, costs continue to drop and performance improves. In the last year or so RTDGPS solutions have begun to appear that approach the cost-effectiveness and dependability of Trimble units.

The major variable in the cost vs. dependability equation of RTDGPS is the choice of the source for the differential correction data. For most of us, there are three major sources for correction data: 1) commercial broadcasts on FM wavelengths, using transmission facilities of normal commercial radio, 2) commercial broadcasts from geosynchronous satellites, and 3) government broadcasts from specialized Coast Guard DGPS transmitters called "Beacons." As you might expect, there are trade-offs between cost, convenience, and capability for these different options. *For a more complete discussion of sources for data correction see www.cdfa.ca.gov/gps*

Mix and Match - There are two other trends that can affect the choice of a system. First, RTDGPS has such overpowering advantages that manufacturers are integrating RTDGPS receivers with GPS receivers in their higher-end systems. For example, *Trimble's ProXL* has been replaced by the ProXR, which incorporates a Beacon receiver, and the ProXRS, which incorporates both a Beacon and satellite receiver. The other trend is to turn a computer or other equipment into a GPS system. For instance, TeleType produces a small GPS sensor, without any readout whatsoever, that can plug into the PC port of a laptop computer and turn it into a GPS unit. Including software to allow viewing of the results against a background map, it costs about $850. At CDFA, we are about to evaluate a similar system. It combines a Racal Navigator 2-meter accuracy DGPS sensor (which is a Trimble 8-channel GPS receiver integrated with Racal's DGPS correction receiver), a handheld Windows CE computer, and datalogging/GPS/mapping software to create a complete datalogging RTDGPS system, which should also provide a moving map for navigation purposes. The sensor costs about $2800, the handheld computer about $600, the software about $700, and various costs for cables, battery, and pack bring the total cost to $4500, which includes one year of the satellite DGPS subscription service. This competes in cost with the GeoExplorer, yet provides real-time differential GPS in the field for excellent navigation (especially with the moving map), robust satellite service, and a very convenient and flexible data entry system.

What's a Poor Mapper to Do?

If you are trying to get into GPS mapping of weeds, the first step is to

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General GPS Web Sites

www.navcen.uscg.mil/dgps –The Coast Guard site for DGPS
www.fs.fed.us/database/gps/ USFS -GPS Page, especially good for access to Trimble Base Station sites
ftp://ftp.trimble.com/pub/cbsfiles/-Trimble's base station files from Sunnyvale, CA
www.fs.fed.us/database/gps/eureka.htm -USFS Eureka, California GPS base station
www.cnde.iastate.edu/staff/swormley/gps/dgps.html -Sam Wormley's DGPS explanations
www.qualityeng.co.uk/gpstutor -GPS Tutor: fairly detailed treatment
vancouver-webpages.com/pub/peter/index.html - Peter Bennett's GPS and NMEA Site
www.geo.swt.edu/reference/Gps.html -GPS LINKS
www.gislinx.com/GPS_Sites/ - Gateway site for links to many GPS and GIS issues
www.utexas.edu/depts/grg/gcraft/notes/gps/gps.html –GPS overview
www.trimble.com/gps/index.htm –Trimble GPS overview

GPS "General Stores"

www.navtechgps.com -Navtech GPS Store
www.cansel.ca –Cansel: sales and rentals GPS and surveying equipment
www.geowarehouse.com -Geowarehouse
www.nvlt.com/index.html -NVLT GPS Receivers and Satellite Communication Products

Mapping and Surveying Grade GPS Manufacturers

www.trimble.com -Trimble GPS Solutions
www.cmtinc.com-Corvallis Microtechnology, Inc
www.satloc.com/index.stm -Satloc: especially for agricultural applications, but also mapping
www.ashtech.com -Ashtech, now merged with Magellan
www.topcon.com –Topcon, mostly surveying

Consumer-grade GPS Manufacturers (including Beacon RTDGPS receivers)

www.eaglegps.com -Eagle Electronics
www.garmin.com -Garmin GPS products
www.magellangps.com -Magellan GPS products

Vendors of FM RTDGPS receivers and services

www.accqpoint.com -ACCQPOINT Communications Corporation
www.dgps.com -DCI's DGPS and TMC Services

Vendors of Satellite RTDGPS receivers and services

www.omnistar.com -OmniStar
www.racal-landstar-usa.com
www.racal-landstar.com -Racal LandStar

Post-Processing DGPS Software

www.geotronics.se:81/gpssoft.shtml - Geotracer System 2000

establish your priorities, including cost. Your budget will determine whether you can afford differential correction and flexible data entry and manipulation. Also consider where you work. If you work within range of the Coast Guard Beacons, this is definitely an option to consider carefully. A simple sportsman model GPS with an added consumer-level Beacon receiver (accurate to 4-12 meters) would not cost much more than $600 total. For another $1100-1500 you could add flexible data entry, by interfacing a Beacon-based RTDGPS sensor with a consumer handheld computer and appropriate software. If you work beyond the range of the Beacons but have a higher budget, *Trimble's GeoExplorer* provides data entry flexibility, good accuracy for mapping via PPDGPS, and no continuing subscription costs. If you can afford an additional $800 per year above the cost of a GeoExplorer, then a handheld computer system interfaced with a satellite-based RTDGPS will give you accurate navigation, very convenient data entry, and the freedom of satellite RTDGPS. If you cannot afford differential correction, probably greater overall accuracy can be achieved with careful marking of 7.5 min USGS topographic quads in the field, rather than GPS. Finally, remember that GPS is an emerging technology. If you can't afford what you want now, in a year or two it might be available.

Improving the Accuracy of the GPS System: Differential Correction

Most of us would probably wish to locate a weed to better than 100 meters, or even 20 meters. There are several ways of improving the accuracy of the GPS system, but the one that presently offers the best combination of speed, convenience, cost, and dependability is called differential correction, or differential GPS (DGPS). It is not the most accurate, but will provide 0.5 -10 meter accuracy with one second of data, depending on the quality of the GPS receiver. Even the better sportsman models routinely provide 2-5 meter accuracy using differential correction. One to three meters of accuracy has proved adequate for our needs at CDFA, and DGPS has so many other advantages over more accurate approaches that we have never implemented them.

DGPS works on a simple principle. One unit is stationary, at a known location, and acts as a reference base station. The base station unit knows its true location, but continues to calculate its position according to the information it receives from the GPS satellites. The difference between the calculated position and the true position provides an accurate estimate of the errors in the calculated measurement, at the time of the measurement. This estimate of the error can then be applied to the position calculations made at the same time by any GPS unit nearby (called the mobile or rover unit), even if it is moving. For many applications, "nearby" can be anywhere up to 200 miles.

There are two major methods whereby differential corrections can be applied to the measurements made by a mobile unit. 1) **Post-Processed DGPS (PPDGPS):** The position measurements are stored in the mobile GPS and later downloaded to a computer. The correction measurements from the reference GPS are also downloaded into the computer, and then specialized

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software applies the corrections to the measurements made by the mobile unit. 2) **Real-Time DGPS (RTDGPS):** The correction measurements from the reference GPS are sent to the mobile GPS (almost always by radio), and the corrections are applied to the position measurements a split second after they are made. The mobile GPS unit must have the necessary software and circuitry to apply the corrections to the mobile GPS position measurements, but this capability is now common in modern GPS units, even many sportsman models. Such models use phrases such as "DGPS ready" to describe themselves. A separate antenna and receiver must be added to the GPS unit so it can receive the broadcasts from the reference station. In addition, in many cases access to the reference station signals is sold as a separate service. In high-end professional GPS units, integrated receivers for the reference stations are becoming more common.

Pat Akers is a Agricultural Biologist with the Integrated Pest Control Branch, California Department of Food and Agriculture, pakers@cdfa.ca.gov

NAEPPC Meets at Natural Areas Association Conference

Brian Bowen,
SE-EPPC Coordinator

The National Association of the Exotic Pest Plant Council met on October 13 in conjunction with the 26th Annual Natural Areas Conference in Tucson, AZ. The meeting was well-attended with representatives from CalEPPC, FLEPPC, TN-EPPC, KY-EPPC (forming) and Mid Atlantic-EPPC (MA-EPPC). The Pacific Northwest EPPC was unable to attend. A brief overview was given by Brian Bowen regarding the history of NAEPPC. There was a discussion of the MOU signed by FLEPPC, CALEPPC, PACNWEPPC, and TN-EPPC at Asilomar, California in 1995 which established NAEPPC. Brian Bowen of TN-EPPC, John Randall and Nelroy Jackson, both of CALEPPC who were present a this meeting, also helped draft the 1995 MOU. John Randall suggested that the MOU be updated. Nelroy Jackson, who was the original transcriber, agreed to work on updating it. Brian and John agreed to review the changes. The MOU will then be sent to all of the respective EPPC boards for approval.

Some noteworthy changes include updating the MOU to add the newly-formed Councils. This may also include organizations interested in participating in the NAEPPC even though they are not an EPPC formally by name, ie., the New York Invasive Plant Council. All participating organizations however will be required to subscribe to the EPPC mission and its goals. The MOU will clearly state that EPPC's purpose pertains to natural area and wildland weed issues. It was

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also suggested that SE-EPPC have individual state chapter representation to NAEPPC, instead of a single SE-EPPC representative.

Another important topic of discussion pertained to completing the EPPC patent that Florida EPPC began working on last year. A renewed effort will be made, perhaps enlisting the help of KY-EPPC, who may have useful legal connections. NAEPPC will hold the patent and will have the authority to determine who can use the name. This concern is based on very non-eppc like groups forming with very different purposes, using the name, and undermining EPPC's credibility. Once again, this is very much about keeping EPPC's original purpose in tact as the only the non-governmental organization whose primary focus is natural area or wildland weed issues.

NAEPPC voted to support Brian Bowen's nomination to the National Invasive Species Advisory Committee. This Committee will advise the National Invasive Species Council whose charge under the President's Executive Order is to help shape national policy on invasive exotic species issues. The Invasive Species Council is required to oversee the completion of a national management plan by August 2000. Brian was also nominated to represent the Natural Areas Association, where he serves as a board member and chair of the exotic species committee. Jil Swearingen agreed to write the support letter for NAEPPC. Other EPPC support letters were sent by FLEPPC, TN-EPPC, and SE-EPPC.

As the last order of business, Jil Swearingen of MA-EPPC was elected chair person for NAEPPC. Her responsibilities entail setting the agenda and organizing next year's NAEPPC meeting at the Natural Areas Conference in St. Louis, MO. The NAEPPC meeting adjourned after approximately two and half hours of productive work (see minutes on SE-EPPC's web page for more information, www.se-eppc.org).

-Brain Bowen is the Southeast EPPC Coordinator and founding member of Tennessee EPPC and the National Association of Exotic Pest Plant Councils. He can be reached via e-mail at: nighttrain0@ home.com.

SE-EPPC President's Message

Dan Brown, SE-EPPC President

A friend told me this short story several years ago. It is still one of my favorites: Two newborn babies are lying in adjacent cribs. They are facing each other; and they appear to look at each other and smile. Time passes. Eighty years later, the same two people meet once again. They are in adjacent hospital beds, and they both are near death. Their eyes meet; they smile; and one says to the other: "Well, what did you think?"

Now, you may be thinking: "Brown obviously doesn't have a president's message, because he's starting out with some off-the-hospital wall short story."

Here's my point: SE-EPPC is new. A lot of changes are going to happen around us - involving us, and exotic invasive plants - over the next few years. During our early years of growth, we (SE-EPPC) can have a lot of impact on what those changes are. Take a look at our objectives: We're basically saying that we want to make the public more knowledgeable about invasive exotic plants. We want them to know how seriously these plants can spread and take over areas and even choke-out the native plants. We want them to know how to control these exotics...and we want them to know more about growing native plants.

So, what are some good ways to accomplish these objectives? If you were (or are) a land owner or land manager, what would you want to know about these exotic pests? Think about it. Talk to other members; talk to the public. Let me, or the other officers, or board members know what you're thinking - new publications, workshops, ways to increase membership, newsletter topics, whatever! We can use your ideas to develop important, practical activities and products relating to our objectives. We're a new organization. You, the members, have a tremendous amount of knowledge and expertise relating to exotic pest plants, and to native plants. Let's use that knowledge and expertise to make a positive difference for the Southeastern environment - and beyond.

...and then in the not too distant future, when someone asks you what you think of SE-EPPC; you can say: ".....!"

-Dan Brown is the President of the Southeast Exotic Pest Plant Council. He can be reached via e-mail at: Mtnrr@ aol.com.

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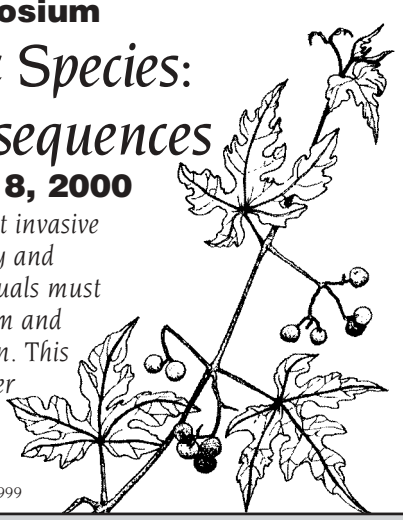
Annual Symposium

Invasive Exotic Species: Truth and Consequences

March 16, 17, 18, 2000

The level of awareness of the negative effects that invasive exotic plants have on the environment, economy and human health is increasing. Concerned individuals must sustain and expand this educational momentum and strive to reduce the threats of biological pollution. This Symposium is a key forum for bringing together individuals from diverse backgrounds and perspectives to help meet this challenge.



Ampelopsis brevipedunculata, porcelain berry by Sandra Brooks-Mathers 1999

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A print-out registration form and conference information can also be found on the web
www.unc.edu/depts/ncbg

Internodes

Maui Invasive Species Committee Hires 'SWAT TEAM'

The Hawaiian Islands are home of some of the world's most unique biological diversity, yet the 50th state also has the highest number of endangered species for the United States. Among the many threats to these endemic plants and animals (found nowhere else on earth!), are invasive species brought from all corners of the globe. An under-funded State Department of Agriculture has its hands full trying to limit new serious introductions and looks forward to developing technologies that will aid them in this huge task. But in the meantime, how does Hawaii prevent incipient invaders from establishing beyond control?

Help is on the way! While tackling harmful alien species on all of the islands may be overwhelming, the islands of Maui County have organized to set a precedent for others to follow. Over the years, good relations among various conservation agencies has led to effective partnerships that identify common goals for the overall protection of Maui's natural areas. More recently, these partnerships have culminated in the formation of the Maui Invasive Species Committee (MISC).

MISC has interested parties from not only conservation and local government, but the private and business sector as well. The committee expanded its focus of simply preventing invasives' impact on conservation areas, to include threats to economy, health, and quality of life. Hard work from dedicated individuals resulted in funding from a large pool of stakeholders, and this formed the operating budget to execute this year's MISC Action Plan.

This Action Plan prioritizes the worst plant and animal pests that are currently at the beginning stages of becoming established in Maui County. Research has shown these target species to have severe impact in ecosystems similar to Maui's; it's anticipated (through a system of scientific criteria) that they will wreak havoc if they're allowed to become established in Maui County. While eradication is a noble goal for many of these alien threats, the value of immediate containment is also recognized.

The newly hired MISC field crew will perform the real 'on the ground' work to halt the establishment of targeted species. Their duties include surveying, mapping, control, data tracking, landowner interaction, and public outreach and education. After recently taking this crew out on 'scout and control' missions for *Miconia* (Hawaii's worst incipient weed), I am happy to report that the able-bodied 'SWAT Team' will prove their determination to rid Maui of these unwanted pests. -Pat Bily, The Nature Conservancy of Hawaii , pbily@tnc.org.

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The "Witch Doctor" is out to pasture

Dr. Robert E. (Bob) Eplee, dubbed the "Witch Doctor" for his many years of service to the witchweed eradication program retired from the USDA on December 31, 1999. Bob is a native of McDowell County, NC. He received a B.S. (and he's good at it) from Berea College in Kentucky, a M.S. from the University of Kentucky and Ph.D. from North Carolina State University. He was an Extension Agent in Kentucky from 1957-1962, a lead scientist and Director of the Witchweed/Whiteville Methods Development Center, USDA, ARS from 1965-1995, and has been with USDA, APHIS/PPQ since 1999.

Many of us know Bob for his longtime involvement in weed science. He served as primary liaison with the Weed Science Society of America (WSSA) toward passage of the Federal Noxious Weed Act of 1974. In the 1970s he worked with the University of Florida and the Imperial Valley in California to develop hydrilla control methods (hiring the young rising star, Randall Stocker to develop triploid white amur in CA). In the 1980s he worked with state agencies and universities to eradicate several Federal Noxious Weeds, including crupina, goatsrhue, wormleaf salsoa, broomrape,

and itchgrass. He was named Weed Science Fellow by the WSSA in 1993. Most recently, many of us have worked with Bob or are familiar with his efforts on tropical soda apple, wetland nightshade, and redrice eradication, participation on the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, and contributions to the OTA Report on Harmful Non-indigenous Species and the Executive Order on Invasive Species.

For Bob Eplee's ambition and accomplishments in solving invasive/noxious weed problems we owe a debt of gratitude. And although he is officially retired I don't think we've heard the last of him, as he slipped while I was talking to him on the telephone that he was "fixing up an office in the back of the lab." Keep in touch, Bob.

– Ken Langeland.

IFAS Circular 1204, "Help Protect Florida's Natural Areas From Non-Native Invasive Plants" has been updated to reflect species that were added to the DACS Noxious Weed List in 1999. Multiple copies are available free to EPPC members from the IFAS Center for Aquatic and Invasive Plants. If you would like to obtain copies to hand out at meetings where they can be used for public education please contact us at 352/392-9613/1799 or kpb@gnv.ifas.ufl.edu.

Mark Your Calendar

Florida Federation of Garden Clubs Blossoms and Butterflies Conference. Winter Park, FL. **March 14-16.** Contact Caron Beatty 904/241-1563.

Southeast Exotic Pest Plant Council Annual Meeting. North Carolina Botanical Garden, Chapel Hill. **March 16-18.** Contact: John Randall jrandall@email.unc.edu.

Association of Southeastern Biologists Annual Meeting. University of Tennessee, Chatanooga. **April 5-8.** Contact Patricia Dreyer 423/576-8123 or see http://am.appstate.edu/top/dept/biology/asb/.

BES/ESA 2000: A Joint Meeting of the British Ecological Society and the Ecological Society of America. Orlando, FL. **April 9-13.** Contact ESA 202/833-8773, esahq@esa.org or see http://esa.sdsc.edu.

Sixth International Conference on Remote Sensing for Marine and Coastal Environments. Charleston, South Carolina. **May 1-3**. (A pre-conference workshop will address the uses of GPS and geographic information systems technologies for natural resource management.) Contact: Nancy Wallman, PO Box 134008, Ann Arbor, Michigan 48113-4008, (734) 994-1200, wallman@erim-int.com, www.erim-int.com/CONF/marine/MARINE.html.

Florida Native Plant Society Annual meeting, Miami Florida. **May 4-7.** Contact: Keith Bradley 305/644-0452, conference@ fnps.org.

Ecosystems Restoration and Creation (formerly Annual Conference on Wetlands Creation). Hillsborough Community College, Tampa, FL. **May 11-12.** Contact: Frederick J Webb 813/757-2148, webb@mail.hcc.cc.fl.us.

Florida Exotic Pest Plant Council 15th Annual Symposium. Westin Beach Resort, Key Largo, FL. **May 16-18.** Contact: Ken Langeland 352/392-9614, kal@gnv.ifas.ufl.edu.

Third International Weed Science Congress. Foz do Iguassu, Parana, Brazil. **June 6-11.** Contact: P. J. Eventos 55/41/372-1177, pj@datasoft.com.br, http://www.sercomtel.com.br/ice/plantas

International Meeting for the Society of Conservation Biology. University of Montana, Missoula. **June 9-12.** Contact Fred Allendorf 406/243-4184, darwin@selway.umt.edu, http://conbio.rice.edu/scb/announcemts/2000meeting.shtml.

40th Annual and International Meeting, Aquatic Plant Management Society. Handerly Hotel and Resort, San Diego CA. **July 16-20.** Contact Jim Schmidt 800/558-5106, jimschmidt@appliedbiochemists.com.

85th Annual Meeting of the Ecological Society of America. Snowbird Utah. **August 6-10.** Contact ESA 202/833-8773, esahq@esa.org or see http://esa.sdsc.edu.

International Conference of the Society for Ecologial Restoraton. Liverpool England. **September 4-9**. Contact: SER 608/265-8557, ser@macc.wisc.edu, http://www.ser.org.

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