



## Ocklawaha River Restoration Surface Water Quality

**KEY REFERENCE:** *Despite the predicted increase in downstream nutrient load, the positive aspects related to the restoration of floodplain functions, increased unique habitat and migratory fish passage appeared to provide overall net environmental gain. – John Hendrickson, SJRWMD*

### Current Conditions

- Temperature at the Rodman Reservoir is higher than the natural river
- Velocity on the impounded portion of the Ocklawaha River is slower
- Stagnant water at the dam allows for sediment, nutrient and contaminant buildup
- Slower flow and elevated temperatures increase invasive aquatic plant blockages
- Contaminant buildup at the reservoir is triggering public health advisories for fish caught above and below the dam
- These conditions result in loss of fish and wildlife diversity

### Partial Restoration Benefits

- Temperature of a restored Ocklawaha is estimated to drop by almost 10 degrees
- Velocity of a free-flowing river will be greater
- Lower invasive aquatic weed growth due to reduced temperatures, velocity and nutrients
- Re-establishes approximately 7,500 acres of forested wetlands
- Restores more than 8,000 acres of existing floodplain forest that lies between the dam and the St. Johns River
- Forested wetlands provide added nutrient and contaminant filtering and natural flood protection

The destruction of the approximately 7,500 acres of forested wetlands replaced by the Rodman Reservoir removed the natural filtering of contaminants, and, therefore, the water in the lake and below the dam are especially high in contaminants and nutrients from fertilizers.

### Contaminant Buildup

The continuing buildup of organic muck sediment on the bottom of the impoundment is an issue. The muck, slowly filling the reservoir behind the dam, traps toxic mercury and other pollutants that bioaccumulate up the food chain. It has also impacted the quality of the fishery. The reservoir bottom accumulates synthetic contaminants from repetitive application of herbicides. Discontinuation, or significant decrease, of long-term application would present an overall environmental benefit.

### Downstream Water Quality Impacts

SJRWMD and USGS have conducted water quality monitoring along the Ocklawaha, Silver and St. Johns Rivers during the routine drawdowns. This data proved earlier assumptions about the potential downstream nutrient loading due to restoration to be in error.

In an updated analysis of the downstream water quality effects of Ocklawaha restoration, SJRWMD concluded that previous concerns about elevated nitrogen loads to the Lower St. Johns River from a free-flowing river were incorrect due to insufficient data and analysis. Successful



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restoration greatly enhances the entire Lower St. Johns River as a result of flow increases and nitrogen load reductions.

SJRWMD scientist John Hendrickson stated, “The predicted Total Phosphorus (TP) load increase from a free-flowing lower Ocklawaha, while not insignificant, is in the range of other permitted TP loads to the Lower St. Johns River, and within the realm of reduction achieved by projects currently functioning elsewhere in the basin.”

Hendrickson explained, “Despite the predicted increase in downstream nutrient load, the positive aspects related to the restoration of floodplain functions, increased unique habitat and migratory fish passage appeared to provide overall net environmental gain.” (1)

“Should FDEP choose to pursue this restoration, and if a mitigation were deemed appropriate to offset potential harm based on the predicted TP load increase, it would likely be achievable through a combination of treatment project options directed elsewhere in the middle St. Johns, Lake George, or the freshwater LSJR. This fact, combined with the understanding of other adverse impacts that occur as a result of reservoir drawdowns, a necessary management action for the maintenance of the reservoir, appears sufficient such that a recommendation of denial, on the grounds of the detrimental impacts to downstream water quality, is no longer a certainty for this restoration permit.” (1)

Hendrickson concludes that impacts from river restoration would be less impactful than periodic drawdowns that occur every three to four years. Drawdowns, although helpful in managing aquatic weeds and the fishery, can result in 1) concentrations of nitrogen and phosphorus downstream during the drawdowns, 2) potential alterations of down-estuary salinity patterns and 3) low dissolved oxygen levels in the river reaches below the dam during exceptionally dry years when the impoundment is refilling. (1)

The Lower St. Johns River (LSJR) Total Maximum Daily Loads (TMDL) was adopted in 2008 and calls for a 30% reduction from upstream sources. “In addition to the TMDL constraints, the designation of the LSJR as an impaired water, with nutrient-driven cultural eutrophication cited as the parameter of concern, could lead to a violation of a consumptive use permit condition (necessary to conduct the drawdown) under the anti-degradation provision of the State water quality standards (F.A.C. 62-302).” (1)

### **Fish Advisories**

The Florida Department of Health 2018 Fish Advisories indicates that pregnant women and children should not eat bass caught on the Ocklawaha below the dam and should only eat one bass a month for those caught in the section from Lake Griffin to the Rodman Reservoir. However, fishing the Rodman Pool is widely practiced by many low-income families in the region. (2)

### **Nutrient Concentrations**

Silver Springs has been a contributor to nutrients to the Ocklawaha River, since the river receives approximately 60 percent of its water from that source. Scientist Robert Knight explained, “The crystal-clear waters viewed by millions of tourists through glass-bottomed boats over the past 100 years now contains concentrations of nitrate-nitrogen more than 3,000 percent higher than the natural background.” (4)



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### Temperature and Flow

Experts have estimated that the restored river with increased velocities would result in a river temperature decline of approximately 10 degrees. A reduction in river temperature would potentially reduce the quantity of invasive, aquatic plants.

Velocity can play a part in reducing algal cover on submerged aquatic vegetation. A UF and SJRWMD joint study looked at whether reducing nitrogen in the Silver and Ocklawaha Rivers would restore important food producers, as essential part of the food chain. Scientists reported that, "Observations indicate that nitrogen reduction alone is unlikely to restore primary producer community structure (PPCS). The velocity of water movement strongly influences PPCS. Restoring higher velocities should reduce algal cover on submerged aquatic vegetation." (3)

### Natural Flood Protection

The Rodman Reservoir, an approximately 9,000-acre man-made impoundment, was not designed to provide flood protection. The acres of natural forested wetlands that were destroyed created natural flood protection. "Approximately 400 plus properties were shown to be in potential harm's way if the Kirkpatrick Dam failed and the impounded water in the reservoir flowed downstream in an uncontrolled discharge." (5) The lower water levels of a restored river will relieve pressure on the structures while the restored habitat will naturally absorb excess storm waters.

### Sources

1. SJRWMD Technical Publication SJ2016-1 by John Hendrickson – *Effects on Lower St. Johns River Nutrient Supply and TMDL Target Compliance from the Restoration of a Free-Flowing Ocklawaha River*
2. Florida Department of Health Fish Advisories
3. 2017 UF and SJRWMD CRISP Study, UF Contract #27789, p. 73 of 1085
4. Florida Silver Springs Conservation Plan, Howard T. Odum Florida Springs Institute, 2018, Principal Authors include Robert Knight, ED of the Institute and Heather Vick, professional hydrogeologist with Washington Dept. of Ecology
5. FDEP Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area Unit Management Plan (2017-2027)