



# Friends of The Great Swamp



FrOGS

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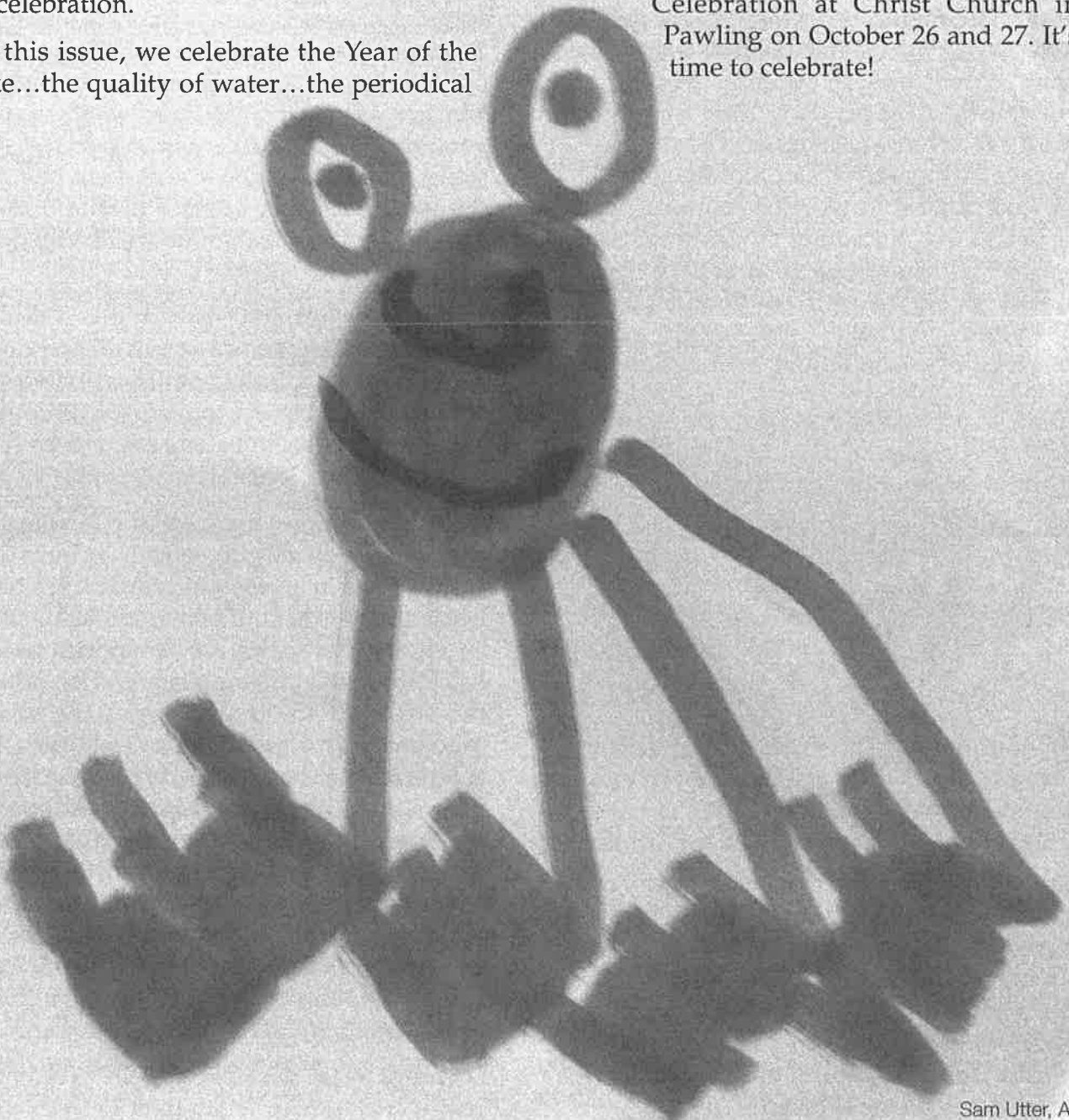
Judy Kelley-Moberg and Jill Eisenstein, Editors

## *Time to Celebrate*

As the frenzied pace of summer winds down, and both humans and animals begin to tuck away the bounties of the harvest, nature seems quieter...yet filled with expectation. Traditionally, fall is a time for thanksgiving and celebration.

In this issue, we celebrate the Year of the Snake...the quality of water...the periodical

cicadas...the people who study the swamp and help others learn...And of course, The Great Swamp itself, which provides us with clean water and breathtaking beauty! Please join us for The Great Swamp Art Show and Celebration at Christ Church in Pawling on October 26 and 27. It's time to celebrate!



Sam Utter, Age 5

# The Year of the Snake

by John Foley

Partners in Amphibian and Reptile Conservation (PARC) is celebrating 2013 as The Year of the Snake. Snakes are facing global decline due to habitat loss and the misconceptions of humans. One of nature's most feared creatures, snakes are perceived as sneaky, poisonous and dangerous. In fact, the term "Ophidiophobia" means "fear of snakes". PARC's goal is to raise public awareness of the importance of this animal in local and worldwide ecosystems.

Feeling the welcoming first hint of warmth, a female garter snake deep within her den awakens from a long slumber. She is surrounded by many other snakes, all awaiting the sun's heat to penetrate the dark depths of their winter hibernacula, a subterranean chamber where snakes congregate during the winter months to stay warm. Like other cold-blooded creatures, snakes brumate and live out winter by lowering their bodies' metabolisms, while mammals hibernate and live off stored fats from the prior fall. Snakes use abandoned mammal holes, tree stumps, or sometimes rocky foundations to brumate.



Sketch by Nancy Clark

The garter snake slowly makes her way out of the chamber towards the sun's heat along with several others. Spring is a busy time for her, and within minutes of tasting her first breath of fresh air, she is surrounded by an entourage of smaller male snakes eagerly looking to mate. They are attracted to her by a natural pheromone (smell) she produces, causing the males to completely

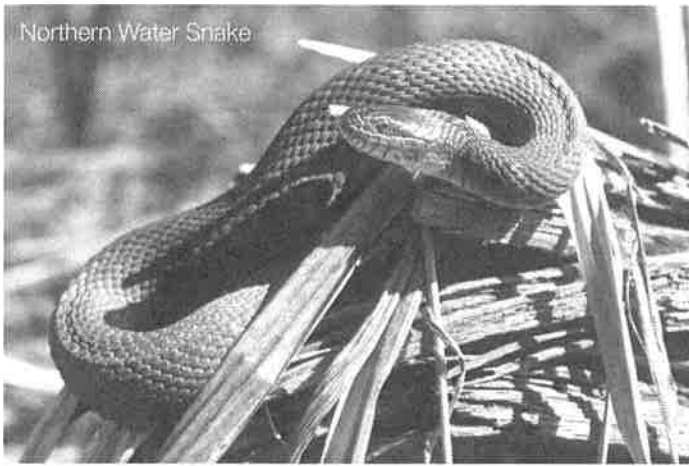
envelope her, making what is known as a "mating ball". Soon they will all go their separate ways to forage for food and spend the sunny days of summer basking in the sun; allowing the Sun's heat to raise their body temperature and their metabolism rate to help them digest food.

Our small, 2-foot garter snake is one of 17 different species found in New York State and only one of 2,800 known snake species worldwide. The Great Swamp is home to many rare species such as the toad-eating hognose snake. The hognose actually plays dead by flipping on its back when frightened. Northern water snakes are commonly seen in aquatic habitats in the swamp. Though often confused with the water moccasin or "cottonmouth", a poisonous snake that inhabits warmer waters, the Northern water snake is not venomous. The Northern brown snake, Ribbon snake and tiny Ringneck snake can be found in the swamp's grassy edges. Colorful milk snakes are attracted to stone foundations and the rodents that live there.

The Great Swamp uplands harbor Copperheads and some of the state's last remaining populations of the threatened Timber rattlesnake. These snakes are two of the three venomous snakes found in NY and prefer habitat along steep rocky talus slopes, much of which is inaccessible to people.

It's late summer now, and the female garter snake has been gorging herself on bugs and earthworms in a vegetable garden. It's time for her to give birth. Unlike many other snakes who lay eggs, garter snakes are ovoviviparous (the eggs hatch while still in the mother) and the litter ranges can be from 10-50, depending on the size of the mother snake. Once she has given birth, there is no maternal care given. The young disperse immediately or may stay in groups for short periods of time. They grow rapidly and within a month may shed their skin (scales) twice. The newborn snakes are important food sources to a variety of predators such as hawks, foxes, skunks, bobcats, opossums, and even other snakes. In fact, up to 85 percent of newborn snakes fall victim to predation in their first year.

Snakes are a "keystone species", meaning they play a critical role within their local ecosystem.



If not for our female snake, the vegetable garden could have been ravished by slugs or grasshoppers. Another snake living in this garden is a large 5-foot black rat snake. Rat snakes are often killed by people because they shake their tails when frightened, mimicking a rattlesnake. Rat snakes are actually quite docile, and this one has been keeping the rodents in check.

Snakes can also harm the environment. People keeping snakes in warmer climates have released unwanted pets such as Pythons and Boa constrictors into the wild. These invasive species hurt fragile ecosystems by out-competing (and eating!) the native animals that belong there. Be aware that it's illegal and punishable by law to release ANY pets into the wild.

Fall has arrived, and her home under the leaf litter has changed to brilliant reds and yellows. Grasshoppers and beetles have begun to disap-

pear, and even worms are harder to find. Feeling a chill in the air, our snake senses that the daylight hours are getting shorter. With cold weather moving in, she can no longer regulate her body temperature. Her metabolism slows. She stops eating completely, going through an amazing chemical change to prepare for winter. Instinct tells her that she must begin her mile-long journey back to her den (some of her den-mates travel even further!). It's a treacherous journey. As she makes her way back, she is very vulnerable to predation by mammals looking to bulk up for the winter. Crossing roads has become increasingly perilous for migrating snakes and amphibians. Many snake dens are destroyed by development every year, forcing snakes to search for new ones and during the search, many perish.

Prior to slipping down into the hibernacula, she gives the air a final smell with her tongue and then slowly descends into her winter retreat. Luckily, her den site and many others will remain safe within the preserved lands of The Great Swamp.

The origin of snakes remains a mystery. Did snakes evolve from terrestrial or aquatic 4-legged creatures? Snake fossils have been found dating back 150 million years to the late Jurassic Period. What was the biggest prehistoric snake? A snake from South America called Titanoboa, which reached lengths of 50 feet and presumably weighed over a ton!

## New Board Member: Diana Lee

As a child Diana felt imprisoned in her three-family home in Queens. She was set free when she moved upstate to Briarcliff where she could play in the Hundred Acre Wood near her home. Here she learned about succession as she watched it unfold in meadows and ponds, as well as finally figuring out how to shimmy up a tree! Her love affair with The Great Swamp began with tantalizing canoe trips that were never long enough. Finally, she obtained her first kayak and kayaked every mile of both the north and south flow, in every season, in the daylight and under

the full moon, earning her the appellation of Swamp Thing and her address as The Great Swamp. She watched beaver working, otters frolicking, and minks fishing. Protecting this most beautiful place as a FrOGS' Board Member is the logical next step. Along with the great love that Diana feels for The Great Swamp and its many creatures, she brings a background in resource economics, teaching, and environmental education. She plans on focusing on FrOGS educational outreach in the community, school, and on the internet.

# The Quality of Water

by Jill Eisenstein

Water is perhaps the strongest single entity that unites—and divides—the earth and its people. As far as scientists can figure, it is the one requirement for life as we know it; the search for livable places in the universe is primarily a search for liquid water. As humans, we can go without food for many days but we cannot live a week without water.



Can you drink this?

There is a lot of talk about water these days, and often the term “water quality” bubbles to the top. The term seems at once intellectual and emotional, political and personal. Just what does it mean? According to United States Geological Survey (USGS), “Water quality can be thought of as a measure of the suitability of water for a particular use based on selected physical, chemical, and biological characteristics.” The quality of water depends on the climate of a region, the local geology and ecosystem, and human uses such as sewage dispersion, industrial pollution, land and water use, and development.

Usually, the term “water quality” is used when we talk about water suitable for sustaining life—either human or plants and animals. To sustain life, it has to provide food and shelter for aquatic animals, and be drinkable by animals or humans. Here’s why clean water is such a big deal: 1) Polluted water cannot sustain life. 2) For all the water on this planet, only 0.00003 % of it is even usable by humans (and not all of that is drinkable)! 3) And while human population expands by the moment, the amount of water on earth does not.

## Pollution and Solution

People need clean water. Unfortunately, for many years in our country—especially during and after the Industrial Revolution—people thought of water as a way to take away things that they did not want to see or deal with...supporting the “out of sight, out of mind” idea, and the old adage, “the solution to pollution is dilution.” Chemicals and sewage were dumped into water to be swept away or onto the ground where they seeped into the water table

below. It caused sickness in some places. But it was not until the 1960’s that cries of alarm started swelling...something was wrong with the water!

In 1977, the EPA authored the Clean Water Act which regulates pollutants that can be put into U.S. waterways, either actively or passively and in both surface water and ground water. The EPA has set specific regulations for 84 known contaminants in public drinking water. Contaminants they regulate include viruses and bacteria, salts and metals, organic chemicals from industrial processes and petroleum use, pesticides and herbicides, and radioactive contaminants.

New York City has a reservoir system of surface water from which it gets its drinking water. In many places around the U.S., however, wells are drilled to tap drinking water from underground aquifers. Underground water gets there by gravity, so it was once surface water—and it can be polluted or clean, depending on what was in it on the surface and whether it got cleaned as it traveled down to the aquifer. Wetlands like The Great Swamp and its upland forests help filter or trap pollutants such as sediments, oils, salts, and chemicals, not only cleaning the water that goes into the aquifer, but keeping pollutants from rushing into streams, rivers, lakes, water supplies and the oceans.

## Determining the Quality of Water

When we measure water quality, we usually sample surface water. Scientists can measure physical and chemical characteristics such as temperature, dissolved oxygen (DO), conductivity, alkalinity (pH), and other things (check the EPA list above). They can also conduct biological assessments by sampling communities of creatures that dwell at the bottom of water bodies. But to provide accurate and usable information, both physical/chemical measurements and biological sampling of a particular water body must be done within a larger context. When one conducts experiments in a lab, one needs a control. In nature, one needs a normal.

According to Dr. Ryan Taylor, Assistant Professor of Environmental Studies at SUNY Purchase, when one talks of water quality, it should be in the context of what is normal for that particular ecosystem. To know normal, or the baseline, for a system, one has

# Cherie Ingraham - Creator of "Chuckie Goodnight"

Cherie grew up on a farm in New York State where she and her sister spent many happy hours communing with the land. She always felt "Earth Is All That Is"!

She attended the Fashion Institute of Technology and became a fashion designer. Although she enjoyed her career she lost touch with the Earth. When Cherie and her husband moved to Brewster, the land was so beautiful, the Earth spoke again, and she reconnected. Concerned with what was happening to the environment she wanted to do something to help.

Once she decided to work with children, the wheels started turning and Chuckie Goodnight (a friendly cartoon dog) and his crew of loyal animal friends was conceived. Chuckie's motto is "It's your Earth and my Earth too! Let's make everyday Earth Day! Please be kind to Mother Earth!"

The Chuckie Goodnight Foundation for the Environment was incorporated in 2001. Its mission is to teach children to be kind, respectful, and a friend to Earth. The foundation produces environmental education materials such as "Chuckie Goodnight's Earth Journal" and The Chuckie Goodnight Earth Calendar. Young artists have an opportunity to submit art to be used in this "free" calendar. Workshops for children use clay as a way



Cherie Ingraham of "Chuckie Goodnight" helps youngsters form clay frogs.

to experience Earth while sculpting and learning about its plants and animals. A yearly scholarship is offered to a graduating senior who is pursuing a college education in Environmental Science.

The Chuckie Goodnight Foundation supports local environmental organizations like Friends of The Great Swamp (FrOGS) and the Putnam County Land Trust (PCLT). Cherie hopes... "to work more closely with the environmental community in order to enhance the environmental education of our children; as they are the future stewards of the Earth and our legacy." ([www.chuckiegoodnightfoundation.org](http://www.chuckiegoodnightfoundation.org))

## FrOGS Needs Your Help!

The generosity of our members and supporters extends FrOGS reach and effectiveness. Contributions support the efforts of the Education Committee, research and this newsletter.

### There are two great ways to help...

Remember your donations are tax deductible! Send yours to:  
Friends of The Great Swamp, P.O. Box 373, Pawling, NY 12564

- ☐ Supporter \$25    ☐ Contributor \$50    ☐ Friend \$100  
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We can always use another helping hand! Let us know which activities you're interested in helping with. You can pick more than one.

- ☐ Annual Art Show & Celebration    ☐ Canoe Trips    ☐ Mailings  
☐ Educational Activities    ☐ Citizen Science    ☐ Studies  
☐ Suggest an activity: \_\_\_\_\_

Friends of The Great Swamp is an organization dedicated to preserving The Great Swamp through educational programs, scientific projects, special events and by making all aware of this wonderful resource in our midst.

So we know who to thank...

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to record observations—many at one time in different locations and many over time in one location. For example, he said, some streams may normally become low in oxygen in the summer, so finding a low DO reading in July should not be alarming. It's important to understand the stream's normal before one can pinpoint deviations.

He said we have a great advantage for scientific examination of The Great Swamp because one of its major tributaries has been designated by the DEC as a "reference" stream because of its "least disturbed" state. Measurements taken in other streams in The Great Swamp can be compared to the ones taken in that stream.

So, why such interest in water quality? Because every change may impact the biology, chemistry or even the physics of a body of water, thus changing its suitability for sustaining life. If scientists notice a deviation from the norm, steps can be taken toward remediation.

For example, the introduction of an invasive species (such as European milfoil or water chestnut), can disrupt or ruin the entire food web in a body of water. If invasives are noticed, the first challenge is to find out how they are getting there. If boats are bringing them in from another body

of water, cleaning stations can be set up for removing problems before launch. In places where sediments, nutrients or chemicals from human land use are noticed in a stream, either the land use could be altered or a riparian buffer could be planted to trap chemicals or keep sediments from filling the water.



Water quality testing in Swamp River 2013

Every person in every watershed needs unpolluted water. If there's one thing we should have learned from the Hudson River's history, it's that keeping it clean is preferable to trying to clean it later. Protecting the quality of our water—and wetlands like The Great Swamp, whose process of capture, retention and purification clean it not only naturally but much better than we can—is paramount on a planet where clean water is not only in limited supply, but critical to life as we know it.

## The Basic Science of Water Quality

### Physical/Chemical Properties

To know the water quality in a given body of water, scientists often measure indicative properties. Depending on how the study will be used, many other things may be tested, but here are a few basics:

**Temperature:** All aquatic species, from fish and insects to microscopic plants, have a preferred temperature range. The rate of chemical reactions generally increases at higher temperature. Warmer water holds more solutes but less dissolved oxygen.

**Dissolved Oxygen (DO):** Dissolved oxygen is the microscopic bubbles of oxygen in water. DO levels are critical to aquatic plants and animals, and often the single most important measure of habitat quality. Increased heat, salt, or atmospheric pressure can all reduce the ability of water to hold dissolved oxygen. Sometimes too much demand for oxygen in a body of water (like too much bluegreen algae or too much decomposition) can deplete the DO.

**Conductivity:** The more dissolved substances in a body of water, the more electrical conductivity it will have, so by

measuring conductivity, one finds out how saturated the water is with dissolved solids.

**Hardness:** The measure of the amount of dissolved calcium, magnesium and iron present in water. Surface water is softer than groundwater because it has less contact with soil minerals.

**pH:** Water is determined acid, neutral, or basic depending on the relative amount of free hydrogen and hydroxyl ions in it. Living things have a pH range they can tolerate, toward the middle of the spectrum; extremes can be deadly.

**Turbidity:** A measure of relative clarity. Suspended matter in water reduces the transmission of light, thus, clarity. High turbidity can cause increased sedimentation and siltation, which can harm habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants, notably metals and bacteria. For this reason, turbidity readings can be used as an indicator of potential pollution in a water body.

### Biological Assessment

One way to know the water quality in a given body of water is by sampling the benthic macro-invertebrate communities that live in it—insects, snails, crustaceans and worms. Methods for sampling in New York have been standardized by the EPA and the NYS DEC. Both agencies embrace this kind of assessment because the animal species at the bottom of streams and rivers are relatively sensitive to a wide range of stressors, both physical and chemical. Physical and chemical analyses can give disparate readings from day to day, or even from hour to hour, depending on inputs, but the animals that live in a stream are a more stable indicator of conditions over time.

The differences between the species found in each sample and what biologists expect to find in a natural stream in that area (a "reference" stream) indicate localized impacts on water quality and frequently provide insight into the type of impact.

Data is collected and analyzed for numbers and types of animals. Each different type of animal has been assigned a

"Pollution Tolerance Value", with mayflies, stoneflies and caddisflies being the least tolerant of pollution, and leeches, planarians and snails being most tolerant. Using formulas, the scientists use the data to evaluate the quality, or cleanness, of the water.

Although professionals measure others, three of the most important basic indicators of water quality are:

**Taxa Richness:** The number of distinct groups of taxa (animals). This represents the diversity of animals in the sample.

**EPT Richness:** The number of different types of Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies). Richness is a measure of the diversity of them within a sample.

**Biotic Index:** Represents the relative sensitivity to, or tolerance of, the macro-invertebrates to environmental stress. This index is calculated using the numbers of animals and their Pollution Tolerance Values.



# What's Normal?

by Judy Kelley-Moberg

One of FrOGS' missions is to collect data and conduct scientific studies in order to understand how The Great Swamp works—from the water that flows through it to the living organisms that call it home. Members monitor turtles, amphibians, mammals, birds and butterflies. They search for the endangered New England cottontail, count migrating waterfowl and participate in water quality studies.



Just hatched baby box turtles, 2013

The Dutch mentioned abundant beaver in The Great Swamp but farmers in the early 1700's saw only the remains of ancient beaver dams. The 1940's "Hawks Rest" journal recorded the plants and animals seen near Pine Island. "The Great Swamp: A Watershed Conservation Strategy" published and funded by an EPA grant to The Nature Conservancy in 1999 contained the results of environmental studies done in 1998. Change is inevitable but we would like some sense of what's "normal" for the swamp. We need to gather as much information as we can about the swamp today.

What can we tell about the water? State guidelines regulate methods to test water quality. Data gathered using these protocols over several years should indicate what's normal for streams in the swamp, identify any changes and their possible sources.

In 2010, 2012 and again this year, FrOGS hired Kelly Nolan of Watershed Assessment Associates to train volunteers, conduct water quality studies, and submit a written report of

the results. Samples of bottom dwelling invertebrates with varying tolerances to pollution were collected from specific stream sites. The identity of the species found at that location is a measure of the water quality. The 2012 report indicated that the water quality in the Swamp River improved as it flowed from its source to its mouth. The swamp appeared to be doing a fairly good job of filtering out pollutants.

On July 28th of this year more than a dozen volunteers armed with kick nets, report sheets, GPS units, cameras and chemical probes spread out through the watershed. Previous sites were retested and more streams added. FrOGS hopes to keep increasing the number of test sites each year, as funds become available. The data will help create a baseline for the condition of the water in the watershed.

In the past 10 years there have been noticeable changes in The Great Swamp. The beaver are back and the south flow has become a popular destination for boaters. Even Walt Disney found the swamp this year. The unaltered natural beauty



Photo by Sharon Nakazato

of the swamp made it a perfect location for a photo-shoot of Tiana (Jennifer Hudson) as the princess from "The Princess and the Frog".



Edie Keasbey, FrOGS volunteers and WAA crew, Swamp River 2013

Should we do something about the beaver? Will boaters bring invasive species into the watershed? Can we love it too much? If we wish to be stewards of this wonderful and unique swamp we need to continue to gather information on its water, its functions and its natural communities in order to effectively respond to change.

The 2011 and 2012 Water Quality Reports are on FrOGS' website. Click the "research" link under "About FrOGS".



Sketch by Beth Herr

## In Celebration of the Periodical Cicadas by Jill Eisenstein

This year's emergence of the 17-year periodical cicadas, crawling out of the ground and then out of their exoskeletons by the millions created quite a buzz—both literally and figuratively! For me, seeing one in late May climb two feet up an oak tree, then climb out of its "shell", with red eyes and long translucent wings, stirred a deep awe. *Magicicada septendecim*. Thank you, Linnaeus, what a perfect name.



While numerous in the eastern half of the U.S., they are found nowhere else in the world. These creatures live beneath our feet, alone, silent, nearly their whole lives. Then one spring, they emerge to spend the final few weeks of their 17 years with millions or even billions of others, above ground, the males making so much noise together that it has been called one of the loudest sounds in nature. It is at once haunting and soothing, a deep drone rather than the screech of the dog-day cicadas, a sound I will never forget.

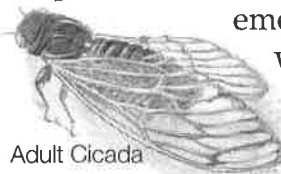
These insects do not bite or sting. They are gentle, clumsy and gregarious, flying around with abandon, bumping into things and seemingly celebrating the air and trees and each other. At the end of their mating frenzy, the females puncture slits in the ends of branches to lay their 100s of eggs...and just three to four weeks after they emerge from

the ground, all of them are dead. Birds, fish and an array of forest animals have a feast. The empty shells disappear...By fall, the only signs they were even here are the waving flags—dead tips of tree branches where the eggs were laid (don't worry, the trees will be fine).

And then, a few months later, tiny ant-like white nymphs hatch from the eggs, crawl to the ends of the branches, drop to the ground and burrow down, not to be seen or heard from for the next 17 years. They draw sap from the roots of the trees all those years as they live silently, alone, buried beneath our feet.

Seventeen years ago, my friend Tim observed an underprivileged urban girl visiting a farm; she found one cicada more interesting than the farm animals that surrounded her. As she held that insect in her hands, it was though she understood that both she and the insect had left the confines of their old worlds to enter the very different world they were now sharing. Both had been transformed. This is the power of nature, where a periodical cicada can become an inspiration for emerging and finding a voice...

where an insect celebrates its final days with abandon... where insect is teacher.



Adult Cicada

Sketch by Nancy Clark