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## NW Florida SWIM 5

Water managers in Northwest Florida completed development on Surface Water Improvement and Management plans for all the major riverine and estuarine watersheds in the region.

## Free-flowing Ocklawaha 6

A University of Florida study concluded that a free-flowing Ocklawaha River would produce greater economic opportunity along the waterway.

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NOAA could more accurately characterize storm surge in the future thanks to data collected from gauges installed before hurricanes make landfall.

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A North Carolina chemical plant's accidental discharge of polyfluorinated compounds into the Cape Fear River has sparked the need for regulatory action at state and national levels.

## Solar momentum 12

Florida power providers are finally beginning to change the state's energy profile by replacing fossil fuel generation with solar farms. Over the next five years, Florida is expected to install about 5,300 megawatts of new solar capacity.

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### Got a story lead?

Got an idea for a story? Like to submit a column for consideration? Fire when ready. And don't forget to fill us in on your organization's new people and programs, projects and technologies—anything of interest to environmental professionals in Florida. Send to P.O. Box 2175, Goldenrod, FL 32733. Call us at (407) 671-7777; fax us at (407) 671-7757, or email [mreast@enviro-net.com](mailto:mreast@enviro-net.com).

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Photo courtesy of Navocean Inc.

Ethan Artunian uses an iPad to operate Navocean's Nav2 sailboat, an autonomous surface vehicle. In addition to allowing manual or autonomous operation, satellite communication provides real-time sensor and navigation data collection. See story below.

## Community deals with proposed solid waste facility

By **BLANCHE HARDY, PG**

The Wedgewood community of Pensacola, located just off Interstate 10 northwest of the city proper, is a long-standing neighborhood of roughly 270 homes.

Most residents own their own homes, many of which have been passed down through generations. It is a quiet, middle-class African-American community.

Over time, a dozen landfills, borrow pits and recycling facilities have surrounded the once idyllic community. And now, another one is seeking permission to open.

Wedgewood residents have long complained of chronic health issues due to the operation of these solid waste facilities. The local community has fought the pits and landfills for years with only marginal success.

In July 2014, residents arranged for local officials and representatives of the media to tour the community to observe the impacts of the surrounding solid waste operations on the community and to get a nose full of the permeating odors from operations there. The visitors were affected.

Shortly after the tour, a health alert was issued due to elevated levels of hydrogen sulfide near the Rolling Hills facility, among the more notable violations.

**WEDGEWOOD**  
Continued on Page 16

## PEER blasts DEP for failures made during petroleum cleanup program revamp

By **ROY LAUGHLIN**

In a white paper released in January, Florida Public Employees for Environmental Responsibility provided an extensive and well-documented critique of the Florida Department of Environmental Protection's Petroleum Restoration Program, pointing out its substantial failures and shortcomings.

The report alleged a spectrum of program deficiencies over the past seven years including inept management, intimidation of DEP staff and a focus on cleaning up less contaminated sites that has delayed cleanup of more problematic sites.

The white paper questioned over \$500,000 in payments made to a Tallahassee law firm to handle three prominent fraud cases that the department's own legal staff could have handled, the continuing reduction in enforcement actions and penalty payment collections, and the prolonged and annually increasing diversion of petroleum cleanup trust fund dollars by the state Legislature.

These problems have occurred throughout Gov. Rick Scott's two terms, but the white paper laid the blame on both the governor and the Florida Legislature.

For purposes of clarity, this article refers to DEP's petroleum cleanup pro-

gram as its current iteration as the state Petroleum Restoration Program.

### False claims justified reforms

DEP's top management, beginning with Sec. Hershel T. Vinyard, Jr., failed to properly oversee the program since Scott's first term, according to the white paper.

A March, 2013, report to Vinyard from DEP Inspector General Candie Fuller discussed a number of irregularities in program administration.

The Office of Inspector General re-

port was used as one justification for the complete revamp of DEP's petroleum cleanup program, resulting in the establishment of the PRP in its present form.

Irregularities cited in the OIG report covered a broad spectrum of PRP activities, from contract administration within the department, to alleged kick-back schemes by contractors, to a lack

**PEER**  
Continued on Page 13

## Robotic sailboat makes useful oceanographic research tool

By **ROY LAUGHLIN**

This winter, Jordon Beckler, PhD, program manager of ocean technology research at Mote Marine Laboratory and Aquarium in Sarasota, collaborated with engineer and ship builder Navocean Inc. to test a two-meter autonomous surface vehicle, or ASV, sailboat as a monitoring instrument platform for oceanographic research.

Beckler, who has been studying red tide responses to nutrient dynamics, represents the research-user side of the collaboration.

In Florida, late fall and winter is the

most active time for red tide blooms along Florida's Gulf Coast.

In December, Scott Duncan, Navocean's owner and chief designer, along with Ethan Artunian, a software engineer with the firm, demonstrated a beach-launch and prototype test of Navocean's Nav2 ASV in nearshore waters off Punta Gorda.

The 6.5-foot, 85-pound vessel looks more like a model RC sailboat than a serious research instrument. But appearances can deceive.

With its 85-pound weight, 25-pound

**ASV**  
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# USGS installs storm-tide sensors along Gulf Coast to more accurately characterize storm surge

By ROY LAUGHLIN

In order to be better prepared for hurricanes in the future, the National Oceanic and Atmospheric Administration added storm surge predictions to their hurricane forecasts based on recently developed models.

Late last year, the U.S. Geological Survey took another step to more accurately characterize storm surge. Scientists installed temporary storm surge gauges when Hurricane Nate landed along the coast of Mississippi.

Under assignment from the Federal

Emergency Management Agency, USGS investigators installed 60 storm-tide sensors from Louisiana to Florida, 20 in Florida, 20 in Alabama, and 28 in Louisiana.

The gauges are autonomous, self-powered instruments that look like 1.5-inch diameter aluminum pipes strapped to pilings. Inside the pipe is a water level pressure sensor. The sensor also measures barometric pressure.

Measurements can be taken every 30 seconds for up to three days. The device

stores the data and the sensor is retrieved after the storm subsides.

The sensors are designed so they can be placed within a day or so before a hurricane's landfall. They are asymmetrically spaced, 50 miles to the left of the storms expected landfall location, and 100 miles to the right of the projected path.

The sensors were installed during the week before Hurricane Nate—up to a day and a half before the storm made landfall.

They are not permanently placed, so they can be reused in subsequent storms at locations around expected landfalls.

The data collected are primarily for study and research. After sensor retrieval, data are uploaded as a time series of water level and water pressure measurements.

USGS' data message includes generation of three-dimensional water surface images, and depth and duration maps.

These are used to study surge flooding and wave height, and provide a minute-by-minute reconstruction of the surge's interaction with coastal features including beaches, islands, estuaries and streams.

USGS scientists are particularly interested in determining the rate that flood waters transfer through various water bodies and landforms, the primary path of surge penetration, surge duration and the height and frequency of waves striking dunes and engineered structures, especially infrastructure.

USGS noted that high resolution time series characterization of storm surge interacting with geographical features is rare up to this point.

The new data will help improve flood insurance maps and building codes, and further calibrate the accuracy of hurricane inundation models. More accurate models will improve flood forecasts and warnings, and advise evacuation plans.

## ASV

From Page 1

payload weight and 2.5-foot draft, Navocean's robotic sailboat can navigate anywhere from shallow coastal waters to open ocean.

Navocean and Mote Marine conducted two test cruises, one lasting two days and the other four days, to gain hands-on experience using the robotic sailboat for gathering data.

The cruises successfully employed a Turner Designs fluorometer to measure chlorophyll a and a colored dissolved organic matter detector.

The recent prototype tests showed that Navocean's sailboat was capable of char-

The USGS is making data from the sensors available online.

In early November, about a month after hurricane Nate crossed the Mississippi Gulf Coast, the USGS' site showed the location of the sensors on a GIS overlay map.

The simple data presentation indicated some counterintuitive occurrences.

For example, the highest water levels in Alabama were measured by sensors at the north end of Mobile Bay, miles from Gulf beaches.

The levels in the upper Mobile Bay were more than twice those measured at Mississippi's barrier islands south of Mobile.

"All of the USGS data from Hurricane Nate has been loaded into the Flood Event Viewer and was also sent to FEMA," said Jason Burton, public affairs specialist in the Eastern States Office of Communications at USGS.

"There are not any plans to do any analyses, interpretations, graphical presentations, etc. for this event, so what is currently available on the Flood Event Viewer is all that will be available," he noted.

The USGS site includes a download link for those wishing to do their own data analysis.

For future storms, if USGS scientists perform further data analysis, results will be available in the viewer.

The frequency of major hurricane landfalls is not increasing as quickly as the damage of the storm surge when these storms come close to the U.S.

For those storms that make landfall, storm surge damage covers a far larger area than high wind damage and persists longer. In many cases, flooding kills and injures more people than wind.

A more accurate storm surge model will be extremely useful to local governments that incorporate the findings into comprehensive plans and building codes.

acterizing bloom patchiness.

It could survey transects from Sanibel to Tampa in one day, using two sailboats launched at either end of the transect sailing towards one another.

The ASV is capable of surveying far shallower coastal waters than does Mote Marine's robotic submarine glider.

The sailboat and its detectors appear to have advantages and capabilities that other monitoring tools lack, but which can dovetail with them.

Beckler said that satellites can produce an image about once every five to seven days to indicate the possible presence of a red tide bloom, and spectral analysis can often accurately indicate red tide.

The sailboat could ground truth a larger area much faster than either stationary monitoring stations or MML's submarine glider.

Under sail, the boat can reach speeds of up to 2.5 knots and can add another 1.5 knots with assistance from its electric motor.

The boat is constructed using all of the current high-tech boating laminates and sail designs and materials.

The mainsail is a flat top main and the boat has a mast-top jib. The small boat possesses serious sailing capability—even before the research begins.

The Nav2 ASV may be operated manually or under full autonomous waypoint navigation software. Its dashboard features a web portal and Navigator 2017 iOS App, operated from an iPad.

The dashboard includes the usual navigation information such as location, speed, course, heading, wind characteristics, battery and solar panel voltage, sail and rotor position, propeller RPM and connectivity status.

Connectivity includes satellite, cell and Wi-Fi.

The Nav2 ASV currently can carry a 25-pound scientific instrument payload.

"The environmental sensors we have

## ASV

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# Studies: Personal care products modify microbial ecology in fresh water ecosystems

By ROY LAUGHLIN

A pair of recently-published research papers and a review paper show that personal care products, or PCPs, discharged to fresh waters from wastewater treatment plants significantly affect microbial communities in biofilms.

The research shows suppressed microbial respiration and photosynthesis, and marked shifts in taxonomic composition of bacteria in the biofilm.

The review paper illustrated that PCPs are responsible for a wide range of sublethal influences of individual organisms representing a broad taxonomic range. Those effects, in some cases, have community-level effects.

PCPs include cosmetics and their preservatives, antimicrobials in soaps and deodorants, and prescription and nonprescription medicines and antibiotics.

In two of the research papers, teams lead by Emma J. Rosi-Marshall, PhD, an aquatic biologist at the Cary Institute of Ecosystem Studies in New York, conducted experiments to assess the effects of some of the most commonly-found PCPs on microscopic algae and biofilm bacteria.

The products tested included caffeine, cimetidine, ciprofloxacin, diphenhydramine, metformin, ranitidine, and a mixture of them.

The researchers measured biofilm respiration suppression that varied from about 51 to 91 percent for ciprofloxacin, a potent antibiotic effective against *Pseudomonas*, often the dominant biofilm bacterium. Biomass decreased by up to 22 percent in these treatments.

In the second paper, researchers examined microbial biofilm community composition at four stations along a watershed that began at the headwaters of Gwynns Run, whose streambed is covered by urban Baltimore, MD.

Three other stations were located on a receiving stream that became increasingly

rural as it flowed away from downtown Baltimore.

Water sampling showed that the stations were on a gradient from multiple PCPs, some present at very high concentrations, to one with none or very low concentrations.

Urban Baltimore's Gwynns Run was heavily contaminated by multiple PCPs, as well as caffeine and morphine.

As in the first study, respiration of the biofilm community at each of the four sites was affected by PCP products tested in bioassays, but in a paradoxical way.

The most heavily contaminated site was affected the least by experimental exposure. Microbial community sensitivity to added PCPs increased downstream where communities had less exposure to the compounds before the experimental exposure.

This indicated that microbial communities, in this case, in the heavily contaminated Gwynn's Run, adapted to PCP exposure.

The review paper, published in January, 2018, was a synthesis of PCP research on individual species from eukaryotes to vertebrates.

The take-away message from the paper is that PCPs have demonstrated effects in bioassays and ecological community studies.

The paper discussed some of the terms of a new paradigm for PCP environmental effects.

Their innate biological activity is the reason they were synthesized and used in the first place. They are usually resistant to degradation both within the human body and in the environment, so they tend to pass through wastewater treatment plants and display environmental persistence.

Typically, PCPs and pharmaceuticals are not bioaccumulated to high levels. But much of their risk comes from a third characteristic explained in the paper—the con-

coming career progression. He will soon relocate from Mote Marine to Florida Atlantic University's Harbor Branch Oceanographic Institution in Ft. Pierce.

That move opens a different focus on harmful algal blooms that will not be limited to red tide research.

Beckler said it may well include the prospects for research that includes robotic sailboat-based data collection and monitoring.

The use of small robotic sailboats for environmental research in Florida is not common yet, but may be in the not-to-distant future.

tinual addition of these compounds to the environment causes persistent exposure to nanogram per liter concentrations. On this basis, the paper characterizes them as "pseudo-persistent."

Because of these characteristics, questions surrounding the biological impacts of PCPs remain largely unanswered.

The answers to those questions will become more evident as chronic effects are studied in long-term life cycle exposure experiments in the future.

In some cases, behavioral and biochemical studies have provided insight into biological effects.

Some of the studies have shown attenuation of biological responses at low exposures, a paradoxical dose-response termed hormesis.

The researchers pointed out that these compounds are used because their biological activity has therapeutic benefits—and yet the risks of biological effects on ecosystems, as opposed to the human body, are dismissed due to the low concentrations typically found in streams and lakes.

The author suggested that this perception that the therapeutic benefits of PCPs exceed the risks has led to a lack of concern for the environmental impacts of the compounds at federal and state regulatory agencies.

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## ASV From Page 8

on our vehicle now are a Turner Designs C.I. fluorometer measuring chromophoric (colored) dissolved organic materials, turbidity and chlorophyll," noted Navocean's Duncan.

In addition, it features an Airmar meteorological sensor that measures wind speed, wind direction, air temperature and barometric pressure.

The Nav2 can be outfitted with an optional conductivity/temperature sensor, he noted.

Turner Designs, which provides the fluorimeter, is a partner for instrument development for the sailboat platform.

Beckler said that the sailboat is an attempt to fill a niche for small boats in the robotic sailboat market.

He said that although other companies produce larger robotic sailboats to carry instruments, they do not provide the shallow water capability that Navocean's six-meter sailboat provides.

"We're still trying to constrain what the role of this robotic sailboat is," Beckler said after several weeks of prototype testing.

He and Duncan have been discussing various design modifications, such as the capability of lowering instrumentation from the boat to take measurements at depth, and the prospects of adding additional instrumentation to study harmful algal blooms.

Red tide blooms usually start offshore, and are typically preceded by a bloom of cyanobacteria.

They start below surface where they may not be observable by satellites in the early bloom stages, and are patchy both in surface coverage and at depth.

In its current configuration, the robotic sailboat can take only surface measurements and observations down to about 2.5 feet.

In describing his plans for possible future robotic sailboat, Beckler discussed a



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