



Ecology for All Ages!

Cobb County Watershed Stewardship is reaching out to some new audiences this summer! We have formed partnerships with two local groups that cater to vastly different audiences - The *Windy Hill Senior Center* and *Girl's Inc. of Marietta*.

At the *Windy Hill Senior Center* we are presenting workshop series with different themes. This summer we will be presenting our wildlife series focusing on birds,

amphibians, reptiles, and butterflies. Participants will learn about the native species they may encounter in their backyard, how to identify them, as well as their role in our ecosystem. The property around the senior center has a wonderful wooded trail and pond that will be utilized to view (and hear!) wildlife in their native habitats. In the fall we will be starting our household hazardous products series, which highlights using homemade, eco-friendly cleaners as an alternative to harsh chemical products.

Inside this issue:

<i>Fishing for Information</i>	2-3
<i>New Volunteers</i>	3
<i>Biodiversity Spotlight: Eastern Mosquitofish</i>	4-5
<i>Calendar</i>	6-7
<i>Recommended Reading</i>	6
<i>Teacher Workshops</i>	7
<i>Monitoring Kit Swap Out</i>	8



Participants at the Windy Hill Senior Center watch for birds.

Special points of interest:

- AAS Chemical and Biological Monitoring Workshops offered upon request
- Butterfly Workshop on 8/26
- Composting Workshop on 9/9
- GA's 2nd Annual Butterfly Symposium on 9/6

Girl's Inc. is a national non-profit organization that encourages girls and young women to become outstanding members of their communities. Their *Operation SMART* program focuses on science, math, and technology. We will be working with the Marietta center to provide ecology education throughout the summer. The younger girls will focus on different animal groups and their roles in the ecosystem, as well as learning about water conservation and water quality. The older girls will be certified in Adopt-A-Stream chemical monitoring, and will be adopting the creek at Larry Bell Park.

We look forward to working with both of these groups and having a great summer!



Girl's Inc of Marietta monitors Rottenwood Creek at Larry Bell Park.

Fishing for Information

by Adam Sukenick, Cobb County Watershed Monitoring

Within Cobb County streams are found the answers to many of our water quality questions; the challenge is catching them. Fish sampling represents a unique way to learn about the health of our stream communities. While chemical samples give us a detailed look at water quality based on a set of chemical parameters, biological sampling provides insight to prolonged stresses, siltation, habitat stability and other factors which act to limit biological populations and distributions. Macroinvertebrate sampling offers many of the same benefits as fish sampling, however macroinvertebrates only spend a portion of their life cycle in an aquatic phase, whereas fish spend their entire lives. Fish are significantly more mobile than macroinvertebrates and possess the ability to flee pollution, migrate upstream and seek more suitable habitats and food sources.



Fish samplers use electroshockers to gather specimens

Fish sampling requirements for Cobb County are based on a five-year permit cycle and ensure samples are taken from each of the four basins (based on the service areas for each Cobb County water reclamation facility) at least once during the cycle. Using a backpack electroshocker, an electrical field is created around the sampler in the water. Fish within this zone are temporarily stunned. Incapacitated fish float to the surface where the sampler nets the fish and transfers it to a handling bucket to recover and be recorded and identified. If a fish cannot be identified in the field it must be preserved and returned to the lab. However, most are quickly identified, measured, weighed and returned safely to the stream.

Population size and composition are important components to any biological study. Current data is compared to past data to detect changes in the community. One of the most important factors to consider when evaluating a fish sample is the total number of native fish species. A healthy, diverse population will contain species that are intolerant of changing habitat and water quality. Stream segments suffering from degrading conditions will be composed of fewer native fish and more hybrids or invasive species. These non-native species easily adapt to varying conditions and sometimes out-compete native fish for food and/or habitat.

Individual fish species have evolved to utilize particular habitats and exploit specific food sources. By noting the presence or absence of fish associated with certain habitats and food sources, we are able to assess those specific parameters. For instance, native sunfish are suited to live in calm pools with close cover for protection. They feed mostly on aquatic insects or terrestrial insects falling from overhanging vegetation. Pools, deeper and slower moving reaches of a stream, sometimes accumulate pollutants and suspended sediments, making them indicators of water quality and habitat degradation. The absence of native sunfish may indicate the loss of pools, instream cover, riparian vegetation or degrading water quality. Similarly, the loss of native insectivorous fish species from a sample indicates a less diverse aquatic macroinvertebrate community. Since this category of fish spawn by depositing eggs in spaces around and in between rocks and gravel, their loss also indicates increasing siltation of gravel riffles; a condition common among urban streams subjected to storm water runoff and large scale bank erosion.

Each fish species is assigned a tolerance classification based upon its specific needs regarding food, habitat and water quality. Fish with specialized needs are considered to be sensitive to environmental degradation or intolerant of change, while those with less precise requirements are defined as tolerant. Since environmental degradation refers to effects of chemical, biological and habitat quality, a measure of intolerant/sensitive species in a sample provides some insight into the biotic integrity of the fish community and the stability of the surrounding watershed.

These few examples demonstrate the complexity of fish preferences and results of environmental impacts. Further measures of stream health involve looking closely at the diversity and relative numbers of individual species that compose the entire population. A very healthy community should be diverse and all fish species present should be equally represented. A dominant fish species within a community may indicate environmental change that just happens to be suitable to one species of fish. A subtle shift in the balance may indicate change is beginning and if allowed to continue over time will upset the integrity of the current biological community.

Fish samples and completed identifications are used to calculate an Index of Biotic Integrity (a combination of 13 unique metrics which evaluate a fish community in conjunction with the natural habitat for the sampling region). The IBI score is used to classify a stream as: Excellent, Good, Fair, Poor, or Very Poor. Since 1999, one Cobb County site has scored Fair, sixteen scored Poor and sixteen scored Very Poor. In July 2008, fish sampling at 23 sites throughout Cobb County will begin again.

Biological communities surviving in Cobb County streams are typically comprised of tolerant species that are able to withstand the instability of an urban environment. Fluctuations in stream flow, increased siltation, varying habitat and human impacts influence species diversity and composition in our streams. Those that are able to adapt to change, pioneer new landscapes and exploit changing food sources dominate the community. Fish sampling is one of the many tools the Watershed Monitoring Program uses to assess stream health and identify environmental change. Continued evaluation of water quality, biological integrity and habitat degradation help us to recognize trends, isolate environmental impacts and, ultimately, institute programs to preserve the health of our streams.

Some common fish species found in Cobb County...



Spotted Bass (*Micropterus punctulatus*)



Bullhead Catfish (*Ameiurus natalis*)



Redbreast Sunfish (*Lepomis auritus*)

Welcome New Watershed Stewards!

CCWS would like to welcome our new volunteers this summer, including participants in our Frog Monitoring initiative!

Frog Monitoring Volunteers

Higgins Family - Willeo Creek Basin

Leigh Lyjak - Noonday Creek Basin

Steve Meacham - Mud Creek Basin

Susie Throop - Rottenwood Creek Basin

Morning Washburn - Mulberry Creek

Whiten Family - Noonday Creek Basin

Eileen Sims - Noonday Creek Basin

Jean Ann Wheelock - Sewell Mill Creek

Joey Giunta - Chattahoochee River
& Sewell Mill Creek Basin

Annette Simpson - Noonday Creek Basin

Malcolm Family - Willeo Creek Basin

Ashley Robbins - Rottenwood Creek Basin

Nancy & Lois Morrison - Rottenwood Creek Basin

Ina Allison - Sewell Mill Creek Basin

Cheryl Ashley-Serafine - Rubes Creek Basin

Delon Barfuss - Noonday Creek Basin

Brian & Amy Duke - Sewell Mill Creek Basin

Connie Ghosh - Willeo Creek Basin

Margaret Loch & Family - Clark Creek Basin

Peggy Higgins - Willeo Creek Basin

Adopt-A-Stream Volunteers

Karen Cox & Nick Jokay - Hampton Park

Patricia Taylor - Highland Lake

Isabel Ott - Kings Cove Lake & Sewell Mill Creek

Biodiversity Spotlight: Eastern Mosquitofish (*Gambusia holbrooki*)

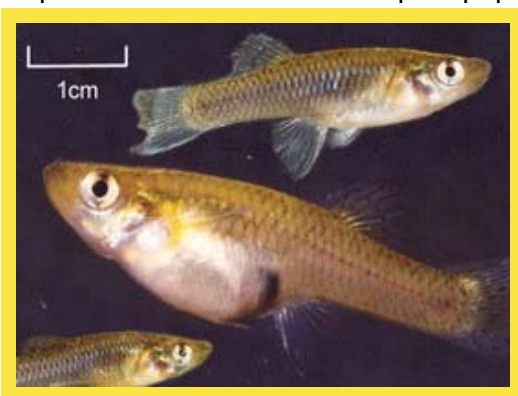
by Erin Feichtner, Cobb County Watershed Monitoring

Gambusia holbrooki, the Eastern Mosquitofish, is native to the southern and eastern United States, but now has an extensive global distribution due to translocation. *Gambusia* are an aggressive, rapidly reproducing fish that are tolerant of a wide range of water quality conditions. Due to their reputation as mosquito control agents, they have been routinely and indiscriminately stocked around the world, sometimes with negative effects to the ecosystem.

Gambusia, like all members of Family Poeciliidae (which includes guppies and mollies), bear live young instead of laying eggs. They are small, short-bodied, dull gray or brown fish with rounded tails. Their flattened head reveals a mouth pointed upward for surface feeding and to take advantage of the oxygen-rich water/air interface. They are very tolerant of pollutants, high water temperatures, and very low dissolved oxygen levels, since this fish can swallow air from the water surface. In the event of a fish kill, *Gambusia* can repopulate quickly. In late spring when the water temperature is above the critical minimum of 16°C, three to four broods of 40-100 live fry are produced. Females become quite pot-bellied while gravid with a brood of young. Live-bearing gives their young a much higher survival rate than most species of egg-laying fish, which typically suffer from egg predation. Growth of the young is rapid and females are sexually mature within eight weeks.

In the United States the first known introductions of *Gambusia* beyond their native range took place in the early 1900's. In some areas, range extensions have occurred through natural dispersal far from sites where the fish were originally introduced. They are now established in most states outside their native range where they were historically stocked. Establishment in northern states may be limited because of the species' intolerance of cold, resulting in high winter mortality.

Although they were once believed to have a great impact on mosquito populations and an effective and inexpensive means of combating mosquito-carried disease, the tide of public opinion is turning. Recent reviews of world literature on mosquito control have not supported the view that *Gambusia* are particularly effective in reducing mosquito populations or in reducing the incidence of mosquito-borne diseases. The impact of *Gambusia* on mosquito populations may be minimal, because mosquito larvae form only a small



part of their diet. Furthermore, they may benefit mosquitoes by decreasing predation pressure from large invertebrates and other native fish. Due to their aggressive and predatory behavior, *Gambusia* may negatively affect other populations of fish through predation and competition. In some habitats, *Gambusia* reportedly displaced select native fish species regarded as better or more efficient mosquito control agents. Large macroinvertebrates who would predate upon mosquitoes, such as dragonfly and beetle larvae, are consumed by *Gambusia*. Many native amphibians, including some threatened and endangered species, successfully breed only in fish-free, seasonal pools and would be significantly impacted by the introduction of *Gambusia*.

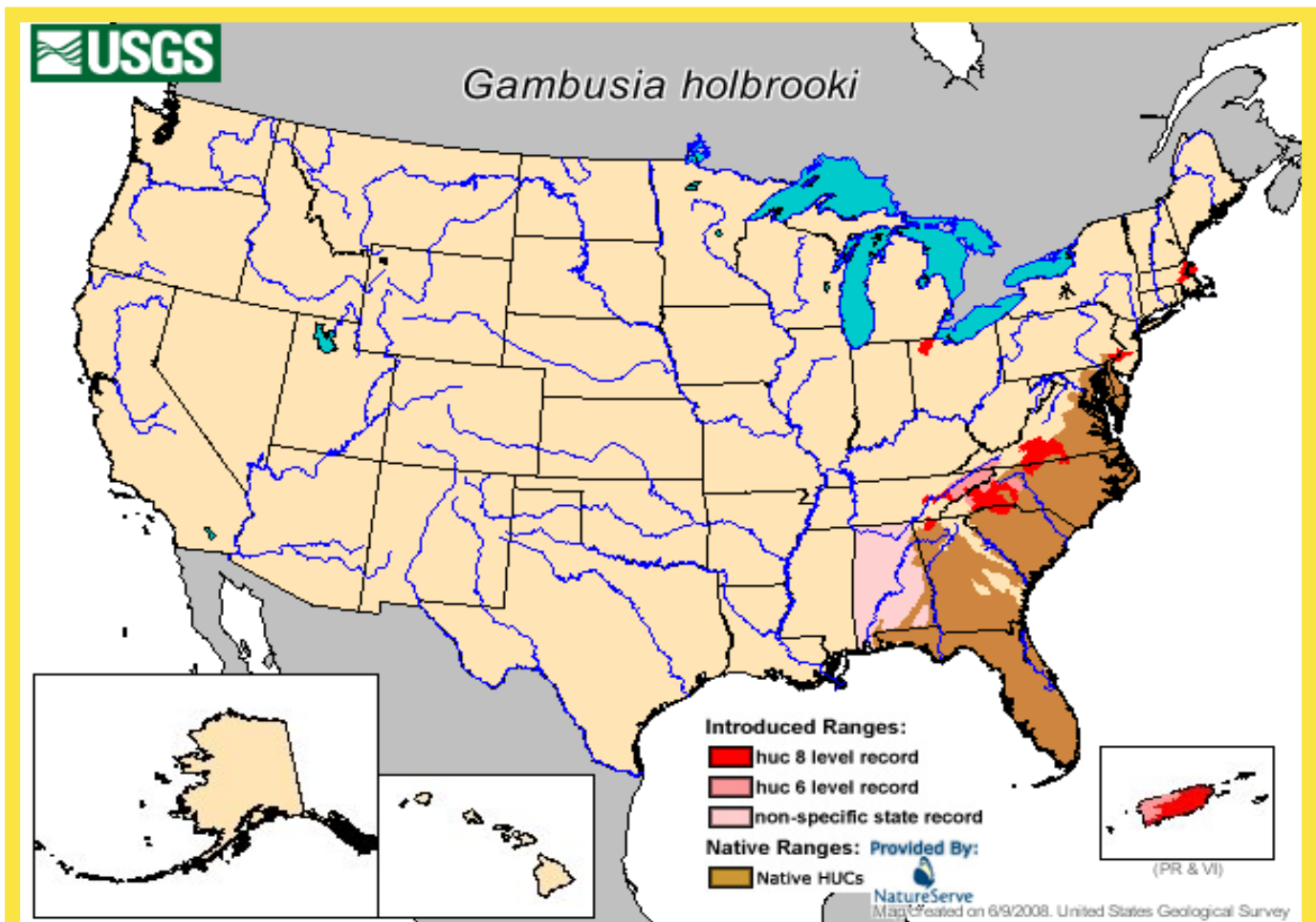
The efficacy of *Gambusia* to impact mosquito populations appears questionable at best and it is likely to result in a false sense of security. Eliminating all artificial sources of standing water is the best way to control mosquitoes. Macroinvertebrate sampling of Cobb County streams show a rarity of mosquito larvae and pupae, as mosquitoes prefer stagnant water for breeding, not flowing streams. Mosquitoes cannot be completely eliminated by any control method, so it is best to avoid outdoor activity at dusk when mosquitoes are most active, or wear protective clothing and insect repellent. *Gambusia holbrooki* is native to Georgia and has been found in several Cobb County streams. While fish sampling in 2003 and 2004, Watershed Monitoring found *Gambusia* at sites on Poplar, Rottenwood, Sewell Mill, Olley, and Noonday Creeks.



Above: A female mosquitofish, distinguishable by its prominent potbelly.



Below: A male mosquitofish, distinguished from the female by its elongated anal-fin rays.



This USGS map shows the native and introduced distribution of *Gambusia holbrooki* populations in the United States. Where data is available, distribution is indicated down to the HUC 8 and HUC 6 resolution. The Hydrologic Unit system is a standardized watershed classification system in which watersheds are given a Hydrologic Unit Code (HUC) and are organized in a nested hierarchy by size. Lower level HUCs represent larger watersheds—for example, the Upper Chattahoochee River is a HUC 8.

Schedule of Events

Ornamental Plants & Care Workshop

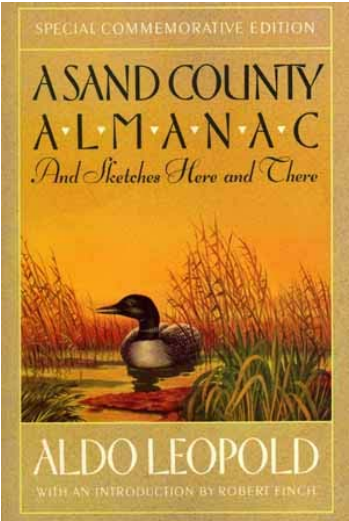
Date: Tuesday, August 12th
Time: 11:30 am - 1:00 pm
Location: Water Quality Lab
Cost: Free
Call: 770-528-4070

Butterfly Workshop

Date: Tuesday, August 26th
Time: 6:00 pm - 7:30 pm
Location: Water Quality Lab
Cost: Free
Call: 770-528-1482

*“There are some who can
live without wild things,
and some who cannot.
These essays are the
delights and dilemmas
of one who cannot.”*

- Aldo Leopold



This publication, like all those profiled in our Recommended Reading feature, is available for checkout from the Watershed Stewardship Library, housed in the Water Quality Laboratory.

August 2008

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
		Ornamental Plants & Care				
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31		Butterfly workshop				

Recommended Reading

A Sand County Almanac by Aldo Leopold

2008 marks 60 years since Aldo Leopold's death - the man proclaimed by many as the father of the modern conservation movement. Aldo Leopold died in 1948 without seeing his book in print, but when *A Sand County Almanac* was published in 1949 it spoke his voice clearly and plainly, and has had a profound effect on its readers ever since.

As he begins *A Sand County Almanac*, Leopold sets aside teaching through argument and instead uses experience to create an ongoing awareness of the continuity between human culture and the land. Leopold repeatedly imbues the world with deeper layers of meaning, adding the awareness of birds and animals to our own. It attempts to make us see meaning in nature as it affects the animal, rather than making animals illustrate what our values and meanings are, as animal personifications usually do.

The sense that land is to be loved and respected, one of Leopold's basic tenets, is created not by argument (how can one prove an idea like this by logical proofs?), but rather by letting us experience the wild beauty of his land.

The power of *A Sand County Almanac* is that it helps us see in so many ways that the land is an organism, a circulating system, of which we are but a part. If and when we tinker, we must exercise ultimate care. But the beauty of this book is that it does so not by merely exercising our minds, but by helping us see, hear, feel, and experience the land organism as it moves and breathes.

- From Treelink.org

September 2008

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3	4	5	6  Monarchs Across Georgia Symposium
7	8	9	10 	11	12	13  Native Seasons
14	15	16	17	18  World Water Monitoring Day www.worldwatermonitoringday.us/	19	20  Clean Up the World Weekend
21  Clean Up the World Weekend www.cleanuptheworld.org	22	23	24	25	26	27  Native Waters
28	29	30				

Schedule of Events

Monarchs Across Georgia Symposium

Date: Saturday, Sept. 6th
Time: 9:00 am - 3:30 pm
Location: Callaway Gardens
Cost: \$55.00
www.monarchsacrossga.org

Composting Workshop

Date: Tuesday, Sept. 9th
Time: 11:30am - 1:00 pm
Location: Water Quality Lab
Cost: Free
Call: 770-528-4070

Native Seasons

Date: Saturday, Sept. 13th
Time: 10:00 am - 3:00 pm
Location: Water Quality Lab
Cost: Free

Native Waters

Date: Saturday, Sept. 27th
Time: 10:00 am - 3:00 pm
Location: Water Quality Lab
Cost: Free
Call: 770-528-8215

Curriculum Workshops for Teachers: Native Seasons, Georgia's Native Waters, & Project WILD

CCWS will be offering a three-part curriculum workshop series this Fall for K-12 teachers. Participants will receive the Native Seasons and Georgia's Native Waters curriculums developed by the Georgia Conservancy, as well as the nationally recognized Project WILD. Space is limited to 15 participants. Please call 770-528-8215 to register!

Native Seasons: Georgia's Flora & Fauna (September 13)

When you study the natural world you see that life has few definitive beginnings and endings, but rather passes through stages that are part of a continuing cycle. As the seasons revolve, many organisms alter their routines to compensate for the changing temperatures and available food. In this interactive workshop you will explore the changes that occur in the flora and fauna throughout the Georgia seasons. Interdisciplinary activities promote critical thinking and team-building skills, and are a great addition to any outdoor classroom lesson plan.

Georgia's Native Waters (September 27)

Designed to be more than conservation education, this curriculum is 212 pages of interdisciplinary lessons and over 55 activities for kindergarten through twelfth grade students that inspire them to apply classroom knowledge to real-world situations through the investigation of many of Georgia's amazing aquatic ecosystems as found in each of Georgia's five diverse eco-regions, while at the same time connecting how community values can impact these areas.

Project WILD (October 11)

From the tiny minnow to the majestic grizzly, wildlife and humans are integrally connected. Project WILD links students and wildlife through its mission to provide wildlife-based conservation and environmental education that fosters responsible actions toward wildlife and related natural resources. The program emphasizes wildlife because of their intrinsic, ecological value, as well as their role in teaching how ecosystems function.

Cobb County Watershed Stewardship Program

Jennifer McCoy, Program Coordinator
Vicki Culbreth, Program Specialist
Emily Toriani-Moura, Program Assistant

662 South Cobb Dr
Marietta, GA 30060
Phone: 770-528-1482
Fax: 770-528-1483
Email: Water_RSVP@cobbcounty.org

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

Sam Olens, *Chairman*
David Hankerson, *County Manager*
Helen Goreham, *District One*
Joe L. Thompson, *District Two*
Tim Lee, *District Three*
Annette Kesting, *District Four*

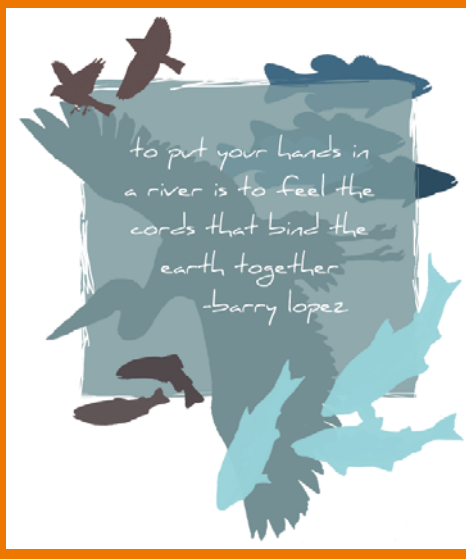


Cobb County...Expect the Best!



2008 T-shirts are Here!

Congratulations to KSU student Stephanie Cline, whose winning design was selected to be on the 2008 Watershed Stewardship t-shirt!



Monitoring Kit Swap Out

Summer is here and everyone is headed to the sunny outdoors, whether it be to the beach or just out to the backyard. Here at the Watershed Stewardship Program, it's the time of year when we inventory and clean our kits to make sure they are ready for another year of monitoring.

Our first, and foremost, responsibility is to make sure that all our volunteers have the support and equipment they need to continue their data collection. The chemicals in our Shallow Water Kits do expire, which could affect the quality of your data. Age, exposure to summer heat and elements, and bacterial contamination may negatively impact your monitoring. To prevent this, we want to give all our volunteers fresh chemicals for the upcoming year.

If you have one of our kits, please contact Vicki Culbreth (770-528-1482) to arrange a time to have it swapped for a fresh, clean kit. Here's to another year of successful monitoring!



Our QA Plan requires kit reagents to be replaced annually.