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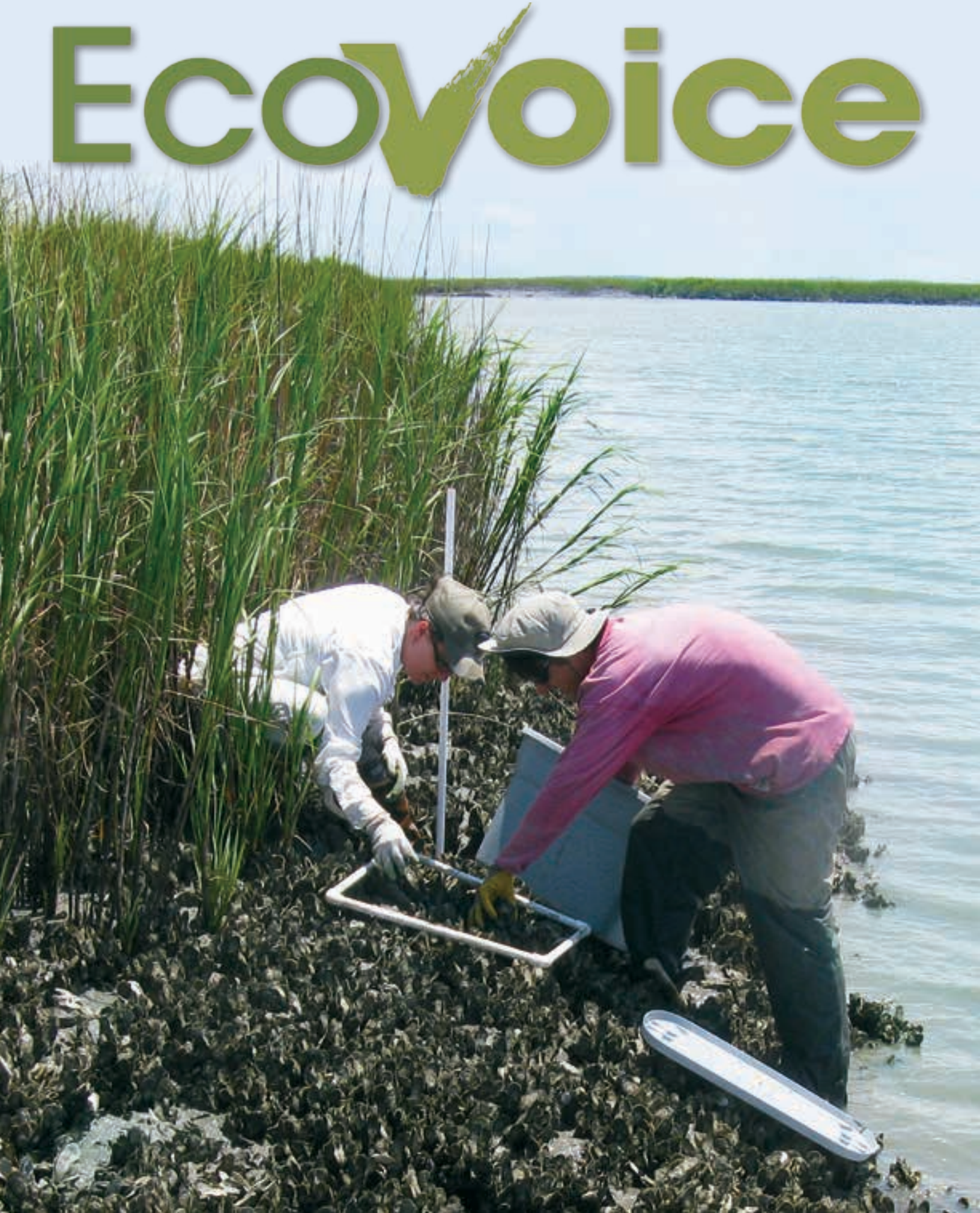

EcoVoice

2013 Annual Issue

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ABOUT THE COVER
Professor Jeb Byers [right] and doctoral student Alyssa Gehman collect specimens from an oyster reef along the southeastern coast. Thorough analysis of the samples yields comparisons between oyster reefs throughout their extensive range. See story on page 2.

Notes from the Dean


JOHN GITTLEMAN

September 17, 2013 marks an important birthday: Dr. Eugene P. Odum's centenary. We'll be taking the opportunity to celebrate, appreciate and reflect on the past and present while looking forward to enhancing the legacy of "Odumology."

What is the Odumology? Betty Jean Craige's fabulous biography, *Eugene Odum: Ecosystem Ecologist and Environmentalist*, reveals that with Dr. Odum, science and personality were entwined. Creativity and vision in developing the concept of the ecosystem were critical, but it was his holistic perspective, a unique personal perception of seeing, touching, smelling the interaction of systems, that motivated so much of Dr. Odum's work. His ability to communicate in a compelling "down-to-earth" manner allowed scientists and the public alike to see the relevance and importance of ecology to our everyday lives.

He was also a pragmatist. In discussing the formulation and successes of the Institute of Ecology, the forerunner of the Odum School, Dr. Odum identified three requirements for a lasting program: grant dollars, collaborative faculty, and a home facility. We're still following that prescription.

In the past year, our fundraising has continued to increase by 38% compared to a five-year average and our external grants from faculty totaled more than $2.3 million—a real achievement at a time when most federal agencies are only funding at around 4%.

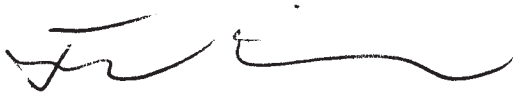
With support from the Offices of Provost and President, we've continued to hire extraordinary, collaborative faculty. You can read about Ford Ballantyne, who joined us in 2012, on page 21. Scott Connelly is a creative, rigorous field researcher specializing in amphibian ecology and conservation. Until recently he directed our programs in Costa Rica; he will return to main campus this fall to energize our instructional programs. Seth Wenger is a landscape ecologist specializing in freshwater systems. He is returning to OSE in January and, as co-director, will develop a new science agenda for the River Basin Center.

In 1973, Dr. Odum and others created a state-of-the-art ecology building. Today, our students and faculty are distributed amongst six buildings across campus. Our long term goal remains a new, completely sustainable structure to house the entire School, a building that will allow us to provide new solutions to ecological questions while illustrating how we can live in a more sustainable, ecologically rich way.

Dr. Odum left not only a scientific legacy, but a cultural one, where metaphors were more effective in communicating ecology than scientific jargon. In Odumology terms, ecosystems were "cooperative" or developing "from youth to maturity," while excessive growth was "cancerous."

I can't imagine what images Dr. Odum would use to capture ecological issues of today: climate change, extinction, emerging diseases—all within the world of apps, Tweets, and texts. The challenge for us is to harness these opportunities for ecological issues and environmental concerns, much as Dr. Odum did with the simplicity of a metaphor.

Our legacies give so much to celebrate. Hope to see you all for the birthday bash to celebrate the Odum School and have fun talking about Odumology—ice cream and cake will be served!



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A Question of Latitude

Oyster reefs differ up and down the Southeast coast

By Beth Gavrilles
Photos by Peter Frey

Oysters reefs along the Georgia/South Carolina coast (above) typically consist of a narrow band of oysters situated between the low-tide line and *Spartina* cordgrass. These reefs stabilize the shoreline and protect the fragile salt marsh. Juvenile oysters, called "spat" (inset), thrive in this environment.

When most of us think about oysters, it's generally in the context of a meal—on the half shell with a squeeze of lemon juice, perhaps, or hot and steaming, fresh off an open fire. But it isn't oysters' culinary status that chiefly interests marine ecologist Jeb Byers, an associate professor at the Odum School of Ecology at UGA. He is far more concerned with the ecological roles they play and the environmental factors that affect them.

Found along the Atlantic and Gulf coasts of North America, the Eastern oyster (*Crassostrea virginica*) lives primarily in shallow and brackish waters, mostly in reefs formed by young oysters settling upon the shells of earlier generations. Considered a "keystone" species—one that other species depend on to

survive and thrive—oysters play several essential roles in the functioning of coastal and estuarine ecosystems. Their reefs serve as habitat for other marine creatures, including fish, shrimp, and crabs, which can feed there and hide in the reefs' crevices from larger predators. The oysters are a food source for some of these creatures too.

Oysters are also known to filter a tremendous amount of water as they feed—by some estimates, up to 50 gallons a day—removing sediment and nutrients that they recycle into food for the smallest marine organisms. Reefs also help reduce the energy of wave action, stabilize shorelines, and prevent bank erosion. "They're really a foundational species," says Byers.

Peaky in Georgia

With funding from the National Science Foundation, Byers and colleagues from the University of North Carolina and Florida State University have been conducting a multiyear study of southeastern oyster reefs, exploring how physical, chemical, and biological factors affect reef health and function, gauging how such influences vary across a large spatial scale.

The researchers chose reefs in 12 estuaries, from Cape Hatteras, North Carolina, to Cape Canaveral, Florida, for their study. Byers in particular and his students focused on reefs at Sapelo and Skidaway Islands in Georgia and the ACE Basin and North Inlet in South Carolina.

Doctoral student Jenna Malek (above) checks one of the experimental reefs off Skidaway Island. The mud crab (inset) is a voracious and determined oyster predator.

"We spent the first year just sampling all kinds of things on the reefs," Byers says. "We measured, for example, the structure of the reef, how steep it is, whether the oysters are upright, how much topography there is on the reef, flow—the shape of the reef affects how water moves over it—temperature, and salinity."

The Byers team also took biological measurements to determine how other organisms were responding to the physical and chemical characteristics of each reef. "We measured everything from microscopic organisms (such as phytoplankton and benthic algae) to small prey items that live in the reef (little crabs and crustaceans, for example) to resident predators (shrimp and small fish) to the really big transitory predator fish that move in and out," says Byers.

The data soon began yielding some intriguing patterns.

"We found that a lot of things we measured—such as the steepness of the reefs, the tidal inundation, productivity, flow, even transitory-fish abundance—had their peaks in Georgia and South Carolina," he says.

One of those peaks is in the rate of oyster recruitment, or delivery of oyster larvae to the reefs, which seeds the next generation. "We have this high recruitment that's the envy of just about every other place on the East Coast," says Byers. "It's actually a problem for aquaculture here in Georgia, because the recruits glom onto the live oysters and basically smother them—there are just so many recruits. But it's a problem that everyone else would love to have!"

Location, location, location

Another Georgia peak that jumped out at the researchers involved predators. "Our sites had a huge abundance of sharks and crabs, for example," Byers says. "So we wondered how much the different predator environments influenced the functioning of the reef."

To find out, researchers designed an experiment. Choosing locations on mud flats near their sampling sites, the UGA researchers first built a series of new and similar reefs from scratch, enclosing the reefs in cages so that they could control what happened on each one. They then applied three different "treatments," each replicated three times at each site.

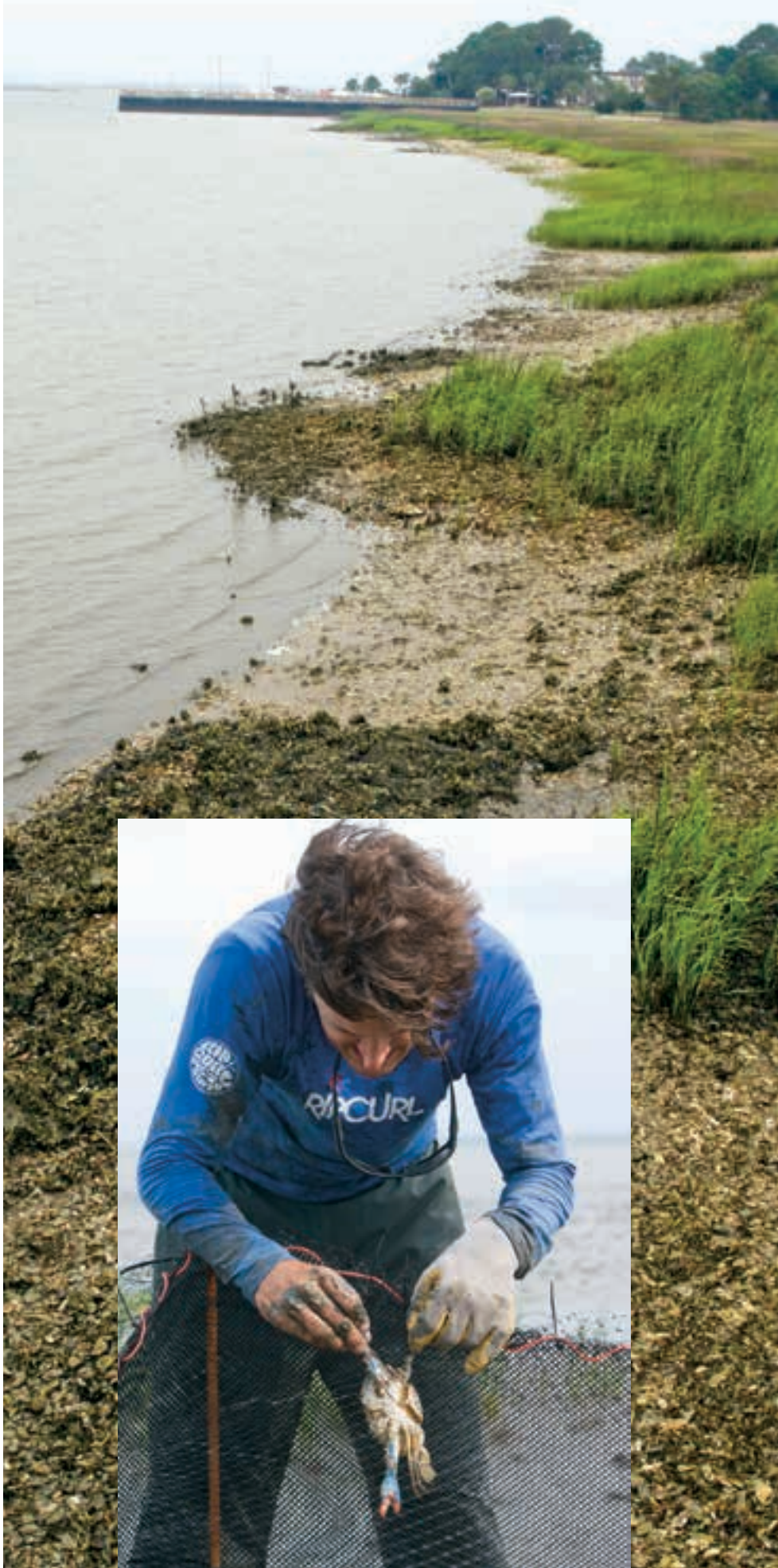
For the first treatment, the researchers added juvenile oysters to one set of reefs. To

the second group of reefs they added juvenile oysters and two kinds of oyster mesopredators (medium-sized predators)—namely, mud crabs and oyster drill snails. For the third treatment they added juvenile oysters, mesopredators, and top predators (in this case, blue crabs and toadfish) to the final set of reefs.

"The idea was to find out how the predators influenced both the direct qualities of the oysters, such as how much they grew and how well they survived, and the indirect qualities of the oysters—their ecosystem functions, such as how much they filtered the water," says Byers. "[The latter influences are] sometimes called the 'ecology of fear.'"

The ecology of fear (see story on page 7) refers to how predators affect ecological communities by scaring—rather than eating—their prey. The researchers found that in general the top predators influenced the behavior of the mesopredators by frightening them so that they tended to remain in hiding, which suppressed their ability to prey on oysters. Although the top predators ate some oysters themselves, Byers says, "the net effect of having the top predators in there was actually good for oysters."

Again, however, location proves to be important: the degree to which top predators help the oysters depends on latitude. It turns out that top predators' effect on oyster survival is much less pronounced in Georgia and South Carolina than in North Carolina and Florida. "We think that's because there's such high recruitment in these reefs in Georgia and South Carolina," Byers explains. "In an environment where food is scarce, if the mesopredator wants to hide because it's afraid of top predators, it has to take a very dangerous risk to come out in the open to eat something. So the predators keep the mesopredators running scared. But in an environment like Georgia's, where oyster larvae are everywhere, mesopredators can eat while in hiding, and thus there are fewer opportunities for those top predators to exert their protective indirect influence on the oysters."



Oyster reefs fringe the marsh near the research team's Skidaway Island lab (above). Jeb Byers (inset) retrieves a blue crab—a predator of both mud crabs and oysters—from inside one of the experimental reefs.

Oyster reefs provide huge ecosystem value

Why do Georgia's waters have this latter effect? Byers suspects that the deeply concave shape of the Georgia coast is chiefly responsible for the physical, chemical, and biological patterns that are emerging from the data.

"We think these patterns are driven by the higher tidal amplitudes we have in Georgia, which is a function of the indentation of our coastline," he explains. "We have substantially higher tides than places on the extreme ends of our sampling distribution, which mean that our reefs are inundated for longer amounts of time and that there's more force and power to those inundations. That could influence all the things we're seeing, including oyster recruitment, as the higher tidal amplitudes bring more productivity to our reefs."

Another factor that may be helping Georgia's oysters thrive is the lack of coastal development relative to other East Coast states. "Water quality, disease, and overharvesting comprise the triple whammy that has hit oysters hard in a lot of places," says Byers. "Georgia is easier on oysters probably because we don't have the same kind of coastal population and our beaches aren't as developed; we haven't had quite the water quality and overharvesting issues that other places have had."

The researchers are continuing to analyze results, and Byers and his students, working with partners that include the Georgia Marine Extension Service, Georgia Sea Grant, and the Skidaway Institute of Oceanography, are meanwhile exploring additional coastal questions: How do oyster disease patterns vary with latitude? What are the impacts of parasites on coastal and marine animals and ecosystems? How does a recently arrived invasive seaweed affect general estuarine health?

As for Georgia's oyster reefs, Byers says that the good news is that they're much better off than most—but we shouldn't take them for granted. "The healthiest site in the whole study is in the ACE Basin, South Carolina," he notes, "which has a huge protected area upstream and good water quality. There is a decent oyster harvest that goes on there, but it's not out of control."

And healthy oyster reefs are important. "Oysters affect erosion and sedimentation, provide essential fish habitat, help with water quality because they filter such large volumes of water, and provide a human food source too. They've got huge ecosystem value," says Byers. As a result of the study, "we're pointing out that these services the reefs provide potentially vary with latitude, and are affected by the tidal range, and the predatory environment. Understanding how these things interact helps us better understand how the oyster reefs are performing and why they might be performing differently in different places. But they're having important effects no matter where they are."

Contact Jeb Byers by email at: jebyers@uga.edu

To monitor the growth and survival of juvenile oysters, researchers glue them to numbered tiles and place them inside the experimental reef enclosures.

The Ecology of Fear

Researchers quantified the effects of transitory predator fish like the bonnethead shark as well as mud crabs and blue crabs like the one above.

Have you ever decided not to do something because you were afraid of the possibly fatal consequences? Most of us have—and humans are not the only ones.

Ecology major Zack Holmes, an Honors undergraduate student from Atlanta, explored the ecology of fear in a series of experiments he conducted while working on the southeastern oyster reef study with Jeb Byers. He examined the influence of bonnethead sharks—a locally important top predator—on the behavior of creatures that frequent the reefs in Georgia's waters.

Holmes notes that bonnethead sharks are abundant in Georgia coastal sites and in some surrounding estuaries, but they are barely present at many of the main study's other sites. That makes them important for understanding how Georgia's reefs function.

Bonnetheads, smaller relatives of hammerheads, prey heavily on blue crabs, which constitute most of their diet. Would the fear of this predator influence the behavior of blue crabs—just as the fear of blue crabs influences the behavior of the smaller mud crabs?

Holmes designed a laboratory experiment to test this idea. "We set up four tanks, each a little over nine feet in diameter, and about three feet deep," says Holmes. "All the tanks had juvenile oysters—half on an artificial reef structure and half just on their own. One tank had only oysters; one had oysters and mud crabs; one had oysters, mud crabs, and blue crabs; and one had all three plus a bonnethead shark."

Sure enough, the blue crabs behaved very differently in the presence of the shark. "In the tank with the bonnethead, the blue crabs would hunker down, usually within the structure that the oyster reef provided so that the shark couldn't get at them," Holmes says. "That allowed the mud crabs often to return to the behavior they exhibited when the blue crabs were not present—that is, eating a lot more oysters."

Holmes's research was supported by the National Science Foundation's program, Research Experiences for Undergraduates.

Longleaf Pine Ecosystem Recovery

The Role of Nitrogen Fixation

The fire-dependent longleaf pine forests that once extended from Virginia to Texas now exist in only a few remnant stands. Photo: Beth Gavrilles

The longleaf pine forests that once dominated the southeastern coastal plain are now considered one of the most endangered ecosystems in North America. Once covering 90 million acres from Virginia to Texas, longleaf is found today in only about three percent of its historic range. Many of those remaining acres are on U.S. military installations, where land managers are tasked with keeping the forests healthy while meeting their primary objective of supporting military readiness.

To help the Department of Defense accomplish these dual goals, Odum School Assistant Professor Nina Wurzburger is leading a study exploring how the soil-based process of nitrogen fixation facilitates recovery from physical disturbances, including military training exercises and fire. The five-year project is supported by a $1.39 million grant from the Strategic Environmental Research and Development Program of the U.S. Department of Defense in partnership with the U.S. Department of Energy and the U.S. Environmental Protection Agency.

Understanding the dynamics of nitrogen fixation in longleaf ecosystems is important for many reasons, not least of which is their capacity to store carbon. Nitrogen fixation—the process by which soil microorganisms take nitrogen from the atmosphere and convert it into usable forms for plants—enhances the growth of the pines, allowing them to keep that much more carbon dioxide out of the atmosphere.

"There hasn't been any systematic examination of nitrogen fixation, what controls it, and how fire and other disturbances influence it," said Wurzburger. "Longleaf pine forests are ideal systems for understanding these processes."

Wurzburger explained that the longleaf ecosystem depends on periodic fire; without it, fire-intolerant species soon take over. But fire, though necessary, removes nitrogen from soils and places it back in the atmosphere.

Fortunately, longleaf forests contain plenty of nitrogen fixers that can replenish these losses. These include leguminous plants like indigo, partridge pea, and prairie clover that associate with nitrogen-fixing bacteria in their roots; soil crusts—thin layers of lichen, algae, mosses, and bacteria that cover the open ground; and certain free-living bacteria in the soil. Training conducted at military installations can impact these nitrogen fixers, however.

"What we learn will help land managers understand soil ecology, particularly nitrogen fixation, as a natural mechanism for recovery in longleaf ecosystems," said Wurzburger. "It will help guide better management practices for conservation of these last remaining longleaf stands."

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

Hotspots and Silver Bullets

Measuring biodiversity to aid global conservation

Efforts to protect threatened species often focus on protecting habitat, especially areas that are considered hotspots of biodiversity. But how are those hotspots identified?

In a recent study published in the Royal Society journal *Proceedings of the Royal Society B,* Odum School of Ecology researchers showed that evolutionary diversity can be an effective method for identifying hotspots of mammal biodiversity. Their findings could help conservation organizations better protect threatened species across the globe.

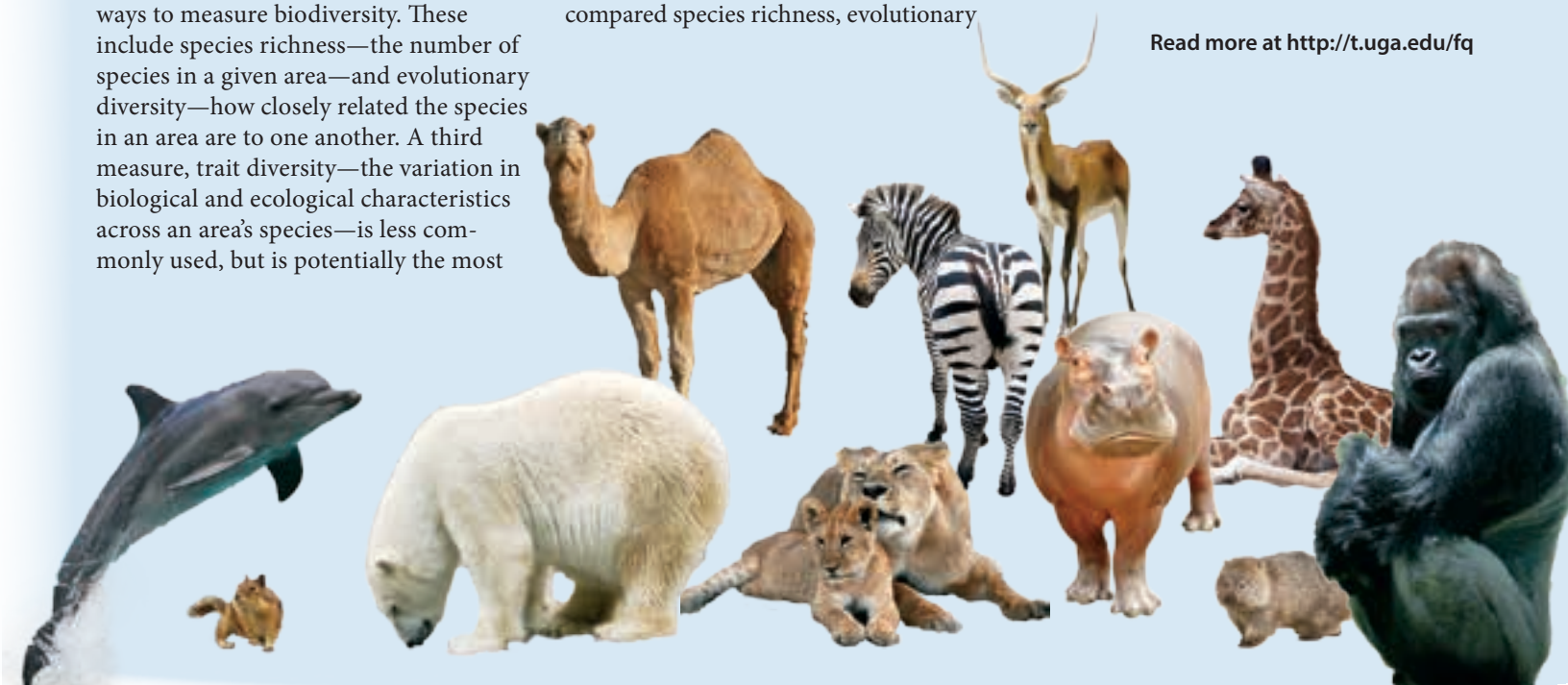
Shan Huang, PhD '12, the study's lead author, explained that there are several ways to measure biodiversity. These include species richness—the number of species in a given area—and evolutionary diversity—how closely related the species in an area are to one another. A third measure, trait diversity—the variation in biological and ecological characteristics across an area's species—is less commonly used, but is potentially the most important for conservation. Huang and her colleagues, Odum School Dean John Gittleman and Assistant Research Scientist Patrick Stephens, found that evolutionary diversity can often serve as an effective proxy for both species richness and trait diversity—as Huang described it, a "silver bullet."

Working with enormous databases—PanTHERIA, an online global compendium of biological and ecological information about all known living mammal species, and the IUCN mammal species database, which includes all known mammals' geographic range and threat status (i.e. the Red List)—the team analyzed and compared species richness, evolutionary diversity, and trait diversity of terrestrial mammal communities across the world.

They found that evolutionary diversity could be a reliable representative of biodiversity. "In some cases, it's as good as species richness, in some cases better," said Huang.

There are practical reasons why this is good news for those interested in conserving threatened species, according to Gittleman. "With new molecular techniques, it's much easier, faster, and cheaper to come up with an evolutionary tree than going out and collecting data on species biological traits in the field," he said. "This is a shortcut to species conservation."

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



Using Social Networks to Fight Disease

Insights could help prevent outbreaks in endangered chimpanzees

Julie Rushmore in Kibale National Park, Uganda. Photo: Rebecca Stumpf

Most of us think of social networks in terms of Facebook friends and Twitter followers, but for the Odum School's Julie Rushmore, social networks are a tool in the fight against infectious diseases. Rushmore, PhD '13, analyzed the social networks of wild chimpanzees to determine which individuals were most likely to contract and spread pathogens. Her findings, published in the *Journal of Animal Ecology*, could help wildlife managers target their efforts to prevent outbreaks, and potentially help public health officials prevent disease in human populations as well.

Effective disease intervention for this species is important for a number of reasons, Rushmore explained. Wild chimpanzees are highly endangered, and diseases—including some that also infect humans—are among the most serious threats to their survival. Furthermore, due

to habitat loss they increasingly overlap with human populations, so disease outbreaks among chimpanzees could spread to people and to livestock, and vice-versa.

Disease prevention in wildlife is logistically challenging, however, and resources are scarce. Even when vaccines are available, it is impractical to vaccinate every individual in a wildlife population. Rushmore and her colleagues decided to use social network analysis to pinpoint individuals that were most important in disease transmission.

During December 2009 to August 2010, Rushmore recorded the interactions of chimpanzees in Kibale National Park in Uganda at 15 minute intervals between 6:00 a.m. and 7:30 p.m., four to six days per week. She also collected information about the traits of individual chimpanzees including age, sex, rank, and family size. She mapped her observations onto a diagram showing how often each individual associated with the others.

This analysis showed that the most central figures in the network were mothers and juveniles with large families who lived and foraged in the interior of the community's range. "They form nursing parties—essentially like day care—where several families will hang out together," she explained. "In that way they become quite central because they have contact with a large portion of the community."

Rushmore's findings have implications for disease prevention beyond chimpanzees.

"This work can easily be applied to other systems," she said. "You could use similar methods to identify which traits are predictive of centrality. The theme that would carry over from our findings is that these central individuals are likely important to target for vaccination or treatment."

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

A mother chimpanzee with two of her offspring in the Kanyawara chimpanzee community, Kibale National Park, Uganda. Photo: Julie Rushmore

EcoReach Expands

By Sarah Budischak,
Doctoral student and EcoReach president

Ecology doctoral student Sarah Budischak works with a Hilsman Middle School student volunteer on a lesson about water. Photo: Katherine Adams

EcoReach, the volunteer outreach program run by Ecology graduate students to provide science education to local schoolchildren, took significant steps to reach more students in more ways this year. Thanks to the hard work and dedication of our members, the effort was a sucess.

In addition to the regular EcoReach activities (Scary Oozy Slimy Day at Sandy Creek Nature Center, judging at the Georgia Science Fair, and Barrow Elementary Science Night), our members worked in teams to develop five new lessons specifically requested by Clarke County educators.

EcoReach established connections with the UGA College of Education and the principals and science teachers at two Clarke County schools, Hilsman Middle and Fowler Drive Elementary. We went from one graduate student visiting six classrooms in 2011-2012 to more than fifteen students visiting forty classes in 2012-2013. Also, for the first time, we hosted a Boy Scout Environmental Science merit badge class and had twenty-two scouts attend.

Additionally, we held two fundraisers, a bake sale during the Graduate Student Symposium and a social with the Warnell School of Forestry and Natural Resources, that each raised over $100. The funds will help EcoReach replenish materials used during our activities, develop new lessons, sample streams with Barrow Elementary, revamp our Science Night materials, and establish a Girl Scout Merit Badge Day.

By developing new lessons, building connections with educators, and seeking financial support, we were able to provide EcoReach with a solid foundation to accomplish our true objective, getting young students excited about science!

EcoFocus FILM FESTIVAL 2013

Sara Beresford, MS CESD '00
Director, EcoFocus Film Festival

The fifth EcoFocus Film Festival wrapped up on March 24th as the most successful festival yet. We reached over 2,250 audience members during the festival and its associated events. Audience members viewed award-winning films throughout the festival and participated in lively post-film discussion with filmmakers, expert panelists, and special guests. In addition to the standing-room-only EcoKids event, more than 300 students from local schools participated in EcoFocus screening events at their schools. We are proud to be a part of raising environmental awareness in this region, and the sixth festival is planned for March 2014.

EcoFocus 2013 was presented by the Odum School of Ecology, Ciné, the Willson Center for Humanities and Arts, the UGA Office of Sustainability, and Georgia Sea Grant. For more information, visit the EcoFocus web site at www.EcoFocusFilmFest.org.

1. EcoFocus audience members engaged in a fun discussion with Director Andrew Garrison and Choreographer Allison Orr via Skype about their film *Trash Dance*.

2. This is what it feels like to have an EcoFocus moment. Audience members enjoyed a Skype conversation with director Deborah Dickson and sculptor Todd McGrain, moderated by Dr. Richard Hall of the Odum School of Ecology (with microphone), after the screening of their film *The Lost Bird Project*.

3. After the screening of *Cafeteria Man*, local educators and advocates led a discussion of local school and community gardens, farmers markets, and school lunch initiatives. Participants included Stacy Smith, School Garden Coordinator for Athens-Clarke County for the Community Garden Network; Teri Hamlin, Georgia Organics Northeast Georgia Farm to School Coordinator; Tad MacMillan, Principal at Clarke Middle School; Hilary Savage, Clarke County School District School Nutrition Coordinator; and Jan Kozak, Manager of the Athens Farmers Market.

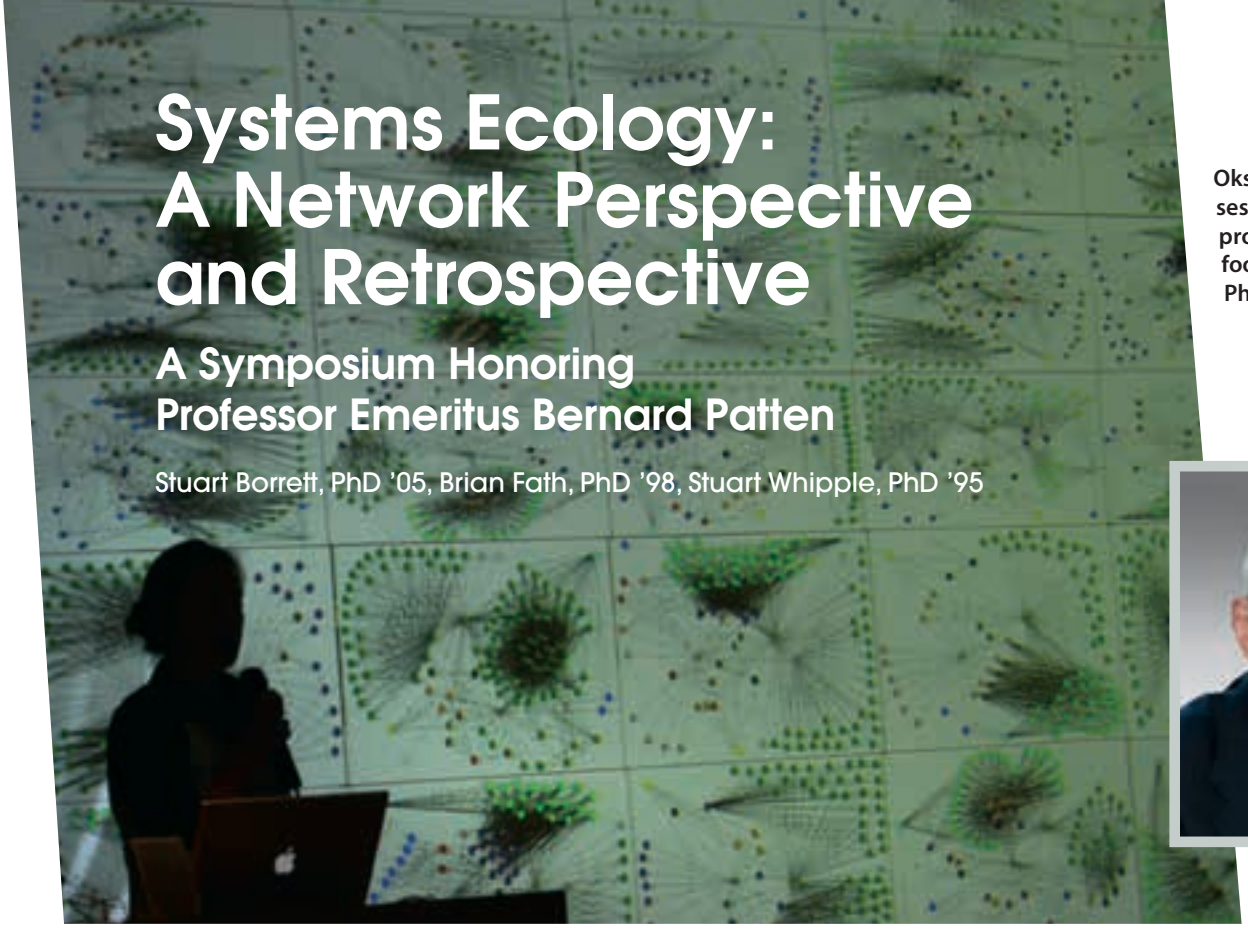
4. The EcoKids screening of an EcoFocus favorite *Bag It* was followed by hands-on activities to promote earth-consciousness and plastics reduction. Big thanks to Athens Montessori School for organizing the EcoKids activities!

Photos courtesy of EcoFocus Film Festival

Systems Ecology: A Network Perspective and Retrospective

A Symposium Honoring Professor Emeritus Bernard Patten

Stuart Borrett, PhD '05, Brian Fath, PhD '98, Stuart Whipple, PhD '95



Oksana Buzhdygan's session on the network properties of pastoral food webs in Ukraine. Photo: Melanie Aaron

BERNARD PATTEN

The Odum School of Ecology hosted *Systems Ecology: A Network Perspective and Retrospective* from April 12-14 at the UGA Complex Carbohydrate Research Center in Athens, cosponsored by the International Society of Ecological Modelling, the UGA College of Engineering, and Elsevier.

The Systems Ecology Symposium was conceived as way to bring together a group of scholars who have been associated with Bernard C. Patten over his fifty-plus year career as a systems ecologist.

Bernie has often said that much of his career has been spent trying to develop a rigorous theory that can provide some insight into the question: "What is the nature of the organism-environment relationship?" Patten's answer, developed in collaboration with his students and many other colleagues, is environ theory, a formal theory of environment developed over the past 45 years at the University of Georgia. Many, if not all, of the symposium attendees were there because they are significant nodes in the output environ of Bernie Patten.

Participants, including Patten's colleagues and former students, are a virtual "Who's Who" of systems ecology. Keynote speakers were Timothy F. H. Allen, Professor of Botany and Environmental Studies at the University of Wisconsin, Madison; Sven Erik Jørgensen, Professor Emeritus at the University of Copenhagen; Robert E. Ulanowicz, Professor Emeritus of Theoretical Ecology at the Chesapeake Biological Laboratory, University of Maryland; and Patten himself.

The 15 oral presentations and 11 posters covered recent systems research and theory and traced Patten's influence throughout the field. Session topics included Systems Ecology: Current State of the Art; Application of Systems Ecology; Network Environ Analysis: Origins, Current Research, and the Promise of Holoecology of the Future; and Proposals for Future Directions.

The proceedings of the symposium will be collected in a peer-reviewed special issue of the journal *Ecological Modelling* to be published in 2014.

A highlight of the event was a banquet at the State Botanical Garden Conservatory, where Patten was presented with a beautiful framed drawing of the Patten academic family tree. Drawing by A. Dingeldein. Photo: Stuart Borrett

Graduate Student: Virginia Schutte

Virginia Schutte grew up in Morehead, Kentucky, with a pond in her backyard and lots of woods to wander through. She received her B.S. in biology from the University of North Carolina at Chapel Hill in 2007, and started her Ph.D. at UGA in 2008. She studies mangrove trees, a foundation species of tropical island edges and coastlines, exploring how their growth responds to water pollution and to animals that live on them, as well as how those growth changes impact the fish and other organisms that normally live underwater in a mangrove forest. Virginia was a finalist in the NSF's Creating the Future video contest with a film about her work. She and her husband Charles welcomed their first child in July. She sat down with Development Director Lee Snelling for a conversation about research, teaching, and what's ahead.

What made you select the Odum School for graduate study?

First, I wanted to work with Jeb Byers (my Ph.D. advisor). He and I connect on some of the fundamental ecology issues that make me really excited to be pursuing this career. Second, the community at the Odum School can't be beat. At the faculty, grad, and undergrad levels, this is the most supportive environment I have ever worked in. Finally, I'm married! We wanted a place for both my husband and me to thrive and we found that at UGA.

Congrats on winning the UGA Excellence in Teaching Award. What is it about the teaching experience that you enjoy so much?

I know that I only have my current position because of the excellent education and mentoring I received as an undergrad and lab technician. I'll be proud of myself if I can have a productive career, but if I can also pass on my passion for science and give future scientists opportunities along the way, then my impact will be much bigger than just my career accomplishments. I am also drawn to the large, non-major undergraduate science courses like ECOL 1000, where I would have the chance to reach several hundred people every year—an unparalleled outreach opportunity to leave them with lasting lessons about the sciences.

Tell us about the significance of competing in the NSF research video contest.

I am excited to build a successful career for myself in ecology, but for science to change the world it has to leave academia. Making my video entry was my first formal attempt at making non-scientists understand and connect with my work. I was very excited about the medium because words can only do so much to convey what doing science is really like. Especially when you work in an area of the world that many people may not know much about, really *showing* people what research is about is the only way to make them care.

What do you feel are the biggest ecological concerns in the years ahead?

I think that the way humans interact with the world is changing. When environmental conservation really got going decades ago, a common strategy for protecting natural resources and areas of interest was to fence them off (by creating areas like parks and sanctuaries). This is still a really common way to get the public involved in conservation: save the rainforest by donating money to buy a piece of it, etc. But we have increasing evidence that this is not enough. Our challenge is to learn how to live responsibly *on Earth*, not next to it. Global threats like climate change, pollution, and resource overexploitation can be caused by people who live thousands of miles away from some of the areas they're impacting. (Do you know where your seafood comes from?) I also believe that if someone truly understood the impact their actions have, which ultimately affects their own food supply and way of life, people wouldn't choose to "ignore" climate change, pollute, or irresponsibly use non-renewable resources. If I had to boil all this down into one question that I think encapsulates the biggest ecological challenge we will face in the coming years, it would be this: "How can we get people to truly understand their impact on the world?"

Undergraduate: Todd Pierson

Todd Pierson, of Zionsville, Indiana, graduated in June 2013 with his B.S. in Ecology. A UGA Foundation Fellow, Todd received numerous honors while at the Odum School, including a Udall Scholarship and a National Geographic Young Explorers grant. At UGA he served on the executive board of the Gameday Recycling Program, as a representative for the Go Green Alliance, and as co-president of the Herpetology Society. Odum School Director of Development Lee Snelling asked Todd to talk about his Odum School experiences for *EcoVoice*.

As an out-of-state student, what originally attracted you to the University of Georgia and the Odum School of Ecology?

My college search focused primarily on large universities in the South, as I wanted the research opportunities offered by the former and the herpetological diversity of the latter. When I visited UGA, I was thoroughly impressed with the Odum School, and the invitation to come to UGA with the Foundation Fellowship really sealed the deal.

What makes the Odum School unique?

Many schools boast that they can provide a small school atmosphere at a larger university, but the Odum School really delivers on its promise. I had close relationships with many faculty, advisors, and students, but the opportunities available at the Odum School and elsewhere within UGA far surpassed what would have been possible at a small college.

If you had to pick one specific experience as being most influential during your time here what would it be?

I've spent much of my undergraduate years traveling internationally, but despite great experiences across the world, the Southern Appalachians remain my favorite place to explore. I worked for half of my first summer at UGA in an REU at Coweeta LTER, and the time I spent researching salamanders in the mountains convinced me that this was the place for me.

Who were some of the most enjoyable faculty?

Populations and Community Ecology with John Drake and Andrew Park and Ecosystems Ecology with Nina Wurzburger were my favorite in-classroom experiences, and Jim Richardson has been a reliable friend to whom I can talk about anything.

What is it that interests you so much about salamanders?

My interest in herpetology in general has little logical foundation. I grew up spending a lot of time outdoors, and amphibians and reptiles were some of the first creatures that caught my eye. It was my move to Georgia—home to one of the world's greatest diversities of salamanders—that really focused my attention on these tailed amphibians.

Which salamander is your favorite?

The southern two-lined salamander (*Eurycea cirrigera*) is an abundant and widespread species of the lungless salamander. It's incredibly common, even in heavily disturbed areas, and I enjoy looking for them wherever I travel.

What's the best piece of advice you've been given?

My father is always fond of (and frequently quotes) Louis Pasteur: "In the field of observation, chance favors the prepared mind."

What are your plans for the future?

Next year, I plan to continue working on the development of environmental DNA as a tool for monitoring aquatic plethodontid salamanders under the supervision of Dr. Travis Glenn of Environmental Health Science, before moving on to a graduate program in Fall 2014.

1980s

JAMES RIEHL BRENT HAGLUND

Brent M. Haglund, PhD '81, was inducted into the Academy of Science and Engineering at the University of Minnesota Duluth in 2012 by Dean James Riehl of the Swenson College of Science and Engineering**. Randall Hicks**, PhD '83, director of the Center for Freshwater Research and Policy and professor in the UMD Department of Biology, made the presentation at the ceremonies in Duluth on 14 September 2012. Brent, who received his BS from UMD, has served on the Swenson College of Science and Engineering External Advisory Board for many years, as well as securing research funds for faculty and graduate students at UMD. A leading environmentalist in North America since the mid-1960s, he has focused on private landowner conservation through ethics, science and incentives as president of the Sand County Foundation since 1988. He was previously the State Director of The Nature Conservancy in Wisconsin.

1990s

Douglas Booher, BS '98, received a National Science Foundation Graduate Research Fellowship. Doug is pursuing his doctorate at the University of California Los Angeles, where he is studying the ecology of North American dacetine ants.

Dr. **Jeffrey Brooks**, MS CESD '98, recently co-authored two peer reviewed papers, "Alaska Native peoples and conservation planning: A recipe for meaningful participation," published in *Native Studies Review* in 2011and "Stakeholder understandings of wildfire mitigation: A case of shared and contested meanings," published in *Environmental Management* in June 2012. Jeff works as a social scientist for the National Wildlife Refuge System in Anchorage, Alaska where he lives with his wife, Robin, daughter, Anna, and son, James.

Ellen Sutherland Irby, BS/MS CESD '99, and her husband welcomed Miles Garrett Irby into the world on June 19, 2013. Elle reports that all are healthy and happy.

Mark Warner, PhD '98, associate professor of marine biosciences at the University of Delaware, presented a talk, "Our Changing Climate and the Future of Coral Reefs: How Can We Predict the Winners and Losers?" to open the Ocean Currents Lecture Series in 2013. His presentation explored how pollution and rising temperatures are impacting the health of coral reefs.

Jeff Lovich, PhD '90, is a research ecologist with the U.S. Geological Survey, Southwest Biological Science Center in Flagstaff, Arizona. His current research focuses on the impacts of wind and solar energy development on wildlife in the desert southwest, especially federally protected Agassiz's desert tortoises.

2000s

SCOTT CONNELLY

Scott Connelly, PhD '09, accepted a position as Assistant Professor at the Odum School of Ecology in 2013. Connelly, who has been serving as faculty director of the Odum School's ecology program at UGA Costa Rica, will continue his involvement with the program as the leader of the ecology Maymester course there.

Grantly R. Galland, BS '04, recently joined the Office of International Affairs at the National Oceanic and Atmospheric Administration as a National Sea Grant College Program Dean John A. Knauss Marine Policy Fellow. He earned his doctorate in marine biology at the Scripps Institution of Oceanography after serving in the Peace Corps.

Nicole Gottdenker, PhD '09, was lead author on a paper, "Host Life History Strategy, Species Diversity, and Habitat Influence *Trypanosoma cruzi* Vector Infection in Changing Landscapes," published in *PLoS Neglected Tropical Diseases* in 2012, with coauthors Luis Fernando Chaves, José E. Calzada, Azael Saldaña, and Professor Emeritus **Ron Carroll**. Nicole is an assistant professor in the UGA College of Veterinary Medicine Department of Pathology.

Rebecca Haynes, MS CESD '06, recently joined the staff of the nonprofit Conservation Voters of South Carolina as Director of Government Relations. Rebecca previously worked for American Rivers as Associate Director of Southeast Conservation. An active community volunteer, she is a founder and Board member of the NoMa Bark Park and President of the Earlewood Community Citizens Organization in Columbia, South Carolina.

John Kominoski, PhD '08, accepted a position as assistant professor in the Department of Biological Sciences and Southeast Environmental Research Center at Florida International University in 2013.

Sam Miles III, BS '09, is a commercial and industrial account manager for United Renewable Energy, LLC, in Chattanooga, Tennessee. A LEED Accredited professional, he previously worked as a hazardous waste project manager and environmental consultant for Marion Environmental, Inc.

Nanette Nelson, MS CESD '00 and **Bob Hall**, PhD '96, celebrated their fifth wedding anniversary in August. Nanette and Bob live in Laramie, where Bob is a professor in the Department of Zoology and Physiology and director of the PhD Program in Ecology at the University of Wyoming. Nanette is in her sixth year with the Wyoming Survey and Analysis Center where she is an associate research scientist. Beginning in September, Bob and Nanette will be on a nine month sabbatical at Duke University. Nanette reports that they plan to make several trips to Athens to visit friends during their stay in Durham, North Carolina.

Kelly Sands, MS CESD '08, recently joined WRA Environmental Consultants in San Rafael, California, as a Mitigation Banking Analyst.

Theresa Thom, MS CESD '00, PhD '05, is an aquatic ecologist for the U.S. Fish and Wildlife Service Inventory and Monitoring Network for the Southeast region.

Seth Wenger, MS CESD '99, PhD '06, was named Assistant Professor and Co-Director for Science of the River Basin Center at the Odum School of Ecology. He will start his new position in 2014.

Alexandra Worden, PhD '00, and **Andrew Allen**, PhD '02, were among 16 scientists to receive Marine Microbiology Initiative Investigator awards from the Gordon and Betty Moore Foundation in 2012. Andy is an associate professor in the Microbial and Environmental Genomics Department at the J. Craig Venter Institute, and Alex is a principal investigator in molecular microbial ecology at the Monterey Bay Aquarium Research Institute.

Sonia Hernandez, PhD '08, assistant professor of wildlife disease in the Warnell School of Forestry and Natural Resources and the Southeastern Cooperative Wildlife Disease Study, received widespread media attention in 2012 for her "Kitty Cam" project. Using lightweight video cameras mounted on the collars of 60 pet cats in Athens, Sonia and her team documented the activities of cats as they roamed outside over the course of 10 days. The next phase of the Kitty Cam project involves studying the impact of a stray cat colony on avian populations on a barrier island.

An Excellent Icelandic Adventure

A group of Ecology alumni and their families met up in Iceland this summer for an unforgettable vacation of hiking, bird-watching, and sightseeing. **Kevin Barnes**, MS CESD '98, and **Sara Beresford**, MS CESD '00; **Jamie March**, PhD '00 and Sarah March*; and **Jon Benstead**, PhD '01, and **Heidi Wilcox**, MS Aquatic Entomology '03, and their children paused for a photo on top of a volcano in Heimaey, Iceland, in July 2013. Jamie is Associate Professor of Biology at Washington and Jefferson College in Washington, Pennsylvania. Jon is Associate Professor of Biological Sciences at the University of Alabama in Tuscaloosa. Kevin is a fish biologist and stream ecology consultant for Streamtechs in Northeast Georgia, and Sara is the director of EcoFocus Film Festival in Athens (see story on page 12.) The group met at the tail end of Jon and Heidi's seven-month long research stay in Iceland. Jon was part of an international team of ecologists—which also included **Wyatt Cross**, PhD '04, and **Alex Huryn**, PhD Entomology '86—studying the effects of global warming on stream food webs and ecosystem processes in streams in the Hengill region, a project funded by the National Science Foundation.

**Sarah March is the artist responsible for the Kosrae (Micronesia) paintings in the Ecology lobby!*

2010s

Brett Berry, BS '12, will enter the master's degree program in the Odum School this fall. He will be working jointly with **Andrew Park** and **Jim Porter** studying coral diseases.

Christina Faust, BS/MS '09, is currently a doctoral student in the Department of Ecology and Evolutionary Biology at Princeton University, where she is studying wild primate malaria in southeast Asia. She received her M.Sc. in Global Health and Immunology from the National University of Ireland Maynooth, with First Class Honors, in 2010. At UGA, Christina received Udall and Truman scholarships and a George Mitchell Fellowship.

Andrew Mehring, PhD '12, accepted a two year postdoctoral position at the Scripps Institution of Oceanography at the University of California San Diego. He will work on a project examining how animals and plants interact in freshwater, brackish, and saline wetlands to enhance wastewater and graywater purification, studying the processes in natural and constructed wetlands in California and Australia. The project is a collaboration between Monash University and the University of Melbourne in Australia, and UCSD, UC Irvine, and UCLA.

Ashley Helton, MS CESD '06, PhD '11, was lead author on two papers in 2012. "Scaling flow path processes to fluvial landscapes: An integrated field and model assessment of temperature and dissolved oxygen dynamics in a river-floodplain-aquifer system" was published in the *Journal of Geophysical Research: Biogeosciences,* and "Relative influences of the river channel, floodplain surface, and alluvial aquifer on simulated hydrologic residence time in a montane river floodplain" in *Geomorphology.* She accepted a position in the Department of Natural Resources and the Environment and the Center for Environmental Sciences and Engineering at the University of Connecticut in 2013, after two years as a postdoctoral associate at Duke University.

Shan Huang, PhD '12, is a postdoctoral scholar at the University of Chicago, where she is working with David Jablonski in the Paleontology Research Group, in the Department of Geophysical Science.

Tierney O'Sullivan, BS '12, received a **Fulbright Scholarship** for study in 2013-2014. She will work with the Forest Practices Authority and the University of Tasmania, Australia, for a year to research the effect of road traffic on the breeding behavior and success of the wedge-tailed eagle. She will monitor nesting sites and record behavioral responses to disturbance. The wedge-tailed eagle is the sole remaining predator in Tasmania, and is currently endangered on the island. This project will continue in an ongoing effort to better understand the factors responsible for its decline and enable its conservation in the future.

Science writer **Kathleen Raven**, MS CESD '12, attended the 2013 Lindau Nobel Laureate Meeting in Germany as a blogger for *Scientific American*. Raven, who also received a master's in journalism at UGA, recently completed a science writing internship at *Nature Medicine*. Follow her on Twitter: @sci2mrow.

Julie Rushmore, PhD '13, will pursue a DVM from the UGA College of Veterinary Medicine beginning in fall 2013.

Stephen Shivers, MS Ecology '10, continues his work on the effects of invasive aquatic vegetation (*Hydrilla*) on nutrient storage and cycling in Lake Seminole as a PhD student in the Odum School. This large reservoir on the border of Georgia and Florida receives inflow from the Flint and Chattahoochee Rivers and releases flow to the Apalachicola River. Stephen is studying the effects of two molluscan invasive species (*Corbicula* and *Pomacea*) that may alter nutrient cycling by their feeding activities.

After a postdoc studying nitrogen cycling in Lake Superior, **Chip Small**, PhD '10, recently began a faculty position in the Biology Department at the University of St. Thomas in Saint Paul, MN, where he teaches courses in environmental biology and urban ecosystem ecology. He and his wife Julie are expecting their third child in June.

Daniel Streicker, PhD '11, has accepted a postdoctoral fellowship at the University of Glasgow, where he will conduct research on bat rabies evolution, to begin in fall 2013.

Amy Trice, MS '11, is the Lapham Conservation Fellow at the nonprofit conservation organization American Rivers, where she works on issues related to the Clean Water Act, preserving headwater streams and flood mitigation.

Jamie Winternitz, PhD '13, accepted a two year postdoctoral position at the Academy of Sciences, Czech Republic, at the Institute of Botany to work on immunity and host-parasite ecology. She will be doing comparative genetic work to study immune genes in wildlife populations.

Gina Botello Young, MS Ecology '12, has a paper, "Immature Mosquitoes in Agricultural Wetlands of the Coastal plain of Georgia, U.S.A.: Effects of Landscape and Environmental Habitat Characteristics," in press in *Ecological Indicators*. Gina married Justin Young on May 11, 2013 and is working for a consulting firm.

Costa R(on)ica!

By Terry Camp, Odum Librarian

RON CARROLL

Lots of fun and frolicking was had by all at Costa R(on)ica, the 2013 Ecology Spring Fling and celebration for Ron Carroll, who retired in December 2012.

Ron came to UGA in 1988 as associate director of the Institute. In 1991, along with then-director Ron Pulliam and Carol Hoffman, he started the Master's in Conservation Ecology and Sustainable Development degree program. He served as director of the Institute of Ecology from 1997 to 2003, and has been the codirector for Science of the River Basin Center since 2008. He also served as associate dean of the Odum School from 2011-2012.

In honor of the occasion, everyone was asked to dress in tropical style or 1980s-themed outfits (congratulations to Richard Hall on winning the coveted gnome award for best costume) and master's student Tammy Andros presented a "marshmallow" roast and slideshow with help from Janice Sand. Two beautiful pottery bowls decorated with ants circling the interior rim were given to Ron from the Odum School (special thanks to Cathy Pringle for finding the perfect gift).

Many of Ron's former students traveled from near and far to help celebrate. An oversized check for $6,150 was also presented to Ron to be used to support the Ron Carroll and Carol Hoffman Costa Rica Travel Award, which Ron and Carol established this year.

We wish Ron great happiness in his retirement and ask him to not be a stranger.

ODUM SCHOOL SPRING FLING 2013 AWARDS

Best Student Paper: Applied
Julie Rushmore

Best Student Paper: Basic/Theoretical
Sarah Budischak

Distinguished Graduate Student Teaching Award
Gregory Skupien

Environmental Policy Award
Shannon Bonney

Faculty Instructor of the Year
Sonia Altizer

Ron Carroll - Carol Hoffman
Costa Rica Travel Award
Rachel Usher and
Katherine Zarada

Frank Golley Memorial Award
Sarah Budischak

Graduate Diversity Award:
Dexter Strother

Josh Laerm Memorial Award
Malavika Rajeev

Judy Meyer-Gene Helfman Graduate Travel Award
Shannon Bonney

Thelma Richardson - Frank Golley
Undergraduate Support Award
Scott Saunders and **David Stoker**

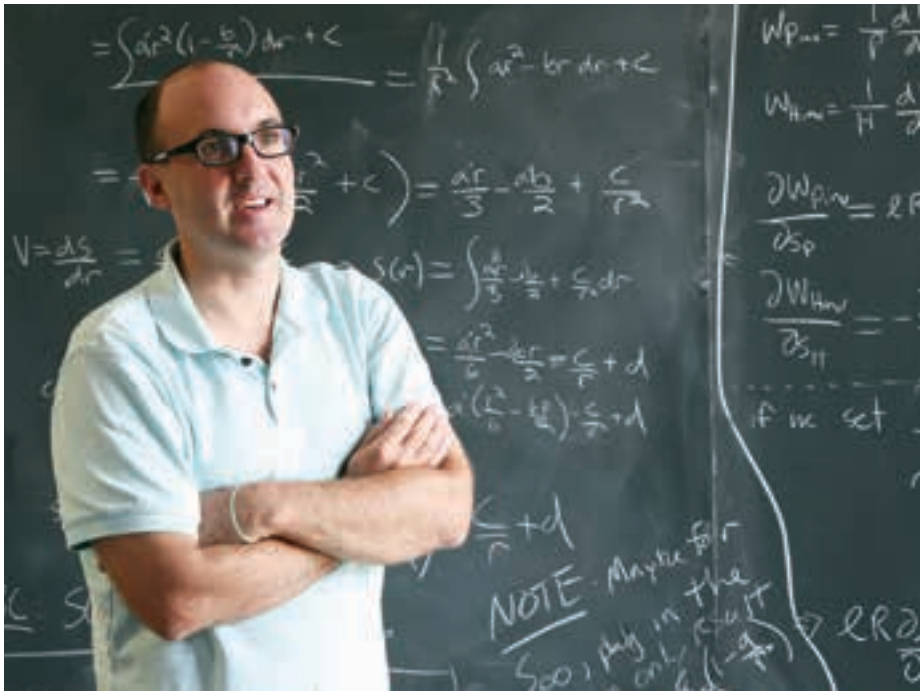
Purple Heart Award
Katherine Adams

Solitary Glove Service Award
Daniel Harris

Employee of the Year
Katherine Adams

Dean's Award
Brian Perkins

Odum School Welcomes Ecosystem Ecologist Ford Ballantyne



FORD BALLANTYNE

You could describe Ford Ballantyne as a Renaissance ecologist. With research interests that span community ecology, population ecology, theoretical and statistical ecology, biogeochemistry, and ecosystem ecology, his work is not easy to categorize.

"I've always thought of myself as a question-driven person," he says. "I've tried to understand general principles that can be applied across habitat types or biomes."

His current projects include studying how the decomposition of soil organic matter and the associated release of CO2 will respond to changing temperature regimes, investigating how the composition of consumer communities influences whole stream or whole river network metabolism, and exploring the interaction between ecological and evolutionary dynamics.

"I'm interested in a lot of things, and when opportunities arise I have a hard time not getting involved in new things that are interesting and exciting," he says. "Primarily what I do is mathematical and statistical modeling and some experiments in the lab but I'm also collaborating with field ecologists and experimental ecologists on larger scales."

Ballantyne's pursuit of ecology began when, as an undergraduate at the University of Wisconsin, he spent a year abroad in Nepal. "I got really interested in species abundance distributions of birds in different habitats, at different elevations," he says. His curiosity about patterns of community composition led him to the University of New Mexico to do his Ph.D. work with Jim Brown; along the way, he received a master's in statistics.

He then did postdoctoral research at the Scripps Institution of Oceanography and at Princeton University, and came to the Odum School from the University of Kansas, where he was an assistant professor, in the fall of 2012.

"In general, some of the experiments I was doing at KU that I will continue here are an opportunity to really understand what's driving element fluxes at the cellular level, and taking that understanding and translating it back up to a biogeochemical flux that's relevant at an ecosystem level," he says.

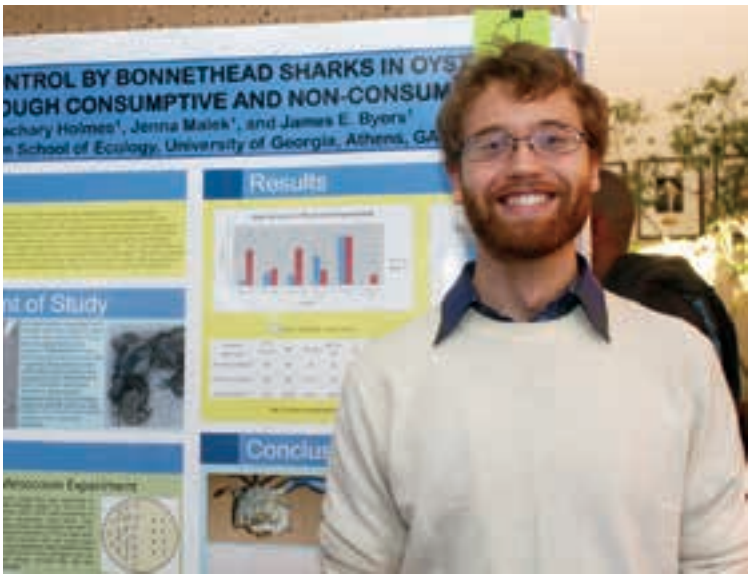
One project that has carried over from Ballantyne's time at KU is the NSF-funded *Scale, Consumers and Lotic Ecosystem Rates* study, a continent-wide examination of the role of consumers in stream and river system function. Researchers from seven institutions, including the Odum School's Amy Rosemond and former postdoctoral associate John Kominoski, PhD '08, are working at sites ranging from tropical forest to tundra, in streams large and small, asking if knowledge gained from small-scale experiments can be used to explain ecosystem-level processes. Ballantyne's role involves modeling and integrating experimental data into the theoretical framework and parameterizing models that are then placed into the context of the whole hydrologic network.

He was already working on the SCALER project when the opportunity arose to join the Odum School faculty; Ballantyne jumped at the chance. "The appealing things were being at an institution where ecology was really supported and appreciated; and having the opportunity to interact with all of the people within ecology but also to have a broad and diverse set of interactions with people outside of ecology, including marine sciences, forestry, crop and soil sciences, and even microbiology," he says. "It's really fun for me to learn about what other people are doing. I think that's one of the greatest things about this job; you can continually learn about new things."

Graduate Student Symposium Demonstrated Outstanding Scholarship

The 19th annual Graduate Student Symposium took place January 18-19, 2013 at the Odum School. This year's keynote speaker was Wyatt Cross, PhD '04, assistant professor at Montana State University. His talk, "Foodweb Dynamics in a Large River Discontinuum," concerned his study of the Colorado River, an ecosystem that has been thoroughly altered by human activity, and particularly the consequences of those alterations for foodweb function and response to perturbation.

Forty graduate students gave oral presentations and 14 undergraduates displayed research posters. Awards were given for best presentation in three categories and for best undergraduate poster.



Undergraduate Zack Holmes with his GSS research poster.
Photo: Daniel Harris

Kaitlin Farrell gives fellow award winners a thumbs up for their well deserved recognition.
Photo: Daniel Harris

Proposed Research

1ST PLACE
Daniel Harris, Application of Landscape Ecology to Interactions between Coastal Keystone Species

2ND PLACE (tie)
Kaitlin Farrell, Effects of Consumer Community Composition and Feeding Strategy on Ecosystem-Level Processes: An In-Depth Comparison of Temperate Mountainous and Grassland Streams within the SCALER Project

Jeff Minucci, Determining the Threshold Response of Symbiotic N2-Fixation to Drought and the Consequences for Forest Composition and Function

4TH PLACE
Carly Phillips, Do Plant-Soil-Microbial Feedbacks Influence Arctic Carbon Storage?

Master's Research

1ST PLACE:
Malavika Rajeev, Examining Seroprevalence of Zoonoses in Livestock Across Land Use Types in Central Kenya

2ND PLACE
Phillip Bumpers, Nutrient Enrichment of Detritus-Based Headwater Streams Stimulates Growth of a Top Predator

3RD PLACE
Emily Cornelius, Migratory Trade-Offs: Discovering the Relationship between Distance Traveled, Stress, Lipids and Immune Response in Songbirds

Doctoral Research

1ST PLACE
Julie Rushmore, Effects of Contact Heterogeneity on Pathogen Transmission and Control in Wild Chimpanzees

2ND PLACE
Tom Barnum, Structure of an Algal-Based Food Web in a Neotropical Stream Before and After Amphibian Extirpation

3RD PLACE
Kimberly Kellett, Well-seasoned Demography: The Importance of Intraannual Variation for a Neotropical Milkweed

4TH PLACE:
David Manning, Dissolved Phosphorus Concentrations Explain Magnitude Increases in Leaf Litter Breakdown Rates in Streams

Undergraduate Posters

1ST PLACE
Kelly Murray, Investigating the Effects of Introduced Guppies of *Anablepsoides hartii* (Cyprinodontiformes: Rivulidae) Foraging Behavior in Trinidadian Streams

2ND PLACE (tie)
Johanna Therese Blakeslee, Jennifer Kukharchuk, and **Han Nguyen**, Monarch Health: Citizen Science Data Reveals Trends in Infectious Disease of a Migratory Insect

Chelsea Sexton, Diatoms in the Diet of *Paraprionospio pinnata*, a Polychaete in the Northern Gulf of Mexico Hypoxic Zone

3RD PLACE
M**elanie Fratto**, A Testosterone Tale: Do Females Really Have Higher Levels Than Males?


CYNTHIA CARTER


ROSALIE HENDON


MOLLY MARTIN


PATRICK MCEVOY


RALEIGH NYENHUIS


BENJAMIN PAULL

Congratulations Graduates!

GRADUATE STUDENTS

Summer 2012
Marcia Snyder, PhD Ecology
Leslie Ruyle, PhD Ecology
James Moree, MS Ecology

Fall 2012
Shan Huang, PhD Ecology
Tyler Kartzinel, PhD Ecology
Jamie Winternitz, PhD Ecology
Gina Botello, MS Ecology

Spring 2013:
Kelly Robinson, MS CESD
Courtney Collins, MS CESD
Julie Rushmore, PhD Ecology

UNDERGRADUATES

Summer 2012
Stephanie McCall, Gainesville, GA
Matthew Wood, Marietta, GA, *cum laude*

Fall 2012
Chelsea Born, Athens, GA
Erin Froetschel, Crawford, GA, *magna cum laude*
Andrew Glenn, St. Simons Island, GA
Amanda Huels, Marietta, GA
Steven Howell, Jacksonville Beach, FL
Austin Martin, Athens, GA
Sergio Minchey, Buford, GA, *cum laude*
Tierney O'Sullivan, Roswell, GA, *magna cum laude*
Elliot Rickett, Watkinsville, GA
Cody Schobak, Lawrenceville, GA
Charlton Torbett, Watkinsville, GA
Stenka Vulova, Roswell, GA, *summa cum laude* with Highest Honors

Spring 2013
Dina Abdulhadi, Alpharetta, GA, *cum laude* with Honors
David Ansley, St. Simons Island, GA
Katharine Bleau, Atlanta, GA, *magna cum laude*
Cynthia Carter, Grayson, GA
Malvika Duphare, Marietta, GA
Melanie Fratto, Peachtree City, GA, *magna cum laude* with High Honors
Samantha Frigerio, Marietta, GA, *cum laude* with Honors
Devon Gaydos, Albany, GA, *cum laude*
Rosalie Hendon, Tallahassee, FL, *summa cum laude* with Highest Honors
Katherine Lacksen, Sparta, GA, *cum laude*
Yelana Lugin, Alpharetta, GA
Molly Martin, Tyrone, GA
Patrick McEvoy, Peachtree City, GA, *cum laude*
Raleigh Nyenhuis, Brunswick, GA
Benjamin Paull, Atlanta, GA, *cum laude*
Russell Phillips, Alpharetta, GA
Todd Pierson, Zionsville, IN, *summa cum laude* with Highest Honors
Geneva Preston, Watkinsville, GA
Marianna Rivera de Armas, St. Simons Island, GA, *cum laude*
Laura Robinson, Moultrie, GA
Theresa Stratmann, Irmo, SC, *summa cum laude* with Highest Honors
Melody Tanner, Jefferson, GA
Waring "Buck" Trible III, Fredericksburg, VA, *magna cum laude* with High Honors
Marlene Walters, Champaign, IL
Bradley White, Roswell, GA, *summa cum laude* with Highest Honors
Elijah White, Lilburn, GA, *cum laude*
Jamie Winokur, Atlanta, GA


THERESA STRATMANN


ELIJAH WHITE

Hello from San José!

by Alan Covich

The 50th anniversary meeting of the **Association for Tropical Biology and Conservation** and **Organization for Tropical Studies** went very well. The plenaries reviewed 50 years of OTS and ATBC history, and urged more innovation in the future of tropical ecology. There was a focus on climate change and the need for outreach and education, which makes the case that having our Odum School of Ecology program here in Costa Rica is really important now and even more so in the future.

There was a full session on education opportunities and organizations in and around Monteverde, where our program is located, and several speakers had very positive things to say about UGA Costa Rica. **Joanne Sharpe**, who sponsors the **Robert A. Sheldon Memorial Award** at the Odum School in honor of her late husband, was in the audience for that session. She and everyone from UGA were very pleased to see how people referred to UGA in Costa Rica. Joanne, who presented research on tropical ferns, also enjoyed meeting **Shafkat Khan**, a recent recipient of the Sheldon award.

Four other Odum School graduate students presented: **Courtney Collins, Carissa Ganong, Rebecca De Jesús,** and **Kimberly Kellett,** who started her career at San Luis with **Diana Lieberman**. UGA Ecology alumni presenting research included **Beth Anderson**, PhD '04 and **Alonso Ramirez**, PhD '97. Odum School faculty presenting included Assistant Professor **Jackie Mohan** and courtesy faculty **Jim Hamrick** and **Dorset Trapnell**. Odum School Lab Coordinator **Paul Frankson** was also in attendance. All did a fine job representing the Odum School.

Shafkat Khan, Carissa Ganong, Alan Covich, Kimberly Kellett, Paul Frankson, Courney Collins, and Rebeca de Jesus

KATHERINE ADAMS

AWARDS AND FELLOWSHIPS

- Professor **Alan P. Covich**, Professor Emeritus **Judith Meyer**, Professor **James W. Porter**, Professor **Catherine M. Pringle**, Professor Emeritus **H. Ronald Pulliam**, and Savannah River Ecology Lab Professor Emeritus **Rebecca Sharitz** were all named to the inaugural list of **Fellows of the Ecological Society of America** in 2012.

- Doctoral students **Daniel Becker, Daniel Harris,** and **Carly Phillips** each received **NSF Graduate Research Fellowships**. The fellowships provide a $30,000 stipend and tuition per year for three years.

- A short video by doctoral student **Virginia Schutte** was one of 14 to make it to the final round of the inaugural **NSF Creating the Future Video Contest** for students with current NSF Graduate Research Fellowships. *Improving Mangrove Management to Protect the Ocean's Tropical Nurseries*, which explores the critical role of red mangrove forests in marine ecosystems of the Caribbean, was also accepted into the Beneath the Waves Film Festival. View the video at www.youtube.com/watch?v=2wCP9FsMq6o.

- Doctoral student **Daniel Becker** received an **NSF Ecoimmunology Research Exchange Award** to participate in research training in ecoimmunology.

- Doctoral student **Sarah Budischak** received an **NSF Ecology and Evolution of Infectious Diseases Travel Award** to attend the International Association for Ecology and Health annual conference in Kunming, China, in 2012, where she won the EcoHealth Best Student Presentation Award.

- Doctoral students **Sarah Budischak, Sara Heisel**, and **Dara Satterfield**—otherwise known as the "Parasite Ladies"—took second place in the **NSF Innovation in Graduate Education Challenge** in 2013. Their proposal, "Retaining Women in STEM Careers: Graduate Students as the Building Blocks of Change," which was one of more than 500 entries sub-

ALAN COVICH & STUDENTS

DANIEL HARRIS

TODD PIERSON

JAMES PORTER

mitted, offers practical suggestions for fostering more equal and lifelong careers for women scientists.

■ Postdoctoral research associate **Daniel Streicker**, PhD '11, received a two-year **NSF Postdoctoral Fellowship in Biology** and the **Robert C. Anderson Memorial Award** from the UGA Research Foundation in 2013. The Anderson Award is given to recent PhDs for outstanding research at the University or immediately after graduating.

■ Undergraduates **Katharine Bleau, Melanie Fratto, Rosalie Hendon, Todd Pierson, Malavika Rajeev, Theresa Stratmann**, and **Buck Trible** were elected to **Phi Beta Kappa** in 2013. Phi Beta Kappa, founded in 1776, is the oldest and most widely known academic honor society in the U.S.

■ Undergraduate **Sara Black** was inducted into the Georgia chapter of the national **Blue Key Honor Society** in 2013.

■ **Devon Gaydos**, BS '13, and undergraduate **Samuel Scuderi** were first recipients of the **Georgia Power Outstanding Undergraduate Research Award**. Their study, "Mesocosms Designed to Investigate Ecological Facilitation between Golden Mice and White-Footed Mice," was presented at the 93rd Annual Meeting of the American Society of Mammalogists.

■ Doctoral student **Alyssa Gehman** was named a Wormsloe Fellow for 2013-14 by the Wormsloe Insititute for Environmental History and the UGA Graduate School. Previous Wormsloe Fellows from the Odum School are **Emily Cornelius**, MS Ecology '13, from 2011-13 and doctoral student **Jennifer Pahl** from 2011-12. For more on WIEH, see www.wormsloeinstitute.org.

■ BS/MS student **Malavika Rajeev** received the 2013 **Rotaract Service Award** for the Odum School. Rotaract is an international program for adults ages 18 to 30, sponsored by Rotary International, a service organization of business and professional leaders.

■ **Julie Rushmore,** PhD Ecology '13, received an **Achievement Rewards for College Scientists (ARCS) Scholar Award** in 2013. The ARCS Foundation supports academically outstanding U.S. citizens studying to complete degrees in science, engineering and medical research. Rushmore also received the award in 2012; in 2010 she won the ARCS Foundation Global Impact Scholar Award. For more on ARCS, see www.arcsfoundation.org. For more on Rushmore's research, see the story on page 10.

■ Doctoral student **Virginia Schutte** received the UGA Graduate School Excellence in Teaching Award in 2013.

■ MS CESD student **Kristina Summers** received the **UGA Outstanding Teaching Award** in 2013.

SCHOLARSHIPS

■ **Katherine Lacksen**, BS '13, received a **Fulbright Scholarship** for study in 2013-14. She will conduct research in Australia, based in the city of Darwin in Australia's Northern Territory, where she will study the impacts of development on the Daly River, focusing on water supply, aquatic life, biodiversity, recreation, and aesthetics. Following her Fulbright, Lacksen has been admitted for graduate studies at Emory's Water Resources Institute.

■ Undergraduates **Henry Adams, Lara Mengak**, and **Chelsea Sexton** received scholarships from the **Garden Club of Georgia** in 2012-13.

■ Undergraduates **Sara Black**, a double-major in ecology and anthropology, and **Ian Karra**, majoring in economics and finance with a minor in ecology, received **Morris K. Udall and Stewart L. Udall Foundation Scholarships** in 2013. Udall Scholarships recognize outstanding sophomores and juniors pursuing careers focused on environmental or Native American public policy. Black and Karra are both UGA Honors students, and Black is a UGA Foundation Fellow.

■ Doctoral student **Daniel Becker** received a **Bat Conservation International Student Research Scholarship** to support his project, Resource shifts and rabies control: implications for bat conservation and ecosystem services, Peru. For more about BCI, see www.batcon.org.

■ **Julie Rushmore**, PhD Ecology '13, received the **James L. Carmon Scholarship Award for Advanced Creative Computational Research** in 2013. The award, which recognizes UGA graduate students who have used computers in innovative ways, is given by the UGA Research Foundation.

OTHER RECOGNITION

■ Graduate Academic Advisor **Katherine Adams**, a PhD candidate in the UGA College of Education, and two fellow COE students presented a paper, "Boundary Spanning Roles in Communities & Organizations: Implications for Adult Educators," at the opening symposium of the 54th annual **Adult Education Research Conference** in 2013.

■ Associate Professor **John Drake** was the Leverhulme Visiting Professor at **Oxford University** in 2012, and the Keeley Visiting Fellow at Wadham College, Oxford University, during Michaelmas term.

■ Professor **Catherine M. Pringle** received a five year appointment as University of Georgia Distinguished Research Professor for 2013-18.

■ Assistant Professors **Rich Shefferson** and **Nina Wurzburger** were both named **UGA Outstanding Teaching Faculty in 2013.**

■ Doctoral student **Virginia Schutte** won the UGA Graduate School's **Three Minute Thesis** competition in 2013; doctoral student **Kristy Segal** was the runner-up.

■ Assistant Professor **Rich Shefferson** was a Visiting Professor for the summer 2013 at Kyoto University's Center for Ecological Research. He worked with Dr. Takashi Osono on macroevolutionary trends in plant-fungal mutualism.

SELECTED GRANTS

Assistant Research Scientist **J.P. Schmidt**, PhD '06, and Professor Emeritus **Ron Carroll** received a $23,831 grant from the **Georgia Department of Natural Resources Coastal Resources Division** for *Economic Analyses for Ecosystem Services and Climate Change Adaptation*. They will assess the economic value of environmental services provided by salt marsh and sand-sharing systems of the Georgia coast and look at various contributions including water purification and storm protection.

Jeb Byers, associate professor, received a three year Discovery Project grant from the **Australian Research Council** for $375,354 for *Integrating ecosystem engineering and trophic effects on food webs across fluctuating abiotic gradients*. Co-PIs are Jeffrey T. Wright of Australian Maritime College, Paul E. Gribben of the University of Technology Sydney, and Craig Johnson of the University of Tasmania.

DUSTIN KEMP

Postdoctoral Research Associate **Dustin Kemp**, PhD '08, is co-PI on a $1.1 million, three-year Collaborative Research grant from the National Science Foundation, *The Physiology and Ecology of Widespread "Stress-Tolerant" Coral Endosymbionts: Coral "Saviors" or Opportunistic Invaders?* The UGA portion of the grant is $169,254. Lead PI **Todd LaJeunesse** of Penn State University was a postdoctoral research associate with Professor Bill Fitt from 2000-04. Co-PI **Mark Warner**, PhD '98, is currently associate professor of marine biosciences at the University of Delaware (see Alumni News for more on Warner.)

Postdoctoral Research Associate **John Kominoski,** PhD '08, was part of a research group that received a **National Science Foundation** Collaborative Research grant of $1.5 million for *Water Sustainability under Near-term Climate Change: A Cross-Regional Analysis Incorporating Socio-Ecological Feedbacks and Adaptations*. Collaborators include researchers from North Carolina State University and Arizona State University. At UGA, partners include Georgia Museum of Natural History Director **Bud Freeman**, PhD Zoology '80, Odum School adjunct professor **Mary Freeman**, and Freeman Lab Coordinator **Megan Hagler**, MS Ecology '06.

Todd Pierson, BS '13, received a grant from the nonprofit **Chopsticks for Salamanders** to pursue salamander research in the southern Appalachians.

Distinguished Research Professor **Catherine M. Pringle** received a grant of $450,000 from the **National Science Foundation** to renew her Long-term Research in Environmental Biology project *Emergent landscape patterns in stream ecosystem processes resulting from groundwater/surface water interactions* through 2016. Her co-PIs on the project, conducted at La Selva Biological Station, Costa Rica, since 1985, are **Alonso Ramirez**, PhD '01, and John Duff.

Assistant Research Scientist **Patrick Stephens** was awarded a **National Science Foundation** Research Coordinated Network grant of $499,451 for five years to study global patterns of emerging infectious diseases across species. The RCN will be based at the Odum School and will include research groups from around the U.S.

JOHN DRAKE

Associate Professor **John Drake** received a three-year grant for $283,500 from the **National Science Foundation** for *Research Experience for Undergraduates Site: Population Biology of Infectious Diseases*. Co-PI: M. Strand.

NINA WURZBURGER

Assistant Professor **Nina Wurzburger** received a five-year grant from the **U.S. Department of Defense, Department of Energy, and Environmental Protection Agency Strategic Environmental Research and Development Program** for $1.39 million to study nutrient dynamics in longleaf ecosystems undergoing disturbance. (See story on page 8.)

Lab Coordinator **Megan Hagler,** MS Ecology '06, will lead an assessment of stream fish dynamics in the Apalachicola-Chattahoochee-Flint River basin for the **River Basin Center**. RBC staff will collaborate with U.S. Geological Survey scientists to collect and analyze field data on fish species occupancy dynamics in relation to streamflow patterns for differing regions of the ACF River basin. The data will help researchers and stakeholders better determine the effects of water level and flow variation on fish populations. The study is funded by a $60,000 grant from the **U.S. Department of the Interior**.

Assistant Research Scientist **J.P. Schmidt**, PhD '06, received a $45,000 grant from the **World Agroforestry Centre** to calibrate NIR spectral measurement of soil carbon measures in eastern Amazon Brazil.

ODUM SCHOOL SMALL GRANTS FOR GRADUATE RESEARCH

Fall 2012

Andrea Ayala, PhD Ecology; **Daniel Becker**, PhD Ecology; **Sarah Bowden**, PhD Ecology; **Phillip Bumpers**, MS Ecology; **Tad Dallas**, PhD Ecology; **Rebecca de Jesús**, PhD Ecology; **Carissa Ganong**, PhD Ecology; **Eric Goolsby**, PhD Toxicology; **Kristy Segal**, PhD Ecology; and **Marcus Zokan**, PhD Ecology.

Spring 2013

Peter Baas, PhD Ecology**; Sabrie Breland**, MS Ecology; **Alyssa Gehman**, PhD Ecology; **Casey Harris**, MS Ecology; **Kimberly Kellett**, PhD Ecology; **Elise Krueger**, PhD Ecology; **Megan Machmuller**, PhD Ecology; **Bill McDowell**, PhD Ecology; **Jeff Minucci**, PhD Ecology; **Jennifer Pahl**, PhD Ecology; **Carly Phillips**, PhD Ecology; **Troy Simon**, PhD Ecology; **Greg Skupien,** MS CESD; and **Jason Westrich**, PhD Ecology.

A Letter from the Director of Development

Hello Alumni and Friends,

This has been yet another exciting academic year in the Odum School. Once again our undergraduate and graduate students continue to excel through their academics, research and outreach activities. Our students were recipients of Udall Scholarships, NSF Fellowships and various other awards. Their research activities take them all over the world exploring various ecosystems. Their success in the classroom and beyond is greatly assisted by the generosity of our alumni and friends.

As the Odum School's outreach activities expand we look forward to engaging all of you who are invested in our mission of identifying and solving key ecological questions. Great things happen when collaboration is embraced. We remain increasingly grateful to our Advisory Board for their ongoing support of our students, faculty and staff.

We're excited to announce that next year we will host our first Odum School alumni weekend. Keep a look out for a save the date card in the coming months. We also plan on hosting our second Parents and Families Day in the spring.

Thanks to all of you who've made contributions towards the Ron Carroll and Carol Hoffman Costa Rica Travel Award. The first two recipients traveled to Costa Rica in May, and came back incredibly grateful for the opportunity. Many other contributions went towards supporting graduate student small research grants, undergraduate student travel to conferences, the EcoFocus Film Festival and a variety of other initiatives.

Please don't hesitate to contact me at snelling@uga.edu if you have any questions regarding our alumni relations and fundraising efforts. I look forward to hearing from you and working together to expand the opportunities available in the Eugene P. Odum School of Ecology.

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, 2012-June 30, 2013.

Tammy and Perry Andros
Anonymous
Athens Montessori School
Balance
Wilson G. and Sarah Gaines Barmeyer, MS CESD '06
Alan and Mary Barnes
Kevin H. Barnes, MS CESD '98, and Sara K. Beresford, MS CESD '00
Gary, PhD' 67, and Terry Barrett
Craig III and Diana Barrow
Rebecca Bell
Bob Berkebile
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Dameron Black IV and Nancy Cotham
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Misha L. Boyd
James E. and Tyra Byers
Harmon W. Jr. and Cathy Caldwell
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Dac Crossley Jr.
Christopher F. D'Elia, PhD '74
Ting Dai, PhD '94
Andrew Davis and Sonia M. Altizer
Raghavan Deepak
David D. Dow, PhD '71
Bertis E. IV and Katherine J. Downs
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William F. Everitt and Amelia Fusaro
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Beth Gavrilles
Georgia Film
Georgia Wildlife Federation
Robert G. Gillen, MS '68
David L. and Susan H. Gittleman
John L. Gittleman
C. P. and Carole D. Goodyear, MS '72
Fred L. Gould
Eugene Helfman and Judith Meyer
John K., MS CESD '99, and Stephanie N. Davis Hiers, MS CESD '00
Carl L., BS '70, and Pamela H. Higginbotham
Skelly Holmbeck
Robert E. Holmes and Penelope S. Crump
Roger K. Hux and Julia E. Krebs, MS '72, PhD '77
A. Felton III, BS '90, and Karen Jenkins
Jim S. Kettler, PhD '95
Wayne E. Sr. and Claudia M. King
Alison J. Lipman, PhD '08
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Shana L. Udvardy, MS CESD '03
U.S. Environmental Protection Agency
Charles A. and Brenda Vice
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Marlene A Walters, BS '13
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Stephen A. and Merryl J. Weber
Seth J. Wenger, MS CESD '99, PhD '06
James G. Wiener, PhD '79
Gretchen Wieshuber
Mark E. Williams and Susan S. Andrews, PhD '98
Douglas C. and Christine Wolf
Wormsloe Foundation Inc.
Nina Wurzburger

JAKE ALLGEIER

SONIA ALTIZER

Allgeier, Jacob, Lauren A. Yeager, and Craig A. Layman. 2013. Consumers regulate nutrient limitation regimes and primary production in seagrass ecosystems. *Ecology* 94:521–529.

Altizer, S., R. Ostfeld, P. Johnson, S. Kutz, and C. D. Harvell. 2013. Climate change and infectious diseases: from evidence to a predictive framework. *Science*, in press. (to appear Aug. 2013)

Altman, Safra, John Robinson, James Pringle, **Jeb Byers**, John Wares. 2013. Edges and overlaps in North Atlantic phylogeography. *Diversity*, in press.

Ballantyne, F. 2013. Commentary on classic paper (Taylor, 1961) in Smith, F.A., **J. L. Gittleman**, and J.H. Brown. *Foundations of Macroecology*. University of Chicago Press.

Ballantyne, F. 2013. Evaluating model fit to determine if logarithmic transformations are necessary in allometry: a comment on the exchange between Packard (2009) and Kerkhoff and Enquist (2009). *The Journal of Theoretical Biology* 313:418-421.

Billings, S. A. and **F. Ballantyne**. 2013. How interactions between microbial resource demands, soil organic matter stoichiometry and substrate reactivity determine the direction and magnitude of soil respiratory responses to warming. *Global Change Biology* 19:90-102.

Berry, Brett S., BS '11, **Krisztian Magori** (former postdoc), **Amanda C. Perofsky**, BS '09, D. E. Stallknecht, and **Andrew W. Park**. 2013. Wetland cover dynamics drive hemorrhagic disease patterns in white-tailed deer in the United States. *Journal of Wildlife Diseases*. doi: 10.7589/2012-11-283.

Budischak, S. A., A. E. Jolles, and **V. O. Ezenwa**. 2012. Direct and indirect costs of co-infection in the wild: linking GI parasite communities, host hematology, and immune function. *International Journal for Parasitology: Parasites and Wildlife* 1:2-12.

Byers, J. E., **W. G. McDowell**, S. Robertson, R. Haynie, L. M. Pintor, and S. B. Wilde. 2013. Climate and pH predict the potential range of the invasive apple snail (*Pomacea insularum*) in the southeastern United States. *PLoS One* 8(2): e56812. doi:10.1371/journal.pone.0056812.

Burfeind, D. D., K. A. Pitt, R. M. Connolly, and **J. E. Byers**. 2013. Performance of non-native species within marine reserves. *Biological Invasions* 15: 17-28.

Byers, J. E., P. E. Gribben, C. Yeager, and E. Sotka. 2012. Impacts of an abundant invasive ecosystem engineer within mudflats of the southeastern US coast. *Biological Invasions* 14: 2587-2600.

Cowden, C. C. (former postdoc) and **R. P. Shefferson**. Diversity of root-associated fungi of mature *Habenaria radiata* and *Epipactis thunbergii* colonizing manmade wetlands in Hiroshima Prefecture, Japan. *Mycoscience*, in press.

Robinson, J. R., J. P. Wares, and **J. M. Drake**. Extinction hazards in experimental *Daphnia magna* populations: effects of genotype diversity and environmental variation. *Ecology & Evolution*, in press.

Drake, J. M. and **A. M. Kramer**. 2012. Mechanistic analogy: How microcosms explain nature. *Theoretical Ecology* 5:433-444. doi:10.1007/s12080-011-0134-0.

Ezenwa, Vanessa O., Nicole M. Gerardo, David W. Inouye, Mónica Medina, and Joao B. Xavier. 2012. Animal Behavior and the Microbiome. *Science*. doi: 10.1126/science.1227412.

Han, B., **Rushmore, J.**, **Fritzsche, A.**, **Satterfield, D.**, **Winternitz, J.** 2012. Preempting pandemics (Review of the book *The Viral Storm* by N. Wolfe). *Science* 337: 647-648.

Haven, James, **Krisztian Magori** (former postdoc), and **Andrew W. Park**. 2012. Ecological and inhost factors promoting distinct parasite life-history strategies in Lyme borreliosis. *Epidemics,* http://dx.doi.org/10.1016/j.epidem.2012.07.001.

Huang, Shan, PhD '12, **Patrick R. Stephens**, and **John L. Gittleman**. 2012. Traits, trees and taxa: global dimensions of biodiversity in mammals. *Proceedings of the Royal Society B*. doi:10.1098/rspb.2012.1981

Jordan, Carl F. 2013. *An Ecosystem Approach to Sustainable Agriculture: Energy Use Efficiency in the American South*. Springer.

Kartzinel, T. R., PhD '12, **R. P. Shefferson**, and D. W. Trapnell. 2013. Relative importance of pollen and seed dispersal across a Neotropical mountain landscape for an epiphytic orchid. *Molecular Ecology.* doi: 10.1111/mec.12338.

Kartzinel, T. R., PhD '12, D.W. Trapnell, and **R. P. Shefferson**. 2013. Critical importance of large native trees for conservation of a rare Neotropical epiphyte. *Journal of Ecology*. doi: 10.1111/1365-2745.12145.

VANESSA EZENWA

ANDREW PARK

Magori, Krisztian (former postdoc) and **Andrew Park**. 2013. The evolutionary consequences of alternative types of imperfect vaccines. *Journal of Mathematical Biology*. doi: 10.1007/s00285-013-0654-x.

Maher, S. P. (former postdoc), **A.M. Kramer**, **J. T. Pulliam**, **M. A. Zokan**, **S. E. Bowden**, **H. D. Barton** (former postdoc), **K. Magori** (former postdoc), and **J. M. Drake**. 2012. Spread of white-nose syndrome on a network regulated by geography and climate. *Nature Communications* 3:1306.

Laurance, et al. (including **C. M. Pringle**). 2012. Averting biodiversity collapse in tropical protected areas. *Nature* Jul 25: 22832582.

Marshall, M. C. (former postdoc), **A. J. Binderup**, MS '11, E. Zandona, S. Goutte, R. D. Bassar, R. El-Sabaawi, S. A. Thomas, A. S. Flecker, S. S. Kilham, D. N. Reznick, and **C. M. Pringle**. 2012. Longitudinal variation in top-down effects of macroconsumer assemblages on benthic ecosystem structure and function along a neotropical stream, Trinidad. *PLoS One* 7(9): e45230.

Pringle, C. M., **E. P. Anderson**, PhD '04, **M. Ardon**, PhD '06, **R. J. Bixby** (former postdoc), **S. Connelly**, J. H. Duff, A. P. Jackman, P. Paaby, **A. Ramirez**, MS CESD '97, PhD '01, **G. E. Small**, PhD '10, **M. N. Snyder**, PhD '12, **C. Ganong**, and F. J. Triska. 2013. River ecosystems of Costa Rica. *In*: M. Kappelle (ed.) *Costa Rican Ecosystems*. Oxford University Press.

Small, G. E., PhD '10, **M. Ardon**, PhD '06, A. P. Jackman, J. H. Duff, F. J. Triska, **A. Ramirez**, MS CESD '97, PhD '01, **R. J. Bixby** (former postdoc), **M. Snyder**, and **C. M. Pringle.** 2012. Rainfall-driven amplification of seasonal acidification in poorly-buffered neotropical streams. *Ecosystems* 15: 974- 985.

Whiles, M. R., PhD '95, **R. O. Hall Jr.**, PhD '96, W. K. Dodds, P. Verburg, **A. D. Huryn**, PhD '86, **C. M. Pringle**, K. R. Lips, S. S. Kilham, C. Colon-Gaud, A. T. Rugenski, S. Peterson, and **S. Connelly**. 2012. Disease-driven amphibian declines alter ecosystem function in tropical streams. *Ecosystems* 16(1): 146-157.

Ardon, M., PhD '06, J. Duff, **A. Ramirez**, MS CESD '97, PhD '01, **G. E. Small**, PhD '10, A. Jackman, F.J. Triska, and **C. M. Pringle**. 2013. Experimental acidification of two bioeochemically-distinct neotropical streams: buffering mechanisms and macroinvertebrate drift. *Science of the Total Environment* 443: 267-77.

Small, G. E., PhD '10, **P. J. Torres**, L. M. Schweizer, J. H. Duff, and **C. M. Pringle**. 2013. Importance of terrestrial arthropods as subsidies in lowland Neotropical rainforest stream ecosystems. *Biotropica* 45(1): 80-87.

Rushmore, J., D. Caillaud, L. Matamba, R. M. Stumpf, S. P. Borgatti, **S. Altizer**. 2013. Social network analysis of wild chimpanzees with insights for disease transmission. *Journal of Animal Ecology*. doi: 10.1111/1365-2656.12088.

Rushmore, J., S.D. Leonhardt, and C.M. Drea. 2012. Sight or scent: lemur sensory reliance in detecting food quality varies with feeding ecology. *PLoS One* 7(8): e41558.

Schmidt, J. P., **P. Stephens**, **J. M. Drake**. 2012. Two sides of the same coin? Rare and invasive plants native to North America. *Ecological Applications* 22:1512-1525. doi:10.1890/11-1915.1

Schmidt, J. P., M. Springborn, and **J. M. Drake**. 2012. Bioeconomic forecasting of invasive species by ecological syndrome. *Ecosphere* 3:art46. doi:10.1890/ES12-00055.1.

Shefferson, R. P. and D. A. Roach. 2013. Longitudinal analysis in Plantago: strength of selection and reverse age analysis reveal age-indeterminate senescence. *Journal of Ecology*. doi: 10.1111/1365-2745.12079.

Shefferson, R. P., T. Kull, K. Tali, and **K. M. Kellett.** 2012. Linking vegetative dormancy to fitness in two long-lived herbaceous perennials. *Ecosphere* 3:13.

Shefferson, R. P. and D. A. Roach. 2012. The triple helix of *Plantago lanceolata*: genetics and the environment interact to determine population dynamics. *Ecology* 93:793-802.

Streicker, D. G., **S. Altizer**, A. Velasco-Villa, and C. E. Rupprecht. 2012. Variable evolutionary routes to host establishment across repeated rabies virus host shifts among bats. *Proceedings of the National Academy of Sciences of the USA* 109 (38). doi: 10.1073/pnas.1203456109.

Streicker, D. G., S. Recuenco, W. Valderrama, J. Gomez-Benavides, I. Vargas, V. Pacheco, **R. E. Condori**, J. Montgomery, C. E. Rupprecht, P. Rohani, and **S. Altizer**. 2012. Ecological and anthropogenic drivers of rabies exposure in vampire bats: implications for transmission and control. *Proceedings of the Royal Society B* 279, 3384-3392. doi: 10.1098/rspb.2012.0538.

Streicker, D. G. and A.B. Pedersen. 2012. On the origin of zoonoses. (Invited review of *Spillover: Animal Infections and the Next Human Pandemic*, by David Quamman). *Science* 338: 1030. doi: 10.1126/science.1230791.

Streicker, D. G., A. Fenton, and A.B. Pedersen. 2013. Differential sources of host species heterogeneity influence the transmission and control of multi-host parasites. *Ecology Letters***.** doi: 10.1111/ele.12122

Winternitz, Jamie C. and John P. Wares. 2013. Duplication and population dynamics shape historic patterns of selection and genetic variation at the MHC in rodents. *Ecology and Evolution*. doi: 10.1002/ece3.567.

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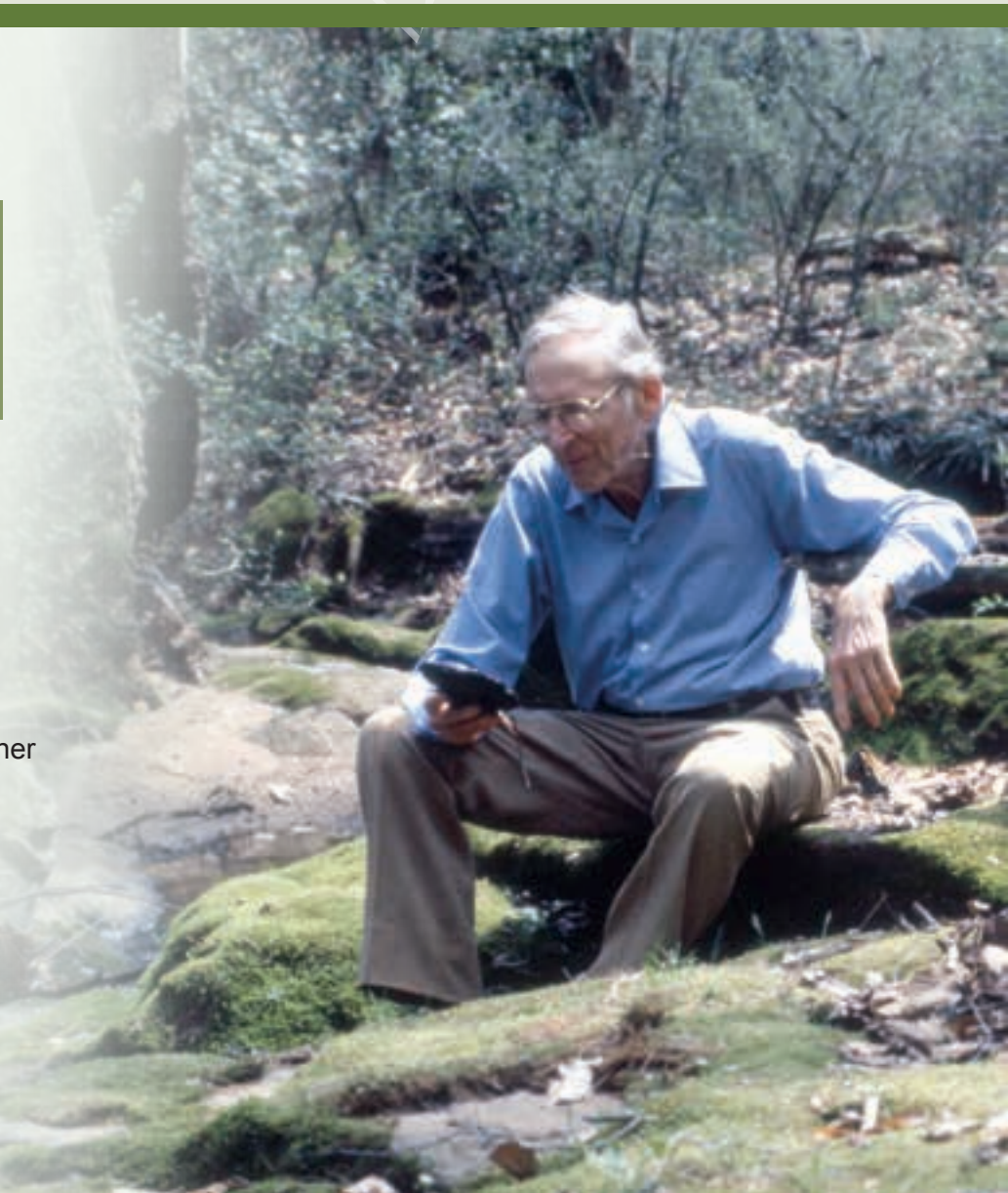

University of Georgia
Odum School of Ecology
Tuesday, September 17, 2013
3:00 p.m. – 5:00 p.m.

Welcome
Dean John Gittleman

Guest Speaker
Dr. Betty Jean Craige, Odum's biographer

Panel Discussion
Ecology: The Last and Next 100 Years

Cake and Ice Cream

RSVP by September 10
to snelling@uga.edu