Providing the tools for sustainable management of aquatic resources and ecosystems
This was a big growth year for the River Basin Center (RBC). The center officially took over coordination of the biannual Georgia Water Resources Conference and sponsored or cosponsored four other conferences and workshops. We launched a new small grants program for graduate students and honored the first two recipients at our inaugural RBC “microconference.” The number of RBC faculty affiliates expanded to 57 in 12 different units. Thirty-two of these affiliates wrote proposals or held grants associated with the RBC with an estimated $2.14 million in active annual external funding.

In 2017 the River Basin Center officially assumed coordination of the Georgia Water Resources Conference. The 2017 conference featured 124 speakers, 8 panel discussions, 2 workshops, and attracted over 300 registered attendees.

SEC ACADEMIC CONFERENCE
We worked with four other water centers at SEC schools to co-organize an SEC academic conference focused on water, held at Mississippi State in February 2017. Six UGA faculty presented their research and outreach activities at the conference.

SUSE4
In May the RBC co-sponsored the fourth Symposium on Urbanization and Stream Ecology (SUSE4) at Haw River State Park in North Carolina.

#RBCμC2017
In December 2017 the River Basin Center held its first “Microconference”—an afternoon session of 20 short talks by faculty and student affiliates designed to share research and foster interdisciplinary collaboration.

ALABAMA/GEORGIA WATER RESOURCES & ECONOMICS CONFERENCE
In October 2017 we convened a conference on transboundary water management at Troy State University in Alabama. The meeting was well-attended by major stakeholders including regulatory agencies, water managers, and the NGO community and featured presentations on environmental flows, drought management, reducing agricultural withdrawals, and resolving interstate legal conflicts by the directors of the Susquehanna River Basin Commission, the Interstate Commission on the Potomac, and others. The meeting was an extension of the RBC’s ongoing work to help resolve the legal dispute between Florida, Alabama, and Georgia on flows in the Apalachicola, Chattahoochee, and Flint Rivers.
During calendar year 2017, a total of 32 RBC faculty affiliates held active grants associated with the RBC and/or wrote new proposals associated with the RBC. Existing contracts total $5.28 million in external funding, of which we estimate $2.14 million was spent in 2017 (since our reporting period crosses fiscal years, we estimate annual expenditures by dividing the total value of each contract to UGA by the number of years it is active). Funding sources are diverse and include federal agencies (NSF, USDA, NASA, EPA, FWS, NPS, Army Corps), private foundations (Dobbs, Riverview, Ray C. Anderson), state agencies (DNR, GDOT, Georgia Forestry Commission), and utilities (Southern Company, Electric Power Research Institute).

Two grants merit particular mention

Faculty affiliate Puneet Dwivedi of the Warnell School of Forestry and Natural Resources was awarded a grant from the USDA to study the long-term economic sustainability of the Upper Floridan Aquifer. This $5 million project will be conducted with PIs at the University of Florida, Auburn and Albany State; $1.2 million will come to UGA.

Faculty affiliate and advisory board member Amy Rosemond of the Odum School of Ecology was awarded an NSF grant to study the effect of warming on carbon dynamics of small streams, along with PIs at the University of Alabama, University of Connecticut, and Coastal Carolina University. This $1.7 million project includes an outreach component that involves volunteers from regional conservation groups in monitoring the temperature of their local streams. Both projects are exciting examples of the kind of work that meets River Basin Center’s mission of applying the world-class science and policy research at UGA to real-world management issues.
FEATURED RESEARCH

CONSTRUCTED WETLANDS AT SEWANEE

Working with the University of the South and funded by the Coca-Cola Foundation and the Riverview Foundation, the RBC is spearheading ground-breaking work on the efficacy and management of constructed wetlands to treat pharmaceuticals and other contaminants in wastewater in the rural Southeast and in developing countries. The concept for the pilot wetland at the Sewanee Utility District was developed by UGA grad and law students in the Interdisciplinary Environmental Practicum and Sewanee undergrads. Monthly water quality monitoring demonstrated the success of the system at removing nutrients and bacteria during the first year of establishment. Total nitrogen, ammonia, and fecal indicator bacteria decreased during all seasons, with increased reduction during spring months, seemingly due to plant absorption, especially during growth. Total phosphorus and reactive phosphate levels also generally decreased after wetland treatment. This monitoring will continue into the second year and add pharmaceutical analyses. In addition, mesocosm studies will be conducted to determine the role of specific wetland processes on water treatment.

We are developing a Rural Economic Development Incubator proposal to USDA to be centered around the potential for wetlands to provide wastewater capacity in impaired watersheds or in communities that are looking to drought-proof or lack technical/financial capability for traditional wastewater treatment.

RECIPIENTS

Rachel Katz currently a biometrician at the USFS’s National Wildlife Refuge System in Massachusetts

Laura Keys research associate for Louisiana State University's Freshwater Ecology research group

Laura Early Satilla Riverkeeper

Phillip Nussbaum just graduated and completed a Nepal trek; currently interviewing for jobs

Caitlin Conn (left) transferred to the Ecology PhD program

Rick Bauer current student

Carol Yang (above) current student

BUTLER FELLOWS

The Butler Fellows were established in 2006 through a $1 million contribution to the Institute of Ecology from Columbus GA trial attorney and environmental advocate James E. Butler, Jr. A lifetime of experiences beginning with a love of fishing in Georgia’s rivers instilled in James Butler a deep regard for the environment. The fellowships that bear his name are for graduate students studying aquatic ecology, water quality and land use in Georgia and surrounding states.

Each year the Odum School of Ecology in cooperation with the UGA River Basin Center awards a research assistantship to one incoming Masters student in Conservation Ecology and Sustainable Development, who is designated a “Butler Fellow.” The assistantship constitutes fall-spring funding (at 4/9 time) for two consecutive years. Applications are solicited annually through a nationwide advertisement, but applicants may also be nominated by any member of the graduate faculty of the Odum School of Ecology or faculty of the River Basin Center. Applicants should be interested in conducting applied research or policy analysis in the Southeastern US.

Aligned with the RBC

Working with the University of the South and funded by the Coca-Cola Foundation and the Riverview Foundation, the RBC is spearheading ground-breaking work on the efficacy and management of constructed wetlands to treat pharmaceuticals and other contaminants in wastewater in the rural Southeast and in developing countries. The concept for the pilot wetland at the Sewanee Utility District was developed by UGA grad and law students in the Interdisciplinary Environmental Practicum and Sewanee undergrads. Monthly water quality monitoring demonstrated the success of the system at removing nutrients and bacteria during the first year of establishment. Total nitrogen, ammonia, and fecal indicator bacteria decreased during all seasons, with increased reduction during spring months, seemingly due to plant absorption, especially during growth. Total phosphorus and reactive phosphate levels also generally decreased after wetland treatment. This monitoring will continue into the second year and add pharmaceutical analyses. In addition, mesocosm studies will be conducted to determine the role of specific wetland processes on water treatment.

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Watershed UGA (www.watershed.uga.edu), which we lead in concert with the Office of Sustainability and in partnership with many schools and offices on campus, is growing; we now have 90 faculty participating through classroom activities, research or engagement in service and outreach (all three land grant missions of the university). The goal of the program is to create social infrastructure that facilitates the use of the UGA campus as a living-learning laboratory on sustainability with the initial focus on restoring the streams that run through campus.

We have developed six narrated powerpoint presentations on various watershed topics that faculty can assign to their students as well as accompanying learning objectives, active classroom stimuli, service-learning assignments and pre- and post-assessments for each; this enables students in classes as diverse as Introductory Economics and Print-making to Fluvial Geomorphology to participate.

Our work was recognized in 2017 by two community awards-- the Watershed Steward Award by the Athens-Clarke County government and the Impact Award by the Clarke County School District. In 2017 we successfully recruited funding for the restoration of an abandoned urban forest, trail and tributary to campus stream Trail Creek, on the Howard B. Stroud Elementary School, the poorest and most racially diverse in the county (98% of children are eligible for free school lunch).

Another Watershed UGA project, the restoration of Lake Herrick (above), is now underway. Recreational use of the lake, which has been off-limits for the past decade due to poor water quality, is expected to resume in summer 2018.

In 2017, River Basin Center staff completed a first of its kind analysis showing that the U.S. Army Corps Savannah District is failing to meet the critical national policy of “no net loss” for streams. Savannah District regulatory personnel incorporated recommendations from the report into proposed standards for permitting that, if adopted, should rectify most of the major issues we identified. The no net loss policy dictates that Army Corps Districts should offset stream and wetland impacts permitted under Clean Water Act Section 404 through compensatory mitigation activities such as restoration. At the very least, Corps Districts should be requiring compensatory mitigation at a 1:1 areal ratio – for every foot or acre of stream or wetland impacted, a foot or acre should be mitigated. Through a comprehensive permit and GIS analysis, RBC staff found that, in the Savannah District, for every acre of wetland impacted through a Section 404 permit, 1.8 acres are mitigated, but for every foot of stream impacted, only 0.36 feet are mitigated.

The report for this project, No Net Loss in the U.S. Army Corps Savannah District, includes a comprehensive review of applicable regulations, our technical process and results, and recommendations for the Savannah District. It is available on the River Basin Center website at https://rivercenter.uga.edu/project/clean-water-act-mitigation-no-net-loss-analysis/. This project was funded by the Georgia Environmental Restoration Association.
Watershed study uncovers imperiled fishing waters

According to a recent study on Southeastern United States watersheds by the Tennessee Aquarium Conservation Institute and the University of Georgia River Basin Center, fish species within several significant local watersheds are in dire straits—and so are the anglers who hunt them.

“At the most general level, game fish are not much different from non-game fish,” says Seth J. Wenger, Co-Director for Science at the Georgia River Basin Center. “You’re looking at a complex system where a loss of one species can have a pretty substantial whole system consequence.”

The study revealed the largest factor in watershed degradation is human involvement, mainly in the form of urban and agriculture runoff, which can increase sediment levels, kill fish and plants, and pollute us via cyanides and barium.

Wenger adds, “We’re certainly looking at potential extinctions.” Elkins says, “There are many species that are just barely hanging on.”

Weber believes the work isn’t cut-and-dry. “We’ve got some very narrow-ranged species here locally,” he says. “These species can play big roles in their local ecosystems. Game fish across the Southeast may rely heavily on the bass and game fish that are part of their diets. Even if they don’t, species that feed on the dace or the Chickamauga crayfish could themselves be a primary food source for game fish.”

Wenger and Elkins recommend identifying local waterways, ensuring any development or work you do is in line with city and county standards, and placing support stormwater regulations. It’s the number one most at-risk river, and can be difficult to visualize. The lakes and streams in them, though, aren’t. Here are some of the premier fishing spots in the top 20 most at-risk watersheds the study identified.

Lake Pickwick (Pickwick Watershed, #1 most at-risk)
Wheeler Lake (Wheeler Watershed, #2 most at-risk)
Big Creek (Upper Clinch Watershed, #3 most at-risk)
Wolf Creek (Middle Coosa Watershed, #4 most at-risk)
Conassauga River (Conasagua Watershed, #7 most at-risk)
Caney Fork River (Caney Watershed, #10 most at-risk)

The study, by the numbers

<table>
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<tr>
<th>Watersheds examined in the study</th>
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<td>States involved in the study</td>
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<tr>
<td>Percentage of fish species that are considered imperiled — for what it was 20 years ago</td>
<td>28</td>
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<tr>
<td>Percentage of mussels and crayfish species present in the study</td>
<td>10</td>
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The mission of the RBC is to produce and disseminate the knowledge and tools for sustainable management of aquatic resources and ecosystems through applied scientific and policy research, and by training the next generation of managers and researchers.