Troubled Waters: Low Apalachicola River Flow May Hurt Gulf Fisheries

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(PhysOrg.com) -- Reductions in the flow of the Apalachicola River have far-reaching effects that could prove detrimental to grouper and other reef fish populations in the northeastern Gulf of Mexico, according to a new Florida State University study that may provide new ammunition for states engaged in a nearly two-decade water war.

The Florida State researchers found that in years with low river flow, the concentration of phytoplankton -- the microscopic plant-like organisms that feed into the food chain -- decreased over a large area of the continental shelf. This is significant because scientists have hypothesized that year-to-year changes in the phytoplankton can alter the availability of food for the very young fish larvae, according to research scientist Steven Morey of the Center for Ocean-Atmospheric Prediction Studies (COAPS) at Florida State.

Though much of the scientific research examining the consequences of low-flow conditions, primarily caused by extended drought in recent years, has focused on the Apalachicola River and the estuary system of Apalachicola Bay, the Florida State researchers instead examined the effect of unusually low and high flows over the wide western Florida continental shelf. A number of important reef fish, such as grouper, spawn on the outer shelf edge and use the inner shelf areas as nursery habitat.

“This work shows that variations in the river flow can have implications on marine ecosystems over a much broader geographic region, namely

much of the continental shelf extending out several hundred miles," Morey said. "This now suggests that there might be a link between the river flow variations and offshore fisheries."

Morey, Dmitry Dukhovskoy, also of COAPS, and Mark Bourassa, an associate professor of meteorology at FSU, examined the seasonal and year-to-year variability of the river flow caused by changes in precipitation over the watershed encompassing much of western Georgia and parts of eastern Alabama and the Florida Panhandle. The researchers used satellite ocean color data and computer models of ocean circulation to identify a region extending about 125 miles offshore of Apalachicola Bay in which the changes in ocean color, which is indicative of the abundance of phytoplankton and other organic material in the water, is linked to changes in the river flow.

The researchers outlined their findings in an article, "Connectivity of the Apalachicola River flow variability and the physical and bio-optical oceanic properties of the northern West Florida Shelf," published in the journal Continental Shelf Research.

The findings broaden the environmental considerations of managed flow reductions in the Apalachicola-Chattahoochee-Flint (ACF) river system. The Apalachicola River, the final leg of the river system, has been the focus of a nearly 20-year legal battle between Florida, Georgia and Alabama, known as the Tri-State Water War. At the heart of the dispute is Georgia's desire to divert water from the ACF river system to the burgeoning population of the Atlanta metropolitan area, and Florida and Alabama's contention that this flow reduction could have negative consequences for the downstream river environment.

The Apalachicola River is considered a "hot spot" of ecological biodiversity, and Apalachicola Bay supports extensive finfish and shellfish communities dependent on the regular flow of freshwater from

the river. The river is a source of nutrients that can contribute to the abundance of phytoplankton, which are consumed by small zooplankton, thus feeding the marine food web in the region. The strongest connection between the river flow rate and the offshore water properties is seen during the late winter and early spring months, which coincide with the spawning period of several reef fish species.

“It is possible that if the natural flow of the river is reduced by water being diverted to reservoirs upstream, it could reduce the natural nutrient supply to the local food web,” Morey said. “That could potentially result in a reduction of food available for larger plankton, like fish larvae.”

The study sheds some light on potential effects of climate change scenarios altering precipitation patterns over the southeastern United States, Morey said, but further study is needed to determine if the proposed man-made flow reductions at the center of the water wars will have a significant impact on the offshore marine systems, especially during abnormally dry years.

Provided by Florida State University (news : web)