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The D'Olive Creek Watershed:

Ensuring a Clean Water Future Through Watershed Management Plan Implementation

By Tom Herder, Watershed Protection Coordinator, Mobile Bay National Estuary Program

Restoration efforts along the Eastern Shore in the D'Olive Creek Watershed provide a great example of the value of a watershed planning approach to managing environmental resources. Watershed management plans (WMPs) are in-depth studies of relatively small land areas that drain to a single body of water, usually a stream or river. The 7,700-acre D'Olive Creek Watershed that includes portions of the cities of Daphne and Spanish Fort drains through Joe's Branch and Tiawasee and D'Olive creeks, through D'Olive Bay, and into Mobile Bay. The area has been plagued by excessive erosion and sedimentation since the early 1970s, and ongoing development continues to intensify problems there.

Marlon Cook of Geological Survey of Alabama (GSA) calls it "the perfect storm" of stormwater impacts, due to its hilly terrain; sandy, erodible soils; hardened, developed surfaces; and five and a half feet of average annual rainfall. The disappearance of over 70 percent of the submerged aquatic vegetation (SAV) that existed in Mobile Bay in the 1950s is blamed largely on excessive sedimentation. *Continued on page 15*

Currently Inside

Coastal Corner

By Phillip Hinesley, Coastal Section Chief,
Alabama Department of Conservation and Natural Resources
State Lands Division

Clean Water and Beaches Equal Healthy Economy

The Alabama coastline is home to beautiful beaches on the Gulf of Mexico. We are blessed with 53 miles of Gulf shoreline, which is an important part of the quality of life for many of the State's citizens and one of the State's greatest economic and environmental assets. The white sandy beaches and clear water of the coastal towns of Gulf Shores, Orange Beach and Dauphin Island are beloved and popular vacation destinations for Alabamians and out-of-state tourists. The fine quality of the sand and gentleness of the surf make for some of the prettiest beaches in the world and are the top tourist destinations in the State.

The tourism industry in South Baldwin County provides for more than 50,000 jobs and generates more than $2 million in revenue annually, and clean beaches and clean water is the linchpin of the industry.

While most of the time the Gulf beaches receive the focus, Alabama does have an additional 504 miles of coastal bays, lagoons, bayous and rivers. These areas are also important to the economy and environment of South Alabama.

One thing is for sure, a healthy coastal environment translates to a healthy economic climate. If we have dirty beaches and waters, then that can jeopardize our entire quality of life as we know it. Trash and debris along our coasts and in our waterways can be harmful to our health, the environment and the economy. Most trash that ends up in the water begins its journey on land, often in streets or parking lots, but through stormwater runoff into our many waterways it finds its way to our bays, beaches, and the Gulf of Mexico.

The State of Alabama, along with the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA), are working to reduce the amount of trash and litter that enters streams and rivers, lakes and bays, beaches and coastlines, and ultimately the Gulf of Mexico. These actions include coastal cleanups, outreach and education, research and new program partnerships.

Most people know that trash and debris in the water compromises the health of humans, wildlife and the livelihoods that depend on a healthy ocean. Trash on the beach can be harmful to the health and safety of beach users. It also makes the beach look ugly and dirty. Trash threatens tourism and recreation and the critical dollars they add to our local economies. Dirty beaches discourage visitors and cause local beach communities to lose money

Storm debris after the record flood in April 2014; Magnolia River

from tourism and spend money on cleanup efforts. Trash complicates shipping and transportation by causing navigation hazards. Finally, marine animals can swallow marine debris causing suffocation or starvation. Sea birds have been known to swallow small plastic pieces (which look like fish eggs), and sea turtles have been known to swallow clear plastic bags (which look like jellyfish).

Unfortunately, what we see dirtying beaches and floating on the coastal water's surface is just the tip of the iceberg. Much more lies unseen beneath the surface and far away on the open water, but that doesn't make it any less important.

While we are making progress on trash and marine debris by coastal cleanups and efforts from local governments, we still experience huge problems during tropical storms and flooding events. Marine debris ends up in our coastal waters every day as a result of littering and poor waste management, but occasionally, large amounts enter near shore coastal waterways all at once, especially during natural disasters. Abandoned and derelict vessels, construction and demolition debris, and household hazardous waste are just a few of the types of marine debris we find in waterways after a disaster. The State of Alabama now has a plan that will help state and local officials, along with federal partners, respond to acute waterway debris releases from hurricanes and other natural disasters or man-made incidents.

The purpose of this plan which was developed by NOAA with input from the State of Alabama is intended to improve preparedness for response and recovery operations following an acute waterway debris release incident in coastal Alabama. This plan outlines existing response structures at the local, state and federal levels to facilitate a coordinated, well-managed and immediate response to potential waterway debris incidents impacting coastal areas in the State of Alabama.

The plan addresses potential acute waterway debris incidents affecting Alabama's two coastal counties, Mobile and Baldwin. For purposes of this plan, the term waterway debris (or incident waterway debris) includes any solid material, including vegetative debris and debris contaminated with oil or hazardous material, which enters a waterway or shoreline following an acute release incident and poses a threat to the natural or man-made environment. This may include shoreline debris and debris in some inland, non-tidal waterways. This plan only specifically addresses "acute" waterway debris incidents, such as debris generated by natural disasters, and may not apply to chronic waterway debris issues.

The development of this plan will help the State of Alabama and our federal partners next time we experience a severe natural disaster. Additionally, this plan along with marine debris education and cleanup events will go a long way towards keeping our coastal habitats clean and healthy, helping maintain a high quality of life for generations to come.

Alabama Coastal Comprehensive Plan (ACCP) *What is Your Vision?*

The Alabama Department of Conservation and Natural Resources has partnered with the U.S. Army Corps of Engineers' Mobile District, the Mississippi-Alabama Sea Grant Consortium, and the Mobile Bay National Estuary Program to develop a constituent-informed, science-based coastal comprehensive plan to strengthen the economic, environmental, and social resilience of coastal Alabama for current and future generations.

By maximizing the use of resources in support of this comprehensive planning effort, the ACCP will create a roadmap for local, state and federal officials as they seek to:

- reduce the susceptibility of residential, commercial and public infrastructure to storm damages;
- improve habitats for coastal and marine resources to support commercial and recreational harvest;
- assist in the restoration of natural and human-made features damaged by erosion or unwise land use or development decisions;
- promote long-term erosion reduction during future natural hazards; and
- promote diversification of economies within the two coastal counties as a means of economic resilience from future hazards.

As part of the initial development of the ACCP, nineteen visioning sessions have been conducted – seventeen with targeted focus groups and two with a broader public audience. In addition to these meetings, the ACCP website offers an opportunity for individuals to share their vision online as well as to view comments received thus far on an interactive map. Please visit www.accp.usace.army.mil to get the latest update on the ACCP.

By Roberta Swann, Director,
Mobile Bay National Estuary Program

Making a Case for the Watershed Approach *to Coastal Resource Management*

On a recent Tuesday afternoon, I decided to go to the beach. With blue sky above me and waves constant, rolling, and lapping at my feet, I sat down on the white sand seeking inspiration for this article. For the most part I shared this stretch of beach with a willet, pecking for treasures in the sand. As I contemplated the intensive watershed planning underway and the challenges related to realizing the recommendations of each, I heard a message in the ebb and flow of the waves bringing in the high tide.

We are all connected… agricultural fields, subdivisions, commercial stretches and industry, longstanding restaurants keeping our heritage alive, anglers, boats, and grains of sand – all connected by a web of water, ultimately making its way to a bay, through a sound, and out to the Gulf of Mexico.

At present, Mobile Bay National Estuary Program is coordinating the development or implementation of seven watershed management plans across Mobile and Baldwin counties. Within the next couple of years, another 19 will be prepared, effectively producing management plans for all tidally-influenced watersheds in the state of Alabama.

Collectively, these watersheds cover a landscape of 22 municipalities and both counties and encompass 41 stream segments designated "impaired" by the Alabama Department of Environmental Management for pollutants and impacts including ammonia, nutrients, low dissolved oxygen, siltation/sediment, pathogens, and organic enrichment. On the positive side, within these watersheds there are three water bodies designated as "Outstanding Alabama Waters" and 13 place-based grassroots groups of volunteer members committed to creating a clean water future for their communities, Mobile Bay, Mississippi Sound, Weeks Bay, Perdido Bay, Wolf Bay, and the Gulf of Mexico.

Through this watershed planning and subsequent prescribed actions, it is clear: The relationship between community growth and impaired waters develops over time. If we want to maintain a rich quality of life, which in coastal Alabama is intrinsically tied to our water-rich landscape, communities must seek new ways of controlling stormwater runoff (and the pollution carried by it) created by the hard surfaces related to community growth like driveways, sidewalks, streets, and rooftops.

In Mobile County, communities in the Dog River/Halls Mill/Garrows Bend drainage complex and Fowl River and Bayou La Batre River watersheds are engaged in learning about the areas of land draining into their rivers and creeks and how natural flows have been altered over time. They are learning about what types and levels of pollutants are impairing or threatening their water quality, why shorelines are eroding, where restoration is most prudent and cost effective, and when results from lots of hard work will finally pay off in terms of clean water and resilient buffers to storms and stormwater runoff. As the plans are completed, the most important question becomes, "Who?" Armed with knowing what needs to happen to improve management of the lands and waters of these watersheds, whose responsibility is it to implement the plan? Local, state or federal government? Community groups? Business and industry? The NEP? Or all of the above?

A Case Study: The D'Olive Watershed

In Baldwin County, the D'Olive watershed is being transformed. With one of the first "comprehensive" watershed management plans in hand, both the cities of Spanish Fort and Daphne have updated their subdivision regulations to better protect riparian buffers and control stormwater runoff. Responding to a request by the two cities, the MBNEP accepted a charge to champion restoration work necessary to remove Joe's Branch, D'Olive Creek and Tiawassee Creek from the State's 303(d) List of Impaired Waterbodies. To date 2.3 million dollars have been invested in restoration efforts, translating to an average of $852 per linear foot of stream restored. Preliminary results from improving stormwater management and ecosystem function in a tributary to Joe's Branch are impressive. Pre-construction vs. post construction data gathered by the Geological Survey of Alabama reveals a 97 percent reduction in sediment

leaving Joe's Branch which translates into significant reductions in sediment entering D'Olive Bay and Mobile Bay. In addition, 3,000 linear feet of riparian buffer have been stabilized and the same length of stream bed restored or strengthened to handle the volumes and velocities of stormwater runoff generated by a quickly urbanizing landscape. Additionally, best management practices, including grading and installation of drop inlets at the Spanish Fort ball fields and a concrete flume connection to two landscaped, detention basins with dissipation blacks and baffle dikes, were installed by Spanish Fort upstream of the restored streams to reduce both volume and velocity of stormwater runoff.

Not only do the on-the-ground efforts demonstrate success, the commitment to collaborative watershed management has remained strong. Since the plan was published in 2010, the City of Daphne has had three different mayors and Spanish Fort, two. Council membership has changed over the years, yet support for implementation of this plan has not diminished. The value of this collaboration cannot be overstated. Creating a resilient watershed will require the long-term commitment of government, business, and the citizens to responsibly grow their community by balancing growth with environmental protection. The cities of Daphne and Spanish Fort understand the costs associated with NOT factoring environmental protection into the equation.

Managing our coastal resources by watershed is a clear demonstration of how we are, across geopolitical boundaries, connected by water. The watershed approach is instrumental in developing a shared understanding of conservation priorities across many different stakeholder interests, and this understanding is key to informing future land and water management decisions. Shifting the paradigm from traditional resource management (geopolitical boundaries) to a drainage basin or watershed management approach may seem like an absurd proposition. However, "only those who attempt the absurd can achieve the impossible" *(Chinese Fortune cookie)*.

Watershed	Major Concerns	Community Vision	Status
Eight Mile Creek	Failing septic and sewer infrastructure; stormwater runoff	Clean water, passive recreation	Plan complete; mapping of septic infrastructure; stream restoration/ passive park complete; stormwater improvements in Gum Tree Branch
D'Olive, Joe's Branch, Tiawassee Creek	Streambank erosion, sediment in water	Clean water, responsible development	Plan complete; 13 streams being restored; subdivision regulation changes
Three Mile Creek	Urban runoff, lack of access to resource, streambank erosion, sediment deposits in stream segments	Destination location for City of Mobile with trail along creek from USA to downtown; clean water for passive boating, fishing	Plan complete; first leg of trail in development; stormwater management improvements in Toulmins Spring; community capacity building in lower reaches of creek; partnership with USA students for implementing plan on campus
Fowl River	Shoreline erosion; marsh protection; stormwater runoff/litter; responsible development	Clean water, responsible development, resilient shorelines, fragile habitat conservation	Plan will be complete by 12/31; restoration underway for tip of Mon Louis Island; anticipate project development for living shorelines, wetland protection; wetland enhancement; community education
Dog River	Stormwater runoff/litter; erosion of streambanks; sediment deposits; lack of access to resource	Under development	Plan will be complete by 6/2016
Bon Secour	Streambank erosion; stormwater runoff/litter; development in headwaters	Under development	Plan will be complete by 9/2016
Fish River	Streambank erosion		Consultant selection underway, plan to be completed by 10/2016

Volunteer Water Monitoring

Engages Coastal Residents in Watershed Protection

By Christian Miller, Non Point Source Pollution Outreach, Auburn University and Mobile Bay National Estuary Program

Have you ever wondered about the quality of water that is flowing through your favorite fishing spot or swimming hole? Did you assume, like so many others, that the state keeps a close eye on our streams, lakes, bayous and bays? Well, with more than 77,000 miles of streams and rivers and over half a million acres of lakes in Alabama, that would be a charge difficult to accomplish for even the most well-funded state agency. Established in 1992 to help fill this void in water quality monitoring, Alabama Water Watch (AWW) is a volunteer water quality monitoring program covering all the major river basins of the state. The goal of AWW is to improve both water quality and water policy through citizen monitoring and action. To date, about 6,000 volunteers from 265 community groups have been certified as water monitors. Cumulatively, AWW monitors have tested 2,500 sites and submitted more than 72,000 data records statewide. This data is used by the Alabama Department of Environmental Management (ADEM) and countless researchers to guide more in-depth monitoring programs and assessments, initiate environmental regulations, and focus watershed planning efforts throughout the state.

Locally, volunteer monitoring has played an important role in understanding water quality trends throughout many of our coastal watersheds including Dog River, Wolf Bay and Little Lagoon just to name a few. One of the great success stories of local water monitoring has been to establish Outstanding Alabama Water (OAW) classification for Wolf Bay. This classification, the highest of seven levels of waterbody classifications regulated by ADEM, protects Wolf Bay with higher water quality standards including more stringent restrictions on wastewater discharges and toxic substances into the bay. Essentially, less pollution is allowed to enter Wolf Bay due to its OAW status. This status was only obtained through the tireless monitoring efforts of Wolf Bay Watershed Watch (WBWW) and their army of volunteer water monitors. In 2007, after a decade of sampling and reporting bacteriological and water chemistry data, ADEM granted OAW status to Wolf Bay and several of its tributaries. According to Leslie Gahagan, current WBWW president, "Our water quality monitors are the heart of Wolf Bay Watershed Watch. Their tireless efforts not only gained Outstanding Alabama Water designation for Wolf Bay, but the data also continues to provide insight on water quality trends throughout the watershed." The volunteers with WBWW believe that this OAW designation, along with the implementation of comprehensive watershed plans for the area, will continue to support the health of the estuarine habitats that contributes greatly to the local economy and the quality of life that drives so many people to coastal Alabama.

Water monitoring training at Bayfront Park in Daphne, Alabama

A need to attract and retain new coastal monitors has been identified as a primary concern by local watershed groups. Over time, many long-time volunteers quit monitoring and reporting water quality data for one reason or another. This creates gaps in historical data and makes it difficult to track trends in water quality. With the goal of increasing the ranks of volunteer coastal water monitors the Mobile Bay National Estuary Program, Alabama Clean Water Partnership, AWW, and a host of local grassroots groups have partnered to host regular local certification trainings, provide access to testing kits and replenishment of chemical reagents, and match seasoned monitors with new volunteers in an effort to mentor. Participating in a volunteer water monitoring program is one way to become actively engaged in the watershed planning and implementation process and make a meaningful impact in protecting and restoring coastal watersheds.

28th Annual Alabama Coastal Cleanup a Success

By Angela Underwood, Natural Resources Planner, Alabama Department of Conservation and Natural Resources Coastal Section

The 28th Annual Alabama Coastal Cleanup was held on Saturday, September 19, 2015. This year, over 5,000 volunteers helped to "get the trash out of the splash" by walking, boating or scuba diving 31 different coastal and inland waterway zones across Mobile and Baldwin counties, as well as inland zones in the Blackwater and Sepulga watersheds and as far away as the Tennessee River.

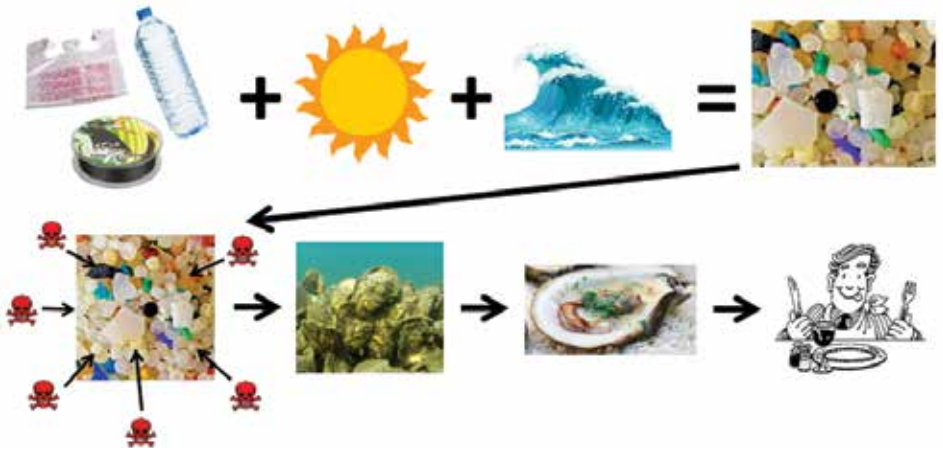
Each year brings unusual finds, and this year was no exception. Along with the everyday litter such as plastic bottles and cigarette butts were couches, a television set and laptop computer. The most unusual find for the day came from the cleanup site at Fort Morgan where volunteers discovered the front end of a Nissan Pathfinder with a Texas license plate still attached!

Thank you to all those who supported the cleanup this year. This huge event would not be successful without the hard work of our volunteers and the generous support from our sponsors: 2015 Presenting Sponsor - The Poarch Band of Creek Indian, ADCNR Coastal Section, AL PALS, The National Oceanic and Atmospheric Administration, Mobile Bay National Estuary Program, Bebo's, ExxonMobil, Alabama Power Company, Alabama Department of Transportation, Baldwin EMC, City of Gulf Shores, City of Orange Beach, Create a Clean Water Future, Compass Media, Flora-Bama, Home Depot, Ike's Beach Service, LuLu's, Riviera Utilities, The Original Oyster House, Utility Board of Gulf Shores, Evonik, Ineos Phenol, Vulcan Materials Company, ALFA, Honda Manufacturing of Alabama, Alabama Farmer's Cooperative, Baldwin County Commission, Gulf Shores/Orange Beach Tourism and The Ocean Conservancy.

Photo by Rhoda Vanderhart

Microplastics: *The Tiny, Yet Massive, Threat to Our World's Oceans*

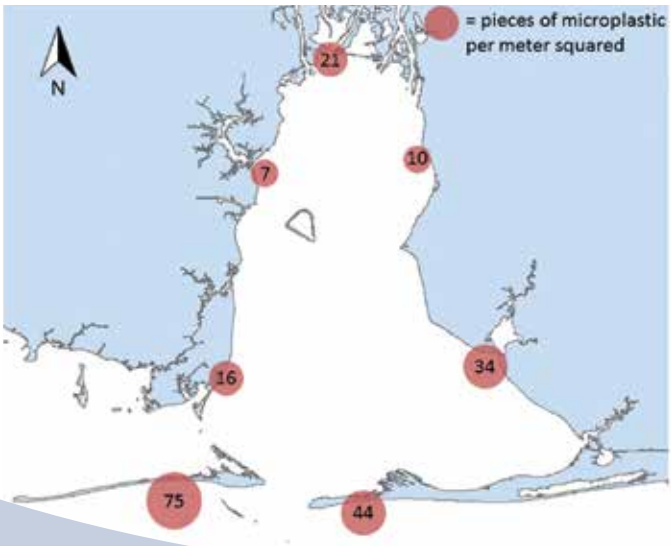
By Caitlin Wessel, PhD student, Dauphin Island Sea Lab, University of South Alabama



Every summer millions of visitors from across the USA flock to the white sand beaches of coastal Alabama, ready to enjoy a little rest and relaxation. Unfortunately, unless you are visiting a beach that gets cleaned every morning, more often than not, you will also see litter. Human-made litter can be found throughout the world's oceans and seas, even in remote areas far from human contact, and is commonly referred to as marine debris. What you may or may not notice in the sand are tiny, colorful pieces of plastic, called microplastics, which have washed ashore with the tide. In the northern Gulf of Mexico, microplastics (plastic particles smaller than 5mm) result mainly from the breakdown, by sunlight and waves, of larger plastic trash floating in the oceans but can also come from products containing microbeads, like toothpaste and face wash. Scientists from the University of Georgia estimated that 4.8 to 12.7 million metric tons of plastic trash made its way into the ocean in just one year (2010), and current estimates indicate that 92 percent of the plastic floating in the world's oceans are microplastics.

Microplastics have become a prominent pollution issue, not only in Alabama, but also throughout the world. They are small enough to be easily ingested by aquatic animals, particularly in marine and coastal environments where they float on the ocean surface. Microplastics floating in the water column can be accidentally ingested by filter-feeders and then work their way up the food chain. Our plastic can affect everything from filter-feeding oysters and mussels to shorebirds, crabs, fish, sea turtles and even dolphins and whales!

Plastics also contain concentrated toxins from their manufacturing and also from absorbing toxins found in the water column. These toxins can then be released from the plastics as they work their way through the digestive tract and end up in organ and muscle tissue. So do you need to worry about microplastics in your food? Maybe, but so far research has shown ingested microplastics accumulate mainly in the guts of organisms, although some pieces are small enough to enter the blood stream. Unfortunately, little research has been conducted about how much plastic we may be ingesting from our food and there is no information on how microplastics could be affecting humans.



Researchers at the Dauphin Island Sea Lab and the University of South Alabama are currently working on several projects with the Center for Environmental Resiliency and NOAA to determine how marine debris, big and small, are affecting Alabama and the northern Gulf of Mexico. Our data shows that the amount of marine debris accumulating on beaches DOUBLES between

April and May. We aren't sure yet what is responsible, but it is likely related to the increase in tourism and fishing during that time of year. Daily monitoring of shoreline trash on Dauphin Island suggests that beach supplies (chairs, tents, sand toys, etc.) left out overnight by beachgoers frequently end up washed out to sea by storms and high tide. Once exposed to constant sunlight and wave action, these large plastic items quickly begin to break down into smaller pieces and eventually become microplastics. So far everywhere we have looked for microplastics in Alabama, Florida, and Mississippi we have found them. All of us are responsible for the problem of marine debris, and it will take all of us to be the solution.

So what can you do?

➤ For starters, recycle. But that in itself is not a solution to the problem since only about 5 percent of plastic is recoverable to make new products.

➤ We need to decrease the usage of single-use plastic items like grocery or sandwich bags and start using reusable bags and containers.

➤ Stop buying products that contain plastic microbeads. Read the label and look for words like microbeads, polyethylene, or polypropylene.

➤ Say NO to printed receipts. Over 250 million gallons of oil, 10 million trees and 1 billion gallons of water are consumed each year just for receipts printed in the USA, generating 1.5 billion pounds of waste.

➤ Use outdoor trash bins with lids. Trash blowing out of waste bins or the backs of pickup trucks accounts for 19 percent of litter.

➤ Buy a reusable mug or container for coffee and other drinks. Many places will even give you a discount for bringing your own cup.

➤ Drink filtered or tap water out of reusable containers instead of buying bottled water. Beverage bottles are the fourth most common litter item found in Alabama.

➤ All of us are responsible for the problem of marine debris, and it will take all of us to be the solution.

Educational Kiosk Installed at Lulu's in Gulf Shores

By Mobile Bay National Estuary Program Staff

Lulu's restaurant in Gulf Shores and the Alabama Clean Water Partnership (ACWP) are teaming up to teach lessons about water quality in a fun interactive way. A touch-screen kiosk allowing children of all ages to navigate through multiple activities related to water quality has been installed on the grounds of the popular Gulf Shores, Alabama, eatery.

Representatives from the ACWP and the Mobile Bay National Estuary Program installed the kiosk which contains content in both English and Spanish. The content includes a short quiz to determine the user's knowledge of water and interactive video clips explaining the water cycle, watersheds, pervious surfaces, and their effects on watershed health. Users can also elect to be entered into a drawing to win a free iPad.

Gerald Tipton, General Manager at Lulu's, is excited to have tips on property to educate their guests on the important issue of water quality and stormwater runoff. The overall goal of the project is to reduce nonpoint source pollution flowing into Alabama waterways after heavy rainfall events.

The Alabama Clean Water Partnership, a state-wide, non-profit organization focused on stormwater education, along with project partners Mobile Bay National Estuary Program, Alabama Department of Environmental Management, U.S. Environmental Protection Agency, Alabama Power Company, Montgomery Water Works and Sanitary Sewer Board, and Hamline University Office of Global and Environmental Protection, will work with Lulu's to make sure the kiosk runs smoothly and will inform users of events in their watershed if they desire to "stay in the loop." So, the next time you visit Lulu's for some fresh Gulf seafood, spend a few minutes at the kiosk and leave not only full and satisfied, but also informed and educated on how to create a clean water future along the Gulf Coast!

Monitoring in D'Olive:
Making Sure We Are Getting It Right

By Renee Collini, Science Coordinator, Mobile Bay National Estuary Program

The stormwater-impacted D'Olive Watershed is the target of extensive efforts to restore condition and function not only at formerly-eroded stream restoration sites, but also downstream where water quality and provision of ecological services should also be enhanced.

(See cover story.)

Restoration activities can impact a wide variety of ecosystem functions in the watershed, and to ensure the right factors are being monitored, a working group of experts in hydrology, marsh ecology, stream restoration, sedimentation, water quality, submerged aquatic vegetation, and biological indices from local, state, and federal agencies, academia, and the private sector was formed. The group developed the Mobile Bay Subwatershed Restoration Monitoring Framework to standardize monitoring efforts in and around Mobile Bay and to comprehensively address four major focus areas that could be impacted: Sedimentation and Flow, Water Quality, Habitat, and Biology.

The working group then developed recommendations specific for D'Olive watershed based on the Framework. Leveraging efforts from local cities, academic institutions, federal partners, and ongoing monitoring efforts, a monitoring plan was developed that will quantify cumulative direct and indirect impacts and effects from the restorations.

Getting the Monitoring Done – A Group Effort

The recommendations for a comprehensive assessment of restoration impacts will require a wide array of expertise to successfully monitor the recommended parameters and time scales. The Geological Survey of Alabama (GSA) will monitor parameters to assess flow and sedimentation throughout the watershed. In addition to manual sampling, automatic samplers will be installed throughout the watershed that will provide great insight into variations in watershed response to rain events as stress from poorly functioning stream sections are reduced. These automated samplers will provide data on sediment and other water quality parameters. The additional water quality data will not only be utilized to track changes due to restoration, but also provide information that local cities may use in permitting. Consequently, the cities of Daphne and Spanish Fort are contributing maintenance assistance. There will also be water quality monitoring in D'Olive Bay. Experts in submerged aquatic vegetation (SAV) from Dauphin

Island Sea Lab will be conducting monthly sampling to determine if the water quality is suitable for SAV.

Assessing the quality and quantity of habitats is such an important and diverse task it will be addressed by three different efforts: habitat mapping, stream and riparian buffer assessment, and wetland assessment. The Mobile Bay National Estuary Program will map the extent and type of habitats throughout all of Mobile and Baldwin counties. These data will be compared to past mapping efforts and will be conducted again in the future allowing us to determine if habitat quantity has changed. Researchers from the University of West Florida and experts from Wetland Resources Environmental Consulting will measure many attributes of stream and wetland quality that indicate a healthy, functioning riparian buffer zone, stream habitat, and wetland habitat. The metrics being sampled were developed so that multiple state and federal agencies can utilize these data including the U.S. Fish and Wildlife Service and the Alabama Department of Environmental Management.

Marlon Cook of the Geological Survey of Alabama installs a real-time continuous water quality monitor in a tributary to D'Olive Creek to measure flow, dissolved oxygen, temperature, turbidity, and conductivity.

Putting It All Together

The monitoring efforts from the various state, academic, and private partners will come together to demonstrate how D'Olive watershed will have changed over the coming years and to determine if the restorations have had a positive impact. High resolution sampling will demonstrate changes in watershed responsiveness and long-term, large-scale sampling will provide insight into overall system improvements such as increased quality and quantity in habitats that provide crucial ecosystem services for the communities throughout D'Olive watershed. A science based organization, the MBNEP must show clear evidence of improvements to determine if the restorations have been successful. The good news? Early monitoring in Joe's Branch, a tributary of D'Olive watershed, is already showing indicators of reduced turbidity and sedimentation – a good sign that the hard work is paying off.

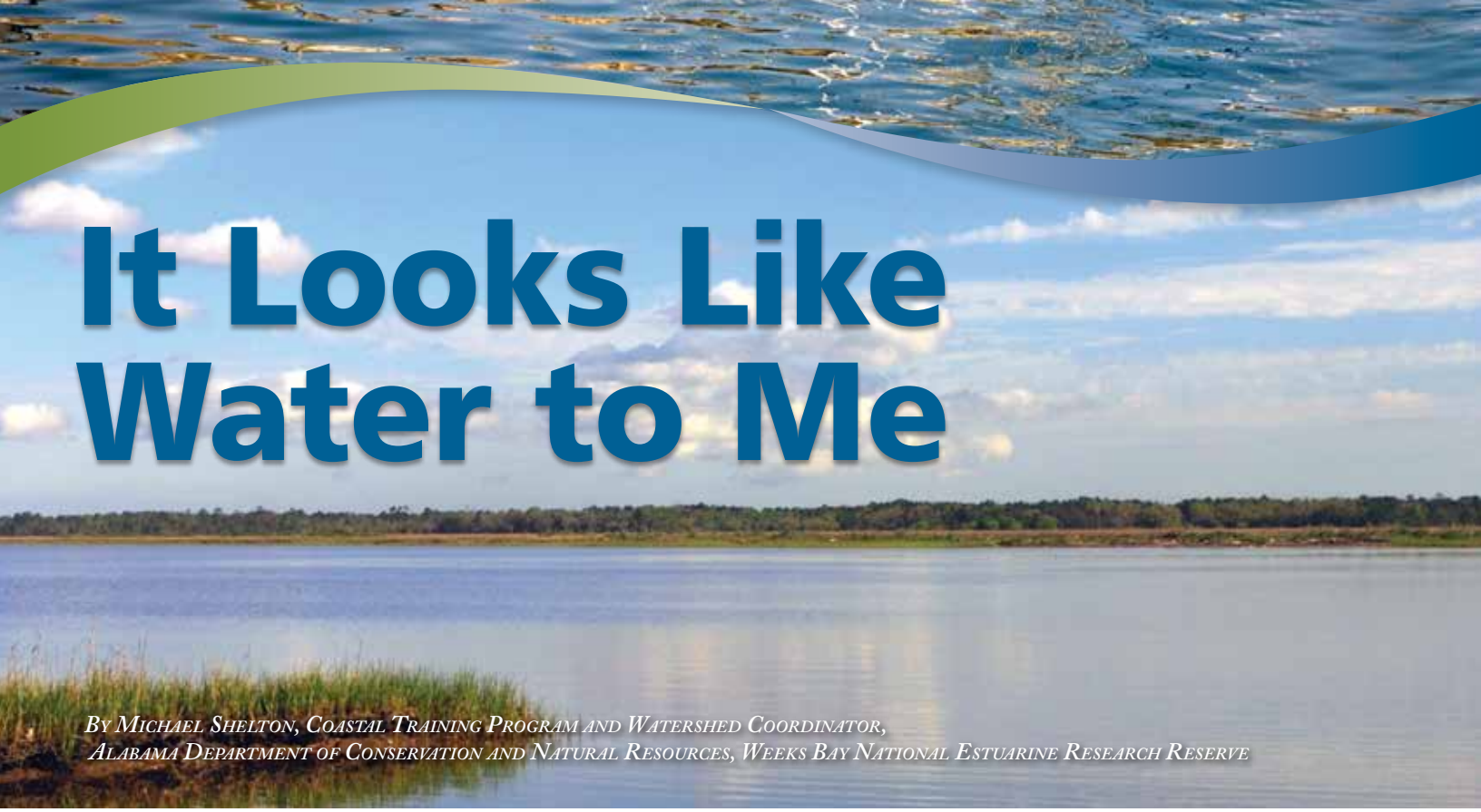
Mobile Bay Subwatershed Restoration Monitoring Framework

SEDIMENTATION AND FLOW
Often the primary focus of restoration, it is important to quantify changes in sedimentation and erosion and flow rates at strategic locations throughout the watershed.

WATER QUALITY
is impacted by restoration and is important to improvements in targeted habitats including submerged aquatic vegetation (SAV).

HABITAT
Is crucial to ecological function and services. Quality and quantity of existing habitats and quantifying subsequent shifts is critical to tracking watershed scale impacts.

BIOLOGY
Any identified threatened or endangered species that live within the watershed needs to be monitored and any shifts in population or critical habitat need to be tracked.



It Looks Like Water to Me

By Michael Shelton, Coastal Training Program and Watershed Coordinator, Alabama Department of Conservation and Natural Resources, Weeks Bay National Estuarine Research Reserve

The people of Coastal Alabama share one thing in abundance, water. Some of the water is salty, some fresh, and much of it falls somewhere in between. Area waters range from large open expanses for boating to small meandering creeks just for splashing and everything in between. This abundance of water creates a responsibility to keep it healthy, clean, and clear for the enjoyment of future generations.

All of us can see cloudiness in the waters after a rainfall event. Even cloudy, it still looks like water, and curious residents may be interested in learning more about the status of a local waterway. Citizens seeking to become more involved in a specific river or bay may say, "I am not a scientist, or I have no electronic gizmo to use for testing," but most of the volunteers who participate in Alabama Water Watch, a water quality monitoring program, are not chemists with expensive equipment. They are residents concerned about the conditions of the watery world around them. Alabama Water Watch educates volunteers about water health, trains them to use easy and accurate testing methods, and challenges them to stay involved. Once trained, volunteers monitor conditions like dissolved oxygen and water clarity essential to keeping fish abundant and healthy. Water Watchers can be trained to check bacteria count, such as E. coli, that may be present in local waters and learn to identify classes of insects used to measure water quality. Insects, such as mayflies and dragonflies, spend their early lives as crawling underwater forms and without clean water, the young do not survive to become flying adults. To learn more about Alabama Water Watch, go to alabamawaterwatch.org. Discover times and locations for the next training workshops and begin testing soon!

> *"...to the degree that man interferes with the natural order of things, he and his machines must do the work that Mother Nature did before."*

Of course, not everyone wants to do testing but may still be interested in the conditions of our local waters. Luckily for these folks there are professionals regularly checking the health of our bays and rivers. A great online resource to obtain information is mymobilebay.com. Operated by the Mobile Bay National Estuary Program and participating partners, numerous stations maintained by university, state, and federal scientists feed information into this website. Click on the location of interest to access current water conditions. Several stations also report current weather conditions. Another website to examine is the Beach Monitoring Program (www.adem.state.al.us/programs/coastal/beachMonitoring.cnt) operated by the Alabama Department of Environmental Management and Department of Public Health where scientists test for bacteria at designated swimming beaches all along the Alabama coast. Another location for information on bacteria testing at swimming beaches is the WaterKeeper® Swim Guide (www.theswimguide.org). This website provides information about swimming beaches on the Alabama coast and the results of bacterial testing at each location. People who live or visit the coast deserve accurate and up to date information to help them understand the health of our local waters. All of these websites contain information to help citizens make educated decisions about swimming, boating and other water dependent activities. Take the time to take part in examining the health of our coastal waters.

Mobile Bay Oyster Trail Continues to Grow

By Mobile Bay National Estuary Program Staff

The latest installment of The Oyster Trail was unveiled at the GulfQuest National Maritime Museum of the Gulf of Mexico on Sept. 17. The 26th overall and 13th placed in downtown Mobile is co-sponsored by the Mobile Bay National Estuary Program and Thompson Engineering/Watermark Design; "Estuary Gifts" was painted by native Mobilian James Foster.

On its face, Foster painted extraordinarily vivid scenes depicting the varied topography and biology of the lower reaches of the Mobile Bay watershed which supports some of the most unique plants, animals and birds on the planet. A focal point of the shell's inside scene is a three-dimensional pearl that Foster fashioned to scale where it rests inside a freshly opened Mobile Bay oyster.

During the unveiling, Thompson/Watermark's President John Baker said The Oyster Trail, along with the Gulf Quest Maritime Museum provide greater opportunity to educate locals and visitors to Mobile alike about the importance of the environment and the importance of Mobile Bay to our economy. "The health of Mobile Bay and surrounding watersheds is directly tied to the health of our communities and the quality of life we enjoy," Baker said. "While I'm certainly not a marine biologist, and I'm not trying to play one today, the oyster is an indicator species of the overall health of the bay. If we have poor water quality conditions in the bay, the oysters are the first to know it.

The Oyster Trail is a fun, educational and public-art treasure hunt throughout coastal Alabama. Look for the large fiberglass oysters that have been painted by local artists throughout the area and which can be found along the streets, within parks, and in lobbies. Each oyster has a fact plaque that includes important information about the oyster's ecological and economic benefit to Mobile Bay. Visitors to the trail are guided by a Trail Map which provides locations of the oysters. Trail Maps can be found in hotels, shops, visitor centers, etc., or can be downloaded.

"Estuary Gifts" unveiling at GulfQuest Maritime Museum. L-R: James Foster, Artist: P.J. Waters, Program Coordinator Mobile Bay Oyster Gardening Program; Marie Dyson, Oyster Trail Coordinator ; John Baker, President Thompson/Watermark Design; Roberta Swann, Director Mobile Bay NEP; Tony Zodrow, Executive Director GulfQuest Maritime Museum.

Through sponsor donations, The Oyster Trail not only teaches people about the importance of healthy oyster populations as it relates to water quality, but the money is also used to fund the Mobile Bay Oyster Gardening Program. This volunteer-based program coordinated by the Auburn University Shellfish Laboratory on Dauphin Island focuses on education, restoration/enhancement and oyster research by "bringing the reef to the people."

Gardeners receive oyster spat in early July and grow them in baskets hung from their wharves until late November when they average about 2.5 inches. Their oyster offspring are collected and planted on reefs that have been degraded by storms, sedimentation and other causes. Volunteer gardeners have grown nearly 600,000 advanced stocker oysters for planting in and around Mobile Bay over the past 15 years, said Program Coordinator P.J. Waters. "Without the supporters, sponsors and artists who participate in The Oyster Trail, the Mobile Bay Oyster Gardening Program would not exist," Waters said.

According to Director Roberta Swann, the MBNEP's support of The Oyster Trail has been steadfast since its inception because it includes on-the-water as well as educational benefits. "Not only does this Oyster Trail generate money to continue the gardening program, it provides educational facts about the value of oysters in our estuary," Swann said. "Not only can an adult oyster filter up to 50 gallons of water a day, oyster reefs provide habitat for other fish and shellfish. They can reduce wave energy in close proximity to the shore and most important, are at the very foundation of coastal Alabama heritage and culture. To secure a future of oysters in Alabama is vital to securing a healthy estuary and frankly, a tasty treat."

To learn more about or become a Mobile Bay Oyster Gardening Program volunteer, go to http://www.oystertrail.com. To learn more about the Mobile Bay National Estuary Program's efforts in watersheds across the area, go to http://www.mobilebaynep.com.

A New Day for Alabama Water Resources:

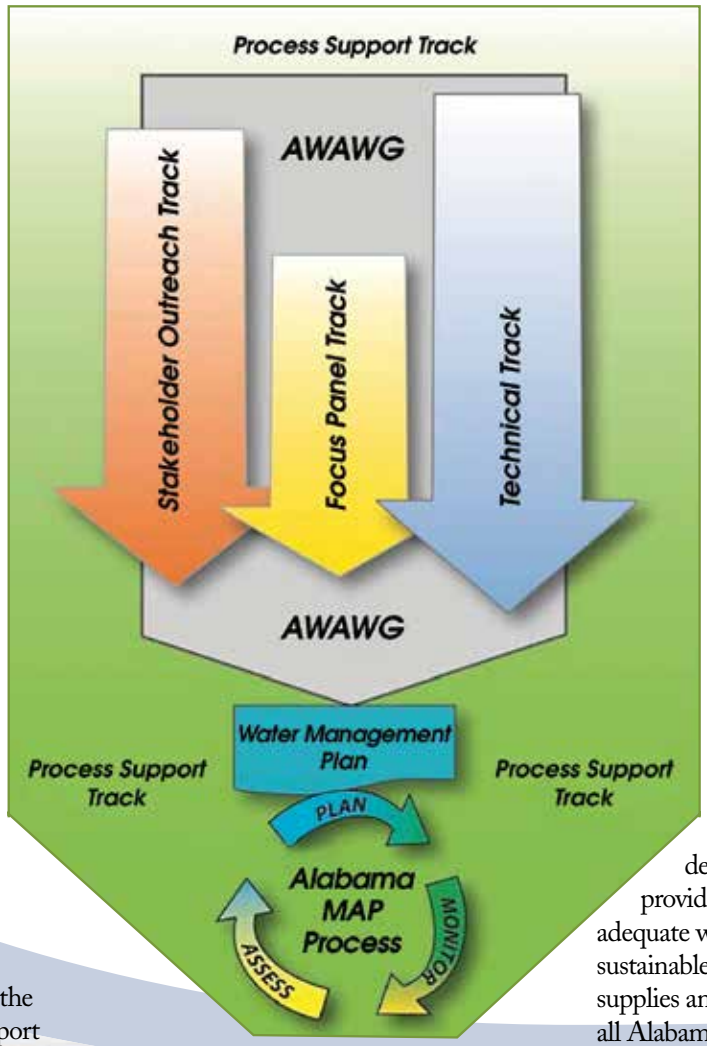
Sustainability through Science, Management, and Political Will

By Marlon R. Cook, Director Groundwater Assessment Program, Geological Survey of Alabama

Modern water resource management initiatives began in Alabama in 1993, when the Alabama Office of Water Resources was created and began implementation of certificates of beneficial use that tracked water users withdrawing or diverting more than 100,000 gallons per day. In 2008, the legislature formed the Permanent Joint Legislative Committee on Water Policy and Management. In 2011, Governor Robert Bentley commissioned the Alabama Water Agencies Working Group (AWAWG) with a mandate to establish a process to develop a water resource management plan for the state. The AWAWG includes the Office of Water Resources (OWR), Alabama Department of Environmental Management (ADEM), Alabama Department of Conservation and Natural Resources (ADCNR), Alabama Department of Agriculture and Industries (ADAI), and Geological Survey of Alabama (GSA). Governor Bentley included the State Climatologist Office in 2015.

The AWAWG was mandated by Governor Bentley to comprehensively investigate Alabama water issues and make recommendations and provide policy options. A report titled Mapping the Future of Alabama Water Resources Management: Policy Options and Recommendations was submitted to the Governor in December 2013. The report includes stakeholder opinions, descriptions of water resource issues, and a procedure consisting of four tracks (stakeholder outreach, focus area panels, technical, and process support) resulting in a water resource management plan. The management plan will be maintained in perpetuity using the MAP process. MAP is a continuous process of Monitoring, Assessment, and Planning (fig. 1). The technical track was launched in 2014, with initiation of a statewide water resource assessment, consisting of a statewide groundwater assessment conducted by the GSA, and statewide surface water assessment performed by OWR. Water resource assessments are multi-year efforts focusing on water availability. The focus area panel (FAP) track began in summer 2015 with establishment of five FAPs (Riparian and Other Legal Issues, Local/Regional Planning, Water Conservation, Efficiency, and Reuse) populated with invited experts in specified water resource fields. FAPs will convene for one year and will make recommendations to the AWAWG addressing each of the FAP issues. In late 2015, the AWAWG will convene a series of public meetings designed to solicit stakeholder input in the water resource management process.

Alabama Water Management Road Map



A water resource management plan will include strategies for long-term, sustainable water resource development and protection, providing all Alabama water users with adequate water for economic development, sustainable agriculture, and public water supplies and insuring the quality of life that all Alabamians deserve.

The D'Olive Creek Watershed *Continued from page 1*

In 2010, Thompson Engineering was contracted by the Mobile Bay National Estuary Program (MBNEP) to complete a D'Olive Creek WMP. Using scientific analysis and thorough community outreach, it provided watershed description and conditions, identified critical areas and issues, and recommended management measures with cost estimates, implementation strategies, and financing alternatives. It recognized sediment discharge as a particular problem there because of deeply eroded stream valleys, steep slopes, numerous tributary segments, highly erodible soils, and instability of exposed sediments. Of the 23 miles of watershed streams at the time of publication, it reported over two miles as substantially degraded, four miles currently being degraded, and six miles facing potential future degradation. The WMP's first implementation recommendation was to repair immediate problems. While the price tag for "stopping the bleeding" was expensive, it argued that doing nothing would result in deferred costs that would dramatically escalate as environmental deterioration continues.

> *"The disappearance of over 70 percent of the submerged aquatic vegetation (SAV) that existed in Mobile Bay in the 1950s is blamed largely on excessive sedimentation."*

In 2011, the collapsing banks of a degraded tributary to Joe's Branch along a wooded hillside at Westminster Village in Spanish Fort were on the verge of undermining Highway 31 to the north and impacting residences to the south. With contributions from ALDOT to match federal funding, MBNEP partnered with GSA, the AL Conservation Department's State Lands Division, AL Department of Environmental Management, and both cities to secure a Clean Water Act Section 319 Grant to fund a Thompson Engineering-designed step pool, stormwater conveyance (SPSC). Coarse sediments from collapsed stream banks choking downstream wetlands were first excavated and placed within the degraded channel to create an infiltration bed, and 32 boulder weirs were installed across and down its steep 1,000-foot length to create individual pools to slow velocity and reduce energy. This tributary delivered 100,000 tons of sediment per square mile into Mobile Bay, the most ever documented by GSA for an Alabama stream. The SPSC withstood the extraordinary April 2014 rain event, reduced delivery of sediment by over 90 percent, and won a Gulf Guardian Award for the many partners responsible for the construction and implementation of this step pool design project.

Recognizing the effects of upstream erosion on estuarine nursery areas, MBNEP applied for and received a National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund Grant to repair the most critically degraded streams across the D'Olive Creek Watershed. This landscape scale restoration includes 12 stream reaches and construction of three stormwater retention facilities in the watershed. Restoration of the first tributary, a 1,700-foot-long reach, was substantially completed in August 2015. Two major restorations, one near Mile Marker 31 between I-10 and route 90 and two segments of Tiawasee Creek in Daphne, will be under construction as early as late 2015. Three stream restorations in tributaries to Joe's Branch will follow in early 2016, along with construction of and improvements to two retention ponds. The remaining five restorations and construction of a major stormwater management facility will be completed by the end of 2017.

To determine whether this watershed-based approach to restoring conditions of estuarine habitat is effective, MBNEP's Science Advisory Committee has developed a comprehensive monitoring strategy. By measuring pre- and post-restoration condition of stream and wetlands downstream, as well as the distribution of SAV in D'Olive and Mobile Bays, scientists will be able to measure and describe improvements in the delivery of ecosystem services (like providing food, shelter, or nursery area or improving water quality) by critical coastal habitats.

Alabama current connection

About the Mobile Bay National Estuary Program: The Mobile Bay National Estuary Program's mission is to lead the wise stewardship of water quality and living resources of the Mobile Bay and Tensaw Delta. The MBNEP serves as a catalyst for activities of estuary stakeholders, helping to build community-based organizational capacity for sound resource management and leveraging commitment and investment to ensure the estuary's sustainability. For more information, please contact the MBNEP office at 251-431-6409.

About ADCNR, State Lands Division, Coastal Section: In an effort to protect and enhance coastal resources and reduce potential conflicts between environmental and economic interests, the Alabama Coastal Area Management Program (ACAMP) was approved by the National Oceanic and Atmospheric Administration (NOAA) in 1979. The ACAMP is administered through the Alabama Department of Conservation and Natural Resources, State Lands Division, Coastal Section. For more information, please contact the Coastal Section office at 251-621-1216.

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Alabama Current Connection encourages reprinting of its articles in other publications. If you have recommendations for future articles or would like to subscribe, please contact the editor:

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Get Involved with the Watershed Management Plan for the Bon Secour Complex

A watershed management plan for the Bon Secour Basin is being developed, and we want to hear your voice and encourage you to participate in the planning process. The watershed planning approach will follow EPA guidance and address key elements and values deemed important to coastal Alabama. The project is designed to address issues such as:

1. Improved Water Quality and Biological Health
2. Green Infrastructure Planning and Education
3. Shoreline and Streambank Stabilization
4. Public Access
5. Environmental Awareness
6. Groundwater and Flooding Issues
7. Non-point Source Pollution
8. Stakeholder Concerns

There will be two community meetings in both the north and south end of the watersheds over the one-year project time frame. The first meetings will be held in the Civic Center in Foley on Wednesday, December 2, 2015, at 5:00 p.m. and in the Gulf Shores Activity Center on Thursday, December 3, 2015, at 5:00 p.m. The general public and all stakeholders in these watersheds are encouraged to attend and participate in the planning to help create a clean water future in your local waterways!