

COASTAL CONNECTIONS



VOLUME 3, ISSUE 6

A BIMONTHLY PUBLICATION FOCUSED ON TOOLS FOR COASTAL RESOURCE MANAGERS

DECEMBER 2005 / JANUARY 2006

COASTAL MANAGEMENT PROFILE



Cathy J. Sakas
Education Coordinator,
Gray's Reef National
Marine Sanctuary

Hometown: Savannah, Georgia (born in Portsmouth, Virginia)

Education: B.S. in biology and M. Ed. in science, both from Armstrong Atlantic State University in Savannah, Georgia

Most fulfilling aspect of your job:

Taking scientific research, explorations, and data sets and transforming them into materials that a classroom teacher can use and into understandable language for the general public.

Most challenging aspect of your job:

Choosing among so many wonderful opportunities and projects. I want to do them all!

One work-related accomplishment you're proud of: Completing a feature-length film on the

Continued on Page 2

THIS ISSUE'S FOCUS

THE GLOBAL POSITIONING SYSTEM (GPS)

What Is the Global Positioning System?

The Global Positioning System (GPS) is a satellite-based radio navigation system first developed and operated by the U.S. Department of Defense. The system allows users to estimate or measure a position anywhere on the Earth's surface.

GPS receivers acquire the latitude, longitude, and altitude of their position by determining the length of time it takes for radio signals from orbiting satellites to reach the receivers.

For coastal resource managers, this technology provides data for tasks where location information is important—including marking boundaries, mapping shorelines, monitoring erosion, assisting with dock permitting and other management plans, and tracking endangered animals.

How Does It Work?

A GPS receiver uses radio signals from multiple satellites to determine its location on the surface of the Earth. When a receiver is turned on, it searches for any of the GPS satellites located above the horizon. After the first of four required satellites is found, the receiver begins to collect data. GPS signals are available on any day, at any time, from any location, and in most weather conditions. (For more information, see the graphic on page 2.)

Some Purchasing Considerations

GPS has been around since 1978, but it is only in the past several years that prices have come down enough to make this technology affordable for most state coastal programs.

There are a wide range of options and costs associated with GPS. Study area locations, project needs, and accuracy requirements will determine which options are best suited for each organization. The following lists some points to consider before making this important purchase.

- **Number of channels** – The number of channels in a receiver determines how many satellites can be read at once.
- **Data processing** – Is it important to get accurate data while in the field? Or will taking the data back to the office to process suffice? In-the-field processing units can cost up to three times more.
- **Data-logging capabilities** – If you are going to use these data in a geographic information system (GIS), you will need the ability to log descriptive information.

Continued on Page 2

Profile continued from Page 1

watershed that affects Gray's Reef.

One personal accomplishment you're proud of: Creating two five-part nature series for Georgia Public Television.

Things you do in your spare time: Spending as much time in the great outdoors as possible by as many means as possible. I also play a guitar, ukulele, and a baritone ukulele and sing in a band.

Family: My husband of eight years is Christopher Morris (who is an electronics engineer). We met in college, but it took him 25 years to get up enough nerve to ask me out. It worked! At present we have no children and no pets.

Favorite movie: O Brother, Where Art Thou?

In your CD player right now: Los Lonely Boys, Alison Kraus, Mozart, Dusty Springfield, Led Zeppelin, Vivaldi, Eric Clapton, Heart, Fleetwood Mac, Frog Calls of Georgia (I'm not kidding!)

"I really enjoy being and doing anything outside. For the first 26 years of my career, I led wilderness environmental trips all over the southeastern U.S., Caribbean, and Central America. It was like being on vacation most of the time. When the opportunity came up to work at Gray's Reef, I jumped at the chance. It was an excellent career move, since I can now utilize my talents to reach a lot more people on behalf of the oceans and reefs. Through my work within NOAA, I have become a submersible pilot and an aquanaut."

The Global Positioning System (GPS) continued from Page 1

- **Recreational-grade receivers** – These receivers produce 10 to 20 meters in accuracy. They are usually the lowest in cost and are used only for activities such as camping, hiking, and boating. Generally, they do not provide a connection to a computer, and positions cannot be easily downloaded to other software packages.
 - **Mapping-grade receivers** – These units are diverse in price, features, and applications. They can obtain 1 to 10 meters in accuracy and utilize the differential correction method—the process by which GPS positions are corrected for errors. They are able to record data in wooded or obstructed areas.
 - **Survey-grade receivers** – These are the most expensive receivers and can determine positions within two inches of accuracy. These receivers need specific situations for data collection, require an unobstructed view of the sky, and take a longer time to collect data at each position than mapping-grade receivers.
- Other considerations include power source options, antenna configuration, software compatibility, memory capabilities, and the ability of the unit to weather various natural elements such as rain, salt water, dust, and sand.

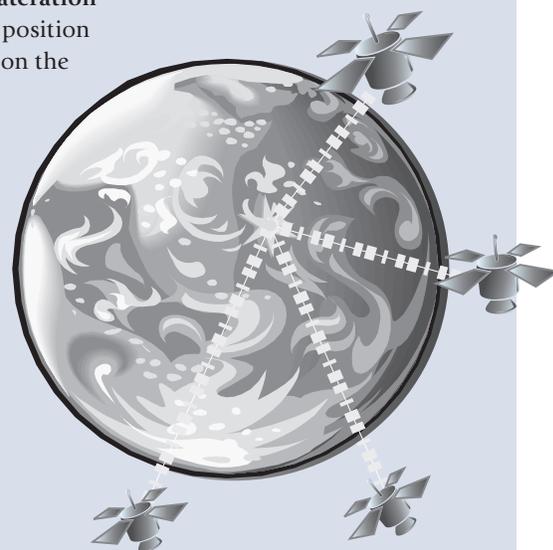
GLOBAL POSITIONING SYSTEM (GPS) *BASICS*

GPS equipment relies on a simple mathematical principle called **trilateration** to determine a three-dimensional position (latitude, longitude, and altitude) on the surface of the Earth.

GPS equipment must first receive a radio signal from four or more GPS satellites, which explains where the term **GPS receiver** comes from. Each radio signal includes the satellite's location and the precise time the signal left the satellite.

By timing how long it takes each signal to arrive, the GPS receiver can determine the distance to each satellite.

Once the distance to each satellite is known, the GPS receiver uses mathematical formulas to "triangulate" its own horizontal and vertical position.



PROJECTS IN THE PACIFIC



GPS surveying on Saipan, CNMI

There are many reasons GPS is becoming commonplace in the coastal manager's toolbox. The following represents some examples from the Pacific Islands.

American Samoa

"The GPS project that we are trying to complete is the roads database," explains Troy D. Curry, GIS specialist, American Samoa Department of Commerce Coastal Zone Management Program. "We strap a Trimble ProXR onto a pickup truck and drive around mapping the roads, driveways, and parking lots of Tutuila. We have also mapped the other islands including Ta'u, Ofu, and Olosega. Information that we collect within a data dictionary includes the road surface [concrete, pavement, and dirt], road type [access drive, driveway, parking lot, road, or trail], and description [business name, government facility, area of interest, such as beach, scenic turnout, school, church, etc.]," adds Curry.

Northern Mariana Islands

"We used our office's Trimble unit to delineate wetlands," says

Hilary Stevens, NOAA Pacific Islands assistant [natural resource specialist], Commonwealth of the Northern Mariana Islands. "Our wetlands area of particular concern needed updating, so we field-checked a number of wetlands on Saipan, Tinian, and Rota. We are monitoring shoreline change in several areas of Saipan. This process involves lying transects across the beach at consistent locations. We are using our handheld GPS units to relocate starting points," adds Stevens.

Guam

"I assisted the Forestry Division under the Government of Guam's Department of Agriculture to GPS an unpermitted clearing in the limestone forest of Guam in the northern end of the island," says Victor R.H. Torres, GIS manager, Guam Coastal Management Program. "The data will be used to determine the area [that has been] destroyed, which is part of the formula in estimating the appropriate fines from the violator," adds Torres.

NEED MORE INFORMATION?



The National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center offers GPS training in combination with several of its technology courses, such as Coastal Applications Using ArcGIS: Overview of GPS—and Coastal Applications Using ArcGIS: GPS Data Integration.

In addition, the NOAA Pacific Services Center has written a guidebook for coastal and ocean resource managers in the Pacific Islands who are considering investing in GPS technology. While the guidebook includes information about special considerations for the Pacific, the general information about purchasing decisions is applicable to those on the mainland as well. Please e-mail Adam.Stein@noaa.gov to request a copy of the guidebook, or visit www.csc.noaa.gov/training/ to get information about the courses.

Coastal Connections is a publication of the National Oceanic and Atmospheric Administration Coastal Services Center, produced for the coastal resource management community. Each issue of this free bimonthly newsletter focuses on a tool, information resource, or methodology of interest to the nation's coastal resource managers.

Please send us your questions and suggestions for future editions. To subscribe or contribute to the newsletter, contact our editors at

Coastal Connections
NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston,
South Carolina 29405
(843) 740-1200
CoastalConnections@noaa.gov
www.csc.noaa.gov/newsletter/

Editor:

Elliot Shapiro

Communications Director:

Donna McCaskill

Current Events Editor:

Hanna Goss

Copy Editor:

Gerald Esch

Graphic Designer:

Frank Ruopoli

NOAA/CSC/20512-PUB

This paper is made with 100% recycled fiber and contains at least 25% post-consumer waste.

NEWS AND NOTES

NOAA Announces New Program on Columbia River

The Columbia River has become the 13th waterway in the U.S. to install the Physical Oceanographic Real-Time System (PORTS) for the benefit of the maritime community. Users of these data include mariners, port authorities, recreational boaters, fishermen, and surfers. For more information and to visit other PORTS data sites, click on http://tidesandcurrents.noaa.gov/d_ports.html.

Minnesota Sea Grant Celebrates 30 Years of Superior Science

One of 30 Sea Grant programs across the country, Minnesota Sea Grant began in 1975 at the University of Minnesota Duluth. Currently, Minnesota Sea Grant is training shoreline property owners in stewardship techniques, linking the campus with the Great Lakes Aquarium, offering fellowships to graduate students working on aquatic research projects, and funding fish genetics research that could apply to human health conditions. For more information, visit www.seagrant.umn.edu.

National Marine Sanctuary Program Launches Encyclopedia of Marine Life

An on-line encyclopedia of the marine life found in U.S. oceans and the Great Lakes is now available at the Encyclopedia of the Sanctuary Web site. The site features photos, streaming video, and facts about animals found in the NOAA sanctuaries. More information can be found at <http://marinelife.noaa.gov/>.

Transitions

Several position changes have recently occurred at NOAA. **Dr. Rick Spinrad**, former assistant administrator for Ocean Services and Coastal Zone Management, National Ocean Service (NOS), has been named the new assistant administrator for the NOAA Office of Oceanic and Atmospheric Research (OAR). **Charlie Challstrom** has been named acting assistant administrator for the NOS. **Dr. Jack Hayes** has been named deputy assistant administrator for OAR. **Capt. Craig McLean** has been named acting deputy assistant administrator for NOS.

Katherine "Kacky" Andrews has been named executive director of the Coastal States Organization.

NOAA Coastal Services Center
2234 South Hobson Avenue
Charleston, South Carolina 29405

PRST STD
POSTAGE & FEES PAID
NOAA COASTAL
SERVICES CENTER
PERMIT NO. G-19

