Long-Term Spartina alterniflora biomass, productivity, porewater chemistry and marsh elevation in North Inlet Estuary, Georgetown, SC: 1984-2015.

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Distribution URL for file	http://links.baruch.sc.edu/data/accessfiles/North_Inlet_Long_Term_Spartina_alterniflora_database_1984_2015.zip				
DATASET TITLE:	Long-Term Spartina alterniflora biomass, productivity, porewater chemistry and marsh elevation in North Inlet Estuary, Georgetown, SC: 1984-2015.				
INVESTIGATOR INFORMATION :	**Investigator 1**	**Investigator 2**	**Data Manager**		
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DATA FILE INFORMATION:	***This condensed metadata is from the original, more extensive metadata*** created on 3/17/2004 by Ginger Ogburn-Matthews. If needed, the original may be accessed at: **http://links.baruch.sc.edu/Data/NISpartina/metadata/NorthInlet.2015.Spartina.Metadata__.pdf** Links and email addresses in the original have not been updated as those locations and people may no longer be available The data manager identified on this page should be contacted for any questions aboutthe data.				
Data File Name	North_Inlet_Long_Term_Spartina_alterniflora_database_1984_2015.zip				
Beginning Date	01-May-1984				
End Date	31-Dec-2015				
Number of Data Records	48198				
RESEARCH LOCATION:	North Inlet Estuary	Goat Island	Oyster Landing	Sixty Bass Creek	
Geographic Description	The North Inlet Estuary is located on the southeastern coast of the United States, approximately 10 kilometers east of Georgetown, South Carolina. The North Inlet Estuary lies east of the uplands of Hobcaw Barony (also known as the Belle W. Baruch Property). To the north of the Estuary is the Debordieu Colony Property. North Inlet Estuary is a bar-built Class C type estuary (Pritchard, 1955) and is a relatively small tidal estuary (area = 2630 hectares). It is composed of numerous winding tidal creeks dominated by Spartina alterniflora and is considered a pristine tidal estuary due to minimal anthropogenic impacts. The watershed drains a 24.8 square kilometer area of mostly pine forest and a moderately developed residential watershed to the north. **North Inlet Estuary-Hobcaw Barony Sampling Site Map(Link):**	The Goat Island sites are accessible from Clambank Rd. about 1/2 mile south of Clambank Landing. A board walk connects the high marsh site and the low marsh site.	Oyster Landing is accessible from the Baruch Marine Field Laboratory. The high marsh site is located on the north side of the causeway which leads to the landing. The low marsh site is just south of the pier.	The dieback site (33° 19.33'N, 79° 11.39'W) at Sixty Bass Creek is accessible by boat from Clambank Landing.	
Location Bounding Box					
West Bounding Coordinate	-79.2				
East Bounding Coordinate	-79.18				
North Bounding Coordinate	33.35				
South Bounding Coordinate	33.32				
OR if single point location					
Latitude		33° 19.88'N	High Marsh Site(33° 21.08'N), Low Marsh Site(33° 20.88'N)	33° 19.33'N	
Longitude		79° 11.87'W	High Marsh Site(79° 11.52'W), Low Marsh Site(79° 11.36'W)	79° 11.39'W	
Elevation					
TAXONOMIC COVERAGE:					
Taxonomic Protocols					
Organisms studied	Spartina alterniflora				

KEYWORD INFORMATION

KEYWORDS: estuary, salt marsh, above ground biomass, primary production, annual productivity, LTER, LONG-TERM ECOLOGICAL RESEARCH, long term, marsh, pore water chemistry, nutrients, marsh elevation, sedimentation erosion table (SET), surface elevation table(SET), LTREB, LONG-TERM RESEARCH IN ENVIRONMENTAL BIOLOGY, North Inlet Estuary, South Carolina, Georgetown, southeast, United States, Atlantic Coast, above ground, below ground, marsh surface, high marsh, low marsh, poaceae, Grasses, Spartina, Spartina Alterniflora, smooth cordgrass, saltmarsh cordgrass, Atlantic cordgrass, Kingdom, Plantae

ABSTRACT:

Abstract: The salt marsh in the North Inlet estuary was sampled approximately monthly for estimates of biomass, productivity, porewater chemistry, and salt marsh elevation. The sampling sites were dominated by *Spartina alterniflora*. Sampling plots were initially located in the low- and high-marsh at Oyster Landing (OL) and Goat Island (GI). Annual productivity is determined from non-destructive aboveground biomass measurements at five plot sites. Two plot sites are in the low marsh (one each at OL & GI); three sites are high marsh (one at OL & two at GI). The additional GI high marsh site is fertilized with nitrogen and phosphorus. Measurements for biomass and productivity began in May 1984 (GI) or July 1986 (OL). Beginning in 1993, nutrient (PO4, NH4, S2, Cl and Fe2) concentrations of porewater samples collected with permanent equilibrators were determined at the same five biomass and productivity sites; a sixth porewater site (DB) was located in a high-marsh dieback on Sixty Bass Creek beginning in 2006. Surface Elevation Tables (SET) were used to measure changes in the elevation of the marsh surface at Goat Island high- and low-marsh plots beginning in 1996.

Purpose: The purpose of this project is the long term study of *Spartina alterniflora* and nutrients in salt marsh ecosystems. Specifically, the measurement of biomass, production, and stem density in various marsh sites is used to understand long-term patterns of *Spartina* growth and to relate these patterns to other factors such as sea level, climate, pore water nutrients and marsh elevation.

METHODS:

Plant height, snail observations, biomass and productivity determinations

Field Methods: Duplicate sampling quadrats (10cmx10cm, 10cmx15cm or 20cmx20cm) are permanently installed within triplicate m2 plots at each of five sites on the marsh surface in North Inlet, SC. Plants within each quadrat are tagged, and plant heights are measured monthly. Beginning in 2003, observations of snails within the plot were initiated. The species of snail, location (plant or ground), plant vitality (live or dead) and plant ID are recorded. Three plots at one of the sites are fertilized every other month with NH4NO3 and P2O5 for a final annual application rate of 26.7 mol N/m2/y and 12.3 mol P/m2/y. Data Processing Methods: Individual plant heights are entered into an ACCESS database which compiles and outputs stem height data. Snail observations are entered into the same ACCESS database. The data outputs are analyzed with Fortran programs which utilize a series of algorithms to convert plant height to plant biomass for each stem. The Fortran programs also compute plant biomass, plant density and plant growth for each quadrat. SAS is used to further analyze the data generated by the Fortran programs. As of the year 2015, the computer is a 3.4 GHz machine running Windows 7 with SAS Release 9.4 64 bit. The ACCESS data base and Fortran programs are archived annually with the Baruch Institute data manager.

Porewater chemistry collection and analysis

Field Methods: Triplicate porewater diffusion samplers are permanently installed on the marsh platform in fertilized (26.7 mol N/m2/y and 12.3 mol P/m2/y) or control plots in a Spartina alterniflora-dominated salt marsh in North Inlet, SC. 22mL scintillation vials were attached to 1.5m PVC poles at 10, 25, 50, 75, and 100cm depths. Vials were filled with deionized water and covered with nitex mesh. Samplers were allowed to equilibrate for 1 month, then removed and subsampled for water chemistry. Samples are retrieved monthly. Porewater samples are either filtered (0.45 uM) or preserved with ZnAc (for sulfides) immediately upon return from the field.

Lab Methods: Filtered porewater samples were analyzed for PO4, NH4, chloride, sulfide and Fe (+2) concentrations according to standard laboratory protocols. Phosphate and ammonium were measured colorimetrically on an autoanalyzer (Lachat, Technicon or Bran+Leubbe; Strickland and Parsons 1972). Chloride was measured by coulimetric titration of silver wire on a Labconco digital chloridometer. Sulfide is measured by a modification of Cline (1969). Iron is measured by a modification of Gibbs (1979). Analysis of Fe2 began in 2003.

Data Processing Methods: SAS is used to further analyze the data (e.g. means, regressions). As of the year 2014, the computer is a 3.4 GHz machine running Windows 7 with SAS Release 9.4 64-bit.

Marsh surface elevation measurements

Field Methods: Triplicate SET benchmarks are permanently installed in the high marsh (HM) and low marsh (LM) on the marsh platform in a *Spartina alterniflora*-dominated marsh at Goat Island, North Inlet, Georgetown, SC. Each SET benchmark is positioned such that elevation readings can be taken in 3 control subplots and 3 fertilized subplots. The treated subplots were fertilized with NH4NO3 and P2O5 for a final annual application rate of 26.7 mol N/m2/y and 12.3 mol P/m2/y from May 1996 (HM) or Jan 2001 (LM) until Aug 2004. At each subplot, the SET sampling arm is leveled, 9 fiberglass pins are lowered to the marsh surface, and the height of each pin above the sampling plate is measured and recorded. Surface elevations are measured monthly.

Data Processing Methods: Data are entered into an Excel Spreadsheet. The mean elevation for each subplot at time zero was determined. The change in elevation over time is determined for each pin by subtracting the elevation for the subplot at time zero from the elevation of the pin at time x. SAS is used to further analyze the data (e.g. means, regressions). As of the year 2014, the computer is a 3.4 GHz machine running Windows 7 with SAS Release 9.4 64-bit.

VARIABLE DESCRIPTIONS:

Variable Name	Variable Description	Units	Measurement Scale	Code Information	Number Type
Site	name of the sampling station where stem biomass, porewater sample was collected, or marsh elevation was measured	GI (Goat Island), OL (Oyster Landing)	nominal		
Location	location of sampling plot within the sampling station.	HM (High Marsh), LM (Low Marsh)	nominal	HM=High Marsh | C=Control Plot	

Treatment	the designation and/or manipulation of the sampling plot in the experimental design.	NP(Fertilized Plot), C (control Plot)	nominal	NP=fertilized | C=control	
Plot	identifies the area within the site/location/treatment that was sampled	1,2,3,4,5,6,7,8,9,12,13,14	ordinal		
Subplot	identifies the area within the site/location/treatment/plot that was sampled	1,2,3,4,5,6,9,10,11,15,16,17,18,20,21, 22,23,24,25, a, b	ordinal		
Plant ID	Plant identification number		ordinal	999999.xxxxxx = dead plant	
Number of Months	Number of months for which that plant was measured	1 ~ 30	datetime		real
MONTH_INITIAL	First month in which that plant was measured	1-335	datetime	mm1 = May 1984 | mm335 = Dec 2012	real
MONTH_FINAL	Final month in which that plant was measured	1-335	datetime		real
CENSUS_MONTH	month a snail was observed		ratio		
HEIGHT MONTHx	Plant height in month x	0-177 centimeters	ratio	a negative sign (-) indicates flowering plant	real
PLANT_VITALITY	plant vitality in month that snail was observed on it		ratio		
#LITTORINA_ON_PLANT	number of Littorina irrorata snails obseverd on the plant		ratio		
#MELAMPUS_ON_PLANT	number of Melampus bidentatus snails observed on the plant		ratio		
#LITTORINA_ON_GROUND	number of Littorina irrorata snails obseverd on the ground		ratio		
#MELAMPUS_ON_GROUND	number of Melampus bidentatus snails observed on the ground		ratio		
Year	the year that the monthly biomass samples were collected and processed or year that the marsh elevation was measured	yyyy	datetime		real
PRODUCTIVITY	mean annual dry weight of the above ground Spartina stems.	364.7 – 7663.5 grams Per Meter Squared Per Year	ratio		real
Stderr	standard error of Annual Productivity.	32.2 – 1730.5 grams Per Meter Squared Per Year	ratio		
Comments	text information pertaining to the individual year/site/location/treatment's data point.		nominal		
Month	the month that the biomass or porewater samples were collected or moth the marsh elevation was measured	mm	datetime		
Day	the day that the biomass samples were collected.	dd	datetime		
Biomass	biomass dry weight of the above ground Spartina stems	0-10912 grams per square meter	ratio		
TREATMENT	the treatment and/or manipulation of the sampling plot in the experimental design.	NP(Fertilized Plot), C (control Plot)	nominal	NP=fertilized | C=control	
REPLICATE	replicate sample identification (for porewater samples)	a,b,c	nominal		
Depth	identifies the vertical depth into the marsh soil that the porewater sample was collected.	10, 25, 50, 75, 100 centimeters	ratio		
PO4	the concentration of phosphate that was measured in the porewater sample.	0.2 – 499.7 micromoles per liter	ratio	BD = Below Detection	
NH4	the concentration of ammonium which was measured in the porewater sample.	0.3 – 1983.9 micromoles per liter	ratio	BD = Below Detection	
S2	the concentration of sulfide which was measure in the porewater sample	0.1 – 6967.3 micromoles per liter	ratio	BD = Below Detection	
Cl	the concentration of chloride which was measure in the porewater sample.	0.2 – 23.8 grams per liter	ratio	BD = Below Detection	
Fe2	the concentration of iron which was measure in the porewater sample.	0.4 – 491.5 micromoles per liter	ratio	BD = Below Detection	
Stderr	standard error of the mean change in elevation from measurements at nine subplots	0.05 to 0.25 centimeters	ratio		
MEAN ELEVATION CHANGE	mean change in elevation by treatment and location (9 replicate subplots)	(-)0.96 to 4.43 centimeters	ratio		

SALINITY	the salinity of the porewater sample.	parts per thousand	ratio		