   

Center for Freshwater Studies (CFS)

An Interdisciplinary Research and Education Center

Dr. Amy Ward, Director

http://www.as.ua.edu/cfs/

THE UNIVERSITY OF ALABAMA

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UA CFS faculty members include 38 faculty in 6 academic units across the UA campus, including faculty from three departments in A&S (biological sciences, geological sciences, and geography), and one department each in the College of Engineering, the School of Law, and the College of Commerce & Business Administration. They contribute expertise primarily in *biogeochemistry, biodiversity, climate change, conservation ecology & genetics, ecological engineering, ecophysiology, geochemistry, geomorphology, geology, hydrology, land-scape ecology, stream/river, lake and wetland ecology, phylogenetics, water policy/law, and water resources.*

Mission and Objectives

The Center for Freshwater Studies at the University of Alabama was formed to provide a focus and organized structure for interdisciplinary education and research involving faculty and students in various departments and colleges throughout the University who have expertise and common interests in fresh waters. The CFS was primarily charged to:

(1) organize research efforts across departments and facilitate interactions among faculty in similar water-related areas,
(2) enhance our ability to compete for extramural funds, especially in interdisciplinary areas, and
(3) expand freshwater educational opportunities for undergraduate and graduate students.

Background

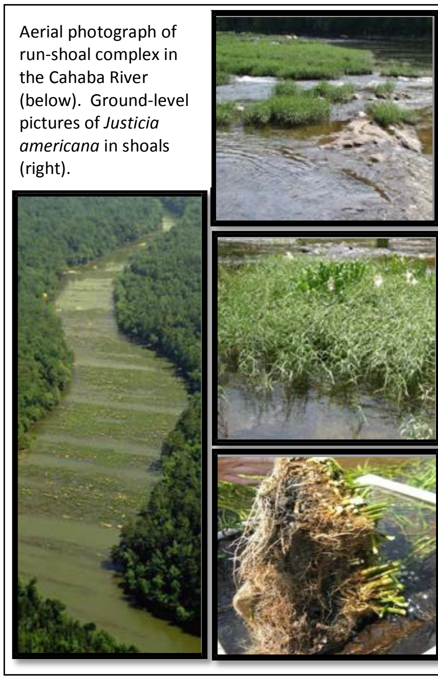
The CFS has a strong track record of scholarly excellence in research, including support of undergraduate and graduate student education and training.

- **Previous large-grant funding has been from NSF Water/Watersheds, NSF IGERT, NSF EPSCoR among others + many smaller grants;**
- **In any given reporting year: ~$4 to 6 million in-force funds from ~15-20 grants; Currently from: NOAA, NSF, USDA, USDI, USGS, USDOC, USDOE, ADCNR, C/e Solutions, Dauphin Island Sea Laboratory**
- **One primary focus is to find ways to leverage opportunities associated with NSF National Ecological Observatory Network (NEON) and the NOAA National Water Center.**
- **Interdisciplinary with inter-institutional, regional, and continental-scale perspectives.**

The CFS provides funds for various faculty and student activities that support the CFS mission and objectives. Below are summaries of two funded CFS projects.

"GEO-ECOLOGICAL MODELING OF RIVERINE HABITAT OCCURRENCE AND NUTRIENT RETENTION" J. Edmonds and B. Mortazavi, Dept. of Biological Sciences; S. Cohen and L. Davis, Dept. of Geography.

The U.S. EPA has identified accelerated nutrient (phosphate and nitrogen) loading and loss of aquatic habitat as the two primary causes of river impairment in the United States, with 55% of U.S. rivers and streams incapable of supporting healthy aquatic life due to the presence of excess nutrients and/or excess sediment (EPA, 2013). Because the number of rivers affected by non-point source nutrient contamination is so large, improving the biological integrity of American waterways requires research that can be applied at regional and continental scales, which coupled geospatial-ecological models are uniquely able to achieve. Due to this pressing need for regional to continental-scale models to address water quality issues, modeling has become an increasingly requested component of many of the current grant competitions in Biological and Geosciences NSF directorates. Thus, this project will result in the development of a model that addresses nutrient retention in rivers, and highlights the importance of habitat frequently lost to river regulation. This funded project is critical to successfully competing for larger, external grants in the future.

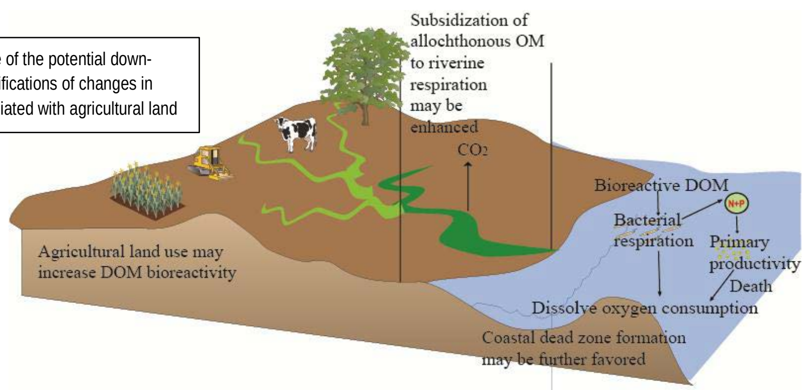


Aerial photograph of run-shoal complex in the Cahaba River (below). Ground-level pictures of *Justicia americana* in shoals (right).

"EFFECTS OF AGRICULTURAL LAND USE ON THE MOLECULAR COMPOSITION OF STREAMWATER DISSOLVED ORGANIC MATTER AND MICROBIAL COMMUNITY STRUCTURE" Y. Lu and N. Dimova, Dept. of Geological Sciences; R. Findlay, Dept. of Biological Sciences

Dissolved organic matter (DOM) plays a pivotal role in a variety of environmental and ecosystem processes within aquatic systems. DOM protects aquatic biota by attenuating ultraviolet-B penetration, affects the physical states and transport of ecotoxins and trace metal pollutants, and serves as the basal substrate and energy sources for heterotrophic food webs. Agricultural land use has been recognized as a global change that has fundamentally altered terrestrial landscapes and soil environments and, thus, may directly alter the quantity and characteristics of DOM exported from watersheds to receiving waters. Recent studies have shown that agricultural land use in watersheds may change the quantity, sources, ages, composition and reactivity of DOM in receiving waters, which may have substantial environmental and ecological ramifications for downstream rivers and coastal oceans. In this study, we will conduct a focused investigation on variation in DOM and associated microbial responses from streams draining a gradient of agricultural land use.

An example of the potential down-stream ramifications of changes in DOM associated with agricultural land



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