

## Georgia Coastal Ecosystems LTER at a Glance

**Background:** The Georgia Coastal Ecosystems (GCE) LTER project was established in 2000 to understand how long-term variation in fresh and salt water inputs affect coastal ecosystems. Our goal in GCE-III is to evaluate how variation in salinity and inundation, driven by climate change and anthropogenic factors, affect biotic and ecosystem responses at different spatial and temporal scales, and to predict the consequences of these changes for habitat provisioning and carbon dynamics across the coastal landscape. We divide our research into 4 inter-related programmatic areas: Climate and Human Drivers of Change (Area 1); Long-term Patterns within the Domain (Area 2); Response of Marsh Habitats to Changes in Salinity and Inundation (Area 3); and Integration and Forecasting (Area 4).



Fig. 1. GCE domain showing core monitoring and experiment sites. Inset shows the watershed of the Altamaha River, which is the main source of freshwater to the domain.

**Study area:** The GCE domain is located on the central Georgia coast (Fig. 1). It encompasses three adjacent sounds (Altamaha, Doboy, Sapelo) as well as upland (mainland, barrier islands, marsh hammocks), intertidal (fresh, brackish and salt marsh) and submerged (river, estuary, continental shelf) habitats.

### GCE-III goals:

**Area 1:** To track long-term changes in climate and human actions, and to evaluate the effects of climate and human drivers on domain boundary conditions.

**Area 2:** To describe temporal and spatial variability within the domain and to evaluate how they are affected by variations in river inflow and other boundary conditions.

**Area 3:** To characterize the responses of *Spartina* marsh, fresh/brackish marsh, and high marsh to pulses and presses in salinity and inundation that might be expected in the coming decades.

**Area 4:** To describe current patterns of habitat provisioning and C sequestration and export, and to evaluate how these might be affected by changes in salinity and inundation.

### Key partners:

**UGA Marine Institute (UGAMI):** UGAMI serves as the base of field operations for the GCE.

**Sapelo Island National Research Reserve (SINERR):** The boundaries of the Research Reserve fall within the GCE domain.

**Georgia Department of Natural Resources (GA DNR):** Sapelo Island is managed by the Wildlife Resources Division of GA DNR. GCE also works closely with the Coastal Resources Division, which is responsible for coastal zone management in GA.

**USGS:** GCE partners with USGS and SINERR to fund a weather station at the Meridian Dock.

## GCE Funding:

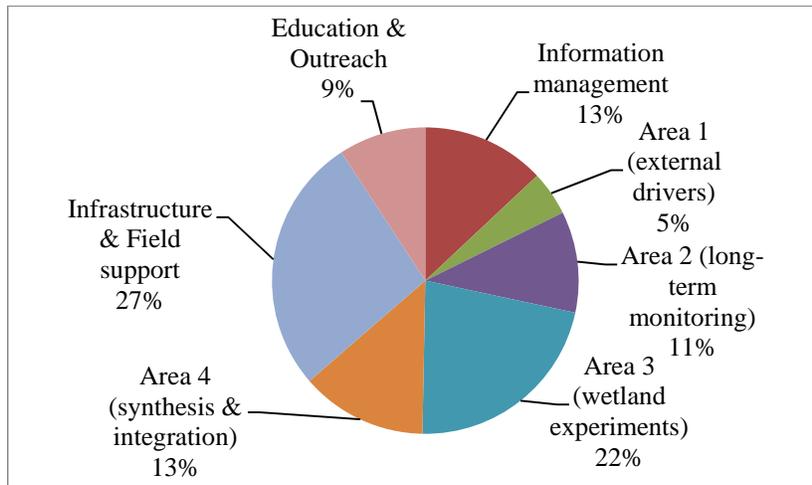


Fig. 2. Major categories of funding allocation for the GCE-III project

**Funding:** The GCE receives \$980K per year in base funding from NSF, which is allocated as shown in Fig. 2. Since 2012, GCE investigators have also brought in more than \$5.6 million in leveraged funding, primarily from NSF and NOAA. These external grants take advantage of GCE infrastructure and long-term data, and support projects ranging from studies of dissolved organic matter and bacterioplankton to trophic cascades to modeling estuarine responses to development.

## Key products (last 3 years):

*Papers:* 69 journal publications; 13 book chapters

*Graduate education:* 42 students from 8 institutions; 5 Ph.D. & 3 M.S. dissertations completed

*Undergraduate education:* 31 students (including 8 REU students) from 13 institutions

*Experiments:* Salinity manipulation and flux tower projects initiated

*Models:* 2 hydrodynamic models and 1 soil model under development

*Cross-Site Activities:* Oceanography special issue on LTER research; Graduate course with 150 participants; Coastal SEES project to compare salt marsh persistence at 3 coastal LTER sites

*Data sets:* 443 data packets published in PASTA

*Outreach:* Georgia Coastal Research Council produced 7 technical summaries for GA DNR; more than 1400 children's books were distributed; GCE hosted a visit by Senator Sheldon Whitehouse

## Personnel

*Totals:* GCE has a total of 109 active personnel (52 female; 57 male). Includes 19 Asians, 2 African-Americans, and 2 Latinos; 16 foreign citizens, and 8 non-US permanent residents

*Lead PI:* Merryl Alber; Co-PI – Steve Pennings

*Executive Committee:* Adrian Burd; Chris Craft; Daniela Di Iorio; Wade Sheldon

*Project Investigators:* Brian Silliman, Clark Alexander, Chuck Hopkinson, Christof Meile, James Byers, James T. Hollibaugh, John Schalles, Marc Garbey, Monique Leclerc, Patricia Medeiros, Renato Castelao, Richard Peterson, Richard Viso, Samantha Joye, Victor Thompson, Wei-Jun Cai

*Academic Institutions:* Univ. of Georgia, Coastal Carolina, Univ. of Delaware, Duke, Univ. Houston, Indiana Univ.

*Advisory Board:* Dave Eggleston, Kay Gross, George Jackson, Michael Kemp, Wim Kimmerer, Cathy Pringle

## Project Management

Project membership criteria and responsibilities are described in the GCE Project Bylaws. The Executive Committee makes all major decisions by consensus, but the lead PI and co-PI have final responsibility for the project. The entire membership meets annually with the Advisory Board. The Executive Committee and specific project working groups meet regularly, typically monthly.