

Rainbow River Fact Sheet

Background

The Rainbow River is located in southwest Marion County near the town of Dunnellon, approximately 20 miles southwest of Ocala. The first magnitude spring system that forms the Rainbow River has an average discharge rate of 763 cubic feet per second (cfs), or 493 million gallons per day (mgd) and is one of 33 first magnitude spring systems in the State. The river flows south from the headspring complex approximately 5.7 miles to the tannic Withlacoochee River.

The unique ecological attributes of Rainbow River/Rainbow Springs were recognized by the state of Florida when the system was designated an aquatic preserve in 1986 and an Outstanding Florida Water (OFW) in 1987. The Florida Park Service opened Rainbow Springs State Park in 1995. In 1989, the Southwest Florida Water Management District (District) adopted the Rainbow River as a SWIM priority water body.

Land-Use Changes and Impacts

Similar to other spring-fed rivers in the state, as well as the District, the natural systems and water quality of the Rainbow River have been impacted by development. The Rainbow River and its immediate surroundings were mined for phosphate in the early part of the 20th century. From 1934 to 1973 the headspring complex was used as a tourist attraction that included glassbottom boats and mermaid shows. These land use changes have led to altered surface and groundwater chemistry, reduced wetlands in the watershed, hardened natural shorelines, increased nutrient loading to the system, disturbed natural sediment regimes, the introduction of exotic plant and animal species, and increased disturbances related to recreational activities.

Management Actions

Water Quality

Current management issues related to water quality on the Rainbow River focus on nutrient loading. The primary nutrients of concern are nitrogen and phosphorus. These nutrients occur naturally in low concentrations and support natural processes associated with aquatic ecosystems. However, excess nutrients from man-made sources fuel the growth of phytoplankton, epiphytic algae and nuisance filamentous algae.

The District has been monitoring water quality since 1989 through a variety of diagnostic studies and monitoring programs. The District's water quality monitoring efforts have shown a steady increase in nitrate concentrations in the Rainbow River. Recent water quality data show nitrate concentrations consistently above 1.6 mg/L while background concentrations are considered to be <0.1 mg/L. Nitrogen isotope sampling has determined that the source is inorganic fertilizers applied to the landscape within the 73 square mile springshed that feeds the spring.

The District also recognizes that phosphorus is a nutrient of concern. Phosphorus levels in the Rainbow River remain at or very near background levels averaging 0.03mg/L.

Water Clarity

It has been perceived by many that water clarity along the river has been decreasing over time. Excess nutrients discharging from the spring vents fuel the growth of chlorophyll-producing organisms in receiving rivers and estuaries thereby decreasing water clarity or transparency, which impacts rooted aquatic vegetation.

In 2002, the District initiated a surface water quality monitoring project to examine the relationship between water quality parameters and water clarity along the Rainbow River. The result of the project was the development of an optical model that explained both spatial and temporal variability in water clarity through chlorophyll concentrations. Over 80% of the variability in water clarity can be explained by chlorophyll concentrations.

Aquatic Vegetation

Immediately following the designation of the Rainbow River as a SWIM priority water body in 1989, the District recognized the importance of preserving the diverse submerged aquatic vegetation (SAV) found in the system and began documenting and monitoring its condition. The first effort to map submerged aquatic vegetation along the Rainbow River was in 1991 with subsequent mapping occurring approximately every five years (1991, 1996, 2000, 2005). The 1996 mapping effort identified the four most dominant SAV communities as *Sagittaria kurziana*, *Hydrilla verticillata*, *Vallisneria americana*, and *Najas guadalupensis*. When comparing the 1996 mapping effort to the 2005 mapping effort it appears that the SAV community within the Rainbow River is stable and that current management techniques are sufficient in controlling *Hydrilla verticillata* coverage. The District plans to continue vegetation mapping efforts along the Rainbow River with the next mapping scheduled to occur in 2010.

Sediment

The sediment that makes up the bottom of the Rainbow River is very important both as a substrate for vegetation and as a sink for nutrients. A recent sediment study was completed in 2007 and produced baseline data on the nature and extent of the sediments within the Rainbow River. Sediment types, sources of sediment, sediment distribution, and sediment biological communities were examined. It was determined that the river is dominated by medium to fine sand conducive to supporting a lush SAV community. However, sediments in the lower portion of the river are nutrient enriched by phosphate contributory soils and the settling of organic debris.

Minimum Flows and Levels

Minimum flows and levels (MFLs) identify the limit at which further withdrawals would be significantly harmful to the water resources or ecosystem of an area. Pursuant to Chapter 373.042 Florida Statutes, the District is required to establish MFLs for aquifers, surface watercourses, and other surface water bodies.

The District is currently in the process of establishing a minimum flow for the Rainbow River. This process involves data collection, data analysis and reporting, independent peer review and rule adoption. Data collected include flows, bathymetry, vegetation analysis, instream habitat assessments, and fish assessments. The data are used in conjunction with a hydraulic simulation model to predict changes in various habitats under different flow ranges. District staff are currently analyzing all of the collected data with plans for MFL adoption in 2009.

Public Education

The "Know Where It Flows" watershed education project began in 2007 and focused on educating private homeowners, landscape professionals and retail outlets regarding the appropriate use of fertilizers. The program is ongoing and includes training and education workshops, creation and distribution of educational materials and education through media outlets.

In 2006, the District entered into a cooperative agreement with Marion County to cost-share the public education and outreach portion of the County's Springs Protection Program. The goal of the program is the development and initiation of a comprehensive, long-term education and outreach campaign aimed at promoting and encouraging springs protection through public awareness. To date, the program has resulted in the distribution of various educational materials throughout the county, the purchase of two billboards with educational messages, and the installation of signage throughout the county notifying the public of springs protection zones.

Cooperative Funding Initiative

The District recognizes the importance of partnerships when trying to manage water resources. One of the programs used to facilitate partnerships with local governments is the District's Cooperative Funding Initiative (CFI). This program is designed to aid local governments in the development and implementation of projects that they could otherwise not afford to fund themselves. As a result of this program, the District has partnered with the City of Dunnellon and Marion County on a number of projects that include: Watershed Management Plans, stormwater retrofits, education and outreach projects, Non-Point Source Pollutant Load Models, and stormwater research project.