

In Our

# Nature



The State of the Environment  
in North Carolina

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## The State of the Environment in North Carolina

### Table of Contents

An Introduction from Secretary William G. Ross Jr.....	5	5 – The Art of Natural Resource Conservation .....	24	10 – Waste Not Want Not.....	48	17 – The Everyday.....	76
1 – From A to Z.....	6	Schooling Spadefish		Making Recycling Cool Again		Serving Small Businesses	
A is for Aquarium		Underwater Photo Contest		A Greasy Situation		Be Smart. Buy Smart. Know Your Choices	
Z is for Zoo		Arbor Day Poster Contest		Recycling Across Borders		A Dirty Job	
2 – Taking Stock .....	10	Wildlife in North Carolina Photo Competition		Solid Waste Management Act of 2007		Auto Inspections	
School Planning		Zoo Art		Partnering to Reduce Waste		Lights, Camera, Action	
Gorgeous Gorges		6 – And the Award Goes To... ..	28	11 – The DENR Risk-takers .....	52	18 – ABCs.....	80
County Bounties		An Air of Excellence		Code Purple		An “A” in Recycling	
The Birds and the Bees...And the Fish		SwEEPing Up the Awards		Helping in Times of Need		Sound Learning	
3 – The Elements .....	14	On the Leading EDGE		Nuclear Know how		A Zoo of a School	
Earth		A First in Sustainability		Team Slide		Get on the Bus	
Mapping Landslides		Safety is No Accident		12 – The Enforcers – Strong, Fair, Effective.....	56	The Morning Paper	
Cleaning Up a Landfill		It’s Good to Have a Plan		Law & Order		Envirothon	
Air		7 – Dem Bones .....	32	The Northeast Interceptor		Life on the Edge	
Forecasts Calling for...		A Lab on Wheels		A Healthy Enforcement Strategy		Environmental Mentors	
Positively Electric		Duckbilled Dinosaur		Two Divisions, One Vision		No Child Left Inside	
Fire		You Could Have Been an Underwater Archaeologist		CAMAraderie		19 – Gone Fishin’ .....	86
On the Scene – The EQ Fire		8 – In Partnership .....	36	Keeping Hazardous Waste in its Place		Local Catch	
The Evans Road Fire		Love-A-Tree		13 – Stewardship Enterprise .....	62	License to Fish	
Water		Enhancing Ecosystems		Forest Stewardship		20 – Thar She Blows.....	88
What’s Your River Basin?		Marine Patrol		Protecting Coastal Habitats		Hurricane Isabel, 2003	
Improving Richland Creek		Take a Child Outside		Oh, the Tonnage You’ll Save		Hurricanes Frances and Ivan, 2004	
4 – Animal Vegetable Mineral .....	20	Ranging in New Directions		Firewise		Hurricane Ophelia, 2005	
Animal		Pollution Prevention Goes Whole Hog		One Million Acres of Trees		21 – Is It Hot In Here? .....	92
Tracking Sea Turtles		I’d Know That Stream Anywhere		Sowing Your Oats		A Climate Action Plan	
A Mosquito by Any Other Name		FerryMon		14 – Rarities.....	66	The Climate Registry	
A New Order		9 – Get Going.....	44	Hawksbill Sea Turtle		22 – Local Ties .....	94
Vegetable		N.C. Birding Trail		Rare Golden Sedge		The Pisgah Covered Bridge	
Local Produce		A Greenway Explosion		Saint Francis Satyr Butterfly		A Community Helper	
Agriculture Cost Share		Saddle Up!		15 – Mapping the Future of Conservation .....	69	Adkin Branch	
Mineral		Places to Hike, Bike and Paddle		One NC Naturally		A Boy and His Aquarium	
North Carolina Treasures				Mapping Specialties		Community Conservation	
				Surveying Shellfish Waters		23 – Every Drop Counts .....	98
				Stormwater Mapping		Water Advisory	
				16 – Marching In Step .....	72	Saving for a Rainy Day	
				Buffering the Edges		Water-Saving Tools	
				Fort Macon Restoration			
				Mapping Out the Defense			
				Sustainable Sandhills			



24 – Places to Go, Things to Do.....100

- Environmental Education Centers
- Chimney Rock – A Crown Jewel
- Discover the World Outside
- I'd Like to Make a Reservation
- Science Café
- Grandfather Mountain

25 – Good for Your Health .....104

- Shellfish Safety
- Beach Advisories
- Can It

26 – Far Afield .....106

- UNITE
- The Kabul Zoo
- The Baghdad Zoo
- Tracking Elephants in Uganda
- Where in the World is Brian Rosa?
- Recruited for Flounder
- An Invitation to South Korea

27 – Alternative Thinking .....110

- Energy Hogs
- Green Building Commitment
- Energy From Waste
- Going Solar
- A Bright Idea

28 – No Boundaries .....114

- Crossing the Line
- An UnSERPPASable Partnership
- Disaster Response
- Environmental Education in the Southeast

29 – Show Me the Money .....118

- Profiting from Parks
- Are You Going to Recycle That?
- Money Does Grow On Trees
- Awarding Assets
- What's Brown, Then Green and Making a Difference All Over?

30 – The Oyster Is Your World.....122

- Wherever the Spat Shall Land
- Plant Some Oysters in Your Garden
- Recycling Shells

31 – Invaders.....124

- Lionfish
- Aquatic Weed Control
- West Nile Virus

32 – New Digs .....126

- Green from the Ground Up
- Aquarium at Pine Knoll Shores
- Prairie Ridge
- Prolific Parks
- The Valerie H. Schindler Wildlife Learning Center at the Zoo

33 – All Things Are Connected .....130

- Restoring Purlear Creek
- In a Nutshell
- Raise a Glass to One-Stop Coordinators

Appendix.....134



# In Our Nature

## An Introduction...

It has been my great honor and privilege to serve as the department’s secretary for nearly eight years. It is sometimes pointed out that I have held the position longer than any of my predecessors. This accomplishment should not be attributed to my skills, but rather to the intelligent, hard-working and capable men and women that make up the department. They are the ones who work daily towards conserving and protecting our natural resources and ensuring a high-quality environment for all North Carolinians. Credit goes not only to those out in the field, but also to the many employees working behind-the-scenes in administrative offices within the department who keep things running and make all of our accomplishments possible. Credit also goes to our many partners.

In Our Nature is not your typical state of the environment report. While facts and figures are important in getting a clear picture of the health of North Carolina’s natural resources, I feel that facts and figures alone cannot express the wide breadth of talent, unique expertise and true grit demonstrated by the department over the past eight years. For those of you interested in a more in-depth look at the current state of the environment in North Carolina and the challenges we plan on tackling as we forge ahead, please refer to the Appendix on page 134.

In the pages between this introduction and the above-mentioned appendix, you will not find simply facts and figures – you will find stories. These are the stories of where this department has journeyed over the past eight years. They are stories of accomplishments made possible through tenacity and collaboration. They are glimpses into the lives of people who care deeply about their jobs and their commitment to North Carolina’s beauty and her people.

Read on, and you will meet the department’s risk-takers who fight forest fires and handle threats of nuclear hazards. Follow along as department educators lead North Carolina’s classroom teachers across mountains, along coastlines and even under the sea in cutting edge professional development programs. Learn about how One North Carolina Naturally has helped guide the conservation of a natural network of working lands and natural areas, and how natural treasures like Grandfather Mountain and Chimney Rock will be preserved and showcased for future generations. Discover how many of our state’s natural resource protection endeavors also benefit public health, the military and North Carolina’s economy.

Over the past eight years, the people of North Carolina’s Department of Environment and Natural Resources and our many partners have achieved great successes. The road ahead, however, is not without substantial challenges. Global climate change, clean and abundant drinking water and alternative energy resources are issues we must quickly and creatively address in the coming years, all while helping everyone realize the connections between our everyday choices and actions and the health of our shared environment and future. I am confident that the men and women of the department and our partners are up to these challenges. After you read this report, I think you will share that same confidence. Coming together to solve problems and develop new solutions and initiatives to improve North Carolina’s environment is what we do...it’s in our nature.

Sincerely,  
William G. Ross Jr.





The N.C. Department of Environment and Natural Resources has it all - from A to Z - where A is for aquariums and Z is for zoo! North Carolina's three coastal aquariums, as well as the N.C. Zoological Park in Asheboro, are all accredited by the Association of Zoos & Aquariums, or AZA. What does this accreditation mean? In order to be accredited, zoos and aquariums must achieve rigorous standards for animal care, education, wildlife conservation and science. Facilities are evaluated on animal environments and nutrition, enrichment opportunities, veterinary programs, conservation and research efforts, education programs and safety. The AZA accreditation is difficult to attain and speaks to the high standards for which North Carolina's zoo and aquariums strive for and achieve.

## A is for Aquarium

Three Marine Resources Centers were opened in 1976 along North Carolina's coast. It was in 1986 that these facilities were renamed the North Carolina Aquariums. The past eight years have been eventful for all three institutions.

*The N.C. Aquariums aren't just for fish! A green sea turtle at the Aquarium on Roanoke Island (C.P. "Buster" Nunemaker III) above; moon jelly (on next page) at the Aquarium at Fort Fisher. All photos courtesy of N.C. Aquariums.*

### N.C. Aquarium on Roanoke Island

By 2001, the recently renovated aquarium in Manteo had been open for several months. The new facility was twice its previous size and ready to serve visitors with new programs, its signature Graveyard of the Atlantic exhibit and new ways to educate and excite. A new Aquarium Confidential exhibit opened in 2006, giving guests a behind-the-scenes look at aquarium animal care. The Roanoke Island facility continues to plan for even more new projects including an onsite oyster research facility and an open ocean exhibit.



*The ray touch pool at the N.C. Aquarium at Pine Knoll Shores. Photo by Scott Taylor.*

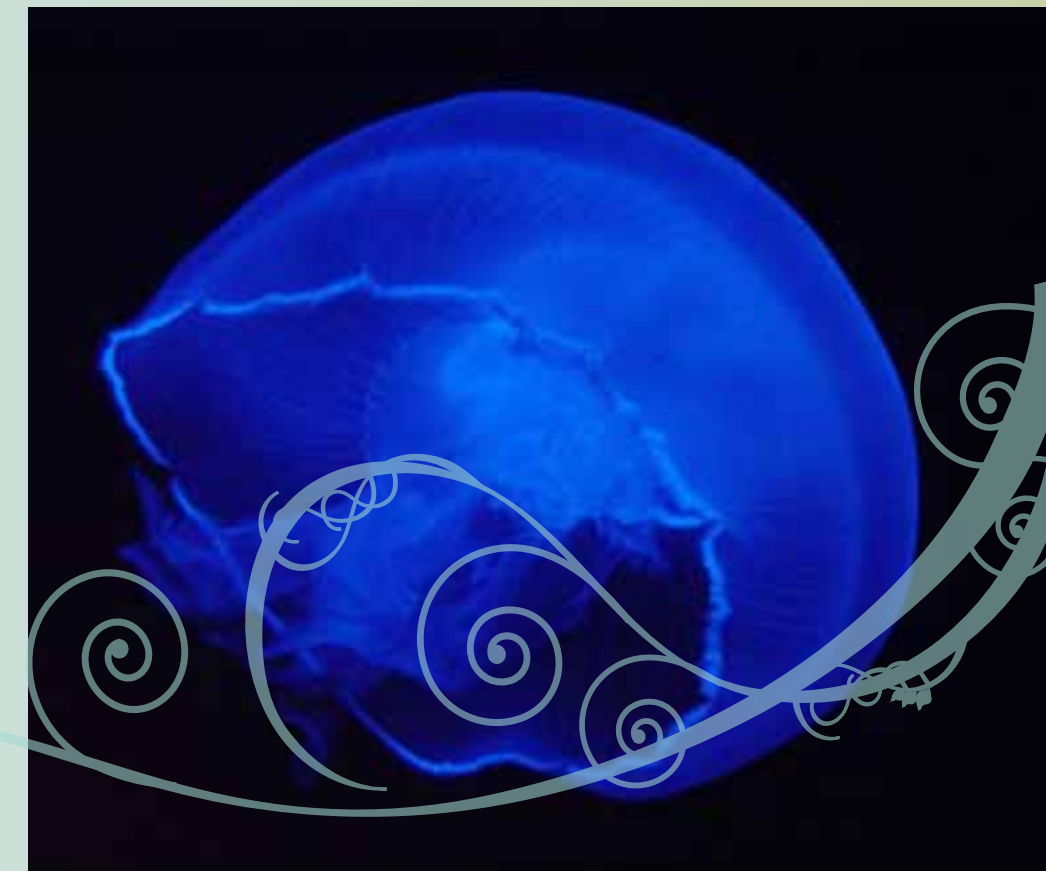
### N.C. Aquarium at Pine Knoll Shores

After being closed to the public for 2.5 years, in 2006 visitors to Bogue Banks were welcomed to the reopened N.C. Aquarium at Pine Knoll Shores. The new facility is 93,000 square feet in size, three times larger than the previous facility. Exhibits are based around a Mountains to the Sea theme, complete with a mountain waterfall. Other favorites of the new building include the sea otter exhibit and the 306,000-gallon Living Shipwreck exhibit.



### N.C. Aquarium at Fort Fisher

In March 2002, this N.C. Aquarium, located on Kure Beach, reopened its doors following a \$17.5 million renovation. It is triple the size of the previous facility and includes the stunning, half-acre large Cape Fear Conservatory. The following year three more exhibits were opened – Buzzard Bay, Seahorses and Loggerhead Legacy. New developments continued in 2005 with the unveiling of an Exotic Aquatics exhibit.





# Z is for Zoo



The N.C. Zoological Park was the first American zoo designed from the very beginning around the “natural habitat” philosophy, in which exhibits mimic as closely as possible the animals’ native environment. It was 1973 when the first animals arrived – two Galapagos tortoises. From that time on the zoo was continually planning, expanding and improving, and the past several years have been no exception.

In 2001 the zoo opened a redesigned entrance to its Africa section. Known as the *Akiba Market*, the ranger offices, gift shops and restaurant facilities recreate a Ugandan village. Also in 2001, the zoo’s chimpanzee exhibit reopened after more than two years under renovation. The *Kitera Forest* (“kitera” is the Ugandan word for chimpanzee) features a lush environment with a 25-foot high artificial climbing tree for its inhabitants.

Although known for animals from across the world, the N.C. Zoo does its part to help protect native wildlife as well. In 2001, the zoo and the North Carolina Zoo Society opened the Valerie H. Schindler Wildlife Rehabilitation Center. The purpose of the center is to care for injured and orphaned native animals until they can be returned to their natural habitat.

Another major expansion of the zoo took place in 2008 when the *Watani Grasslands Reserve* was completed. This area now houses the zoo’s elephants and rhinoceroses. The \$8.5 million expansion allows the elephants seven acres on which to roam, and the zoo’s Southern white rhinos enjoy 40 acres of African Plains habitat.



*The zoo’s elephants and rhinos got major habitat upgrades in 2008. N.C. Zoo photos.*



*A baby squirrel receives care at the N.C. Zoo Rehabilitation Center. N.C. Zoo photo.*





# Taking Stock

The Department of Environment and Natural Resources is the lead stewardship agency for the preservation and protection of North Carolina's natural resources. This is quite a responsibility, and it takes the work of many who are dedicated to inventorying and managing resources and populations.

## School Planning

From 2001 through 2008, the Division of Marine Fisheries has released 11 new or updated fishery management plans. Such a plan must be prepared for all of North Carolina's commercially and recreationally significant species or fisheries. Each plan is a colossal undertaking, incorporating information and research on stock assessments, habitat, pollution and social and environmental impacts. Input is obtained from fisheries, scientists and the public, and the final plan is usually about 250 pages in length.

*In 2004 the N.C. Marine Fisheries Commission adopted an amendment to the state's blue crab management plan. Blue crabs are North Carolina's top commercial fishery. N.C. Division of Marine Fisheries.*



## Gorgeous Gorges

Securing the land for a new state park is just the beginning. In 2001, a comprehensive natural heritage inventory was completed for Gorges State Park, North Carolina's first state park located west of Asheville. The department's Natural Heritage Program worked with researchers from N.C. State University, Western Carolina University and the N.C. Geological Survey to collect information that would enhance the interpretation of the park's impressive features while protecting the rare and sensitive elements in the park.

The geological inventory of Gorges State Park identified an active landslide. Most of us think of a landslide as a single, sudden event, but some landslides move only a few inches each year. The landslide in Gorges State Park could move, depending on rainfall, several inches to a few feet each year. The four-acre landslide presented a great interpretive element for park planners to incorporate, as well as an area on which they would definitely avoid any construction.



*Bearwallow Falls at Gorges State Park. N.C. Division of Parks and Recreation.*

Inventories by researchers identified several rare community types and rare species. "As plans are made for foot trails, roads and a park office," said Linda Pearsall, head of the Natural Heritage Program, "we want to put these in places that won't harm significant resources, but will give park rangers the chance to interpret them to the public."





*Both of these significant species can be found in Cumberland County.*

*Fox squirrel. Terry Shankle, N.C. Wildlife Resources Commission.*

*Bearded grass-pink orchid. Bruce Sorrie, N.C. Natural Heritage Program.*

## County Bounties

Each of the 100 counties in North Carolina has its own natural heritage that the Department of Environment and Natural Resources' N.C. Natural Heritage Program is working to map. Candace Williams, director of the Sandhills Area Land Trust's Cumberland County office, perhaps best explained the importance of the County Natural Heritage Inventory of her county. "This is the story of Cumberland, and it's never been told." The department's Natural Heritage Program conducts these inventories in order to identify the rarest examples of plant and animal diversity in North Carolina and designate Significant Natural Heritage Areas. These inventories inform conservation of our state's natural resources. As of 2008, 82 such inventories have been completed and another seven are underway.

## The Birds and the Bees...And the Fish

Over the past several years, the husbandry staff at the N.C. Aquarium at Fort Fisher have been successful in captive breeding programs for several species. The benefits of captive breeding are many – wild populations and habitat are not disturbed, fish are more likely to be free of parasites and disease, the stress of relocation is avoided and it can be an important tool in conserving threatened and endangered species. Some species for which the aquarium has been successful in establishing captive breeding programs include Atlantic sea nettles, black-banded sunfish, Carolina pygmy sunfish, European cuttlefish, lined seahorses and yellow stingrays.



*The European cuttlefish is one of the species with an established captive breeding program at the N.C. Aquarium at Fort Fisher.*





# The Elements

The idea of the four elements—earth, air, fire and water—goes back to Ancient Greece. While ancient in their derivation, these four elements are evident throughout the functions of the Department of Environment and Natural Resources. Here they provide a framework for sharing major events and accomplishments of the past eight years.

## Earth

### Mapping Landslides

In September 2004, hurricanes Frances and Ivan brought soaking rains to western North Carolina. The heavy rainfall from these storms triggered more than 400 landslides that killed five people, destroyed or heavily damaged 27 homes and blocked countless roads throughout the western part of the state. Many calls for assistance following these events came to the N.C. Geological Survey.

The N.C. General Assembly responded to the crisis with the Hurricane Recovery Act of 2005, which authorized and funded the Geological Survey to begin making landslide hazard maps for 19 of the state's western counties. The Geological Survey creates the maps using Geographic Information Systems (GIS) technology as well as Light Detecting and Ranging (LiDAR) high resolution digital elevation data collected as part of the N.C. Floodplain Mapping Program. While they rely on these modern technologies, the rapid progress they have made would not have been possible without also relying on geologic and soil mapping that had been ongoing for decades beforehand.

The landslide hazard maps show where landslides have happened or are happening, where rapidly moving landslides (called debris flows) are likely to start, the paths that debris flows are likely to take and areas where certain rock types, faults or other structures increase the potential for unstable slopes. Hazard maps have been completed for Macon and Watauga counties and are underway for Buncombe and Jackson.



*Rebecca Latham of the N.C. Geological Survey takes notes about the landslide that occurred in the White Laurel subdivision of Watauga County. Notice that the landslide shown began under the corner of the house, cracking the foundation. N.C. Division of Land Resources.*

### Cleaning Up a Landfill

In order to understand the significance of the Warren County PCB Landfill cleanup, you must go back to 1978. That is when a contractor working for the Raleigh-based Ward Transformer Company illegally sprayed more than 30,000 gallons of PCB-laden waste transformer oil along roadsides in 14 North Carolina counties. PCB stands for polychlorinated biphenyl and was once used in coolants and lubricants for transformers. PCB exposure may cause developmental and reproductive harm to people and is a likely carcinogen. For this reason, the Environmental Protection Agency designated the roadsides where the oil had been sprayed as a Superfund site in 1978. The Superfund program was established by the EPA to address abandoned hazardous waste sites.

It wasn't until 1982 that the contaminated soil was removed from North Carolina's roadsides. In an extremely controversial

decision, the state resolved to bury the polluted soil in a landfill located in the Afton community in Warren County. Warren County residents were vehemently opposed to the landfill's location. The residents' opposition and repeated demonstrations are considered to have elevated the issue of environmental justice to the national level. Eighty-four percent of the Afton community was African-American, and Warren was one of the poorest counties in North Carolina.

The residents of Warren County never gave up on having the landfill site cleaned and the land returned to the community. It wasn't until 2001 that work actually began on removing and cleaning the contaminated soil. In 2003, after more than 20 years, \$17 million and 81,000 tons of soil, the Division of Waste Management had decontaminated the Warren County landfill to a level 10 times cleaner than federal standards required.



*This aerial photograph shows the detoxification process nearing completion at the Warren County site in 2003. The black mounds are the piles of treated soil to be put back into the landfill. Photo courtesy of EarthTech Inc.*



# Air

## Forecasts Calling for...

As part of its Air Awareness Program, the Division of Air Quality has expanded North Carolina's air quality forecasting program. Air quality forecasts for ozone are now available for seven metropolitan areas across the state. In 2003, DAQ added particle pollution to the air quality forecasts for the Charlotte metropolitan area. Today, air quality forecasts for particle pollution are available for six metro areas in North Carolina.

The purpose of the Air Awareness Program is to increase public awareness about air pollution, its causes and ways to prevent it. Both ozone and particle pollution can cause health problems, especially among high-risk groups. Air Quality's color-coded forecasts make it easy for people to know when they may want to consider limiting strenuous activities, as well as what they can do to reduce both ozone and particle pollution.

## Positively Electric

In October 2004, 50 new parking spaces were installed at a truck stop in Orange County. Why is that newsworthy? These weren't just any parking spaces – they were electrified parking spaces! Diesel trucks account for a lot of air pollution in the state, and not just when they are on the road. Truck drivers must rest 10 hours for every 11 they drive, and many drivers, understandably, want to be able to use the heater, air conditioner, phone and Internet during these hours. That means that many of drivers idle their trucks while they are parked at truck stops. The electrified truck stop in Mebane allows drivers access to all of what they need without idling their engines.

The project was made possible through a grant from the National Association of State Energy Offices. The Division of Air Quality administered the grant in North Carolina. This makes sense, since the new facility prevents about 2,732 tons of carbon dioxide, as well as several other pollutants, from going into the air each year. In addition, truckers save money on fuel.

*Clean Air Clair and the Clean Air Maniac are mascots for the N.C. Division of Air Quality's Air Awareness Program. N.C. Division of Air Quality.*



*This electrified truck stop helps reduce air pollution caused by idling. N.C. Division of Air Quality.*

*EQ facility the day after the incident. N.C. Division of Waste Management.*



# Fire

## On the Scene – The EQ Fire

Who gets called when there is a fire? The fire department, of course, but sometimes divisions in the Department of Environment and Natural Resources get called as well. Several received calls in October 2006 after an explosion at the Environmental Quality (EQ) chemical storage plant in Apex. The toxics branch of the Division of Air Quality, Division of Water Quality staff and the Division of Waste Management's Hazardous Waste Section all became involved in the incident.

The air toxics team had set up air quality monitors surrounding the scene by daybreak the morning after the fire. They also carried out a study on the possible deposition of pollutants on homes and businesses located near the plant.

Division of Water Quality staff arrived at the scene in the early morning hours following the explosion and fire. Though they were not allowed to get onto the property right away, they went to a creek downstream of the plant and immediately took samples to measure for metals, pesticides and other potentially harmful contaminants.

Once they were allowed on the scene, they took additional samples and had their first chance to examine the berms that the firemen and others had built around the site to trap firefighting water and prevent runoff into nearby storm drains. The water quality samples taken downstream of the site came back clean, thanks to the effective job that first responders did to prevent negative water quality impacts.

The Division of Waste Management's Hazardous Waste Section was involved with the EQ fire and its aftermath longer than any other division. It was this agency that investigated the facility and the incident and ultimately levied fines against the company in 2007. In response to the incident, Gov. Mike Easley appointed a Hazardous Materials Task Force that recommended legislation that was passed in June 2007. The Hazardous Waste Section immediately began implementing this legislation, which enhanced financial, information-sharing and technical regulatory requirements for commercial hazardous waste facilities.





*Evans Road fire, looking north, up Evans Road to Lake Phelps. This was the western boundary of the fire. Vince Carver, U.S. Fish and Wildlife.*

### The Evans Road Fire

You know something is amiss when people on North Carolina’s coast are hoping for a hurricane. After fighting the Evans Road Fire for two weeks, however, the Division of Forest Resources’ emergency response crews would have welcomed a tropical storm. “It’s not that we want the damage from a strong tropical storm,” said Brian Haines, division spokesperson, “but we could use the rain.”

The fire was initially reported on June 1, 2008. A lightning strike had sparked the fire in Hyde County. Fueled by wind and exacerbated by the state’s worst drought in recent history, the blaze quickly spread over 40,000 acres. The Division of Forest Resources was on the scene as soon as the fire was reported and worked for months to bring the blaze under control. Firefighters from across the country joined them, bringing bulldozers, helicopters and planes to help put out the fire.

The blaze on the ground was only part of the concern. The Division of Air Quality measured particle pollution levels that were 30 to 60 times higher than the air quality standard. Emergency dispatchers all the way in Raleigh were getting hundreds of calls from people concerned about the smoke. Code red air quality alerts were issued for the Triangle, and code orange alerts were issued as far west as Winston-Salem. The DAQ also began issuing air quality smoke forecasts for the coastal region for the first time. The blaze was 100 percent contained on Sept. 24, 2008.

# Water

## What’s Your River Basin?

Everyone lives in a river basin, which is why it’s a great concept with which to connect people to their natural environment. The N.C. Office of Environmental Education has been producing the Discover North Carolina’s River Basins booklet since 2001. There are also brochures - one for each of the 17 basins in our state - that accompany the booklet. In 2007, a page was added to each of the river basin brochures letting folks know where they can hike, bike and paddle in each basin. This was done to expand the audience to whom the materials go, and also to help illustrate the importance of water quality and natural resources to the state’s recreation economy.

You may have noticed river basin signs posted along highways in North Carolina. These were created through a partnership between the Office of Environmental Education and the N.C. Department of Transportation. Signs in each of the state’s 17 river basins call attention to basin boundaries and promote stewardship of public waters.

### Improving Richland Creek



In 2006, Richland Creek in Haywood County was placed on North Carolina’s list of impaired waters due to bacterial contamination more than 10 times the allowable water quality standard. The Division of Water Quality began working with the local government and community interest groups to locate the sources of contamination. Failing sewer lines and septic systems were identified and repaired, and a door-to-door survey revealed additional septic system failure as well as straight-piping violations.

Repairs were made, and cost-share programs were used to help low-income homeowners get financial assistance to make necessary fixes. As a result of more than 200 water samples taken, seven sewer leaks, four sewer overflows and 12 failing septic systems were identified and repaired; 18 gray water discharges were removed; and two farms implemented best management practices to reduce the bacterial impacts of their sites. Bacterial levels are now near compliance levels, and Richland Creek will soon be removed from the list of impaired waters.


*The Office of Environmental Education’s brochure for the Pasquotank River Basin.*

### PASQUOTANK RIVER BASIN

What North Carolina river basin is 41 percent water, contains more national wildlife refuges than any other and has the fewest people? If you guessed the Pasquotank River Basin, you’re right. But these facts probably escape the notice of the millions of visitors who flock to the basin’s Outer Banks every year. They need only the region’s reputation for unsurpassed beauty and rich natural heritage to entice them.



Most tourists come to see the lighthouses, and to fish, hang-glide, windsurf and swim. They clamor to scale the tallest natural sand-dune system in the eastern United States (Jockey’s Ridge). They travel to the barrier islands to witness the fall migration of thousands upon thousands of ducks, geese and swans and to bear tribute to the first power plant in the world.



**profile:**

- Total miles of streams and rivers: 474
- Total acres of estuary: 918,223
- Total miles of coastline: 110
- Municipalities within basin: 11
- Counties within basin: 10
- Size: 3,635 square miles
- Population: 118,913 (2000 U.S. Census)

*Roanoke Island Lighthouse, Cape Hatteras National Seashore (left); Jockey’s Ridge, the tallest natural sand dune system in the eastern United States, fluctuates between 80 and 120 feet high (below).*



*Water monitoring in Richland Creek. N.C. Division of Water Quality.*



# Animal, Vegetable Mineral

## Animal

### Tracking Sea Turtles

North Carolina is fortunate in that five of the seven species of sea turtles visit our shores. The most common to nest on North Carolina's beaches is the loggerhead. All sea turtles are currently listed as either endangered or threatened under the Endangered Species Act, and several Department of Environment and Natural Resources agencies are working hard to study and protect these majestic creatures.

The N.C. Aquariums each run a sea turtle rehabilitation program where injured turtles found on the beach can be nursed back to health. In 2003, staff began tracking some of the loggerheads being released through the use of satellite transmitters. Satellite signaling devices are attached to the turtles' shells, which allow both scientists and the public to track their travels. A sea turtle's life is spent almost exclusively at sea, so satellite tracking technology allows humans to follow along on a journey that was once a complete mystery.

Animal, vegetable or mineral? All things are supposed to fit into one of these categories as a simple way to make sense of the world. Whether discovering new species, exploring the miles traveled by our produce or displaying the gems of North Carolina, the Department of Environment and Natural Resources is intimately familiar with all three categories.



*A loggerhead sea turtle is released with a satellite-signaling device attached to its shell. N.C. Aquariums.*



*A loggerhead hatchling can fit in the palm of your hand.  
Photo by Claire Aubel, N.C. Aquariums.*

### A Mosquito by Any Other Name...

Some folks would be offended to have a mosquito named after them, but not Dr. Bruce Harrison of the Division of Environmental Health. In 2007, he was honored for his many contributions toward understanding the mosquito genus *Anopheles* by having a species in this genus named after him, *Anopheles harrisoni*. That's not the first time, either. Dr. Harrison's name can be found on four species and one genus of mosquito and one species of chigger!

"For the last 43 years, I have worked on the prevention of human diseases that are transmitted by insects," said Harrison. "This vocation has been exhilarating as it allows me to travel, meet people, work outdoors and, last but not least, learn something new every day." Dr. Harrison has worked to improve the surveillance and control of mosquito- and tick-transmitted diseases in North Carolina. He assisted the Centers for Disease Control and Prevention with mosquito surveillance following Hurricane Katrina. "Bruce Harrison is one of the premier mosquito toxicologists in the world," said Dr. Charles Apperson, William Neal Reynolds Professor of Entomology at North Carolina State University. "He is a tremendous person and a valuable resource in the area of vector biology and management. We are very lucky to have him in North Carolina."

### A New Order

You have to look hard to find something only one-half inches long in the coastal rain forests of Southern Alaska and British Columbia, Canada. Rowland Shelley, curator of terrestrial invertebrates at the N.C. Museum of Natural Sciences, and his colleagues didn't just find something on an expedition funded by a grant from the National Geographic Society. They discovered a brand new order of millipede, the first for a millipede new to science since 1894!



*Millipede discovered by Rowland Shelley.  
Photo by Art Bogan, N.C. Museum of  
Natural Sciences*





# Vegetable

## Local Produce

The food we eat nourishes us and gives us energy to live. The food we eat also needs energy to be grown, raised transported and stored. Many factors play a part in determining the environmental consequences of food. One factor that can have quite an impact is where our food comes from. Was it raised locally, or did it travel great distances to reach our table?



*The Office of Environmental Education's produce postcard.*



The Office of Environmental Education developed local produce information postcards for distribution at farmers markets, local shops and other sites as part of its Informed Consumer Initiative. This initiative does not tell people what to buy or where to buy it, but rather highlights many of the issues surrounding our everyday actions and choices and the costs and benefits associated with them.

## Agriculture Cost Share

Nonpoint source pollution is the primary source of degradation of North Carolina's streams and rivers. Agricultural activities can be a major source of such pollution, which is why the Division of Soil and Water Conservation launched the Agriculture Cost Share Program in 1983. The program was originally piloted in a 16-county area, but due to the program's success has since been extended to all 100 counties in North Carolina.

Through the Agriculture Cost Share Program, participating farmers receive up to 75 percent of the average cost for installation of best management practices aimed at keeping valuable soil and nutrients on farmers' fields and out of waterways. These include projects such as sediment control basins, riparian buffers and stream restoration. Technical assistance is also provided. From 2001 through 2008, the Agriculture Cost Share Program has kept 1.9 million tons of topsoil and 13 million pounds of nutrients out of area waters.

*A field border (seen on the left-hand side of the photo) is one of the many sediment and nutrient management measures that farmers can use to protect water quality. N.C. Division of Soil and Water Conservation.*



# Mineral

## North Carolina Treasures

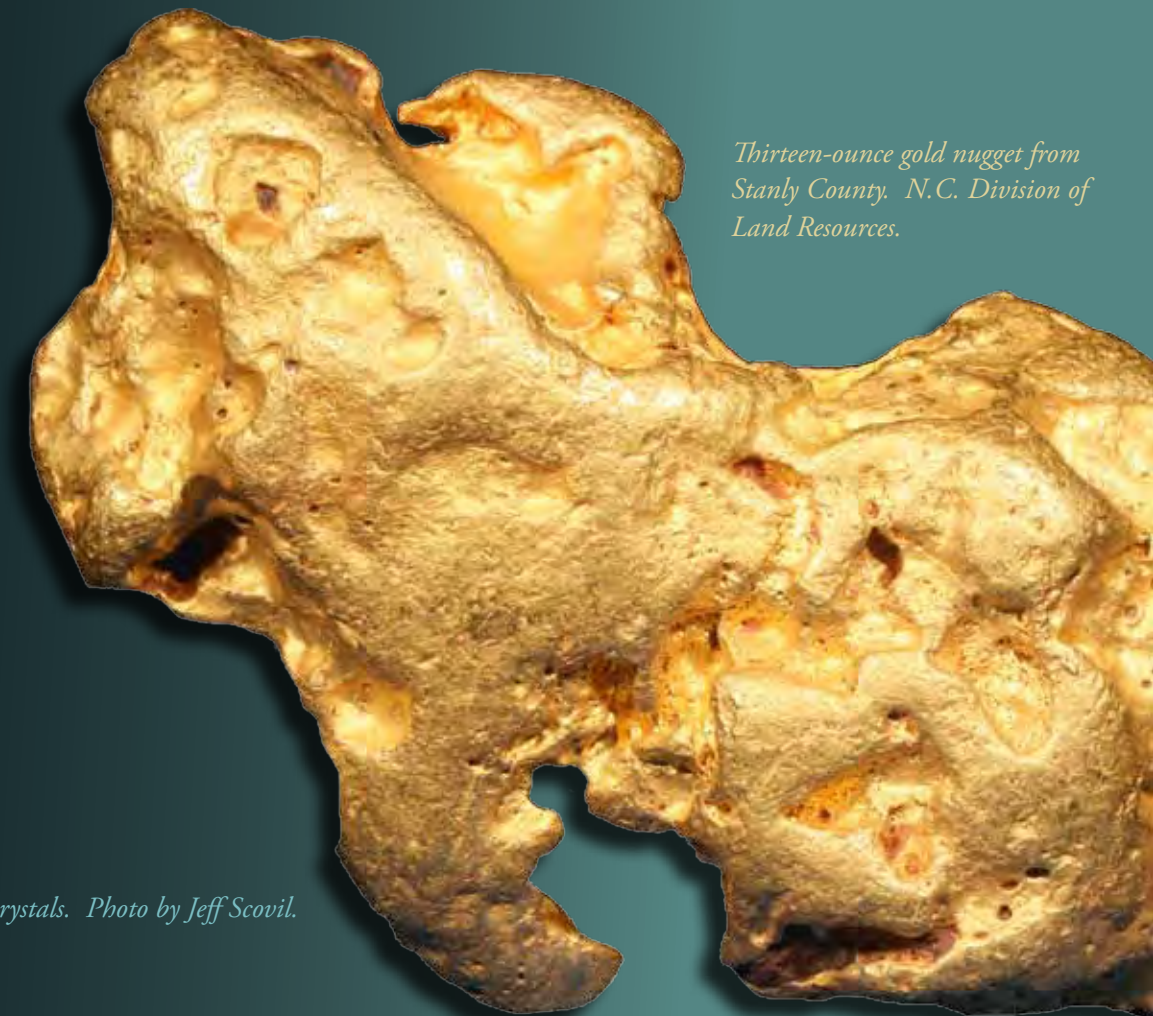
North Carolina's incredible geologic diversity has created spectacular treasures—emeralds, rubies, sapphires, gold and more—that were formed in darkness, underground, over millions of years. They are the history of the ground we walk on, Earth's original buried treasures.

With an unmatched eye for beauty and a remarkable knowledge of North Carolina geology, an anonymous collector amassed an amazing array of these gems and minerals. The collection comes from all over the state, many specimens from mines that no longer exist. In 2004, the N.C. Museum of Natural Sciences presented Treasures Unearthed, giving the public their first chance to view this stunning assortment—the largest collection of North Carolina's gems and minerals ever displayed.

This was the first exhibit to be completely created by museum staff, a process that involved building display cases, a recreated gold mine and a hands-on learning lab, as well as intricate detail work such as creating mounts for the various gems. They did such a fabulous job that, at the close of the exhibit, the owner was determined that his collection would be permanently housed at the museum. In 2006, the museum unveiled the permanent North Carolina Treasures Collection.



*Bright red rutile with tiny quartz crystals. Photo by Jeff Scovil.*



*Thirteen-ounce gold nugget from Stanly County. N.C. Division of Land Resources.*



# The Art of Natural Resource Conservation



North Carolina's incredible natural resources have been an inspiration to countless artists. Painters, photographers, sculptors — all have been moved to create art based on what they saw in the natural world across our state. The Department of Environment and Natural Resources seeks not only to highlight this art, but also to encourage its creation as well.



*Wood duck photo by Carmen Johnson. 2007 first place winner in aquarium photo competition.*

## Underwater Photo Contest

Each year the N.C. Aquariums highlight the state's aquatic diversity by hosting an underwater photo contest. Images can be submitted that were taken off of North Carolina's coast, within the state's freshwater system or at one of the three aquariums.



*Blackbar soldierfish photo by Chris Smith. 2007 first place winner in underwater photo contest.*

## Arbor Day Poster Contest

Every year the Division of Forest Resources, in partnership with the National Arbor Day Foundation, has hosted an Arbor Day Poster Contest for fifth grade students.

*Preston Willen of Fayetteville accepts his award as the North Carolina winner of the 2008 National Arbor Day Poster Contest.*



*The Schooling Spadefish sculpture greets visitors to the N.C. Aquarium at Pine Knoll Shores. N.C. Aquariums.*

## Schooling Spadefish

Sculptor David Turner's 15 Atlantic spadefish grace the outside of the N.C. Aquarium at Pine Knoll Shores. The sculpture is cast out of bronze and weighs 3,000 pounds.





*First place in Peaks, Valleys & Plains  
by Scott Hotaling.*

## Wildlife in North Carolina Photo Competition

In 2005, the N.C. Museum of Natural Sciences teamed up with the N.C. Wildlife Resources Commission to sponsor the inaugural Wildlife in North Carolina Photo Competition. Winning images were placed on exhibit at the museum.

*Honorable Mention in Youth Photographer  
13-17 category by Michael McCloy.*



*Stone that stands in an Empty Sky sculpture detail.  
N.C. Zoo photo.*

## Zoo Art

The N.C. Zoological Park has been committed to creating a climate that recognizes the potential for artists, art works and arts programming to enhance the zoo's vision. The zoo sees art as a "sensory bridge," connecting visitors to the zoo experience and expanding their appreciation and awareness of the natural environment.

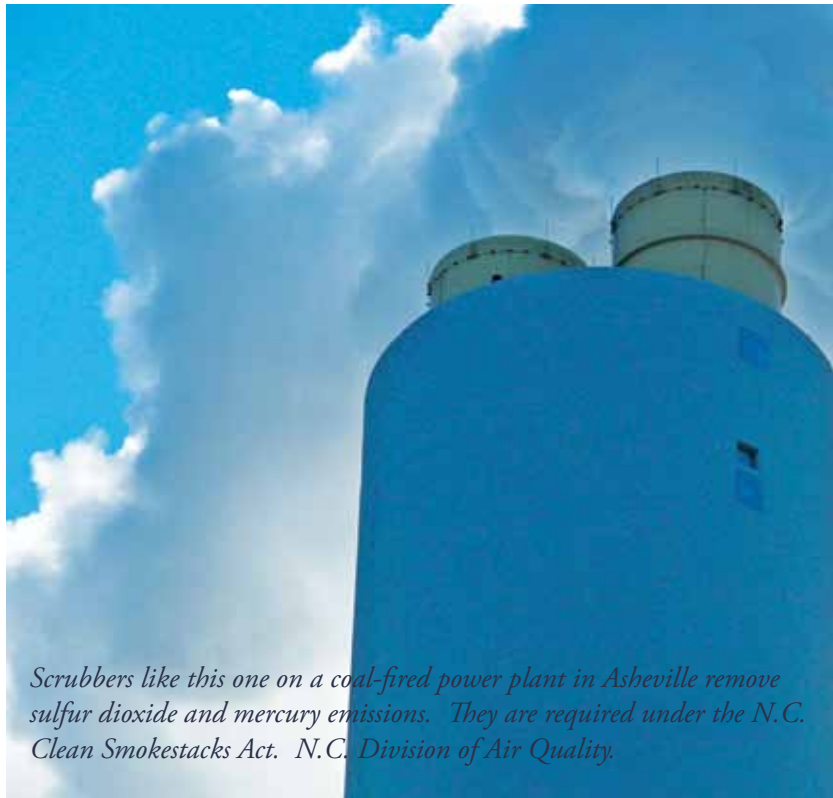


*Catamount bronze sculpture in the zoo's  
cypress swamp exhibit. N.C. Zoo photo.*



# And the Award Goes To...

Over the past eight years, Department of Environment and Natural Resources staff members and programs have been the recipients of numerous awards. Below are just a few of the highlights.



*Scrubbers like this one on a coal-fired power plant in Asheville remove sulfur dioxide and mercury emissions. They are required under the N.C. Clean Smokestacks Act. N.C. Division of Air Quality.*

## An Air of Excellence

In 2004, the Division of Air Quality staff accepted an Environmental Protection Agency Clean Air Excellence Award on behalf of North Carolina for the Clean Smokestacks Act. According to the EPA, this act serves as a nationwide model for controlling multiple air pollutants through a partnership of state, business and environmental groups.

The Clean Smokestacks Act was adopted in 2002. Under this legislation, coal-fired power plants must achieve a 77 percent reduction in nitrogen oxide emissions by 2009 and a 73 percent reduction in sulfur dioxide emissions by 2013. These reductions are meant to significantly reduce ozone, haze, fine particles and acid rain as well as help safeguard public health, improve visibility and protect the environment. At the time of its passage, the Clean Smokestacks Act went above and beyond the federal rules that only applied during the April through October ozone season and allowed utilities to buy or trade pollution credits from other states instead of cutting their own air pollution. North Carolina's act required utilities to cut their emissions year-round and did not allow pollution credit trading.

## SwEEPing Up the Awards

And the award goes to...the Ecosystem Enhancement Program! It seems to happen over and over again. The Ecosystem Enhancement Program, or EEP, officially began operations in 2003. Since then it has been the recipient of numerous prestigious awards. In both 2005 and 2007, EEP was designated as one of the 50 top new government initiatives in the United States by the Ash Institute for Democratic Governance and Innovation at Harvard's Kennedy School of Government. The Innovations in American Government Awards given by the Ash Institute are considered to be the "Oscars" of government awards. As the director of the awards program put it, "These 50 programs – which touch the lives of so many people across the street and around the world – offer a very compelling snapshot of what is right, good and uniquely innovative in American government at every level today."

The Ash Institute selected the 50 programs from more than 1,000 that applied. Programs were judged on the basis of creativity, effectiveness in achieving tangible results, significance in addressing important problems of public concern and promise in inspiring successful replication in other states. "We spent a lot of time as a staff discussing the best way to tell our story in a manner that would be readily understood by the selection committee," said Tad Boggs, EEP communications director. So, how did they distill the complexity of what EEP does on a daily basis into a simple explanation? "North Carolina's Ecosystem Enhancement Program addresses a problem familiar to every state in the nation: achieving responsible economic development while simultaneously restoring, enhancing and protecting the environment...North Carolina would make the state's environmental agency – not its transportation agency – the watchdog over offsetting the unavoidable environmental effects of new transportation infrastructure."

In 2005 EEP was recognized again for its innovation by the National Association of Environmental Professionals with its Environmental Excellence Award in Planning Integration. This award acknowledged EEP's plan to offset growth, development and loss of wildlife habitat in the Pasquotank River Basin. It was also in 2005 that the Council of State Governments recognized EEP through its Innovations Awards Program.

It was perhaps upon winning the title of Natural Resource Agency of the Year through the Governor's Conservation Achievement Awards in 2006, however, that the true meaning and impact of EEP's work was best expressed. T. Edward Nickens of the N.C. Wildlife Federation presented the award. In an effort to get to the heart of what EEP does, he put it this way. "When you stand at the confluence of the Uwharrie and the Little Uwharrie rivers in Randolph County, and the wild pink azaleas are in bloom, and white indigo flowers are open, and you reach down to touch a rare Carolina creekshell mussel, you are there because the Ecosystem Enhancement Program works."



*EEP project managers get their feet wet when examining progress on stream restorations like this one in western North Carolina. Ecosystem Enhancement Program.*



## On the Leading EDGE

In 2005, the Prairie Ridge Ecostation open-air classroom received the Triangle Business Journal's EDGE Award. Designed by architect Frank Harmon, the classroom was selected as the "project that best exemplifies environmental sensitivity." The 1,400 square foot structure was indeed built to have a minimal impact on the environment. The structural lumber used is what is known as parallel strand lumber, a composite of many smaller trees, which reduces impacts on old-growth forests. The concrete masonry units in the foundation are made from 100 percent recycled material. The building has a south-facing overhang to maximize sun exposure, a cistern that captures rainwater that is then used to flush toilets, and will soon be submitted for LEED certification. Quite edgy, indeed!

*Outdoor classroom at Prairie Ridge. Courtesy of Frank Harmon Architect, PA.*



## Safety is No Accident

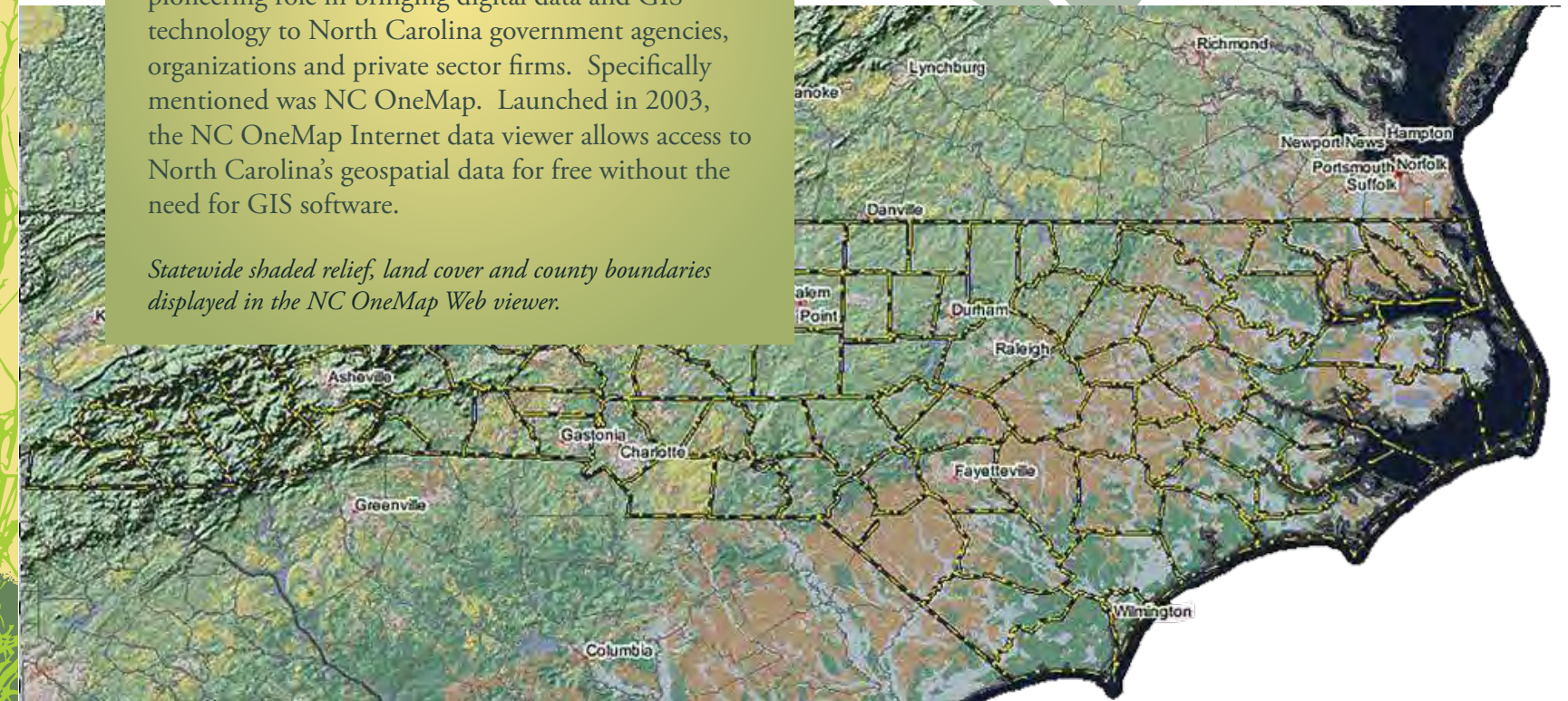
In August 2006, the Division of Waste Management became the first state agency to be honored by the N.C. Department of Labor's workplace safety program. The Carolina Star program reserves its Public Sector Star Worksite awards for those local governments and state agencies that have achieved outstanding safety performance and have shown a commitment to preventing workplace injuries. The Division of Waste Management has staff working in such areas as hazardous waste, Superfund and landfills, just to name a few, making workplace safety especially important to the division.



## It's Good to Have a Plan

In 2006, the N.C. Chapter of the American Planning Association cited the Center for Geographic Information and Analysis' (CGIA) work in providing geographic information system (GIS) services as one of the top 10 planning events of the past 60 years. CGIA and the N.C. Geographic Information Coordinating Council were singled out for their pioneering role in bringing digital data and GIS technology to North Carolina government agencies, organizations and private sector firms. Specifically mentioned was NC OneMap. Launched in 2003, the NC OneMap Internet data viewer allows access to North Carolina's geospatial data for free without the need for GIS software.

*Statewide shaded relief, land cover and county boundaries displayed in the NC OneMap Web viewer.*



## A First in Sustainability

The State Energy Office and the N.C. Project Green program awarded the first State Government Sustainability Award in 2004 to the N.C. Zoological Park. The zoo had been involved in several programs since 1990 aimed at conserving energy, water, fuel and other resources. It was also the first North Carolina agency and the first zoo in the entire United States to develop a comprehensive environmental management system. The zoo has continued to win awards for its focus and effort toward sustainability. It has been an example and a leader with its programs in composting, integrated pest management, biodiesel and hybrid vehicles, constructed wetlands and solar energy.



*Bob Langston shows off some of the zoo's cell phone recycling efforts, one of many programs aimed at resource and energy conservation. N.C. Zoo photo.*



# Den Bones

Scientists continue to uncover fossils that help them piece together the past and track the evolution of species. While research and scientific breakthroughs help to determine our future, they also tell the story of the past.



## A Lab on Wheels

Everyone hates waiting on test results - even paleontologists - which is why they have created a mobile paleontology lab! In 2008, scientists from the N.C. Museum of Natural Sciences, Montana State University and North Carolina State University bought and renovated a 48-foot semi trailer, turning it into a high-tech lab where they could chemically analyze fossils. “We have found that our chances of recovering both tissues and cells from dinosaur bone, as well as any molecular information, are greatly enhanced by examining the bone as soon as possible after it comes out of the ground,” said museum paleontologist Mary Schweitzer. The mobile lab is the first of its kind and, according to Schweitzer, “a dream come true.”

*This image is on the side of the mobile paleontology trailer. Trailer graphic design by Brenda Wynne, N.C. Museum of Natural Sciences.*



**NC STATE UNIVERSITY**

**MUSEUM OF THE ROCKIES**  
Montana State University

**NORTH CAROLINA**  
**MUSEUM OF NATURAL SCIENCES**

**Molecular Paleontology Field Station**





*Duckbilled dinosaur skull.  
N.C. Museum of Natural Sciences.*

## Duckbilled Dinosaur

Want to know a secret about museum dinosaurs? Most of them are made up of only about 50 percent real bone, the rest being made out of a cast material. Even then, the real bones are often from more than one individual dinosaur specimen. This is because paleontologists rarely find a specimen that is more than halfway complete. That is why it was so exciting in 2006 when researchers from the N.C. Museum of Natural Sciences and North Carolina State University recovered an 80 percent complete skeleton and skin impressions from a 67-million-year-old duckbilled dinosaur known as *Edmontosaurus annectens*.

Bones from the specimen were originally discovered in 2004 by geologists from the University of Wisconsin working in Ekalaka, Mont. The University of Wisconsin team already had an *Edmontosaurus* specimen, and their paleontology focus had shifted to other kinds of dinosaurs, so they invited the museum scientists to take over their dig permit. Unearthing the dinosaur, not to mention getting it back to North Carolina, was quite a task. The skull alone weighed 400 pounds! At least five people were needed to carry some of the heaviest pieces from the site.

The duckbilled dinosaur specimen is the most complete dinosaur ever brought to North Carolina. It is estimated to be among the top five percent of all dinosaur specimens worldwide in terms of its completeness and preservation. The museum looks forward to having the unique specimen on display.

## You Could Have Been an Underwater Archaeologist

Cathy Neilson almost tripped over what she thought was an old cypress trunk in Lake Waccamaw, but was surprised when she reached down and pulled up a piece of bone. Her 2008 find led to a full-fledged fossil hunt. Paleontologists are used to chiseling out fossils on land, but recovering bones that were underwater, some of which were encased in limestone, made things a challenge. Staff from Lake Waccamaw State Park called upon the state's Underwater Archaeology Branch (yes, there is such a beast!). While used to diving in shipwrecks searching for man-made artifacts, the archaeologists quickly became underwater paleontologists.

What was uncovered was a prehistoric whale skull. It is actually not uncommon to discover whale fossils in eastern North Carolina. While Lake Waccamaw is a freshwater lake located about 50 miles from the ocean, many millennia ago much of the state east of present-day Interstate 95 was under salty ocean water. What makes this find so exciting is that the skull was largely in one piece, rare for a whale skull found in North Carolina. Researchers will continue to reconstruct the recovered bones that were collected.



*Vince Schneider, paleontologist with the N.C. Museum of Natural Sciences, and Richard Lawrence, diver with the state's Underwater Archaeology Branch, with a whale skull fragment found in Lake Waccamaw.*



*Lake Waccamaw. N.C. Division of Parks and Recreation.*



# In Partnership

The Department of Environment and Natural Resources has more than 4,000 employees working in more than 30 offices and divisions across the state. Although each division has its own focus and goals, the overall mission of everyone in DENR is the same: “to conserve and protect North Carolina’s natural resources, and to maintain an environment of high quality for the health, well-being and benefit of all.” While division employees are passionate about their specific area, we know that when we work together we accomplish more than we could on our own. Below are some of the standout examples of divisions partnering with each other — as well as with other agencies and organizations — to work toward a common mission.

## Love-A-Tree

Teachers who want to integrate environmental education into the classroom curriculum often aren’t sure where to begin. A lot of resources are available, but it can be difficult to know which are reputable and which will help teachers cover the standards mandated by the state. The Office of Environmental Education has made it easy for classroom teachers to get quality lesson plans, materials and resources through the Love-A-Tree Program. Through funding from International Paper, Love-A-Tree provides activities from many DENR divisions that have been correlated to the fifth grade Standard Course of Study.

Each Love-A-Tree packet produced emphasizes a particular environmental theme. The 2007 packet was called North Carolina Naturally: One State, Many Habitats. It included activities from 10 DENR divisions that focused on the goods and services provided by nature and our natural resources. The packets are extremely popular, with educators from all 100 counties in North Carolina ordering Love-A-Tree kits for their classrooms.



*Students from C.T. Overton Elementary in Salisbury stand on an outline of North Carolina’s river basins. Stencils for the river basin playground map were created as part of the 2007 Love-A-Tree program. Photo by Debbie Leslie.*



*Marine patrol pilot Shephard Newman prepares for an enforcement flight in a marine patrol helicopter. N.C. Division of Marine Fisheries.*

## Marine Patrol

The Marine Patrol, part of the Division of Marine Fisheries, is responsible for ensuring sustainable marine and estuarine fisheries in North Carolina. The Division of Coastal Management works to protect, conserve and manage North Carolina’s coastal resources, which includes enforcing the Coastal Area Management Act (CAMA), a law meant to ensure coastal resource protection. While the enforcement responsibilities of the two agencies don’t overlap, the areas they patrol do. In 2006, the Marine Patrol increased its cross-training with the Division of Coastal Management so that Marine Patrol officers would be able to recognize CAMA violations. The Marine Patrol has not only become an extra pair of eyes for Coastal Management enforcers, but also an extra pair of wings, providing observation flights from which to monitor coastal areas. This is just another example of DENR agencies working together to do more.



Enhancing Ecosystems

The Ecosystem Enhancement Program’s very existence is based on some unique partnerships. It was in 2001 that some of these unlikely partners sat down together to try and solve a problem. Through the mid-1990s, the N.C. Department of Transportation had seen a growing trend of significant delays on many of its construction projects. About 40 percent of these delays were caused by problems surrounding wetland and stream mitigation. The federal Clean Water Act mandates that whenever wetlands and streams are destroyed, equivalent aquatic resources must be restored in the same watershed, as these resources serve as nature’s own water purifiers and their protection is essential.

The Department of Environment and Natural Resources, NCDOT and the U.S. Army Corps of Engineers decided to reinvent the state’s method of protecting the environment while facilitating responsible economic growth. What they created through this unique partnership was the Ecosystem Enhancement Program, which began operations in 2003 and is housed within DENR. Instead of focusing on the impacts of an individual highway project, EEP’s innovation would be to develop holistic plans to “fix” watersheds by considering the cumulative impacts within a given watershed. The partnership agreed to solve many of the regulatory problems and expedite permitting approvals by constructing new wetlands before the development project impacted existing wetlands. Road construction and its associated wetland and stream mitigation are now planned seven years out.

Since EEP’s inception, there have been no delays due to lack of mitigation permitting, a stark contrast to years prior. While the agencies that partnered to create EEP did not always agree on every facet of the program, their commitment to protecting the health and well-being of North Carolina’s people, economy and natural resources created a strong foundation that became more than the sum of its parts.

The Ecosystem Enhancement Program further expanded its partnership in 2003 to accelerate its advance mitigation. A contract was struck with the Conservation Trust for North Carolina and 22 local or regional land trusts to improve preservation efforts of natural areas around the state. EEP identified regions where environmental impacts were expected to occur, and then relied on the local expertise of the land trusts to find high-quality sites for preservation and work with landowners to protect these areas.



*The Mingo tract, a 5,600-acre acquisition in Caldwell and Wilkes counties, was purchased by EEP and other state programs in 2003. Ecosystem Enhancement Program.*



*EEP monitoring supervisor Mac Haupt explains the design of a restored rural creek at an EEP stream restoration project in Wilkes County. Ecosystem Enhancement Program.*

Take a Child Outside

In 2007, the Museum of Natural Sciences spearheaded a national program designed to help reconnect children with the outdoors. Take A Child Outside Week is now an international, annual occasion occurring Sept. 24-30. The first year of the program, more than 130 organizations signed on as partners from across the country, offering events and outings in celebration of Take A Child Outside Week. The museum created the Web site [takeachildoutside.org](http://takeachildoutside.org) where parents, teachers and other caregivers could pledge to take children outside, find partner locations near them and learn fun and easy outdoor activities. Those who pledged could even return to the site and share what they had discovered while exploring the out-of-doors.



*Through bird watching and hiking, children learn about the animals that live in the Theodore Roosevelt Natural Area that surrounds the N.C. Aquarium at Pine Knoll Shores. N.C. Aquariums.*



*Taking a closer look at a snail. Photo by Juan Pons.*



Ranging in New Directions

“I became a state park ranger for the N.C. Division of Parks and Recreation at Eno River State Park about 3.5 years ago. Shortly after I was hired, my supervisor enrolled me in the N.C. Environmental Education (EE) Certification program. I knew very little about the certification, only that it was a requirement for all new park rangers and took a long time to complete. I think it is understandable, given the circumstances, that EE certification was the last thing on my mind.

I had moved to a new state and was working at a new park; I was responsible for hundreds of acres of land, miles of trails, the park’s interpretative program and a seasonal employee. However, my attitude completely changed once I attended my first few workshops and visited a couple of the environmental education centers scattered throughout the state. I was hooked!

I was increasing my knowledge of the natural and cultural resources this beautiful state has to offer at the same time that I was learning new skills and improving upon earlier experiences. I began to realize the importance of the certification program as a statewide vehicle—for getting environmental education into the classroom and students into the field; for teachers and non-formal educators to network and establish partnerships; and for helping N.C. State Parks to achieve its mission of instilling a stewardship ethic in us all.

The day I completed my EE certification, I did take a big ‘sigh’ of relief, knowing that I was able to check this requirement off my list, but more importantly, I gave a jubilant shout of praise for the fun I had, the good people I met, the essential skills I learned and the places I hope it will take me in the future, because this is just the beginning.”

Ranger Christopher Ammon – Eno River State Park, 2008



Ranger Christopher Ammon leads an interpretive program. N.C. Division of Parks and Recreation.



Pollution Prevention Goes Whole Hog

There are more hogs in North Carolina than there are people, so dealing with the potential environmental impacts of hog farms has long been part of the role of the N.C. Department of Environment and Natural Resources. As agreements went into place for managing environmental impacts of large, company-owned farms, department staff realized that contract and independent farmers needed assistance, tools and training to better manage their environmental impacts.

In 2001, the Division of Pollution Prevention and Environmental Assistance worked with the N.C. Cooperative Extension Service and the N.C. Division of Soil and Water Conservation to help seven pilot pork farms design and implement an environmental management system, or EMS. An EMS is a set of processes and practices that allow an organization to reduce its environmental impacts and increase its operating efficiency.

DPPEA staff had knowledge and experience in EMS development, while Cooperative Extension and Soil and Water staff were knowledgeable about pork production operations and environmental regulations and requirements affecting the industry and had established relationships with pork farmers in the state. The program was extremely helpful to pork producers, and the DPPEA has used the experience to develop tools and resources available to all pork producers in the state. Here is what one of the pilot farmers had to say about his experience developing and implementing an EMS:

“EMS for me is the coat of wax on a nice car. In my operation, I had done all that was possible to identify environmental issues. However, with an operation my size, this was not enough. Invariably I found myself behind the problem rather than in front of it. Although EMS has not instantaneously corrected all of my problems, it has given me the vision needed to address environmental impacts related to my farm. Within the year I feel confident that my overall operation will be dramatically enhanced by the implementation of EMS. Some say that we in the industry are just trying to use EMS to justify an unjustifiable way of farming. This is incorrect. Each EMS is different in design and nature because each application is different. One size will never fit all where EMS is concerned. Simply put, what is an issue to me as a hog farmer in North Carolina may not be as big an issue to a hog farmer in Iowa or a dairy farmer in Wisconsin or even another hog farmer in North Carolina.

EMS enables you to take a long and hard look at your overall operation, while at the same time examining the effectiveness of specific components that allow your farm to function daily. Within the framework of EMS, you are able to set long-term goals, while simultaneously and systematically accomplishing short-term objectives. In a nutshell, EMS is a living, breathing animal that flourishes if used, but dies on the vine if not fed by the injection of variables, both long and short term. Today it is simply not adequate to identify a set of problems, goals or strengths. As farmers, we must go after improvements, mark them off as completed, and move on to the next challenge. EMS is the vehicle to accomplish this. EMS allows us to incorporate a system of checks and balances that eventually will hold us accountable to ourselves and others, that in the end will result in a more environmentally efficient farm.”

Chuck Stokes – Little Creek Farms, 2004



Piglets suckling sow at farrowing barn. N.C. Division of Pollution Prevention and Environmental Assistance.





### I'd Know That Stream Anywhere

What is a stream? It may seem an odd question to ask. There are, however, different kinds of streams, and they fall under different regulations. The Division of Water Quality realized that everyone across the state needed to be speaking the same language, and so developed a method of identifying streams as ephemeral, intermittent or perennial. Beginning in 2002, the division began teaching stream identification classes to their own staff as well as Division of Forest Resources staff.

Since that time, more than two dozen stream identification classes have been taught, and not just to Forest Resources staff. Employees of the N.C. Department of Transportation, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency and state employees from South Carolina, Tennessee and Virginia have taken the training. Several federal, state and local agencies across the country have adopted the stream identification method developed by North Carolina's Division of Water Quality for their own areas and programs.



*Individuals take part in a Division of Water Quality stream identification class held at Browns Summit.*

### FerryMon

For most oceanographic survey work on water quality, more than 50 percent of the cost is for the survey vessel itself. For an innovative water quality monitoring program in the Pamlico Sound and Neuse River Estuary, the vessels were free!

Spurred by pollution issues following Hurricane Floyd, the Division of Water Quality wanted to find a way to characterize and monitor a broad area of the Pamlico Sound on a consistent basis. In 2001, through a unique partnership with the University of North Carolina at Chapel Hill's Institute of Marine Sciences, the Duke University Marine Laboratory and the Department of Transportation's Ferry Division, ferries were outfitted with water monitoring equipment. Through the FerryMon project, as it's called, readings are taken every three minutes and then sent immediately to the UNC and Duke labs.

The program forms the basis for evaluating how the Pamlico Sound ecosystem responds to human-created, as well as nature-related, phenomena. If data results are abnormal, the Division of Water Quality and other environmental agencies can immediately be notified. FerryMon now serves as a model for other states of how to conduct unattended, continuous water quality monitoring using existing transportation infrastructure.



*Carteret ferry. N.C. Department of Transportation*



North Carolinians are lucky to live in a state with such a rich and diverse array of ecosystems. From the rhododendron-covered peaks of the Blue Ridge to the lush forests of the Piedmont to the salt marshes of the coastal plain — the state is breathtaking from the mountains to the sea! It's a wonderful state to get out and explore. Trail systems crisscross the landscape and facilities make it easy to paddle, ride and hike your way through the great outdoors.

# Get Going!



*Photos courtesy of N.C. Division of Tourism, Film and Sports Development.*



## N.C. Birding Trail

Efforts to develop the North Carolina Birding Trail began in 2003. This endeavor is being led by a partnership among the N.C. Wildlife Resources Commission, the U.S. Fish and Wildlife Service, the N.C. Cooperative Extension Service, N.C. Sea Grant, Audubon North Carolina and N.C. State Parks. The trail will go from the coast to the mountains, connecting prime bird-watching locations. 2007 marked the inauguration of the eastern section of the trail. Included in the 102 sites on the eastern section of the trail were 14 state parks and the N.C. Aquariums at Pine Knoll Shores and Fort Fisher.

*Birders enjoy Hammocks Beach State Park on the day the coastal segment of the N.C. Birding Trail was dedicated. N.C. Division of Parks and Recreation.*



*Searching the skies for migrating birds. N.C. Aquariums.*





Saddle Up!

The N.C. Division of Parks and Recreation's first equestrian center was dedicated at South Mountains State Park in 2001. The 12-acre facility offers a 4,800 square foot stable surrounded by 15 campsites and opens onto 29 miles of bridle trails. In 2008, the division updated its master plan for the state's largest park, which calls for upgrading the popular equestrian center and trail system.



The equestrian facility at South Mountains State Park. N.C. Division of Parks and Recreation.

A Greenway Explosion

Hiking, walking and jogging along greenway trails have emerged as popular activities in North Carolina. Many communities consider trail systems as a “must-have” component. The State Trails Program within the Division of Parks and Recreation is a clearinghouse for ideas and a conduit for state and federal grant money for trail projects.

Since 2000, more than \$10 million has been awarded to government agencies and nonprofit organizations for trail and greenway projects through the federal Recreational Trails Program, which is administered through the State Trails Program in North Carolina. In addition, in the past eight years the Department of Environment and Natural Resources has awarded 264 Adopt-A-Trail grants. State trails specialists have also been working with local governments to coordinate greenway and trail systems as well as advise on land acquisition, construction and grant efforts.




Places to Hike, Bike and Paddle

The N.C. Office of Environmental Education has been producing the Discover North Carolina's River Basins booklet and brochures on each of the state's 17 river basins since 2001. While these materials have been extremely popular, especially among teachers, the office wanted to reach more of the adult population in North Carolina. As part of this endeavor, the 2007 updated version of the river basin brochures included a new page with information on where people could hike, bike and paddle in each basin.


### BROAD RIVER BASIN

The scenery and natural heritage of the Broad River Basin have captivated tourists and ecologists alike. Hollywood even memorialized some of these places on the big screen, including in battle scenes filmed for the 1992 movie "Last of the Mohicans" at the 404-foot Hickory Nut Falls.




The Broad River originates in the mountains of western North Carolina and flows southeast through the foothills and Piedmont before entering South Carolina. Major tributaries include the Green, First Broad, Second Broad and North Pacolet rivers. There are also four major man-made lakes, including the popular tourist destination Lake Lure, which was built in 1926 to supply electricity. Other reservoirs include Lake Adger and Kings Mountain Reservoir, also known as Moss Lake. Municipalities in the basin include Forest City, Kings Mountain, Chimney Rock Village, Lake Lure, Rutherfordton, Shelby and Spindale.


Some of the best-known natural beauties of the basin are Hickory Nut Gorge, Chimney Rock Park and Lake Lure. Perhaps lesser known is the incredible diversity of flora and fauna within the basin. The Broad River Basin shelters 111 rare animal and plant species, including the bog turtle, which is federally listed as a threatened species. The green salamander, a state-listed endangered species; mole salamander; and crevice salamander also are among the basin's rare



Bog turtle



Big Bradley Falls (left); Broad River (below)



Big Bradley Falls (left); Broad River (below)

**profile:**

Total miles of streams and rivers: 1,513

Total acres of lakes: 1,954

Municipalities within basin: 27

Counties within basin: 8

Size: 1,513 square miles

Population: 342,282 (2000 U.S. Census)

The new brochures were promoted through outdoor retailers including camping stores, canoe/kayak stores and biking stores. This avenue not only increased the awareness of the general public as to their ecological whereabouts, but also helped promote the connection between health and environmental education, which is a focus of the Office of Environmental Education. This initiative fit very well into the office's Informed Consumer Initiative, which highlights some of the environmental impacts of our consumer choices and how these choices affect one's ecological address and help determine one's ecological footprint.

Updated river basin brochures let people know where they can hike, bike and paddle in each basin.



Paddling the Bogue Sound with an aquarium educator. Claire Aubel, N.C. Aquariums.





Many producers and consumers are now considering the sources of an item’s raw materials. Researchers are studying and promoting alternative uses for waste products. A life-cycle assessment of the manufacturing process used to be cradle-to-grave, but now a cradle-to-cradle approach is becoming more common. The Department of Environment and Natural Resources is proud to be a part of the efforts being made to reduce waste, find innovative uses for the waste stream and educate the public about what they can do.

### Solid Waste Management Act of 2007

The Solid Waste Management Act of 2007 was the result of a year-long study of North Carolina’s and other states’ regulations and laws regarding solid waste. It provided major advancements in environmental protection, modernization of regulations and cleanup of old landfills. The N.C. Division of Waste Management works to ensure adherence to the rules established under the Solid Waste Management Act.

Several components of the act provide for an increased level of standards for landfill development and maintenance. Increased buffer areas around new landfills are required, and enhanced standards address leachate collection and containment and liner testing. The act also established a solid waste disposal tax of \$2 per ton to provide funding for local governments for solid waste activities and for the cleanup of old landfills. The Solid Waste Management Act of 2007 was a major step forward in protecting the citizens and environment of North Carolina.



The city of Greensboro’s White Street landfill. N.C. Division of Waste Management.

### Making Recycling Cool Again

In 2004, the Division of Pollution Prevention and Environmental Assistance was running a successful recycling campaign for younger audiences, but knew that their message was not resonating with teens or the 20-something crowd. That all changed in 2005 with the creation of the RE3.org Campaign. Just look what folks have been saying about it...

“We give RE3.org t-shirts out at skateboarding competitions and still see kids wearing shirts around town instead of balling them up in a drawer somewhere.”

Lisa Grant, Keep Onslow Beautiful

“Your RE3.org flicks are great, and they target a generation that is sometimes hard to reach. Mr. Mutton Chops is my favorite, and it’s perfect to stream through college dorm TV – especially dorms equipped with trash chutes. Thanks so much for making the world of recycling sexy again!”

Jessica Sankey, Chittenden Solid Waste District

“Our Kenny poster was stolen. At first I was ticked off, but then I thought, who’s ever heard of a recycling poster getting stolen? You know you rock when your free recycling poster was stolen off the wall!”

Marty Wiggins, Office of Environmental Education

The RE3.org program continues to grow. RE3.org commercials can be found on YouTube, recycling and waste management information is posted on the RE3.org blog and thousands visit the Web site each month. From 2007 to 2008, brand recognition of the RE3.org logo more than doubled. Now that’s pretty cool.



Posters from the RE3.org Campaign. N.C. Division of Pollution Prevention and Environmental Assistance.



A Greasy Situation

In 2005, the N.C. Zoological Park received a grant to partner with Piedmont Biofuels. The organizations worked together to construct a biofuel processor that produces biodiesel from vegetable oil from the zoo’s five restaurants. The zoo uses this fuel to help power 20 trams and buses that transport visitors around the zoo, as well as equipment that is used to maintain the park.

A worker mixes a batch of biofuel, now used in all diesel vehicles at the N.C. Zoo. N.C. Zoo photo.



Recycling Across Borders

In 2003, the Albemarle-Pamlico National Estuary Program partnered with the Cooperative Extension Service, local Soil and Water Conservation Districts, three Resource Conservation & Development Councils and the Virginia Department of Conservation and Recreation to help farmers deal with used oil. Prior to the project, used oil from farm equipment was often stored for long periods in steel drums, plastic buckets or dumped on the ground. Containers would leak and oil was contaminating the ground and surface waters.

The partners worked to provide farmers with used oil recycling tanks that would not leak and could easily be collected by commercial oil recyclers. In a little more than a year after beginning the project, 29,805 gallons of used oil had been picked up for recycling from farms in the Chowan River Basin of North Carolina and Virginia. This program is now self-running, requiring no further input of public funds.

A North Carolina farm. N.C. Division of Soil and Water Conservation



Waste Reduction Partners staff Dave Lowles and small business owner Renee Fisher show off recycled demonstration floor made with recycled wood pallets at the Grove Arcade in Asheville. N.C. Division of Pollution Prevention and Environmental Assistance.

A Toast to Recycling

Beginning Jan. 1, 2008, the state required Alcoholic Beverage Control permit holders who sell their products for on-premises consumption to separate, store and recycle all recyclable beverage containers. The Division of Pollution Prevention and Environmental Assistance conducted and participated in workshops across the state to provide technical assistance to these bars and restaurants.

Bars in North Carolina are now required to recycle. Photo courtesy of Owens-Illinois.



Partnering to Reduce Waste

The Waste Reduction Partners program became part of the Department of Environment and Natural Resources in 2000 when the Division of Pollution Prevention and Environmental Assistance partnered with the Land-of-Sky Regional Council of Government in the western part of the state. The council had a “retired engineers” technical assistance program called Waste Reduction Partners that they were looking for someone to manage. The division had limited staffing and no regional presence in western North Carolina. It was a win-win scenario.

“The Waste Reduction Partners program engages the talents and ‘brain power’ of the state’s growing baby-boomer demographics for both economic and environmental benefits,” said Terry Albrecht, director of the program in western North Carolina. Through the program, retired engineers, scientists and architects provide pro bono technical surveys for business, industry and public institutions on ways to reduce energy use, conserve water and promote waste reduction strategies.

Since being incorporated into the department, the program has provided more than 115,000 hours of technical assistance to 830 agencies in 37 western counties. 168,000 tons of waste have been kept out of the landfill, 220,000 gallons of water per year have been saved and energy use has been lowered by 73,000 mega-watt hours. This successful program is now being started in the eastern part of the state through the Triangle J Council of Governments with funding from the State Energy Office.



There are groups of people in the Department of Environment and Natural Resources that aren't like most of us. They are the men and women who can include dropping 500 gallons of water at a time from an airtanker onto a forest fire a "normal" part of their job. They are the people who are contacted when threats are made that involve nuclear devices. They are the people who arrive on the scene first after a chemical plant explosion. They are the DENR risk-takers...

# The DENR Risk-takers



*A Division of Forest Resources single engine air tanker makes a drop on a fire in Bladen County. Amery Wells, N.C. Division of Forest Resources.*



*Smoke from the Evans Road fire shrouds the Raleigh skyline. N.C. Division of Forest Resources.*

## Helping in Times of Need

The Division of Forest Resources is nationally recognized for its highly proficient incident management teams. These teams use the Incident Command System, or ICS, a management tool that provides response teams with a response, communication and supervisory framework. ICS is used throughout the United States, which makes it easy for the DFR teams to work in other states when they are needed in emergencies, as well as for other states' teams to help in North Carolina. DFR's incident management teams have provided assistance in numerous hurricanes and wildfires, both within and outside of North Carolina. In 2003, several teams traveled to southeast Texas to assist with the recovery efforts of Space Shuttle Columbia.

*Back fire being lit on the Summit Ridge fire in Wilkes County in 2007. Jody Brady, N.C. Division of Forest Resources.*



## Code Purple

If you're a member of the Division of Air Quality's air toxics team, you have to keep your pager and cell phone handy at all times. These are the folks who are called upon when there is an emergency that causes major air pollution problems. It was this team that was contacted at midnight when the EQ hazardous waste facility exploded in Apex in 2006. By daybreak, a network of air quality monitors had been set up surrounding the plant and samples of chemical deposition had been collected.

The air toxics team was also there to help during the Evans Road fire in the summer of 2008, which destroyed thousands of acres in Hyde, Washington and Tyrrell counties. According to Lori Cherry, who headed up the team, even seasoned staff members were surprised at the pollution levels that were being measured. The team had set up mobile air quality monitors surrounding the fire, and they were measuring particle levels 30 to 60 times the 24-hour standard. This prompted the first ever Code Purple air quality advisory warning to be issued by the central office.



Nuclear Knowhow

On Feb. 19, 2008, at 7:15 p.m., Lee Cox’s cell phone started ringing. Cox was the N.C. Radioactive Material Branch Manager in the Division of Environmental Health. When his phone rings after hours, it usually means that he has a long night ahead of him. It definitely did on that night. One of his partners was calling to tell him that an individual had called a local television station in Wilmington and stated that there was a nuclear device that was going to explode at the port of Wilmington at 3 p.m. the following day.

The Radiation Protection Section had spent a considerable amount of time since Sept. 11, 2001, forming what they call “response relationships.” This definitely helped Cox respond to the incident he had at hand. He immediately began getting in touch with his contacts. “In our business,” says Cox, “it takes this entire network to be successful.”

By 12:30 a.m. Cox was at the Wilmington Port along with Grant Mills, the incident coordinator for the Division of Environmental Health’s Radiation Protection Section, as well as members of the U.S. Coast Guard and U.S. Customs and Border Protection. In less than 30 minutes, Cox and Mills were each leading a team. Using radiation detection equipment, both teams conducted sweeps until every container and all grounds at the port had been subjected to radiation surveys. At 6:30 a.m., a briefing was held at the offices of the U.S. Coast Guard to report that no evidence was found of a nuclear device or bomb containing radioactive material. The 3 p.m. hour passed that day without incident.

As with any incident to which the Radiation Protection Team responds, extremely detailed reports were recorded. There is one thing, however, that Cox says did not end up in the report. “Secretary Ross called me on my cell phone while we were still surveying the port the day the detonation was threatened. While immediately giving him an update on our monitoring, he interrupted me and asked how Grant and I were doing. At that moment, I remembered why I worked at DENR. It’s because of the leadership.”



*The Radiation Protection Section in action while conducting radiation surveys during the clean-up phase of a transportation incident. Patrick Cox, N.C. Division of Environmental Health.*

Team Slide

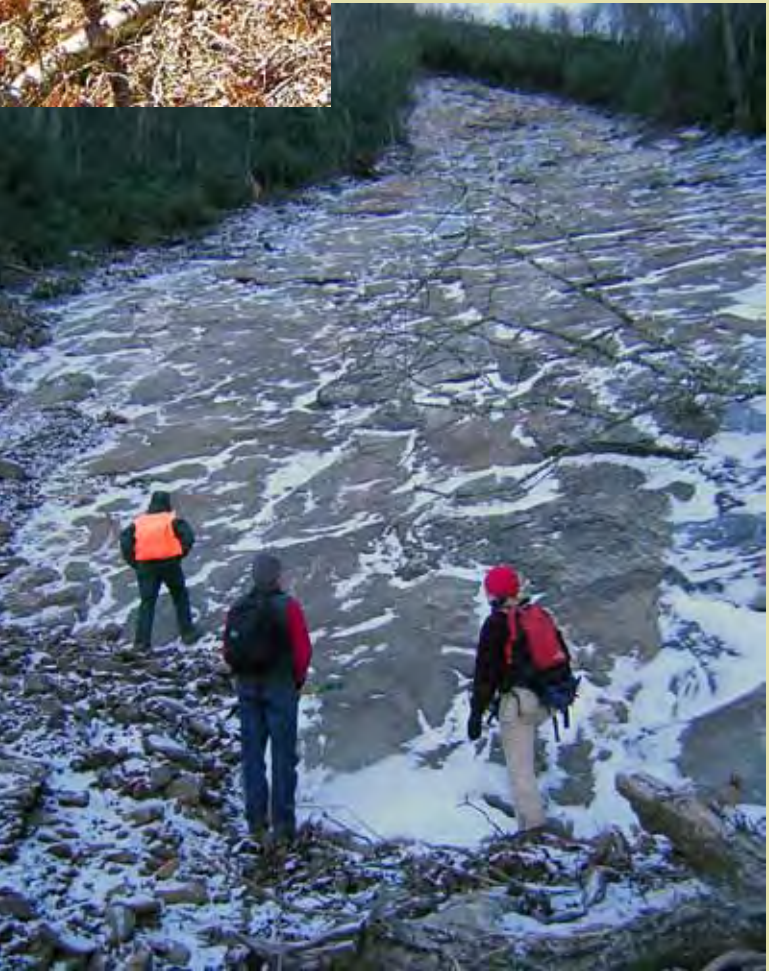
The N.C. Geological Survey’s landslide hazard mapping team, known as “Team Slide,” was formed as a result of the Hurricane Recovery Act of 2005. Seven geologists based in Asheville make up the team, and they all lend a wealth of knowledge and experience to their task of creating maps that show where landslides have occurred in the past and where they are likely to occur again. Their story is one of hard work – climbing mountains and unraveling the clues recorded in the ancient rock and landslide deposits. It is a story of research – looking for the answers of where landslides have happened in the past, because that is where they are likely to happen again. It is a story of working with other people – emergency managers, public leaders, scientists and landowners. It is a story of saving lives.



*Team Slide members Tommy Douglas and Jennifer Bauer collect soil permeability data at a landslide site in Macon County.*



*Stephen Fuemmeler, a member of Team Slide, collect information about the debris left behind from the landslide at Peek Creek in Macon County. The pile of trees and boulders seen here were deposited when a debris flow moved through this area.*



*Rebecca Latham, a member of Team Slide, stands with Chip Smith of the Natural Resources Conservation Service and Dan Manning of the U.S. Forest Service on Fishhawk Mountain. The bare rock they are looking at was exposed when the soil and trees slid down the side of the mountain following heavy rainfall from remnants of Hurricane Ivan.*



# The Enforcers – Strong, Fair, Effective

Ideally, environmental regulation and enforcement would not be necessary. It would be replaced by environmental stewardship, through which everyone would take responsibility for their actions, use resources sustainably and have the greater community in mind. We all know that this ideal scenario is often not the reality. Whether due to an issue of capabilities, priorities, values or perspectives, environmental stewardship is not always adopted.

In the environmental regulation and enforcement system, the environment and North Carolina's citizens are represented by six separate yet equally important divisions.

*These are their stories...*



*Billboard produced by the N.C. Division of Air Quality to educate the public about open burning.*

## Law & Order

In the largest civil penalty ever assessed for an open burning case in North Carolina, a Wake County contractor was fined more than \$78,000 in July 2002. The violator contested the case, and the penalty was ultimately settled for \$23,432. “We consider open burning violations to be serious because smoke from illegal fires is unhealthy to breathe, particularly for people with respiratory problems, and it harms the environment,” said Keith Overcash, director of the Division of Air Quality. The U.S. Environmental Protection Agency found that backyard burning of trash is actually the largest source of highly toxic dioxin emissions.

The Wake County violator was fined for burning tires, a motorcycle, building materials, metal sheeting and pipes, bedsprings, wire and other non-permissible items in 2001 near Garner. Under the N.C. Open Burning Rule, the Division of Air Quality can assess fines as high as \$25,000 per violation. Larger fines can be assessed in cases involving repeat violations and for people who knowingly break the law. The higher-than-usual fine in this case was assessed because the contractor had already been fined five times for open burning violations since 1997.



*Open burning often contains tires, trash and other man-made materials that are illegal to burn in North Carolina. N.C. Division of Air Quality.*



*Smoke from illegal burning is the N.C. Division of Air Quality's top enforcement problem. N.C. Division of Air Quality.*



## The Northeast Interceptor

On July 1, 2005, just before a major holiday beach weekend, a sewer line pipe coupling along Hewlett’s Creek in Wilmington failed, sending an estimated three million gallons of untreated wastewater into the creek. The sewage traveled down the creek to Masonboro Inlet and into Masonboro Sound. Shellfish beds were closed, and the public was warned against swimming in Hewlett’s Creek. This was seen by many as the last straw in a long line of issues with this section of sewer line known as the Northeast Interceptor.

The Division of Water Quality fined the city of Wilmington just over \$51,000 in civil penalties and investigative costs. In addition, a moratorium was issued that limited sewage flow allocations that the city could make available to business and residential development. Finally, the city’s local officials responded, entering into an official agreement with the Division of Water Quality in which they committed to fixing the problems along Hewlett’s Creek. In 2008, repairs and upgrades made by the city of Wilmington resulted in the moratorium being lifted.



*Hewlett’s Creek pump station following the sewer line failure. N.C. Division of Water Quality.*



*Pipe separation at Hewlett’s Creek. N.C. Division of Water Quality.*

## A Healthy Enforcement Strategy

Food safety is an issue that involves many departments in the state government system. A salmonella outbreak in Mecklenburg County in 2008 resulted in immediate action from the Department of Environment and Natural Resources’ Division of Environmental Health, the N.C. Department of Agriculture and Consumer Services and the N.C. Department of Health and Human Services. NCDA&CS samples found one Charlotte distributor with avocados and jalapeño peppers that tested positive for salmonella. Division of Environmental Health staff were able to identify those food service establishments that had purchased avocados or jalapenos from the implicated distributor, and in a two-day period they had investigated 72 establishments. Several cases of potentially contaminated produce were disposed of to protect the health of North Carolina’s citizens.



## Two Divisions, One Vision

The Division of Land Resources and the Division of Water Quality are both charged with the responsibility of protecting North Carolina’s water quality. While they share this common goal, their authority to regulate comes from different places. The Division of Water Quality gets its authority from the Federal Clean Water Act and other related state statutes and rules dealing with wastewater discharge, turbidity and stormwater. The Division of Land Resources gets its regulatory authority from the state Mining Act of 1971 and the Sedimentation Pollution Control Act of 1972.

In order to avoid the appearance of double jeopardy on enforcement of the same violation and make the best use of regulatory tools to stop violations and restore damaged wetlands and streams, the two divisions have regularly met to discuss enforcement cases and decide what will be most effective for the case in question. Since the ultimate goal of enforcement is the conservation and protection of North Carolina’s natural resources, the divisions of Land Quality and Water Quality work together to determine which division can best work towards that goal in a given situation.

The teamwork in the Winston-Salem Regional Office is noteworthy for its successes. This region’s teamwork has led to the restoration of nearly 12 miles of stream. Through communication of project status and inspection efforts and coordination of enforcement efforts, the two divisions have efficiently and effectively used their regulatory authority to accomplish more together than either could have done alone.



*Stream restoration project sites in Wilkes County that resulted from the teamwork in the Winston-Salem Regional Office. N.C. Division of Water Quality.*



CAMAraderie

The Coastal Area Management Act, or CAMA, requires permits for development in North Carolina’s 20 coastal areas if planned within an Area of Environmental Concern. Areas of Environmental Concern are those of natural importance that are susceptible to flooding or erosion or have environmental, economic, social or aesthetic value to our state. Realizing the importance of protecting North Carolina’s coastal resources, in 2006 Gov. Easley and the General Assembly provided the Division of Coastal Management more resources to enforce CAMA.

A staff person was added to each of the Division of Coastal Management’s four district offices to focus on compliance and enforcement of CAMA rules. “This should help to prevent violations from occurring since staff will be able to provide oversight of projects as they are being constructed,” said Roy Brownlow, compliance coordinator for the division. In addition to increased staff, the General Assembly authorized the Coastal Resources Commission to increase civil penalties for CAMA infractions. This increase became effective in 2008, and was the first increase for CAMA penalties since 1983. It is hoped that stiffer penalties will reduce the number of violations and give the division a way to recoup some of the costs associated with investigating violations.



*Using sandbags for temporary erosion control requires a CAMA permit.  
N.C. Division of Coastal Management.*



*Cleanup activities at the EQ site. N.C. Division of Waste Management.*

Keeping Hazardous Waste in its Place

The evening of Oct. 5, 2006, will not soon be forgotten by residents of Apex, first responders or the Department of Environment and Natural Resources. It was on that night that an explosion and fire at the Environmental Quality (EQ) North Carolina commercial hazardous waste facility led to the evacuation of thousands of Apex citizens, weeks of environmental cleanup and months of investigation.

In the year following the EQ fire, much was done to ensure that such an incident would not happen again. The Division of Waste Management announced that EQ North Carolina would relinquish its hazardous waste facility permit and not restart operations in Apex. Through a settlement agreement, EQ agreed to pay more than \$400,000 in penalties, fees and reimbursements to the state.

In response to the incident, Gov. Easley appointed a Hazardous Materials Task Force to study related issues and facilitate the strengthening of rules governing commercial hazardous waste facilities in North Carolina. The recommendations of the task force led to the passage of a bill improving the oversight of hazardous waste facilities by requiring them to provide more information to state and local governments, making information on the facilities and their contents more readily available, enhancing financial requirements and strengthening regulations.



# Stewardship Enterprise

*“The land ethic simply enlarges the boundaries of the community to include soils, waters, plants and animals, or collectively: the land.”*  
- Aldo Leopold

Stewardship of the environment means ensuring that our natural resources are sustainably managed for current and future generations. The Department of Environment and Natural Resources is North Carolina’s lead stewardship agency and works hard to share the process, outcomes and ethics of stewardship through its work.

*N.C. Christmas trees. Bill Russ, N.C. Tourism.*



## Forest Stewardship

In 2008, Henry Cantrell was certified by the Burke County Stewardship Committee as a forest steward. Cantrell, who owns 30 acres of forest land in Burke County, had been participating for four years in the N.C. Forest Stewardship Program. This program, run by the N.C. Division of Forest Resources with participation from several other natural resources organizations, assists landowners in managing their land and recognizes those landowners that work with natural resource professionals to improve the forest environment and adhere to a multiple-use concept of forest management.

Forest owners who are part of the program receive technical assistance in developing a stewardship management plan. The plan is based on the objectives of the landowner and provides a strategy for enhancing the forest for wildlife, soil and water quality, timber production, recreational opportunities and natural beauty. Since nearly 70 percent of North Carolina’s 18 million acres of forest land is privately owned, the Forest Stewardship Certification Program plays a critical role in ensuring the sustainability of this valuable resource.

*Henry Cantrell, right, receives a forest steward award from Harry Jarrett, county forest stewardship chairman. N.C. Division of Forest Resources.*

## Oh, the Tonnage You’ll Save

In 2001, the Division of Pollution Prevention and Environmental Assistance developed the Environmental Stewardship Initiative. The mission of the program is to assist organizations in reducing their environmental impact beyond regulatory requirements and recognize those that achieve and maintain this commitment. The program is open to any site-specific, regulated organization or entity including manufacturers, businesses, government agencies, schools and nonprofit agencies. More than 100 members are now part of the program, and their collective reduced environmental impact and cost savings are quite impressive. From 2003 through 2006, participants saved more than \$23 million, reduced landfill waste by 201,420 tons (that’s the weight of 26,800 African elephants), reduced water use by 1,829,086,775 gallons (enough to fill 2,770 Olympic swimming pools), and reduced energy use by 169,414,198 MBtu (the equivalent of what more than 217,000 households in North Carolina use in one year).



*In April 2008, Environmental Stewardship Initiative partner Burt’s Bees held a “Dumpster Day” event. For two weeks, trash bins were emptied and volunteers from the facility sorted the waste into three categories: what should have been recycled or composted, what could be recycled if they found the right outlet and what was truly trash for a landfill. As a result of this exercise, Burt’s Bees has reduced the amount of trash sent to a landfill from its facility by 50 percent. N.C. Division of Pollution Prevention and Environmental Assistance.*



# Protecting Coastal Habitats

The General Assembly set in motion the creation of the Coastal Habitat Protection Plan program within the Department of Environment and Natural Resources with its passage of the Fisheries Reform Act of 1997. The Act requires preparation of the Coastal Habitat Protection Plans, or CHPP, for critical fisheries habitats in the coastal area of the state. In December 2004 the CHPP was officially adopted by the Coastal Resources, Environmental Management and Marine Fisheries commissions. It focused on six basic fish habitats: water column, shell bottom, submerged aquatic vegetation (SAV), wetlands, soft bottoms and ocean hard bottom. A chapter is dedicated to each of these habitat types, each one including information on the description and distribution of the habitat, its ecological role and function, status and trends, threats and recommended management actions to deal with those threats.

Within the department, the divisions of Marine Fisheries, Water Quality and Coastal Management are the lead agencies for implementing the CHPP program. Once the CHPP had been adopted, these divisions, as well as the commissions, developed and adopted two-year implementation plans in 2005. These plans detail specific steps for divisions to take. The plans were organized by the four major goals of the CHPP: improve effectiveness of existing rules and programs protecting coastal fish habitats; identify, designate and protect strategic habitat areas; enhance habitat and protect it from physical impacts; and enhance and protect water quality.

The Department of Environment and Natural Resources has worked hard to accomplish many of the steps outlined in the implementation plans. SAV mapping and research is underway as is shellfish habitat mapping, and numerous education workshops have been held on coastal development rules and stormwater best management practices. More funding is going to oyster restoration and oyster shell recycling, and rule changes are being considered that will help protect critical marsh habitat. The achievements are numerous, but perhaps most importantly, the CHPP has facilitated more partnerships between environmental agencies and organizations, assisted agencies in identifying research needs and enhanced communication and cooperation among the department’s divisions, enabling greater success for all.



*Salt marshes on Bald Head Island. Natural Heritage Program.*



## Sowing Your Oats

The N.C. Aquarium at Fort Fisher led sea oat-planting projects in 2004 and 2005, to restore sand dunes that had washed away during previous storms. Sea oats capture wind-blown sand, creating the dunes that serve to protect Fort Fisher’s state-owned natural areas and structures. *N.C. Division of Coastal Management.*

# Firewise

In 2003, River Run Plantation in Brunswick County became the state’s first Firewise Community. The Firewise Communities/USA program provides communities with knowledge and assistance in achieving fire readiness with the goal of minimizing damage to homes from an approaching wildfire. The N.C. Division of Forest Resources manages this national program in the state. Firewise coordinators with the division help communities assess their wildfire risks and take actions that will minimize those risks.

River Run Plantation had undeveloped, overgrown lots and was surrounded by heavily forested land. The history of wildfire in Brunswick County prompted the community to take action. Through working with the Division of Forest Resources and the local volunteer fire department, a Firewise Task Force was formed, potential fuel was removed from undeveloped lots, an emergency road exit was created and community members were educated about the program. River Run Plantation hoped its achievement would be an example to other small communities.

*Eastern White Pine.*

## One Million Acres of Trees

The Division of Forest Resources’ Forest Development Program was established in 1978 to encourage landowners to reforest their land by reimbursing them for some of the cost associated with doing so. In 2005, the program reached an impressive milestone – one million acres of trees planted. The landowner who planted the one millionth acre was Charles Royal, who grew loblolly pines on the acreage in Sampson County on which his great-grandfather used to grow cotton. “I think it’s a great program,” said Royal. “I think the incentive is there to motivate and entice you to replant acreage that you might not otherwise plant.”

To understand the program’s value, consider that one million acres of forestland:

- Would fit into an area about twice the size of Johnston County;
- Removes roughly six to 10 million tons of carbon dioxide each year;
- Produces four million tons of oxygen each year, enough for 18 million people to breathe;
- Can provide North Carolina landowners with more than \$800 million in timber harvest revenue;
- Produces enough lumber to build more than 500,000 homes.



*Loblolly pine seedling being planted. Each year the Division of Forest Resources produces approximately 21 million seedlings. N.C. Division of Forest Resources.*





# Rarities

From Venus flytraps to the Rafinesque's big-eared bat — North Carolina is home to many rare species. The Department of Environment and Natural Resources works hard to identify and protect its rare species and ecosystems.

## Hawksbill Sea Turtle

In March 2001, a juvenile hawksbill sea turtle was found stranded on the beach in Rodanthe. It was brought to the Network for Endangered Sea Turtles' (NEST) rehabilitation center at the N.C. Aquarium on Roanoke Island to recuperate. It was likely cold-stunned, as sea turtles are very susceptible to changes in water temperature. Hawksbill sea turtles, named for their bird-like beaks, are not usually found this far north. Fortunately, the stranded turtle had a speedy recovery and was released in May when the water was warmer.

*Hawksbill sea turtle. Photo by Caroline Rogers, USGS.*



## Rare Golden Sedge

In 2002, the golden sedge (*Carex lutea*) was added to the federal endangered species list. Originally discovered in 1991, this rare plant is only found in Pender and Onslow counties in North Carolina. Biologists believe that the species relies on periodic fires in order to survive. Fire suppression has pushed the population into just a few tiny pockets.

*Golden sedge. Misty Buchanan, N.C. Natural Heritage Program.*



*Saint Francis Satyr. Steve Hall, N.C. Natural Heritage Program.*

## Saint Francis Satyr Butterfly

The location is top secret. State and federal officials refuse to discuss it. Intrigue, mystery... butterflies! For many years, staff from the Natural Heritage Program have been conducting habitat and population studies of the Saint Francis satyr

butterfly. The only location on earth where this butterfly can be found is near the artillery zones at Fort Bragg. While a bombing zone might not seem like the best place for a federally endangered species of butterfly, it seems to work for the Saint Francis satyr.

Explosions aren't the only disturbances that the butterfly lives with, either. It appears that flooding from beaver dams and fires are two disturbances that this species may actually require for survival. It is hoped that the research currently being conducted will be able to be used to improve the habitat for this rare creature, which was actually thought to be extinct in the early 1990s. The researchers studying the Saint Francis satyr are truly dedicated, tromping through swamps in mid-summer hoping to catch a glimpse of the drab, brown butterfly, which only has distinctive markings on the underside of its wings and spends most of the day clinging to sedges. It lives on an Army base after all; of course it would be good at camouflaging itself!





Gray's lily.

Topographic, river basin, county, geologic, land use, climate...the list of the kinds of maps used by the Department of Environment and Natural Resources is long. Maps help delineate where unique ecosystems are located; help identify where certain environmental issues are likely to occur; and help department staff plan for future conservation efforts.

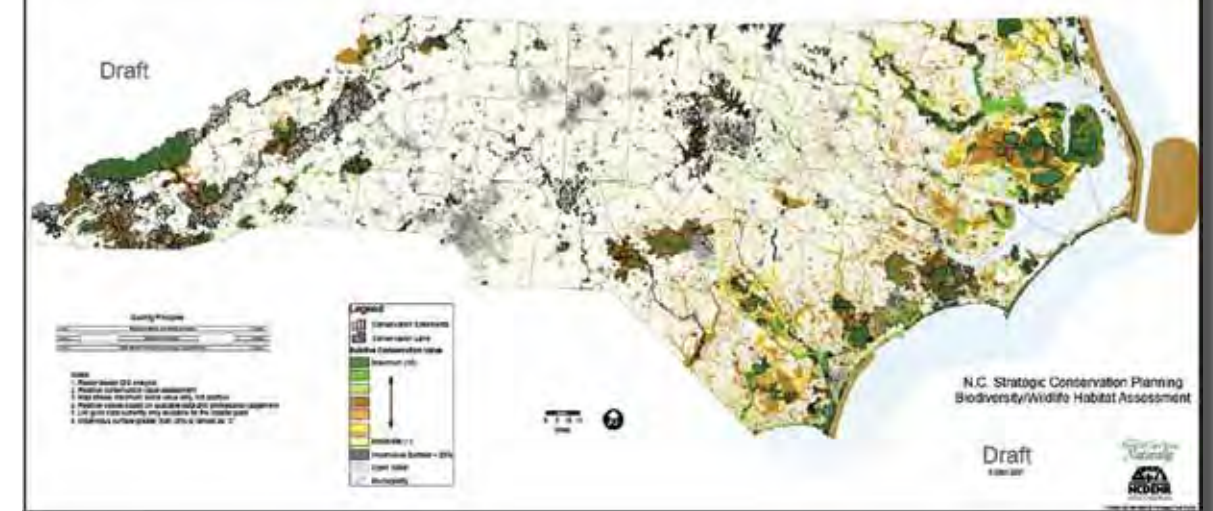
# Mapping the Future of Conservation

## One NC Naturally

The Department of Environment and Natural Resources established a comprehensive, visionary initiative in 2002 called One North Carolina Naturally, meant to implement strategies to promote conservation in the context of rapid development. One NC Naturally works in three sectors – natural areas, working lands and coastal habitats. A major goal of the overall program is to make conservation efforts in the state better coordinated and more effective.

At the first statewide conference planned through the initiative, Secretary Bill Ross introduced the need for a consolidated map that would guide conservation work and track progress. The map would help illustrate what was already being done and aid in determining how to connect and support those efforts, as well as fill in any gaps. The first step in creating such a map occurred in 2004, when local governments and private organizations were asked to use the technical and financial support of state government to develop plans and maps of existing protected spaces and future conservation opportunities. These regional plans would then be incorporated into the One NC Naturally map to show joint interests and encourage coordinated conservation. The interactive Conservation Lands Map Viewer was made available online in 2005.

*The One NC Naturally Conservation Planning Tool streamlines the process of identifying and prioritizing the areas in North Carolina's landscape that are essential for conservation. Featured here is the Biodiversity and Wildlife Habitat assessment. This interactive map viewer can be accessed at [www.oneNCnaturally.org](http://www.oneNCnaturally.org). NCDENR.*



In 2006, the Office of Conservation and Community Affairs in DENR began work on developing North Carolina's first green infrastructure plan: the Conservation Planning Tool. A year later it was released. The Conservation Planning Tool was designed to identify and prioritize the essential, high-quality natural resources across the state, as well as crucial land gaps that should be connected for a network of supporting ecosystems. The tool is available online as an interactive map viewer. At the time of its release, the tool included biodiversity and conservation land layers. Layers for agricultural and forestry lands, marine fisheries and estuaries as well as water sources will be added by the end of 2008. The One North Carolina Naturally initiative and the tools that have been developed as part of it will allow the hard work of all natural resource conservation organizations to go further, more efficiently, now and in the future.



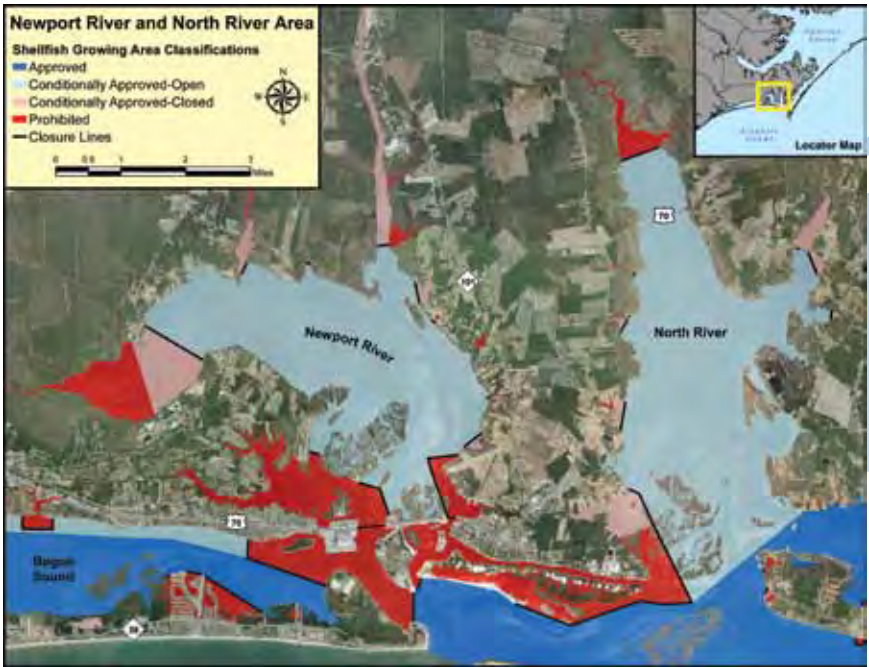


*Find out if you live near any rare species such as this Schweinitz's sunflower. Misty Buchanan, N.C. Natural Heritage Program.*

### Mapping Specialties

Thanks to the Natural Heritage Program, North Carolinians can select any point in the state on a United States Geological Survey map and get a report of all of the rare species that are found within two miles.

*Shellfish harvesting waters classifications for Newport and North River in Carteret County. N.C. Division of Environmental Health.*



### Surveying Shellfish Waters

Oysters are filter feeders, which is what makes them so good at cleaning up the water. It also means, however, that if an area suffers from too much pollution, the oysters and other shellfish in that area may not be safe to eat. It is the role of the Division of Environmental Health's Shellfish Sanitation and Recreational Water Quality Section to monitor and classify coastal waters as to their suitability for shellfish harvesting for human consumption. At the end of 2006, this group updated and improved how it accomplishes this task.

Previously, the shellfish closure maps were hand-drawn and accompanied by latitude and longitude descriptions of the closure areas. It was sometimes difficult to determine where exactly closure lines fell on these maps in relation to prominent landmarks, and they were not easily accessible. In 2006, the Shellfish Sanitation Section released electronic closure maps that had been created in cooperation with the divisions of Marine Fisheries and Coastal Management. "The updated shellfish closure maps and our Web site make it easier to share this information with harvesters and the public," said Patti Fowler, acting chief of the Shellfish Sanitation and Recreational Water Quality Section.

*Runoff that flows down the storm drain goes directly to a nearby body of water, along with any pollutants it may be carrying. N.C. Division of Water Quality.*



### Stormwater Mapping

The question of who is in charge can have a multitude of answers when stormwater is involved. Stormwater permitting responsibility across North Carolina could be local, state, shared by multiple entities or not a requirement at all. Add this to the fact that watersheds don't follow municipal boundaries and that other states have their own state and local requirements and it's plain to see why stormwater requirements can be confusing, to say the least.

The Center for Geographic Information and Analysis collaborated with the Division of Water Quality in 2007 to develop the Stormwater Permit mapping tool. Using North Carolina's county boundaries as the base data, the custom layers represent all possible cases of stormwater permitting responsibility based on unique and overlapping jurisdictions and rules. The interactive map clarifies what rules apply anywhere in the state.



# Marching In Step

It seems that the focus of the United States Armed Services and the N.C. Department of Environment and Natural Resources would not have much overlap, but the two organizations have partnered on many projects. The results have been extremely positive on both fronts.

## Fort Macon Restoration

The Division of Parks and Recreation completed its restoration of the 168-year-old fort at Fort Macon State Park in 2003. It now features state-of-the-art interpretive exhibits for visitors to enjoy. It was one of the most extensive historical restoration projects ever to be completed in North Carolina.



*Fort Macon State Park. N.C. Division of Parks and Recreation.*



*Military training often requires large tracts of land remote from human development.  
Photo courtesy of Marine Corps Base Camp Lejeune.*

## Buffering the Edges

Most military installations were established and located away from population centers. As state populations grew, however, encroaching development became an issue for many installations. As more and more residential areas spring up near these military sites, the number of noise complaints rises. Sometimes increased nighttime lighting from neighboring communities makes it impossible for military units to train properly for nighttime combat. As the population in North Carolina has risen, military installation encroachment issues have risen as well.

The Department of Environment and Natural Resources often sees development encroachment as a problem for reasons different than those of the military. The department worries that areas that once served as wildlife habitat or riparian buffers are being developed. While the underlying reasons may be different, the department and the military have realized that by working together, land can be protected for both of their needs.

In 2002, for example, through the combined efforts of the Clean Water Management Trust Fund, the N.C. Natural Heritage Trust Fund, the Wildlife Resources Commission, The Nature Conservancy and Camp Lejeune, 2,500 acres next to Camp Lejeune were purchased for conservation. The land had been slated for residential development and a golf course. The tract includes a “sandhill seep” habitat – one of the rarest natural habitats of our state. It is home to carnivorous Venus flytraps and pitcher plants as well as the endangered Carolina goldenrod. The N.C. Wildlife Resources Commission owns and operates the property, but Camp Lejeune retains limited rights to train on the land. It’s truly a win for the Marines and wildlife.



## Mapping Out the Defense

In December 2004, Fort Bragg’s 20<sup>th</sup> Engineer Brigade was preparing to go to Iraq for the daunting task of helping to rebuild Iraqi infrastructure such as bridges, roads and pipelines. The brigade contacted the N. C. Geodetic Survey, requesting technical assistance on how to establish a spatial reference system for Iraq.

Although it is possible to build small, isolated structures without accurate and precise coordinates, the job of reconstructing a neighborhood, let alone a nation’s infrastructure, definitely required precise and accurate coordinates. A spatial reference system provides the land-surveying foundation essential for building modern bridges, laying pipelines across vast featureless distances and constructing roads efficiently. The system also provides the geographic information system (GIS) foundation for mapping existing and rebuilt infrastructure components in order to help prioritize reconstruction.

Upon receiving the request from the brigade, Geodetic Survey staff went to Camp Mackall at Fort Bragg to meet with the brigade’s surveyors and leaders to discuss what assistance would be needed. The agency then prepared and conducted a two-day training session for the brigade on how to use GPS land surveying techniques, set geodetic monuments and establish GPS base stations. Perhaps most important was the continued support that the Geodetic Survey provided to the brigade via e-mail during the brigade’s deployment.

On June 6, 2006, the U.S. Army, National Geodetic Survey and N.C. Geodetic Survey unveiled a stainless steel commemorative geodetic disk in a dedication ceremony to honor their cooperative spirit and the dedicated individuals who participated in establishing the Iraqi Geospatial Reference System. This monument to their effort can be seen next to the control tower at the Camp Mackall airfield.



*The commemorative geodetic disk located next to the camp Mackall airfield control tower. N.C. Division of Land Resources.*

Following the brigade’s return to Fort Bragg, the U.S. Army presented the N.C. Geodetic Survey with a certificate of appreciation. It reads:

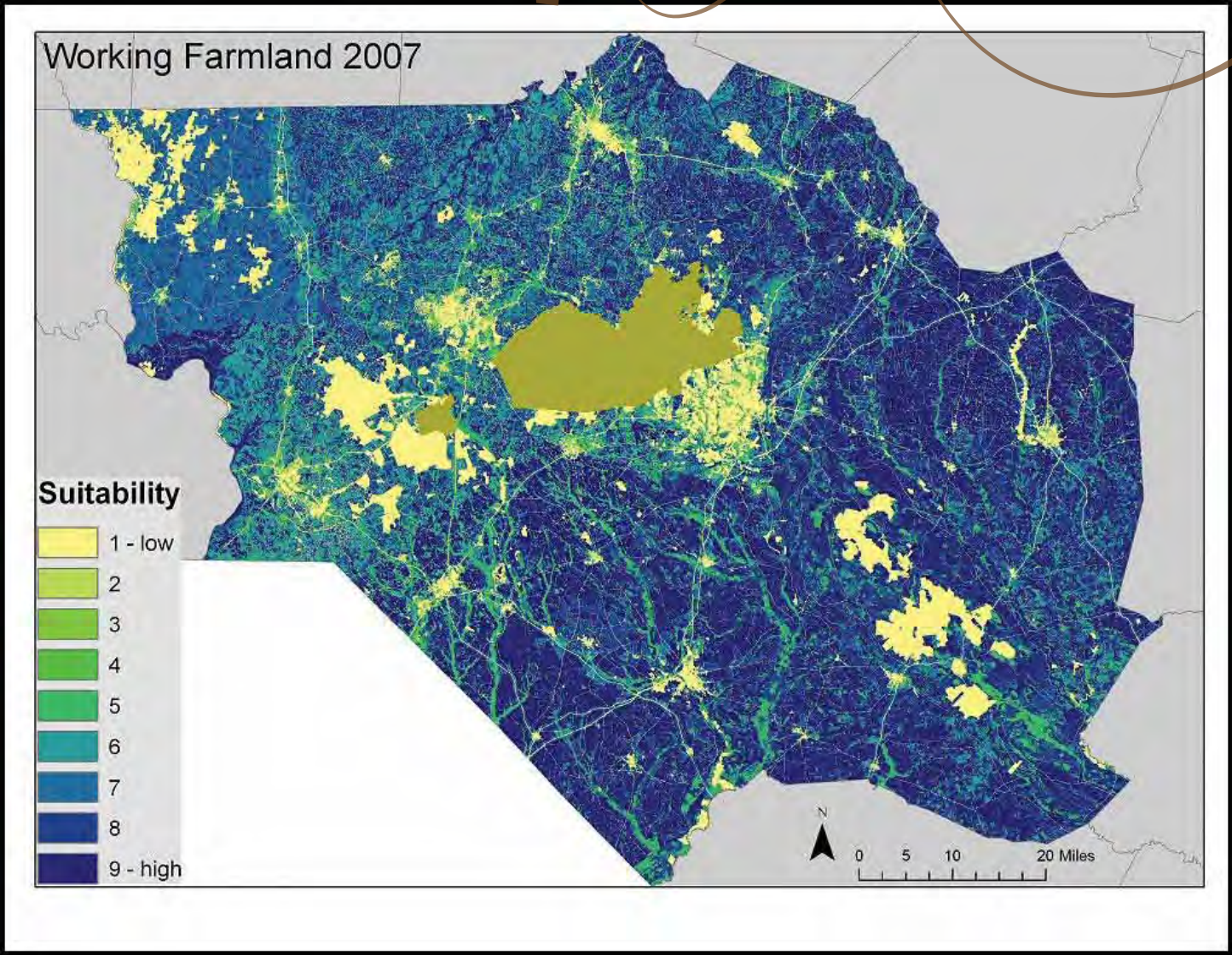
*“In appreciation for the North Carolina Geodetic Survey’s vital support to the 20<sup>th</sup> Engineer Brigade (Combat) (Airborne Corps). Their unparalleled patriotism and outstanding ability to provide technical assistance were vital to the realization of the Iraqi Geospatial Reference System. Their actions are in keeping with the finest traditions of civil service to our nation and reflect distinct credit upon them, this command, and the United States Army.”*

## Sustainable Sandhills

In 2002, Col. Tad Davis, Fort Bragg’s garrison commander, met with Department of Environment and Natural Resources Secretary Bill Ross about a vision for a sustainable region within North Carolina’s Sandhills. The result was the innovative Sustainable Sandhills Initiative – a partnership between Fort Bragg, the department and the eight counties abutting the military installation. The initiative works to ensure long-term sustainability in the region through work in six program areas: awareness and education, eco-tourism, green business, green design, land planning and recycling.



*A map showing the potential for working farmland in the 11-county Sustainable Sandhills region. Dark blue is the highest farmland suitability.*







# The Everyday

Everything we do each day has impacts on natural resources. Brushing our teeth, walking the dog, cooking dinner...the connections are not always right on the surface, but all of our decisions, purchases and actions affect natural resource use somewhere down the line. Below are some examples of how Department of Environment and Natural Resources staff are involved behind-the-scenes with activities we all do, and how they are working to educate people about the issues surrounding the choices made each day.

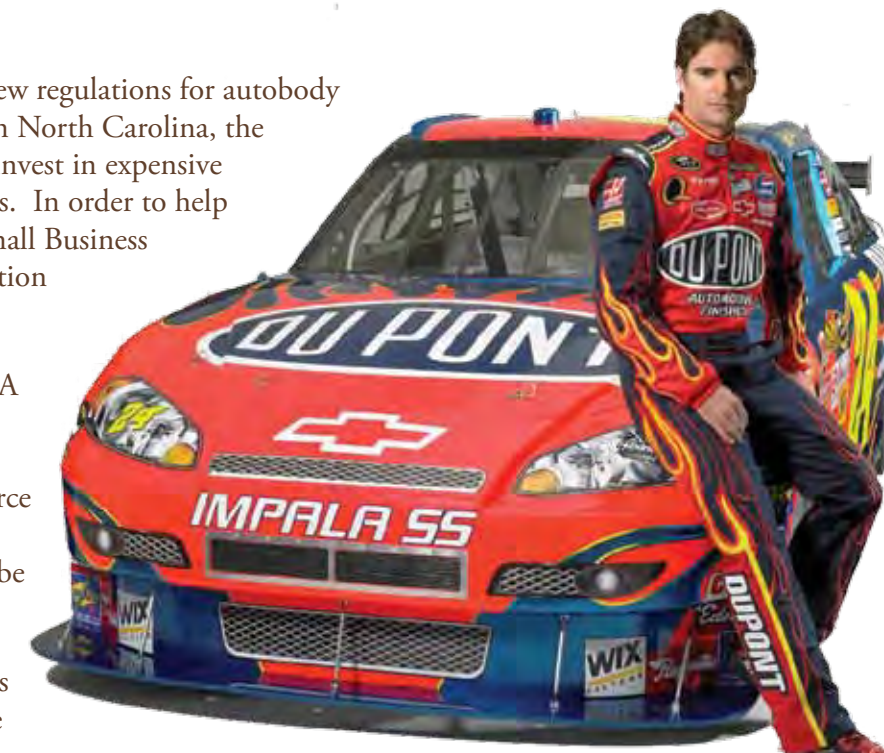


## Serving Small Businesses

In 2008, the Environmental Protection Agency came out with new regulations for autobody shops. While the rules applied equally to all 2,000+ businesses in North Carolina, the compliance burden was greatest for small businesses that had to invest in expensive equipment and provide specialized training to all of their painters. In order to help the small business community, the Customer Service Center's Small Business Environmental Assistance Program designed outreach and education programs for shop owners and staff.

The center produced a training DVD in partnership with the EPA and used local North Carolina autobody shops for filming in order to provide realistic examples of operations in small shops. Center staff also worked with the Hispanic Chamber of Commerce to create Spanish versions of the DVD. NASCAR driver Jeff Gordon also participated to help promote the DVD, which will be used nationwide.

The confidential, compliance assistance role of the Small Business Environmental Assistance Program enables the Customer Service Center staff to work closely with individual business owners and trade associations. By working together, they can develop industry-appropriate permit training and guidance materials. "Many of my clients employ family members and live in the community where their business is located," said SBEAP's lead engineer, Tony Pendola. "The last thing they want to do is emit unhealthy levels of pollutants. They just need some help learning how to keep from doing it. Once they understand the benefits, they are generally eager to do what is needed."



*North Carolina's own Jeff Gordon, driver of the #24 DuPont Chevrolet, is featured in the autobody DVD. The four-time NASCAR Cup Series champion encourages shops to reduce air pollution and keep their communities safer. Photo courtesy of Jeff Gordon Inc.*

## Auto Inspections

We all take our cars in for annual safety inspections, and for many of us in North Carolina this annual event also includes emissions testing. Most of us don't think about the pollution that results from driving our cars, but that is the job of the Division of Air Quality. In 2002, North Carolina made a major change in the way it tests motor vehicle emissions. Instead of measuring pollutants coming from cars' exhaust pipes, the state began using cars' own computers to determine whether their air pollution controls were working properly. This built-in system, called on-board diagnostics (OBD), continuously monitors vehicle performance and helps identify problems when a vehicle fails an inspection. From 2002 to 2006, DAQ, in cooperation with the N.C. Division of Motor Vehicles, expanded the emissions inspection program for cars and light-duty trucks. The emissions testing program expanded from nine to 48 counties during the four-year period, so that more than 80 percent of North Carolina's vehicles are now subject to inspections. "The auto emissions inspection program is a key part of our efforts to reduce ozone, which is North Carolina's most widespread air quality problem," said DAQ Director Keith Overcash. "Cars and trucks account for about half of the ozone-forming emissions statewide, so it's important that vehicles' emissions controls are working properly." More than half of North Carolina's residents live in counties where ozone levels exceed the standard. DAQ is working hard to improve air quality and protect the health of all North Carolinians.



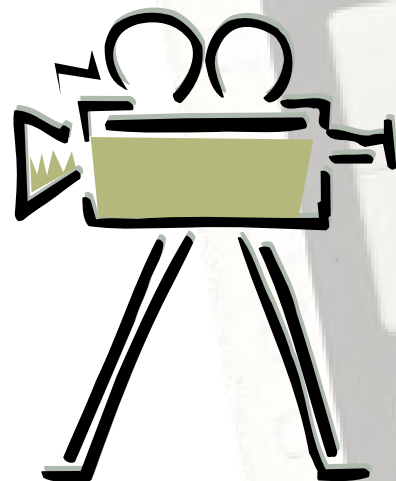
*The Division of Air Quality's Otto Parts cartoon character helps educate the public about the importance of emissions testing for cars and trucks. N.C. Division of Air Quality.*



Be Smart. Buy Smart. Know Your Choices

The Office of Environmental Education launched its Informed Consumer Initiative in 2006. This new adult education program was aimed at educating the public about issues surrounding the purchases and actions that are part of their everyday lives. This initiative covers topics such as food, lawn and garden, energy, water, waste, household products and personal care products. The information and resources provided as part of the initiative are not meant to advocate for any particular choice, but rather let people know what choices are out there and the costs and benefits associated with them. The interest in and popularity of the initiative has led to new components, including presentations to community groups, an Eco-Smart Consumer blog, informed consumer news RSS feeds and several educational publications.

“Initially we were trying to reach more of the adult public through our Web site,” said Rachel Golden Smith of the Office of Environmental Education. “Most people do not identify themselves as the ‘general public,’ but almost all people identify themselves as ‘consumers.’ The Informed Consumer Initiative does not aim to tell people what they should or should not buy or where they should or should not shop. It just highlights many of the environmental issues surrounding our everyday purchases and actions as consumers. In following the basis of environmental education, it does not tell people what to think or do. It instead gives people all of the resources they need to make their own informed decisions.”



Pumpkin patch at a North Carolina farmer’s market. Bill Russ, N.C. Tourism.

Lights, Camera, Action

EUE Screen Gem Studio in Wilmington was about to expand its facility with a new sound stage that would include one of the largest indoor production tanks in North America. They had a chance to lock-in several large contracts, but only if they could start construction immediately. Thanks to Express Permit Review through the Department of Environment and Natural Resources Customer Service Center, they could.

Express Permit Review was established as a pilot program in 2004 and expanded statewide in 2006. It provides faster review of permits, but does not relax requirements. The quicker process is possible through an expansion of staff supported by higher permit fees, requiring high-quality applications and emphasizing clear communication between all parties involved through pre-application meetings.

Screen Gem Studio was able to get the necessary coastal stormwater permit processed in only nine days, compared to the 60 to 90 days it would have taken otherwise. The studio is the largest full-service motion picture facility east of California, providing income and jobs to the Wilmington area. The Express Permit Review system has been a way that the department can ensure environmental protection while also ensuring stability for North Carolina’s economy and businesses.



Pet waste pick-up signs created by the N.C. Office of Environmental Education.

In 2007, the Office of Environmental Education had pet waste signs created and has been distributing them to department agencies, other state facilities and North Carolina Environmental Education Centers free of charge. Look for them at any of North Carolina’s Department of Transportation rest areas with pet waste stations.

A Dirty Job

Studies had shown that most people in North Carolina did not realize that water flowing down the storm drain does not get treated before it flows into local waterways. Many people are also not educated about potential sources of stormwater contamination. Pet waste, especially in heavily populated areas with a lot of impervious surfaces, can have a negative impact on water quality. Only about one third of dog owners in North Carolina claimed that they usually picked up after their dog on walks.

In 2006, as part of its Informed Consumer Initiative, the Office of Environmental Education developed postcards that provided information about the water quality impacts of not picking up after pets. “I didn’t want to create a postcard and just have it handed out to everyone only to be thrown away,” said Rachel Golden Smith with the Office of Environmental Education. “I know most dog owners trust their vet and value their input, so I really wanted to have vets distributing the postcards.” The postcards were initially sent to more than 800 vets across the state along with a letter inviting vets to order more postcards for free to distribute to their clients. As of 2008, vet clinics alone have requested more than 16,000 postcards, and more than 80,000 postcards have been requested overall. Groups commonly requesting the cards include homeowners’ associations, parks, pet shelters, nature centers and many other organizations.

“We’ve had lots of other states contact us to get the digital files of the postcard to produce their own version,” said Smith. “I even had a woman working with a stormwater program in Puerto Rico who wanted the card to translate into Spanish!” The popularity of the pet postcards prompted the office to seek funding to produce signs for pet waste stations. “There are more and more locations providing pet waste bags and disposal receptacles,” said Smith, “yet the signs available to accompany the receptacles often do not tell people why picking up pet waste is important. Making pet waste receptacles available and telling people why they are important to use, for better water quality of their own local waters, will make individuals more likely to use them.”



# ABCs

Experiencing and learning about the environment and natural resources of North Carolina is a lifelong endeavor. Many of the agencies in the Department of Environment and Natural Resources provide resources to classroom teachers in the form of professional development, classroom outreach, curricula and student mentoring.

*Orange urchins such as this were collected during the "Life on the Edge" missions on which the N.C. Museum of Natural Sciences invited teachers to participate. Photo by Art Howard.*

## An "A" in Recycling

The Division of Pollution Prevention and Environmental Assistance has worked to increase recycling participation by schools through recycling workshops, curriculum workshops and school bin grants. In 2006, more than 68 local governments reported that they had a school recycling program. On average, each of these programs diverts three pounds of material from landfills per student per month.

*The Recycle Guys have helped teach about recycling in North Carolina's schools. N.C. Division of Pollution Prevention and Environmental Assistance.*



## Sound Learning

Twenty-two elementary teachers and media coordinators participated in a weeklong training experience in 2005 that introduced them to a new way of teaching their school curriculum using environmental education.

The "Sound Learning Institute" was made possible by funding from the Albemarle-Pamlico National Estuary Program to the Environmental Education Fund and was administered by the Office of Environmental Education. The institute was a collaborative effort of multiple government agencies, nonprofit organizations, environmental education centers and universities to bring environmental education skills and resources to North Carolina's teachers. Sarah Palmer, a teacher at Raleigh's Wiley International Magnet Elementary, was one of the workshop attendees.

Going to the Sound Learning Institute kick-started my earlier, vague attempts to be an environmental educator. When Carolyn Toben did her activities to awaken our childhood experiences with nature, then told us we were probably the last generation who had that, I got a real jolt and decided, 'over my dead body will MY students not have intimate experiences with nature!' I've been eagerly grabbing every environmental education (EE) experience I can possibly have time/energy for ever since, both for the benefit of my students (and many other children I know), as well as my extreme enjoyment! I've learned so much about North Carolina's environment and general environmental knowledge and teaching skills and opportunities. I'm doing a 2,000+ square foot native plants natural learning garden at my school so our kids have a wild place to just be, and also to learn formally. In July I'm going to the RESTORE institute in Madison, Wis., to learn about restoring native ecosystems on school campuses and creating research-based curriculum for them. The contact for that was made at an Environmental Educators of North Carolina conference – I've been networking my little heart out, and reaping great results for my own edification and my students' benefit. In my classroom, I throw in environmental stuff as much as I possibly can, and many kids are starting to see me as the 'Ms. Frizzle' of nature – they bring me bugs, birds hit by cars, egg shells, weird nature stuff. I LOVE EE, and it has really added a wonderful spark to my life as a teacher and person in the world.



*Teachers explore our state's coastal habitat at the Sound Learning Institute. Office of Environmental Education.*



## A Zoo of a School

Ribbon-cutting ceremonies were held for the Asheboro High School Zoo School in September 2007. Located on the zoo grounds, the school is a science-focused program for 100 students in grades ten, eleven and twelve. It is only the fourth such school in the country.

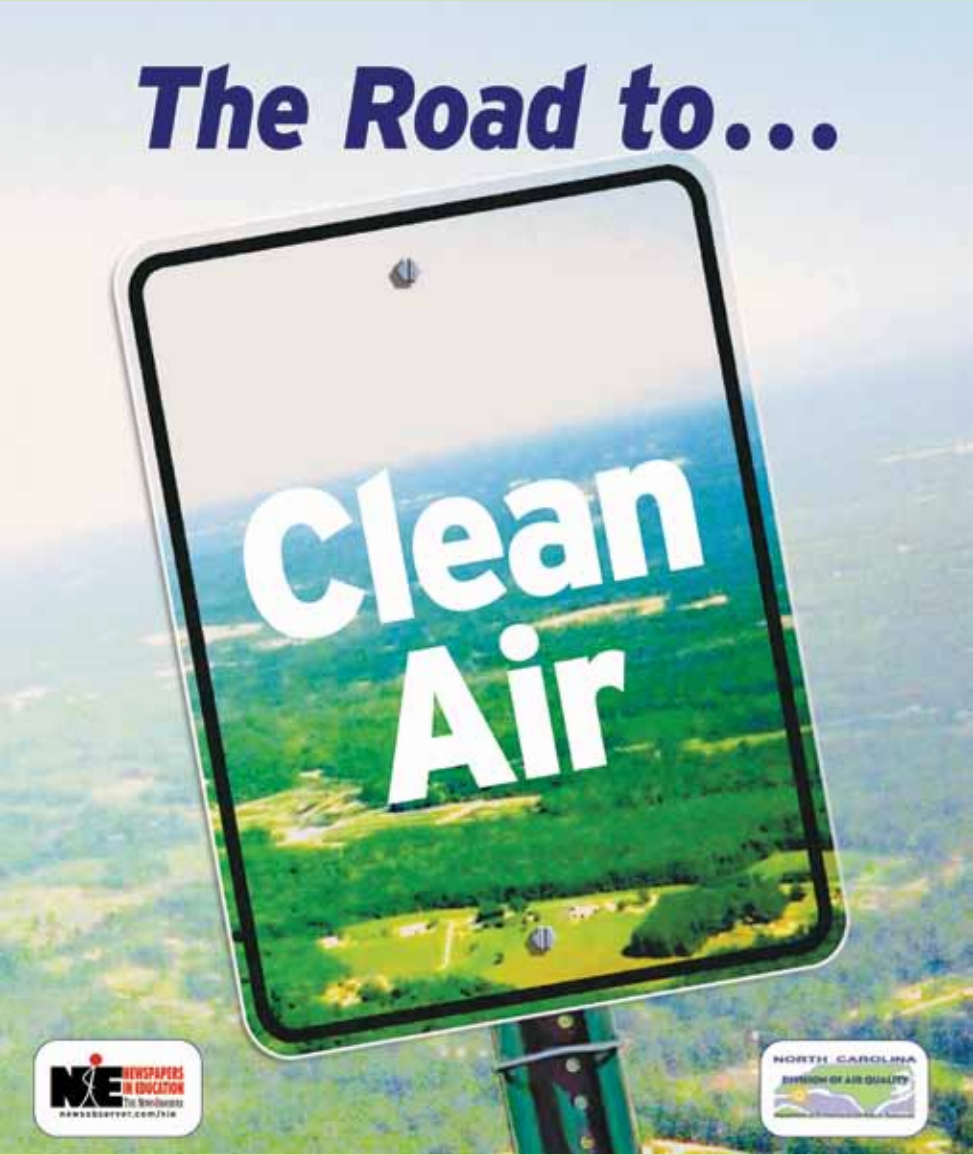
*Students at the Asheboro High School Zoo School. N.C. Zoo photo.*



## Get on the Bus

One sixty-fourth of a cent doesn't sound like a lot, but it does a lot of good. The 1/64-cent per gallon tax on gasoline sold in North Carolina funds the Mobile Source Emissions Reduction Grants that are administered by the Division of Air Quality. Many of the funded projects have involved the retrofit of school buses with controls to curb diesel emissions so that school children can breathe cleaner air when riding on school buses. In fact, in 2004, it was decided that all of the grant money would go toward installing diesel oxidation catalysts on school buses, which reduces their emissions of soot and other pollutants that can form fine particles in the atmosphere. A fraction of a penny for ensuring better health of school children seems like a pretty good deal!

*The Division of Air Quality has worked to retrofit school buses with diesel oxidation catalysts to help reduce air pollution. N.C. Division of Air Quality.*



## The Morning Paper

The Newspapers In Education (NIE) program is a worldwide effort that encourages teachers to use newspapers as supplemental text in their classrooms. Several of the divisions in the Department of Environment and Natural Resources have contributed to the NIE effort by developing newspaper inserts on various topics. Examples include The Road to Clean Air, Stormwater and You and North Carolina's Natural Network – How Do We Keep It Together? These educational resources have been distributed to teachers across North Carolina.

*The N.C. Division of Air Quality helped create this Newspapers in Education insert.*



*The Sequoias Envirothon team (from L to R) - Lewis Braswell, Thomas Lineberger, Stephanie Taylor, Frankie, Johnson and Erin Lineberger. N.C. Division of Soil and Water Conservation.*

## Envirothon

The West Johnston High School Sequoias placed eighth out of 54 teams from the United States and Canada at the 2008 North American Canon Envirothon competition in Flagstaff, Ariz. The team qualified for the national competition in North Carolina's statewide Envirothon, which has five study areas: soils/land use, aquatic ecology, wildlife, forestry and current environmental issues. The West Johnston High School team scored the highest score in the history of the state Envirothon, with a score of 496 points out of a possible 500.

The Envirothon is North America's largest high school environmental education competition. The national competition has a test in each of the five subject areas, and also has an oral component in which the teams are given a real-life environmental problem. The team has to devise a plan to solve the problem, prepare posters, develop a budget and then give a 20-minute presentation on their proposed solution.

North Carolina is excited to be hosting the 2009 Canon Envirothon at the University of North Carolina at Asheville campus.

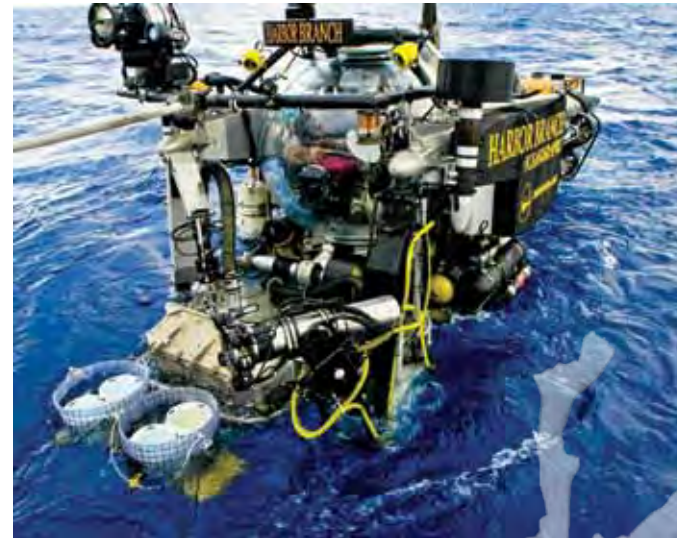


## Life on the Edge

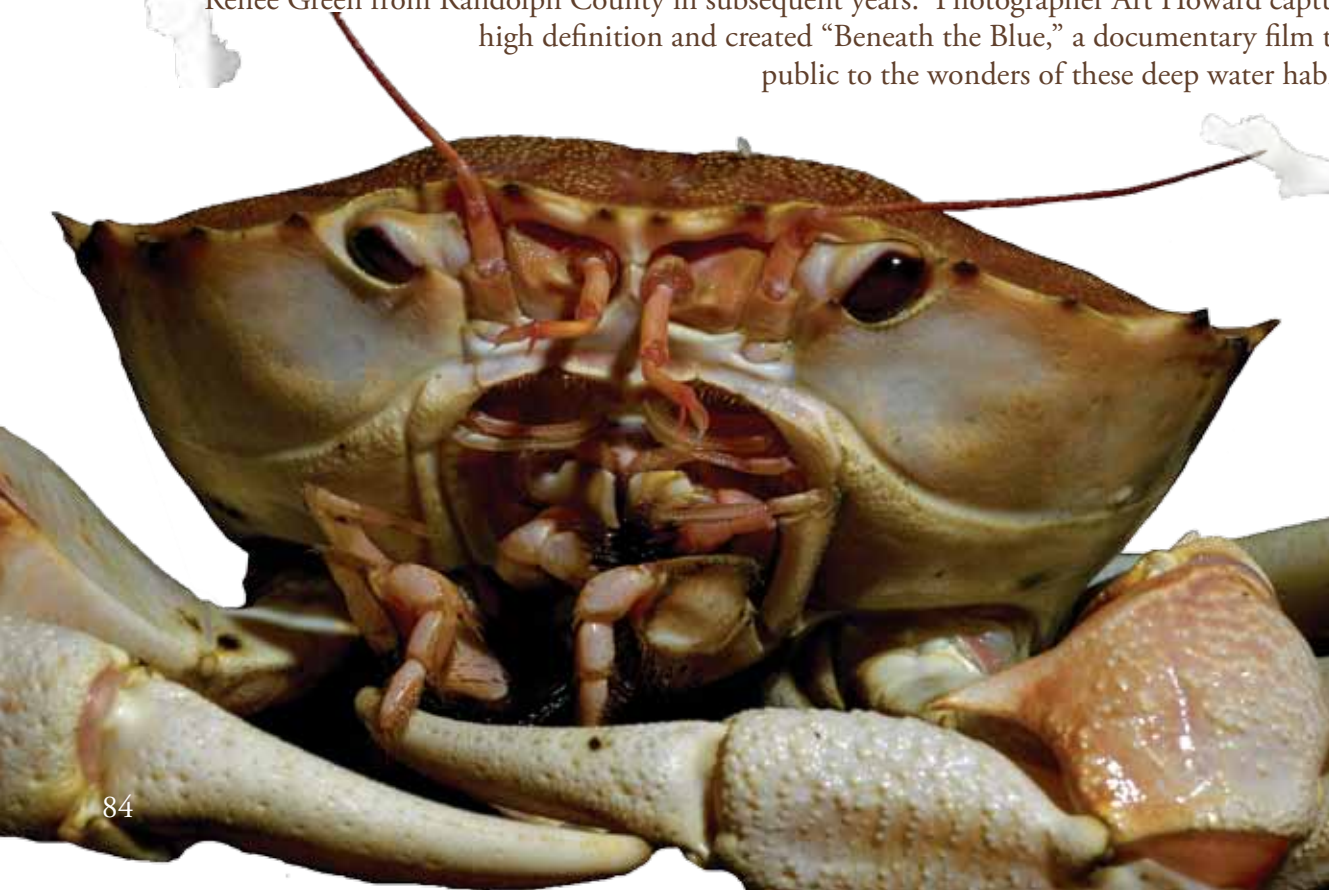
The Museum of Natural Sciences is known for the amazing professional development opportunities for teachers, but in 2002 it really went over the edge...the edge of the continental shelf. Museum educator Liz Baird and Alan Felker, a middle school teacher from Boone joined researchers from the University of North Carolina Wilmington, the National Marine Fisheries Service and the U.S. Geological Survey aboard a 204-foot vessel from the Harbor Branch Oceanographic Institute. Their mission, funded by the National Oceanic and Atmospheric Administration, was to explore the continental slope off the coast of North Carolina. From the ship, researchers used the Johnson Sea-Link II submersible to travel to the ocean floor and collect specimens.

North Carolina schoolchildren were able to follow along on the adventure and interact with the researchers from their classrooms. Team members posted their findings online, wrote and posted daily journal entries and answered questions from students posed via e-mail. Felker's students at Hardin Park School kept track of their teacher as the ship tried to hide from tropical storm Cristobal. Although the storm created some tense moments for Felker and his ocean-going colleagues, the reality of the chase made an ordinary mapping project come alive for his students. "They got pretty excited about that," said Felker.

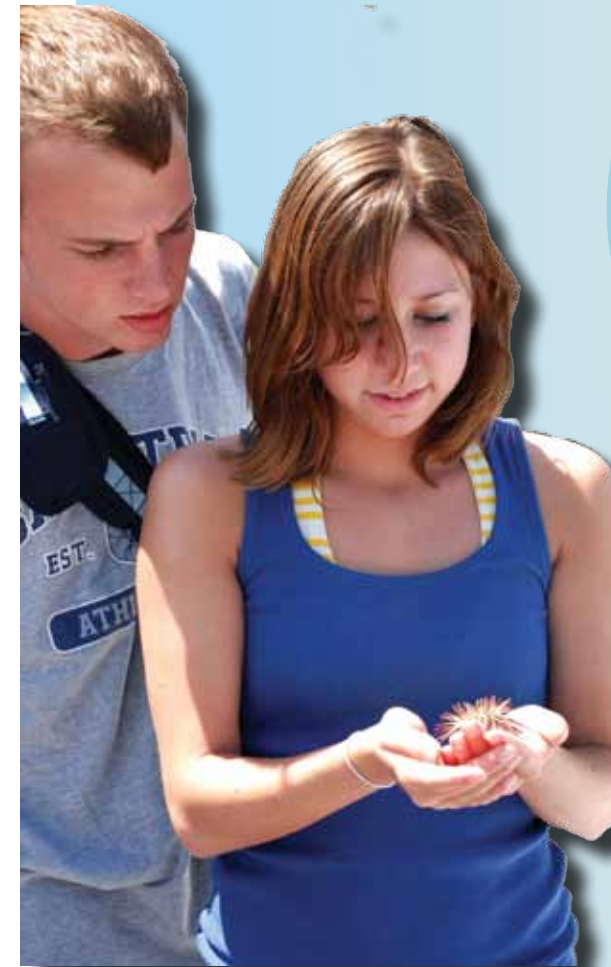
The museum took teachers Doni Angell from Burke County, Katie Cartwright from Carteret County and Renee Green from Randolph County in subsequent years. Photographer Art Howard captured these trips in high definition and created "Beneath the Blue," a documentary film to introduce the public to the wonders of these deep water habitats.



*The four-person Johnson-Sea-Link submersible is lowered into the Gulf Stream off the stern of the Seward Johnson. Photo by Art Howard.*



*The researchers participating in the "Life on the Edge" missions were interested in documenting the life in the deep coral habitats, such as this Chaceon crab. Photo by Art Howard.*



*The N.C. Aquarium at Pine Knoll Shores encourages children to explore North Carolina's waterways. Claire Aubel, N.C. Aquariums.*

## No Child Left Inside

In September of 2008, the U.S. House passed the No Child Left Inside Act--the first major federal legislation that supports environmental education since 1990. This bill passed with bipartisan support, by a vote of 293 to 109. In anticipation of its passage into law, DENR and the N.C. Department of Public Instruction formed a partnership to develop an environmental literacy plan for the state. This literacy plan is a requirement of the legislation and could lead to substantial funding for environmental education.

## Environmental Mentors

Beginning with the class of 2010, students who wish to graduate from a North Carolina public high school must complete a graduation project. The North Carolina Graduation Project includes four components: a research paper, a product, a portfolio and an oral presentation. In an effort to assist students interested in pursuing an environmental topic for their project, the Office of Environmental Education created a support page on its Web site with listings of individuals and organizations across the state that are willing to act as mentors on student projects, as well as possible project ideas.



*Students can complete a project with an educator or aquarist at the N.C. Aquarium at Pine Knoll Shores. N.C. Aquariums.*



# Gone Fishin'

From surf fishing on the beach to fly-fishing in the mountains, one thing is for sure — North Carolina is a great place to fish!



*Jess Hawkins instructs a fishing class at Pine Knoll Shores. N.C. Aquariums.*

## Local Catch

At the 2007 N.C. Seafood Festival, the N.C. Aquariums debuted its new Local Catch Seafood Availability wallet cards. The cards were developed in partnership with Sea Grant and are based on a poster developed by Sea Grant, the N.C. Division of Marine Fisheries and the N.C. Department of Agriculture and Consumer Services. The four cards, one for each season, let consumers know what seafood is available as well as where and how seafood is harvested along North Carolina's coast. The "Quality Counts" section gives consumers tips on what to look for to make sure they are getting fresh seafood.

Joanne Harcke of the Aquarium at Fort Fisher had the idea of developing the cards. The original poster was often used by staff at the state's three aquariums when fielding questions from visitors curious about local seafood. "We wanted to create a positive message for what North Carolina has to offer," said Harcke. Everyone seems to agree that the cards were a great idea. "These are great consumer education tools that complement the state's 'Freshness from North Carolina Waters' campaign," said William Small of the NCDA&CS Seafood Marketing program. Dr. Louis Daniel, director of the state's Division of Marine Fisheries, added, "In addition to letting consumers know what and when local seafood is available, the charts serve as a springboard for educating the public about fisheries management."



*Local Catch Seafood Wallet Cards.*

## License to Fish

In 2005, the N.C. General Assembly enacted a law requiring those who harvest finfish recreationally in state coastal waters to purchase a fishing license. According to the legislation, the funds collected from the purchase of the licenses will be used "to manage, protect, restore, develop, cultivate, conserve and enhance the marine resources of the State." Once this law was passed, the Department of Environment and Natural Resources' Division of Marine Fisheries immediately began the task of setting up a licensing system.

Beginning on Jan. 1, 2007, anyone over the age of 16 needed to have a license to fish in North Carolina's coastal waters. The Division of Marine Fisheries worked with the Wildlife Resources Commission to make the new coastal fishing license available with all other hunting and fishing licenses housed within the commission. Revenues collected from the licenses go into one of two funds. Money from the N.C. Marine Resources Fund has already been used to support several fisheries-related projects.

One of the projects funded through the new license receipts was the N.C. Coastal Recreational Angler's Guide. This 131-page, full-color, pocket-sized booklet provides information on DMF recreational fishing programs, license requirements, ethical angling practices, fish biology, habitat information and fishing tips. The guides are available free of charge.



# Thar She Blows



*Hurricane Isabel struck the northern outer banks of North Carolina in September 2003. NOAA.*



*Hurricane Isabel caused severe beach erosion and destroyed numerous homes in Kitty Hawk. N.C. Division of Environmental Health.*

North Carolinians know a thing or two about hurricanes. No matter their particular focus, all of the divisions in the Department of Environment and Natural Resources have the same goal when a hurricane comes our way. All of the agencies work together to ensure the safety, health and recovery of everyone touched by the storm.



## Hurricane Isabel, 2003

Hurricane Isabel made landfall on North Carolina's Outer Banks as a Category 2 storm on Sept. 18, 2003. Wind speed measured 105 miles per hour, and the storm surge washed out a portion of Hatteras Island, including the main water supply piping. Many North Carolinians were stranded or without power for days.

The Division of Environmental Health was at the ready. Prior to and immediately following the storm, division staff disseminated information on well disinfection, public water supply system status, food safety, septic systems, restaurant reopening, recreational water quality and shellfish water status, pest avoidance and aerial mosquito spraying.

Following the storm, a blanket boil advisory was issued by the division for any public water system that had flooded or lost pressure. The division made use of its new, Web-based Water System Status Report, which was implemented for the first time. It allowed regional staff to input data into an online tracking system. As water service was restored and sampling showed no contamination, staff could immediately clear systems that had initially been included in the blanket advisory. This provided a way to immediately notify the press and the public of any updates.

Drinking water wasn't the only concern after the storm. "Isabel was the first instance in the United States in which an outbreak of West Nile Virus was underway in a state when a hurricane hit," said Dr. Nolan Newton, chief of the Public Health Pest Management Section. "Neither state nor federal officials knew what to expect in terms of increased West Nile Virus activity from floodwater mosquitoes." Assessments made after the storm indicated that it was possible that floodwater mosquitoes could spark an increase in West Nile Virus. In response, the Public Health Pest Management Section initiated aerial spraying. This quick response prevented an increase in mosquito-borne illnesses.

Hurricane Isabel offered another first for the Division of Coastal Management. Following the storm, Secretary Bill Ross activated an emergency general permit offered by the division. The permit had been adopted three years previously by the Coastal Resources Commission as a way to speed up recovery and rebuilding after hurricanes. Property owners along sounds, rivers and creeks who needed to replace structures that were damaged by the storm could do so under this permit.

People weren't the only ones who needed help following Hurricane Isabel. Three wild horses from the Rachel Carson Estuarine Research Reserve in Beaufort were found on Shackleford Banks following the storm. "In the 20 years I've been here," said John Taggart, manager of the North Carolina Coastal Reserves at the time, "the only time I'm aware of horses going from one place to another was, we had a horse go across Taylor's Creek into Beaufort, and we've had horses that have gone to Radio Island, but those distances are only a few hundred yards. This time the distance was more than a mile. This was an extreme event because of the storm."

Staff from Rachel Carson and the National Park Service safely transported the horses back to the reserve. The three horses were darted with anesthetics, captured, lifted onto panels and taken by boat to Rachel Carson. They were placed in a pen and monitored during their recovery from the anesthetics. A state veterinarian examined the horses and found them to be healthy. The horses then rejoined the Rachel Carson herd.



*The town of Buxton on Hatteras Island was largely under water following Hurricane Isabel. N.C. Division of Environmental Health.*



Hurricanes Frances and Ivan, 2004

Hurricane Frances landed on Florida’s east coast on Sept. 5, 2004. By Sept. 8, the storm had made it to North Carolina with winds still gusting between 40 and 60 miles per hour. Ten to 15 inches of rain fell in parts of the state. As North Carolinians were closely watching Frances approach, Hurricane Ivan had become the Atlantic’s ninth named storm of the season. It made landfall as a Category 3 storm along the Gulf Coast of Alabama. From there it made its way north, delivering more wind and rain to the already battered western part of the state.

In the midst of the storms, Division of Water Quality staff in the Asheville Regional Office worked around flooded roads to help permittees at wastewater facilities and animal operations solve their problems and bring their treatment systems back into compliance. Staff also worked with other local, state and federal agencies to provide technical assistance and to assess potential water quality threats.

The combination of high winds, heavy rains and steep slopes during Frances and Ivan resulted in more than 400 landslides in the area. The Peaks Creek debris flow in Macon County killed five people and destroyed 15 homes. The Division of Land Resources’ Geological Survey provided emergency technical assistance to local and state emergency management personnel. Geological Survey staff inspected landslide sites, participated in technical review committees to determine landslide causes and predict where they were likely to happen again, presented information to local government and interest groups and provided public safety information to the news media.

The Geological Survey wasn’t the only group from the Division of Land Resources called on for assistance. Staff in the Dam Safety Program were also critical in the emergency response activities following the storms. Personnel from the Asheville and Winston-Salem regional offices made more than 150 emergency inspections of high-hazard-potential dams within a short period of time to determine if flood flows were endangering or had weakened the dams. Dam Safety staff provided on-site technical assistance for excavating emergency channels adjacent to three high-hazard-potential dams to relieve the overtopping spillways. These three dams would likely have otherwise failed, which would have caused severe damage downstream.

The Division of Forest Resources was involved in recovery efforts after Frances and Ivan as well. Requests were made for Forest Service Incident Management teams to support the emergency response and recovery efforts that were underway. More than 300 division personnel were involved with this request. In order to expedite the cleanup of debris that was left behind by the storms, the Division of Waste Management also aided communities. It provided local governments and citizens with technical assistance towards the cleanup and management of vegetative debris, demolition waste and household waste.

Division of Forest Resources personnel assist with loading water onto National Guard cargo aircraft for distribution. N.C. Division of Forest Resources.



Damaged piers and downed power lines on Bogue Banks following Hurricane Ophelia. Robert McCabe, Carteret County.

Hurricane Ophelia, 2005

The 2005 Atlantic Hurricane season is one that surely nobody will soon forget. With 27 named storms, it claims the title of most named storms ever recorded in a single hurricane season. It was the 2005 season that delivered hurricanes Katrina and Rita to the Gulf Coast. Oddly enough, the 2005 hurricane that severely impacted North Carolina never officially made landfall. Instead, on Sept. 14 and 15, the storm raked the southeastern North Carolina coast from Cape Fear to the Outer Banks, with the eye of the storm staying just offshore.



Photo courtesy of NC Dept. of Crime Control & Public Safety

The Division of Environmental Health was, as always, ready to help wherever needed following the storm. Public Water Supply Section staff were in the field evaluating isolated areas and providing technical assistance. They also provided daily reports of public water supply systems that had issued advisories and updated reports as soon as the advisories had been lifted. The division’s Shellfish Sanitation and Recreational Water Quality Section closed all shellfish waters statewide and issued swimming advisories for all coastal recreational waters. Water quality samples were collected and tested until results indicated that they had returned to normal. Division staff also worked with local health departments to help them meet emergency needs.



# Is It Hot In Here?



Global climate change poses obstacles unlike any we have seen before. It will take the work of many people in many organizations to address the issue. There are innovative examples of actions being taken in our state right now.

## A Climate Action Plan

Scientific measurements have documented a substantial increase in CO<sub>2</sub> levels in the atmosphere since the mid-1800s. There has been a growing scientific consensus that increasing emissions of greenhouse gases, such as CO<sub>2</sub>, to the atmosphere are increasing the temperature and variability of the earth's climate. Recognizing the profound implications that global warming and climate variation could have on the economy, environment and quality of life in North Carolina, the Department of Environment and Natural Resources established the Climate Action Plan Advisory Group in 2006. The purpose of this group, managed by the Division of Air Quality, was to make recommendations for specific actions to help reduce or cope with climate change in the state. These recommendations would include measures for reducing greenhouse gas emissions and sequestering or removing such gases from the atmosphere, as well as analyses of their likely economic costs and benefits.

The Climate Action Plan Advisory Group was made up of more than 40 members representing a broad range of backgrounds and interests including industry, environmental groups, government agencies, academic institutions, agriculture, forestry, coastal interests, real estate, tourism and other businesses. The group closely coordinated its work with the Legislative Commission on Global Climate Change. The General Assembly established the commission in 2005, and it was focusing on broader issues related to climate change, such as whether North Carolina should set a cap or goal for reducing greenhouse gas emissions.

Working as part of the CAPAG were five technical work groups. These were comprised of CAPAG members as well as experts in the specific field of the work group. Work groups were formed in the areas of: Energy Supply; Residential, Commercial, Industrial; Transportation and Land Use; Agriculture, Forestry and Waste Management; and Cross-Cutting Issues. In 2008, the CAPAG's official final report was completed, offering 56 recommended mitigation options. The mitigation options are distributed across the five work group fields, and an expected greenhouse gas reduction value has been attributed to each. In addition, the net economic value of each was indicated. This economic analysis indicated significant cost savings for the state's economy overall if the mitigation options are adopted.

## The Climate Registry

In 2007, North Carolina became one of 30 members of The Climate Registry. The Registry is aimed at measuring, tracking and verifying emissions of greenhouse gases that contribute to global climate change. "Getting accurate data on greenhouse gas emissions is a vital step towards addressing the potential impacts of climate change in North Carolina," said Department of Environment and Natural Resources Secretary Bill Ross. "The registry provides a way for states to share resources and synchronize our programs."

The Division of Air Quality has been encouraging air emissions sources to participate in The Climate Registry. Companies, institutions and government agencies that volunteer to join agree to calculate and report their greenhouse gas emissions. DAQ Deputy Director Brock Nicholson said, "Sources that participate in The Climate Registry will help us obtain accurate data on greenhouse gases while preparing for future issues dealing with climate change." The registry is seen as a key part of efforts to cope with climate change, and it is hoped that it will encourage market-based approaches toward dealing with global warming.







# Local Ties

Many of the department's agencies serve statewide roles, but that doesn't mean that they are not connected and committed to the communities in which they are located. Many community members are committed to agencies as well.



The restored Pisgah Covered Bridge. N.C. Zoo photo.

## The Pisgah Covered Bridge

The N.C. Zoological Park in Asheboro may have animals from all over the world and take part in projects across the globe, but it is closely linked to and supportive of its local community. This was evidenced in the summer of 2003 when floods washed away the nearby Randolph County landmark, the Pisgah Covered Bridge. Zoo Director Dr. David Jones pledged the zoo's efforts toward rebuilding the structure.

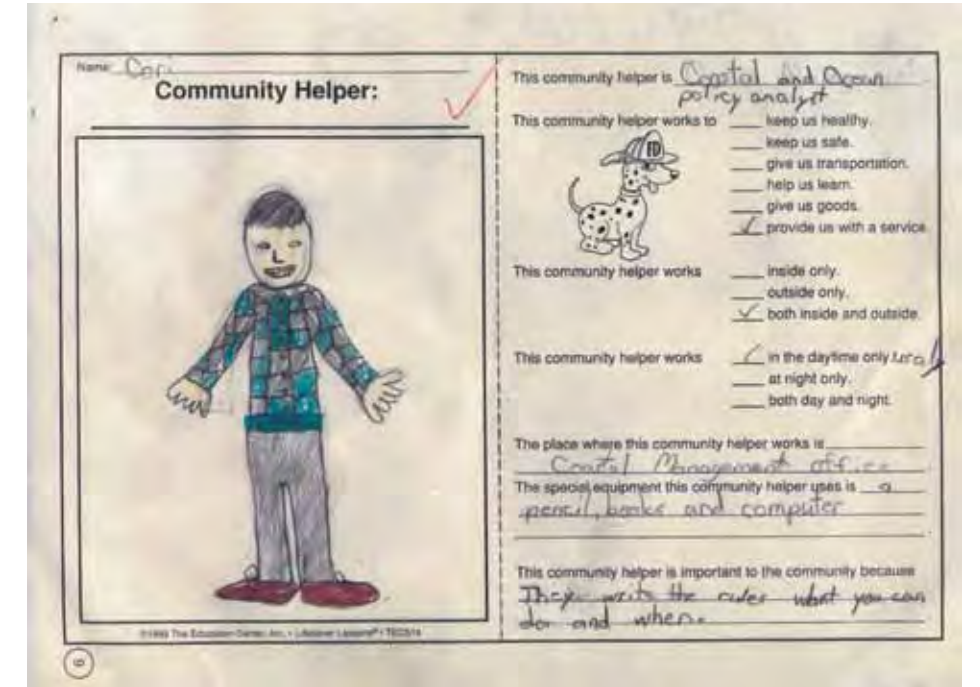
The Pisgah Covered Bridge was one of only two surviving covered bridges in the state. It was originally built in 1911, spanning a branch of the Little River. Zoo employees salvaged as much of the original 51-foot wooden structure as possible after it was washed away. In less than a year, \$80,000 had been raised. In May 2004, the restored bridge was reopened.

## A Community Helper

Mike Lopazanski has a picture on his office door that was drawn by his daughter, Cori. It was a school assignment to draw a picture of a community helper. Most kids probably drew firemen or policemen or nurses, but Cori decided to draw her dad in his role as an ocean and coastal policy analyst for the Division of Coastal Management.

Not everyone may agree with this designation as a community helper, but Mike definitely does. He sees his role as helping coastal communities protect their valuable and irreplaceable environmental resources, while at the same time addressing economic development concerns.

In describing how he ended up in the Division of Coastal Management, Mike said, "I just fell in love with the North Carolina coast, and then I found out about this agency called Coastal Management that would actually pay me to help protect it. It was my ideal job, to make a living protecting this amazing place." Mike believes that working for the Division of Coastal Management is the best way to affect coastal policy and help try to find the delicate balance between economic development and resource development. A community helper indeed!



Cori's drawing of her dad as a community helper.

## Community Conservation

Until recently, very little help was available for owners of small land parcels for controlling erosion and runoff on their properties. In 2006, the Division of Soil and Water Conservation began administering the Community Conservation Assistance Program to provide educational, technical and financial assistance to these landowners. Landowners apply to the program through and receive help from their local Soil and Water Conservation District for projects such as backyard rain gardens, cisterns and more.

One CCAP project that began in 2007 was the result of a contract between the North Carolina Coastal Federation and the Onslow County Soil & Water Conservation District. The project was located on Jones Island, at the mouth of the White Oak River. Through the project, volunteers including high school students, staff from Hammocks Beach State Park and concerned citizens planted more than 5,000 marsh plants to stabilize the shoreline and create coastal marsh habitat.

"The Community Conservation Assistance Program has allowed us to expand our coastal habitat and water quality restoration efforts through shoreline protection and installation of stormwater runoff controls such as cisterns and stormwater wetlands. Thanks to the CCAP, North Carolina is one step closer to achieving its goal of improving water quality by reducing polluted stormwater runoff polluting our waterways."

Dr. Lexia Weaver, Coastal Restoration Specialist – North Carolina Coastal Federation

Volunteers do work at Hammocks Beach State Park. N.C. Division of Soil and Water Conservation.





# Adkin Branch

In 1999, the rains of Hurricane Floyd turned more than 200 properties along Adkin Branch into a virtual wasteland. A tributary of the Neuse River in Kinston, Adkin Branch has been the focus of the Ecosystem Enhancement Program for more than five years. In partnership with the city of Kinston and landowners along the creek, the EEP has been planning to re-engineer Adkin Branch to improve water quality and aquatic habitat and reduce flooding.

The major endeavor will include reshaping the eroding stream banks of the creek. Vertical bulkheads will be removed, and the banks will be reshaped into a sloped form. Vegetation will also be planted along the stream. Reshaping the banks and planting these buffers will help make future flooding less severe. “When there is a rain event and the water starts to rise,” explained Kristie Corson, an environmental specialist with EEP, “it has an area to flood naturally.”

Corson sees the restoration of the creek going well beyond water quality and flood capacity. She sees the stream becoming an outdoor classroom for neighboring schools. She has reached out to local teachers and hopes to work with them through a program called Project WET, or Water Education for Teachers. Project WET is a hands-on, environmental education program that provides teachers with field-tested lesson plans and training focused on water quality.

*“Our project in Kinston has the potential to help residents there learn and understand more about the importance of preserving our natural resources in an urban setting,” said Corson. “And when you get right down to it, that’s what all of our projects should be about.”*



*EEP will begin work on the restoration of degraded Adkin Branch in Kinston in 2009. Ecosystem Enhancement Program.*

# A Boy and His Aquarium

Seven-year-old Jackson Alexander came to the N.C. Aquarium at Pine Knoll Shores the day before it shut down for its 2.5-year-long renovation. The Kinston resident was one of the aquarium’s biggest fans, visiting often with his grandmother who lived on Emerald Isle. The rising second-grader and budding entrepreneur had a plan to help do some fundraising. Jackson created his own aquarium at his grandmother’s house, creating five marine habitats in small aquariums and populating them with plastic animals. He then charged \$2 for friends and neighbors to visit ‘Alexander’s Aquarium at the Beach House.’ “I thought if I helped raise money, maybe the aquarium would open sooner,” he explained.

In fall 2005, Jackson stopped by the aquarium’s temporary location to deliver his contribution - \$70 worth of coins! Aquarium Director Jay Barnes came out to meet him and thank him for his generous donation. Jackson got a behind-the-scenes tour of the husbandry holding area, and was promised a behind-the-scenes tour of the renovated facility just as soon as it opened.

Jackson was invited to help cut the ribbon on the new facility at the opening ceremony on May 19, 2006. He made it all look easy, chatting with Department of Environment and Natural Resources Secretary Bill Ross and cutting the ribbon alongside Lt. Gov. Beverly Perdue. Then he made a beeline for the entrance, and was the first visitor through the door.

*Jackson Alexander cuts the ribbon of the renovated Aquarium at Pine Knoll Shores in 2006 with Director Jay Barnes, Roy Park Jr., donor, Lt. Gov. Beverly Perdue and Pine Knoll Shores Mayor Joan Lamson. Bob Roush, N.C. Aquariums.*



*Jackson Alexander walks with DENR Secretary Bill Ross, Lt. Gov. Beverly Perdue and former N.C. Aquariums Society Chairman David Womack. Bob Roush, N.C. Aquariums. 2006*





# Every Drop Counts

In the past eight years North Carolina has seen some of the worst drought on record. The agencies of the Department of Environment and Natural Resources have worked hard to conserve our precious water resources and educate people about what they can do to save water.



*Falls Lake during the 2007 drought. N.C. Wildlife Resources Commission*

## Water Advisory

The Drought Monitoring Council was an interagency collaboration that was created in 1992. During the 2002 drought, the council did an exemplary job of monitoring and coordinating drought response. In recognition of its leadership and performance, the General Assembly gave the group a statutory base in 2003, at which time the name was also changed to the Drought Management Advisory Council to reflect the broader role which it was to play. The Department of Environment and Natural Resources' Division of Water Resources leads the council.

The Drought Management Advisory Council issued its first drought advisory under new statutory authority in October 2005. This advisory, and the many that have followed, provided local governments and other water users reliable information on which to base their management decisions. The Division of Water Resources maintains the Web site for the council, where detailed drought assessment and water use information can be found. When determining the issuance of a drought advisory, the council takes into account stream flows, groundwater levels, the amount of water stored in reservoirs, weather forecasts and time of year. It tailors advisories to local conditions, which is extremely helpful to local governments making water-use decisions.

## Saving for a Rainy Day

Thanks to a grant from the Albemarle Pamlico National Estuary Program, the N.C. Aquarium on Roanoke Island is saving a lot of water! Since 2005, the aquarium has been using four 2,500-gallon rainwater collection cisterns. On rainy days, water used to pour off of the roof of the aquarium's main building. A lot of water can pour off of a roof that is more than 7,300 square feet! The grant allowed the aquarium to have cisterns designed and constructed that would collect and store this water.

The cistern water is used to fill exhibit tanks in the aquarium's Coastal Freshwater Gallery, irrigate plants inside the conservatory, irrigate outdoor gardens, fill the sculpture pond and help with outdoor cleaning and maintenance. Educational signs were also constructed and placed at the tanks to teach aquarium visitors about the project.

The initiative was a partnership effort from the beginning. The aquarium's staff worked with Cooperative Extension as well as stormwater experts from the Biological and Agricultural Engineering Department at North Carolina State University's College of Agriculture and Life Sciences. The aquarium relied on the expertise of these agencies, and now these agencies can use the site as a demonstration project for workshops and show others how they can save water, too.



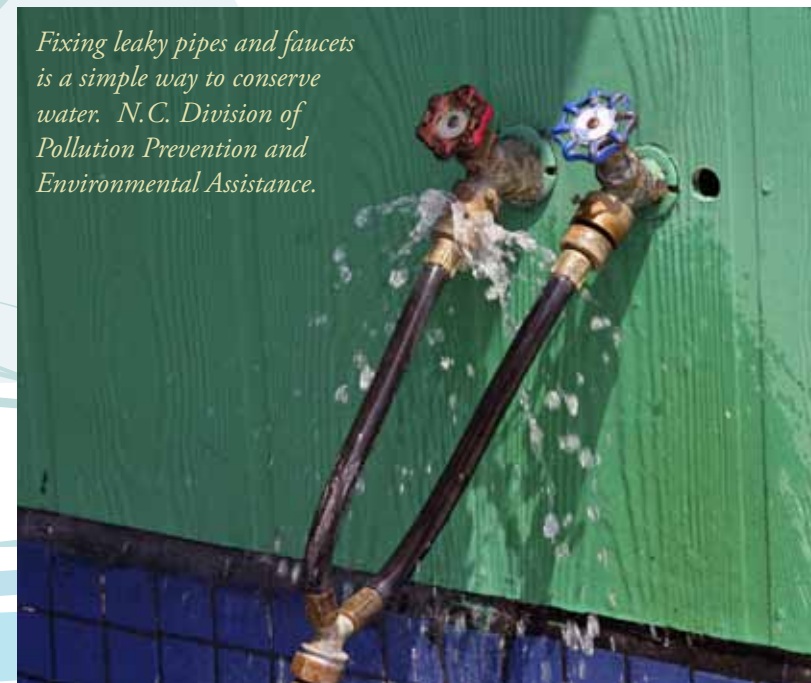
*Cisterns at the N.C. Aquarium on Roanoke Island. N.C. Aquariums.*

## Water-Saving Tools

During the major drought that struck North Carolina in 2007, the Division of Pollution Prevention and Environmental Assistance stepped up to the plate to help everyone. Division staff developed a Web site that provided information to citizens, water systems, state agencies and business and industry. This Web site became the basis for SaveWaterNC.org, a joint effort between the Department of Environment and Natural Resources, the Department of Crime Control and Public Safety and the Governor's Office.

Thanks to DPPEA, no matter who you are, you can easily learn about ways that you can save water. For citizens, the division developed a brochure entitled 10 Simple Ways to Save Water. It gives helpful, simple and inexpensive suggestions such as checking for and repairing leaks in the home, refitting plumbing and using appliances wisely. It also lets people know where they can go for more detailed information on what they need. A similar brochure was created for business and industry. It lets businesses know where they can find industry-specific water conservation documents developed by the division. In addition, division staff worked throughout the state holding meetings, presentations and workshops for the public, government agencies and businesses. DPPEA quickly provided North Carolinians with the information they needed during a time of crisis.

*Fixing leaky pipes and faucets is a simple way to conserve water. N.C. Division of Pollution Prevention and Environmental Assistance.*

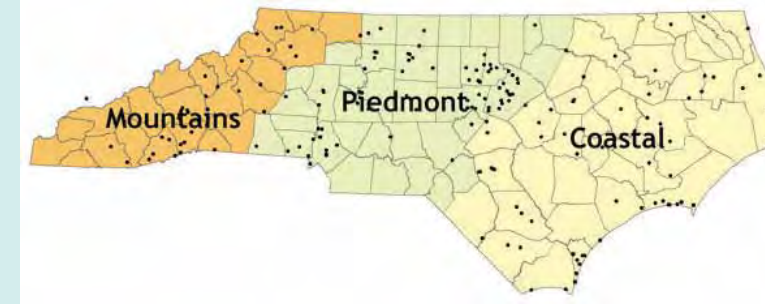




# Places to Go, Things to Do

Seminars, workshops, fairs,  
outdoor excursions...the  
list of places to visit and  
activities offered by the  
Department of Environment  
and Natural Resources goes  
on and on!

*Merchants Millpond State Park. Bill Russ, N.C. Tourism.*



*A map of North Carolina's environmental education centers.  
N.C. Office of Environmental Education.*

## Environmental Education Centers

Did you know that in 2008 there were 185 environmental education centers across the state of North Carolina? In the last eight years, the list of centers has grown, and the N.C. Office of Environmental Education continues to help promote and identify these centers.

An environmental education center is any facility that provides quality environmental education for the public, including outdoor experiences, exhibits and programs. They include state park visitor centers, the N.C. Zoological Park, the three state Aquariums, the Museum of Natural Sciences and our state's educational state forests. Environmental education

centers can also be county or city parks and nature centers, private entities or university-supported centers.

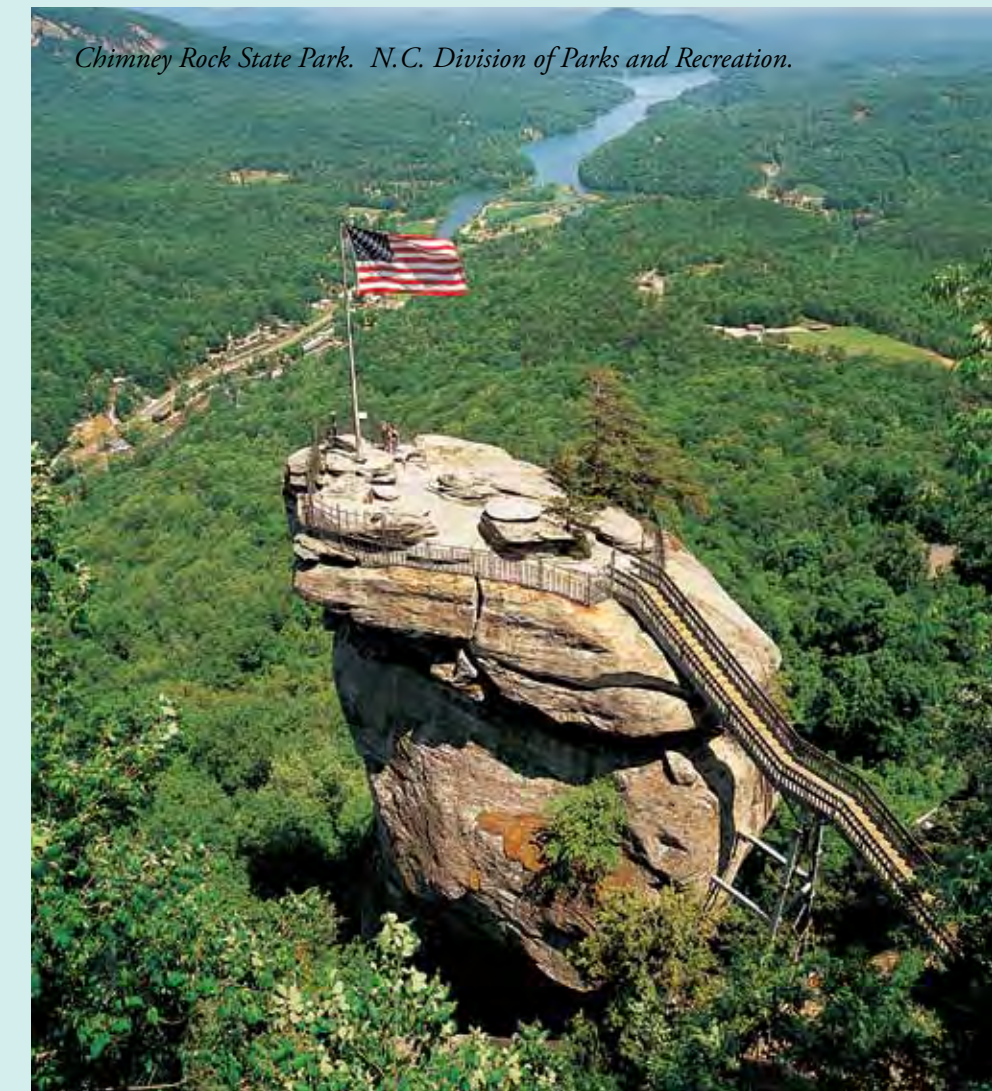
The Office of Environmental Education promotes these centers in a variety of ways on its Web site. Visitors to the site will find a complete listing of all of the centers, a map showing where each center is located in the state, as well as a center search feature. The office also highlights centers that are incorporating art, health and green building through programs, exhibits and facilities. These centers are highlighted and designated as ArtsEE, HealthEE and GrEEen centers, respectively. In 2008, the office updated a print guide to the state's environmental education centers that will soon be printed and distributed. With so many environmental education centers in North Carolina, there is always a new place to learn and explore!

## Chimney Rock – A Crown Jewel

The state parks system was in the process of developing a new park in the Hickory Nut Gorge, which offers stunning scenery as well as high-quality natural resources, when the Morse family proposed the idea of adding Chimney Rock, which it owned at the time. The 1,000-acre tourist destination with a 100-year history was a linchpin in a span of properties being acquired for the new state park. It offered some of the gorge's most spectacular views as well as opportunities to broaden the protection of fragile natural resources. It also provided ready-made visitor amenities surrounding the 315-foot-tall rock spire.

The 2007 acquisition involved a partnership that grew to include the state parks system, the state's conservation trust funds, several land conservancies, the General Assembly, Gov. Mike Easley and the local communities in the gorge. The project of the Division of Parks and Recreation has grown to more than 4,000 acres, and a master plan is being readied that will ensure a world-class state park.

“The acquisition of Chimney Rock adds one of the most visible images of our North Carolina landscape to our state parks system, alongside Mount Mitchell, Jockey's Ridge, Pilot Mountain and other crown jewels,” said Gov. Mike Easley when making the announcement of the purchase. Chimney Rock is a nationally known landmark and an icon in the North Carolina landscape. Its acquisition was both a testament to partnership and the result of a thoughtful conservation plan.



*Chimney Rock State Park. N.C. Division of Parks and Recreation.*



## Discover the World Outside

An increasing amount of research shows that spending time outdoors has many benefits to both the mental and physical health of adults and children. The Office of Environmental Education has been sharing this information and making spending time outside easier for people in North Carolina.

The Discover the World Outside postcards, created in 2007, relate the many physical and mental benefits of spending time outdoors. Some of these cards were targeted towards parents and highlight the specific benefits for children. Others were aimed at reaching the young adult population in our state. All of the postcards share recent research findings and direct people to the statewide environmental education calendar, a great resource to help people discover the world outside wherever they live!

The environmental education calendar features events, workshops and classes happening across the state. All environmental education organizations and centers can post their events to the calendar, so it's truly the one place for all of North Carolina's environmental education happenings. Users can also search for upcoming events by keyword or location. It makes it easy to find out what is going on in any area across the state to help plan your next outdoor adventure!



*One of the Office of Environmental Education's Discover the World Outside postcards.*



## I'd Like to Make a Reservation

In 2007, North Carolina's state parks system had a record 13.4 million visitors! To help rangers and other park staff manage this growing level of visitation, the parks system is developing a full-service, Internet- and call center-based reservations system. The system will track reservations for nearly 3,000 campsites, 106 picnic shelters, nine community buildings and other conference rooms and auditoriums. "We're confident this will be a state-of-the-art system that will not only help our visitors get more enjoyment from the state parks, but help the parks and their rangers manage ever-growing visitation," said Lewis Ledford, director of the state parks system.

*Beach camping at Hammocks Beach State Park. Bill Russ, N.C. Tourism.*

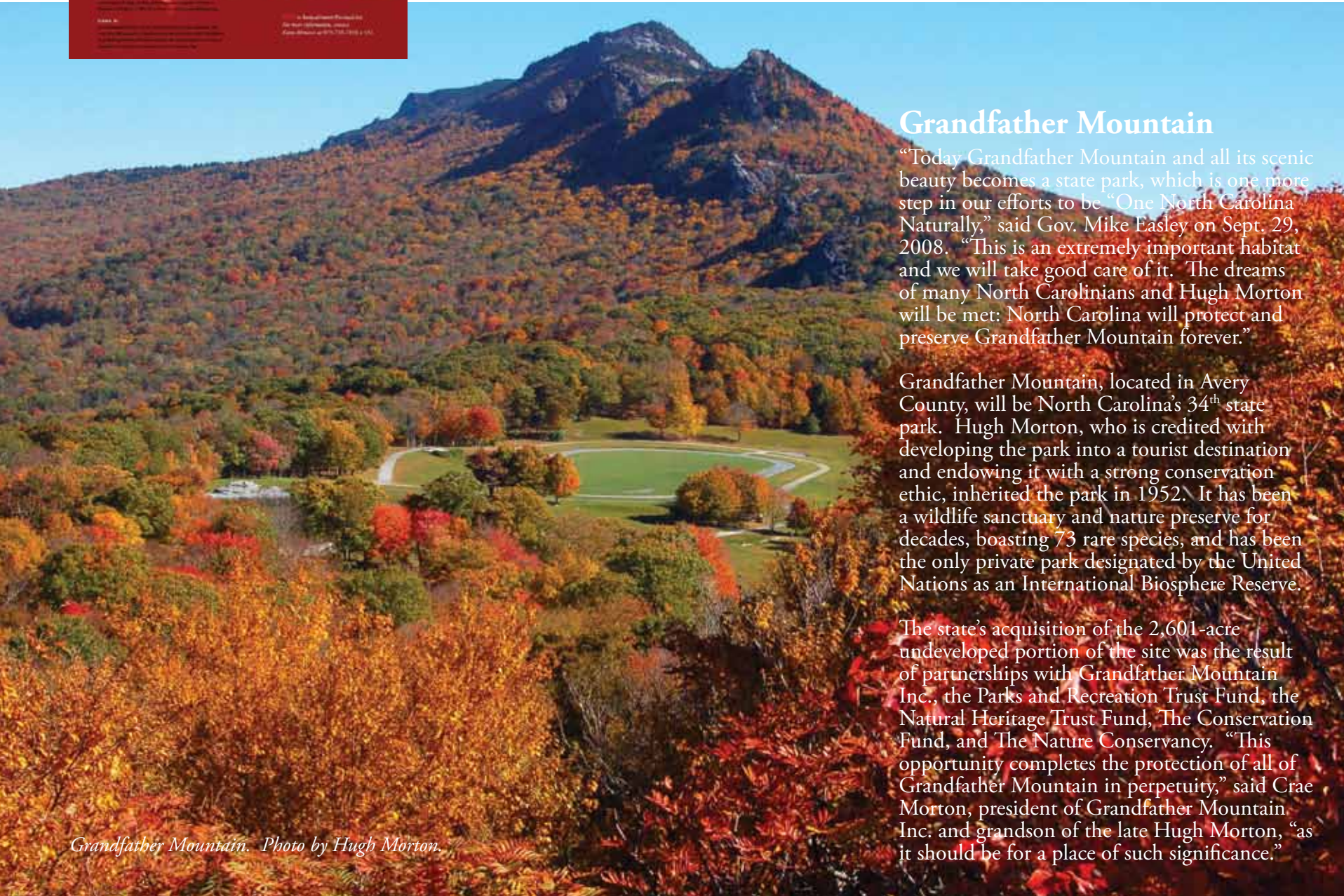


## Science Café

Curious about hurricanes? Well, why don't you discuss them over a cold beverage with the director of the State Climate Office? Want to know more about the bird flu? Ask questions of an immunology specialist over a cup of coffee. That's the idea behind the Science Café, a joint project of the North Carolina Museum of Natural Sciences and the Research Triangle Park Chapter of Sigma Xi.

The Science Café began in 2006 and has been very popular. The aim of the project is to promote public engagement with science and make science more accessible. Each month, leaders in the fields of science and technology discuss the latest issues or newest findings at a coffee shop, bar or restaurant in the Raleigh area. Anyone is welcome to join in the conversation. Past topics have included alternative fuels, dinosaurs, beekeeping and dog behavior.

*Poster promoting the Science Café. Poster design by Jeff Williford, N.C. Museum of Natural Sciences.*



## Grandfather Mountain

"Today Grandfather Mountain and all its scenic beauty becomes a state park, which is one more step in our efforts to be "One North Carolina Naturally," said Gov. Mike Easley on Sept. 29, 2008. "This is an extremely important habitat and we will take good care of it. The dreams of many North Carolinians and Hugh Morton will be met: North Carolina will protect and preserve Grandfather Mountain forever."

Grandfather Mountain, located in Avery County, will be North Carolina's 34<sup>th</sup> state park. Hugh Morton, who is credited with developing the park into a tourist destination and endowing it with a strong conservation ethic, inherited the park in 1952. It has been a wildlife sanctuary and nature preserve for decades, boasting 73 rare species, and has been the only private park designated by the United Nations as an International Biosphere Reserve.

The state's acquisition of the 2,601-acre undeveloped portion of the site was the result of partnerships with Grandfather Mountain Inc., the Parks and Recreation Trust Fund, the Natural Heritage Trust Fund, The Conservation Fund, and The Nature Conservancy. "This opportunity completes the protection of all of Grandfather Mountain in perpetuity," said Crae Morton, president of Grandfather Mountain Inc. and grandson of the late Hugh Morton, "as it should be for a place of such significance."

*Grandfather Mountain. Photo by Hugh Morton.*





# Good For Your Health

## Shellfish Safety

The National Shellfish Sanitation Program was established in 1925 after outbreaks of typhoid fever in several cities were linked to consumption of polluted shellfish. Shellfish, including oysters, clams and mussels, are filter feeders. If the water they live in is polluted, they can concentrate harmful bacteria and viruses in their tissue. The N.C. Shellfish Sanitation Program follows the guidelines of this national program and ensures the safety of shellfish consumers by monitoring harvesting waters and ensuring the proper handling of shellfish sold to the public.

In order to improve the identification of pollution sources that could affect the water quality of shellfish-growing areas, the Division of Environmental Health's Shellfish Sanitation and Recreational Water Quality Section obtained a grant from the Environmental Protection Agency in 2002 to develop new methodology for shoreline surveys. Shoreline survey staff walk the entire shoreline and look for existing and potential pollution sources. Prior to this grant, they would document these pollution sources on maps by hand with written narratives. The new methodology incorporated geographic information systems (GIS) and global positioning system (GPS) mapping technology. Using this technology, staff members could identify and map potential pollution sources such as stormwater outfalls, marinas, docks, agriculture operations and subdivisions.

The 2002 grant focused on four pilot shellfish-growing areas. In 2006, the General Assembly provided funding for the expansion of the program that would allow the mapping of all shellfish-growing areas along the North Carolina coast. "Now other local, state and federal agencies can view all of the pollution sources spatially mapped as well as have the ability to access images of the pollution source and its respective data," said Shannon Jenkins, environmental senior specialist in the Shellfish Sanitation and Recreational Water Quality Section. "The possibilities are endless as to how this information can and will benefit public health and the environmental future of North Carolina."



*Jonathan Andre inspects a stormwater discharge during a shoreline survey. N.C. Division of Environmental Health.*

The Department of Environment and Natural Resources does not just strive to protect the health of the environment. Its staff and programs also work hard to protect the health of North Carolina's citizens.

## Beach Advisories

Initiatives pursued by the Division of Environmental Health's Recreational Water Quality Program in 2004 and 2005 have made it easier for beachgoers to know the health status of the water before they dive in. In 2004, rules were passed that gave the program the authority to post signs on the beach at discharging storm drains. Rain washing off of roads, roofs and lawns can carry pollutants. When this polluted runoff travels down storm drains and is released through stormwater pipes on the beach, the pollutants can pose a health hazard to swimmers.

In 2005, beachgoers were able to find out about the water quality around North Carolina beaches before even getting to the beach. That is when the Recreational Water Quality Program unveiled its Web site that included current and previous sampling results and swimming advisories, sampling locations, educational materials and information on state regulations. Recreational beach quality at that time was tested at 241 monitoring stations. The Web site was updated daily to provide the most up-to-date information possible. "This new resource gives North Carolinians the ability to understand the quality of the recreational waters they visit each year," said J.D. Potts, manager of the Recreational Water Quality Program. "Water quality in North Carolina's coastal recreational waters is generally very good, and now people can see this for themselves."

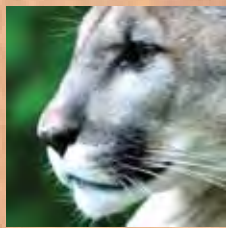


*Bill Russ, N.C. Tourism.*

## Can It

In July 2007, Castleberry Foods recalled products nationwide due to possible botulism contamination. The recall involved more than 90 food products and 27 brands. In all, more than 35,000 cans of food had to be removed from grocery store shelves to protect public health. The Division of Environmental Health worked with the Department of Agriculture and Consumer Services and all local health departments to locate and detain products. Their work was recognized as the most aggressive effort in the nation.





# Far Afield

Wind and ocean currents can make pollution in one part of the world an issue for another community across the globe. Many of the issues and environmental decisions we make can have global impacts. The Department of Environment and Natural Resources does not limit work to North Carolina, or even to the United States. Some of its programs and people work to protect the environment in other parts of the world.

## UNITE

The N.C. Zoological Park's UNITE program, which stands for Uganda and North Carolina International Teaching for the Environment, is a unique conservation education program. The purpose of the UNITE program is to bring together teachers from North Carolina and Uganda to explore environmental issues, develop teaching skills and techniques and create hands-on lessons for students in both regions.

The first group of zoo staff and teachers from North Carolina traveled to Uganda in 2002. It was the job of this small, initial group to meet with Ugandan community groups, conservation researchers and schools. The group also assessed the educational needs of the community, looked for ways they could integrate the Ugandan and American curricular materials and determine the technological feasibility of what they wanted to do.

The following year, a slightly larger group of teachers and zoo staff made the trip, this time to conduct a conservation education workshop with 20 Ugandan teachers. The group shared curriculum ideas, teaching methods and their concerns regarding environmental, social, cultural and economic issues. Students of the North Carolina teachers were able to follow along on their teacher's adventures through daily journals that were posted online.

The UNITE program has sent North Carolina teachers to Uganda every year since the program began. The Ugandan teachers expand their skills by learning cutting-edge, inquiry-based teaching methods to which they have never been exposed. The North Carolina teachers get to see the tropical ecosystems they teach about up close and personal. Student from both countries make personal connections with each other through letters. According to Randy Fulk, curator of education, "It truly makes thinking globally come alive."

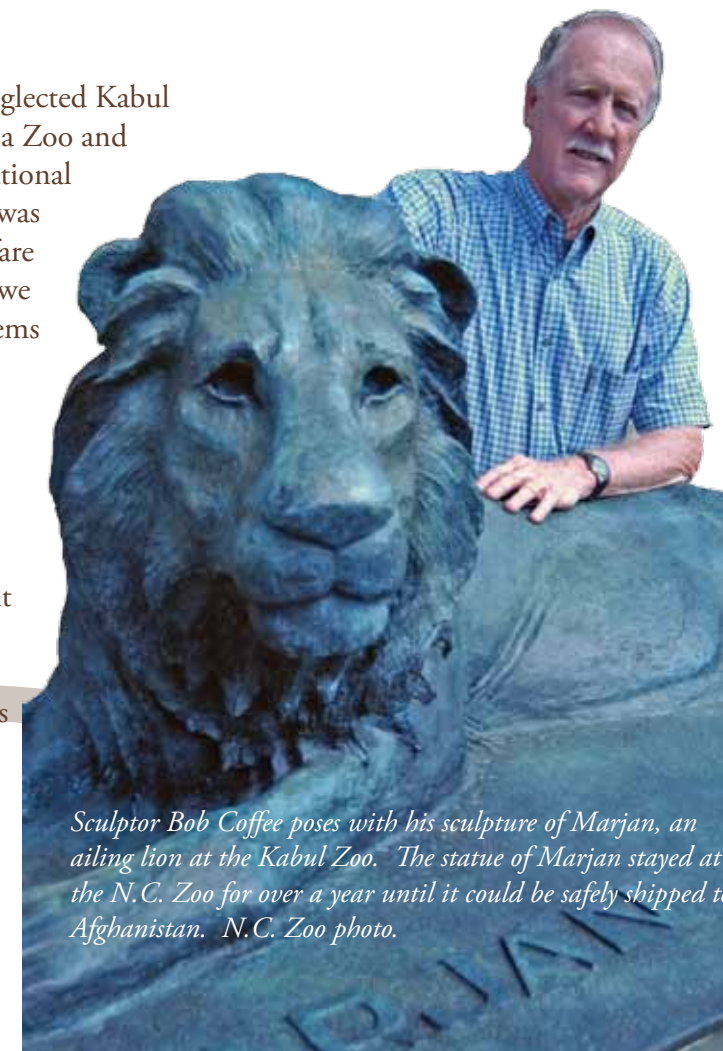


*A UNITE teacher works with students at Bagodi Primary School in Uganda. N.C. Zoo photo.*

## The Kabul Zoo

The United States war in Afghanistan exacerbated the struggles of the already neglected Kabul Zoo. In 2001, the Association of Zoos and Aquariums asked the North Carolina Zoo and its nonprofit support organization, the N.C. Zoological Society, to spearhead national efforts to help the troubled facility. Dr. David Jones, director of the N.C. Zoo, was serving as chairman of the board of the Brooke Hospital, the largest animal welfare organization in Pakistan. "Because of the work we do in Pakistan," said Jones, "we have a network of people who can assist in getting funds, food and veterinary items to the Kabul Zoo."

More than \$400,000 was raised to aid in this effort. Dr. Jones reported in 2005 that, although much still needed to be done, funds from the Zoo Society had improved every resident animal's enclosure. The enclosures had been enlarged and exhibit appearances had been improved. In addition, structures had been added to exhibits of those animals most in need of enrichment items. "As urgent as the need is for humanitarian aid, there is also the need to help animals that have been suffering during these times," Jones commented when the aid effort began. "As members of the international zoological community, we feel that this is where our expertise and efforts are best spent at this time."



*Sculptor Bob Coffee poses with his sculpture of Marjan, an ailing lion at the Kabul Zoo. The statue of Marjan stayed at the N.C. Zoo for over a year until it could be safely shipped to Afghanistan. N.C. Zoo photo.*

## The Baghdad Zoo

After being called on to help the Kabul Zoo in 2001, The Association of Zoos and Aquariums asked N.C. Zoo Director Dr. David Jones to spearhead a second nationwide effort to raise funds for the Baghdad Zoo in Iraq in 2003. More than \$77,000 was raised towards the aid project.

The N.C. Zoo continued to help the Baghdad Zoo beyond this fundraising effort via several avenues. Through an innovative teleconferencing program that was established by the North Carolina State University College of Veterinary Medicine, vets at the Iraqi zoo have been able to receive advice and assistance from vet experts in North Carolina via a virtual link to classes. Baghdad vets were able to interact via satellite internet connection with instructors, students and N.C. Zoo staff veterinarians. Financial support and equipment that made this possible came from the N.C. Zoological Society and the U.S. Army.



*Iraqi veterinarian Farah Murrani trained with the vet staff at the N.C. Zoo. N.C. Zoo photo.*



## Tracking Elephants in Uganda

How do you spy on an elephant? That is what researchers from the N.C. Zoo needed to figure out if they were going to help both elephants and people living in Cameroon. The zoo began working with the World Wildlife Fund's Program Office in Cameroon in 1998. Their goal was to protect elephants, protect the local people from elephants, and provide training to the people in Cameroon on the economic and ecological benefits of protecting elephants.

Humans and elephants in Cameroon were at odds, oddly enough, due to their similarities. Both elephants and humans require a large amount of space and a large amount of natural resources. A single adult elephant can consume 330 pounds of vegetation and 60 gallons of water in a day. In just a few hours, a herd can easily demolish a family's or an entire village's annual food supply. The zoo's researchers knew that property rights needed to be their focus, so they needed detailed information on where the elephants were traveling.

The National Oceanic & Atmospheric Administration's weather satellites passed regularly over Cameroon. Dr. Mike Loomis, the zoo's chief veterinarian, and his team fitted elephants with radio collars that would allow them to be tracked by these satellites. This method gave the researchers the information they needed on where the elephants were going and when. They then needed to figure out how to use this information to protect people's crops while making sure the elephants got the resources they needed.

The research team approached this problem from three angles. First, they provided education to the people who had suffered from the elephants moving onto their land. They taught techniques for protecting crops from herds and about the economic and moral arguments for saving elephants. Second, the government of Cameroon provided financial support to those who had been harmed by the elephant herd. Finally, elephant herd location data was shared with rangers to alert them of elephants headed their way. The rangers could divert the elephants before any crops, or any elephants, were harmed. These strategies resulted in a drop in the number of clashes between people and elephants, and the model is now being used in several locations.



*World Wildlife Fund team members install a tracking collar on a tranquilized elephant. N.C. Zoo photo.*

## Recruited for Flounder

In 2001, Joanne Harcke, conservation and research coordinator for the N.C. Aquarium on Roanoke Island, was recruited to help Chinese scientists raise Southern flounder. Harcke visited four different research facilities and presented a seminar on larval development and culture techniques. Harcke was one of only a few people who were involved in Southern flounder larviculture at the time, and she was happy to share her expertise in Beijing.

*Joanne Harcke at the Great Wall of China. Photo courtesy of Dr. Cris Liu.*



## Where in the World is Brian Rosa?

When the Division of Pollution Prevention and Environmental Assistance's Brian Rosa was contacted in 2005 and asked to teach composting and organic growing practices to farmers in Azerbaijan, he had one thought – where the heck is Azerbaijan?

Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), who extended the invitation, is a private, nonprofit organization that promotes broad-based economic growth in emerging democracies and developing countries. Although Rosa had never heard of Azerbaijan (which he later learned was bordered by the Caspian Sea, south of Russia) he was excited to have the opportunity to spread the composting gospel to the some of the country's farmers and agricultural specialists.

Rosa volunteered to spend two weeks traveling throughout the country. He traveled to a small village where he conducted a workshop. The eight-hour workshop took a little longer than usual since each word Brian spoke had to be relayed through an interpreter, but everyone was patient and grateful. He continued his instruction by helping construct several compost piles throughout the village to get the community started with organic farming.

Rosa enjoyed his time in Azerbaijan and has been invited back to help start a large-scale vermicomposting (worm composting) operation. He hopes to return to the country soon to continue encouraging organic farming and natural practices.



*As the wedding's guest of honor, Brian Rosa was invited to dance by himself for about five minutes, after which the village officials joined in for another half hour of dancing. Photo courtesy of Brian Rosa.*

## An Invitation to South Korea

In October 2006, Libby Wilcox of the Office of Environmental Education was invited to travel to South Korea. The invitation came from Dr. Ju-Hee Lee, a professor at Daegu University in the North Gyeongsang province of South Korea. Dr. Lee worked closely with the Korea National Forest Service which was in the process of developing a certification program for its forest culture and recreation programs and its forest interpreters. Wilcox was invited to share information about the N.C. Environmental Education Certification Program, the first program of its kind in the United States, as well as information about the diverse environmental education resources and opportunities available in North Carolina.

Dr. Lee and members of the Korea Forest Service were so impressed with what they heard that they had to come check it out for themselves! The Office of Environmental Education coordinated their visit and Wilcox went from visitor to host, guide, driver and facilitator. Their stops included Grandfather Mountain, the Blue Ridge Parkway, Lake James State Park, the N.C. Arboretum, Great Smoky Mountains National Park, Great Smoky Mountains Institute at Tremont, Joyce Kilmer Memorial Forest, the Cradle of Forestry in America, Holmes Educational State Forest, Brevard College, Pisgah Forest Institute and the forest lands at the Biltmore Estate. The delegation also met with officials from the U.S. Forest Service, the Appalachian Trail Conservancy and the Division of Forest Resources. On their final day, the group traveled to the N.C. Department of Environment and Natural Resources' headquarters in downtown Raleigh to meet with Secretary Bill Ross. The group then visited with the entire staff of the Office of Environmental Education for a moment of rest and a final goodbye before heading back to South Korea.



*Ranger Tim Benton at Lake James State Park discusses park management with Korean dignitaries, Dr. Ju-Hee Lee and Gil Bon Koo. Office of Environmental Education.*



# Alternative Thinking

North Carolina, along with the rest of the world, is facing many environmental challenges. Overcoming these challenges will require innovative, outside-of-the-box thinking. Staff in the Department of Environment and Natural Resources are stepping up to the challenge.



*Artist's rendering of the Fort Macon Visitor and Coastal Education Center. Groundbreaking for this project was in early 2008.*

## Green Building Commitment

In 2007, the Division of Parks and Recreation continued its ongoing efforts to promote sustainable building practices by adopting a policy requiring the pursuit of Leadership in Energy and Environmental Design (LEED) certification for all new or significantly renovated buildings more than 5,000 square feet in size. The LEED Green Building Rating System and certification program is administered by the U.S. Green Building Council. LEED emphasizes state-of-the-art sustainability strategies for site design, waste reduction, water efficiency, renewable energy and more.

## Going Solar

Do you know who hosts North Carolina's largest solar power project? It's the N.C. Zoo! In 2008, through a partnership with Carolina Solar Energy and Randolph Electric Membership, the zoo had a 9,600 square foot, grid-tied photovoltaic solar system mounted on three picnic pavilions. The project was projected to create 130,000 kilowatt-hours of energy per year, enough to power 11 to 13 average homes in North Carolina.

*One of the zoo's solar picnic pavilions. N.C. Zoo photo.*



## A Bright Idea

If every household in North Carolina replaced just one incandescent light bulb with a compact fluorescent (CFL) bulb, it would conserve enough energy to light more than 86,000 homes for an entire year! That was one of the messages that the Division of Air Quality was sharing beginning in 2007 with its Change A Light campaign. The division partnered with the State Energy Office, N.C. Cooperative Extension and a number of electric utilities to inform the public about the energy they could conserve, the money they could save and the pollution they could reduce simply by changing to CFL bulbs.

A key effort during the campaign was to distribute free CFLs to people who pledged to use them in their homes. Progress Energy donated 10,000 bulbs to be distributed at the N.C. State Fair in Raleigh. Other utilities donated thousands more bulbs that were distributed at county fairs and energy workshops across the state. The campaign also reached teachers and students by making a teacher guide available online that included classroom activities. Finally, state employees received information with their September 2007 paycheck about the benefits of CFLs and an invitation to participate in the campaign. The CFL promotion was continued at the Green N.C. exhibit at the 2008 State Fair, with Progress Energy providing 11,000 bulbs to distribute to citizens for free.



Energy From Waste

The Division of Waste Management is the state partner with the U. S. Environmental Protection Agency’s Landfill Methane Outreach Program, working to facilitate a number of landfill gas projects with uses such as electricity generation, steam production, greenhouses, artist studios and the production of biodiesel. As the state ally in this program, the Division of Waste Management works with landfill owners, developers and end-users to make these projects happen.

The Division of Pollution Prevention and Environmental Assistance, along with DWM, the State Energy Office and the Solar Center, developed a major state conference on developing energy production from landfill gas resources. DWM has worked in conjunction with The Energy Center at Appalachian State University and the Golden Leaf Foundation to spread the word about the economic and environmental benefits of landfill gas utilization. Companies such as Ajinimoto, Mallinckrodt, Cone Mills and Google benefit from DENR’s efforts in this area.



Landfill methane gas flare.  
Photo by Susie Fields.



Nursery pigs move to the grower barn.  
N.C. Division of Pollution Prevention  
and Environmental Assistance.

Energy Hogs

With the signing of Senate Bill 1465 in 2007, the General Assembly created the Swine Farm Methane Capture Pilot Program. Through this program, up to 50 swine farms will work with the N.C. Division of Soil and Water Conservation and the N.C. Utilities Commission to capture methane gas generated by their waste systems and use it to generate electricity. Turning pig waste into electricity...now that’s alternative thinking!



A flush pipe runs from the swine barn into the lagoon. N.C. Division of  
Pollution Prevention and Environmental Assistance.



# No Boundaries

Although the Department of Environment and Natural Resources is charged with preserving and protecting the natural resources in North Carolina, partnerships are often forged outside the borders of the state. Natural resources such as rivers and ecosystems do not recognize state boundaries, and the department can often accomplish more when it doesn't recognize them, either.

## Crossing the Line

The Albemarle-Pamlico estuary system is the second largest estuary system in the United States. Estuaries serve as nurseries for marine organisms, act as pollutant filters and help control flooding in coastal areas. The Albemarle-Pamlico sounds encompass 16 counties in Virginia and 36 counties in North Carolina. In 2001, DENR Secretary Bill Ross signed an agreement with Virginia's Secretary of Natural Resources and Department of Conservation and Recreation director, pledging to work together to protect the critical resource. The North Carolina and Virginia agencies promised to coordinate their research and conservation efforts in the three river basins that make up the Albemarle-Pamlico estuary system.

## An UnSERPPASable Partnership

Rapid population growth and environmental resource loss are not only issues faced in North Carolina. The entire southeastern United States faces similar issues, and these challenges are also affecting military bases where land is needed to conduct training exercises. In response to these shared issues, in 2005 state environmental and natural resource officials across the Southeast partnered with the Department of Defense and other federal agencies to form the Southeast Regional Partnership for Planning and Sustainability, or SERPPAS. The agencies involved work together to prevent encroachment around military lands, encourage compatible resource-use decisions and improve coordination among regions states, communities and military services.

One endeavor that SERPPAS has been working towards is the recovery of red-cockaded woodpecker populations. Red-cockaded woodpeckers depend on longleaf pine forests in southeastern states. Many of these forests have been destroyed, but boundaries of military installations in the Southeast have helped protect the longleaf pine habitat from complete destruction. SERPPAS partners have been working together not only to protect longleaf habitat, but also to reintroduce red-cockaded woodpeckers into restored habitats in order to increase the overall population of the endangered bird.



*Longleaf pine forest. Photo by: Misty Franklin*



*Red-cockaded Woodpecker, NC Wildlife Commission*



Disaster Response

In disaster situations, other states often call on the N.C. Division of Forest Resources for assistance. The division provides trained personnel and equipment for dispatch to virtually any location in the United States. The recurring requests are a testament to the high level of training and fire control expertise that division personnel have obtained. North Carolina’s Division of Forest Resources is recognized nationwide as one of the most efficient and best-trained fire-suppression agencies on which to call for assistance. In the past eight years, the division has sent fire fighting and other emergency assistance to Nevada, Texas, Oklahoma, Tennessee, Arkansas, Minnesota, Florida, Montana, Wyoming and Georgia.



*The morning briefing of the N.C. Division of Forest Resources Incident Management Team while in Florida working on Hurricane Frances response. N.C. Division of Forest Resources.*

environmental education



*N.C. Office of Environmental Education.*

Environmental Education in the Southeast

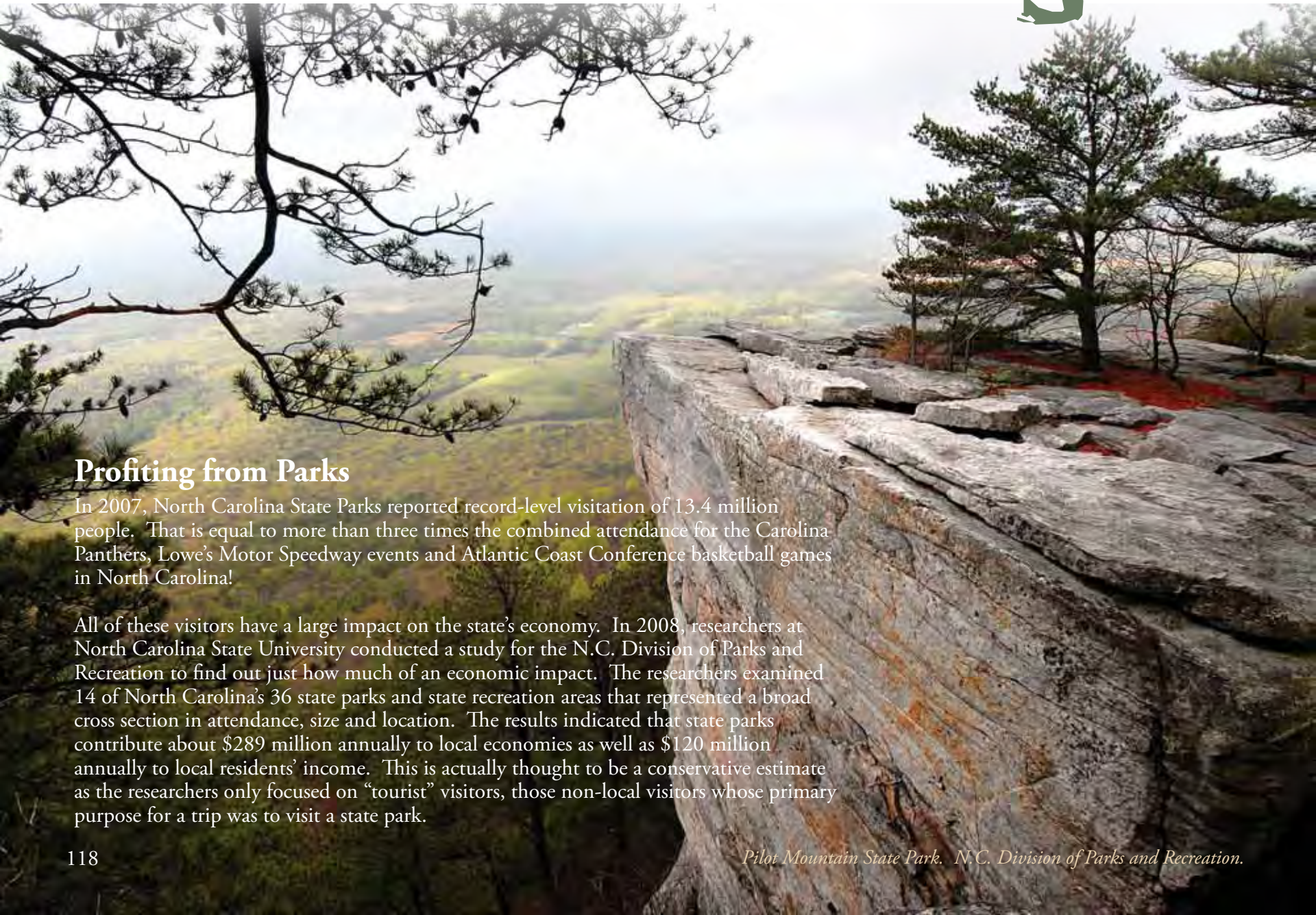
When EEinGeorgia.org got a grant from the Environmental Protection Agency to share its newly developed Web site capabilities with other southeastern environmental organizations, the N.C. Office of Environmental Education was chosen as the pilot state. The office has worked closely with its counterpart in Georgia to build capacity for environmental education throughout the Southeast. Beginning in 2005, the two states worked together to develop Web-based resources that would help their citizens find environmental resources, events and centers.

“The new Web site features make it possible for the Office of Environmental Education to provide information about environmental education events, programs, and facilities to people all over North Carolina,” said Lisa Tolley, director of the office. “It really highlights the diversity of environmental education programs going on in our state.”

*Teachers can now find environmental education professional development opportunities on the online calendar. N.C. Museum of Natural Sciences*



# Show Me The Money



*Pilot Mountain State Park. N.C. Division of Parks and Recreation.*

## Profiting from Parks

In 2007, North Carolina State Parks reported record-level visitation of 13.4 million people. That is equal to more than three times the combined attendance for the Carolina Panthers, Lowe's Motor Speedway events and Atlantic Coast Conference basketball games in North Carolina!

All of these visitors have a large impact on the state's economy. In 2008, researchers at North Carolina State University conducted a study for the N.C. Division of Parks and Recreation to find out just how much of an economic impact. The researchers examined 14 of North Carolina's 36 state parks and state recreation areas that represented a broad cross section in attendance, size and location. The results indicated that state parks contribute about \$289 million annually to local economies as well as \$120 million annually to local residents' income. This is actually thought to be a conservative estimate as the researchers only focused on "tourist" visitors, those non-local visitors whose primary purpose for a trip was to visit a state park.

Green doesn't just symbolize the environment; it stands for money as well. Often natural resources are not thought of in economic terms, but they are critical to North Carolina's economic health. Green spaces enhance the value of neighborhoods, natural resources provide ecosystem services such as water filtration and environmental organizations and programs generate income and jobs within communities.



*North Carolina Christmas tree farm. Bill Russ, N.C. Tourism.*

## Money Does Grow On Trees

- ❖ Forest products are North Carolina's largest industry, surpassing textiles in 2007.
- ❖ In 2006, forest products manufacturing employed one out of every five of the state's manufacturing workers
- ❖ North Carolina is the second leading manufacturer of furniture in the United States
- ❖ North Carolina produces more than 19 percent of the real Christmas trees in the United States
- ❖ Forestry, logging and wood products manufacturing contribute 10.9 billion dollars annually to the state's economy.





### Awarding Assets

The N.C. Aquariums and the North Carolina Aquarium Society were winners of the 2002 G. Lynn Nisbet Award. The Travel Council of North Carolina presents the annual award to an organization or business that makes significant contributions to the state’s travel and tourism industry.

*Young visitors eye an alligator at the N.C. Aquarium at Fort Fisher. N.C. Aquariums.*

### Are You Going to Recycle That?

Recycling is not only beneficial to the environment; it’s also beneficial to the economy of North Carolina. That is according to 2004 and 2008 studies released by the N.C. Recycling Business Assistance Center, a program of the N.C. Division of Pollution Prevention and Environmental Assistance. While the number of manufacturing jobs has been declining, recycling jobs have increased. From 1994 to 2004, for example, the number of recycling jobs in North Carolina increased 60 percent. Employees in the recycling industry have a total annual payroll of \$379 million, which provides more than \$13 million in tax revenue.

While manufacturing jobs have been declining in the state, producers of recycled products are ensuring that manufacturing remains a part of North Carolina’s economic future. Products manufactured out of recycled materials range from paper, plastic bottles and flowerpots to composite decking and rubber mulch.

A 4.4 percent increase in recycling rates would have the same effect as removing 27 million passenger cars from the roadway each year. Saving landfill space, creating jobs, reducing pollution...isn’t recycling great?!

*Aluminum cans ready for recycling at the Onslow County Recycling Center. Photo by Susie Fields.*



### What’s Brown, Then Green and Making a Difference All Over?

There are stores, museums, libraries, sports fields and restaurants across North Carolina that people visit everyday that are located on former brownfields. So, what is a brownfield, anyway? It’s an opportunity – for economic development, job creation and environmental restoration all at the same time.

A “brownfields site” is an abandoned, idle or underused property where redevelopment has been hindered by the threat of environmental contamination. The North Carolina Brownfields Program, which is administered by the Division of Waste Management, is the state’s effort to overcome these barriers to site redevelopment. The Brownfields Property Reuse Act of 1997 set forth the authority for the Department of Environment and Natural Resources to work with prospective developers to put these brownfields sites back into use. The prospective developer, as defined under the statute, is any person who desires to buy or sell a brownfields property for the purpose of redeveloping it and who did not cause or contribute to the contamination of the property.

At the heart of the program is the brownfields agreement – in effect a covenant not-to-sue offered to a prospective developer of a brownfields property. This agreement is designed to break environmental liability barriers that hinder a developer’s ability to obtain project financing. Under a brownfields agreement, a prospective developer agrees to perform those actions deemed by the department to be essential to protect public health and the environment while making the property suitable for the proposed reuse.

North Carolina local governments were awarded \$2.7 million in U.S. EPA brownfields grants in 2008, more than in any previous year. This figure was the highest among southeastern states and eighth highest awarded nationwide.

Statewide, there have been 131 brownfields agreements (24 of them in Fiscal Year 2008) that have facilitated the reuse of abandoned, contaminated properties. In effect, it’s recycling. This land has safely been recycled into productive use. The program has facilitated more than \$4 billion in committed private investment in redevelopment, creating thousands of jobs in the process.



*The restored brick chimney and oil house are also located in the lobby of the new Rocky Mount Arts Center. N.C. Division of Waste Management.*



# The Oyster Is Your World

Oysters hardly seem the likely poster child for the environment, but oysters serve many important functions in their estuarine environment. They filter pollutants out of the water, have economic value in the seafood trade and their shells are the perfect substrate on which new oysters grow. Many divisions within the Department of Environment and Natural Resources are working to track, study and ensure the health of oyster populations and habitat.

*John Alexander with the N.C. Division of Marine Fisheries' Resource Enhancement Section unloads recycled oyster shells at a stockpile site. N.C. Division of Marine Fisheries.*

## Recycling Shells

Craig Hardy, chief of Resource Enhancement for the N.C. Division of Marine Fisheries, was at a conference in South Carolina in 2002 when he saw a trailer bearing the state's oyster shell recycling logo pull up to the event's oyster roast. He was intrigued to say the least. "I was thinking that if it worked in South Carolina, it would be worth a try in North Carolina," said Hardy.

Hardy was right. North Carolina's Oyster Shell Recycling Program has collected more than 62,000 bushels of oyster shells to use for restoration projects. There are 71 public drop-off sites and 44 participating restaurants in 21 counties. Recycling oyster shells benefits commercial and recreational fishermen, improves water quality and protects shorelines from erosion...and helps grow more oysters to start the whole cycle again!



## Wherever the Spat Shall Land

Several agencies within the Department of Environment and Natural Resources have been working together to restore oyster habitat along the coast. In 2002, under the hot summer sun, staff and volunteers with the N.C. Coastal Federation, Duke Marine Lab and the N.C. Division of Marine Fisheries spread more than 5,000 pounds of oyster shells along the shoreline of the N.C. Aquarium at Pine Knoll Shores and at an oyster reef sanctuary nearby. Oyster populations and habitats had been declining in the state's coastal waters, and this project was part of an effort to reverse that trend. Oysters cannot grow just anywhere. Oyster larva, called spat, need a solid surface on which to attach. The most suitable surface for attachment happens to be oyster shells.

Additional help for oysters came in 2005 when the Oyster Hatchery Program was established by legislative initiative in response to declining harvests. The OHP was spearheaded by the N.C. Aquariums. Through the program, millions of baby oysters hatched at Carteret Community College were delivered to oyster sanctuaries. Previously, restoration efforts in North Carolina relied on importing oyster seed from other states. In 2007, the DMF designated four oyster research sanctuaries. Three were set apart for Carteret Community College in Morehead City to develop and use as demonstration areas. The fourth was set apart for the N.C. Aquarium at Pine Knoll Shores to use as a shellfish gardening education site.

*An empty oyster shell is a great place for young oysters to attach. Newly attached oysters are called spat. People who live along estuaries can "plant" these shells with spat in a backyard oyster garden. Photo by Skip Kemp.*



## Plant Some Oysters in Your Garden

The Citizen's Oyster Gardening Project, based at Carteret Community College in Morehead City, was funded by the Albemarle Pamlico National Estuary Program in 2005. It provided workshops and training towards creating an active citizens' network of oyster gardeners in North Carolina. The CCC oyster hatchery distributed oyster larva to partners who planted public oyster gardens along the coast.

*Aquarium Conservation and Research Coordinator Pat McNeese measures oysters for growth. N.C. Aquariums.*



# Invaders



*Lionfish photo by Sandy Smith. Honorable mention in the 2007 N.C. Aquariums Underwater Photo Contest.*

Lionfish (*Pterois volitans*) are native to the Indian and Pacific oceans. It was unclear as to why and how the fish had made its way to North Carolina, but by the winter of 2002, lionfish had been sighted at 19 locations off of the East Coast of the United States. The fish have stripes, fleshy appendages and spine-laden fins that make them quite impressive in appearance. Like many flashy or colorful animals, however, these characteristics are not meant to impress but rather to serve as a warning. The spines along the fins and back of lionfish are venomous and used in defense.

While divers are strongly advised not to handle the fish, swimmers are unlikely to have any encounters. The sightings off of North Carolina's coast have been between 18 and 40 miles offshore at depths of more than 100 feet.

Animal and plant species evolve together in an ecosystem, each filling a specific niche. When a new, non-native species appears on the scene, systems can be thrown off balance. Often invasive species pose a challenge to native species. They can pose a challenge to natural resource agencies as well.

## Lionfish

In 2002, the N.C. Aquarium at Pine Knoll Shores opened a new exhibit featuring 10 to 15 beautiful lionfish in a 1,200-gallon cylindrical tank. You might think that "lionfish" sounds exotic. You would be right. The exhibit, called "Lionfish – Mysterious Traveler," would not have been considered for a North Carolina facility before 2000. That is when scuba divers exploring a shipwreck off of Morehead City reported seeing the unusual lionfish for the first time along North Carolina's coast.

## Aquatic Weed Control

Invasive aquatic weeds can cause a lot of problems by becoming navigation hazards, impeding recreational activities, clogging water intakes, providing breeding habitat for mosquitoes and other pests and leading to flooding and erosion. The Aquatic Weed Control Program within the Division of Water Resources assists local governments with their aquatic weed issues through management and eradication operations and cost-share grants for projects. In 2004 alone, the program led projects that eradicated 4,000 acres of hydrilla, 63 acres of alligatorweed and 30 acres of creeping water primrose!

*Rob Emens, manager of the Aquatic Weed Control Program, working out in the field. N.C. Division of Water Resources.*



## West Nile Virus

West Nile Virus originates from Africa, West Asia and Europe. It was first discovered in the United States in 1999 in New York City. It didn't take long for this exotic-sounding pathogen to become common in conversation. The first detection of the virus in North Carolina occurred in 2000. It has since been found in all contiguous states in the United States, north into Canada and south to Argentina.

Staff with the Public Health Pest Management Section of the Division of Environmental Health has been involved with research, prevention and education involving West Nile Virus from the very beginning. Their work has had a tremendous impact on the knowledge of and ability to deal with mosquitoes that transmit the virus. West Nile Virus is actually a bird virus. It is spread to humans and other animals through mosquitoes that have fed on an infected bird. Environmental Health staff initially focused on surveillance of sick or dead wild birds as they were initially tracking and learning about the disease. By 2003 they had shifted their focus to protecting citizens in North Carolina through precautionary measures and elimination of mosquito habitat.

It is important to know that the majority of people infected with West Nile Virus have no symptoms. Only 20 percent of people infected will develop West Nile Fever which is a mild illness that usually lasts for only a few days. Less than one percent of those infected will experience a severe infection called West Nile Encephalitis or meningitis. Regardless of the probability of infection, everyone should take the recommended precautions, and anyone with symptoms of the virus should see a doctor right away.



*Capturing wild birds for West Nile Virus testing. Nolan Newton, N.C. Division of Environmental Health.*



# New Digs

The Department of Environment and Natural Resources continues to grow and enhance its resources and facilities. While doing so, it strives to improve programs and exhibits and be a model in sustainable development.



Queen angelfish in the Caribsea exhibit at the N.C. Aquarium at Pine Knoll Shores. Photo by Julie Powers, N.C. Aquariums.



N.C. Aquarium at Pine Knoll Shores. Photo by Scott Taylor.

## Green from the Ground Up

In early 2008, three old government buildings were demolished to make way for two eco-friendly ones. So eco-friendly, in fact, that 98 percent of the rubble from the demolished buildings was either reused or recycled, keeping reusable material out of the landfill.

The \$134 million Green Square complex will be located in downtown Raleigh. It will include a four-story, 105,000-square-foot Nature Research Center, an expansion of the Museum of Natural Sciences, and a 146,500-square-foot building to house the headquarters of the Department of Environment and Natural Resources.

The Nature Research Center will engage the public and school groups in scientific research and environmental issues affecting our daily lives. "In the Museum of Natural Sciences, we're really focusing on what we know about North Carolina's environment," said Museum Director Betsy Bennett. "In the Nature Research Center, we're focusing on how we know what we know."

Both buildings will be models of environmentally-friendly design. Plans include maximizing the use of natural sunlight, conserving water through cisterns, reducing stormwater runoff, a green roof, low-emission paints and carpentry materials and using locally-produced building materials. Construction is expected to be complete in 2011.

*Museum Director Betsy Bennett helps break ground for the Green Square Complex in April 2008 alongside Friends of the Museum president-elect, Tom Earnhardt. Jonathan Pishney, N.C. Museum of Natural Sciences.*



Plans for DENR's Green Square Complex.





## Aquarium at Pine Knoll Shores

On May 19, 2006, the N.C. Aquarium at Pine Knoll Shores reopened its doors following a \$25 million expansion. The renovation lasted 30 months, but it was definitely worth the wait. The theme of the renovated, 93,000 square foot facility is “North Carolina’s aquatic life from the mountains to the sea,” and that is exactly what visitors get to see. Five galleries represent the state’s five aquatic zones: Mountain, Piedmont, Coastal Plain, Tidal Waters and Ocean. After feeling the spray from a 32-foot Smoky Mountain waterfall, watching frolicking river otters, exploring a cypress swamp and getting an underwater view of a shipwrecked submarine, visitors feel as though they have gone from the mountains to the sea!

**Living Shipwreck** – This 306,000-gallon exhibit features a three-quarter-size replica of the coral-encrusted U-352, a German World War II submarine that the U.S. Coast Guard sank off of North Carolina’s coast in 1942. Visitors can watch sand tiger sharks, moray eels and schools of colorful fish that are typically drawn to offshore shipwrecks.

**Tidal Waters Gallery** – Here visitors can touch the inhabitants of the Skate and Ray Encounters exhibit. At the nearby Tidal Touch Pool, people get a chance to experience horseshoe crabs, hermit crabs, sea stars, sea urchins and whelks.

**River Otters** – Neuse and Pungo, the Aquarium’s two river otters, have been a favorite of visitors since opening day. These curious creatures are given plenty of items to explore and also get exercise and enrichment sessions. A third river otter, named Eno, arrived at the aquarium in April 2008.



*River otter at the N.C. Aquarium at Pine Knoll Shores. N.C. Aquariums.*



## The Valerie H. Schindler Wildlife Learning Center at the Zoo

The North Carolina Zoo and Zoo Society recently worked together to create a new indoor habitat, but it’s not for any of the zoo’s animals. It’s for people! The Valerie H. Schindler Wildlife Learning Center will help meet the needs of college and university students who want to work or conduct research at the zoo. It will also serve as a residential center for zoo interns and be available for local businesses for meeting space and as a conference and retreat center.

*The Valerie H. Schindler Wildlife Learning Center. N.C. Zoo photo.*



*A teacher looks for monarch eggs and larva on milkweed plants at Prairie Ridge. The center has become a popular place for teacher workshops. Mike Dunn, N.C. Museum of Natural Sciences.*

## Prairie Ridge

Nearly 40 acres of restored grasslands, wetlands and forested bottomlands are an oasis from the hectic pace of the everyday. Although it feels like a secluded haven, the Prairie Ridge Ecostation for Wildlife and Learning is located just 10 minutes outside of downtown Raleigh. The Museum of Natural Sciences’ Prairie Ridge opened in 2004. It serves as a resource for education and research as well as a model of renewable energy and sustainable living.

The outdoor classroom is made of engineered parallel strand lumber, used in place of old growth timber for the large beams. Recycled materials were used for the classroom’s foundation, and extra lumber was reused for other on-site projects and mulch. Flushing a toilet at Prairie Ridge is even an educational experience. North Carolina State University assistant professors Bill Hunt and Garry Grabow developed a research project to determine the efficiency of a cistern-driven plumbing system.

This natural laboratory also includes a pavilion with a green roof. Plantings on the roof reduce stormwater runoff from what would otherwise be an impermeable surface. Prairie Ridge’s Nature Neighborhood garden attracts butterflies and hummingbirds to native nectar sources. The garden is designed to be a place to enjoy nature and a place for education. “The most important part is that it’s interactive,” said Kim Smart, a museum educator and the project manager of the garden. “Children can splash in the pond if they want to, or explore the garden. I want them to learn, but I want it to be fun.”

## Prolific Parks

It seems like the Division of Parks and Recreation is always providing visitors with new and improved experiences. Since 2001, new visitor centers were built at Hammocks Beach, Medoc Mountain, Jones Lake, South Mountains, New River and Dismal Swamp state parks as well as Jordan Lake State Recreation Area. More visitor centers are underway at Merchants Millpond, Cliffs of the Neuse, Raven Rock, Fort Macon and Gorges state parks.



*Visitor center at South Mountains State Park in Burke County. N.C. Division of Parks and Recreation.*



# All Things Are Connected

"Tug on anything at all  
and you'll find it  
connected to everything  
else in the universe."

John Muir

On the surface, it may seem unusual that an agency focused on forest resources would put its efforts towards protecting water quality. Why would a zoo spend time and energy toward restoring the native habitat of surrounding communities? In nature, all things are connected. Ecosystems function much like an organism, with each species playing a role and each component vital to the others. Agencies within the Department of Environment and Natural Resources realize this, and work to preserve the system as a whole.

## In a Nutshell

In 2007, the N.C. Zoo's Horticulture Division worked with Trees Asheville on an initiative to reintroduce the American chestnut tree to the southern Appalachian region. The American chestnut is an extremely endangered species of tree due to its propensity to suffer from blight. It may seem odd for the zoo to be involved with local tree reintroduction, but the zoo has a history of taking part in projects focused on North Carolina's native plants and wildlife. After all, all things are connected...

*N.C. Zoo arborists join with local students and conservation groups to plant endangered American chestnut trees. N.C. Zoo photos.*





## Raise a Glass to One-Stop Coordinators

When most people think of a winery, they don't think about wastewater, but that is one of the many things that a grape grower has to consider. Many agriculture-related operations clearly show the connections between various parts of the environment. Soil quality, water quality and human health are suddenly very obviously interconnected on a single field or pasture. This can sometimes make it difficult for those in the agricultural field looking for answers to know where to go.

Companies, local government agencies and producers often breathe a sigh of relief when they learn that the Department of Environment and Natural Resources has permit coordinators who will help them determine up front what permits are necessary for a given project. Regional one-stop permit coordinators also play the role of bringing together the necessary parties to find environmental solutions.

North Carolina has seen a rapid growth in vineyards and wineries in recent years, especially in the Piedmont region of the state. Grape growers were concerned about which of their wastewater operations were considered agricultural and which were commercial/industrial. Most of the wastewater was created in about a four-month period with little else the rest of the year. Were there options they had that would take this into account? How could they compost and reuse the grape-skin waste they produced?

It was the job of the one-stop coordinator in the Department's Customer Service Center to work with the Division of Waste Management, the Division of Water Quality and local wineries to review the processes and spell out environmental requirements. The results were a clearer understanding of permitting and waste management options for the wineries, as well as input on how the wineries could compost and reuse water. Drink your wine in gladness and compost your grape skins...because all things are connected!



North Carolina winery. N.C. DENR Customer Service.

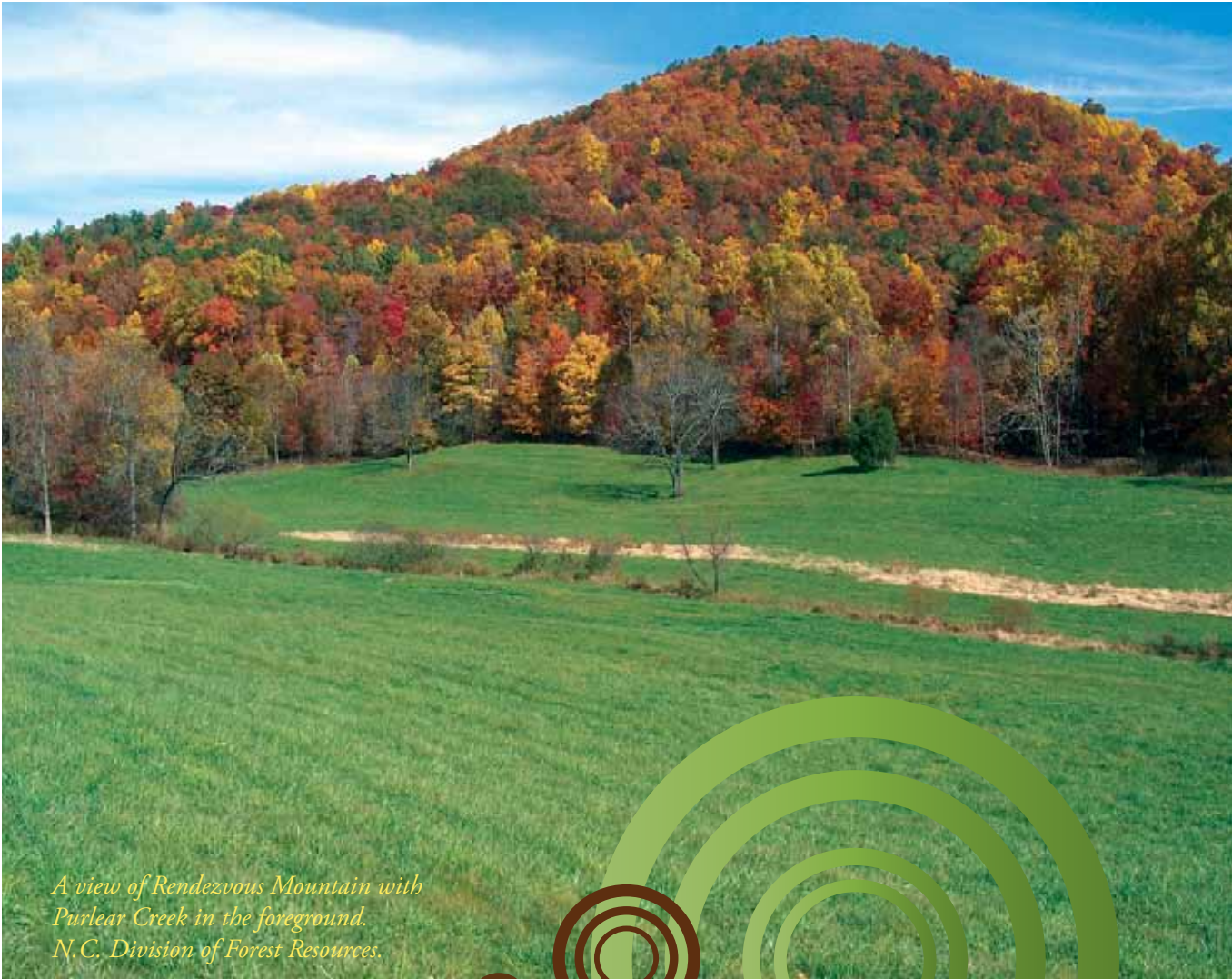
## Restoring Purlear Creek

The forest rangers in Wilkes County knew and had great respect for Mozelle and B.N. Benton, a farming couple who owned 99 acres in the county. When Mr. Benton realized that his health was declining, he made it known that he would like his land to become part of Rendezvous State Forest, rather than be developed with houses and lose its natural beauty. The farm at the foot of Rendezvous Mountain had been grazed by cattle for many years. Purlear Creek, which ran through the farmland, showed the effects of the constant wear and tear of cattle hooves.

In December 2003, paperwork was signed that transferred ownership of the land to the N.C. Division of Forest Resources. The creek needed a lot of work, especially if it was going to be healthy enough to reach the ultimate goal – trout. The DFR foresters and rangers obtained technical advice and oversight from the North Carolina State University Department of Biological and Agricultural Engineering Stream Restoration Department.

By August 2007, the stream had been restored, reconfigured, relocated or otherwise rehabilitated. Trees and shrubs had been planted along its banks to form the beginnings of a riparian forest. Once these trees provide enough shade, the division will work with the N.C. Wildlife Resources Commission to evaluate the best method for trout reintroduction.

It might seem odd for the Division of Forest Resources to be leading a project in stream restoration. Streams, wildlife, fisheries and soil conservation are all part of healthy forests.



A view of Rendezvous Mountain with Purlear Creek in the foreground. N.C. Division of Forest Resources.

*All things are connected...*





# Appendix

## OVERVIEW OF THE DEPARTMENT

The mission of the N.C. Department of Environment and Natural Resources is to conserve and protect North Carolina’s natural resources and to maintain an environment of high quality, for the health, well-being and benefit of all, from the mountains to the sea. DENR and its 4,000 permanent employees and 2,300 seasonal employees strive to achieve that mission through four kinds of programs.

The department’s environmental protection and environmental health programs work to protect and maintain the high quality of the state’s air, water and land resources and also to protect the public health. The agency’s natural resource programs work to conserve and protect North Carolina’s forests and farms, parks and open spaces, greenways and trails, streams and rivers, sounds and oceans, and the plants and animals that make their homes in all those places. Educational institutions make up the third category of departmental programs. The department educates the citizens of our state about the importance of a healthy environment through the exhibits and programs of three aquariums, the Museum of Natural Sciences and the N.C. Zoological Park, as well as through educational programming provided by other parts of DENR and in partnership with other organizations. The fourth kind of departmental program is the group of essential offices that supports the work of all the other DENR programs. Budget, purchase and services, and human resources are examples of divisions in this fourth category.

This overview would not be complete without two other observations. First, none of these DENR programs operates in a vacuum. Each depends on a wide range of partners, in and out of the department and in and out of government, to accomplish its mission. When the partners work together, the job gets done. Second, the work of the department and its partners is important to our state and its people. At the bottom line, a healthy environment and healthy natural resources are essential to healthy communities and a healthy economy, and to the health, well-being and benefit of all our citizens.

## THE DEPARTMENT’S STRATEGIC PLAN 2008-2009 (as revised May 13, 2008)

The department’s most recent strategic plan is set out below. The purpose of the plan is to lay out the steps (i.e., “strategic directions”) and code of conduct (i.e., “values”) that will enable the department to accomplish its mission and vision. The strategic plan will now need to be revised and updated to reflect the new administration’s priorities, including priorities for the 2009 budget and legislative session, and to respond to the challenges, opportunities and emerging issues that the new year and the new federal administration bring with them.



*Pitcher plant flower. N.C. Zoo photo.*

MISSION: To conserve and protect North Carolina’s natural resources and to maintain an environment of high quality, for the health, well-being and benefit of all.

VISION: North Carolina: Green and Growing!

### VALUES:

1. Integrity
2. Accountability
3. Commitment to mission, vision and values
4. Respect
5. Quality
6. Knowledge of external environment
7. Working together: teamwork and partnerships

### STRATEGIC DIRECTIONS

1. One North Carolina Naturally: statewide land and water conservation initiative
  - a. Planning, mapping and guidance for statewide conservation
    - i. Continued development and use of Conservation Planning Tool
  - b. Spending authorized funds wisely and well
  - c. Stewardship of conservation lands
  - d. Coastal Habitat Protection Plan implementation
  - e. Waterfront access implementation
  - f. Conservation on private lands
    - i. Forestland
    - ii. Farmland
  - g. DuPont State Forest: plan for the future
2. Advancing organizational effectiveness
  - a. Green Square
  - b. Beacon
  - c. IT consolidation
  - d. Diversity
  - e. Performance solutions
  - f. Building internal auditing capacity
  - g. GICC recommendations for geospatial data sharing
3. Water for the future
  - a. Enactment and implementation of Governor Easley’s three-part drought legislation proposals
    - i. Modernize public water systems
    - ii. Promote water conservation and efficiency
    - iii. Improve our ability to respond to water emergencies
  - b. Protecting our waters
    - i. Coastal stormwater rules



- ii. Jordan Lake watershed rules
  - iii.ERC’s Water Allocation Study
  - iv. CAMA issues, including enforcement of rules requiring removal of sandbags for erosion control after 2-5 years
  - v. Plan for sustainable water use by river basin
- 4. Advancing environmental education
  - a. Zoo: advance capital projects
  - b. Museum of Natural Sciences: Nature Research Center
  - c. Environmental education:
    - i. Certification program improvements
    - ii. State environmental education plan
  - d. Aquariums: advance 3 pier projects
- 5. Improving air quality and responding to climate change
  - a. Lead NC effort on important rulemaking, e.g., change in ozone standard
  - b. Set up organizational vehicle to guide and sustain DENR’s efforts to respond to climate change
  - c. Participate in Climate Registry
- 6. Progressing toward sustainability
  - a. Advance state – military partnerships
    - i. SERPPAS
    - ii. Sustainable Sandhills – BRAC RTF – RLUAC
    - iii.Onslow Bight Conservation Forum
  - b. Land conservation and place-based economic development initiatives along Catawba / Johns rivers and Yadkin / Pee Dee River
  - c. Advance the Environmental Stewardship Initiative
  - d. Pursue SC/NC project on mercury
  - e. Support development of EMC recommendations on regulation of alternative energy sources
- 7. Protecting groundwater and restoring contaminated properties
  - a. Implement solid waste disposal tax (effective July 1)
  - b. Initiate program to identify, assess, and remediate old landfills
  - c. Improved management of contaminated sites (development of a consistent protocol for on-going groundwater monitoring)

#### THEMES / PRIORITIES FOR 2008 BUDGET AND LEGISLATIVE SESSION

1. Water for the future
2. One North Carolina Naturally
3. Advancing organizational effectiveness

## UPDATES ON ISSUES IN VARIOUS DENR PROGRAM AREAS

### Managing Waste

#### *Solid Waste*

The latest available statistics show a steadily increasing state per capita disposal rate – disposal is up 25 percent from the FY 91-92 base year. North Carolina communities created nearly 12 million tons of waste, which were disposed of in both North Carolina and out-of-state facilities. It is forecast that in 10 years, North Carolina will need the landfill capacity to dispose of just over 15 millions tons of waste annually ([http://www.wastenotnc.org/SWHOME/AR06\\_07/AR06-07.pdf](http://www.wastenotnc.org/SWHOME/AR06_07/AR06-07.pdf)). Clearly, as a state, we need to increase our recycling efforts. The department is trying to encourage that increase through its “2 Million Tons by 2012” initiative. For more information, see <[http://www.p2pays.org/press\\_releases/101308.pdf](http://www.p2pays.org/press_releases/101308.pdf)>.

#### *Hazardous Waste*

To date, the Inactive Hazardous Sites Program has catalogued 2,972 chemical spill or disposal sites and old, unlined dumps or landfills that are not being addressed by other environmental authorities. Of this number, 2,536 still require work to address their hazards.

Of the 2,972 site total, 669 are old non-permitted unlined landfills requiring action. These landfills pose threats from contaminated groundwater reaching drinking water wells and from hazardous substances and methane vapors off-gassing from the waste and contaminated groundwater, making it into structures on or near the landfill and thereby posing health threats and explosion hazards. Based on inspections of these sites, 64 percent have a residence, school, church, day care or drinking water source on or within 1,000 feet of the landfill. There are currently 165 landfills that have drinking water wells within 500 feet, 32 that have residences on the landfill, 53 with structures other than residences, and many others with sensitive uses such as parks. Based on observations at sites investigated by the U.S. EPA and the N.C. Division of Waste Management, most of North Carolina’s unlined landfills can be expected to have groundwater contamination.

Senate Bill 1492, enacted in 2007, established a statewide tax on waste disposal. Some of the funds generated by this tipping fee will be used to address the hazards posed by these old non-permitted landfill sites. The provisions of the bill which relate to the assessment and abatement of contamination at these non-permitted landfills went into effect July 2008. The first proceeds of this tax are expected to be provided to the division in February 2009.

Limited funds are available for non-landfill orphan site assessment and cleanup. The Inactive Hazardous Sites Branch has been able to collect some funds through bankruptcy claims for a few sites. All currently available funds are dedicated to specific site actions. However, the budget bill (HB2436) authorized the transfer of \$400,000 from the Dry Cleaning Solvent Cleanup Fund to the Inactive Hazardous Sites Cleanup Fund to assess and clean up contaminated sites or to provide alternate sources of drinking water to contaminated private wells. Approximately 100 sites have one or more contaminated drinking water wells and no identifiable responsible party. Once the funds are transferred, the \$400,000 will be used to address some of these cases. The funds will be sufficient to address only a portion of the cases.



# Improving Air Quality

## *Smog, Tiny Particle Pollution, Acid Rain and Haze*

In 2002, Gov. Easley signed into law a landmark piece of air quality legislation, the Clean Smokestacks Act. The act addresses emissions from 14 coal-fired power plants that contribute to smog, tiny particle pollution, acid rain and regional haze. The act set deadlines for the state’s major utility companies to substantially reduce emissions from their coal-fired power plants. The implementation of the Clean Smokestacks Act is on target and on schedule. (<http://www.ncuc.commerce.state.nc.us/reports/csa2008.pdf>) So far, Duke Energy and Progress Energy have met or exceeded the act’s 2007 caps on nitrogen oxides (NOx), and they are on target to meet the 2009 caps on NOx and sulfur dioxide. In meeting these requirements, the utilities have installed the state’s first large-scale scrubbers (which remove sulfur dioxide and mercury) on coal-fired power plants in Buncombe, Catawba, Person and Stokes counties with more units underway in Brunswick, Gaston, Person and Rutherford counties.

The Division of Air Quality, in cooperation with the state Department of Transportation, has also fully implemented a new program to reduce motor vehicle emissions that contribute to ozone pollution.

## *Mercury*

North Carolina’s power plants must cut their mercury emissions substantially over the next 12 years or face shutting them down, under rules the state Environmental Management Commission adopted in 2006. The rules require 14 coal-fired power plants operated by Duke and Progress Energy to install controls for reducing mercury emissions. These emissions may have contributed to elevated levels of mercury in some fish from North Carolina waters. Ultimately, the rules could lead to nearly a 90 percent reduction in mercury emissions based on the levels of mercury contained in coal. The N.C. Division of Air Quality estimates that mercury emissions will drop by 74 percent when the Clean Smokestacks Act is fully implemented in 2013. Further reductions will occur by 2018, as facilities not covered by the Clean Smokestacks Act add controls under the new mercury rule.

# Conserving and Protecting Water Resources

## *Drought Management Actions*

The Department of Environment and Natural Resources worked hard to improve water supply management and drought response during the drought of 2007-2008. With Gov. Easley’s active leadership, the department and others pushed for drought response legislation in the N.C. General Assembly. The Drought Management Act of 2008 (<http://www.ncwater.org/drought/>) enhances the ability of the governor and local communities to respond to worsening drought conditions and encourages greater water supply planning, conservation and cooperation. The new law also streamlines the process for declaring a drought emergency. Under the new law, the Department of Environment and Natural Resources gained the authority to require water systems to implement water conservation measures in situations of “extreme” or “exceptional” drought and to step up the level of water conservation if existing measures are not sufficient. The legislation takes steps to improve the quality and amount of information about water use available to state and local agencies for planning purposes.

DENR spent several million dollars in 2007-2008 directly for drought response projects (including emergency actions to assist Rocky Mount and Siler City). The N.C. Rural Economic Development Center provided \$500,000 to each water system to fund interconnections (Siler City to Sanford and Rocky Mount to Wilson). DENR provided technical assistance and expedited permits for those projects and a number of others to provide interconnections between water systems or emergency water supplies in 2007-2008.

Both the N.C. Rural Economic Development Center and the Department of Environment and Natural Resources gave priority to drought response projects in allocating grant and loan funds for water infrastructure. Additional drought response projects included: Boone/Blowing Rock/Appalachian State University interconnections; Mars Hill/Weaverville interconnection; and regional interconnections between Hendersonville, Saluda, Tryon and Columbus. In 2007-2008, the state committed more than \$16 million in funding for drought-related interconnection or emergency water supply projects (\$6.6 million in grants from the N.C. Rural Economic Development Center and \$9.4 million in low interest loans from the N.C. Drinking Water Revolving Loan Fund). DENR provided technical assistance on water conservation and efficiency to approximately 70 commercial and industrial facilities, and also set aside \$500,000 to assist 22 water systems with water audits and leak investigations. The 2008-2009 state budget included a \$600,000 drought reserve fund to continue assistance with water audits; provide additional seed money for drought response projects; and fund water conservation education materials.

## *Water Quality*

Progress toward reducing water pollution in the state’s surface waters is being made in many areas; in other areas pressures on the environment continue to grow.

Data collection is the key to the Division of Water Quality’s identification of impaired waters. Both the quality and quantity of water quality data has increased. Collection methods and guidance have improved so that the water samples have more reliable quality control. Data collected by the Division of Water Quality has been supplemented in recent years by data provided by local governments, monitoring coalitions and numerous state agencies.

Improvements have been seen in the reduction of all sources of pollution in some areas. Technological improvements in wastewater treatment control have resulted in significant reductions of pollutants. Better understanding of non-point source pollution – pollutants that enter surface waters from many different land use activities –has led to improvements in controls for stormwater runoff, agricultural operations and land-based waste disposal. Increased cooperation between local businesses, city and county government agencies, environmental groups and state agencies have also resulted in numerous watershed improvements through increased monitoring, elimination or mitigation of sources of pollution and implementation of best management practices. As one example, the Neuse River has shown significant improvement as tighter controls on wastewater discharges and better stormwater management in the river basin succeeded in reducing the high nutrient levels that caused fish kills in the 1980s.

## *Coastal Stormwater Rules*

The coastal stormwater rules adopted by the Environmental Management Commission in the late 1980s were intended to protect coastal waters from the impacts of runoff from developed areas. Starting in 2005, the Division of Water Quality undertook a comprehensive review of the coastal stormwater program’s effectiveness. The study concluded that the existing Coastal Stormwater Rule was outdated and ineffective in providing an adequate level of environmental protection to the coastal ecosystem. In response to this finding, the EMC amended the rules to provide further protection. In 2008, the General Assembly adopted a modified version of the EMC’s rules. The new rules should improve the management of coastal stormwater and the protection of our coastal waters.

## *Safe Drinking Water*

**Bernard Allen Emergency Drinking Water Fund.** In 2006 the General Assembly created the Emergency Drinking Water Fund as a program to improve the state’s response to groundwater contamination that affects drinking water wells. The fund provides assistance to low income households that need a safe and clean drinking water supply to replace a contaminated well. The fund received a \$300,000 appropriation in 2006 and a \$615,000 appropriation in 2007. The General Assembly did not appropriate any money to the fund in 2008.



The legislation establishing the fund outlined three authorized uses: 1) to notify citizens whose wells are at risk from groundwater contamination; 2) to pay for water quality testing of private wells; and 3) to provide an alternative drinking water supply to well owners whose wells are contaminated. The legislation directs DENR to disburse the money based on financial need and on the risk to public health.

Since its inception the program has served a critical need to the citizens of North Carolina. Dozens of residents throughout the state have benefited from the fund, either through a permanent connection to public water supplies or through the receipt of emergency bottled water until a long term solution is found. The department continues to work with local governments to identify eligible sites where the fund may be able to assist residents affected by contaminated groundwater.

In December 2007 the Division of Water Quality was notified of potential drinking water concerns in Montgomery County. DWQ sampled the well in question and by January 2008 began expanding the geographic scope of its sampling. Sampling results indicated that approximately three dozen wells in the area contained pesticide compounds above the drinking water standard, apparently the result of past practices in growing peaches.

DWQ began working with local officials and the U.S. Environmental Protection Agency to identify a short-term and long-term solution to the contaminated wells. In April 2008 residents were supplied with bottled water paid for through the Bernard Allen Fund. DWQ is continuing to conduct sampling in nearby areas, and local officials have been working with the N.C. Rural Center and other funding agencies to secure funds for a waterline extension project, with an initial cost estimate of more than \$1.2 million.

**Private Well Legislation.** About 2.7 million North Carolinians rely on wells for their drinking water. In 2006, the General Assembly passed a new law that requires counties to enforce minimum statewide standards through local well programs with the use of permits and inspections. Before receiving final approval for drinking, well water will be tested for 17 different possible contaminants as well as for bacteria and acidity. The law included \$1.1 million to help counties get these programs up and running. The Division of Environmental Health will help counties enforce standards and assist them in starting new well inspection programs; all counties were required to have local well program in place by July 2008.

## Conserving and Protecting Land Resources

### *Sedimentation Control*

The number of new sedimentation and erosion projects approved this past fiscal year decreased, probably reflecting the slowdown in the national economy. The growth of delegated local erosion and sediment control programs is also taking a portion of the new projects formerly overseen by the state. Two new local programs were added during this last year. The proportions of sites requiring a Notice of Violation was down slightly from previous years. Other improvements in the works for the State Sedimentation Control Program include updates to the “Erosion and Sedimentation Control Design Manual” published by the Sedimentation Control Commission. The updates will reflect the newest technology. Additionally, rulemaking has begun for the purpose of implementing a new provision in the law requiring self-inspection for erosion and sedimentation control.

Development on steep slopes has become an increasing concern in recent years. In 2004, rains associated with hurricanes Ivan and Frances caused landslides that destroyed or damaged several homes and resulted in deaths and injuries. Several projects in the mountains of North Carolina caused sedimentation problems this past year when the slopes were graded too steeply and became unstable, resulting in the failure of erosion and sedimentation measures and offsite sedimentation damage. Several local governments have addressed steep slope development in their local erosion and sedimentation control ordinances, or have passed separate steep slope ordinances to better address long term erosion and sedimentation control for this type development.

### *One North Carolina Naturally: Conserving and Protecting Open Space*

Through the end of 2007, public and private partners have joined together since the inception of the Million Acres Initiative in 1999 to conserve and protect 589,685 acres of land on a permanent basis.

The lands protected in 2007 represent important natural areas for habitat, recreation opportunities, working forests and streamside buffers. Notable projects completed in 2007 include the addition of the 996-acre Chimney Rock Park to the State Parks System, a 1,088-acre conservation easement conveyed from the town of Sylva to the state of North Carolina on the largest remaining unprotected tract in the Plott Balsam Mountains, and the transfer of nearly 60,000 acres of former International Paper land from The Nature Conservancy to the state. In the last several years, the pace at which our state is protecting and conserving open space has increased.

Nevertheless, the amount of land currently protected each year is insufficient to meet the goal of permanently protecting an additional million acres by Dec. 31, 2009. In fact, at our current pace, land protection efforts do not match the rate at which natural and agricultural lands are being lost to development in North Carolina, which currently amounts to about 100,000 acres per year. At the current average rate of land protection and funding levels, we will reach the million acre goal in 2014.

In addition to increasing the rate at which land is protected in North Carolina, the department, through its One North Carolina Naturally program and working with many partners, has made available high quality information and tools to support effective conservation planning and action. The most significant improvement in this area is the statewide Conservation Planning Tool, introduced in 2007. The Conservation Planning Tool is a comprehensive reference that provides accurate information to support land use and conservation planning and action. It uses scientific and strategic analysis to identify and prioritize the essential high quality natural resources across the state, as well as identify crucial protection gaps in our state’s network of supporting ecosystems. The plan highlights opportunities for collaborative conservation that will contribute to conserving and protecting the most significant natural resources across the state.

The Conservation Planning Tool can help all the state’s conservation partners conserve and protect the most important natural resources, optimize available funding and make the case for closing the gap between what we have and what we need. Working together, we can achieve the goal outlined in the statute that sets the million acre goal: “to protect the water quality, wetlands, drinking water sources, natural beauty, and ecological diversity of North Carolina as well as provide opportunities for public recreation” in order to “provide a high-quality environment for present and future generations.”

## A NEW YEAR, AND THE PATH AHEAD

### Challenges and Opportunities

On Dec. 23, 2008, the News and Observer published an article entitled *N.C. Grows Despite Downturn*. In part the article stated as follows:

“North Carolina’s population continued to grow in the year ending July 1, 2008, despite the drag of an already-faltering economy, according to the latest estimates released Monday by the U.S. Census Bureau.

The state added more than 180,000 residents during that year, growing at a rate of 2 percent – the fourth highest in the nation and more than double the national growth rate.



That growth boosted North Carolina’s population to more than 9.2 million, the Census Bureau said. Still, that was a smaller increase than the state experienced in the prior two years.”

Although in different ways, a growing population and a faltering economy both mean increasing competition for increasingly scarce resources. A changing climate and an energy crisis both raise the stakes and pace of the competition for the scarce resources. Around the state and around the world, it is a time of great risk and challenge, but also of great hope and opportunity.

Against that background, here briefly summarized are some of the major environmental and natural resource policy issues facing the department and the state in the new year:

**Military Expansion and Partnerships.** One important reason for the growth in North Carolina’s population is the growth of the military presence in our state. For example, at both Camp Lejeune and Fort Bragg, the military presence is expanding dramatically and quickly. Planning for and accommodating that growth is a complicated but essential task that must involve the military, the state, local communities and many other diverse partners. Partnerships for planning and sustainability have already made key contributions to solving the problems and seizing the opportunities raised by these expansions, and are poised to be work even more effectively in the future. One such partnership is the Southeast Partnership for Planning and Sustainability, or SERPPAS, a partnership among the military, five southeastern states, federal agencies and other partners. SERPPAS has related work groups focusing on projects specific to North Carolina.

**Climate Change and Energy.** The N.C. Division of Air Quality’s work with the Climate Action Panel Advisory Group has been completed with the submission of the CAPAG final report in 2008. In recent years, DAQ has also supported the work of the Legislative Commission on Global Climate Change and helped organize the Climate Registry. While DAQ will continue its work on climate change in various capacities, it is important that the department evaluate its overall approach to this issue and develop an internal structure that allows for a more robust and focused approach to addressing climate change and energy issues at the state level while at the same time integrating and coordinating with developments at the federal level.

**Interstate Air Pollution Rules.** The state will need to respond to numerous significant U.S. EPA rules on air quality, such as, for example, the tightening of the federal ozone standard.

**Water Supply.** The Environmental Review Commission of the General Assembly has a study of water supply, allocation and permitting issues underway. An interim report will be provided in 2009 and final report in 2010. DENR’s Division of Water Resources, Division of Water Quality, the Public Water Supply Section in the Division of Environmental Health and the Secretary’s Office have all been involved in developing the scope of the study and providing information. The study could lead to recommendations affecting a number of DENR regulatory, planning and funding programs related to water supply.

**Drought Management Implementation.** With passage of House bill 2499, Drought/Water Management Recommendations, the legislature provided the state with enhanced tools to use in drought situations. First and foremost among those new tools is state authority to provide oversight for development and implementation of local water shortage response plans. Local water systems are required to develop plans to address water shortages that may result from drought or other conditions creating a water shortage emergency. The new law also requires the water systems to implement the plans in a water shortage. In December 2008, the Division of Water Resources will begin reviewing water shortage response plans submitted by the water systems. Plans that meet the statutory criteria for an acceptable plan will be approved; some number may need to be returned for additional work. In addition, implementation of the bill will involve collection of additional data on water use, support for local water systems working on interconnections and backup water supplies, improving water efficiency and increased public education on water conservation.

**Solid Waste Management Act Implementation.** In 2007 the General Assembly passed the Solid Waste Management Act of 2007. Included in this legislation was the imposition of a \$2 per ton tip fee that will generate more than \$20 million annually with a significant portion of that revenue dedicated to cleaning up the more than 700 old abandoned landfills throughout the state. The Department of Revenue began collecting the tip fee July 1, 2008. DWM is in the process of putting together a plan to prioritize assessments and cleanup.

**Groundwater Contamination.** Over the next several years the department needs to work with the legislature, other agencies and relevant commissions to strengthen the state’s management of groundwater resources. Incremental progress has been made in recent years with the passage of Gov. Easley’s private drinking water well legislation and a more coordinated approach to risk assessment between DENR and DHHS. The department is working on a comprehensive database that will provide a single source of information concerning all of the contaminated sites known to DENR’s water quality, public health and waste management agencies. The public will gain access to information about the location of these sites and the nature and extent of contamination at each site.

**Coastal Issues.** At the direction of the Coastal Resources Commission, the Division of Coastal Management has begun an enforcement initiative related to use of sandbags for temporary erosion control. The commission’s rules only allow use of sandbags for a 2-5 year period (depending on the size of the structure that is threatened by erosion) to allow recovery of the beach or an acceptable long-term solution such as relocation of the structure or beach nourishment. Many sandbags on the ocean shoreline have been in place much longer than the rules allow without any progress toward an acceptable permanent solution. The department may need to respond to a renewed effort to modify the state’s ban on use of hardened erosion control structures (such as seawalls, jetties and groins) on the oceanfront. Changing federal policy on offshore oil and gas exploration and interest in construction of wind turbines for electric generation will also raise issues that the state’s coastal management program will be required to address.

**Jordan Lake Rules.** The Jordan Lake rules are intended to reduce nutrient pollution, both nitrogen and phosphorous in Jordan Lake. The targeted sources of pollution include wastewater treatment plants, new development, existing development, agriculture and the N.C. Department of Transportation. The rules were approved by the EMC in spring of 2008 and then approved by the Rules Review Commission following an initial rejection. However, the RRC has received the requisite number of objections from the public to ensure that the rules will be subject to legislative review in 2009. The Jordan Lake rules are strongly opposed by affected local governments and the development industry. The rules will likely be subject to a legislative stakeholder group.

**Renewable Energy.** With the passage of Senate bill 3 in 2007, North Carolina became the first state in the Southeast to establish a renewable energy portfolio standard. This legislation has led to a wealth of activity in the area of renewable energy. The EMC has been evaluating current environmental programs and whether they provide sufficient safeguards for these new renewable facilities. In addition, the legislative Environmental Review Commission has been directed in the 2008 Studies bill to study the need for a wind permitting program at the state level. Specific wind projects have already been proposed, prompting some local governments to enact local moratoriums on wind farms. Also in this arena, a company that converts poultry litter to energy is proposing three sites in North Carolina to construct new facilities. North Carolina clearly has an opportunity to establish itself as a leader in the field of renewable energy, but the regulation and implementation of these efforts and others at the state and local levels will present a significant challenge.

**Animal Operations.** N.C. State University’s multi-year study on environmentally superior technologies for swine farms to replace the lagoon and sprayfield waste systems concluded with a final report in early 2006. The study identified some alternatives to the existing waste treatment systems but did not find them to be economically feasible at this time. Nevertheless, work continues to move forward in this area, including new regulatory standards for new and expanding swine farms as outlined in Senate bill 1465. The EMC is in the process of promulgating new rules on this issue starting this fall with public hearings. The discussion of these rules is likely to continue into 2009.



**Land Conservation.** In recent years the General Assembly has made funding of land conservation a priority. Despite these funding efforts, the goal of preserving and protecting 1 million acres in 10 years will fall short. However, recent funding efforts have ensured that important projects, such as acquisition of Chimney Rock Park and Grandfather Mountain, were successful. The funding of open space projects is especially critical to the Division of Parks and Recreation given its long-term expansion plans.

With revenue pictures already a concern for next year’s state budget, the department and the funding agencies will need to continue to develop innovative approaches to protecting our open space. In addition, staff and resources will need to be allocated to build on the progress the department has made through its conservation planning tool. As population growth continues at a rapid pace, the conservation planning tool has the potential to serve as a critical resource for local governments and planners.

**Coastal Habitat Protection Plan.** While implementation of the CHPP has been ongoing for several years with notable successes – such as the coastal stormwater rule and the development of strategic habitat areas – much work needs to be done to address the threats facing our coastal resources. Increased communication and coordination at the division level and the commission level have been hallmarks of the CHPP program. Over the next year a reassessment of the implementation priorities and resource allocation will be pivotal in maintaining positive momentum.

**Emergency Response.** The department’s ability to respond to emergencies of varying type will be critical to its mission in the upcoming years. For example, the Evans Road fire that burned in the eastern part of the state for three months in 2008 taxed both the department’s staff and financial resources. Other emergency events, whether slow-moving like the drought or immediate like Hurricane Floyd, the Apex chemical fire or landslides, are likely to occur. Only advanced planning and preparation and coordination among state, federal and local agencies will ensure an effective response

# In Our Nature

## The State of the Environment in North Carolina



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