

NORTH CAROLINA COASTAL FEDERATION

# State of the **COAST** Report 2008



**STORMWATER:** THE WAY FORWARD

# State of the **COAST**

NCCF is a non-profit tax-exempt organization dedicated to involving citizens in decisions about managing coastal resources. Its aim is to share technical information and resources to better represent current and long-term economic, social and environmental interests of the North Carolina Coast.

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## NCCF's 13th Annual State of the Coast Report

The intent of the *State of the Coast Report* is to provide citizens who care about our coast with a tool to better understand the issues, challenges and solutions that are key to our coast's health. We hope this publication will move you to participate in the restoration and protection of our coast. To learn more, call the NC Coastal Federation at 252-393-8185. The opinions expressed in the *State of the Coast Report* represent the views of the NC Coastal Federation.

### ACKNOWLEDGEMENTS

This publication required a major effort that combined the expertise of many people. Frank Tursi, NCCF's Cape Lookout Coastkeeper, was the report's editor and lead author. Jim Stephenson, the federation's policy director, and Jan DeBlieu, our Cape Hatteras Coastkeeper, also contributed major articles. Christine Miller, NCCF's planning and communications director, edited the publication and oversaw design, printing and distribution, and Sara Birkemeir and George Scott at 8DotGraphics designed the publication.

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# The Sky Isn't Falling; It's Only Raining

My eleven-year-old son Grant knows better than to eat off a dirty plate. And while his stubborn 14-year-old brother would rather eat off of dirty dishes than wash them, both boys would turn up their noses if I asked them to eat dinner straight off the ground. Yet, all three of us hardly think twice about putting on our waders on cold winter days and walking along the edge of the salt marsh to feast on raw oysters plucked straight out of the mud.

Thanks to good public-health laws, so far we've avoided getting sick from eating polluted shellfish. Since I know something about coastal hydrology and pollution, I only catch oysters or clams in places that are mostly undisturbed by development. I sample these raw delicacies only in places where the nearby land isn't ditched and drained.

Most natural coastal landscapes absorb a huge amount of rainfall. These areas have almost no surface runoff to contaminate the water. Bacterial pollution dies quickly in saltwater, and therefore I take comfort in limiting my consumption of raw shellfish to these mostly pristine locations.

Except when I buy my oysters and clams, and I have no idea where they really are caught. Then, I put my trust the public-health system to protect me.

As houses, condos, shopping centers and golf courses become more packed along the coast's shoreline, natural hydrology is lost. In these areas the capacity of the ground to process, store and use water is reduced or eliminated. As a result, runoff from rain is concentrated into drainage systems and discharged into creeks, sounds and ocean in minutes or hours instead of taking weeks and months to make its way overboard.

State water-quality regulators have known for almost 30 years that stormwater is a huge pollution problem. They have tried various ways to deal with it. And by their own admission, they have failed.

This State of the Coast Report reviews the ugly legacy that has resulted in what is likely to be the permanent pollution of thousands of acres of our most precious coastal creeks, sounds and even ocean swimming waters. The report explains the science, technology and solutions to stormwater problems along our coast. It discusses the economic and the public-health and safety perils associated with not being proactive to prevent stormwater from becoming a problem. It points out significant economic advantages associated with becoming stormwater savvy when developing and managing land.

Addressing stormwater pollution effectively is about a lot more than eating raw shellfish. It's about the safety of our coast as a place to swim, live and make a living. Communities that proactively prevent stormwater problems will be cleaner and safer places to live and will remain economically sustainable.

Homes, subdivisions and communities that use low impact development strategies have been shown by numerous studies to be less costly to build and have lower tax liabilities facing their residents. These communities are able to avoid paying for hugely expensive "retrofits" to fix neighborhood flooding and pollution problems. They have also been shown by economists to be viewed as more valuable and better places to live by homeowners and other buyers of real estate.

As you read this report, you'll see that opposition to effective stormwater management is driven by three factors—lack of knowledge, ignorance and greed.

Lack of knowledge is understandable. Stormwater is a complex subject, and this State of the Coast Report is our attempt to help more people understand it. A lot more people now understand this issue than they did just a few short years ago, and we all have to work together to spread this knowledge. Most people want to protect and restore the environmental and economic health of our coast, and they will support effective stormwater management once they understand what needs to be done.

The final two reasons that people oppose effective stormwater management are harder to address, and it's unlikely that this report will have much direct bearing on these factors. Strong opposition to addressing stormwater rules appears to come from some public officials who simply refuse to acquire knowledge that can easily and should be learned to act as responsible decision-makers. And then there's a group of opponents who fully understand what's at stake, and who choose to take advantage of widespread misunderstanding and ignorance about the subject to further their own financial gains.

To quote Bob Woodward of the Washington Post, "There are people who take rumors and embellish them in a way that can be devastating. And this pollution has to be eradicated by people in our business as best we can."

That's what we're attempting to do with this State of the Coast Report. It will be up to all of us to inform as many people as possible about stormwater, and to provide the leadership to make sure our coastal communities are protected and restored.

*Todd Miller*

Todd Miller, *Executive Director*



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Cover by George Mitchell • [www.carolina-photo.com](http://www.carolina-photo.com)

# POLLUTED RUNOFF

## Takes Heavy Toll on Coastal Waters

Rain begins when water molecules, whizzing through clouds, become too heavy or crowded and find release in the only direction possible—down. Here on the coast, far from the polluting plumes of factories, our rain showers are still pretty clean. Along with moisture to slake our thirst, rain grants us the ability to live beside the salty sea and sounds.

Any fourth-grader can tell you about the water cycle: how moisture moves through the atmosphere to Earth, trickling down to the oceans and rising skyward again, all through flow, evaporation and the respiration of plants. It's a beautiful system, honed over four billion years.

But there's a monkey wrench in the works, and few textbooks or museum exhibits ever describe it. Huge portions of the Earth have been covered by impervious surfaces—roads, roofs, sidewalks and parking lots. In natural settings the ground soaks up rain, cleanses it, and gradually releases the overflow to underground aquifers or local waterways. In developed areas, however, the “solution” to ponding water is to get rid of it as quickly as possible: Funnel it into a ditch that's connected to a street drainage system, which empties into a creek. Better yet, install a system of curbs and gutters that will carry it, untreated, to grated drains and pipes, into which it miraculously disappears.

Engineering solutions to such “problems” often just lead to bigger headaches. Our experience with stormwater has once again shown that to be true. Because of widespread paving, ditching and draining, because of the destruction of wetlands and the failure of federal and state regulators to implement meaningful controls, the coastal rains no longer bring just clean, freshening moisture.

They create billions of gallons of runoff contaminated with nutrients, petroleum products and bacteria—so much runoff, in fact, that stormwater is now the top pollutant in our coastal rivers, bays and sounds.

In the past 25 years, coastal North Carolina has grown from an undiscovered gem to a home for hundreds of thousands and a major destination for tourists. In the process our coastal waters have grown dirtier, swimming advisories have been posted, and thousands of acres of shellfish beds have been closed because of stormwater. The problem will only get worse in the next 25 years when the permanent population of Eastern North Carolina is forecast to almost double. More people mean more roads and parking lots and roofs.

Like coastal communities that were urbanized before us, we're faced with a dilemma. Will growth ruin the things we most love? Must the ugly tale of spreading pollution be repeated here?

### THE DOWNWARD SPIRAL

To understand why stormwater is so harmful to coastal

waters, think about what happens when a mountain forest is clearcut and sediment is left to run downhill each time it rains. Such practices badly damaged the great rivers of the western U.S. until regulations were enacted requiring sediment control.

Now consider what happens on the coast when a piece of land is stripped of vegetation. Although the slope of the terrain is much gentler, silt nonetheless runs into adjacent creeks and bays, where it covers shellfish beds and clogs the gills of fish. Once a house is built and a driveway installed, rain flows off ground that once soaked it up. Turf doesn't hold moisture the way native vegetation would, so lawns shed stormwater—and chemical fertilizers—too.

Bacteria like fecal coliforms—generated by failing



*Stormwater gushes out of pipes behind a sand dune in Atlantic Beach.*

septic tanks and animals (including humans)—gather on impervious surfaces, an invisible menace. Rain flushes them straight into a river or creek or first into ditches and underground pipes. Now, in addition to the silt and nutrients that can sicken marine animals, the creeks and sounds contain pathogens that can taint shellfish and lay low that most keystone of creatures—we humans.

Public swimming advisories are common along shorelines near stormwater drains (see accompanying sidebar). But it's the growing closure of shellfish beds that has raised the alarm about spreading pollution—and that has been tied so closely to stormwater from development.

### A DEVASTATING DECLINE

Oyster and clam beds are closed to human harvest when tests show the presence of more than 14 fecal coliform colonies in 100 milliliters of water. You'll read later about research, some going back decades, that have long implicated stormwater with high bacteria levels in



*Stormwater blows through the sand dune and flows to the beach in Emerald Isle.*

shellfish waters. More recently, testing by the N.C. Coastal Federation's Coastkeepers and volunteers found fecal colonies numbering in the thousands and tens of thousands in runoff flowing out of ditches and pipes. Sampling in the White Oak River in Carteret County and the Lockwoods Folly River in Brunswick has detected bacteria levels thousands of times higher than the shellfish standard.

The state Division of Water Quality (DWQ) released in 2005 the results of a study that showed that as development spread along six coastal creeks in New Hanover County, closures of shellfish beds followed—even though the state had regulations in place to control stormwater.

According to the DWQ study, about 52,000 acres of the state's shellfish beds were closed in 1988, when the state issued the first coastal stormwater permits. A story later on will describe the political compromises and skullduggery that led to a weak program. Since then, another approximately 4,500 acres of shellfish waters have been permanently closed, most of them along newly developed shores. Tens of thousands of additional acres close temporarily after each moderate rain. Maybe most disturbingly, the state has closed more than 1,300 acres of Outstanding Resources Waters—the state's highest and most restrictive water classification—since the stormwater rules were approved. Polluted runoff is responsible for about 90 percent of the closures—a clear sign that the current regulations aren't working.

Under the federal Clean Water Act, waters that no longer support their highest and best use are considered “impaired,” and states are required to bring them back to health. This is no small task. For a waterbody to be listed as impaired means it must be in serious trouble.

That's why the long list of coastal creeks, rivers and sounds on Pages 10 and 11 is so depressing. There are more than 63,000 acres of waters on that list. All have been impaired by bacteria. Stormwater is the known or suspected cause. All require corrective action by the state. This is our coastal heritage. This is what uncontrolled stormwater has bequeathed to us.

Clearly, our rules have failed us. DWQ recognized as much in that 2005 study. The current stormwater regulations, the agency concluded, haven't protected the most-sensitive coastal waters and aren't likely to do so in the future.

In response, the state passed more effective rules that you'll read more about later. Again, special interests, abetted by several county governments, are fighting the

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# PUBLIC SWIMMING ADVISORIES: North Carolina's Version of Beach Closures

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rules. If they are successful, as they were 20 years ago, the future looks dim for clean water.

## INTO THE FUTURE

Forty years ago our waters could withstand the small amount of runoff released by sparse development. It's no secret that the region's population has since exploded. And as scientific studies on the southern coast have clearly shown (see Page 6), with growth comes stormwater and increased pollution.

If predicted population trends are correct and we don't change the way we deal with stormwater, things will only get worse. Between 2000 and 2005 our fastest-growing coastal counties added population at an impressive rate. The number of residents in Brunswick County was 20 percent larger in 2005 than in 2000. During the same period, the population grew by 29 percent in Camden County, 17 percent in Dare County and 12 percent in Pender County. But those numbers pale beside what's to come. By 2030, the population of Brunswick County is predicted to expand by 95 percent. In Camden County the increase is expected to be a stunning 111 percent, in Dare 81 percent and in Pender 77 percent.

The conclusion is clear: Without strengthened protections against stormwater, our rivers and sounds won't withstand the onslaught. We can't afford to wait.

In the following pages, we'll offer ideas that show what we as citizens can do to ensure that the coast stays a place where we can continue to live, work, visit and enjoy.



## MESSING WITH MOTHER NATURE

You probably remember the hydrologic cycle from your science textbooks. On an undisturbed coastal forested shoreline, water evaporates (1) and rises into the atmosphere, where it condenses (2) to form clouds. The clouds release their moisture as rain or snow (3). The precipitation slowly soaks into the ground (4), where it is taken up by plants or recharges the groundwater. Almost none of the precipitation enters nearby rivers or sounds as surface runoff.

On a developed shoreline, many of the trees are removed and the ground is covered in roads, parking lots or other types of hard, constructed surfaces. Very little precipitation now infiltrates into the ground. Instead, it runs quickly off the hard surfaces and, untreated, enters the river or sound, carrying a host of pollutants with it. Compared to a natural landscape, surface runoff can increase 30-100 percent, depending on the amount of hard surface.

SOURCE: EPA

You've seen the signs: "Public Swimming Advisory. Swimming not recommended within 200 feet." But what do they mean?

North Carolina does not close beaches to swimming. Instead, when technicians from the state Recreational Water Quality (RWQ) Program find problems in the water, they post the area with an advisory. The culprit is often runoff, which may contain bacteria, viruses, and parasites. Swimming in water contaminated with such microorganisms can cause ailments from ear and eye infections to gastrointestinal illness.

From April to October, RWQ staff collect water samples from 240 sites, most of them weekly, and test them for enterococci, a bacteria associated with the guts of humans and animals. The rest of the year, sites are tested monthly. Many of the sites have outfalls—but not all. Some are contaminated by nearby marinas or, in a few cases, unknown sources.

The most popular Tier 1 beaches are placed under advisory when a single sample contains 104 enterococci in 100 milliliters of water, or when the monthly average reaches 35 enterococci. J.D. Potts, environmental supervisor for RWQ, says in waters along shores without stormwater outfalls, the enterococci count is typically 10 to 20 bacteria per 100 milliliters.

If an outfall has runoff constantly flowing from it—because it's draining groundwater—it may contaminate the surrounding waters even during dry weather, Potts says. But some outfalls only discharge runoff when it rains. Even RWQ staff don't always know whether drains are dry or constantly wet. If the discharge point is underwater, it's hard to tell.

Staff members don't hesitate to post beaches when they find a potential health threat. But here's the rub: They can only test each site once a week. As Potts notes, if contamination occurs the day after a sample is drawn, there will be no warning. And the staff is too small to test more than a fraction of the receiving waters with outfalls. "We know where the ocean outfalls are, because they're obvious," Potts says. "But we don't have a clue how many outfalls drain to the soundside.



A sign at Atlantic Beach warns people about swimming because of stormwater contamination.

I don't know anybody who's got a handle on that."

Last summer Frank Tursi, NCCF's Cape Lookout Coastkeeper, collected water samples from Carteret County's popular Boathouse Creek during rains. Some samples contained thousands of enterococci. But because the site isn't included in the state's testing program, no advisory was issued.

Wherever stormwater courses into a waterway, there's good reason to think it's not safe to swim.

## MAJOR POLLUTANTS IN STORMWATER

CATEGORY	PARAMETERS	POTENTIAL SOURCES
Bacteria	Total and fecal coliforms, streptococci, other pathogens	Animals, soil bacteria, humans
Sediment	Turbidity, pollutants that bind to soil particles	Construction sites, eroding streambanks, disturbed areas, pastures, row crops
Nutrients	Nitrogen and phosphorus	Animals, lawn fertilizer, decomposing organic matter, atmospheric deposition, sewer plants, septic tanks
Biodegradable chemicals	Biological oxygen demanding wastes	Leaves, grass clippings, animals, street litter, oil, grease, sewer plants, septic tanks
Organic chemicals	Pesticides, PCBs	Pest and weed control, packaging, hydraulic and lubricating oils
Inorganic chemicals	Suspended solids, dissolved solids, toxic metals, chloride	Erosion (lawns, stream banks, construction sites), industrial pollution, street dirt
Physical and aesthetic	Thermal, discoloration, odors	Heated streets, parking lots, sidewalks and rooftops; animal waste; industrial runoff

# Effects of Polluted Runoff Have Been Known for Decades

By the time Dr. Mike Mallin started poking around tidal creeks in New Hanover County in 1993, scientists had known for at least a decade that runoff in populated watersheds could pollute rivers and streams. They were even beginning to understand the role that roads, rooftops and other hard, constructed surfaces have in delivering those pollutants. Mallin, a marine and estuarine ecologist at UNC-Wilmington, would soon provide concrete evidence of the saltwater smoking gun.

Mallin and his research team began taking water samples that year from five creeks in the county, one of the most densely populated in North Carolina. Bacteria levels in the creeks were already so high that all were permanently closed to shellfishing or closed temporarily after moderate rains. Mallin and his researchers would take more than 1,000 bacteria samples in next four years, closely correlating bacteria concentrations in the water with sediment loads, nutrient levels, salinity and, most importantly, land development.

"We found a strong and significant correlation between the percentages of impervious surface coverage in the watersheds to the geometric mean bacteria concentrations in the creeks," Mallin explained. "The creeks with the highest percentage of impervious surfaces had the highest bacteria concentrations and the most shellfish closures."

Roads are "impervious." So are parking lots, rooftops and driveways. Unable to penetrate such hard surfaces, rain runs off them. Scientific research dating back to the 1970s had implicated this runoff, whether it came from pastures or city streets, with a wide variety of pollutants. The high levels of bacteria in runoff, though, were turning heads.

Found in the intestines of all warm-blooded animals, these bacteria seemed to be everywhere. The U.S. Geological Survey in the early 1980s reported that about 20 percent of all water samples at its main sampling stations nationwide recorded bacteria concentrations that exceeded the federal swimming standard. Failing septic tanks were assumed to be the culprits until the agency later noted that highest bacteria levels were in urban watersheds where public sewer was common.

The U.S. Environmental Protection Agency, in a landmark study a few years later, funded a nationwide look at urban stormwater. More than 1,600 samples were taken from rivers and creeks bordering the country's cities and towns. The mean bacteria concentration was thousands of times higher than the standard considered safe for swimming. As part of the EPA study, the Long Island Planning Board sampled stormwater



Ted Wilgis, the N.C. Coastal Federation's Cape Fear Coastkeeper at the time, tests stormwater in Wilmington.

discharges in shellfish waters. The bacteria concentrations in the samples were often 100 times greater than the shellfish standard, leading the researchers to conclude that more than 90 percent of the bacteria in the water came from runoff.

Closer to home, officials in Myrtle Beach, S.C., were so alarmed in 1979 by the high bacteria levels in the surf that they commissioned a study of the almost 300 pipes that discharged runoff onto the beach. The researchers found high bacteria levels in the runoff coming out of the pipes. The study also found very high levels running off city streets during the peak of the tourist season. The researchers concluded that impervious surfaces were major sources of bacteria.

It didn't take runoff from a place the size of New York or even

Myrtle Beach to pollute the water. A study by two professors at East Carolina University in the early 1980s suggested a correlation between population increases in nine N.C. coastal

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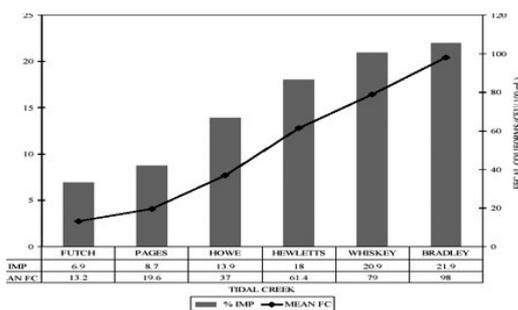
## Fecal Coliform Concentrations in Urban/Suburban Areas

Two studies in the mid-1990s in two Midwestern towns confirmed that high levels of bacteria are routinely found in runoff from typical urban and suburban environments.

LOCATION	MARQUETTE, MI	MADISON, WI
Commercial parking lot	4,200	1,758
High traffic street	1,900	9,627
Medium traffic street	2,400	56,554
Low traffic street	280	92,061
Commercial rooftop	30	1,117
Residential rooftop	2,200	294
Residential driveway	1,900	34,294
Residential lawns	4,700	4,093

Measured in colonies of bacteria per 100 milliliters of water.

SOURCE: U.S. GEOLOGICAL SURVEY



## Impervious Surface and Fecal Bacteria

This chart of six creeks in New Hanover County shows the close correlation between impervious surfaces in a watershed and the concentrations of fecal coliform bacteria in the water. The legend on the left is the percentage of impervious coverage in the watershed. The one on the right is fecal coliform concentrations. As the impervious coverage increases so do the mean fecal concentrations.

SOURCE: DR. MIKE MALLIN, UNC-WILMINGTON

## DOZENS OF STUDIES CONNECT STORMWATER AND BACTERIA

The scientific connections between stormwater and bacteria concentrations or bacteria concentrations and impervious surface are well established. Here are just a few of many dozens of research reports and papers written on the subject. They span the globe and date back to the 1970s.

As Joe Ramus, a professor emeritus at the Duke Marine Laboratory in Beaufort, notes:

**"This is textbook stuff now."**

Applied Biology Inc. 1984. Sea Pine-Forest Beach 1983 nonpoint source assessment at Hilton Head Island. Prepared for EPA Region IV contract 44-0/9-75-004.

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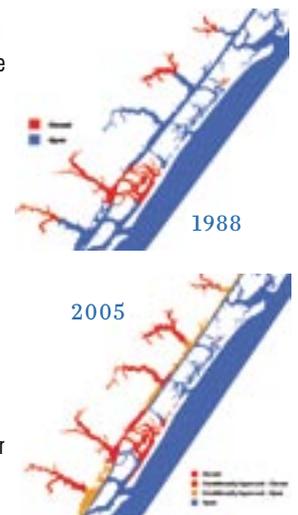
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## SHELLFISH WATERS TELL THE SAD STORY

North Carolina's shellfish waters have paid the price over the past 20 years for a failed state policy to control polluted runoff. This map of five tidal creeks in New Hanover County illustrates how heavy that toll has been. In 1988 when the first state permits under the current stormwater program were issued, the creeks weren't in the best of shape. But only one was totally closed to shellfishing because of high bacteria levels, as signified by red. Only the headwaters of the others were closed, and one was entirely open to shellfishing, as shown in blue. Also, only a portion of the Intracoastal Waterway and some adjoining creeks were closed. The new state stormwater program was meant to at least maintain the creeks in that condition.

But by 2005, water quality in all of the creeks had deteriorated. Three were entirely closed to shellfishing and only the mouths of the other two were open during dry weather. They now are closed after a moderate rain. The entire connecting Intracoastal Waterway was either permanently closed or closed temporarily after moderate rains.



SOURCE: N.C. DIVISION OF WATER QUALITY

# Stormwater Rules Have a Fractured and Fractious History

Bowing to powerful special interests, regulators disregarded good science and ignored public sentiment when they fashioned the state's current coastal stormwater regulations 20 years ago. Meeting illegally in a motel room, they came to an understanding and then approved weakened rules that many knew at the time would condemn thousands of acres of shellfish waters.

"It started with good science," remembered Dr. Richard Barber. He is a professor emeritus at the Duke University Marine Lab near Beaufort who in the mid-1980s served on the Environmental Management Commission (EMC), the state's major environmental rulemaking body.

"But hard decisions were always made that benefitted development instead of valuing the environment," Barber continued. "It helped to have the science, but in policy issues involving water quality the science rarely gives you a number that will overwhelmingly convince the other side."

That science was good enough, however, for what was then the N.C. Division of Environmental Management. The agency in January 1985 issued a landmark report, "Coastal Development and Shellfish Waters," that reviewed research on the effects of runoff on shellfish waters. The state at the time had no program to effectively address such pollution. The science on the subject was overwhelming, the agency noted.

"As coastal development continues, urban runoff will increasingly affect water quality," the report concluded. "High density development with large areas of impervious surface cover will produce larger runoff volumes with associated pollutant loads... Mitigation measures will be needed to address all of these pollution sources if coastal shellfish resources are to be protected."

Responding to the report that April, the N.C. Coastal Federation, a fledgling environmental group then only three years old, joined with Carteret Crossroads, an established and respected advocacy group, and the N.C. Fisheries Association, a trade group for commercial fishermen, to petition the EMC to require four proposed development projects in Carteret and Onslow counties to get state permits to control stormwater.

Saying that they needed time to consider such a requirement, EMC members two months later voted 11-1 against the request, though the commission's staff supported it. Barber was the lone dissenter. "It's really unfortunate to have to delay the action because developers are frantic to get their projects in while they don't need a permit to do so," he said at the time.

The N.C. Coastal Resources Commission (CRC) was more amenable. The board, which sets development rules on the coast, considered adding stormwater requirements to its permits. It held a public hearing in Morehead City in the fall of 1985 on a proposed set of rules that increased the waterfront setbacks from 30 feet to 50 feet and limited the amount of hard, or impervious, surface near the water to 15 percent of a lot.

Most people who spoke at the hearing favored the new rules, and written comments ran heavily in favor of them. Some developers, home builders and other opponents,

however, urged the CRC to proceed cautiously. They questioned the science behind the regulations and the need for them. They said the rules were "needlessly complex" and "terribly unfair." Septic tanks, they charged, were the real culprits.

The CRC, though, seemed prepared to adopt the rules when it next met, in Wilmington, in December. Five days before the meeting, S. Thomas Rhodes, the secretary of the then Department of Natural Resources and Community Development, sent an emissary to the CRC to ask the commissioners to postpone any vote on stormwater rules until the EMC had a chance to act in the next year. Both commissions were part of the department.

The CRC complied. But the commissioners weren't happy about it, noted Preston Pate, an assistant director of the N.C. Division of Coastal Management at the time. The division administers CRC rules. "There was disappointment not only at not being able to go forward but at the way it was handled," Pate said. "During the Rhodes administration it was very difficult to pass any rules to limit development. Stormwater was one of them."

For the next two years, the EMC struggled with stormwater. It passed temporary rules in 1986 that were considerably weaker than what the CRC had debated. Gone was the wider setback and the impervious surface limit close to shellfish waters was increased from 15 percent to 25 percent.

William T. Small, an EMC commission member, remembers the debate getting more rancorous as Gov. Jim Martin appointed more development-friendly board members. "Some selfish interests began to permeate the commission," said Small, then an assistant dean at the School of Public Health at UNC-Chapel Hill. "Part of the group thought we should try to protect our coastal interests. There were others who were more pro-development and less concerned about the needs of the coastal environment. That was the genesis of the turmoil that got more and more divisive."

It came to a head in 1987 when the EMC debated permanent coastal stormwater rules. Environmentalists and scientists wanted the rules to apply countywide instead of confining permits to the within 75 feet of the water, as the temporary rules did. Those rules also required that projects control four inches of rain in 24 hours. Developers and many EMC members wanted to reduce that to 1.5 inches.

The night before the EMC was to meet in October 1987 in Southern Pines to vote on the permanent rules, a quorum made up of Martin appointees met secretly with Rhodes in a motel room. They passed the weakened rules the next day with little discussion.

"That created quite a stir," Small said of the secret

*continued on page 15...*



*A brown plume of sediment floods in Bogue Sound from a new subdivision built under the state's coastal stormwater program. Photo courtesy of Bonnie Jones*

## STATE STUDY FINDS THAT CURRENT RULES DON'T WORK

The verdict came as no surprise to those who fought for tougher coastal stormwater rules 20 years ago, to the scientists who argued for them and to the shellfishermen who watched as the yellow "closed" signs dotted the shoreline: Those rules aren't working.

That's the conclusion the N.C. Division of Water Quality reached in 2005 after a nine-month study to determine if the rules passed by the Environmental Management Commission in the late 1980s were doing as intended and stemming the flow of polluted runoff into coastal waters, especially those designated for growing oysters and clams. The task fell to Tom Reeder, then the head of the division's wetlands and stormwater section.

"We looked at a variety of different things that all led to the irrefutable conclusion that the existing program isn't working and it isn't going to work," said Reeder, who was recently made deputy director of the N.C. Division of Water Resources.

While the rules have been in place, Reeder determined that more than 42 square miles of roads, parking lots, driveway and other hard, or "impervious," surfaces were built in the 20 coastal counties. Most were built under the rules' so-called "low density" option, which allows as much as 25 percent impervious surface close to shellfish waters with minimal stormwater controls. Reeder reviewed years of scientific research, which clearly showed that water quality begins to decline when impervious surface in a watershed exceeds 12 percent.

"One of things I find interesting is that I hear from these armchair biologists coming out of the woodwork today who say the current rules are working," Reeder said. The real biologists and water-quality professionals on the state's environmental regulatory commissions or working for its Division of Environmental Health told Reeder otherwise. "All are in agreement that the existing stormwater rules are the biggest obstacle in keeping shellfish waters open," he said.

All they had to do was travel to New Hanover County, where much of the coastal development during the last 20 years has taken place. Most of the tidal creeks there were open to shellfishing, at least much of the time, when the rules took effect. Now, they are all closed. "It was all low-density residential development," Reeder noted. "That was supposed to be the most benign type of development."

## STORMWATER RULES ENTER SHADOWY WORLD

The new coastal stormwater rules have spent much of the spring getting quietly reshaped and messaged by special interests and their lobbyists. Though the subject of four public hearings and debated openly by regulators before being approved, the rules have now entered the shadowy world of “605” meetings.

That’s not a term that your kid will find in her high-school civics book, but these meetings have long been part of the quasi-legislative process in Raleigh. Named for the number of a room in the Legislative Office Building where meetings on environmental issues were first held, the term has become political shorthand. Just knowing what it means marks you as one of the power brokers.

Only thorny, controversial subjects merit a 605, even apparently stormwater rules that have been debated openly and have followed the usual public rule-making process. Development interests and their allies on boards of county commissioners didn’t like that outcome, though. They complained loudly and have been given the chance to fashion an outcome more to their liking. Quietly this time.

State law requires that the N.C. General Assembly have an opportunity to review new rules before they take effect. A panel of legislators, called the Environmental Review Commission, knew that debate on the stormwater rules could be, well, stormy. To avoid a brawl in an election year, they set up a 605, formally known as the Coastal Stormwater Working Group. For legislators, the process is comforting and tends to legitimize the bills that emerge.

The idea is to get all the “stakeholders” in one room at the same time to hammer out their differences over the rules and come up with some sort of compromise that the legislators could then approve with a minimum of arm wrestling. The horse trading has been going on weekly for more than a month with little public scrutiny.

These 605 meetings are public under state law. They appear on the legislative calendar and have been streamed on the Internet via the General Assembly website. But, in reality, the meetings are public in name only. Few people except for those who are paid to do so can devote a day each week driving to and from Raleigh. Neither is the media normally encouraged to attend these gatherings for fear that regular coverage might squelch debate.

The N.C. Coastal Federation has sent its main legislative lobbyist to the meetings. Other environmental groups have also been there. The great majority of people who have attended, however, represent development interests and local governments. The outcome was still uncertain at the time we were putting this publication together in late April.

# NEW RULES Attempt to Fix a ‘Broken’ System

Officials with the N.C. Division of Water Quality were in a difficult position after acknowledging in 2005 that their stormwater rules failed to protect sensitive waters in the 20 coastal counties. Continuing to issue permits that they knew led to pollution put them in violation of federal law and invited a lawsuit.

“We know the system is broken, and we have to fix it,” noted Charles “Pete” Peterson, a distinguished professor at UNC’s Institute of Marine Sciences and vice chairman of the N.C. Environmental Management Commission (EMC).

The EMC, the state’s major environmental rule-making body, directed the division to fashion the fix and approved a draft of the new rules in May 2007. More than 1,000 people turned out at four public hearings on the rules that fall. Most of those who spoke at the meeting or submitted written comments later supported tougher stormwater rules. The commission approved the final rules in April 2008.

## WHAT THE RULES DO

Like the old rules, the new ones set tighter standards the closer a project is to shellfish waters. Unlike the ones they replace, though, the new rules follow the recommendations of well-established science: reduce hard surfaces near sensitive waters and increase the amount of runoff that must be controlled.

For new projects within a half mile of shellfish waters, the new rules would:

- **Reduce the impervious threshold from 25 percent to 12 percent.** Developers could exceed the threshold but they would have to install effective stormwater controls.
- **Require that ponds, basins and other types of controls hold about 3.5 inches of rain in 24 hours.** The old standard was 1.5 inches of rain.

For new projects farther than a half mile of shellfish waters, the new rules would:

- **Reduce that impervious surface threshold from 30 percent to 24 percent.**
- **Require that stormwater controls control 1.5 inches of rain in 24 hours, up from one inch.**

The vegetative building setback for all new waterfront projects, regardless of their

proximity to shellfish water, would increase from 30 to 50 feet from mean high water. To prevent coastal marshes from becoming just another place to dump stormwater, the rules won’t allow any wetlands to be included in the calculating the impervious surface coverage. That would mean that more projects will have install techniques to control stormwater.

Who would need a project has been a source of conflict from the beginning. Currently, a developer has to disturb an acre before a stormwater permit is needed. The EMC originally wanted to lower the disturbance trigger to 10,000 square feet. To appease those who complained at the public hearings, the EMC’s final rules require commercial projects to get a permit if they disturb 10,000 square feet. The disturbance for residential projects would remain at an acre.

Residential projects that disturb more than 10,000 square feet, but less than one acre, wouldn’t need a permit but would be required to do something to control stormwater, such as collect rooftop run-off into rain barrels or use porous material for driveways and patios.

## THE HOWLS BEGIN

Just as in the late 1980s when the current rules were debated, special interests representing developers, homebuilders and real-estate agents have waged a spirited and well-financed fight to defeat, weaken or delay the rules. Some county commissioners, led by those in Carteret County, have spent tax dollars to spread what Peterson called “disinformation” in a letter he sent to all coastal legislators and boards of county commissioners. You’ll read more about the opponents’ campaign and overblown charges later.

The important point to note here is that state law prevents any new rules from going into effect until the N.C. General Assembly has an opportunity to review them. Opponents of these rules have gotten the collective ear of the legislature and are expecting it to act this summer.

Peterson hopes legislators understand what’s at stake. “We need these rules to protect and sustain the coastal economy, which is dependent on clean water – to fish, to shellfish as well as to swim, kayak and do all the other things we like to do with our waters,” he said. “We’re not talking about a conceptual issue about how the ecosystem works. We’re talking about people and their ability to enjoy what nature gives us free of charge as long as we do the minimal things needed to keep them clean.”



The new rules won’t fix existing sources of stormwater, such as this pipe in Carteret County. Other state or federal programs can be used to address such sources.

## MAJOR CHANGES IN STORMWATER RULES Within a Half Mile of Shellfish Waters

	EXISTING RULES	ADOPTED RULES
When a Stormwater Permit Is Needed	1 acre of land disturbance or major CAMA permit	Commercial – 10,000 sq. ft. of disturbance Residential – 1 acre of disturbance
Impervious Surface Trigger	25%	12%
Building Setback From Mean High Water	30 feet	50 feet
Stormwater Control	Capture 1.5” of rain in 24 hours	Capture rain from 1-yr., 24-hour storm*
Wetlands	Included in impervious surface calculations	Excluded from calculations

\*Varies along the coast. About 3.8 inches in Wilmington, 3.6 in Morehead City and 3.2 in Elizabeth City.

# MYTH BUSTER: A Handy Chart to Separate Fact from Fiction

Opponents of the state’s new coastal stormwater rules have conjured up numerous myths about the rules. Carteret County’s Economic Development Council, or EDC, has been the source of many of these misrepresentations. They’ve changed and evolved over time. Only the most persistent are presented here.

MYTH	FACTS
<b>THE RULES LIMIT DENSITY TO 12% OF A LOT.</b>	They do no such thing. Within a half-mile of shellfish waters, the rules would require that development that disturbs more than an acre include effective methods to control runoff if hard, constructed surfaces exceed 12 percent of the lot. There are no caps on density in the rules, except within 575 feet of designated Outstanding Resource Waters — the rarest and cleanest of state waters. Everywhere else, developers could theoretically pave every inch of a lot if they could effectively contain the resulting runoff.
<b>NOT EVEN A MOBILE HOME CAN BE BUILT WITHOUT A PERMIT AND EXPENSIVE STORMWATER CONTROLS.</b>	The crafty use of “mobile home” is meant to scare moderate-income families who want to build a home on a single lot. They can relax. Unless the mobile home or residence is part of a new subdivision, the family won’t even need a permit if the lot is less than an acre. On larger lots, the family would have to <i>disturb</i> at least an acre before a permit is needed. If the disturbance is less than an acre but more than 10,000 square feet, the family may be required to install inexpensive stormwater controls such as a cistern or a rain garden. Either can be done for as little as a few thousand dollars.
<b>THE RULES COULD ADD AS MUCH AS \$43,000 TO THE COST OF A NEW HOUSE.</b>	This particular gem is meant to scare the willies out of small private landowners. To make it even scarier, the price is sometimes raised to \$48,000. It includes the cost of consultants and engineers and topographic and wetland surveys. The price, according to an EDC “fact” sheet, is based on a 2,000 square-foot house built on a 35,000 square-foot lot. It’s all bogus. Since the lot used to arrive at the forecast is less than an acre, no stormwater permit would even be required for the example cited. No consultants, no engineers, no topo surveys. The N.C. Division of Water Quality estimates that it will cost owners of average-sized new homes subject to the regulations less than \$4,000 to meet them, and, as mentioned above, many homeowners won’t be subject to them.
<b>THE RULES WILL BRING DEVELOPMENT ON THE COAST TO A HALT.</b>	This is the logical if somewhat hyperventilated conclusion if the previous statements were true. This myth is usually coupled with unsubstantiated forecasts of drastic drops in property values and tax receipts. Tired economic arguments are always trotted out as weapons against new regulations. The same argument was used 20 years ago when the current stormwater rules were debated. We can now safely say that no one went broke meeting those rules. Opponents have no empirical evidence on which to base this prediction. In fact history argues against them. See the story on Page 12 about economist Eban Goodstein’s study, which found that, historically, the forecast cost of environmental regulations exceeds the actual cost by at least 50 percent. It’s also worth noting that states such as Rhode Island and Georgia have more stringent coastal stormwater rules than these, and development hasn’t ground to a stop in those places.
<b>THE RULES ARE SCIENTIFICALLY UNFOUNDED.</b>	More than a dozen coastal scientists whose resumes include decades of stormwater research spoke at public hearings or submitted written comments in support of the new rules. The state’s review of scientific studies on stormwater and water quality fills several pages. See Page 6 for a story on the research done in New Hanover County and elsewhere. See also the June 2006 edition of <i>Scientific American</i> for a detailed look at the science of stormwater.
<b>SHELLFISH CLOSURES ARE DUE MAINLY TO SEPTIC TANKS, MARINAS AND SEWER PLANTS.</b>	This argument overlooks all the science done on the subject. While they can close shellfish waters, failing septic tanks, sewer discharges and marinas aren’t implicated in the great majority of permanently or temporarily closed waters along the coast. Turn to the centerfold on Pages 10 and 11 for a list of impaired waters in the 20 coastal counties. There are more than 63,000 acres and 150 miles of coastal waters on that list. Septic tanks, marinas and sewer plants haven’t been implicated in any of the impaired waters listed.
<b>THE BACTERIA CLOSING THE WATERS COME FROM THE POPULOUS PIEDMONT SECTION OF THE STATE.</b>	Such a statement once again ignores accepted science and overlooks reality. In saltwater, bacteria aren’t long-lived. They certainly can’t survive the days it would take to travel from Raleigh or Greensboro. Upstream sources can contribute many pollutants — nutrients, sediments, toxins — that can affect coastal water quality. Bacteria aren’t among them. They’re local. How else to explain closures in the lower White Oak River, for instance? That river starts in the megalopolis of Jones County before emptying in the sea some 60 miles later near Swansboro in Onslow County. How else to explain Hewlett’s, Bradley or Howe creeks? All are closed and all start and end in New Hanover County. And how about Archers Creek? It’s closed, too, and it’s totally contained in Emerald Isle.

# Runoff Pollutes 63,000 ACRES of Coastal Waters

Here are the 351 water bodies in the state's 20 coastal counties that are considered "impaired" under the federal Clean Water Act because of polluted runoff. That means they are too polluted to meet their best and highest use. North Carolina, like most states, is required every two years to report its impaired waters to the U.S. Environmental Protection Agency, along with the causes and potential sources of the impairment. The potential sources for the water bodies listed here are "urban runoff," "storm sewers" or are unknown. The potential sources of stormwater pollution are so diffuse that they are often impossible to locate.

The coastal waters on this list total 63,671 acres, or an area about the size of Durham, and 158 miles of streams, or the distance between Morehead City and Durham.

Under federal law, North Carolina is obligated to take steps to clean up these waters.

## SOURCE: N.C. 2006 303(D) REPORT

([h2o.enr.state.nc.us/fmdl/documents/303d\\_Report.pdf](http://h2o.enr.state.nc.us/fmdl/documents/303d_Report.pdf))

### BEAUFORT COUNTY

Alligator Gut.....	3 acres
Bradley Creek.....	10 acres
Drinkwater Creek .....	10 acres
Flannigan Gut.....	4 acres
Jacks Creek.....	9 acres
Jacobs Creek.....	13 acres
Jordon Creek.....	90 acres
Garrett Gut.....	8 acres
Little Creek.....	21 acres
Long Creek.....	30 acres
Muddy Creek.....	97 acres
North Creek.....	162 acres
N. Prong Wrights Creek .....	37 acres
Pamlico River .....	218 acres
Pantego Creek.....	952 acres
Pungo Creek.....	1,702 acres
Pungo River.....	3 acres
Robin Gut.....	1 acre
Satterwaite Creek .....	86 acres
Sheepskin Creek .....	2 acres
Short Creek.....	6 acres
S. Prong Wrights Creek .....	45 acres
South Creek.....	3,073 acres
Tooley Creek .....	15 acres
Whitehurst Creek .....	16 acres
Wilson Gut.....	1 acre
Wright's Creek.....	40 acres
27 water bodies.....	6,654 acres

### BERTIE COUNTY

Chowan River.....	8 miles
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### BRUNSWICK COUNTY

Atlantic Ocean.....	6 miles
Bald Head Creek.....	80 acres
Beaverdam Creek.....	11 acres
Big Gut Slough.....	1 acre
Brunswick River.....	744 acres
Calabash River.....	3 acres

Cape Fear River.....	4 miles
Cape Fear River.....	6,726 acres
Coward Creek.....	6 acres
Denis Creek.....	34 acres
Dutchman Creek.....	192 acres
Elizabeth River.....	289 acres
Fishing Creek.....	8 acres
Goose Creek.....	4 acres
Intracoastal Waterway .....	2,013 acres
Jinnys Branch.....	1 acre
Kilbart Slough.....	1 acre
Lockwoods Creek.....	1 acre
Lockwoods Folly River.....	607 acres
Mill Creek.....	2 acres
Mill Pond.....	3 acres
Molasses Creek.....	1 acre
Montgomery Slough.....	2 acres
Mullet Creek.....	6 acres
Piney Point Creek.....	11 acres
Sams Branch.....	1 acres
Saucepan Creek.....	63 acres
Shalotte Creek.....	136 acres
Shalotte River.....	647 acres
Spring Creek.....	2 acres
The Swash.....	4 acres
Town Creek.....	32 miles
29 water bodies.....	11,617 acres
3 water bodies.....	32 miles

### CARTERET COUNTY

Adams Creek.....	320 acres
Adams Creek Canal.....	139 acres
Alligator Creek.....	2 acres
Annis Run.....	3 acres
Archer Creek.....	18 acres
Back Creek.....	262 acres
Back Sound.....	242 acres
Bell Creek.....	64 acres
Big Creek.....	61 acres

Boathouse Creek.....	16 acres
Bogue Sound.....	2,247 acres
Broad Creek.....	91 acres
Broad Creek.....	36 acres
Brooks Creek.....	20 acres
Buck Creek.....	6 acres
Caleb Branch.....	2 miles
Cales Creek.....	6 acres
Cedar Creek.....	16 acres
Clubfoot Creek.....	563 acres
Core Creek.....	256 acres
Core Sound.....	334 acres
Crabbing Creek.....	2 acres
Crab Point Bay.....	134 acres
Davis Bay.....	202 acres
Ditch Cove.....	32 acres
Deep Creek.....	22 acres
Doe Creek.....	5 acres
Dubling Creek.....	53 acres
Duck Creek.....	3 acres
Dumpling Creek.....	25 acres
Eastman Creek.....	13 acres
Eastman Creek.....	96 acres
Elisha Creek.....	2 acres
E. Fork South River.....	14 acres
E. Prong Broad Creek.....	8 acres
E. Prong Gales Creek.....	1 mile
E. Prong Sanders Creek.....	3 acres
Feltons Creek.....	4 acres
Fort Macon Creek.....	26 acres
Fulcher Creek.....	53 acres
Gable Creek.....	50 acres
Gales Creek.....	46 acres
Gibbs Creek.....	65 acres
Gillikan Creek.....	6 acres
Glover Creek.....	10 acres
Godfry Branch.....	3 acres
Golden Creek.....	10 acres
Goose Bay.....	266 acres
Goose Creek.....	67 acres
Great Creek.....	72 acres
Hannah Branch.....	1 mile
Hadnot Creek.....	43 acres
Hampton Bay.....	82 acres
Hardy Creek.....	24 acres
Harlowe Canal.....	5 acres
Harlowe Creek.....	212 acres

Howland Creek.....	26 acres
Hunting Island Creek.....	3 acres
Jarrett Bay.....	1,207 acres
Jumping Run.....	1 acre
Lewis Creek.....	21 acres
Little Creek.....	21 miles
Little Creek Swamp.....	5 miles
Lynch Creek.....	7 acres
Middens Creek.....	20 acres
Mill Creek.....	2 miles
Mill Creek.....	6 miles
Miry Gut.....	1 acre
Money Island Bay.....	103 acres
Money Island Slough.....	8 acres
Mullet Gut.....	1 acre
Neal Creek.....	3 acres
Nelson Bay.....	861 acres
Newby Creek.....	9 acres
Newport River.....	4,872 acres
North Leopard Creek.....	95 acres
North River.....	6,422 acres
Oyster Creek.....	50 acres
Oyster Creek.....	128 acres
Pamlico Sound.....	12 acres
Pasture Creek.....	6 acres
Pettiford Creek.....	35 acres
Pettiford Creek Bay.....	239 acres
Rich Island Gut.....	1 mile
Russell Creek.....	16 acres
Sanders Creek.....	35 acres
Sandy Branch.....	1 mile
Schoolhouse Branch.....	1 acre
Sikes Branch.....	1 acre
Sleepy Creek.....	155 acres
Smyrna Creek.....	27 acres
South Leopard Creek.....	78 acres
South River.....	385 acres
Southwest Creek.....	151 acres
Spooner Creek.....	24 acres
Starkey Creek.....	29 acres
Steepphill Branch.....	1 acre
Styron Bay.....	10 acres
Styron Creek.....	8 acres
The Straits.....	102 acres
Thomas Creek.....	5 acres
Thorofare.....	35 acres
Turner Creek.....	52 acres





Stormwater rushes out of a pipe into Deer Creek, an impaired stream in Carteret County (above). The runoff carries high levels of nutrients, such as phosphorus and nitrogen. These nutrients feed wintertime blooms of algae that cover the creek bank in a fibrous mat. The algae blooms have been getting worse each year (below left).

W. Fork South River.....	36 acres
W. Prong Broad Creek.....	8 acres
Wade Creek.....	142 acres
Wading Creek.....	16 acres
Ward Creek.....	582 acres
Westmouth Bay.....	7 acres
Whitehurst Creek.....	86 acres
White Oak River.....	4,032 acres
Willis Creek.....	15 acres
Willis Creek.....	51 acres
Williston Creek.....	24 acres
Wolf Branch.....	1 mile
108 water bodies.....	26,344 acres
9 water bodies.....	21 miles

### CRAVEN COUNTY

Big Branch.....	2 acres
Core Creek.....	15 miles
E. Prong Mortons Mill Pond.....	1 mile
Gulden Creek.....	35 acres
Isaac Creek.....	39 acres
Jerry Bay.....	52 acres
Kearney Creek.....	4 acres
Mitchell Creek.....	117 acres
Mortons Mill Pond.....	31 acres
Neuse River.....	158 acres
Snake Branch.....	1 mile
W. Prong Mortons Mill Pond.....	1 mile
8 water bodies.....	438 acres
5 water bodies.....	20 miles

### DARE COUNTY

Askins Creek.....	5 acres
Austin Creek.....	8 acres
Baum Creek.....	11 acres
Beach Slue.....	77 acres
Broad Creek.....	119 acres
Brooks Creek.....	25 acres
Cape Creek.....	16 acres
Callaghan Creek.....	25 acres
Croatan Sound.....	680 acres
Cut Through.....	124 acres
Eagle Nest Bar.....	55 acres
Joe Saur Creek.....	18 acres

Johns Creek.....	11 acres
Long Shoal River.....	420 acres
Mill Creek.....	16 acres
Oyster Creek.....	63 acres
Pamlico Sound.....	705 acres
Peters Ditch.....	2 acres
Pond Island.....	167 acres
Roanoke Sound.....	2,333 acres
Rockall Creek.....	6 acres
Sand Beach Creek.....	39 acres
Sandy Bay.....	28 acres
Spencer Creek.....	87 acres
Stumpy Point Bay.....	431 acres
The Slash.....	31 acres
26 water bodies.....	5,502 acres

### GATES COUNTY

Chowan River.....	8 miles
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### HERTFORD COUNTY

Bells Branch.....	5 miles
Painter Swamp.....	4 miles
Wiccaon River.....	22 miles
3 water bodies.....	31 miles

### HYDE COUNTY

Becky Creek.....	20 acres
Berrys Bay.....	12 acres
Cedar Creek.....	12 acres
Far Creek.....	389 acres
Germantown Bay.....	180 acres
Jarvis Creek.....	8 acres
Jones Creek.....	15 acres
Juniper Bay.....	67 acres
Lone Tree Creek.....	2 acres
Long Creek.....	30 acres
Long Shoal River.....	35 acres
Middletown Creek.....	71 acres
Midgette Creek.....	8 acres
Neal Creek.....	68 acres
Northwest Creek.....	19 acres
Oyster Creek.....	35 acres
Oyster Creek.....	50 acres
Pamlico River/Sound.....	218 acres
Rose Bay.....	318 acres

Rose Bay Creek.....	154 acres
Slade Creek.....	591 acres
Speer Creek.....	11 acres
Spellman Creek.....	15 acres
Swanquarter Bay.....	136 acres
Raffing Creek.....	5 acres
Waupopin Creek.....	96 acres
Wood Creek.....	27 acres
Wysocking Bay.....	126 acres
28 water bodies.....	2,718 acres

### NEW HANOVER COUNTY

Banks Channel.....	111 acres
Burnt Mill Creek.....	5 miles
Everett Creek.....	1 acre
Futch Creek.....	28 acres
Greenfield Lake.....	75 acres
Hewletts Creek.....	98 acres
Howe Creek.....	29 acres
Intracoastal Waterway.....	246 acres
Masonboro Sound.....	379 acres
Pages Creek.....	76 acres
Topsail Sound/Middle Sound.....	281 acres
Whiskey Creek.....	13 acres
11 water bodies.....	1,337 acres
1 water body.....	5 miles

### ONSLow COUNTY

Alligator Bay.....	555 acres
Batts Mill Creek.....	41 acres
Bear Creek.....	309 acres
Bear Island ORW.....	70 acres
Bell Swamp.....	1 acre
Biglins Creek.....	6 acres
Brinson Creek.....	3 acres
Browns Creek.....	53 acres
Browns Swamp.....	1 mile
Bumps Creek.....	14 acres
Cartwheel Branch.....	4 acres
Chadwick Bay.....	579 acres
Charles Creek.....	38 acres
Clay Bank Branch.....	1 mile
County Line Branch.....	1 acre
Courthouse Bay.....	2 acres
Cypress Branch.....	1 acre
Dicks Creek.....	22 acres
Everett Bay.....	240 acres
Everett Creek.....	1 acre
Fannie Creek.....	10 acre
Freeman Creek.....	65 acres
Fullard Creek.....	164 acres
Gillets Creek.....	3 acres
Goose Bay.....	39 acres
Goose Creek.....	3 acres
Halls Creek.....	27 acres
Holland Mill Creek.....	24 acres
Holover Creek.....	5 acres
Intracoastal Waterway.....	1,403 acres
Little Northeast Creek.....	8 miles
Mile Hammock Bay.....	8 acres
Mill Creek.....	53 acres
Mill Creek.....	15 acres
Millstone Creek.....	6 acres
Mirey Branch.....	1 mile

Muddy Creek.....	17 acres
New River.....	68 acres
Northeast Creek.....	10 miles
Parrott Swamp.....	120 acres
Pasture Branch.....	1 acre
Pitts Creek.....	1 mile
Queen Creek.....	722 acres
Rogers Bay.....	51 acres
Saliers Bay.....	56 acres
Stevens Creek.....	6 acres
Stones Bay.....	32 acres
Stones Creek.....	73 acres
Stump Sound.....	87 acres
Stump Sound ORW.....	940 acres
Topsail Sound.....	1,213 acres
Turkey Creek.....	139 acres
Wheeler Creek.....	11 acres
White Oak River.....	47 acres
49 water bodies.....	7,358 acres
6 water bodies.....	22 miles

### PAMLICO COUNTY

Alligator Creek.....	2 acres
Bay River.....	100 acres
Bear Creek.....	200 acres
Bennett Creek.....	16 acres
Bill Daniels Gut.....	2 acres
Bill Gut.....	6 acres
Bills Creek.....	8 acres
Bright Creek.....	11 acres
Broad Creek.....	202 acres
Brown Creek.....	122 acres
Coffee Creek.....	7 acres
Dawson Creek.....	122 acres
Eastman Creek.....	96 acres
Gale Creek.....	29 acres
Gideon Creek.....	26 acres
Harper Creek.....	32 acres
Long Creek.....	1 acre
Neuse River.....	70 acres
Orchard Creek.....	37 acres
Oyster Creek.....	118 acres
Pierce Creek.....	51 acres
River Ditch.....	8 acres
Ship Creek.....	5 acres
Spice Creek.....	5 acres
Tar Creek.....	44 acres
Whitaker Creek.....	96 acres
26 water bodies.....	1,416 acres

### PASQUOTANK

Little River.....	11 miles
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### PENDER

Banks Channel.....	4 acres
Beckys Creek.....	109 acres
Burgaw Creek.....	9 miles
Long Creek.....	8 miles
Mill Creek.....	18 acres
Mullett Run.....	7 acres
Old Topsail Creek.....	29 acres
Topsail Sound/Middle Sound.....	6 acres
Virginia Creek.....	97 acres
9 water bodies.....	287 acres

# ECONOMIC COSTS OF NEW RULE ARE LIKELY HIGHLY EXAGGERATED

Complying with the new coastal stormwater rules, say some developers, homebuilders, realtors and the like, will bankrupt them. It will raise the cost of a new house... pick a number... \$8,000, \$20,000, \$48,000. A county commissioner in Pamlico County predicts, with no evidence, that property values there will plummet 81 percent. Commissioners in coastal counties far from any oysters or clams voted to spend tax dollars to fight new rules that are primarily aimed at protecting shellfish waters. It could get so bad, opponents charge, that middle-income people will be shut out of the coastal housing market, that even mobile homes will be impossible to site. DEVELOPMENT COULD COME TO A STANDSTILL.

Quick. Somebody get these poor folks paper bags because no amount of reason or logic can seem to prevent them from hyperventilating.

To prevent a relapse, try to assure opponents of the rules that the workings of state government and the long arc of history provide rather convincing and comforting evidence that no one will go broke meeting these rules. In fact, there's money to be made from them.

Tom Reeder has been around state government for a while now. He was head of the state's stormwater and wetlands branch and is now deputy director of its Division of Water Resources. Reeder knows how things work.

"Every time we change rules we're told the new rules will stop development," he said. "Nothing we've ever done has stopped development. All we do is regulate the pollution that will come from new development."

The state, in other words, isn't in the business of putting people out of business, at least not those in legal enterprises. Why should these rules be any different?

They likely won't be, at least if history is any guide, according to Dr. Eban Goodstein, an economist at Lewis and Clark College who has studied the economic effects of regulations and has written a textbook on the subject. "The economic arguments are always the first ones used against new regulations," he said. "The costs of meeting regulations are almost always wildly overestimated."

Goodstein studied about a dozen environmental regulations, dating back to the 1970s. He compared what meeting the rules were forecast to cost to what they actually cost. In every case, the forecast costs exceeded the actual cost by at least 50 percent. In some cases, meeting the rules proved cheaper than doing it the old way. The error existed regardless of who was doing the forecasting – the regulated

industries, environmental groups or unbiased college professors. The error then seemed to be systemic rather than grounded in bias.

"The forecast costs are always way too high because when the regulations are put in place, business always finds a way to do it cheaper," Goodstein said. "These forecasts, though, always assume that business will continue following the same process or use the same material and simply absorb the costs of meeting the regulation. The forecasters always ignore the ability of business to be flexible and to innovate."

And regulations, says Goodstein, often spur innovation.

In the case of stormwater controls, low impact development (LID) techniques (see Page 13) could be the innovation that would allow developers and homebuilders to meet the rules for far less than what they think it will cost. The U.S. Environmental Protection Agency, in a study

published in 2007, found that commercial and residential LID projects cost as much 80 percent less than conventional designs.

**"THE FORECAST COSTS ARE ALWAYS WAY TOO HIGH BECAUSE WHEN THE REGULATIONS ARE PUT IN PLACE, BUSINESS ALWAYS FINDS A WAY TO DO IT CHEAPER,"**

— Dr. Eban Goodstein



*New stormwater rules in Brunswick County haven't depressed home building there.*

## PHASE II RULES DIDN'T SLOW DEVELOPMENT

Steve Stone can't figure out what all the fuss is about, why some of his counterparts in other coastal counties are complaining about the state's new coastal stormwater rules. As the assistant county manager in Brunswick County, Stone has lived under similar rules for almost eight years now.

"I'm confused as to why there has been such an uproar," he says. "Engineers and developers here have not been saying to us that it is too hard to comply with our regulations. We're a little puzzled by some of the issues others are raising about the new rules."

Brunswick County in September 2002 enacted countywide stormwater regulations to comply with so-called "Phase II," federally mandated stormwater rules that affected medium-sized cities and counties in the state. New Hanover and Onslow counties came under the program last year. The state closely fashioned the new coastal stormwater rules after Phase II. They're scheduled to go into effect in the other 17 coastal counties on Aug. 1.

Developers, homebuilders, real-estate agents and some government officials in those 17 counties have been trying for almost a year to derail the new rules with

outlandish tales of economic ruin. Development will come to a halt if the rules are enacted, they claim. Home prices will skyrocket and property values will plummet.

You wouldn't know it in the three coastal Phase II counties, said Tom Reeder, former head of the Division of Water Quality's wetlands and stormwater branch. "There has been no significant downturn in the permits in those counties," said Reeder, now the deputy director of the N.C. Division of Water Resources. "We've actually had to hire people down there to get the permits out. There's been no economic slowdown down there because of the rules."

Brunswick County has been among the fastest-growing counties in the country for the past three years. The historic boom, Stone noted, took place while the county's Phase II rules were in force. "2005 and 2006 were the biggest years for development in Brunswick County ever," he said. "If our rules had a deterrent effect on development, I hate to think what development would have been like without the rules."

# LID: A Way to Grow Smarter

Contaminated runoff, as you have read by now, is the main source of water pollution in coastal North Carolina. Low impact development offers a way to stem the polluted tide generated by a new wave of development along the state's coast.

More than a million new residents will move to Eastern North Carolina by 2025. Accommodating this growth while still protecting our beautiful beaches and bountiful coastal rivers and sounds will be one of our major challenges.

The reason is simple: More people mean more roads, more rooftops, more driveways and more parking lots. More rain will run off these hard surfaces. How we control the increased stormwater they will generate will determine the future health of our coast.

The traditional ways of dealing with stormwater – the ponds and ditches and swales – haven't been very effective. We have, for instance, lost more than 100,000 acres of our most sensitive shellfish-growing waters to stormwater contamination in the last 20 years. It's time to grow smarter.

Low Impact Development, or LID, can help us do that. This is a relatively new approach to designing and developing land that reduces and often prevents stormwater pollution.

Instead of clear-cutting a construction site and moving mountains of dirt, LID developments work with the land, mimicking the safeguard that nature provides.

In a mature coastal forest, very little rainwater runs off the land and into the water. It slowly soaks into the

ground to nourish trees and plants and to recharge streams, groundwater and wetlands. The rainfall can also pool on the surface where it evaporates.

## BENEFITS OF LID

### TO THE COASTAL ENVIRONMENT

- Helps protect water quality by reducing sediment and stormwater pollution
- Protects shellfish growing areas and beaches from bacterial contamination
- Preserves trees, natural vegetation and open space
- Helps recharge groundwater aquifers and supplies

### TO DEVELOPERS

- Reduces costs of infrastructure such as curbs, gutters and stormwater ponds
- Reduces costs of site grading and clearing
- Helps meet state stormwater regulations
- Can help produce more attractive developments that sell faster
- Can increase the number of lots by reducing the size of stormwater ponds

### TO LOCAL GOVERNMENTS

- Balances growth with environmental protection
- Helps reduce flooding
- Helps reduce the cost of maintaining curbs, gutters and other infrastructure
- Promotes positive public and private partnerships in stormwater management
- Creates more attractive neighborhoods

### TO HOMEOWNERS

- Creates aesthetically pleasing landscape gardening
- Attracts birds and butterflies
- Provides free water for landscaping
- Helps reduce yard flooding

LID tries to mimic this natural hydrology. It can be very effective in protecting water with proper site design, construction and long-term maintenance. A variety of LID techniques can also be used to improve existing development.

LID techniques include rain gardens, cisterns, using native plants, minimizing land disturbance, reducing impervious surface and clustering buildings along natural drainage patterns. These small-scale approaches used throughout a development capture rainwater as close to where it falls as possible, before it has a chance to become polluted runoff.

Not only can it reduce stormwater, but LID can make communities greener and more beautiful and, in many cases, can save developers money by reducing the costs of preparing a site and of building and maintaining stormwater infrastructure. It's also proven to be very versatile and can be used with residential, commercial and industrial projects and for "retrofitting," or fixing, existing sources of stormwater.

You can learn more about LID in a publication put together by the staff of the N.C. Coastal Federation. Low-Impact Development for the North Carolina Coast can be found at [www.nccoast.org/publication/publications/LIDNC](http://www.nccoast.org/publication/publications/LIDNC).

land to fix existing stormwater problems. As an incentive, the program will pay 75 percent of the average installation costs of these practices. Those practices include such low impact development techniques as rain gardens, cisterns, conversion of impervious surfaces, permeable pavement and backyard wetlands.

**N.C. Clean Water Management Trust Fund:** The N.C. General Assembly in 1996 established the fund to help local governments, state agencies and conservation non-profit groups finance projects to protect and restore surface water quality. About six percent of the fund's grants since 1997 have been spent to control stormwater.

**Section 319 Grants:** Congress amended the federal Clean Water Act in 1987 to establish the section 319 Nonpoint Source Management Program because it recognized the need for greater federal leadership to help focus efforts to identify and control stormwater pollution. States receive grant money, which is available to local governments, state agencies and nonprofit groups to support a wide variety of activities including technical and financial assistance, education, training, technology transfer, demonstration projects and monitoring.



Low-impact development requires looking at development different. Here is a site plan using conventional development techniques (top), which will result in a monotonous, cookie-cutter subdivision that will produce a huge flow of stormwater. The LID concept clusters the houses and creates large swaths of green space that will buffer stormwater.

## LID DESIGNS SHOWN TO SAVE DEVELOPERS MONEY

About half the 200 houses in the Somerset subdivision outside Washington were built as a conventional subdivision using curb and gutters, stormwater ponds and the like. LID techniques were used on the other half. Using LID saved the developers almost \$800,000.

Somerset isn't unique. The U.S. Environmental Protection Agency studied 17 residential and commercial developments to compare the costs of conventional designs to those that used LID methods. LID saved developers 15 percent to 80 percent in capital costs compared to conventional methods, the EPA concluded in a report released in December 2007. The report also noted that LID practices led to less polluted runoff and were generally better for the environment.

The more developers integrated LID into the site planning, the more they saved. At Somerset, developers eliminated the four ponds to hold runoff in the LID section, knocking \$650,000 off construction costs. Removing the attendant pipes and ditches saved another \$150,000. Building roads without curbs and gutters trimmed an additional \$350,000 off the final costs. Add the \$370,000 for the needed rain gardens and the savings totaled \$780,000.

NCCF asked N.C. State University to do a similar comparison in North Carolina in early 2007. That study developed an alternative LID plan for a 39-acre subdivision that was originally designed using conventional methods and included an 8,500-square-foot stormwater pond. The LID alternative converted driveways and portions of roads from asphalt to pervious concrete and added a rain garden along a road. The study also evaluated the cost of further treatment of polluted runoff by putting more LID practices on individual properties.

Overall the study found that eliminating curbs and gutters and stormwater ponds and using narrower streets saved money. Developers could cash in on a real bonanza if the land reserved for the pond were then converted into developable lots.

## FEW PROGRAMS PAY TO CONTROL, REMOVE EXISTING STORMWATER SOURCES

*New regulations will only control new sources of stormwater. Dealing with stormwater from existing development and with the thousands of pipes and ditches that discharge polluted runoff into our coastal waters will be expensive and time consuming.*

*A few state and federal programs exist to help local governments and citizens:*

**Clean Water State Revolving Fund:** Congress provides the states with grant money to start revolving loan programs to assist local governments to pay for sewer plants and projects associated with estuary and nonpoint source programs. The states are required to provide 20 percent matching funds.

**Community Conservation Assistance Program:** The N.C. Soil and Water Conservation Districts started this new program to encourage local governments and individual landowners to use the best practices on their

## STORMWATER GLOSSARY

**Best Management Practices (BMPs)** – Strategies or engineered devices used to control, treat or prevent pollution from stormwater runoff. Strategic BMPs focus on pollution prevention, such as alternative site design, zoning and ordinances, education, and good housekeeping measures. Engineered BMPs include bioengineering, restoration and stabilization techniques that use plants, often native species, to mimic natural functions and benefits.

**Biofiltration** – The use of vegetation (usually grasses or wetland plants) to filter and treat stormwater runoff as it moves through an open channel or swale.

**Bioretention** – The use of vegetation in retention areas designed to allow infiltration of runoff into the ground. The plants provide additional pollutant removal and filtering. Also called rain gardens.

**Buffer** – A designated transitional area around a body of water or wetland left in a natural, usually vegetated state so as to protect the water from runoff pollution.

**Detention** – The storage and slow release of stormwater following a rain or snow, usually by an excavated pond, enclosed depression or tank. Detention is used to remove pollutants, store stormwater and reduce peak flows.

**Erosion** – Removal of soil particles by wind and water. Often the eroded silt or sediment becomes a pollutant in stormwater runoff. Erosion occurs naturally but can be intensified by human activities such as farming, development, road-building and timber harvesting.

**Hydrology** – The science addressing the properties, distribution and circulation of water across the landscape, through the ground, and in the atmosphere.

**Impervious Surface** – Hard constructed surfaces, such as asphalt, concrete or rooftops that prevent or retard rain from entering the soil and increase runoff.

**Infiltration** – The process or rate at which water percolates from the land surface into the ground. Infiltration is also a general category of BMP designed to collect runoff and allow it to flow through the ground for treatment.

**Infiltration Basin** – A shallow depression designed to capture and hold runoff, which then soaks into the ground over several days.

**Non-Point Source Pollution** – Pollutants from many diffuse sources. Nonpoint-source pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into

lakes, rivers, wetlands, coastal waters and even underground sources of drinking water.

**Outfall** – The point where wastewater or drainage discharges from a pipe, ditch or other method of conveyance into to a body of water.

**Pervious** – Surfaces that allow the penetration of water into the ground.

**Point-source pollutants** – Pollutants from a single, identifiable source such as a factory or sewer plant.

**Pollutant loading** – The total amount of pollutants in stormwater runoff.

**Retrofit** – The modification of existing stormwater management systems through the construction and/or enhancement of wet ponds, wetland plantings, or other BMPs designed to improve water quality

**Runoff** – Water from rainfall or snowmelt that flows across the ground instead of infiltrating into the ground.

**Sediment** – Soil, sand, and minerals washed from land into water, usually after rain. Sediment can destroy fish-nesting areas, clog animal habitats, and cloud waters so that sunlight does not reach aquatic plants.

**Sheet flow** – The portion of precipitation that moves initially overland in very shallow depths before eventually reaching a stream or other water body.

**Storm drain** – An opening leading to an underground pipe or open ditch for carrying surface runoff, separate from the sewer system.

**Stormwater** – Precipitation that accumulates in natural and constructed storage and stormwater systems during and immediately following a storm.

**Stormwater management** – Functions associated with planning, designing, building, maintaining and regulating constructed and natural facilities that collect, store, control and convey stormwater.

**Swale** – A natural or human-made open depression or wide, shallow ditch that intermittently contains or conveys runoff. Can be used as a BMP to detain and filter runoff.

**Watershed** – Geographical area that drains to a specified point on a water course, usually a confluence of streams or rivers. Also known as drainage area, catchment, or river basin.

## Want to Know More?

There are thousands of websites devoted to stormwater and related subjects. Here are just a few we like.

### CENTER FOR WATERSHED PROTECTION [www.cwp.org](http://www.cwp.org)

Founded in 1992, the center is a non-profit corporation that provides local governments, activists and watershed organizations around the country with the technical tools for protecting streams, lakes and rivers. The center has developed and disseminated a multi-disciplinary strategy to watershed protection that encompasses planning, restoration, research and stormwater management.

### LOW IMPACT DEVELOPMENT CENTER [www.lowimpactdevelopment.org](http://www.lowimpactdevelopment.org)

The Low Impact Development (LID) Center is a non-profit organization dedicated to the advancement of LID technology. You'll find a lot here about design, rain gardens, cisterns and other LID techniques to control stormwater.

### NATURAL RESOURCES DEFENSE COUNCIL [www.nrdc.org/water/pollution/storm/stoinx.asp](http://www.nrdc.org/water/pollution/storm/stoinx.asp)

Stormwater Strategies is a NRDC report that documents some of the most effective strategies being used by communities around the country to control runoff pollution. The collection of 100 case studies is intended to serve as a guide for local governments and environmental activists, but it's also a comprehensive resource for anyone worried about the quality of their local environment.

### N.C. DIVISION OF WATER QUALITY [h2o.enr.state.nc.us/su/state\\_sw.htm](http://h2o.enr.state.nc.us/su/state_sw.htm)

This state website contains general information about stormwater and specific information about the new coastal stormwater regulations, including Power Point slideshows, facts sheets and the rules themselves.

### PORTLAND BUREAU OF ENVIRONMENTAL SERVICES [www.portlandonline.com/BES/index.cfm?c=defji](http://www.portlandonline.com/BES/index.cfm?c=defji)

In Eastern North Carolina, most local governments fight even minimal stormwater controls. It's at least refreshing to know that a place like Portland, Ore., exists. This is a town where the government gives you tax credits for controlling stormwater around your house or installing an "ecoroo" on your business, where "green" streets are mandated by law and citizens are encouraged to take tours of model stormwater projects.

### STORMWATER MANAGER'S RESOURCE CENTER [www.stormwatercenter.net](http://www.stormwatercenter.net)

Though aimed primarily for professionals, the site is chock full of information that anyone interested in knowing how to control polluted runoff will find useful. It contains fact sheets, slide shows on the latest science, model stormwater ordinances and manuals on the best ways to control runoff.

### STORMWATER SMART [www.stormwatersmart.org](http://www.stormwatersmart.org)

The site is the collaborative effort of 17 local governments in the Piedmont of North Carolina. It features the usual stuff — fact sheets, tips on controlling stormwater around the house and the like. It also shows middle-school students and their teachers how to identify and map stormwater problems at their schools and devise easy solutions. The thunderstorm sound effects are also pretty cool.

## Effects of Polluted Runoff Have Been Known for Decades ...continued from page 6

counties since 1950 and shellfish closures.

All of this got the attention of officials at the then N.C. Department of Natural Resources and Community Development. "These data demonstrate that standards for both shellfish protection and frequent body contact, i.e. swimming, are frequently violated as a result of stormwater discharges," they concluded in a 1985 report on coastal development and shellfish waters. "As coastal development continues, urban runoff will increasingly affect water quality. High density development with large areas of impervious cover will produce larger runoff volumes with associated pollutant loads."

Later research only reinforced that point and proved what Dr. William Kirby-Smith learned long ago: It's all about flow. A professor and researcher at the Duke University Marine Lab near Beaufort, Kirby-Smith has spent much of his professional career studying runoff. People too often focus on the sources of bacteria, he said. They are ubiquitous and mostly natural, except from the occasional failing septic tank or malfunctioning sewer plant. The bacteria don't normally pollute the water because on an undisturbed, natural landscape they usually don't make it there, he said.

"I focused on the sources when I first started," Kirby-Smith said. "It's only after I started working on this that I learned that, yes, you can concentrate sources. These are sources that are present in an unaltered watershed but the bacteria just didn't get transported to the water. The alteration of the landscape conveys the bacteria in some fashion."

Mallin's study clearly showed that roads and other types of impervious surfaces are the types of landscape alternations that can create runoff and move it quickly to the surrounding water. Pave over enough of a watershed and the water becomes so laden with bacteria, regardless of the sources, that the oysters and clams are unsafe to eat.

Among the creeks Mallin sampled, Futch and Pages had watersheds with the lowest percentage of impervious surface, less than 10 percent in both cases. The creeks also had the best general water quality, the lowest bacteria concentrations and the most open shellfish waters. Bradley and Hewletts creeks, on the other hand, were both extensively developed and highly populated. Almost 22 percent of Bradley Creek's watershed and 18 percent of Hewletts' were covered in impervious surface, the highest percentage among the five creeks Mallin studied. They also had the highest bacteria concentrations and the most area closed to shellfishing. From that, he reached the same conclusion that similar studies done in freshwater streams had reached — 10 to 12 percent impervious surface seems to be the tipping point. Exceed that in a watershed without controlling stormwater and the river or stream will be degraded. At 20 percent impervious surface, the water will be too polluted for shellfishing.

"The important thing about our research is that it's not there in a vacuum," Mallin said. "By that I mean, this was followed up about three years later in Charleston where they found the same relationship we did between imperviousness and shellfish closures."

That research by the University of Charleston studied 22 tidal creeks in South Carolina.

Tom Reeder has boxes full of such studies. As head of the N.C. Division of Water Quality's stormwater and wetlands branch, Reeder reviewed the research in 2005 before

concluding that the state's current coastal stormwater rules weren't working and had to be replaced with more effective rules, which were recently passed by the state's Environmental Management Commission. Opposition from special interests representing developers, home builders and the like began almost immediately. Despite more than 20 years of research, opponents have maintained that not enough is known about stormwater.

"Every shred of scientific literature that has been written on impervious surface and shellfish waters — There are just dozens and dozens of studies. I have a stack nine inches high in my office — all say that when you exceed 10 percent impervious surface without structural stormwater controls, you will affect water quality," Reeder said. "Opponents of the new rules have had three years to put together scientific evidence to prove us wrong. They haven't done it because it's not out there."

## Dozens of Studies Connect Stormwater and Bacteria ...continued from page 6

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The state's coastal stormwater program has failed to protect the public's safety as this photo of a shopping center after a moderate rain shows. Numerous detention ponds permitted under the program failed to contain the resulting runoff.

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## Stormwater Rules Have a Fractured and Fractious History ...continued from page 7

meeting. "You had one faction meeting void of the other. That was illegal. It was more or less a slap in the face to those of us who weren't invited. Just the audacity to do that."

The N.C. attorney general agreed a week later when he said the motel gathering violated the state's Open Meetings Law and warned that any action taken by the EMC could be legally challenged. Martin ordered the EMC to take another vote. It did, with no change in the outcome.

Newspapers across the state editorially lambasted the EMC. "Partisan politics and business are running roughshod over efforts to protect our marine resources," the Carteret County News-Times bellowed. One paper suggested that the EMC change its name to the "Environmental Make Believe Commission."

Barber, who was off the EMC by 1987, is more charitable. "I was sorry we didn't get the regulations we wanted but I was impressed that we got regulations," he now says. "That left work to be done in the future essentially, but a lot of people didn't think that anything would pass."

No one could guess, though, that it would take 20 years for that future work to get done.

# 2007 Pelican Awards

## LIFETIME ACHIEVEMENT

Orrin H. Pilkey

## LEGISLATOR OF THE YEAR

Speaker Rep. Joe Hackney

## STATE GOVERNMENT OFFICIAL

Dr. Charles "Pete" Peterson

## NORTHEAST COAST

### BUSINESS OF THE YEAR

Coastal Plains Conservation Nursery

### LOCAL GOVERNMENT

Currituck County

### CITIZEN ACTION

No OLF

### ENVIRONMENTAL EDUCATION

John McCord

### NCCF VOLUNTEER OF THE YEAR

Ginger Webster

### CONSERVATION & RESTORATION PROJECT

Thomas White Jr.

## CENTRAL COAST

### BUSINESS OF THE YEAR

Creative Carpentry & Woodworking Inc.

### LOCAL GOVERNMENTS

Onslow Co. Soil & Water District

### CITIZEN ACTION

Carteret Crossroads

### ENVIRONMENTAL EDUCATION

Tanya Scott

### NCCF VOLUNTEER OF THE YEAR

Beth Moulton

### CONSERVATION & RESTORATION PROJECT

Hammocks Beach State Park

## SOUTHEAST COAST

### BUSINESS OF THE YEAR

Freedom Lawns

### LOCAL GOVERNMENT

Town of Kure Beach

### CITIZEN ACTION

Cape Fear Climate Action Network

### ENVIRONMENTAL EDUCATION

Andy Wood

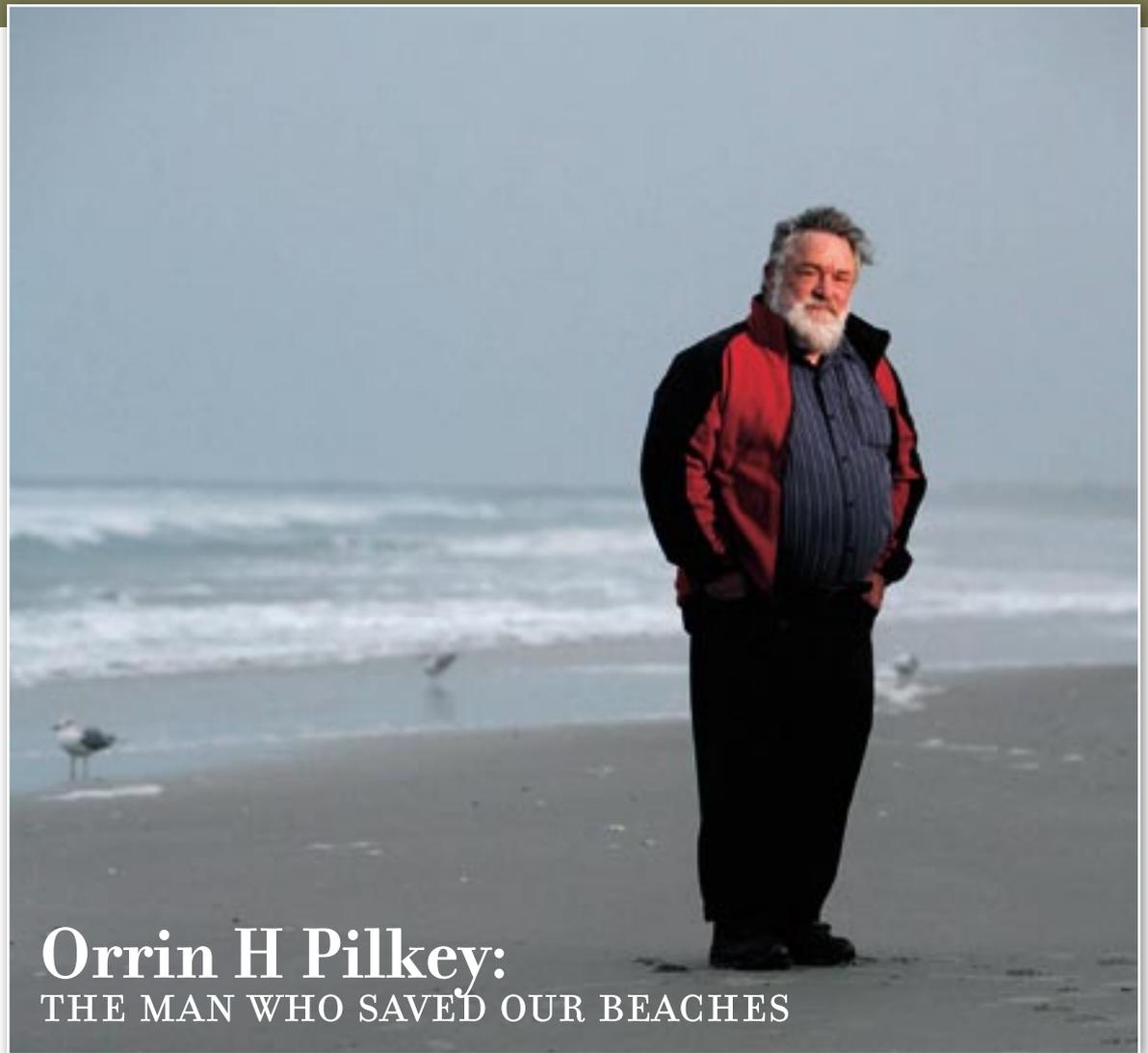
### NCCF VOLUNTEER OF THE YEAR

Rich Peruggi

### CONSERVATION & RESTORATION PROJECT

The Bottoms Neighborhood Empowerment Association

## LIFETIME ACHIEVEMENT



## Orrin H Pilkey: THE MAN WHO SAVED OUR BEACHES

It's hard to find anyone who doesn't have a strong opinion about Orrin Pilkey. People either love him, hate him or love and hate him.

Pilkey started at Duke University in 1965. He happened to

### **NAME:** Orrin H. Pilkey

**POSITION:** Emeritus Professor of Geology, Duke University; Director of the Program for the Study of Developed Shorelines

**EDUCATION:** B.S. degree in geology, Washington State College; M.S. degree in geology, University of Montana; Ph.D. degree in geology, Florida State University

**AWARDS:** He received numerous awards, among them the Francis Shepard medal for excellence in marine geology in 1987, and in 1991 he was the N.C. Wildlife Federation Conservation educator of the year.

**PUBLICATIONS:** More than 150 technical publications and books

come to North Carolina just before coastal development exploded. His first book, *How to Live with an Island*, chronicled his explorations of Bogue Banks, when much of it still remained natural and unblemished, and the wanton destruction he witnessed as the island was cut up into subdivisions with little regard to its natural features and dynamics.

Pilkey is no shrinking violet, and he is not the type of scientist content to merely study the coast. He spoke up about what he saw happening to our ocean beaches and, especially,

about the dangers of flanking them with seawalls. His passion to wake people up to what we were about to do to our beaches

was unrelenting, and he was not ignored.

"You don't have an erosion problem until you build something too close to the water," is one of Pilkey's best-known quotes.

The N.C. General Assembly passed the Coastal Area Management Act in 1974, which designated the state's beaches and estuarine shorelines as protected. But it took more than a decade for Pilkey's message about seawalls to be translated into state rules. Adopted in 1985, they prohibited seawalls, jetties and groins along the oceanfront. North Carolina had officially decided that our public beaches should not be damaged in order to save private oceanfront property that was threatened by erosion.

Passing laws and rules such as a seawall ban tends to be the easy compared to getting such rules consistently enforced. Since the rules passed, Pilkey has remained vigilant in promoting our public beaches and recruiting others to continue his work.

Today it's hard to find anyone, even those who dislike Pilkey, who would publicly disagree with his fundamental belief that our ocean beaches are more valuable to protect than private oceanfront property. Generations to come will always owe a big debt of gratitude to Orrin H. Pilkey for being the person most responsible for saving our state's natural beaches, and for making sure that the North Carolina coast remains the envy of the nation.

## Legislator

### SPEAKER JOE HACKNEY

Joe Hackney has served in the N.C. House of Representatives representing Orange, Chatham and Moore counties since 1981. He has been a leading advocate for openness in government and ethics and lobbying reforms. Hackney was responsible for much of the significant environmental legislation in North Carolina for the past 26 years. An attorney by trade, Hackney was elected Speaker of the House in 2007. The Speaker does not introduce legislation, but he controls the legislative process in the House.

Hackney crafted a compromise in 2007 so that a bill restricting giant landfills could pass the House and become law. And he impeded the progress of a bill to allow small jetties on the beach by confining it to a committee.

Hackney has restored public faith that the legislature serves the people of the state, not just those with money and privilege. For this turnaround, the National Conference of State Legislators gave Hackney its Excellence in State Legislative Leadership Award.

## State Government Official

### DR. CHARLES “PETE” PETERSON

Controlling stormwater is a tough sell. Everyone wants clear, clean coastal waters, but not many are willing to do what is necessary to achieve it. As coastal waters continued to degrade and close to shellfishing and swimming, Dr. Charles “Pete” Peterson decided it was time for a sea change in the state’s coastal stormwater program. As a distinguished coastal scientist and a key environmental policymaker, Peterson was just the person to do it.

Most of the time, Dr. Peterson is teaching or performing research at the University of North Carolina’s Institute of Marine Sciences in Morehead City. He applies his scientific knowledge to policymaking as vice-chairman and the only coastal member of the state’s Environmental Management Commission. Dr. Peterson in 2007 ushered a revamped set of coastal stormwater rules through the EMC. When implemented, the new rules will require new construction to control their stormwater onsite and not send it downhill to pollute the nearest creek.

## NORTHEAST COAST

### Business

#### COASTAL PLAINS CONSERVATION NURSERY

It’s a natural partnership: NCCF and a business that grows native plants. We’d be buying plant stock from Ellen Colodney’s Coastal Plains Conservation Nursery near Edenton even if she weren’t a champion of clean coastal waters. Ellen has energetically supported the construction of rain gardens all along the coast. Ellen has not only provided a source for native plants; she’s helped assess sites for rain gardens and made suggestions about designs. She also serves on the federation’s Northeast Region Advisory Committee and keeps an eye out for coastal pollution.

## Local Government

### CURRITUCK COUNTY

When the federation and the N.C. Coastal Land Trust asked Currituck County officials if they’d help us go

through a planning process to identify properties that should be placed in conservation, we got an enthusiastic reception. For two years, the county, the conservation groups and a committee of stakeholders examined land maps to determine which properties might be held in open space to protect the waters of Currituck Sound, the North and Northwest rivers and their tributaries. The process included a GIS study that ranked the most important pieces of land. After the project was completed last fall, county planners asked the federation and the land trust to work with them to place conservation easements on key properties, especially those that can be linked together to create conservation corridors. That work is continuing.

## Citizen Action

### CITIZENS AGAINST THE OLF

It was supposed to be a battle that couldn’t be won. But residents of Beaufort and Washington counties didn’t want to sit by and let the Navy build an Outlying



Northeast Coast Citizen Action Award Winner: Citizens Against the OLF



Legislator Award Winner: Speaker Joe Hackney

Landing Field (OLF) on the county line. So they took their fight to the streets—or rather, the farm fields. The activists convinced other rural county residents that opposing the OLF wasn’t unpatriotic. On the contrary, it was the kind of fight that this country’s founders would have undertaken—a spirited defense of their homes. They garnered support from everyone in their communities, until No OLF signs were nearly as common as corn plants. They pored through documents, lobbied members of Congress and raised questions that had no good answers. To their surprise,



Northeast Coast Business Award Winner: Coastal Plains Conservation Nursery; owner, Ellen Colodney shown above

they won. Navy officials announced last fall that they were dropping the site from consideration.

## Environmental Education

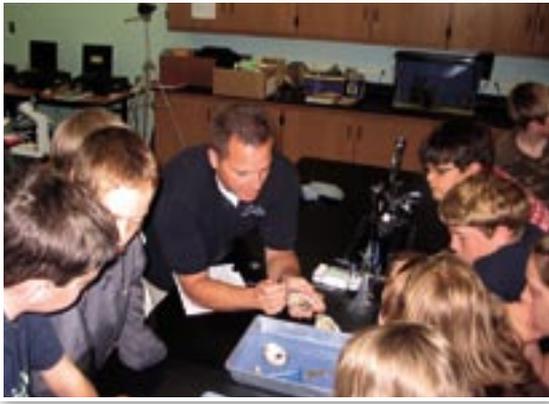
### JOHN MCCORD

John McCord moved to Manteo from California in 2005 to start an environmental education program for UNC’s Coastal Studies Institute. He quickly became known for his creative ideas and hands-on approach to teaching. At the Cape Hatteras Middle School, John runs a program in which eighth graders spawn and grow oyster spat. The project is designed to help students appreciate the estuarine ecosystem and the role of oysters in filtering coastal waters. John also runs a program at Dare County high schools in which students design and build remotely operated vehicles that are capable of doing research in the ocean. In a third project, John found ways for students to participate in designing a new, sustainable development that’s planned for a local landfill. Dare County is lucky to have him.

## Volunteer

### GINGER WEBSTER

There was no contest in 2007: Ginger Webster, a federation board member, spent hundreds of hours helping shape the group’s growing Northeast program. She chaired



*Northeast Coast Environmental Education Award Winner: John McCord*

the regional Advisory Committee, worked diligently on the Capital Campaign, planted rain gardens, reviewed applications for new staff and talked frequently with Coastkeeper Jan DeBlieu about how our efforts in the region should expand. Webster, a former administrator with the U.S. Environmental Protection Agency, has moved from her home on the Currituck Outer Banks to Martins Point in Dare County, where she lives with her husband Ralph.

## Conservation/Restoration Project

### THOMAS WHITE JR.

A gorgeous 6.5-acre tract with towering dunes and maritime forest on Roanoke Sound is safe from development, thanks to a conservation easement put in place by owner Thomas White Jr. Although small as conservation easements go, the acreage is on the desirable north end of Roanoke Island and was considered valuable real estate even in the current deflated market. Its wooded ridges are evidence of a time when Roanoke Island was filled with large, migrating dunes. White donated the conservation easement to the N.C. Coastal Land Trust.

## CENTRAL COAST

### Business

#### CREATIVE CARPENTRY & WOODWORKING INC.

As the founder of Creative Carpentry and Woodworking Inc., Joe Tarascio was a key partner in the Hoop Pole Creek Stormwater Retrofit Project in Atlantic Beach. Not only did he build a very sturdy, attractive and functional walkway for the stormwater project, but Joe did not hesitate when asked to build the boardwalk below the estimated cost. He believed in the projects' purpose as his construction practices are routinely focused on helping to control stormwater runoff. Joe also belongs to the North Carolina Home Builders Association's Hall of Fame, won the Carteret County's Builder of the Year Award twice, is the Home Builders Regional Vice President for Southeastern NC and has been appointed twice to serve on N.C. Code Council Ad Hoc Committees.

### Local Government

#### ONSLOW COUNTY SOIL AND WATER CONSERVATION DISTRICT

The Onslow County Soil and Water Conservation District and District Program Manager Bill Norris have taken the lead in a new program that helps towns, schools, businesses and

homeowners on the coast control stormwater. The N.C. Soil and Water Conservation Districts started the Community Conservation Assistance Program (CCAP) to encourage local governments and individual landowners to use the best practices on their land to fix existing stormwater problems. As an incentive, the CCAP will pay 75 percent of the average installation costs of these practices. The Onslow County district has been active along the central coast, including rain gardens and a cistern at Hammocks Beach State Park, shoreline restoration on Jones Island and cisterns at Sturgeon City in Onslow County.

### Citizen Action

#### CARTERET COUNTY CROSSROADS

From fighting a proposed liquefied propane gas terminal on Radio Island in the late 70s to birdogging the county land use planning process today, Carteret County Crossroads is a strong and consistent voice on local

which will expose students to the importance of preserving the fragile ecosystems of Carteret County.

### Volunteer

#### BETH MOULTAN

It was a sense of adventure that led Beth Moulton to the federation six years ago, and it is perhaps this same quality that has endeared Beth to the federation board, staff and members. Beth came to the headquarters office in 2002 to sign up to participate in a canoe trip. She walked out a volunteer and she's been volunteering weekly since. While Beth's main duties are to man the phones and reception desk with her friendly charm and efficiency, we've called on her many times with the unusual tasks that bear no volunteer job description. Like the times we needed someone to drive a donated truck back to the office or take a windy boat ride in 50 degree weather to meet some members. Every request is met with an energetic smile, that wonderful sense of adventure and the reply, "Sure – sounds like fun!"

### Conservation/Restoration Project

#### HAMMOCKS BEACH STATE PARK

Hammocks Beach State Park has shown a deep dedication to protecting and restoring habitat and water quality in Onslow County. Park officials have recently focused on reducing stormwater runoff into the adjacent sensitive shellfish waters of the Intracoastal Waterway and Bear Island Outstanding Resource Waters. Through a grant from the N.C. Clean Water Management Trust Fund, the park permanently removed nearly 50 percent of the impervious surface from the perimeter of a parking lot. This pavement was replaced with rain gardens to treat stormwater runoff from the remaining parking area. The project led to a reduction in the amount of polluted runoff entering the waterway.

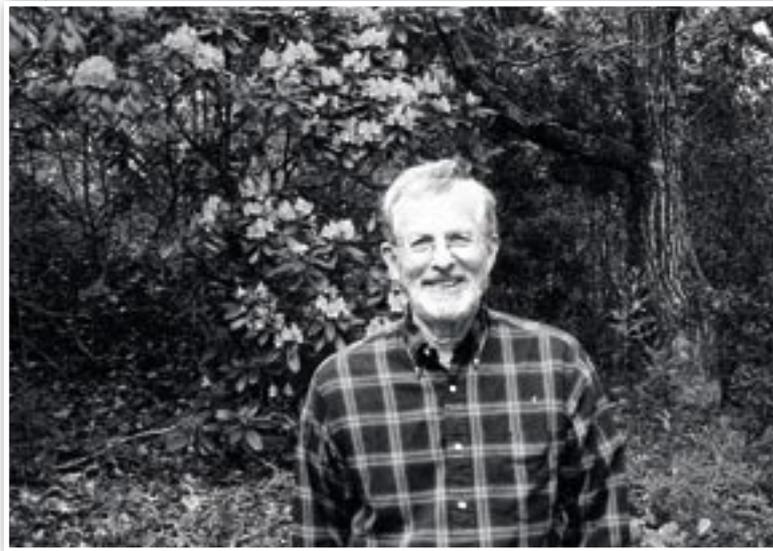
Current plans also include the installation of a cistern and rain gardens to further capture stormwater runoff. In the past, park officials replaced a wooden bulkhead with a living shoreline and restored oyster beds. These numerous projects demonstrate the park's superior efforts towards protecting and restoring habitat and water quality.

## SOUTHEAST COAST

### Business

#### FREEDOM LAWNS USA INC.

Mark A. Tamn started Freedom Lawns USA Inc. in 1999. As a professional in the lawn and landscape industry for more than 30 years, Mark wanted the company to be an alternative to conventional "fast-food" lawn care services. Freedom Lawns uses a regional specific approach that incorporates local soils and environmental conditions to reduce the need for excess watering, fertilizer and pesticide use. Freedom Lawns also has developed and emphasizes the use of organic, regionally specific fertilizers and an



*Northeast Coast Conservation/Restoration Project Award Winner: Thomas White, Jr.*

environmental issues affecting the land, waters and people of the county. The volunteer group organizes letter writing campaigns and other community action on issues they track, including the heated campaign on the new stronger coastal stormwater rules. The epicenter of opposition to the rules is in Carteret County and Crossroads members have joined with NCCF and others to provide a counterpoint to the concerted effort to defeat the rules.

### Environmental Education

#### TANYA SCOTT

Tanya Scott, a sixth grade teacher at Newport Middle School strives to broaden students' appreciation for the environment by involving them in programs such as the federation's Student Wetland Nursery Program and N.C. Big Sweep. Students in her class take part in a school-wide recycling program and help to maintain gardens on their campus. Tanya is currently working on an outdoor learning center that will include a covered classroom, plant specific gardens, compost bins, rain barrels, and other features

integrated pest management system to further reduce the use of harmful pesticides and excess fertilizers. Freedom Lawns works to provide lawn and garden services that are friendlier toward the coastal environment protect water quality and serve as a stewardship example for their customers and competitors.

## Local Government

### KURE BEACH

Nearly every time it rained, Kure Beach officials warned swimmers to stay 200 feet from 18 large storm-water drain pipes that line the beach. Rainfall meant that potentially dangerous bacteria polluted the Atlantic Ocean. The situation prompted the town and N.C. Department of Transportation to find a solution.

They partnered with researchers from N.C. State University's Biological and Agricultural Engineering Department, who designed an experimental infiltration system that uses large underground chambers to pass stormwater beneath the dunes. The stormwater filters through the sand instead of draining directly into the ocean. If the experiment proves successful - and preliminary tests indicate it will - soon significantly less stormwater runoff may flow into the ocean from outfall pipes. The Town of Kure Beach is committed and eager to install additional infiltration systems. And since outfalls that empty storm water into the ocean or sounds are common in many coastal towns, the Kure Beach experiment's results could benefit our state's entire coastal area and beyond.



*Central Coast Business Award Winner: Joe Tarascio of Creative Carpentry and Woodworking Inc.*

## Citizen Action

### CAPE FEAR CAN

Cape Fear CAN (Climate Action Network) was formed in the fall of 2006 when environmentalists, academics and social-justice leaders in the Cape Fear region began discussing how to address the global crisis of climate change at the regional and local level. Their first action was to hold a two-day community sponsored teaching conference at UNC-Wilmington entitled "Global Warming - What Do We Know? What Can We Do?" in June 2007 with over 350 participants. The groups continuing mission is to provide support, recognition and advocacy for local projects that make positive changes in response to climate change.

## Environmental Education

### ANDY WOOD

Whether you've heard him on the radio, tromped through a long leaf pine savannah with him or worked with him to preserve coastal habitats, you have been lucky to experience Andy Wood's knowledge and passion for the natural world. Andy's expertise and enthusiasm for the creatures and habitats of coastal North Carolina has led to thousands of educated and empowered adults and students and dozens of acres



*Central Coast Environmental Education Award Winner: Tanya Scott (right)*

of protected habitats. Andy is the Education Director for Audubon North Carolina where he is building partnerships with rural schools and other community organizations. Since 1987, Andy has reported his observations about nature in weekly radio commentaries on Wilmington's public radio station. A compilation of this work has been published in his first book, *Backyard Carolina: Two Decades of Public Radio Commentary*. He and his wife, Sandy, live in Hampstead with their two sons, Robin and Carson.

## Volunteer

### RICH PERUGGI

Rich Peruggi and his wife Claudia moved to Brunswick County from Connecticut in 2005 after retiring. Since that move he has hit the ground running through his community-minded interest in our coastal environment and more specifically the environs that make up the

Lockwood Folly River. Rich immediately became involved with the federation through the Lockwood Folly roundtable and has been an active presence ever since. He is a member of our Southeast Region Advisory Group. His activities include oyster reef bagging at Airle Gardens, the Brunswick low-impact development committee, water sampling on the Lockwood Folly River and the list goes on. Rich hopes his activism results in a healthier coast for us all.

## Conservation/Restoration Project

### THE BOTTOMS NEIGHBORHOOD EMPOWERMENT ASSOCIATION

A partnership of citizens, a university and state and local officials have built rain gardens and installed cisterns in an attempt to control stormwater that has contaminated Burnt Mill Creek in downtown Wilmington.

Watershed Education for Communities and local officials of N.C. State University, the school's Department of Biological and Agricultural Engineering, Wilmington officials and several other key state and local organizations and citizens groups obtained a federal grant to tackle stormwater management in the watershed.

They focused on The Bottoms, a dense urban neighborhood where flooding is common after storms. A citizen group, The Bottoms Neighborhood Empowerment Association, joined the effort and helped organize three educational workshops, install 11 rain gardens and distribute 65-gallon rain barrels. A large rain garden and 250-gallon cistern were installed at a school in The Bottoms to serve as an education and demonstration site for the community. A smaller rain garden was installed at a church in The Bottoms to demonstrate rain gardens for homeowners. Other rain gardens were built at private residences.



*Southeast Coast Conservation/Restoration Project Award Winner: The Bottoms Neighborhood Empowerment Association*

## North Carolina Coastal Federation

3609 Highway 24 (Ocean)  
Newport, North Carolina 28570  
252.393.8185  
www.nccoast.org



## Join The North Carolina Coastal Federation Today

### MEMBERSHIP APPLICATION

Yes, I want to help protect and restore our coast. Please enter my membership in the North Carolina Coastal Federation today.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_ Email \_\_\_\_\_

Individuals or Families  \$35  \$50  \$100  \$250  \$500  \$1,000

Businesses, Groups & Organizations  \$50  \$100  \$250  \$500  \$1,000

Additional benefits: \$100 level – NCCF hat; \$250 level – NCCF shirt and hat; \$500 level - NCCF hat and shirt and listing in NCCF's Annual Report; \$1,000 level – NCCF hat and shirt, listing in Annual Report and invitation to a private NCCF event.

Please make your check payable to NCCF and mail with this form to 3609 Highway 24 (Ocean) Newport, NC 28570 or complete the credit card information:

Name \_\_\_\_\_ Card:  Visa  MC  Am Exp.  Discover

Credit Card Number \_\_\_\_\_ Expir. Date \_\_\_\_\_

Signature \_\_\_\_\_

Membership fees minus the value of benefits received are tax-deductible. Fair market value of benefits are: \$35-\$50 level: 0; \$100 level - \$10; \$250 level - \$20; \$500 level - \$25; \$1,000 level - \$50.

Check here if you wish to waive benefits and receive the maximum deduction.

### Help Keep North Carolina's Coast Healthy and Beautiful!

Apply for NCCF's specialty license plate TODAY!  
Proceeds will be put to work protecting and restoring coastal North Carolina.



**TO ORDER:** [www.ncdot.org/dmv](http://www.ncdot.org/dmv) or your local license renewal office.

#### **Your membership donation will be used to:**

- Restore degraded coastal shorelines, wetlands and habitats
- Educate students about marine ecosystems and what they can do to keep them healthy
- Protect valuable shellfish waters
- Encourage good environmental rules and laws and their enforcement
- Educate decision makers about better ways to protect natural resources
- Purchase and protect land that is critical to water quality
- Engage the public in projects and activities that restore and protect the coast
- Help Keep the North Carolina Coast a spectacular place for future generations

#### **While your contribution is hard at work for the Coast, you can enjoy these member benefits:**

- Annual *State of the Coast* Report
- Discounts on events and workshops
- Members' Preview of annual native plant sale
- Quarterly newsletters
- Discounts in the Nature Shop
- Checkout privileges in the NCCF library
- Action Alerts

 Please recycle.