Hobcaw Barony and the USC Baruch Marine Field Laboratory

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‘tailing’ red drum on flooded salt marsh
Georgetown

Hobcaw Barony

USC Kimbel Center, HBDC
USC Baruch Marine Field Lab

North Inlet Estuary

Winyah Bay Estuary
The Belle W. Baruch Foundation

Owns and manages Hobcaw Barony
Operates the Discovery Center with USC

University of South Carolina

Belle W. Baruch Institute for Marine and Coastal Sciences
Operates the Baruch Marine Field Laboratory, Kimbel Conference Center, and North Inlet-Winyah Bay National Estuarine Research Reserve

Clemson University

Belle W. Baruch Institute of Coastal Ecology and Forest Science
Operates a research laboratory and conducts coastal wetland and forestry research and education
Hobcaw Barony

- 16,000 acres or 25 sq. miles
- Forest, barrier island, salt marsh, old ricefields
- National Historic Register
- Protected, isolated, and relatively undisturbed
- Dedicated for research, education, conservation
Hobcaw Barony

- Former rice plantations purchased by Bernard Baruch in the early 1900s
- Used at first as a winter retreat for his family, later as a sportmen's lodge for his guests
- Became daughter Belle's property to enjoy, then to forever protect
Belle W. Baruch Institute for Marine and Coastal Sciences
University of South Carolina

- **Research** on the biology, chemistry, physical dynamics, geology, and ecology of estuaries

- **Training** of tomorrow’s marine scientists, educators, and decision makers

- **Informing the public** about the coast and ways to protect and improve systems and resources
USC's Baruch Marine Field Laboratory
Currently at the BMFL:

75 research and environmental education projects involving >120 faculty, grad students, and staff from 30 institutions and agencies

- 4800 person-days of use of the BMFL
- Baruch Scholarships and Visiting Scientist Awards
- 26 college field trips from USC and 11 other institutions
- Summer Courses
Maymester Courses  Marine Science 460
North Inlet - Winyah Bay
National Estuarine Research Reserve

Education: K-12 field trips, teacher training, family events

Professional training: workshops for decision-makers

Stewardship: conservation programs, citizen science

Environmental monitoring and research, CDMO
North Inlet Estuary
- Ocean dominated, high salinity
- >90% of its watershed is natural forest
- Outstanding water and habitat quality
- Likely the most intensively studied and best understood estuary of its kind

Winyah Bay Estuary
- Freshwater inflow from 5 rivers
- 3rd largest estuary of east coast
Understanding the structure and function of estuaries

Watersheds

Salt Marshes - Waterways

Coastal Ocean

Geology, Hydrology, Chemistry, and Biology
Some Research Themes:

Salt marsh grass (Spartina) and algae: growth and production, microbial processes, and nutrient chemistry.

Tides, waves, storms: sediment erosion/deposition, mud flat dynamics, tidal creek evolution.
Water Chemistry and Microbiology:

Nutrients, bacteria, suspended sediments, phytoplankton, zooplankton
Ecology and Biology:

Oyster reefs, intertidal creeks, marsh pools, and flats

Use of these habitats by fishes, shrimps, crabs, and birds
Imaging Instrument Array:

- multi-spectral camera, thermal camera, spectrophotometer
- Helikite (tethered helium kite-balloon) to fly those instruments
- terrestrial laser scanner
- multi-beam sonar
Environmental Monitoring in North Inlet Estuary:

Long-term measurements since ~1980

More than 100 variables including:

• atmospheric conditions
• water quality and chemistry
• plant and algae productivity
• animal populations and communities
Water Quality and Atmospheric Monitoring 24-7-365:
temperature, salinity, dissolved oxygen, pH, turbidity, depth,
rainfall, sunlight, barometric pressure, wind
Salinity in North Inlet Estuary, SC

* El Nino brings more rain and river runoff = lower salinity
Impact of Historic October 2015 Flood on Salinity in North Inlet, SC

1. typical high salinity until October 2, then crashed to river-like levels
2. highly variable and low through winter, flood impact sustained by El Nino effect
3. salinity returning to typical high levels in May
Water Temperature, North Inlet Estuary, SC
Seasonal Residuals Spring 1979 – Winter 2016
10 year Moving Average
Zooplankton in North Inlet estuary, SC
Long-term decreases since 1981

Larval anchovies since 1981
Small Mesozooplankton (153 µm) North Inlet, SC
Quarterly dates from 1981 - 2013 (w/o 2011)
total organisms (no./m³), mean densities (in white)
Long-term trend; linear regression (in red) $r^2 = 0.05$  $p= 0.01$
Comparison of juvenile fish catches (all species) in an otter trawl, Town Creek, North Inlet Estuary
Periods separated by 30 + years: 1981-84 versus 2012-2015

![Graph showing catch-per-unit-effort +/- SE for 1981-1984 (n = 94) and 2012-2015 (n = 78) for each month from January to December.](image-url)
Sea level data from NOAA tide gauge Charleston, SC
Highly correlated with NOAA tide gauge North Inlet, SC
Rise = about 4 inches in the past 35 years (since 1980)
Salt marsh grass lives in a fairly narrow range between the low and high tide levels.

To keep from being drowned, tidal marshes have to accumulate enough sediment to keep up with sea level rise.

Recent measurements indicate that is not happening along the Atlantic and Gulf coasts.

Systems like North Inlet are expected to become mostly open-water lagoons in the next 50 years.
Impacts of climate change on animals and intertidal habitat?
Impacts on commercial and recreational fisheries?
In addition to changing climate, our activities are imposing stresses on coastal ecosystems.
Striving to discover and provide
the scientific information
necessary to establish a healthy balance
Education is the Key

- K-12
- teachers
- citizens and organizations
- consultants
- government and other coastal decision makers
Crabhaul Creek
North Inlet

Courtesy of Dr. Erik Smith