NERR Locations: 27 Reserves serving the nation as scientific, ecological living laboratories and as high quality estuarine reference sites.
Current Sapelo NERR Research Program Highlights

Comparative Ecological Assessment of the Duplin River marshes

• Objective: Developing appropriate rapid assessment methods (RAM) for marsh systems (vegetation, benthos and water column) of the Southeastern U.S.. A partnership project with the following agencies and programs: EPA, NOAA, NCCOS, Savannah State U., CDC, DNR:CRD, GACMP, MAREX…and growing!

Living Shorelines Project

• Objective: Building a better mousetrap. Experimentation and comparative research with alternative shoreline stabilization construction for GA tidal areas. Partners: TNC, MAREX, GA CMP, EPA, DNR:CRD, WRD

The Dean Creek Restoration Project

• Objective: hydrological restoration of a 58 acre salt marsh.
The Dean Creek Restoration Project

Hydrological uplift within a salt marsh: characterization and assessment of ecosystem level changes with reductions in impacts
Brief project description:
Creation of a causeway and culvert pipe engineering (circa 1945) over Dean Creek (using 3; 24” diameter pipes and an associated concrete bulkhead) has restricted normal tidal flow servicing the upper 58 acre salt marsh.
Overall Project Objectives:

Phase I: Collection of as much biological, hydrological and geological data as possible above (affected area) and below (control area) the culvert system prior to spanning bridge implementation.

Phase II: Collation and analysis of data to compare pre vs. post construction ecological function in the areas of sedimentation, hydrology, vegetation and faunal components.

Phase III: Continued long-term monitoring and distribution of the results toward meeting coastal management (CMP) policy information needs related to culvert pipe/bulkhead effects on salt marsh ecosystem services.
Conservation planning and documentation of the project.

The Nature Conservancy (TNC) lead a coastal restoration initiative with its state and federal partners SINERR, GA CMP, GA DNR: CRD, WRD and Parks. Assessed within this document were state owned lands with restoration needs within Liberty and McIntosh Counties (High density TNC conservation target areas in coastal Georgia)

The Dean Creek Project was one of over 40 documented restoration target needs within this initiative.

Awareness of this Project has been promoted through lecture opportunities and programming based upon developing restoration science methods for salt marsh ecosystems.
Restoration Solution

Replacement of concrete bulkhead and culvert pipe using standard modular concrete bridgework spanning approximately 200 ft over creek basin similar to the Oakdale Creek “solution”.

Potential Impacts and characterization emphasis

• Vegetation community consequences (growth, diversity)

• Faunal communities consequences (occurrences, densities)

• Altered sediment regime: creation of a salt panne, channel scouring, Sediment retention in the upper basin.

• Altered hydrological regimes: near-bulkhead water velocity increases (erosion/deposition and scouring), reductions in tidal water volume, enhanced freshwater retention (stochastic events)
Vegetation community characterization

Dean Creek Vegetation Communities
Upper Dean Creek vegetation community and habitat map. Complexity of converging vegetative communities equals 190 based upon dominant and co-dominant vegetation descriptors.

GIS/GPS mapping and ground-truth data collected and processed. Plots: 3; 1/4m² x 1/4m² per habitat shift including plant species and densities Overlay upon 2003, False color, Infrared imagery, 1:18000 scale.

Highlighted area: 58 acres

Highlighted area: 12 acres

Estuarine Marsh-System Complexity
Faunal community characterization

GIS map of all existing intertidal oyster reef beds (n=44) within Dean Creek. June, ‘04

Metadata includes oyster numbers, spatial dimensions, and GPS location.
Intertidal community characterization was accomplished on several (n=12) of the mapped oyster reefs. Sampling also included the placement of green porcelain crab habitat trays which were monitored by the LTER Schoolyard participants Summer 06.

Invertebrate inbenthic communities were also characterized up and downstream of the slated spanning bridge.

Dr. Dale Bishop (GCE-LTER principal investigator) organizes and analyses the data collected by the schoolyard in addition to his own research revolving around macro invertebrate communities.

Photos courtesy of GCE-LTER Schoolyard
Altered sediment regime: Potential sediment retention in the upper basin as compared to the lower basin.

Sedimentation/Erosion Tables

Four (4) Sediment Erosion Tables (SETs) have been placed in the Dean Creek area. Two (2) are in close proximity to the spanning bridge for assessment of effects within the immediate proximity of the construction site with the other two located near the mouth and headwaters of the creek.

Photos courtesy of Dr. Chris Craft
Figure 1. Mean (a) porewater salinity, (b) stem height, (c) stem density and (d) species richness along transects upstream and downstream of the bridge.
Wire Model Of Dean Creek’s basin morphology showing creek channels and pools.

Spanning bridge construction site with scoured pools of current culvert pipe system.

Colorgramic elevation model of Dean Creek

Continuous water quality monitoring site.
Dean Creek Water Quality Station
Operated under the NERR System Wide monitoring protocols for data archiving, quality assurance and quality control
Water quality data has been collected on the following parameters from fall 2004:

**Interval of data collection**
- 15 minute 24/7: S’, DO, pH, Turbidity, Temperature, Tidal amplitude
- Monthly triplicate replication sampling: Nutrients: NO₂, NO₃, NH₄, Total N, Ortho-PO₄, fecal coliforms (in near cooperation with MAREX)

**Typical graphed 5 day YSI data sonde download**

- CA020105.DAT
Auxiliary Data Delivery Programs

National Atmospheric Deposition (NADP) and Mercury Deposition Network (MDN) partnerships

Site Operator: Aimee Gaddis

The NADP, MDN and atmospheric monitoring programs are co-operated by the SINERR and funded in collaboration with the UGA Marine Institute (NADP and weather) which monitors weekly rainfall constituents including: CA, Mg, K, NA, NH$_4$, NO$_3$, CL, SO$_4$, PO$_4$, Methyl Hg and Total Wet Hg
Contributing Dean Creek Restoration Scientific Partners

NOAA: National Oceanic and Atmospheric Administration
National Estuarine Research Reserve System
   Graduate Research Fellows
   Sapleo Island NERR staff
The Georgia Department of Natural Resources
   Wildlife Resources Division
   Coastal Resources Division
The Nature Conservancy (TNC): Georgia Chapter: Altamaha BioReserve
The Georgia Coastal Ecosystems: Long Term Ecological Research (GCE-LTER)
National Fish and Wildlife Service
The United States Geological Survey (USGS)
The National Atmospheric Deposition Program (NADP)
The National Mercury Deposition Network (MDN)
The University of Georgia:
   Marine Extension Service
   School of Marine Programs
   Marine Institute
Indiana University
Savannah State University
The University of Kentucky
Armstrong State University