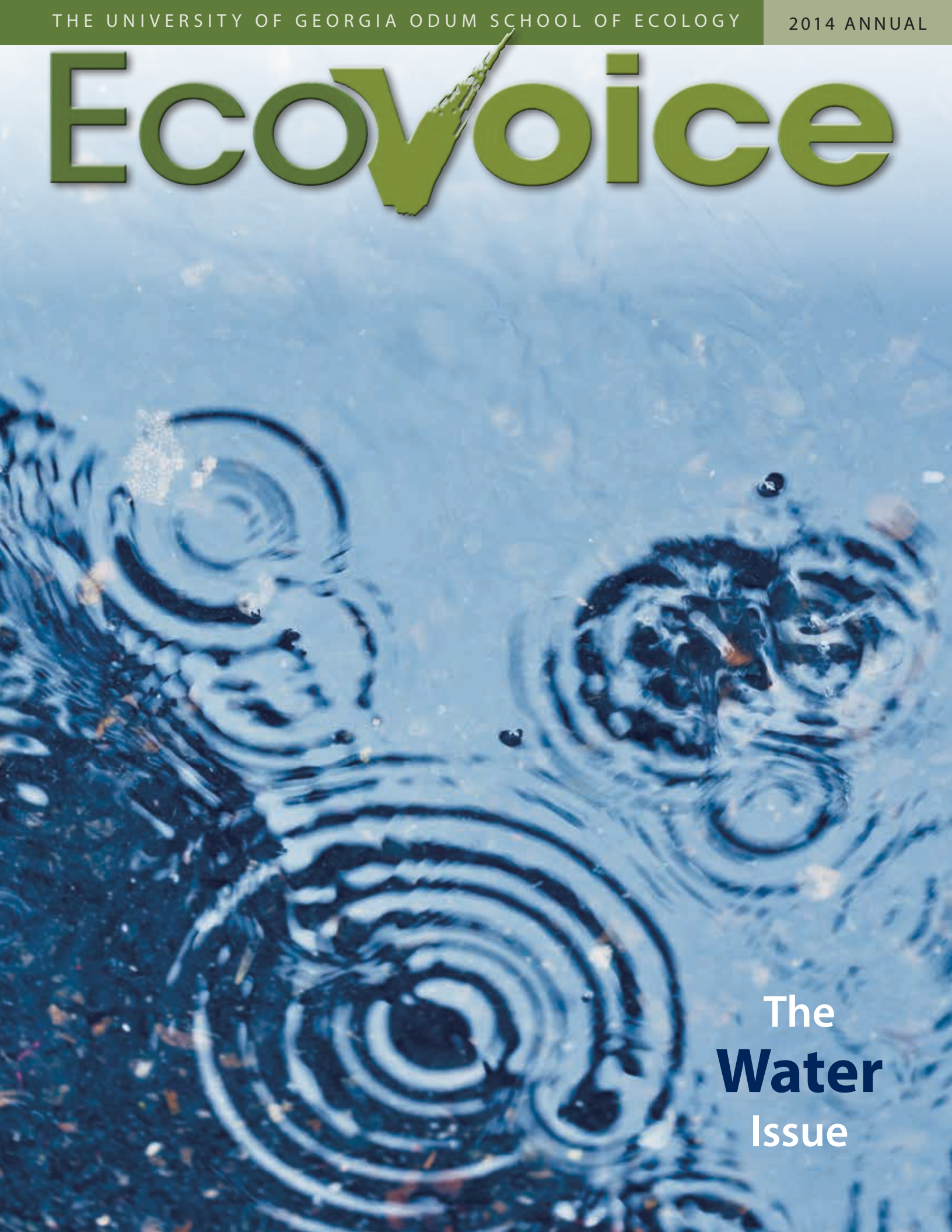
THE UNIVERSITY OF GEORGIA ODUM SCHOOL OF ECOLOGY

2014 ANNUAL

EcoVoice



The Water Issue

EcoVoice

2014 Annual Issue

Dean
John L. Gittleman

Associate Dean for
Academic Affairs
Sonia Altizer

Associate Dean for Administrative
and External Affairs
Laurie Fowler

Editor and Writer
Beth Gavrilles

Contributing Writers
Lee Snelling
Katie Sheehan

Graphic Designer
Mary H. Andrews

706-542-2968
706-542-4819 fax
www.ecology.uga.edu

www.facebook.com/odumschool

@UGAEcology

This publication is available in an electronic format. Please contact the editor at bethgav@uga.edu or phone 706-542-7247.

ABOUT THE COVER
Water is at the center of some of the greatest challenges facing the world today. Odum School researchers, including the faculty, staff, and students of the UGA River Basin Center, are responding to these challenges in innovative ways. See story on page 2.

Notes from the Dean


JOHN GITTLEMAN

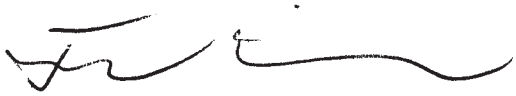
Water, Water, Water

Interesting scientific theorems often come via misconstrued lines or phrases. One of the best, known as Aunt Jobiska's theorem, comes from a poem by Edward Lear: "It's a fact the whole world knows…" We know the Earth is a watery place; water covers 71% of its surface. We know that we must have water to live. And we know that continually and dramatically changing the flow, ecosystem structure, sustainable supply, health, or just about any other measurable aspect of water will lead to trouble.

Whenever something is so obvious, it's open for full-throttle debate—especially when it involves an intrinsically important natural resource that's unevenly distributed: of all the freshwater on Earth, 68 percent is in ice, 30 percent is in the ground, and, according to the U.N., over 780 million people don't have access to clean water.

Dating back to the groundbreaking work of the Institute of Ecology, over half of our faculty is dedicated to studying water-related issues. Whether focused on species invasions along the coast, constructed wetlands for wastewater treatment, or the impacts of climate change and disease on coral reefs, the strength of our science is the collaborative approach of our faculty and students. We are also fortunate to have creative partnerships with facilities and administrative units like the River Basin Center, Savannah River Ecology Laboratory, and the Joseph W. Jones Ecological Research Center, as well as with other UGA colleges.

The challenges facing aquatic ecosystems, biodiversity, and political management are immense. As Leonardo da Vinci wrote, "Water is the driving force of all nature." In this issue of *EcoVoice* we are proud to showcase the Odum School's unique perspectives on this ecologically essential resource and the critical importance of our holistic approach to the science and applied management of water.



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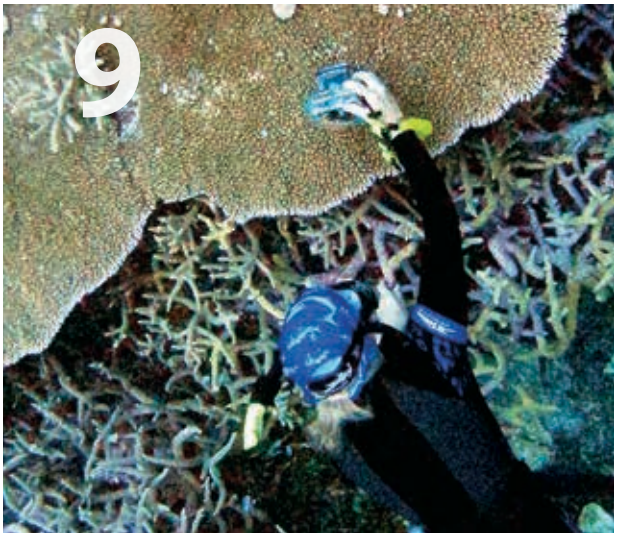

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Blue is the New Green

The UGA River Basin Center is meeting Georgia's water challenges

By Beth Gavrilles

GEORGIA, FLORIDA, AND ALABAMA have been fighting in court for over 20 years about how to share the waters of the Apalachicola-Chattahoochee-Flint River basin. **CLIMATE CHANGE** is altering rainfall patterns across the world, with climate models predicting increases in both flooding and drought in Georgia and the southeastern U.S., while coastal communities are threatened by stronger storms and rising sea levels. **POLLUTION** from industrial discharges, agricultural and residential runoff, inadequately or untreated sewage, and plastic and other trash is increasing worldwide, affecting streams, lakes, oceans, and the biodiversity they support. **WATER** is at the center of some of the greatest challenges facing the world today. In this issue of *EcoVoice*, we feature the work of the UGA River Basin Center where faculty, staff, and students are responding to these challenges through their research, teaching, and outreach.

river basin CENTER

The UGA River Basin Center

Promoting Sustainable Management of Aquatic Resources and Ecosystems

RBC Director of Policy Laurie Fowler and Senior Legal Fellow Katie Sheehan (r) offer legal research and outreach to local governments, state agencies, and NGOs (article on page 5).

The UGA River Basin Center, established in 2000, is a unit of the Odum School that conducts interdisciplinary research, teaching, and outreach to help communities sustainably manage and protect their water and related land resources. The past year has brought a number of exciting changes to the RBC. These include moving to a new home next to the Ecology building and the appointment of Seth Wenger, MS CESD '99/PhD '06, as director of science.

Director of Science Seth Wenger at the River Basin Center co-organized this year's Third Symposium on Urban Stream Ecology (article on page 6).

Wenger joined the Odum School faculty as an assistant professor in January 2014 after five years as a research scientist for Trout Unlimited, where he modeled the effects of climate change and invasive species on native cutthroat trout in the western U.S. Before that, as a postdoctoral associate at UGA from 2007 to 2008, he served as the RBC associate director. He was a lead researcher on the Etowah Aquatic Habitat Conservation Plan, a multi-year, multi-disciplinary effort to help local governments in North Georgia's Etowah River Basin design development standards, based on rigorous scientific research, to protect the basin's nine imperiled fish species. During that time he also organized the Second Symposium on Urban Stream Ecology, an international meeting held in 2007 to establish a research agenda for studying the effects of urbanization on freshwater ecosystems. The Third Symposium took place in Portland in May 2014.

With Director of Policy Laurie Fowler, the Odum School's associate dean for administrative and external affairs, Wenger has worked with the RBC advisory board, faculty, staff, and alumni to re-envision and expand its program and define future areas of focus. These will build on existing strengths, new opportunities for collaboration, and pressing questions related to aquatic resources and ecosystems.

"This is an exciting time for the RBC, and I'm delighted to be back at UGA and be a part of it," says Wenger. "Water resource conflicts and concerns are increasing in Georgia and beyond, and the RBC is in a unique position to help resolve them. Although we're part of the Odum School, our real strength is that we bring together faculty, staff, and students from across the university to address water issues in a truly interdisciplinary fashion."

Along with Wenger and Fowler, RBC core faculty and staff include Professor Emeritus Ron Carroll, much of whose current work involves constructed wetlands for wastewater treatment and biofuel production in the developing world, and Senior Legal Fellow Katie Sheehan, whose work chiefly focuses on developing legal and policy solutions to water quality and quantity issues for local governments and state agencies.

Much of the RBC's work is conducted by graduate student assistants and other students who perform internships and participate in the interdisciplinary graduate-level Environmental Practicum course. Following are examples of recent RBC projects.

The Flint River was named one of America's most endangered rivers for 2013. *Photo: Philip Juras*

Apalachicola-Chattahoochee-Flint Stakeholders Water Management Plan

How to fairly allocate the waters of the Apalachicola-Chattahoochee-Flint River Basin between Georgia, Florida, and Alabama is a question that has been tied up in the courts for over 20 years. When a group of stakeholders, frustrated at the lack of progress, decided to come up with their own solution, they turned to a team led by the River Basin Center for help.

The Apalachicola-Chattahoochee-Flint Stakeholders, Inc., formed in 2009, represents diverse interests including water and electric utilities, local governments, industries, agriculture, seafood, and environmental advocates. To help the group develop a sustainable water management plan and an institutional framework for administering it, RBC Director of Policy Laurie Fowler organized the ACFS University Collaborative, involving institutions from all three states.

Working with faculty and students from Albany State, Auburn, Florida State, Georgia Tech, Troy University, and the University of Florida, the RBC's Fowler, Senior Legal Fellow Katie Sheehan, and students conducted a comprehensive study of successful trans-boundary water management institutions around the world—how they are organized, how they make decisions, what functions they perform, and how they do so.

In April, the University Collaborative traveled to Apalachicola, Florida, to present a thorough analysis of the water management functions currently underway in the basin, including potential gaps. The group is developing a report detailing the various options available for a transboundary water management institution in the ACF, and presented a draft of this document to the ACF Stakeholders at an organizational meeting in Eufaula, Alabama, in June. The final report will be presented in September, and Fowler says she expects the ACFS will act on the recommendations soon.

"Besides its value to the ACFS, the project has provided a fantastic opportunity for UGA students to apply and develop their science and policy research skills," says Fowler. She adds that to date, more than 25 UGA graduate students have contributed to the project, and it is the subject of a doctoral dissertation by Odum School/Integrative Conservation student Shannon Bonney.

See more at http://t.uga.edu/Qp

Legal Research and Outreach

By Katie Sheehan

With attorneys Laurie Fowler and Katie Sheehan on staff and access to upper-level law students in the Environmental Practicum, the RBC offers legal research and outreach to state agencies, local governments, and nongovernmental organizations on issues relating to land use, water policy, and natural resource protection.

Sheehan recently worked with the Georgia Environmental Protection Division to create a guidebook to help local communities protect their wetland resources, with funding provided by the U.S. EPA.

In addition to being beautiful natural areas, wetlands provide services such as flood control, water-quality improvement, groundwater recharge, erosion prevention, fish and wildlife habitat, and recreational opportunities—often at a fraction of the cost of comparable man-made structures. Until recently, however, the value of wetlands was not widely appreciated, and human activities resulted in the loss of more than half of the nation's wetlands by the 1980s. Although federal policies and laws introduced in recent decades have slowed the rate of wetland loss, recent U.S. Supreme Court cases that appear to have removed federal protection from so-called "isolated" wetlands are cause for concern.

"Fortunately," says Sheehan, "local governments have the authority to implement regulatory and nonregulatory programs that can stop wetland losses, and even increase overall wetlands acreage. And since they are familiar with the resources within their communities and are used to making land use decisions, they are uniquely qualified to craft effective protections."

Local Wetland Programs: A Guide for Georgia Communities contains background information on wetlands and on existing laws, programs, and policies; technical and funding resources; strategies for avoiding legal challenges; and 25 regulatory and non-regulatory programs communities can implement. These include education and awareness initiatives, inventories, acquisition, restoration projects, tax and other incentives, permit programs, buffers, zoning standards, development practices, and special programs for climate change adaptation and management.

Wetlands in the Oconee River watershed.
Photo: Philip Juras

See more at www.t.uga.edu/PI

AQUATIC ECOLOGY FACULTY AT THE ODUM SCHOOL

Kimberly Andrews, SREL and Georgia Sea Turtle Center Research Coordinator
Reptile and amphibian conservation.
http://wildlifelab.wix.com/jekyllresearch

Ford Ballantyne, Assistant Professor
Metabolic scaling in river networks.
http://t.uga.edu/QP

Jeb Byers, Professor
Coastal marine ecosystems, species invasions, marine parasites and disease, ecosystem engineers.
http://jebyers.ecology.uga.edu

Ron Carroll, Professor Emeritus
Conservation biology, sustainable development, constructed wetlands for wastewater treatment.
http://t.uga.edu/QV

Scott Connelly, Assistant Professor
Ecosystem effects of the decline of amphibians in the neotropics.
http://t.uga.edu/QQ

Alan Covich, Professor
Impacts of disturbances on aquatic food webs.
http://t.uga.edu/QD

John Drake, Associate Professor
Population dynamics, computational ecology, infectious disease dynamics, biodiversity.
http://t.uga.edu/RV

Bill Fitt, Professor
Basic ecology of and impacts of climate change on corals and their symbionts.
http://t.uga.edu/QC

Laurie Fowler, Associate Dean for Administrative and External Affairs, River Basin Center Director of Policy
Environmental policy and management of aquatic resources.
http://t.uga.edu/QB

Bud Freeman, Senior Public Service Associate, Director of the Georgia Museum of Natural History
Distribution, abundance, and conservation of freshwater fishes.
http://t.uga.edu/QA

Mary Freeman, U.S. Geological Survey Research Ecologist
Linkages between hydrology, land use and the ecology and distribution of freshwater fishes and invertebrates.
http://on.doi.gov/1u6Vo98

Stephen Golladay, Joseph W. Jones Center Associate Scientist
Streams and wetlands, land use impacts on water quality and aquatic invertebrates.
http://www.jonesctr.org

Elizabeth King, Assistant Professor
Salt marsh restoration, land use legacies and resilient futures.
http://kinglab.uga.edu

Drew Kramer, Assistant Research Scientist
Aquatic Population and community ecology, limnology; aquatic work primarily in the Great Lakes.
http://kramer.ecology.uga.edu

Stacey Lance, SREL Associate Research Scientist
Effects of contaminants, disease, and other stressors on aquatic and amphibian systems.
http://www.srellancelab.com

Erin Lipp, Environmental Health Science Professor
Waterborne disease ecology, climate change and human health.
https://sites.google.com/site/lipplab

J Vaun McArthur, SREL Senior Research Scientist
Aquatic microbial ecology.
http://t.uga.edu/QS

James Porter, Josiah Meigs Distinguished Professor
Coral reef ecology, ecology of war.
http://t.uga.edu/QR

Catherine Pringle, Distinguished Research Professor
Stream ecosystems, long-term ecological research, conservation.
http://pringle-lab.org

James Richardson, Undergraduate Coordinator
Population ecology of sea turtles.
http://t.uga.edu/QE

Amy Rosemond, Associate Professor
Effects of anthropogenic change on stream ecosystems.
http://t.uga.edu/QT

Seth Wenger, Assistant Professor, River Basin Center Director of Science
Effects of urbanization and climate change on freshwater ecosystems, conservation, modeling.
http://t.uga.edu/Qz

Third Symposium on Urban Stream Ecology

Many streams in heavily developed areas suffer from "urban stream syndrome"—a term encompassing a host of problems including pollution, bank erosion due to high speed storm runoff, and the exclusion of natural detritus such as leaves and twigs to serve as the basis of the stream food web. The urban stream syndrome was described at the first Symposium on Urban Stream Ecology, held in Australia in 2003. That meeting resulted in several publications that summarized the state of scientific understanding about urban streams and identified important knowledge gaps.

In 2008, Seth Wenger—then a postdoctoral associate with the RBC—and Odum School Associate Professor Amy Rosemond helped organize a second international meeting, SUSE2, to plan and coordinate an urban stream research agenda.

Wenger and colleagues (including Ecology alumni Krista Jones, MS '07, Alonso Ramirez, PhD '01, and Allison Roy, PhD '04) convened SUSE3 in 2014 to coincide with the Joint Aquatic Sciences Meeting in Portland, Oregon. Drawing 127 participants from 6 continents and 13 countries or territories and 23 U.S. states, the meeting's focus was on improving understanding of the mechanisms affecting urban streams and identifying differences driving global variability in stream response to urbanization.

"The SUSE meeting series has been invaluable in advancing the science of urban stream ecology," Wenger says. "I was particularly excited about the international focus of this latest meeting. Most future urban growth will take place in the developing world, but most urban stream studies have been done in the U.S., Australia, and Europe. I think that the global perspective we heard at SUSE3, and the international connections that were established, will catalyze new ways of thinking about urban stream ecology, as well as the threats and solutions."

A special issue of the journal *Freshwater Science* focusing on stream urbanization is planned for March 2016. It will feature a series of papers based on topics raised at SUSE3. SUSE4 is in the works.

For more on SUSE3, see http://urbanstreams.wordpress.com

With the predicted extreme population growth, continued urbanization of the world is inevitable, severely impacting aquatic ecosystems by increasing degradation of our rivers and streams.
Photo: Claudio Arnese

A replicated tidal-flow wetland like this one at Furman University could help UGA save money on wastewater treatment. *Photo: Environmental Practicum*

Environmental Practicum: Biological Water Reclamation

The University of Georgia purchases approximately 482 million gallons of potable water per year at a cost of over $5 million. Of that, 80-100 million gallons are used for irrigation and in HVAC cooling towers—uses that don't require treatment to drinking water standards and that could be met by reclaimed wastewater at a significant savings. The Office of University Architects was interested in exploring alternatives—exactly the kind of complex question tailor-made for the Environmental Practicum.

The Environmental Practicum is a graduate-level service-learning course led by Laurie Fowler. Students from programs including ecology, law, environmental design, engineering, and forestry work together in interdisciplinary teams, putting what they've learned in the classroom to work helping clients solve real-world environmental problems. Practicum students participate in much of the work of the RBC, gaining valuable knowledge and experience while doing so.

In 2014 a group of Practicum students led by Ben Liverman, real estate and space management coordinator for the Office of University Architects who is enrolled in the Integrative Conservation doctoral program through the Odum School, conducted a preliminary analysis of the feasibility of a large-scale biological water reclamation system for UGA. These water treatment systems use biological organisms, such as plants and bacteria, instead of chemicals to clean wastewater. They use significantly less energy than conventional treatment systems and tend to be more aesthetically pleasing as well.

The students produced a 60-page report covering the history of the technology, the science behind it, case studies of other universities using reclamation systems, and an in-depth analysis of the feasibility of doing such a project on the UGA campus, including financial costs and benefits.

Projected savings could be in the millions of dollars.

"The goal of this project is to provide enough information so that UGA's administrators can determine whether the projected benefits of such a wastewater reclamation system warrant the investment of a professional feasibility study," write authors Ben Liverman, Sumner Gann, and Robert Abrunzo. The report is currently under consideration by senior UGA administrators.

Read the report at http://t.uga.edu/RX

Ecosystem Services

Report finds protecting natural areas makes good fiscal sense

Protecting natural resources and fiscal health may seem to be competing goals, but a recent study led by Odum School Assistant Research Scientist J.P. Schmidt, PhD '06, provides a blueprint for achieving both. The paper, in the journal *Landscape and Urban Planning*, offers a new way to assess the financial and environmental costs and benefits of development. Focusing on McIntosh County, Georgia, the study offers recommendations to help keep down the costs of growth and also preserve the area's natural resources and the services they provide.

McIntosh County is one of the least developed counties on the east coast of the U.S., with forests and salt marshes accounting for 95 percent of its land area. Like other coastal areas, however, it is poised for increasing growth as retirees and second-home buyers are attracted to its scenic beauty and recreational opportunities.

Such residential development provides a new source of tax revenue, but it also comes with costs. These include providing services such as new roads and more police and fire protection as well as the lost value of ecosystem services like water purification, flood storage, and carbon sequestration that nature provides for free.

Schmidt was interested in both kinds of costs. "I decided to look for the win-wins," he says. "How could development be cost-effective for the county and at the same time protect areas that are most valuable in terms of ecosystem services?"

Working with former UGA economist Rebecca Moore and UGA Marine Institute Director Merryl Alber, Schmidt first compared the tax revenue generated by different types of land uses—residential, commercial, and rural—with the costs to provide municipal services to each of those development types. To estimate the value of ecosystem services provided by natural areas like forests, forested wetlands, and salt marshes, the team used figures from published studies.

Putting the two analyses together, they ranked different landscape types by the value of services provided and by net cost to the local government. Two landscape types stood out as providing valuable services while costing the least, making them logical targets for conservation.

Salt marshes provide storm protection, nitrogen removal, and wildlife habitat, and serve as nursery grounds for coastal fisheries. And forested wetlands provide services like water filtration and storage, flood control, carbon sequestration, and nutrient absorption.

Both types of landscapes are in need of protection. Although their timber does not fetch a high price, landowners are under pressure to harvest the trees from forested wetlands. And marsh edges are considered prime real estate for resort housing, even though much of it is within the 500 year floodplain—essentially in harm's way from the infrequent severe storms that hit the coast.

Schmidt suggests that broadening existing conservation incentive programs to encourage landowners to forego harvesting timber in wetland forests and limiting development within the 500-year floodplain could make a big difference.

Schmidt says he hopes the study will be useful not only to McIntosh County planners but to those in other rural areas facing development pressure.

Read more at http://t.uga.edu/N9

Photo: Philip Juras

Study coauthor Drew Harvell in the Palmyra Atoll, Pacific Ocean, photographing giant plating Acropora coral colony with tumors. Climate warming is associated with the loss of coral symbionts and the proliferation of lethal coral diseases.
Photo: B. Willis, Cornell University

Climate Change

As climate and disease links become clearer, study highlights need to forecast future shifts

Climate change is already affecting the spread of infectious diseases worldwide, with serious impacts to human health and biodiversity conservation, according to an international team of disease ecologists led by Odum School Associate Dean Sonia Altizer. Writing in the journal *Science,* they propose that modeling the way disease systems respond to climate variables could help public health officials and environmental managers predict and mitigate the spread of lethal diseases.

The issue of climate change and disease has provoked intense debate over the past decade, particularly in the case of diseases that affect humans.

"For a lot of human diseases, responses to climate change depend on the wealth of nations, healthcare infrastructure, and the ability to take mitigating measures against disease," says Altizer. "The climate signal, in many cases, is hard to tease apart from other factors like vector control and vaccine and drug availability."

Climate warming is already causing changes in diseases affecting wildlife and agricultural ecosystems. "In many cases, we're seeing an increase in disease and parasitism," Altizer says. "But the impact of climate change on these disease relationships depends on the physiology of the organisms involved, the location on the globe, and the structure of ecological communities."

At the organism level, climate change can alter the physiology of both hosts and parasites. Some of the clearest examples are found in the Arctic, where temperatures are rising rapidly, resulting in faster developing parasites. A lungworm that affects muskoxen, for instance, can now be transmitted over a longer period each summer, making it a serious problem for the populations it infects.

Climate change is also affecting entire plant and animal communities. This is particularly evident in tropical marine environments such as the world's coral reef ecosystems. In places like the Caribbean, warmer water temperatures have stressed corals and facilitated infections. When corals, the framework builders of the ecosystem, succumb, the species that depend on them are also at risk.

Where human health is concerned, there is not only the direct risk from pathogens like dengue, malaria, and cholera, all of which are linked to warmer temperatures, but indirect risks from threats to agricultural systems and game species that are crucial for subsistence and cultural activities.

Altizer and her colleagues—Susan Kutz of the University of Calgary and Canadian Cooperative Wildlife Health Centre; Richard T. Ostfeld of the Cary Institute of Ecosystem Studies; Pieter T. J. Johnson of the University of Colorado, Boulder; and C. Drew Harvell of Cornell University—lay out an agenda for future research and action.

"Because disease represents the product of multiple interacting species, including hosts, pathogens and other members of the food web, forecasting responses to ongoing climate shifts is a tremendous challenge," says Johnson. "Given the rising importance of infectious diseases not only for human health but also wildlife conservation, it's also a challenge for which we are in sore need of a solution. We hope our work contributes to that."

Learn more at http://t.uga.edu/if

Coral Reef Ecology in the Caribbean and Pacific

Dustin Kemp (r) and Xavier Hernandez-Pech sample a healthy coral reef in the Caribbean. *Photo: Bill Fitt*

Millions of people around the world depend on coral reefs and the services they provide, such as habitat for fisheries, protection of coastal areas during storms, and attracting tourism dollars. Corals, in turn, depend upon symbiotic single-celled algae, known as zooxanthellae, that inhabit them, providing most of their food and giving them their color. Many species of these algae are highly sensitive to temperature and are unable to survive as ocean waters warm, but others have been found to be tolerant of warmer temperatures.

Postdoctoral associate Dustin Kemp, PhD '10, is part of a team of ecologists with ties to the Odum School trying to find out whether heat-tolerant symbiotic algae can play a major part in the response of reef corals to climate change. The study is led by Todd La Jeunesse of Pennsylvania State University, a former UGA postdoctoral associate. Mark Warner, PhD '98, of the University of Delaware, is a co-investigator. All three worked with Professor of Ecology Bill Fitt and Professor of Plant Biology Gregory Schmidt at UGA.

Presently in the second year of a dual ocean experiment, they are using proven genetic and physiological techniques to assess the symbiosis ecology of the widespread thermally tolerant zooxanthellae *Symbiodinium trenchii*, which dominates coral communities across coastal Southeast Asia and at locales such as the extraordinary rock island habitats of Palau.

With funding from the National Science Foundation, they are working at coral reefs off the Caribbean island of Curaçao and the Pacific islands of Palau to study the tradeoffs that may occur when heat-sensitive algae are replaced by heat-tolerant algae. "We're using the Pacific to predict potential consequences, positive or negative, in the Caribbean," Kemp says.

For more, see http://dustinwkemp.ecology.uga.edu

Drought Affects the Carbon Cycle in Georgia Blackwater Rivers

Droughts may be affecting how Georgia's blackwater rivers process carbon, according to a recent study led by Andrew Mehring, PhD '12. The paper, in the *Journal of Geophysical Research: Biogeosciences*, reports less carbon being transported downstream, higher concentrations of carbon in the water, and increasing rates of carbon dioxide released into the atmosphere in years following droughts.

Mehring analyzed nine years' worth of weekly measurements of streamflow, rainfall, temperature and dissolved organic carbon concentrations for a section of the Little River in Tifton. DOC serves as an important part of the river food web, feeding microorganisms that provide food for insects that are in turn eaten by larger animals such as frogs and fish. Some of the DOC is converted to carbon dioxide by bacteria as they consume it and is released into the atmosphere. And some of it remains in the rivers and is carried downstream where it makes a significant contribution to coastal waters.

Mehring says that understanding the impacts of drought on the carbon cycle in Georgia's blackwater rivers is important because droughts may intensify in the southeastern U.S. in the future.

For more, see: http://t.uga.edu/Pm

Photo: Andrew Mehring

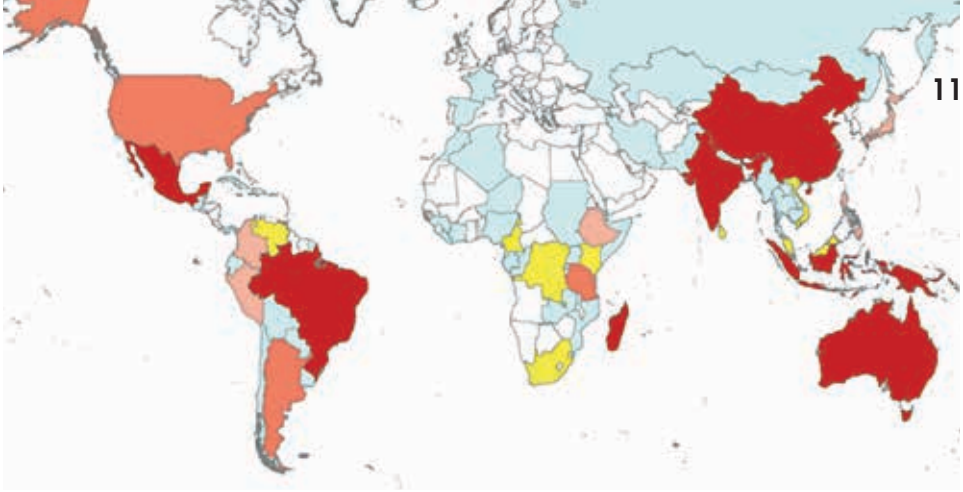
UGA and USACE Researchers Develop New Model to Assess Fish Passage

Migratory fishes are in decline worldwide, often impeded by obstacles like dams and roads as they try to swim upstream to spawn. Researchers from UGA and the U.S. Army Corps of Engineers Engineer Research and Development Center (ERDC) developed a new model that could help environmental managers determine the most cost-effective way to improve the fishes' chances of reaching spawning grounds. Their work was recently published in the journal *Ecological Applications*.

Lead author Kyle McKay, PhD '14, a research civil engineer with the ERDC, and colleagues were tasked with developing a plan to improve migratory fish habitat in the Truckee River in Nevada, where there are more than 30 potential barriers to upstream fish movement. They created a mathematical model based on network analysis to determine the level of a watershed's connectivity—and therefore its suitability as migratory fish habitat—then used it to analyze potential actions, such as dam removal or installation of fish ladders, on eleven dams in the Truckee system. In all, they tested more than 1,000 potential combinations, coming up with 20 cost-effective plans for improving upstream fish passage.

McKay is now working on turning the model into an online tool so that other environmental managers seeking to restore fish passage can use it too.

For more, see http://t.uga.edu/Pn



Improving Global Conservation Funding

A study led by former Odum School postdoctoral associate Anthony Waldron identifies the worst and best countries in the world in terms of funding for biodiversity conservation. The study, published in the *Proceedings of the National Academy of Sciences*, also suggests how funding should change to help achieve the United Nations 2020 goals on reducing extinction.

"It seems likely that the worse the funding, the less chance we have of saving biodiversity," says Waldron, now at the Universidade Estadual de Santa Cruz in Brazil. "However, there was extremely limited global information on where funding levels were poorest. We urgently wanted to fill that information gap as best as possible, with the next United Nations deadline only seven years away."

The researchers, who include Odum School Dean John Gittleman, created two new databases, one containing information about all traceable conservation funding across the world from 1990-2008, and the other information on how stewardship of the world's mammal biodiversity is divided between countries. They then combined four existing global databases—on extinction risk, economic costs, political governance, and protected areas—with the two new ones, to create a model that explains how conservation finance is allocated globally. The model points out countries where biodiversity funding is clearly lower than should be expected.

The model shows that extreme levels of underinvestment are often concentrated geographically. Malaysia, Indonesia, and Australia, all extremely biodiverse countries, also are some of the most poorly funded.

Waldron and Gittleman say their findings contain a positive message. Most—though not all—of the countries in greatest need of more funding are developing nations, and so important gains can be made at relatively low cost. And knowing where the need is greatest could help aid donors to direct their giving for immediate impact.

"The world community is committed to reduce extinction rates by 2020," Waldron says. "This paper provides a fast and urgent estimate of how to better distribute global conservation funding to achieve that."

Gittleman adds that in terms of improving conservation effectiveness, "the fact that 40 of the most underfunded countries harbor 32 percent of all threatened mammal biodiversity indicates that a lot could be changed quickly by targeting just these areas."

The study's coauthors are Arne O. Mooers of Simon Fraser University, Canada; Daniel C. Miller of the University of Michigan School of Natural Resources and Environment; Nate Nibbelink of the UGA Warnell School of Forestry and Natural Resources; David Redding of Simon Fraser University and University College, London; Tyler S. Kuhn of Simon Fraser University; and J. Timmons Roberts of the Brown University Center for Environmental Studies.

The study earned the authors the inaugural Conservation Science Award from the Royal Society for the Protection of Birds in 2014.

Read more at http://t.uga.edu/Qo

Marlene Zuk, professor of biological sciences at the University of Minnesota

Photo courtesy of University of Minnesota

Marlene Zuk: On Cricket Sex and Gender Discrimination in Science

2014 Odum Lecture: Rapid Evolution in Silence

Marlene Zuk, professor of biological sciences at the University of Minnesota, delivered the twenty-ninth annual Odum Lecture on April 1.

Her talk, "Rapid Evolution in Silence: Adaptive Signal Loss in the Pacific Field Cricket," explored conflicting pressures on the evolution of sexual signaling.

Zuk is a leading expert in behavioral ecology and evolution. While still a graduate student, she proposed, with W.D. Hamilton, a role for parasites in supporting the "good genes" hypothesis of sexual selection, namely that females select mates based on showy traits such as bright plumage that indicate robust health and resistance to parasites. These mating preferences increase the chance that offspring acquire genes that confer higher survival.

Pacific field crickets were introduced to Hawaii fairly recently, where they encountered another introduced insect, the parasitoid fly *Ormia ochracea*. Unfortunately for the crickets, these flies attack and kill adult crickets, and find their victims by honing in on the male cricket's mating song.

"Female crickets prefer males that sing… so you've got this cruel bind for the males, where anything they do that makes them less able to be attacked by the flies also decreases their mating success," said Zuk. "So what's a male to do?"

In this case, evolve. Zuk reported that most male crickets on the island of Kauai recently lost the ability to sing, which keeps them from being attacked by the parasitoids. These silent males find mates by intercepting females attracted by the song of the remaining singing males.

"This is extraordinarily rapid evolution and one of the few documented cases of the loss of a sexual signal in the wild in real time," said Zuk.

Gender, Science and Myths of Merit

The next day, Zuk gave a second talk, co-sponsored by the UGA Institute for Women's Studies, the Graduate School, and the Center for Integrative Conservation Research. In "Gender, Science and Myths of Merit" she explored the reasons behind—and some possible solutions for—the disproportionately low numbers of women at higher academic levels in the sciences.

Zuk said that there are two commonly expressed explanations for this disparity: either women don't want to advance their careers as far as men do, even though they are capable of it; or else they don't have the ability.

"I want to suggest that there's actually a third way to look at it," said Zuk. She presented data showing where the career bottlenecks occur, and talked about some of the reasons. These include unconscious gender biases that have been confirmed by numerous studies, most recently in a paper that appeared in *PNAS* in 2012. She finished with thoughts about steps institutions can take to deal with the problem.

Zuk is a Fellow of the National Academy of Sciences and the American Association for the Advancement of Science and the recipient of many honors including the Sigma Xi National Lectureship and the National Science Foundation Young Investigator Award.

Besides more than 100 peer-reviewed papers, Zuk has written numerous articles and books for the popular press. Her books include *Sex on Six Legs: Lessons on Life, Love, and Language from the Insect World*; *Sexual Selections: What We Can and Can't Learn About Sex from Animals*; and most recently *Paleofantasy: What Evolution Really Tells Us About Sex, Diet, and How We Live*.

EcoFocus 2014 was the most successful festival yet, with 25 inspiring environmental films over 11 days in March. Highlights included a number of films with a focus on water, featuring lively discussions with filmmakers and experts after many of the screenings.

The second annual Ripple Effect Film Project, the local water conservation video competition cosponsored with the Athens-Clarke County Water Conservation Office, was also a success, with 18 short videos by amateur filmmakers of all ages vying for the top prize.

And for the second year, EcoFocus, in partnership with Georgia Sea Grant, presented GreenScreen on Jekyll Island. This year's program featured *Into the Gyre* and DisneyNature's *Wings of Life*, and included presentations by UGA researchers working on Jekyll Island and throughout the Georgia coast.

At the end of the festival, director Sara Beresford, MS CESD '00, announced that she would be stepping down after seven years at the helm.

"EcoFocus is the most exciting and gratifying work that I've ever done," she wrote in an email to festival supporters. "It is a truly amazing thing to watch our audiences converge and grow around the festival and the themes that run through the featured films. The energy around this year's festival was inspiring and exciting, and helps me to know that EcoFocus—in whatever form it takes—is an important part of our community." Sara is working with the Odum School administration to ensure a smooth transition to the next chapter for EcoFocus.

An outreach initiative of the Odum School, EcoFocus aims to inform and inspire audiences about environmental issues through film.

www.EcoFocusFilmFest.org

FEATURED FILMS

Hidden Rivers of Southern Appalachia

This short film offered an up-close look at the extraordinary biodiversity of Georgia's streams. After the viewing, director Jeremy Monroe gave a seminar, "Sharing Deeper Water Stories," about how to convey the beauty and importance of aquatic ecosystems and the need for conserving them.

Into the Gyre

This film follows a team of volunteer scientists and students participating in the Sea Education Association semester who sailed to the Sargasso Sea to study plastic pollution in the North Atlantic. It was co-sponsored by UGA's Southeast Atlantic Marine Debris Initiative. Filmmaker Scott Elliott and UGA College of Engineering assistant professor Jenna Jambeck, SEA-MDI principal investigator, led an engaging discussion after the film.

DamNation

This documentary shows the growing movement to remove dams that have outgrown their usefulness. It was followed by a panel discussion with Duncan Elkins, postdoctoral research associate at the Warnell School of Forestry and Natural Resources; Mark Cantrell, a biologist with the U.S. Fish and Wildlife Service Asheville Field Office, and April Ingle, director of Georgia River Network.

Graduate:
Butler Fellowship Recipient Rachel Katz

Rachel Katz graduated from the Odum School with her doctorate in 2014. Originally from Huntersville, North Carolina, Rachel received her B.A. in biology from the University of North Carolina-Chapel Hill and first came to UGA to pursue a master's degree, which she received in 2009. She was the first recipient of the Butler Fellowship, funded by Columbus-based attorney Jim Butler in support of the River Basin Center and its work with graduate students. Development Director Lee Snelling talked with Rachel about the impact of the Butler Fellowship, her advice to incoming ecology students, and what's next.

How did the Butler Fellowship help facilitate your research?

Receiving the Butler Fellowship was essential for me to conduct my research, as it supported me financially while I pursued my master's degree at the Odum School. As a Butler Fellow, my research was motivated by policy related to instream flows that aim to protect aquatic biota and processes in rivers. The fellowship facilitated my research by allowing me to collect, process, and analyze field data to answer ecological questions regarding how low flows caused by extreme drought and water withdrawals influenced the aquatic benthic community in a river used for municipal water supply in Athens.

What guidance would you provide new graduate students entering the Odum School?

As an alumnus of the Odum School and an ecologist who focuses on using ecology to better inform conservation and management, I strongly suggest that new graduate students get involved with the River Basin Center. The resources and expertise at RBC can help students incorporate management-relevant questions into their ecological research. Additionally, the Warnell School of Forestry provides many courses and expertise in how to answer ecological questions that are directly related to management goals. New students interested in ecology and conservation should gain skills related to working with managers and putting ecology into a broader context of management by taking courses broadly related to conservation (i.e., see Integrated Conservation Program courses).

What are the greatest challenges facing your area of ecological science?

A challenge for the effective conservation of aquatic ecosystems includes understanding how stream flow dynamics influence the resistance and resilience of stream biota and ecological processes. Specifically, linking stream flow and network features to flow-related management actions (e.g., hydropeaking, water withdrawals, instream flow policies) remains difficult because of the spatial and temporal complexities of the influence of flow on physical and biological processes. Linking management actions and ecological outcomes can be more quickly achieved by using an adaptive management approach, where alternative hypotheses can be tested within a management framework.

What's next for you?

After receiving my Ph.D. in May 2014, I accepted a postdoctoral research associate position with the Massachusetts Cooperative Fish and Wildlife Research Unit the University of Massachusetts at Amherst. My research is funded by the Northeast Climate Science Center and is focused on developing a cooperative landscape decision framework with multiple land-managing agencies to address the conservation of headwater stream ecosystems. Headwater stream ecosystems are threatened by climate and land use change, and many species (e.g. trout and salamanders) are at risk for decline. I am collaborating with agencies and managers from USGS, U.S. Fish and Wildlife Service, National Park Service, National Forest Service, as well as academic ecologists. I'm excited to help create conservation-decision tools to better inform decisions of land managers to protect headwater stream communities. (see http://www.coopunits.org//Massachusetts/Research/Active/7.7846122496E10)

Undergraduate: Scholar, Advocate, Activist Sara Black, BS '14

I've been an ecology major since my freshman year, although I've taken a sort of nontraditional route," says Sara Black. "I don't know anything about turtles, but I know a lot about mountaintop removal."

Sara Black is a scholar-activist, whose scholarship informs her activism, and vice versa. Instead of focusing on laboratory-based research, she has pursued her interest in environmental and social justice movements in her studies and her extracurricular activities.

A Foundation Fellow and National Merit Scholar from Birmingham, Alabama, Sara graduated *magna cum laude* in May with degrees in ecology and anthropology. Along the way, she won a Udall Scholarship, Rotaract Student Service Award, UGA Award of Excellence, and was elected to the Blue Key Honor Society and Palladia Honor Society for women. She spent a semester in Washington, DC, and a summer working with farmers in upstate New York. That wasn't all that kept her busy, however.

"I spent all my extra time organizing," she says. "I've worked for Sierra Club, Southern Energy Network, Southern Alliance for Clean Energy, UGA Beyond Coal, Athens Immigrant Rights Coalition, Freedom University, and Real Food Challenge. That's a national nonprofit that tries to get universities to direct 20 percent of their purchasing power toward vendors that meet a high standard of sustainability or ethics. I've been trying to build a student group that wants to push UGA to sign that commitment. That's why I was so busy."

Sara combined her academic interests and organizing experience in her senior thesis, "And Justice for All: Scale, Solidarity and Integrational Organizing in the Climate and Immigrant Justice Communities in Georgia."

"In Georgia I've been facilitating a participant action research project where I work with the Sierra Club and local immigrant justice organizations. They have an interesting and unique history of collaboration, where in the past they've done actions together that were mutually beneficial," she says. Her thesis explored their efforts to expand that collaboration beyond its student-focused frame. She presented her work at the 2014 Dimensions of Political Ecology Conference, an important meeting for political ecologists and critical human geography scholars in February, winning the award for best student paper.

Sara plans to move back to upstate New York to continue learning about small agriculture and food systems after finishing a three-month internship at Broad River Pastures, a heritage breed small livestock farm in Elberton. She's also working with her thesis partners, geography professor Nik Heynen and Ph.D. candidate Richard Milligan, to publish an expanded version of her thesis in the *International Journal of Urban and Regional Research*. She intends to look into graduate programs in a year or two.

Sara credits her time at the Odum School with preparing her well for both pursuits.

"I became an Odum student because of Todd Pierson, BS '13. He told me about it—that the student community was really exciting, and the faculty was great. I was really interested in learning more about climate change. And the more I did, the more I also learned about how to be an advocate and an activist and an organizer. I've been super grateful for my ecology education. It's been a fertile foundation."

1960s

Craig Markham, MS '68, retired in 2002 from a 30-year career as an environmental planner and wetlands mitigation and restoration ecologist for the Oregon Department of Transportation. Since then, he has expanded on his lifelong interest in nature photography. Examples of his work can be found at http://cpmarkham.zenfolio.com. He is an active member of the Native Plant Society of Oregon as well as 1000 Friends of Oregon, a land use organization that advocates the protection of natural resource lands and farmland from haphazard urban development. He writes, "I have also enjoyed the challenges of learning to play cello over the past 10 years, even though I have not proven to be a geezer prodigy."

1970s

Richard L. Bailey, MS '70, is the executive director of the Lake Merritt Institute in Oakland, California, a nonprofit community organization dedicated to protecting the health of Lake Merritt. In 2013 he self-published *Stormy, a Novel of Climate Change*. He writes, "I could not have written this book without the 'big picture' education I received at the Institute." For more information, see www.thelastcenturybook.com.

1980s

Peter C. Griffith, PhD '88, was one of 16 honored by the University of Georgia Graduate School with the 2013 Alumni of Distinction Award for achieving exceptional success in their professional careers and in service to their community. Griffith, of Baltimore, Maryland, is the founding director of NASA's Carbon Cycle and Ecosystems Office at the Goddard Space Flight Center. As coordinator of the North American Carbon Program, Dr. Griffith aims to quantify continental-scale sources and sinks of carbon-based greenhouse gases in North America and adjacent oceans. He is a member of the Science Definition Team for the Arctic Boreal Vulnerability Experiment, which is a major field campaign planned for Alaska and Western Canada. Currently, he is the chief support scientist for Sigma Space Corporation and previously was the lead support scientist for Science Systems and Applications.

Left to right: Mary Wagner, Associate Chief of the USDA Forest Service; William Walter Hargrove, Research Ecologist, USDA Forest Service; Thomas L. Tidwell, Chief, USDA Forest Service; and Timothy P. DeCoster, Chief of Staff, USDA Forest Service.

Bill Hargrove, PhD '88, Eastern Threat Center research ecologist with the USDA Forest Service Southern Research Station, recently accepted the 2013 Chief's Honor Award for Preserving and Sustaining our Nation's Forests and Grasslands on behalf of the *ForWarn* team. Hargrove is the lead researcher for *ForWarn*, a program that uses satellites to monitor and track forest disturbance and recovery. More information about *ForWarn* is at http://forwarn.forestthreats.org.

Eric Hughes, MS '80, writes, "I have had the good fortune to work for the US EPA for 36 years now in Atlanta and Jacksonville, Florida, working in wetlands regulatory and water quality protection and Everglades ecosystem restoration issues. I got my M.S. in Zoology/estuarine ecology, doing my fieldwork on Sapelo Island, working with Dr. Larry Pomeroy and Dr. Evelyn Sherr. Dr. Odum was on my M.S. review committee; what a wonderful person he was! Recently reading the history of the UGA ecology program at your website was so enjoyable for me—lots of fond memories of professors and fellow grad students in the late 1970s."

1990s

Scott Hitch, BS '96, was a member and graduate of the 2013 class of the Institute for Georgia Environmental Leadership (IGEL.) He is currently serving as vice chair of the board of directors for the Green Chamber of the South and will assume the role of chair next year.

Jeff Lovich, PhD '90, research ecologist with the U.S. Geological Survey in Flagstaff, Arizona, continues his research on the effects of renewable energy development on wildlife and the effects of climate change on desert tortoises. One of his recent papers in *Biological Conservation* documented the decline of a desert tortoise population over 34 years in Joshua Tree National Park and the relationships among annual tortoise survivorship, drought, and tortoise predators. This winter he was invited to Japan as a keynote speaker to talk about the ecology of invasive U.S. turtles and their effects on Japanese turtles. Prior to that he was invited to the Galápagos to assist in development of a long-term strategy to repatriate and repopulate giant tortoises to their former distribution and abundance. He continues his collaborative long-term research with turtles in Pennsylvania, South Carolina, and Alabama as well. More information on his research and publications can be found at http://profile.usgs.gov/jeffrey_lovich.

Kate McLaughlin banding a hummingbird. *Courtesy McLaughlin Environmental Services.*

Kate Schumacher McLaughlin, BS '95, runs her own consulting firm, McLaughlin Environmental Services, in Prince William Sound, Alaska, where she also serves as president and executive director of Prince William Soundkeeper, a nonprofit citizen's water quality advocacy group. From May through July she also operates the northernmost hummingbird banding station in the world. For more information, see http://www.akenvironmentalservices.com.

Liesl Pimentel, BS '98, celebrates 10 years working for the Phoenix Zoo. As the manager of education she oversees all paid education programming including summer and winter Camp Zoo, Night Camp, outreach, school programs, and family programs. In collaboration with a coworker, she was awarded a staff conservation grant and will spend a month in Guyana this summer (working and vacationing too). The conservation work will be with a variety of research projects happening in the Rupununi, with an emphasis on jaguar population monitoring and social research (conducted by Matt Hallett, Ph.D. student at the University of Florida). Liesl is also in her third year working with National Geographic as an independent contractor coordinating the Giant Traveling Maps Program, which provides floor-sized map rentals as teaching resources to schools around the country. Liesl still swims every weekday (though she retired from competition in 2000), travels often, and enjoys hiking, camping, and kayaking with her dog.

2000s

The Center for Urban Ecology at Butler University, led by **Tim Carter**, PhD '06, was awarded a four-year, $2.9 million National Science Foundation grant in 2013 to create a science museum consisting of sites along six Indianapolis waterways where arts and science will be used to educate the public about Indianapolis's water system. For more information, see: http://bit.ly/1hJMe0p.

Wyatt Cross, PhD '04, received tenure in the Department of Ecology at Montana State University, and has been named director of the university-affiliated Montana Water Center. The Center advances water research, education, and partnerships throughout Montana and beyond, and is part of the National Institutes for Water Resources.

Kacie Moreno-Schoen Darden, BS/MS CESD '05, broke the female two-person team world record in the 2013 Race Across America, a 3,000 mile endurance bicycle race from Oceanside, California, to Annapolis, Maryland. Kacie and her cycling partner Dani Grabol completed the race in 8 days, 2 hours, and 35 minutes, smashing the previous record by more than 13 hours. Along the way they raised more than $30,000 for Camp Twin Lakes, which provides camp experiences for Georgia children with serious illnesses or disabilities.

Andrew Durso, BS '09, is working on his doctorate in ecology at Utah State University, studying snake and lizard physiological ecology. He has published one paper this year in *Ethology* and a second in *Diversity and Distributions*, and his blog, "Life Is Short but Snakes Are Long," has almost attained 175,000 hits. Follow Andrew at http://snakesarelong.blogspot.com.

Andrew Durso with an Eastern Diamondback Rattlesnake on a beach in Florida, during field work.

Nicole Gottdenker, PhD '09, is an assistant professor in the UGA College of Veterinary Medicine Department of Pathology. She won the 2014 John M. Bowen Research Award for Excellence in Animal Research.

Rebecca Haynes, MS CESD '06, was named one of the South Carolina Midland's "20 Under 40" by *The State* newspaper in 2014. Rebecca is the director of government relations for Conservation Voters of South Carolina. For more about Rebecca, see www.thestate.com/20-under-40.

Tim Kelley, PhD '02, is currently professor and graduate director of the masters of science in environmental health (MSEH) degree program at East Carolina University in Greenville, North Carolina. He also serves as editor-in-chief of the international, peer-reviewed, online, open access journal, *Environmental Health Insights*, published by Libertas Academia Press (www.la-press.com/environmental-health-insights-journal-j110).

Emily Franzen Mills, BS '00, reports that she and her family have moved to Falls Church, Virginia, after four years overseas in Hungary and the Philippines. Emily, who received her JD *cum laude* from UGA in 2004 and was the first Legal Fellow at the River Basin Center, recently joined the board of directors as secretary of Fair Shake Environmental Legal Services. Fair Shake is a new nonprofit law firm representing clients of modest means in environmental matters. Emily reports that she and her husband Matt recently welcomed their second daughter, Cecelia.

Maia S. Mukherjee, PhD '08, accepted the position of education administrator at the Kennedy Space Center, in 2014. Maia writes "I am really excited about this opportunity. Once I get settled in, one of my goals for the first six months is to design a new exhibit that showcases NASA's (along with NOAA's and other agencies') role in monitoring climate change and its impact."

Doug Parsons, MS CESD '00, became the North America policy director at the Society for Conservation Biology in Washington, DC, in May 2014. He was previously the climate change liaison for the National Park Service.

2010s

Rachel Katz, PhD '14, accepted a two-year postdoctoral position at the Massachusetts Cooperative Fish and Wildlife Research Unit at the University of Massachusetts at Amherst. She will be working with several federal agencies (USGS, Fish and Wildlife Service, Forest Service, and National Park Service) to develop a cooperative landscape management framework to protect headwater stream ecosystems from threats associated with climate and land use change using decision analysis. The project focuses on two northeastern watersheds (Potomac and Merrimack) as case studies. She is collaborating with academics, research scientists, and resource managers to develop a framework that can be scaled to larger landscapes for effective conservation of aquatic ecosystems.

Katherine Lacksen, BS '13, received a Fulbright Scholarship to conduct research in Darwin, Australia. She will study nutrient pollution in the country's tropical rivers, a subject about which there has been very little research. "I will collect data to analyze which forms of nutrient pollution pose the greatest threat to this iconic ecosystem," she says. A former member of UGA's cross country and track teams, Katherine is also looking forward to volunteering with the Indigenous Marathon Program, which prepares Aboriginal community members to run the New York Marathon, while promoting exercise and healthy lifestyles.

Mark Milby, BS '10, is managing residential energy efficiency programs as a senior program associate at the Midwest Energy Efficiency Alliance in Chicago, a membership organization of state and local governments, energy utilities, research institutes, manufacturers, energy service providers, and advocacy organizations working collaboratively to advance energy efficiency in the 13-state Midwestern region. Mark earned a master of public administration degree in sustainable development from Indiana University in 2013. Mark also reports that he is engaged to be married to Heidi Knoblock, UGA BSFCS '09, in Athens next spring.

Liz Nixon-Shapiro, BS '10, is a professional medical illustrator. She received her M.S. in Medical Illustration from Georgia Regents University (formerly the Medical College of Georgia) in 2014, where she was the recipient of the William Stenstrom Award of Excellence in 2014 and an Award of Merit for Outstanding Medical Illustration in 2013. She married John Shapiro in January 2014. She writes, "Together we have three crazy dogs, and a baby on the way! We're both very excited about meeting our baby girl in the fall." You can view her work at www.nixonmedicalmedia.com.

Tierney O'Sullivan, BS '12, received a Fulbright Scholarship to work on the island state of Tasmania, Australia, examining the role the environment plays in the breeding success of the endangered Tasmanian wedge-tailed eagle, the largest bird of prey in Australia. "In the future, I am interested in looking for answers to a fundamental dilemma in conservation—how to provide the most effective management of the entire ecosystem with limited funding and resources," she says. "My work in Tasmania will serve as an ideal basis for these career goals by providing experience with not only academia, but also the management component of conservation."

Julie Rushmore, PhD '13, is currently pursuing a DVM degree in the UGA College of Veterinary Medicine. She received the Volterra Award for the Best Student Presentation in Theoretical Ecology from the Ecological Society of America at the 2013 ESA annual meeting in Minneapolis. Her paper, "Network-based Vaccination Improves Prospects for Disease Control in Wild Chimpanzees," was published in *the Journal of the Royal Society Interface* in June, 2014.

Mindy Edelson Schwartz, MS CESD '13, is the education program specialist at the California Science Center in Los Angeles. She focuses on professional development for science teachers, including developing curricula and leading teacher training workshops. The education program is designed to empower teachers to follow up on Science Center field trips with classroom lessons that connect what they've learned to the Next Generation Science Standards. Part of Mindy's work is funded by a grant from NASA to provide a space exploration and STEM-oriented curriculum to teachers in grades four through eight. Another grant was used to create a professional development program for third through fifth grade teachers on the subject of ecosystems. Mindy writes, "I like to think that my experience at Odum is the real reason why they hired me—who better to design an ecosystems curriculum from scratch than a real-life, Odum-trained ecologist??"

Mindy celebrated her wedding to Avi Schwartz in November 2013.

Daniel Streicker, PhD '11, currently a Research Fellow in the Institute of Biodiversity, Animal Health and Comparative Medicine at the University of Glasgow, Scotland, received a Sir Henry Dale Fellowship from the Royal Society and the Wellcome Trust, awarded to outstanding postdoctoral scientists working in the U.K. addressing an important biomedical question. He was also the inaugural grand-prize winner of the new international Science and SciLifeLab Prize for Young Scientists awarded at a ceremony in Stockholm in December 2013. The prize, created by *Science* and SciLifeLab, a center for molecular bioscience focused on health and the environment, includes a $25,000 honorarium.

In March, more than 25 freshwater-focused Ecology alumni enjoyed a reunion when they returned to campus to offer advice about future direction for the River Basin Center.

BACK ROW: Duncan Elkins, MS '05, Postdoctoral Associate at UGA; Professor Alan Covich; Wyatt Cross, PhD '04, Assistant Professor of Ecology at Montana State University; Bob Hall, PhD '96, Professor of Ecology at University of Wyoming; Katherine Baer, MS CESD '96, Director of Conservation at the Triangle Land Conservancy in Durham, NC; Jon Benstead, PhD '01, Associate Professor, University of Alabama; Nanette Nelson, MS CESD '00, Associate Research Scientist at University of Wyoming; Professor of Geography David Leigh; Dave Walters, PhD '02, USGS Research Ecologist; Brian Gregory, MS CESD '97, Ecologist with the National Park Service; Doug Parsons, MS CESD '00, North America Policy Director at the Society for Conservation Biology; John Davis, PhD '09, US EPA Postdoctoral Fellow.

CENTER ROW: Museum of Natural History Director Bud Freeman, PhD '80; USGS Senior Research Ecologist and Adjunct Professor Mary Freeman; Emma Rosi-Marshall, PhD '02, Associate Scientist, Cary Institute for Environmental Studies; Megan Hagler, MS '06, Research Professional at UGA; Theresa Thom, MS CESD '00/PhD '05, US FWS Aquatic Ecologist; Kristi Minahan, MS CESD '99, Water Quality Standards Specialist, Wisconsin DNR; Jamie March, PhD '00, Associate Professor, Washington and Jefferson College; Josh Ness, PhD '01, Associate Professor, Skidmore College; RBC Senior Legal Fellow Katie Sheehan; Associate Professor Amy Rosemond.

FRONT ROW: Scott Pohlman, MS CESD '98, Conservation Incentives Program Director, North Carolina DNR; Cathy Gibson, PhD '04, Assistant Professor, Skidmore College; Marcia Snyder, PhD '12, ORESE Fellow, EPA; RBC Director of Policy Laurie Fowler; Mike Paul, PhD '99, Senior Scientist and Director, Tetratech; Jane Rogers Argentina, MS '06, graduate student at Virginia Tech; RBC Director of Science Seth Wenger, MS CESD '99/PhD '06; Jessica Melgey, former Freeman lab technician.

Not pictured: Scott Connelly, PhD '09, Odum School Assistant Professor; Joe DeVivo, MS CESD '96, National Park Service Ecologist and Program Manager; Marirosa Molina, PhD '01, US EPA Microbiologist; and Odum School Professor Emeritus Bruce Wallace.

rEvolutionary

Photos: Beth Gavrilles

The theme of this year's Spring Fling, the Odum School's annual end-of-the-year celebration and awards ceremony, was "The Bea/etles: You say you want a rEvolution," inspired by the 50th anniversary of the Fab Four's arrival in the U.S.—as well as a few notable figures in the history of science and the Odum School of Ecology. The Best Costume award went to Eleanor Rigby and Father McKenzie, aka Jessica Chappell and Mo Sheikh.

SPRING FLING 2014 AWARDS

BEST STUDENT PAPER: APPLIED AND BEST STUDENT PAPER: BASIC/THEORETICAL

Tad Dallas

RON CARROLL & CAROL HOFFMAN COSTA RICA TRAVEL AWARD
Douglas Hart, Audrey Miller, and Meghan Tait

DEAN'S AWARD
Sonia Altizer

FACULTY INSTRUCTOR OF THE YEAR
Nina Wurzburger

DISTINGUISHED GRADUATE STUDENT TEACHING AWARD
Kristy Segal McDowell

JOSH LAERM MEMORIAL OUTSTANDING ECOLOGY UNDERGRADUATE AWARD
Kelly Murray

ODUM GLOBAL SCHOLARS FOR UNDERGRADUATE STUDY AWARD
Zachary Holmes

THELMA RICHARDSON–FRANK GOLLEY UNDERGRADUATE SUPPORT AWARD
Michael Holden and Kip Lacey

FRANK GOLLEY MEMORIAL AWARD
Kimberly Kellett

ROBERT A. SHELDON MEMORIAL AWARD
Sara Heisel

EMPLOYEE OF THE YEAR

Emily Schattler (shown with Dean Gittleman)

AWARD FOR EXCELLENCE IN OUTREACH

Sam Woolford

GRADUATE DIVERSITY AWARD
Joseph Colbert

JUDY MEYER–GENE HELFMAN GRADUATE TRAVEL AWARD

David Manning and Kaitlin Farrell

PURPLE HEART AWARD
Emily Schattler

SOLITARY GLOVE SERVICE AWARD
Sarah Budischak

Scott Connelly

In September 2013 Scott Connelly, PhD '08, started a new position at the Odum School as assistant professor with an emphasis on instruction. Scott was most recently the director for tropical ecology study abroad programs and resident scientist at the UGA Costa Rica campus. His research concerns the ecosystem effects of biodiversity loss, with a focus on the decline of amphibians in the neotropics. His dissertation, "Effects of Catastrophic Disease-Related Tadpole Declines on Upland Neotropical Stream Structure and Function," was based on research he conducted in Panama; he has also worked in Ecuador and Trinidad. He spoke with *EcoVoice* Editor Beth Gavrilles about his new role in the Odum School.

Q: How did you first become interested in ecology, and particularly your area of research?

A: I got into ecology after working in a couple of other fields. I originally obtained a degree in business economics, and I focused on accounting. After some time I decided that wasn't the career for me, and I started investigating graduate programs related to biology. The programs offered through UGA seemed to be exactly what I was looking for.

For my research I wanted to combine conservation, or at least applied ecology, with ecosystem-level ecology. I've always had an interest in amphibian biology and natural history. Work examining the consequences of disease-driven declines in the tropics that was beginning at UGA (through Cathy Pringle's lab) was of particular interest to me. I combined experience I had working in tropical ecology at our Costa Rica campus with the ecosystem consequences of on-going amphibian die-offs in the neotropics.

Q: What attracted you to the teaching emphasis faculty position?

A: The teaching emphasis position allows me to develop and teach more undergraduate and graduate courses than I normally would be able to at a large university, and still be able to conduct research and mentor student research. The position also allows me to continue to work closely with our study abroad ecology program offered through our Costa Rica campus. It's the perfect combination.

Q: What do you like—or find challenging—about teaching undergraduates?

A: Undergraduates have an incredible sense of excitement and enthusiasm toward the natural world that is sometimes lacking as folks progress in their career. Ecological concepts and natural phenomena stay fresh, and the students are always seeing the world through a new lens.

Q: You've worked in Costa Rica for a while now. What is the program you've been running there? How does your new position relate? Will you continue your involvement there?

A: I'm currently teaching and directing our Maymester Ecology program at our San Luis campus. We offer tropical ecology, which is a field-based ecology course, and ecological research, which is a hands-on tropical ecology class where students design, implement, and present their own research while visiting and experiencing the incredible diversity of ecosystems found in Costa Rica. I anticipate continuing my involvement in this program.

Q: You are also continuing to conduct research. What will your research focus be?

A: My research will continue to focus on the ecosystem-level effects of declining biodiversity, particularly with respect to amphibian declines. I'm currently also investigating aspects of captive amphibian husbandry issues, in light of captive breeding efforts. I'm also interested in stream-water quality and quantity issues in Costa Rica.

Q: What made you want to stay at UGA?

A: The combination of the Odum School's commitment to our undergraduate program and the availability of resources (for example, faculty expertise and our Costa Rica campus) make UGA a great place to work.

Odum School Celebrates Carl Jordan's Retirement and New Book

Guests line up after the festivities to have Carl Jordan sign his new book on sustainable agriculture.
Photos: Kelly Goodwin

Students, faculty, alumni, family, and friends packed the Ecology auditorium on November 12, 2013, for a special seminar and reception honoring Carl Jordan, senior research scientist emeritus. The event marked the publication of his latest book, *An Ecosystem Approach to Sustainable Agriculture: Energy Use Efficiency in the American South*, and doubled as a belated celebration of his 2009 retirement. A number of Carl's former students came back to Athens to join in the festivities, which included a tour of his Spring Valley EcoFarm, where much of his recent research has taken place.

Carl gave a seminar on the new book, which he was invited to write by the publisher, Springer Verlag, as the first in a new Environmental Challenges and Solutions series. In it, he pulls together lessons learned over 40 years of his own research and that of the 35 graduate students he mentored. The book is dedicated to them.

He was then joined onstage by three of his former students—Bob Buschbacher, PhD '84, associate in tropical forestry in the Amazon Conservation Leadership Initiative at the University of Florida; Krista Jacobsen, PhD '08, assistant professor in the College of Agriculture at the University of Kentucky; and Justin Ellis, PhD '13, executive director of the Soque River Watershed Association in Clarkesville, Georgia—for an informal conversation about some of the major themes he and his students have explored—and continue to explore—over the course of his career.

The discussion was followed by a series of video tributes from some of Carl's former students from around the globe who were not able to attend in person. The evening concluded with a reception and book signing in the lobby.

Congratulations Carl!


SNYDER, LANG


FULLERTON


MENGAK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VANGALA

Congratulations Graduates!

GRADUATE STUDENTS

Summer 2013

Mindy Edelson, PhD Ecology
Joshua Egenolf, PhD Ecology
Meredith Meyers, PhD Ecology
Malavika Rajeev, MS Ecology
Ouida Stribling Stuber, MS Ecology

Fall 2013

Jason Lang, PhD Ecology
Brian Snyder, PhD Ecology

Spring 2014

Don Christy, PhD Ecology
Casey Harris, MS Ecology
Jessica Joyner, PhD Ecology
Rachel Katz, PhD Ecology
Rachel King, MS Ecology
Kristy Segal McDowell, PhD Ecology
Kyle McKay, PhD Ecology
Carrie Straight, PhD Ecology

UNDERGRADUATES

Summer 2013

Genevieve Dillon
Nathan Harvel
Margeaux Maerz
Malavika Rajeev, *magna cum laude* with high honors
Natalie Woodall

Fall 2013

Heather Abernathy
Gregory Brooker, *cum laude*
Megan Chase
Elizabeth Kruckow
Chelsea Krzyzewski
Rebekah Lee, *cum laude*
Brian McGann, *cum laude*

Spring 2014

Meredith Barrett
Jui Bhingarde
Sara Black, *magna cum laude*
Aaron Eilenfield, *cum laude*
Katherine Evans
Caroline Fullerton, *magna cum laude*
Ashley Lang, *magna cum laude*
Lara Mengak, *magna cum laude* with honors
Kelly Murray, *magna cum laude* with high honors
Nicholas Richwagen, *magna cum laude* with high honors
Scott Saunders, *magna cum laude* with high honors
Chelsea Sexton, *magna cum laude* with honors
Alexander Terry, *magna cum laude* with honors
Shreyas Vangala, with honors

Happy Birthday Dr. Odum!

Odum School Celebrates Founder's Centennial

The Odum School marked what would have been founder and namesake Eugene P. Odum's 100th birthday on Sept. 17, 2013, with cake and ice cream. A program exploring the ongoing Odum legacy at UGA and beyond filled the auditorium to capacity with students, faculty, and friends from across campus and the community.

Betty Jean Craige, University Professor Emerita of Comparative Literature, Director Emerita of the Willson Center for Humanities and Arts, and author of *Eugene Odum, Ecosystem Ecologist and Environmentalist,* gave the keynote address, discussing Dr. Odum's life and scholarship. Her remarks were followed by a panel discussion, "Ecology: The Next and Last 100 Years," featuring Alex Patterson of Athens, a lifelong friend of the Odum family; Professor Emeritus Dave Coleman; and Assistant Professor Nina Wurzburger, and moderated by doctoral student Carly Phillips. The discussion was followed by a screening of the 2002 film "A Celebration of the Life of Eugene P. Odum."

As part of the celebration, the UGA Hargrett Rare Book and Manuscript Library put together a special exhibition drawing from Odum's papers, photographs and other memorabilia, which was on display from September through December, 2013.

Although much has changed since Dr. Odum retired in 1984, the Odum School remains rooted in his vision of an interdisciplinary, collaborative community of scholars taking a holistic approach to research, teaching, and service.

"I think that Gene would be really quite pleased with how the School has grown and changed. Its various foci have shifted over the years consistent with new thinking and theories that have emerged, and new concerns about the environment, but the School continues to take a very holistic approach," concluded Professor Emeritus and former Institute Director Ron Carroll.

For more, see http://t.uga.edu/M4

Gary Barrett Retires After Distinguished Career

Gary W. Barrett, Eugene P. Odum Chair of Ecology and former director of the Institute of Ecology, retired 1 June 2014 after 20 years at the University of Georgia (UGA). Barrett will be known as the Eugene P. Odum Chair of Ecology Emeritus.

Barrett first came to UGA as a graduate student, where he studied under the direction of Eugene P. Odum, receiving his doctorate in 1967. His dissertation research focused upon the effects of insecticide stress on a grassland ecosystem.

He returned to UGA in 1994 as director of the Institute of Ecology and Eugene P. Odum Chair of Ecology after serving 26 years at Miami University, where he held the position of Distinguished Professor of Ecology. He was the recipient of the Miami University Most Outstanding and Effective Teaching Award in 1971, and the Sigma Xi Researcher of the Year Award in 1986. During his tenure at Miami University he founded the Institute of Environmental Sciences (IES) and the Ecology Research Center (IERC).

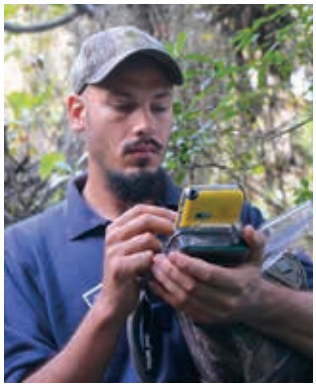
Among his accomplishments at UGA were the establishment of the HorseShoe Bend Ecology Experimental Research Center, acquisition of the McGarity Wetlands Preserve as an educational research site, restoration of the Martha H. and Eugene P. Odum Spring Hollow Watershed, and creation of the bachelor of science and master of science in ecology degree programs.

Barrett's research has focused on landscape ecology, terrestrial ecosystem dynamics, mammalian population dynamics, applied ecology, agroecosystem ecology, and career trends in ecological research and education. His publications include more than 190 papers in peer-reviewed scientific journals as well as eight books, including *Fundamentals of Ecology Fifth Edition* coauthored with Eugene P. Odum.

During his teaching career, Barrett served as major advisor to 48 graduate students and supervised four postdoctoral scholars. He has mentored countless undergraduates, receiving the Excellence in Undergraduate Research Mentoring Award from UGA in 2005. Odum School graduate students presented him with the Purple Heart Award for extraordinary efforts in support of graduate education in 2009, and he was honored by the UGA class of 2012 as a faculty member who contributed greatly to their career development.

Barrett's service to the science of ecology extends far beyond UGA. He has played leadership roles within many scientific societies and organizations, including the American Association for the Advancement of Science, where he was elected a Fellow in 1990; American Institute of Biological Sciences, where he served as president in 1998; American Society of Mammalogists; Association of Ecosystem Research Centers, where he served as president from 1995–1996; Ecological Society of America; International Association for Ecology; International Association for Landscape Ecology, where he served as president of the U. S. Regional Association from 1988–1990; National Science Foundation, where he served as director of the ecology program; National Research Council; Ohio Academy of Science; and scientific honor society of Sigma Xi.

The entire Odum School community extends our thanks and congratulations to Dr. Barrett, and wishes him a very happy retirement.



COLBERT

AWARDS AND FELLOWSHIPS

- Master's student **Erin Abernethy** and doctoral students **Rachel Smith** and **Allison Williams** were awarded NSF Graduate Research Fellowships in 2014; doctoral student **Davide Zailo** received an honorable mention.
- Doctoral students **Alexa Fritzsche**, **Dara Satterfield**, and **Stephen Shivers** all received NSF Doctoral Dissertation Improvement Grants in 2014.
- Doctoral student **Alyssa Gehman** received a 2013 NSF Georgia Coastal Ecosystems LTER graduate assistantship and NSF LTER cross-site soft sediment working group stipend. She was also awarded a 2013 M.K. Pentecost Ecology Fund Grant.
- The **EcoFocus Film Festival**, which has raised environmental consciousness in Athens through scores of high quality films, received a 2014 Alec Little Environmental Award. The award is given in memory of John A. (Alec) Little, who worked closely with many environmental organizations in Georgia. It recognizes individuals and organizations for environmental responsibility in the Athens area.
- Doctoral student **Daniel Harris** received a fellowship from the American Museum of Natural History in conjunction with the Edward John Noble Foundation to conduct research on St. Catherines Island, Georgia. The fellowship provides accommodation, access to a boat, and support for undergraduate researchers.
- Doctoral student **Rebeca DeJesús Crespo** received a Ford Foundation Dissertation Completion Fellowship in 2014; she was also selected for an American Association of University Women Dissertation Completion Fellowship.

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■ Doctoral student **Nick Marzolf** was recognized for the best graduate student poster at the 25th Annual Technical Symposium of the Florida Lake Management Society in Stuart, Florida, in June 2014. His poster, "Quantifying Effects of Invasive Apple Snails (*Pomacea maculata*) in a Large Reservoir: An Outline for Research," was coauthored by Steve Golladay and Alan Covich.

■ Instructor and Undergraduate Coordinator **Jim Richardson** received a Lifetime Achievement Award from the International Sea Turtle Society at the 34th Annual Symposium on Sea Turtle Biology and Conservation in New Orleans in 2014.

■ Distinguished Research Professor **Catherine Pringle** received the Kilham Award from the International Society of Limnology. She delivered the Kilham Memorial Lecture, "Climate-Driven Acidification in Neotropical Streams: Evidence from a Long-Term Research Project in Costa Rica," at the Society's 32nd Congress in Budapest, Hungary, on August 6, 2013.

■ **Sara Black**, BS '14, received the 2014 Rotaract Service Award for the Odum School. Rotaract is an international program for adults ages 18 to 30, sponsored by the service organization Rotary International.

■ Dean **John Gittleman**, former postdoctoral associate **Anthony Waldron**, and their coauthors received an inaugural Conservation Science Award from the Royal Society for the Protection of Birds for their paper, "Targeting Global Conservation Funding to Limit Immediate Biodiversity Declines," which appeared in the Proceedings of the National Academy of Sciences in 2013.

■ Undergraduate **Sara Black**, BS '14, won the award for best paper at the Dimensions of Political Ecology Conference at the University of Kentucky in February for her paper "And Justice for All: Solidarity, Scale, and Integrational Organizing in the Climate and Immigrant Justice Movements in Georgia."

■ Professor Emeritus of Environmental Policy **Jim Kundell** received the Outstanding Civilian Service Medal from the U.S. Army Corps of Engineers.

■ Undergraduate **Sara Black**, BS '14, and doctoral students **Sarah Budischak** and **Virginia Schutte**, received UGA Awards of Excellence during the 2014 Presidential Honors ceremony.

■ Undergraduate **Carmen Kraus** won the award for Best Paper in Physical and Environmental Sciences at the 2014 UGA Center for Undergraduate Research Opportunities (CURO) annual symposium for her paper on density dependent regulation of survival and reproduction in dogbane beetles and underlying host-plant interactions.

■ Associate Professor **John Drake** won a UGA Creative Research Medal in 2014.

■ Professor **Jeb Byers** received one of four First-Year Odyssey Teaching Awards given by UGA in 2014. The awards recognize outstanding instructors who have demonstrated innovation in instruction, connection of seminar content to the instructor's research, and how FYOS program goals are incorporated into the seminar.

■ Associate Professor **Andrew Park** was an inaugural recipient of the UGA Michael F. Adams Early Career Scholar Award in 2014.

■ Undergraduate **Carmen Kraus** received the Tom Callahan Award for Undergraduate Research for her presentation at the 2013 Blandy Summer Research Forum at the University of Virginia's Blandy Experimental Farm, where she participated in a summer Research Experience for Undergraduates program sponsored by NSF.

SCHOLARSHIPS

■ Master's student **Erin Coughlin** was awarded the Hubert B. Owens Scholarship by the Garden Club of Georgia in 2014.

■ Undergraduate **Zachary Holmes** won a John J. Scarano Memorial Scholarship from the Georgia Chapter of the Alliance of Hazardous Materials Professionals in 2014. Holmes also received a scholarship for study abroad opportunities in sustainability from the UGA Office of Sustainability made possible by the Brittney Fox Watts Memorial Endowment.

■ Doctoral student **Eric Goolsby** received a Sigma Xi Grant-in-Aid of Research in 2013.

■ Master's student **Joseph Colbert** received a Tillman Foundation Military Scholarship from the Pat Tillman Foundation which supports military veterans and spouses; he is UGA's first Tillman Scholar.

OTHER RECOGNITION

■ Doctoral students **Peter Baas**, **Megan Machmuller**, **Dan Becker**, **Troy Simon** and faculty **Alan Covich**, **Jackie Mohan**, and **Rich Shefferson** attended the 11th INTECOL International Congress of Ecology, hosted by the British Ecological Society in August 2013 in London.

■ **Katie Brownson**, a doctoral student in the ICON program, received an internship with the International Water Resources Association to research international science-policy interface platforms during the summer of 2014 in Montpellier, France.

■ Dean **John Gittleman** was named UGA Foundation Professor in Ecology in 2014.

■ Doctoral student **Sarah Budischak** was appointed to the UGA Graduate School Emerging Leaders Program for the 2013-2014 academic year.

■ Doctoral student **Alexa Fritzsche** was a finalist in the UGA Graduate School's **Three Minute Thesis** competition in 2014.

■ Doctoral students **Bill McDowell** and **Virginia Schutte** were recognized by the UGA Teaching Academy with the Interdisciplinary Certificate in University Teaching in 2014.

■ Doctoral student **Kimmy Kellett** received a UGA Outstanding Teaching award in 2014.

■ Professor **Alan Covich** and Instructor and Undergraduate Coordinator **Jim Richardson** were named UGA Outstanding Teaching Faculty in 2014.

■ Undergraduate **Katherine Zarada** was one of twelve students selected as a UGA Public Service and Outreach Student Scholar for 2013-2014. As part of the program, Katherine served a 150-hour internship with the State Botanical Garden of Georgia.

■ Doctoral student **Shafkat Khan** received a UGA Office of Sustainability grant to establish a bicycle cooperative to help UGA students with bicycle maintenance and repair. Through partnership with Bike Athens and regular events on the UGA campus, the cooperative will teach bike maintenance skills, encourage students to use their bikes more often, and promote a culture of sustainability by building an active student community around biking.

Milestones

Graduate Advisor Earns Ph.D.

Graduate Advisor Katherine Adams received her doctorate in adult education from the UGA College of Education in 2013. Her dissertation, "The Exploration of Community Boundary Spanners in University-Community Partnerships," delved into the characteristics, roles, and motivations of community leaders who are able to work across traditional "town and gown" boundaries to build relationships with institutional partners.

Faculty on the Move

Assistant Professor **Rich Shefferson** accepted a position as associate professor of plant ecology in the Department of General Systems Studies at the University of Tokyo.

Postdoctoral associate **Barbara Han** joined the faculty of the Cary Institute of Ecosystem Studies as a senior scientist. Barbara was a National Science Foundation Postdoctoral Research Fellow in Biological Informatics in the Sonia Altizer lab from 2008-2010, and a National Institutes of Health Ruth Kirschstein Postdoctoral Research Fellow in the John Drake lab from 2011-2014.

Bonita Wagers Retires

Bonita Wagers, who has been the Odum School receptionist since 2007, retired on June 30, 2014, after 10 years at UGA. Bonita will be keeping busy with her grandchildren, travel, and lots of books.

Odum Babies!

- Adelaide Schutte to doctoral student **Virginia Schutte** and Charles Schutte, July 16, 2013.
- Jonas Glenn Harmon Manning to Meghan Manning and doctoral student **David Manning**, July 22, 2013.

- Jacob Christopher Linkous (above) to doctoral student **Sarah Bowden** and Chris Linkous, November 13, 2013.
- Olivia Rose Ng to postdoctoral associate **Barbara Han** and Jonathan Ng, December 1, 2013.
- Daphne Lydia Fox Cleveland to **Ania Majewska** and Chris Cleveland, November 29, 2014.

Odum Weddings

Doctoral students **Bill McDowell** and **Kristy Segal** were married on June 1, 2013 at Smithgall Woods State Park in North Georgia.

Doctoral student **Keri Goodman** and **Dusty Kemp**, PhD '08, were married on June 20, 2014, in Key Largo, Florida.

Letter from the Director of Development

Hello Odum School Alumni and Friends,

As the 2013-14 academic year comes to a close and we begin another it's nice to take a moment and reflect on what has been a great year. We started the year commemorating Dr. Odum's 100th birthday and celebrating his legacy, which still plays an important role in our continued evolution. We were pleased to welcome back alumni, emeritus faculty, and other friends from through the years. To know where we are heading, it's important we appreciate and understand our past. Dr. Odum's 100th birthday allowed us to do just that.

In the spring we hosted our second Parents and Families Day. We were thrilled to have so many families of our undergraduate students join us to learn more about the undergraduate experience here in the Odum School. The parents seem to love visiting the School and learning about their students' passion for ecology.

We were happy to welcome a group of our alumni who came to campus in March to offer their insights to help guide the future direction of the River Basin Center.

Although only numbering in the region of 1,300, our alumni are spread all over the globe in academia, with NGOs, and in other positions impacting the study of ecology and increasing our understanding of how the science is vital to us all.

Thanks to all of you who help make the Odum School the special place it is. Whether you are alumni, an advisory board member, a student, or faculty/staff, your work and contributions make a difference.

Lee Snelling

The Eugene P. Odum School of Ecology would like to thank all of our alumni and friends for their support during the past fiscal year. Below are all those who made gifts between July 1, 2013-June 30, 2014.

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