

Healthy rivers make healthy marshes, says Sapelo Island research

February 11 2014, by James E. Hataway

(Phys.org) —The health of salt marshes on the Georgia coast depends on the amount of water flowing through the state's rivers, according to a new study from the Georgia Coastal Ecosystems Long-Term Ecological Research program, which operates out of the University of Georgia Marine Institute on Sapelo Island.

Salt marshes on the Georgia [coast](#) support fisheries and wildlife, filter nutrients, and protect the coast from storms. Many of these benefits come from vigorous growth of salt marsh cordgrass, a tall grass that is the most abundant plant in [salt marshes](#). But growth of this plant can be as much as three times greater in one year than another.

To understand why, GCE-LTER scientists measured the cordgrass growth in nine different marshes on the Georgia coast for 12 years. The single factor that best explained plant growth was the amount of [water](#) reaching the coast from the Altamaha River during the late spring and summer months.

In years with more water flowing out of the river, plants were up to three times larger than in years with little water flowing through the river. More fresh water reaching the coast reduces the amount of salt in the marshes, which in turn reduces stress that limits plant growth.

"Coastal rainfall and year to year variation in sea level also affected plant growth to some extent," said Kazik Więski, a postdoctoral associate at the University of Houston who was the lead author of a paper explaining

the discovery in the journal *Ecosystems*. "This was because rainfall and sea level also both affect the amount of salt in the marshes. But river flow had the greatest effect."

"We tend to think of salt marsh plants as being adapted to high salt levels," said Steven Pennings, a professor at the University of Houston who worked with Więski on the project. "But tolerating high salt levels is still hard work for these plants. When they get a break from high [salt](#) levels, they have more resources that they can put into growth".

Although some of the study sites were located very close to the Altamaha River, others were located as much as 15 miles away, yet river flow affected [plant growth](#) at all sites. This happened because the fresh river water that reaches the estuary rapidly spreads out and moves up and down the coast through the complex network of channels and intertidal marsh.

In addition, fresh water that reaches the ocean can be pushed back into adjacent estuaries by the wind and tides, explained Daniela Di Iorio, associate professor of marine sciences UGA, who is also part of the GCE-LTER program.

"These results have implications for water management in the state of Georgia," said Meryll Alber, professor of marine sciences at UGA and the director of the GCE-LTER program. "Taking water out of Georgia rivers during the late spring and summer months, especially during dry years, could have a negative effect on the health of our coastal marshes."

"We also found that hotter summers had less cordgrass growth," said Więski. "This happens because too much heat is also a stress to the plants. This is a potential concern for the future as we face rising global temperatures. But the implications for water management are something that we can address right now."

Provided by University of Georgia

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