

Summer 2010

the Thalweg

Watershed Stewardship Program

Volume 7 • Issue 3

Cobb County Board of Commissioners

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Species on the Move

The Green Tree Frog is Confirmed in Cobb County!

Georgia's state amphibian, the green treefrog (*Hyla cinerea*), was once restricted to the coastal plain, but its range has expanded in recent years to include many areas north of the Fall Line. Varying sources have evidenced this species existing in the metro Atlanta counties, but their populations have only been suspected in Cobb. John Jensen, a Georgia Department of Natural Resources herpetologist, noted that the range of the green treefrog was moving north as the Watershed Stewardship Program was developing its anuran monitoring program a few years ago. He recommended that we include the species in our training manual.



Early this summer, one of our anuran monitoring volunteers heard the distinctive *queenk, queenk, queenk* mating call. Our very own Steve Shelton, former Water Quality Laboratory Superintendent, was walking in the Cochran Shoals Recreation area near the Chattahoochee River and recorded the full chorus. The recording was sent to local frog expert Walter Knapp, who confirmed that it was indeed the green treefrog.

This distinctive species is colored bright lime green with a white racing stripe extending from the upper lip down the side of the body and along the hind legs, although they can change color in response to stress or temperature. Because they thrive in any permanent wetland, their numbers and spread in Georgia have been boosted by an increase in the beaver population as well as the abundance of farm ponds and small reservoirs.

For more information on how you can participate in Cobb County's Anuran Monitoring Program, call 770-528-1482.



A Call for Backyard BIODIVERSITY

*By Douglas Tallamy
Professor and Chair of the Department
of Entomology and Wildlife Ecology at
the University of Delaware*

You have probably never thought of your property as a wildlife preserve representing the last chance we have to sustain plants and animals that were once common throughout the U.S. But that is exactly the role our suburban and urban landscapes are now playing - and will play even more in the near future. If this is news to you, it's not your fault. We were taught from childhood that the plantings in our yards are made mostly for beauty; they allow and encourage us to express our artistic talents, to have fun, and to relax. And whether we like it or not, the way we landscape our properties is seen by our neighbors as a statement of our wealth and social status. But no one has taught us that we have forced the plants and animals that evolved in North America (our nation's biodiversity) to depend more and more on human-dominated landscapes for their continued existence. We have always thought that biodiversity was "happy somewhere out there in nature": in our local woodlot, or perhaps our state and national parks. We have heard nothing about the rate at which species are disappearing from our neighborhoods, towns, counties, and states. Even worse, we have never been taught how vital biodiversity is for our own well-being.

We have taken it all

The population of the U.S., now over 304 million people, has doubled since most of us were kids, and continues to grow by roughly 8,640 people per day. All of those additional souls - coupled with cheap gas, our love affair with the car, and our quest to own ever larger homes - have fueled unprecedented development that continues to sprawl over 2 million additional acres per year (the size of Yellowstone National Park). We have connected all of our developments with four million miles of roads; their paved surface is five times the size of New Jersey. Somewhere along the way we decided to convert the forests that used to cover our living and working spaces into huge expanses of lawn dotted with a few small, mostly nonnative trees. So far we have planted over 62,500 square miles - some 40 million acres - in lawn. Each weekend we mow an area eight times the size of New Jersey to within an inch of the soil and then congratulate ourselves on a job well done. And it's not as if those little woodlots and "open spaces" that we have not paved over are pristine. Nearly all are second-growth forests that have been thoroughly invaded by alien plants like autumn olive, multiflora rose, bush honeysuckle, privet, Oriental bittersweet, buckthorn, and Japanese honeysuckle. More than 3,400 species of alien plants have invaded over 200 million acres of the U.S. To

nature lovers, these are horrifying statistics. I stress them so that we can clearly understand the challenge before us. We have turned 54 percent of the lower 48 states into a suburban/urban matrix, and 41 percent more into various forms of agriculture. That's right: We humans have taken 95 percent of nature and made it unnatural. But does this matter? Are there consequences to turning so much land into the parklike settings humans enjoy? Absolutely, both for biodiversity and for us. Our fellow creatures need food and shelter to survive and reproduce, and in too many places we have eliminated both. State Natural Heritage Centers have estimated that as many as 33,000 species of plants and animals in the U.S. are now imperiled - too rare to perform their role in their ecosystem. These species can be considered functionally extinct. The songbirds that brighten spring mornings have been in decline since the 1960s, having lost 40 percent of their numbers so far. One hundred twenty-seven species of neotropical migrants are in steep decline. In fact, a survey of our nation's bird populations, commissioned by former President Bush, has found that one-third of our nation's birds are endangered.

Why We Need Biodiversity

For most of us, hearing such numbers triggers only a passing

sadness; few people feel personally threatened by the loss of biodiversity. Here's why you should. Biodiversity losses are a clear sign that our own life-support systems are failing. The ecosystems that support us - that determine the carrying capacity of the earth and our local spaces - are run by biodiversity. It is biodiversity that generates oxygen and cleans water, creates topsoil out of rock, buffers extreme weather events like droughts and floods, pollinates our crops, and recycles the mountains of garbage we create every day. And now, with human-induced climate change threatening the planet, it is biodiversity that, if given half a chance, will suck that carbon out of the air and sequester it in living plants. Humans cannot live as if they are the only species on this planet. Why? Because it is other species that create the ecosystem services that are so essential to us. Every time we force a species to extinction, we are encouraging our own demise. Despite the disdain with which we have treated it in the past, biodiversity is not optional.

Parks Are Not Enough

I am often asked why the habitats we have preserved within our park system are not enough to save most species from extinction. Years of research by evolutionary biologists have shown that the area required to sustain biodiversity is pretty much the same as the area required to generate it in the first place. The consequence of this simple relationship is profound. Since we have taken 95 percent of the U.S. from nature, we can expect to lose 95 percent of the species that once lived here unless we learn how to share our living, working, and agricultural spaces with biodiversity. Ninety five percent of all plants and animals! Now there is a statistic that puts climate-change predictions of extinction to shame. And studies of habitat islands with known histories, such as Barro Colorado Island in the Panama Canal and Ashdown Forest in England, suggest that these predictions are accurate. Species are lost in the same proportion in which a habitat is reduced in size. The good news is that extinction takes a while, so if we start sharing our landscapes with other living things soon, we should be able to save much of the biodiversity that still exists.

Redesigning Suburbia

What will it take to give our local animals what they need to survive and reproduce on our properties? Native plants, and lots of them. This is a scientific fact deduced from thousands of studies about how energy moves through food webs. Here is the general reasoning: All animals get their energy directly from plants, or by eating something that has already eaten a plant. Insects are the group of animals most responsible for passing energy from plants to the animals that can't eat plants. This fact is what makes insects such vital components of healthy ecosystems. So many animals depend on insects for food (e.g., spiders, reptiles, amphibians, rodents, and 96 percent of all terrestrial birds) that removing insects from an ecosystem spells its doom. But that is exactly what we have tried to do in our suburban landscapes. For over a century we have favored ornamental landscape plants from China and Europe over those that evolved right here. If all plants supported wildlife equally, that would be fine. But every plant species protects its leaves with a mixture of nasty chemicals that makes them distasteful at best, and

downright toxic at worst. With few exceptions, only insect species that have shared a long evolutionary history with a particular plant lineage have developed the physiological adaptations required to disarm the chemical defenses in their host's leaves. They have developed over time to eat only the plants with those particular chemicals. When we present insects from Pennsylvania, for example, with plants that evolved on another continent, chances are those insects will be unable to eat them. We used to think this was good. Kill all insects before they eat our plants! But a plant that cannot pass on the energy it has harnessed cannot fulfill its role in the food web. We have planted Kousa dogwood, a species from China that supports only a few insect herbivores, instead of our native flowering dogwood (*Cornus florida*), which supports 117 species of moths and butterflies alone. In hundreds of thousands of acres, we have planted goldenrain trees, ginkgos, and dawn redwoods from China instead of one of our beautiful native oaks, and in doing so we have lost the chance to grow and support 534 species of caterpillars, all of them nutritious bird food. My research has shown that alien ornamentals support 29 times fewer animals than do native ornamentals.

Plants Matter

In the past we have ignored the vital role plants play in our landscapes. Plants, of course, are the only organisms that capture energy from the sun and turn it into the simple sugars and carbohydrates: the food that supports nearly all the food webs on earth. Every time we bulldoze a native plant community, we are reducing the amount of food available for our fellow creatures. In fact, the amount of life that can exist in an area is directly proportional to the amount of vegetation in that area. Because plants have physical structure, they also provide housing for animals. We can no longer landscape with aesthetics as our only goal. We must also consider the function of our landscapes if we hope to avoid a mass extinction that we ourselves are not likely to survive. As quickly as possible, we need to triple the number of native trees in our lawns and



Along with nonnative plants come nonnative insects like the Japanese Beetle, compounding rather than eliminating our pest problems.

underplant them with the understory and shrub layers absent from most managed landscapes. Homeowners can do this by planting the borders of their properties with native trees such as white oaks (*Quercus alba*), black willows (*Salix nigra*), red maples (*Acer rubrum*), green ashes (*Fraxinus pennsylvanica*), black walnuts (*Juglans nigra*), river birches (*Betula nigra*), and shagbark hickories (*Carya ovata*). Those trees should be underplanted with woodies like serviceberry (*Amelanchier canadensis*), bottlebrush buckeye (*Aesculus parviflora*), arrowwood (*Viburnum dentatum*), hazelnut (*Corylus americanus*), and blueberries (*Vaccinium* spp). Studies have shown that even modest increases in the native plant cover on suburban properties raise the number and species of breeding birds, including birds of conservation concern. As gardeners and stewards of our land, we have never been so empowered to help save biodiversity from extinction, and the need to do so has never been so great. All we need to do is plant native plants!

This article is reprinted with permission from the Fall 2009 edition of *American Forests* (www.americanforests.org) and originally published in the book *Bringing Nature Home* by Dr. Doug Tallamy.

When the plan for the city of Columbia, SC was laid out in the late 1700's, every major street was over 60 feet wide, based on the belief that mosquitoes could not fly further before dying of starvation. The urban planners had set themselves up for a big disappointment: the pests can travel for miles! Not even a decade later, yellow fever depleted the French army in Haiti. Mosquitoes gave Napoleon an additional argument to give independence to the Haitians, as well as sell Louisiana to the United States. Against this minuscule enemy, humans have worked great lengths. From habitat destruction to the use of harsh chemicals, there might be only few methods we have yet to try. Does man have a fair chance in this battle?



Mosquitoes

BIODIVERSITY

The exact number of mosquito species is unknown, but estimates place it in the magnitude of 3,000. They have conquered every part of the world except permafrost zones. All of them are part of the family *Culicidae*, in the order *Diptera*. Within the US, there are over 160 species, with the highest diversity in Texas. A characteristic difference between genera is their breeding habit. Some lay eggs in standing water, while others only need moist soil. In the latter case, eggs need to dry out before rehydrating and hatching when flooding waters pass through.

The mosquito life cycle follows a complete metamorphosis with four stages. Species of the *Culex* genus (the most abundant in our region) lay their eggs in a raft shape, 100 to 300 at a time. The raft is a quarter-inch long and 1/8 inch wide, hardly visible. The larvae emerge 24-28 hours later. The "wigglers" then live in water for 4-14 days, depending on the water temperature. They are able to come to the surface to breathe, allowing them to survive the anoxic conditions of standing water (other species have developed a siphon to pierce through plant roots to get oxygen). They filter microorganisms, bacteria, and algae from the water. By the fourth instar, they can be half an inch long. At the pupal stage they are called "tumblers", from the motion they use to dive to the bottom when disturbed. They float at the surface of the water and breathe through tubes. This stage lasts one to four days, after which an adult emerges from the pupal case. The entire cycle can last between four days to a month.

Both male and female crave carbohydrates and feed on nectar, making them pollinators like butterflies and bees. Only the female has a proboscis capable of sucking blood; she needs the precious substance for its protein. For each batch of eggs she will draw less than 5 microliters (5 millionths of a liter) at a time, a negligible amount considering the average human adult maintains 5 liters of blood.

THE PROBLEM

The anti-coagulating proteins in mosquito saliva can provoke an immune response in warm-blooded animals, causing swelling and itching. The reaction varies from one individual to another, some people being severely allergic to the bites. In the same manner, certain persons seem to attract mosquitoes more than others. Females are attracted by a combination of stimuli including carbon dioxide, temperature, moisture, odors, and movement. Guided by sensors on their antennae, they can locate prey from 100 feet, simply by the carbon dioxide and lactic acid it emits. They also have infrared sensors to detect the heat of warm-blooded animals and can quickly spot colors contrasting with the background.

Species of *Aedes* and *Ochlerotatus* are active in the early morning and evening, occasionally during cloudy afternoons and in shaded areas. They seem particularly fond of human blood but will feed on horses, cattle, smaller mammals, and birds as secondary choices. *Culex* feed after dark and at dusk, preferring birds over other animals. The Asian tiger mosquito (*Aedes albopictus*), spread through global trade and international traveling a few decades ago, does not rest during daytime. Listed among the "100 of the World's Worst Invasive Alien Species" by the Invasive Species Specialist Group, the aggressive insect even feeds on amphibians and reptiles.

Mosquitoes are responsible for the propagation of several diseases. 300 to 500 million cases of malaria are reported each year, but they can also spread the dengue and yellow fevers, heartworm in dogs, and an array of encephalitis including the infamous West Nile virus. Fortunately, no blood from previous prey will enter the body of new prey, so diseases such as HIV cannot be transmitted from one individual to another. Mosquitoes can actually digest the Human Immunodeficiency Virus. However, some viruses and other pathogens that can reproduce inside the mosquito's body will be present in its salivary glands. When the mosquito bites it injects anti-coagulant fluids, which can transmit the virus.

MANAGEMENT

There are two main approaches to reduce the impact of mosquitoes on humans. The first is regional population control, often referred to as Integrated Mosquito Management. The plan is developed in a specific area, so it reflects particular ecological, economic and social criteria. Reduction of larval habitat is usually the first solution explored. Larvicide, and as last resort adulticide, can be applied. However, the impact on the ecosystem can offset the benefit. Most insecticides have a vast spectrum of action and will kill beneficial species as well. Recent developments in insect growth regulators, which inhibit the development of larva and pupa, bring some hope. Methoprene mainly affects order *Diptera* and is believed to have low toxicity on mammals. Biological regulation is another topic of current research. Bacteria in the *Bacillus* genus are parasites of mosquito larvae. They attack the digestive system and kill the insect before metamorphosis is complete. Unfortunately, they can be applied only to restrained areas under limited conditions. The introduction of fish, bats, and birds does not produce satisfying results since no species feeds mainly on mosquito adults or larvae. It could also disturb the existing food web. Opportunistic insectivores eat every six-legged creature they find, including dragonflies and damselflies, natural predators of mosquitoes.

The second (and seemingly most efficient) approach is to protect your property and your person. There is a lucrative market for residential anti-mosquito gadgets. Costly contraptions of all kinds are available, from light zappers to carbon dioxide traps. They do reduce the amount of insects in the backyard, but mosquitoes represent only a small portion of the captured. Simple and responsible solutions are available:

- Mow the lawn (adults can hide in tall grasses)
- Keep outdoor lights off when enjoying the evening *al fresco*
- Wear long sleeves, light colors, and a head net.
- Eliminate breeding sites in standing water:
 - Drill holes in recycling bins
 - Place a screen on top of rain barrels
 - Properly dispose of used tires
 - Change water in bird baths weekly

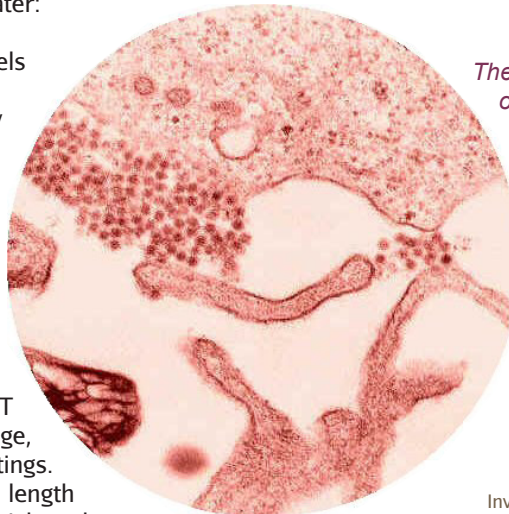
There are very few repellents with proven effectiveness. N,N-diethyl-3-methylbenzamide, sold under the name DEET, is the unrivaled product. Mosquitoes (and ticks) are simply repulsed by the smell of DEET. This repellent was developed by the Department of Agriculture and was in use by 1957. The American Academy of Pediatrics recommends the use of DEET up to 30% for children above 2 months of age, but 10% is usually sufficient for short outings. The concentration of DEET influences the length of effectiveness. 20% is necessary to keep ticks at bay as well.

Some studies suggest that DEET can cause seizures, insomnia, and neuromuscular damage. It is a solvent capable of dissolving materials such as synthetic fabrics and nail polish. It is not known to bioaccumulate, but it is slightly toxic to some freshwater plankton and fish species. People concerned by the potential side effects of DEET can turn to Picaridin, developed by pharmaceutical giant Bayer, and now commonly available. Oil of lemon eucalyptus is a natural option, but cannot be used on children below three years of

age. Citronella does not provide a significantly better repellent than other candles producing smoke. Health Canada has recommended phasing out citronella-based products that are applied directly to the skin. There have been no findings of high toxicity, but the fact that it needs to be reapplied every half-hour raises concerns. A component of citronella, methyleugenol, is known for being carcinogenic and may cause reproductive and developmental defects at high concentrations.

Bat, bee, and amphibian populations have experienced a multitude of diseases in recent decades and some scientists suspect that long-term exposure to low concentrations of pesticides might have made them more susceptible to illness. DDT was successful at destroying pests over thirty years ago, but its impacts on the ecosystem and human health are still visible to this day. Whether herbicides and insecticides are applied directly to the ground or diffused in the air, the chemical components end up in our waterways. Fish and other aquatic species are affected, and so are terrestrial species drinking from the source. Toxicity can accumulate up the food chain, a process known as bioaccumulation. It not only disrupts the ecological balance, it can be a threat to human health as well.

Information can be contradictory, even among reliable sources. One thing is certain: the mosquito is a very successful insect. Scientists estimate the number of eggs per acre in Florida to be between 0.7 and 1.3 million. Of course, just a fraction of them will hatch, but considering the population density of 0.5 person per acre, it gives a ratio of at least 1.5 million mosquito eggs for each Floridian! The hot and humid climate of the southeast is seemingly a heaven for mosquito breeding, but communities around the world experience a similar struggle. In 300 B.C. Aristotle documented the development of mosquitoes and fossil record indicates their presence in the Cretaceous era, 100 million years ago. Perhaps we should simply resign.



The West Nile arbovirus made a scary outbreak in North America in 1999. The first case was observed in Uganda in 1937, but the entire life cycle of the virus was elucidated in Egypt in the 1950's. The virus is passed down from mosquitoes to birds; cattle, horses and humans are "incidental" hosts.

References

Invasive Species Specialist Group - Global Invasive Database
<http://www.issg.org/>

American Mosquito Control Association
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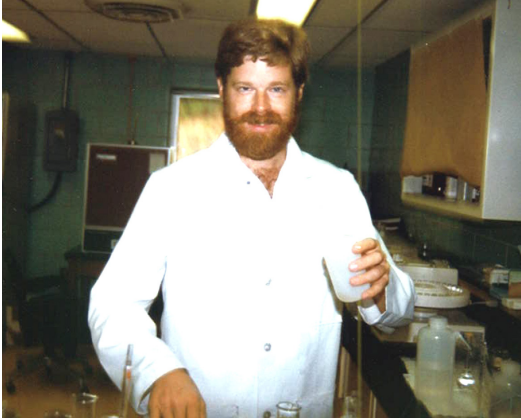
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<http://www.cdc.gov/ncidod/dvbid/westnile/cycle.htm>

Living the Life of Leisure...

Our Laboratory Superintendent, Steve Shelton, elected to retire from Cobb Water on April 27th after 33 years of service. Steve was instrumental in the development of many innovative programs offered by Cobb Water and will be greatly missed. Those who have visited the lab have likely run into him and know how supportive he was, assisting our customers and the community with their water quality issues and concerns.



Steve Shelton became the laboratory superintendent in 1984. Historically, the lab had been an accessory to the county's water reclamation facilities, running tests for permit compliance and process control, then providing this information to the plant superintendents. The Lab did little interpretative analysis on its own. Steve brought a great respect for science and the knowledge of using data to solve problems. He stressed the importance of stringent quality control and adherence to standard methods to improve the quality of data. He excelled in interpretation, creating spreadsheets for analysis that enabled operators, engineers, and supervisors to better understand the data. This brought a dramatic change in the role of the lab and its status in the Water System. During the 1980's, when technologies for wastewater treatment were being tested, the Lab worked closely with the treatment plants to evaluate their effectiveness. Steve always stressed the utilization of in-house resources and encouraged his employees to expand their knowledge

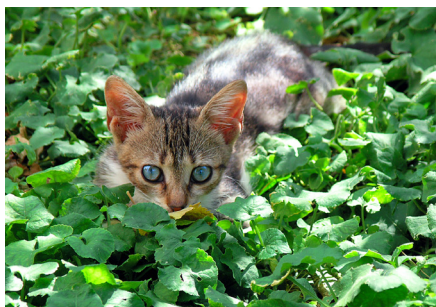
and apply it in new and creative ways. As a result, the Cobb County Water Quality Laboratory was able to conduct studies and research that normally would have been contracted to consultants.

It was this environment that allowed for the creation of an in-house Watershed Assessment Program. While most jurisdictions were hiring consultants to do surface water sampling, Cobb County was laying the groundwork for an in-house watershed assessment program. This involved chemical monitoring and biological surveys at stream sites throughout the county. It was Steve's skill at data management that made this opportunity possible. Data analysis is crucial in any watershed report and it is essential that the monitoring data be summarized and processed through various indices. Steve successfully demonstrated both to the Water System and the Georgia Environmental Protection Division that the Water Quality Laboratory was capable of executing a watershed assessment at a level comparable to any of the major consulting firms.

Steve Shelton participated fully in the creation of our Adopt-A-Stream program. He conceptualized many of the Watershed Stewardship Program's initiatives including the rain garden and anuran monitoring program. In addition to his scientific and analytical expertise, he has stepped into many roles including teaching rain barrel workshops, leading frog vocalization training, building compost bins and animal enclosures, retrofitting steamer trunks for the traveling school libraries... the list goes on and on! His willingness to help build this program and support a non-traditional approach to environmental education has allowed the Watershed Stewardship Program to thrive and develop into a comprehensive and award-winning effort.



Although Steve has retired, he is a Cobb resident and we hope to keep him involved in our program through our volunteer projects such as Anuran Monitoring. Steve is a quiet man who was happy to work behind the scenes and let others take the credit, but his contributions were significant and were in large part responsible for many of the award winning programs found in the laboratory today. Thank you, Steve Shelton, for your support, encouragement and leadership.



observations

Domestic cats are popular pets, but they also are unnatural predators of many wild animals. Keeping your feline companion indoors will help save the songbirds and small mammals that call your yard home ~ especially in the spring and summer when young are venturing out from their nests. It is estimated that hundreds of millions of birds and more than a billion small mammals are killed by cats each year. Keeping your cat indoors certainly benefits wildlife, but you'll also have a safer, healthier cat.

Linda May, Environmental Outreach Coordinator, Georgia DNR, Wildlife Resources Division

What Water Means

Water is for swimming. Water is for drinking.
Water is for animals. Water is for washing.
We need water.

I swim, my brother swims, my sister swims, my
Mom swims, and my Dad swims.

I drink, my brother drinks, my sister drinks, my
Mom drinks, and my Dad drinks.

Cats drink, dogs drink, squirrels drink, birds drink
and raccoons drink.

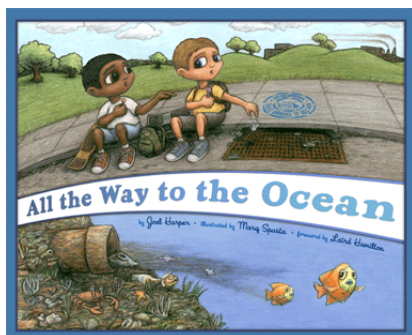
We wash dishes, cups, forks, cars, and faces.

We need water.

Tyler Stott
Grade 2, Due West Elementary School
2009 River of Words State Winner

K-12 students can submit art or poetry to water_rsvp@cobbcounty.org

RECOMMENDED RESOURCE



Although it's designed for children, *All the Way to the Ocean* by Joel Harper sends a message to adults as well, cautioning us not to ignore the far away effects of the items we throw away every day. After James carelessly tosses a candy wrapper into a storm drain, the

book describes the path of litter after its thoughtless disposal. This pollution ends up in rivers, lakes, and eventually the ocean, harming the environment and all the critters who call it home. Expressive illustrations of marine life show the impacts that each and every one of us has on the environment. But the story ends on an uplifting note as James and his best friend Isaac lead a schoolyard cleanup, inspiring their classmates to do the same in their own neighborhoods.

All the Way to the Ocean is printed on recycled paper with soy ink, and a portion of sales goes to the Surfrider Foundation, a non-profit organization dedicated to the protection of the world's beaches.

ECOPEDIA

Environmental Justice - The environmental justice movement insists that the costs of environmental degradation must no longer be borne chiefly by poor people. In cities, it turns out that refineries, garbage incinerator plants, sewage-processing facilities, elevated highways, and other toxics-generating sources are almost universally located in low income or nonwhite neighborhoods. "Not in My Backyard!" had been the slogan of well-to-do communities. Now, "Not in *Anybody's* Backyard!" is a slogan that embodies environmental justice. *From Ecology: A Pocket Guide*

CONSERVATION TIP

Cut your grass so it's two inches high, and leave the clippings on the lawn. You'll spend less time mowing and raking, and you won't have to water your lawn as much. Forty percent of water in summer is allocated to outdoor usage when rates are highest. Also, less lawn care usually means using fewer chemicals that will leach into runoff water and damage local fish and bird habitats. *From The Green Book*

REMINDERS

- Check out our new Facebook page and become a fan! Search **Cobb County Watershed Stewardship Program**.
- If you're receiving a paper version of this newsletter, you can sign up for the electronic version at www.cobbstreams.org. Click on the link at the bottom of the homepage and fill out the form. We'll automatically remove you from our paper mailing list.
- AAS volunteers - please check your certification dates! We will be having a chemical monitoring recertification workshop on July 13. Call 770-528-1482 to register.

welcome

new watershed stewards

Damo Achaiyan

will be monitoring Sewell Mill Creek

Monique & Nile Livingston

will be monitoring a Nickajack Creek

John Baumgartner

will be monitoring Nickajack Creek

Brownie Troop 2055

marked storm drains in Briarwood subdivision

Brownie Troop 29202

marked storm drains in Indian Hills Country Club

East Cobb Rotary Club

will be marking storm drains in Somerset subdivision



Cobb County...Expect the Best!

This is an official publication of the Cobb County Water System, an agency of the Cobb County Board of Commissioners.

Calendar of Events

June

- 16 Children's Program - Wetland Walk ◦ 9am-10am ◦ Heritage Park
- 16 Children's Program - Brooke & Branch Puppet Show ◦ 3:30pm-4:30pm ◦ Stratton Library
- 23 Children's Program - Brooke & Branch Puppet Show ◦ 10am-11am ◦ Smith-Gilbert Gardens
- 23 Children's Program - Brooke & Branch Puppet Show ◦ 3:30pm-4:30pm ◦ East Cobb Library
- 30 Children's Program - Stream Study & Critter Search ◦ 9am-10am ◦ Powder Springs Park

July

- 7 Children's Program - Water Pollution ◦ 2pm-3pm ◦ Vinings Library
- 7 Children's Program - Water Pollution ◦ 3:30pm-4:30pm ◦ Stratton Library
- 8 Children's Program - Brooke & Branch Puppet Show ◦ 7pm-8pm ◦ Mountain View Library
- 10 River Rendezvous with the Sierra Club ◦ 8am-1pm ◦ Cobb County Water Quality Lab
- 12 Children's Program - Water Pollution ◦ 2pm-3pm pm-8saw Library
- 13 Adopt-A-Stream Chemical Monitoring Workshop ◦ 6:30pm - 8:30pm ◦ Cobb County Water Quality Laboratory
- 14 Children's Program - Wild About Wildlife ◦ 9am-11am ◦ Stout Park
- 15 Children's Program - Water Pollution ◦ 3:30pm-4:30pm ◦ East Cobb Library
- 20 Children's Program - Brooke & Branch Puppet Show ◦ 11am-12pm ◦ Powder Springs Library
- 22 Children's Program - Water Pollution ◦ 10am-11pm ◦ Kemp Library
- 28 Children's Program - Family Scavenger Hunt ◦ 9am-11am ◦ Sweetwater Park

Events in red are Cobb County Watershed Stewardship events.
More information can be found on our Calendar at www.cobbstreams.org.

Photography Spotlight



Kudzu (*Pueraria montana*), a member of the pea family, flowers summer through autumn.

Submitted by Ric Donato

Have a great photo to share?
Send it to water_rsvp@cobbcounty.org.