Purpose of scientific study:

The project will examine carbon allocation and sequestration patterns in baldcypress swamps across the continental United States to provide insight into potential changes in carbon sequestration in response to global climate change. Specifically, above- and below-ground carbon stores and primary production will be estimated and compared in 72 sites from 12 locations across the Mississippi River Alluvial Valley, the Gulf Coast, and the Delaware-Maryland peninsula. The results will provide specific information needed to make predictions concerning carbon sequestration in baldcypress swamps in future climate scenarios. The findings will be directly applicable to models of global climate change effects on carbon sequestration. We will test the hypotheses that the rates of leaf litter and root production, carbon sequestration, and above and below ground standing crops are uniform in baldcypress swamps across the continental United States.

The objective of this study is to determine if carbon sequestration patterns differ in baldcypress swamps across the continental United States. This information will be of value in predicting potential levels of future carbon in this major wetland type of North America. Future carbon patterns can be inferred from those of baldcypress swamps experiencing a variety of climatic environments already present along the latitudinal gradient. We will test the hypotheses that the rates of leaf litter and root production, carbon sequestration, and above and below ground standing crops are uniform in baldcypress swamps across the continental United States.

For scientific studies, were any specimens collected?

Beth Middleton, Evelyn Anemaet and student workers visited the baldcypress survey sites in January (Florida, Jean Lafitte, Texas), July (Florida, Jean Lafitte), in August (Texas, Maryland, Delaware, Illinois, Tennessee, Arkansas, Mississippi and Louisiana), in September (Florida), in October (Texas), in November (Delaware, Illinois, Maryland and Tennessee) and in December (Arkansas, Florida, Louisiana, Mississippi and Texas). In July/August Beth, Evelyn and assistant workers set up the leaf litter traps (to measure above-ground production), removed old and inserted new root ingrowth bags (to measure annual below-ground production), surveyed the vegetation (to determine percent cover by species), measured the Surface Elevation Transects (SEts, to monitor elevation) and dendrometer bands (to measure tree growth), took canopy cover photos (to determine leaf area), and sampled soil and porewater. For September and October, we surveyed the sites in Florida and Texas to evaluate hurricane damage from hurricanes Harvey and Irma. In January (Florida, Jean Lafitte and Texas), November and December (all sites), we collected the leaf litter samples, downloaded water data, and
collected seeds and porewater samples. Throughout 2017 at the Wetland and Aquatic Research Center (WARC) laboratories, we continued leaf litter sample drying, sorting and weighing for samples from previous and current years, and processed root ingrowth bags to determine the above- and below-ground production. Canopy cover photos were downloaded, analyzed using Gap Light Analyzer software, and the results compiled with data from previous years. Vegetation survey data, litter and root biomass, water logger data, and SET and dendrometer band measurements were entered into spreadsheets, porewater samples were analyzed for pH and salinity, and the results compiled with sample data from previous years.

Findings and status for 2017:

Journal Articles


Rice, K., P. Beier, T. Breault, T., B.A. Middleton, M.A. Peck, J. Tirpak, and M. Ratnaswamy. 2017. Five-year external reviews of the eight Department of Interior Climate Science Centers: Southeast Climate Science Center: American Fisheries Society, Bethesda, Maryland, 49 p

Invited Seminars and Keynote Speeches

Middleton, Beth A. 2018. Hydrologic remediation to reduce salinity during drought in coastal freshwater forests. International Conference on Theoretical and Experimental Advance in Civil Engineering. SRM University, Kattankulathur, Tamil Nadu, India, May 12, 2018.


Middleton, Beth A. 2017. Fostering global collaboration. SWS, San Juan, Puerto Rico, June 2017 (luncheon speaker).


Middleton, B.A. 2016. Marsh succession, management and climate change. 10th Intecol Wetlands Conference, Changshu, China, September 16-21, 2016


Middleton, B.A. 2016. Vegetation response to hydrologic remediation on altered floodplains. Ecological Society of America

Middleton, B.A. Long-term production increase of swamp forests related to freshwater release. GOMRI, New Orleans, LA, Feb 6-9, 2017

Middleton, B.A. 2016. Long-term trends of climate, land-use and function in North American baldcypress swamps. US-China Workshop, Xiamen, China


*Presenter