

Is increased nutrient delivery compromising the ecological integrity of Florida's spring-fed coastal rivers?

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Nearly a decade ago, reports of elevated nitrate concentrations in the Homosassa, Chassahowitzka, and Weeki Wachee Rivers caused concern about impacts from increased nutrient loads. At that time, scientists and managers lacked quantitative data on water quality and ecological integrity in these rivers. Initial assessments showed significant relationships between the abundance and distribution of submersed aquatic vegetation (SAV) and light availability and salinity. In addition, significant statistical relationships predicted that increases in nitrate and soluble reactive phosphorus (SRP) could affect periphyton and SAV in the Homosassa and Chassahowitzka Rivers. When compared to these 1998 assessments, recent data indicate that statistically significant changes have occurred. Nitrate concentrations in springs supplying the Weeki Wachee, Chassahowitzka, and Homosassa Rivers increased by 50%, 20%, and 6%, respectively. Nitrate loadings near the rivers' headwaters increased by 76%, 43% and 56%. Concentrations of SRP in the upper reaches of these systems also increased significantly, with a 21% increase in the Weeki Wachee River, a 19% increase in the Chassahowitzka River, and a 15% increase in the Homosassa River. At the headwaters, SRP loadings increased by 33%, 44% and 46%, respectively. Increased SRP generates special concern given previous evidence that phosphorus limits algal growth in these rivers. In fact, the abundance of periphyton growing on rooted macrophytes increased by 85% in the Homosassa River and 30% in the Chassahowitzka River. Coincident with these increases in nitrate, SRP and periphyton, mean SAV biomass declined 75% in the Weeki Wachee River, 67% in the Homosassa River, and 31% in the Chassahowitzka River. In addition, native species, such as *Vallisneria americana* in the Homosassa River and *Sagittaria kurziana* in the Chassahowitzka River, occur less frequently. These findings merit immediate attention from water resource managers aiming to prevent further degradation of water quality and ecological integrity in these spring-fed systems.

Keywords: nitrate, phosphorus, SAV, macrophytes, periphyton

Challenges: Ecosystem health and water resource sustainability

Issues: Nutrient enrichment of surface, ground and coastal waters