

# the Thalweg

Watershed Stewardship Program

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## WSP on Pinterest

The Cobb County Watershed Stewardship Program is excited to announce its latest social media initiative – Pinterest! Pinterest is a content sharing website and mobile app that allows members to “pin” images, websites, videos, and other objects to virtual pinboards. It is a tool for finding and sharing resources – and that’s exactly what we plan to do!

We created our Pinterest page, titled “Cobb Streams”, with the goal of sharing environmental education resources. While many of our Pins are targeted at formal and non-formal educators, the content is useful for all environmental stewards, as demonstrated by the pinboards we’ve created, listed and described below:

- Teacher Continuing Ed • Environmentally focused continuing education opportunities for formal and non-formal teachers.
- Water Education • Water stewardship lessons, resources, and ideas.
- Book Shelf • Reading recommendations that promote ecological literacy for all ages.
- Macroinvertebrates • Aquatic macroinvertebrate identification and monitoring tools and activities.
- Early Childhood • Environmentally-based early learning activities.

As we continue to develop our Pinterest page, we want to hear from you! What would you like to see? What types of resources are you interested in and would be beneficial to you? Feel free to send us an email with your suggestions: [water\\_rsvp@cobbcounty.org](mailto:water_rsvp@cobbcounty.org).

If you have a Pinterest account, be sure to follow our boards so that our latest Pins are delivered to your home feed: <http://www.pinterest.com/waterrsvp>.

You can also check out the Cobb County Water System’s newest social media accounts on Twitter and Facebook to learn more about what’s happening at the Water System and for warnings and alerts: @CobbH2o and [www.facebook.com/cobbwatersystem](http://www.facebook.com/cobbwatersystem).





# Georgia's Resident Owls

Owls are as mysterious as they are fascinating. Generally, owl species share many characteristics. Being raptors, they all have sharp talons for grabbing, killing, and holding on to prey and sharp, curved beaks for tearing the food into smaller pieces. Since they cannot digest any of the bones, fur, or feathers of their prey, they will compress this material in the upper portion of their digestive tract and spit it out as an owl pellet.

In addition, an owl's senses of sight and hearing far surpass our own with hearing being even more sensitive than vision, opposite that of diurnal raptors. With 14 neck vertebrae, twice as many as mammals, they can turn their heads 270 degrees or about three-quarters of the way around. In humans and many other animals, the eyes are surrounded by muscles, allowing us to look side to side and up and down without moving our heads. The eyes of owls and other raptors are fixed forward in the skull without these muscles. Having more neck bones allows for more flexibility so the raptor head can turn in all directions.

Maybe its most intriguing feature is an owl's ability to fly silently, unlike any other bird species. When air moves over the feathers of other birds, it creates turbulence and a swooshing sound. In owls, the top edge of each primary feather is fringed. This breaks up the air as it moves over the wing's surface, reducing the turbulence into groups of micro-turbulence, muffling the sound. This silent flight allows the owl to continue to hear and locate its prey while in flight.

Winter is the perfect time to be on the lookout for owls. The absence of leaves makes it easier to spot them up in the trees. Remember though, they will not be sitting on the far end of the branch but rather closer to the trunk, which aids in camouflage. In addition, they are sometimes active on overcast days during this time of year.

We are privileged in Georgia to be home to four species of these mostly nocturnal raptors: Great Horned, Barred, Barn, and Eastern Screech. Here is a look at each of Georgia's resident owls.

## Great Horned Owl (*Bubo virginianus*)

The largest of the four, the Great Horned Owl, has already mated and laid eggs by the end of January, taking advantage of longer winter nights to hunt. The eggs will hatch by the end of February to coincide with the first batch of baby rabbits, one of their prey items. It will take the owlets about 10 to 12 weeks before they can leave the nest.

Adaptable to most habitats in North and Central America, Great Horned Owls feed on a variety of invertebrates, reptiles, amphibians, and other birds, including smaller owl species. They can also take down medium sized mammals heavier than they are, skunks being one of their favorites. While mainly a nocturnal predator, they have been known to hunt during twilight hours, which increases their chances of finding diurnal, or daytime, prey species.



Common great horned owl.  
 18.1 - 24.8 inches high  
 40 - 57 inch wingspan  
 Photo by Greg Hume. [www.wikipedia.org](http://www.wikipedia.org).



*Barred owl.*

16 - 20 inches high

38 - 49 inch wingspan

Photo by Mwaner. [www.wikipedia.org](http://www.wikipedia.org).

## Barn Owl (*Tyto alba*)

Smaller still, Barn Owls prefer open spaces like deserts, grasslands, or agricultural fields and like to roost in enclosed areas of abandoned buildings, barns, church steeples, or tree cavities. A strictly nocturnal hunter, Barn Owls have asymmetric ears with the left being higher than the right. This enables them to locate prey from the ground. Barn Owls can catch prey in complete darkness or prey hidden by vegetation or snow. They prefer to feed on small rodents but will also eat small birds, insects, and reptiles when their main food sources are scarce.

While most owl species hoot, Barn Owls make more of a screeching or hissing sound. Farmers used to think their barns were haunted by a female ghost as this call can resemble a woman screaming.



*Adult barn owl in flight.*

11.5 - 17.5 inches high

9.25 - 12.75 inch wingspan

Photo by Bill Bouton. [www.wikipedia.org](http://www.wikipedia.org).



*Rufous morph eastern screech owl.*

6.3 - 9.8 inches high

18.9 - 24 inch wingspan

Photo by Greg Hume. [www.wikipedia.org](http://www.wikipedia.org).

## Eastern Screech Owl (*Megascops asio*)

The smallest resident owl species living in Georgia is the Eastern Screech Owl. It comes in two color phases, reddish brown (or rufous) and gray (and sometimes an intermediate brown) patterned with complex bands and spots. This gives them excellent camouflage, which comes in handy as they have many predators, including larger owls. They prefer wooded habitats and mainly live in tree cavities, their feathers blending perfectly with the bark.

Because of their size, screech owls hunt for smaller prey including insects and other invertebrates, smaller reptiles, amphibians, and fish. Females will stay in the nest, usually a tree cavity, to incubate the eggs while the male brings food for her and the nestlings. While owl couples are usually monogamous, some males will mate with two females. The first female may be evicted by the second female, who will then add her own eggs to the nest and incubate the whole clutch.

### Sources

Marian, K. (2012, July 25). *Barn owl facts*. Retrieved from <http://www.buzzle.com/articles/barn-owl-facts.html>

*Eastern screech-owl*. (n.d.). Retrieved from [http://www.allaboutbirds.org/guide/Eastern\\_Screech-Owl/lifehistory](http://www.allaboutbirds.org/guide/Eastern_Screech-Owl/lifehistory)

*The silent flight of owls at night*. (2007, September 07). Retrieved from <http://www.birds.com/blog/the-silent-flight-of-owls-at-night/>



## Sentinel species

*Scientist Sarah Nelson is using dragonfly larvae to monitor mercury contamination.*

By Rich Hewitt  
UMaine Today, Spring 2013

In the pastoral settings of freshwater ecosystems, dragonflies buzz and flit through the grasses and floating plants of ponds and lakes. But an up-close look at the larvae of these wetland predators brings images from Alien and other sci-fi horror films to mind.

Large, bulbous eyes. Six spindly legs on a somewhat short, slightly stubby body. Gills in their abdomens to breathe. A lower jaw-like feature that's more like an extendible weapon, shooting out in an instant to grab something edible as it passes by. And they eat just about anything that moves — from mosquito larvae and tadpoles to small fish. Even other dragonfly larvae.

Indeed, dragonflies spend most of their lives as larvae — up to five years. The larvae hatch from eggs in the water, grasses or mud, grow up to 2 inches long and molt repeatedly before developing wings and taking flight.

That aquatic existence is what endears dragonflies to biogeochemist Sarah Nelson, who studies the insects as bio-sentinels of mercury in freshwater ecosystems. Nelson, a scientist at the Senator George J. Mitchell Center and the School of Forest Resources at the University of Maine, has been researching mercury in the environment since she first walked onto the Orono campus as a graduate student. Building on a long history of mercury research at UMaine, she is now the primary investigator for several studies regarding mercury, including research involving dragonfly larvae.



*Dragonflies spend up to five years as larvae living in water, which makes them ideal for monitoring mercury contamination.*

At the same time, she has worked with other agencies and organizations to develop educational programs that put teachers, students and citizen scientists into the field as frontline researchers. Armed only with hip waders and dip nets, students from schools throughout New England regularly go searching for dragonfly larvae under Nelson's guidance. They are not only discovering science, she says, but also are participating in meaningful research that has bolstered the work being done by professional scientists. Dragonfly larvae are easy to identify and it doesn't take the students long, as one of their teachers put it, to "get their dragonfly eyes on."

"They know what they're looking for," Nelson says. "It's hard to get them out of the stream. They go out and bring back what they find on the stream bottom, and they're just amazed at the critters they see. That's a great place-based learning outcome in its own right."

It was during a student program, in fact, that Nelson first had an inkling that dragonfly larvae might be a good indicator species for high mercury levels. She had worked with Bill Zoellick at the Schoodic Education and Research Center (SERC) Institute at Acadia National Park, Maine Sea Grant and Dartmouth College to develop a program now called Acadia Learning. It put students through what Nelson characterizes as a "mini-masters" research project in which they develop hypotheses, collect data, interpret results, and present their findings.

They were working to identify mercury concentrations in invertebrates when students at one school noticed that mercury levels in their specimens were always higher than in those collected by students at another school. Nelson says she also noticed that students at all of the schools in the program consistently turned up dragonfly larvae in their nets. Not only did they find variability in mercury levels at different sites, but also a common insect.

That, she says, was a "eureka moment" — when they first thought that there could be a correlation between the mercury levels in dragonfly larvae and in the environments in which they live. "Since then, I have been working with a diverse group of collaborators all over the U.S. to determine how we can use dragonfly larvae as bio-sentinels for mercury," she says.

The work is significant due to concerns nationwide about environmental mercury contamination. Mercury is a natural element. However, it's also toxic and can be harmful to animals and humans, especially in the form of methylmercury. Methylmercury is the more toxic form that develops as mercury is ingested and excreted by bacteria in the environment. Through that process, mercury becomes linked with a carbon group, which allows it to pass through cell walls and get into the food web, where it can be ingested by animals and humans.

Mercury is a global pollutant. Current loads of mercury to the landscape are about three times preindustrial levels. Partly as the result of burning fossil fuels, elevated concentrations of mercury have been deposited throughout the country, especially in the Northeast. According to Nelson, it is difficult to predict which ecosystems or watersheds might be most affected by mercury or methylmercury. Several New England states, including Maine, have issued statewide advisories for fish consumption from all of their lakes and streams.

For some time, researchers have studied how mercury accumulates in the environment. They also have been looking for indicators that would show which environments were likely to develop high concentrations of mercury in food webs. It's possible to test water samples, but the sampling process must meet stringent handling requirements. And those samples are very expensive to analyze, and might not represent the amount of mercury that becomes entrained in the food web. It's also not feasible to test samples from all of the lakes in each state.

Collecting and analyzing fish has its own set of problems, including their mobility from one environment to another. As a result, researchers have spent a lot of time and effort trying to find less expensive, less labor-intensive and more representative methods to determine how much mercury is in a specific place.

"It would be nice to have a predictive tool for how much mercury is in certain areas," Nelson says. Such a tool would provide a way for researchers to target specific areas for further study. And that's where the dragonfly larvae come in.

The basic characteristics of the dragonfly larvae seem to make them the perfect sentinel species for mercury levels in diverse environments. They are ubiquitous, living in lakes, streams and wetlands, and are found in all 50 states. They are easy to identify and to collect, and because they spend as much as five years developing in the same aquatic system, they experience the water and sediment chemistry of that system.

As both predators and prey, they provide a key link in the food chain as mercury accumulates and magnifies. They also are easier and less expensive to test for mercury than other types of samples.

It has been these characteristics of the developing dragonflies that have allowed Nelson to expand the citizen science portion of her research. The Acadia Learning project — now in its fifth year — includes 17 teachers in 13 schools across Maine, New Hampshire and Vermont. The program brings scientists, teachers and students together in partnerships that result in useful research and effective science education through a model of inquiry-based education, and also includes a summer institute to help teachers incorporate that model in their classrooms.

"We fully support the teachers so they can do this," Nelson says. "It can be perceived as a risky way to teach for some. Teachers don't know the answers at a certain point; they don't always know how it's going to turn out."

Nelson now has partnered with the National Park Service for a pilot program that allows citizen scientists to work with staff at national parks. That grew out of a mercury meeting in Acadia National Park in 2011 where park service officials expressed an interest in expanding Nelson's research in Acadia to other parks. With funding from UMaine through the Faculty Research Funds and High-End Instrumentation Research grants that cover the costs of lab analysis and shipping, they launched a pilot program last spring to gather dragonfly larvae samples from national parks across the country.

"It's a shoestring budget, but we had a great first year with samples from places like Denali, the Great Smoky Mountains, Channel Islands, Cape Cod, the Rocky Mountains and Acadia," she says. "We're currently seeking additional funding to continue with a fully developed program."

While programs such as Acadia Learning and the National Parks project are providing important research data for scientists, Nelson says they also are helping to promote an interest in science beyond the research facility. "Science is not something that only happens in a specialized research facility," she says. "It happens in your backyard."

These types of programs also help to address issues of data literacy, giving students and adults a better understanding of how data are collected and used — and how to talk about them. That is a key skill in the information age, she says. "It's important that people think about science and how to use data. There's a lot of information and data thrown at us every day, and it's hard to make informed choices if you don't know how to interpret the data that are being presented."

Meanwhile, Nelson's research has reached a critical point. An intensive research effort at long-term U.S. EPA lake study sites in New England and New York during summer 2012 may provide the final pieces of data Nelson needs to show that the developing dragonflies are linked to the ponds, lakes and streams in which they live, and reflect the levels of mercury accumulating in those bodies of water. That study links mercury in water and dragonflies to lake chemistry and the landscapes surrounding the 74 sampled lakes and ponds.

"We're nearly there," she says.

Those samples were analyzed late in 2012. The results will be combined with findings of previous research, including work done by students in Maine schools and citizen scientists at national parks nationwide, and may be available as early as this year.

Hewitt, R. (2013). Sentinel species. *UMaine Today, Spring 2013*, Retrieved from <http://umainetoday.umaine.edu/archives/spring-2013/sentinel-species/>





**The Hive**

Chelseigh Millar  
 Grade 12  
 Lassiter High School  
 Marietta, GA  
 Teacher: Pamela Lowe  
 Georgia River of Words Art Winner 2012

w e l c o m e

**Boy Scout Troop 955** - Sewell Mill Watershed

**Karan's Magnet Group** - Sewell Mill Creek

**Norton Park River Kids** - Nickajack Watershed

**Pam Barker** - Sewell Mill Creek

**Sope Creek River Kids** - Sope Creek

ANNOUNCEMENTS

**It's almost time for our annual  
 Watershed Stewardship Fair!**

Date: Thursday, January 30, 2014

Time: 6:30 - 8:30 PM

Location: Cobb County Water Quality Laboratory,  
 662 South Cobb Drive, Marietta, GA 30060

Cobb's Fair is a data sharing event that showcases volunteer stream projects. Participants are encouraged to share their stream observations and project goals with the community, and each group is invited to create a poster displaying their water quality conservation efforts. Also, for those who wish, we give each watershed stewardship group a few minutes to relate success stories and share concerns and frustrations with a like-minded audience. This is your opportunity to learn from and support other Cobb County volunteers.

In addition to a fun evening of education and mingling, tours will be conducted for those who are interested in the day to day workings of the Cobb County Water Quality Laboratory. Join our chemists and biologists as they explain how the lab tests water from Cobb's four wastewater treatment plants to ensure that it is safe to release back into our environment. The tour is great for all ages, from families to elementary through high school students.

Join us on January 30, 2014 to visit the lab, meet fellow volunteers, and speak to environmental professionals. Refreshments will be provided.

If you would like to attend the Watershed Stewardship Fair, please contact us at 770-528-1482 or [water\\_rsdp@cobbcounty.org](mailto:water_rsdp@cobbcounty.org). We hope to see you there!

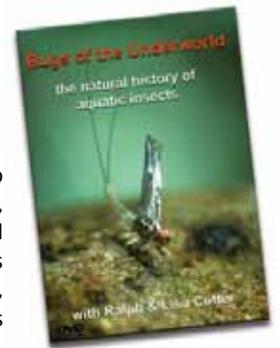
RECOMMENDED RESOURCE

**Bugs of the Underworld**

A fly fisher's guide to the natural history of aquatic insects.

11 years, 8 cameras, 3 countries, countless breaths underwater.

Extraordinary, award-winning underwater video footage follows the life cycles of mayflies, stoneflies, caddisflies, and other amazing bugs. Flyfishers will gain valuable insights as they see how aquatic insects behave and what they really look like to trout! Teachers, parents, river monitors, scientists, and kids of all ages will be entertained and enlightened by this video.



Ralph and Lisa Cutter's California School of Flyfishing. [www.flyline.com](http://www.flyline.com)



Stonefly nymph.

Winter is a great time of year to explore a local creek and look for aquatic macroinvertebrates! The larvae and nymphs of many flying insects overwinter in aquatic habitats and later emerge during the warmer months of spring. This means that you are likely to find a greater diversity of critters during the winter. Even if you don't monitor regularly, take out a net and see who's living in your stream!



Many insect populations die off when cold weather hits, but some species are able to survive through the winter. Adult beetles, aphids, and leafhoppers seek shelter under loose tree bark, in ground debris, and even in our homes. Honeybees create heat in the middle of their hives by rapidly moving their bodies and wings. Beetle grubs bury themselves several inches deep in the soil. If you look closely at odd-shaped dead leaves, you may find the cocoon of a moth or a butterfly chrysalis. As long as predators don't find these insects in a dormant state, their life cycles will continue in the spring.

Linda May  
Environmental Outreach Coordinator  
Georgia DNR Wildlife Resources Division

OBSERVATIONS



Honey bee (*Apis mellifera*) queen and worker bees.  
Photo by Jessica Lawrence, Eurofins Agrosience Services,  
[www.Bugwood.org](http://www.Bugwood.org).

CONSERVATION TIP

Car

Keeping your tires fully inflated could improve your gas mileage by around 3 percent. (It also makes your tires last longer.) The average American, who drives twelve thousand miles per year, could save about 16 gallons of gasoline annually (assuming 25 mpg) just by maintaining his or her tires at the proper pressure. Across all U.S. households, the gasoline savings could total 1.6 billion gallons – approximately the total volume of ice cream produced in the United States each year.

ECOPEDIA

Niche

A niche is an organism's lifestyle, the group of strategies it employs to obtain the food, water, shelter, mating spots, and other necessities that it must have to survive. Its habitat is where a species lives; its niche is how it lives, its job description.

[Ecology: A Pocket Guide](#)



We post twice weekly updates, workshop information, natural history tidbits, and more!



Follow our boards on Pinterest for environmental education and stewardship resources.

[The Green Book](#)



## Stewardship Stars Excellence in Data Collection

*The following volunteers have submitted data each month during the September, October, and November quarter:*

- Butler Creek Kennesaw** - Chemical, Bacterial, & Visual Monitoring in the Butler Watershed
- Dodgen Middle School** - Biological Monitoring in the Sewell Mill Watershed
- Fairfax Consulting Services** - Chemical Monitoring in the Powder Springs Watershed
- Friends of Victory Heights Subdivision Park** - Chemical & Bacterial Monitoring in the Rottenwood Watershed
- GA Lake Monitoring** - Chemical Monitoring on Lake Acworth and Lake Allatoona
- Karan's Magnet Group** - Chemical Monitoring on Sewell Mill Creek
- Keep Smyrna Beautiful Adopt-A-Stream** - Chemical Monitoring in the Nickajack and Rottenwood Watersheds
- Lassiter High School** - Chemical & Bacterial Monitoring in the Rubes Watershed
- McClesky Middle School** - Chemical & Bacterial Monitoring in the Rubes Watershed
- Pope High School** - Chemical Monitoring on Piney Grove Creek
- Rick and Sharon Donato** - Anuran Monitoring in the Rubes Watershed
- Sally Brooking** - Chemical Monitoring on Sope Creek
- Sierra Club Cobb Centennial Group** - Chemical, Biological, & Bacterial Monitoring on Rottenwood Creek
- Village North Highlands Subdivision** - Chemical & Bacterial Monitoring in the Willeo Watershed
- Willeo Watershed Alliance of Loch Highland** - Chemical Monitoring in the Willeo Watershed

Thank you for your hard work and dedication!



Cobb County Water System  
Watershed Stewardship Program  
662 South Cobb Drive  
Marietta, Georgia 30060



*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

## January

- 9 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 15 Adopt-A-Stream Chemical Monitoring Workshop • 6:00pm - 8:30pm • Cobb County Water Quality Laboratory
- 16 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 23 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 24 Homeschooler's Winter Science Series • Our Shared Forests • 1:00pm - 3:30pm • Cobb County Water Quality Laboratory
- 30 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 30 Watershed Stewardship Fair • 6:30pm - 8:30pm • Cobb County Water Quality Laboratory

## February

- 6 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 6-8 Georgia Science Teachers Association Conference • Macon, Georgia • [www.georgiascienceteacher.org](http://www.georgiascienceteacher.org)
- 7 Homeschooler's Winter Science Series • Leap, Fly, and Slither • 1:00pm - 3:30pm • Cobb County Water Quality Laboratory
- 13 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 20 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 27 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory

## March

- 6 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 7 Homeschooler's Winter Science Series • Service Project Symposium • 1:00pm - 3:00pm • Cobb County Water Quality Laboratory
- 12 Adopt-A-Stream Bacterial Monitoring Workshop • 6:00pm - 8:30pm • Cobb County Water Quality Laboratory
- 13 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 13 Rain Barrel Workshop • 11:00am - 12:00pm • Cobb County Water Quality Laboratory
- 20 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 21-22 Georgia Organics Conference & Expo • Jekyll Island • [www.georgiaorganics.org](http://www.georgiaorganics.org)
- 22 Adopt-A-Stream Confluence • Gwinnett Environmental and Heritage Center • Buford, Georgia • [www.georgiaadoptastream.org](http://www.georgiaadoptastream.org)
- 22-29 Atlanta Science Festival • Atlanta, Georgia • [www.atlantasciencefestival.org](http://www.atlantasciencefestival.org)
- 27 Garden Work Day • 9:00am - 11:00am • Cobb County Water Quality Laboratory
- 28-29 Environmental Education Alliance of Georgia Conference • Rock Eagle 4-H Center • Eatonton, Georgia • [www.eealliance.org](http://www.eealliance.org)

Events in **BLUE** are Cobb County Watershed Stewardship events.  
More information can be found on our Calendar at [www.cobbstreams.org](http://www.cobbstreams.org).