



The Withlacoochee River Watershed: Biophysical & Regulatory Characteristics Executive Summary

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This report was produced by an interdisciplinary team of PhD and law students and faculty under the auspices of the Conservation Clinic at the University of Florida College of Law, and with the support of the University of Florida's NSF funded Interdisciplinary Graduate Education Research and Training Program for Water, Wetlands & Watersheds. Development of the report content was aided by input and discussions with associates of the Withlacoochee River Alliance. Based on existing available information, the report describes the Withlacoochee Riverine and Lake System watershed in its biophysical and policy context. The report includes discussion of the ecology, water quality, water quantity, land use and governance of the Withlacoochee River Watershed (HUC 12 # 03100208). The watershed's climate, hydrology, and habitat are discussed to lay a foundation for understanding how the limited resources and the regulations governing them can be used as guides for managing the watershed for a sustainable future. In addition to biophysical and regulatory information, maps, and data summary and analysis, the report includes conclusions and recommendations for managing the watershed for a sustainable future. An extensive list of references is provided.

Executive Summary

Overview

The Withlacoochee River flows in a northwesterly direction for 157 miles from the Green Swamp in Central Florida to the Gulf of Mexico near Yankeetown Florida. The River, its tributaries and its hydrologically connected lakes and wetlands are sometimes referred to as the Withlacoochee Riverine and Lakes System. The Withlacoochee River's surficial watershed drains approximately 2,100 square miles. In addition, Rainbow Springs, the watershed's only first order spring, and other smaller springs, contribute significant quantities of groundwater to the River. Some of the discharge from Rainbow and perhaps other smaller springs originates from outside the surficial watershed. The area of the Rainbow River Springshead is unknown, but likely extends beyond the boundaries of the topographically defined Withlacoochee River Watershed. Thus the boundaries of the Withlacoochee "*hydro-shed*" is more difficult to determine, but the extensive area of the springshed suggests that land use activity occurring outside the River's watershed could affect its ecological health.

Surface drainage, not coming from springs, contributes organic material and tannins that stains the water, making the Withlacoochee somewhat of a blackwater river. The Floridan Aquifer system underlies the watershed. The Hawthorn layer confines the aquifer but sinkholes and springs throughout the watershed provide direct conduits to the aquifer. The Green Swamp is the headwater of the watershed and also the highest piezometric head in the state of Florida. The Withlacoochee River empties into the Withlacoochee Bay Estuary, a large, shallow estuary that begins downstream of

Yankeetown. Prevailing inshore currents in the Gulf flow counter-clockwise and as a result the discharge of the Withlacoochee River provides a primary source of fresh water to Waccasassa Bay to the north and to the southern reaches of the Big Bend Sea Grasses Preserve.

There are numerous lakes and impoundments throughout the Withlacoochee Watershed, but the three main ones are Lake Rousseau, Lake Tsala Apopka, and Lake Panasoffkee. Each of these has a hydrologic connection to the Withlacoochee River. Lake Rousseau is a 5.7-mile long impoundment regulated by the Inglis Dam (Spillway). Lake Tsala Apopka, actually a chain of impounded pools, is the largest lake system in the watershed. The Wysong Coogler Dam controls the water levels in Lake Tsala Apopka. Lake Panasoffkee is the third largest lake in Florida and has an important freshwater fishery associated with it. The Cross Florida Barge Canal intersects the Withlacoochee River 9 miles upstream from the estuary and 2 miles downstream from the Inglis spillway, diverting some of the River's historic flow. Construction on the canal began in 1965 and stopped in 1975 due to environmental concerns. A dredged channel is maintained from the mouth of the River through the estuary to the Gulf of Mexico.

Land Use

Land use in the watershed is equally distributed between urbanized areas, upland forests, agricultural activities, and wetlands. Wetlands and forests comprise nearly 50% of the Watershed, while agriculture and urban areas make up the rest. There are also extensive publicly owned or managed lands in the watershed. This mix of land use has contributed to the ecological health of the watershed.

Water Quality

The FDEP STORET database contains a statewide water quality data set reported by the FDEP, the Florida Fish and Wildlife Commission and Florida Lake Watch. This data is useful for assessing and monitoring point and nonpoint source pollution trends. According to this database, only two sampling locations show regular collections for the River. Water quality in the basin is assessed through the TMDL list of impaired water bodies and NPDES point source permits. In 2010, twenty-seven water body segments within the Withlacoochee River Watershed were placed on the verified impaired waters list due to their failure to meet water body classification parameters. The water quality impairments are for mercury, dissolved oxygen, nutrients (algal mats), and nutrients (Chlorophyll-a). There are 489 NPDES permits existing in the watershed (USEPA, 2010 and FGDL, 2010). Of these 489 permits in the watershed, only 29 of the facilities have been inspected within the last 5 years. There are approximately 42,000 septic tanks in the watershed, many of which may be beyond their anticipated lifespan.

Water Quantity

Water quantity data is not aggregated at the watershed level. The Withlacoochee watershed lies in the SWFWMD northern planning area, and data is aggregated for this larger planning unit. There are currently no significant surface water withdrawals from

the Withlacoochee Riverine and Lakes System. Groundwater currently provides all water supply needs with the watershed. Florida State law establishes that Minimum Flows and Levels (MFLs) must be established for all water bodies in Florida in order to prevent “significant environmental harm.” In 2006, Minimum Flows and Levels (MFLs) were set for Lakes Tsala Apopka (all 3 pools) and Panasofkee in 2006. Draft MFL’s have been written for the Upper and Middle Withlacoochee River in 2010 by the SWFWMD (SWFWMD, 2010). This Draft has been peer reviewed by Locke et al. (2010), but no MFL has been established. MFLs for the lower Withlacoochee River, the Rainbow River and Rainbow Springs are scheduled for 2011.

Ecology

The diversity of the natural ecological communities of the Withlacoochee River Watershed creates a mosaic of habitats that supports a variety of wildlife. The Withlacoochee riverine and lake system provides aquatic habitat for several rare and imperiled fish species including the: Alabama shad, mountain mullet, iron-color shiner, Suwannee bass, and spotted bullhead. According to the Florida Fish and Wildlife Conservation Commission (2008), threats to the freshwater habitat include: the presence of invasive aquatic plants, agricultural activities, waterway modification, degraded water quality, road density, and/or groundwater use. The watershed also provides habitat for a number of upland threatened and endangered species including the Florida Black Bear, Gopher Tortoise, Eastern Indigo snake, Florida Scrub Jay, Bald Eagle, Snail Kite, and Florida Crested Caracara (Defenders of Wildlife 2011, FWC 2010, SWFWMD 2011).

Special Designations

The Withlacoochee River Watershed boasts a number of superlatives and special protections designed to recognize and preserve its ecological health. The Green Swamp is an “area of critical state concern,” a special land use designation that recognizes its importance for groundwater recharge, wetlands, and flood detention. The Withlacoochee Riverine and Lake System, including the Withlacoochee River Estuary have been designated as “Outstanding Florida Waters,” as has the Rainbow River and Springs. Rainbow Springs is also a designated “aquatic preserve.”

Watershed Governance

The Southwest Florida Water Management District administers the water resources of the Withlacoochee River Watershed. The District has established basin boards at the watershed level. The Withlacoochee River Basin Board Basin Board “provide[s] guidance to District staff and basin cooperators in identifying for potential Basin Board funding projects that address the needs of each basin.” However, the Green Swamp, the headwaters of the Withlacoochee River, has been excluded from the jurisdiction of the Withlacoochee River Basin Board. The Withlacoochee Regional Water Supply Authority (WRWSA or "Authority") is a multi-county special district of the State of Florida charged with planning for and developing cost efficient, high quality water supplies for its member governments.

Local Governance

Local governments retain primary land use planning and development decision-making authority in Florida, with increasingly limited state oversight. Their decisions are a key factor in the ecological health of the Withlacoochee River Watershed. The watershed lies primarily within 5 counties - Polk, Marion, Sumter, Levy, and Citrus and includes 34 municipalities. The four most significant are Yankeetown, Dunnellon, Inverness, and Dade City. These local governments adopt comprehensive plans and land development regulations, including riparian buffers and development setbacks to protect the River. The Withlacoochee River Regional Planning Council, an umbrella organization comprised of elected officials from the five counties and their municipalities, provides technical support and non-binding land use planning review to the Watershed's local governments.

Citizen Stewardship

The Withlacoochee River Alliance is a consortium of non-governmental organizations established in 2008 to address the ecological health of the river at a watershed scale. The Alliance is comprised of 7 environmental groups whose members and interests span the watershed. Through its member organizations, the Alliance uses legal and policy advocacy and environmental education to achieve its goals.

Conclusions & Recommendations

Water Quality

In the TMDL process, the Withlacoochee Watershed is in the second period of water quality assessments. Impaired water bodies have been verified and listed.

As of the 2010 assessments there are 27 water bodies segments impaired for either mercury, nutrients, or DO in the Withlacoochee Watershed. Only one, the Cross Florida Barge Canal, is impaired for both nutrients and mercury.

After waterbodies have been listed, the TMDL process requires the establishment of total maximum daily pollutant loads on a priority schedule.

For the Withlacoochee River Watershed, FDEP has prioritized mercury impairment for TMDL development over the next five years due to mercury's potential to affect human health.

Despite the emphasis on mercury impairment, FDEP has concluded, "excessive nutrients (total nitrogen and total phosphorus) constitute one of the most severe water quality problems facing the State. It shall be the Department's policy to limit the introduction of man-induced nutrients into waters of the State. Particular

consideration shall be given to the protection from further nutrient enrichment of waters which are presently high in nutrient concentrations or sensitive to further nutrient concentrations and sensitive to further nutrient loadings” 62-302.400 F.A.C. (#13).

Waterbodies impaired by nutrients and DO have a lesser priority and are slated to be addressed in the next 5 to 10 years “as resources allow.”

At this time, no TMDL for nutrients or DO in the Withlacoochee River has been established.

While it is important to address the mercury issue, the overall ecological health of the Withlacoochee Watershed is likely more affected by nutrient enrichment and low DO than mercury.

Recommendation: even in the absence of a state sponsored TMDL, watershed stakeholders should prioritize addressing the sources of nutrient and DO impairments for the Withlacoochee Watershed.

Best Policy Practice: The St. Marys River Management Committee has formed a water quality technical committee to coordinate water quality monitoring in 2 states and 4 counties and to identify and address sources of contamination, especially those coming from septic systems.

Best Policy Practice: Depending on the land use district, The Town of Yankeetown, within the Withlacoochee Watershed, has established a “nutrient setback” of from 150 feet to 50 feet for nutrient sources other than septic (which has its own setback) for the Withlacoochee River, creeks, streams and wetlands.

Best Policy Practice: A Basin Management Action Plan for nutrient pollution reduction has been developed for the Lower St. Johns River. The Plan sets for a list of projects and programs that cumulatively are expected to eliminate nutrient impairment in that water body.

Outstanding Florida Waters

The Withlacoochee River as well as its connected lakes and tributaries are designated as Outstanding Florida Waters (OFWs), which are held to the highest water quality standards achievable under Florida law.

Rainbow River and Rainbow Springs in Marion County were designated as OFWs on August 8, 1994.

Withlacoochee River Tracts within Sumter County were designated as OFWs on December 1, 1982.

The remaining Withlacoochee Riverine and Lake System was designated as OFW on March 10, 1989.

As a result of the OFW designation, water quality within the Withlacoochee Watershed cannot be degraded below its water level classification or ambient levels at the time of designation, whichever results in a higher water quality standard.

Available data (current and historic) suggests that the water quality of the Rainbow River and Rainbow Springs has degraded since the date of its OFW designation, therefore violating the anti-degradation standard set forth in Florida law. Additionally, neither Rainbow River nor Rainbow Springs are meeting their Class III waters designation due high nutrient concentrations, in further violation of the standard for OFWs.

Recommendation: Since OFWs are designated due to their “exceptional value,” the TMDL development process should prioritize waters designated as OFW’s, including the Withlloochee River system.

Recommendation: The TMDL development priority within the Withlacoochee Watershed should be based on those pollutants that contribute to a reduction in water quality from levels at the time of designation, or which are otherwise impaired. Where there are multiple pollutants that have contributed to ambient water quality degradation, priority should be given to those most likely to provide the greatest contribution to restoring the ecological health of the waterbody.

Septic Tank Maintenance & Inspection

Antiquated and inadequately maintained septic tanks potentially pose a serious water quality concern. The primary contaminants of concern related to septic tanks are fecal coliforms and nitrogen.

According to the Florida Department of Health’s 2007 data, there are more than 42,000 septic tanks in the Withlacoochee River watershed (FDOH, 2008). Statewide, most septic systems are likely greater than 30 years old, which is the average lifespan of a septic system in Florida (FDOH, 2008). This may also be the case in the Withlacoochee Watershed, suggesting that septic tanks pose or could pose a significant pollution problem.

Presently, there are no identified water quality impairments in the Withlacoochee basin due to fecal coliforms, the primary pollutant, along with nitrogen, that results from failing septic tanks.

In 2010 the Florida Legislature created a statewide septic system inspection program, but it has yet to be implemented.

Several Florida counties, including Charlotte, Escambia, and Santa Rosa, have successfully implemented septic system inspection programs under their home rule authority. These programs require periodic mandatory inspections and maintenance or replacement as appropriate.

Recommendation: *Local governments within the Withlacoochee River watershed should move forward with a septic tank inspection and maintenance program to ensure that septic systems are functioning and maintained according to manufacturer's guidelines. Consideration should be given to prioritizing environmentally sensitive areas, and incentives could be provided to accommodate low income owners of septic systems.*

Best Policy Practice: At the local government level, Charlotte, Escambia, and Santa Rosa counties have implemented septic system maintenance programs that, according to DOH (2008), have been favorably received.

Best Policy Practice: At the watershed scale, the Wekiva River Parkway Protection Act requires local governments within the watershed to adopt septic tank maintenance and inspection programs.

Best Policy Practice: The St Marys River Management Committee has formed a “septic think tank” to identify and address this specific source of water quality degradation.

Buffers and setbacks

All municipalities and counties within the Withlacoochee Watershed have riparian buffers and/or development setbacks. However, only Citrus County and the City of Dunnellon appear to have sufficient buffers for the protection of all of the functions for a healthy watershed as described in the literature, and illustrated in Figure 25 of this report.

Recommendation: *To the extent possible local governments within the watershed should harmonize riparian buffers and development setbacks to be at least as protective as those established by Citrus County and the City of Dunnellon.*

The lower Withlacoochee River, from the Inglis spillway to the estuary has been extensively developed with single-family homes on both sides of the River. Much of the shoreline along the Lower Withlacoochee is armored with seawalls or revetments, and lawns and gardens extend to edge of wall in many cases.

Recommendation: *Watershed stakeholders should promote the restoration of riparian buffers along the lower Withlacoochee through a combination of living shorelines waterward of seawalls and revetments where feasible, and voluntary “Withlacoochee-Friendly” riparian buffers landward of seawalls and revetments.*

Best Policy Practice: Depending on the land use district, The Town of Yankeetown, within the Withlacoochee Watershed, has established a “nutrient setback” of 150 feet or 50 feet for nutrient sources other than septic (which has its own setback) for the Withlacoochee River, creeks, streams and wetlands.

Minimum Flows and Levels

No Minimum Flow or Level (MFL) is currently established for the Withlacoochee or its tributaries, though efforts are under way to complete this for the Upper and Middle Withlacoochee River.

Once minimum flows and levels have been established for the River, the River’s water resources can more easily be developed for water supply, and that water supply can be made available to be exported outside the Withlacoochee Watershed, to supply surrounding urbanizing areas.

A draft MFL has been peer reviewed (Locke et al, 2010) for the upper and middle Withlacoochee that allows a reduction of between 7 and 16 percent of the ambient flows. The peer review concluded that generally the “the derived MFLs are reasonable and likely to sustain the ecological health of the upper and middle Withlacoochee River” (Locke et al, 2010).

However, the peer review also concluded that: “additional clarity with regard to defining the benchmark condition (natural vs. historic/existing condition) and how existing changes in flow were accounted for in the MFL evaluation are suggested” For example: “the Panel notes there was no quantification of the surface water changes due to the Wysong Dam AWCS structure and diversions to the Tsala Apopka Chain of Lakes” (Locke et al, 2010).

The peer review panel also concluded that: “as with previous Panels, this Panel also believes that the adequacy of the low-flow threshold, and the use of a *de facto* significant harm criterion based on a 15% reduction in habitat availability from current or historical conditions has not been rigorously demonstrated. This

de facto criterion requires further validation with regard to its application, in this case to Outstanding Florida Waters.” (Locke et al, 2010).

This suggests that the 15% reduction in habitat availability significant harm criterion based on an unclear benchmark condition and uncertainty with regard to how alterations in the flow regime were accounted for would appear to introduce an element of arbitrariness to a “no significant harm” determination.

Recommendation: The concerns of the peer review panel concerning appropriate benchmarks and scientific rigor should be addressed before setting minimum flows and levels that will allow flow and level reductions to occur.

Research in the estuaries in close proximity to Withlacoochee Bay suggests that coastal forests are retreating due to the increased salinities that may be attributable to global and regional sea level rise, as well as historic changes in the River’s upstream flow regime.

Reductions in flow through diversions and withdrawals authorized by the establishment of minimum flows and levels beneath current flows and levels will likely exacerbate estuarine change in Withlacoochee Bay.

Recommendation: Minimum flows and levels on the lower Withlacoochee River should consider the compounding effect that reduced freshwater flows and local sea level rise will have on the salinity gradient

Consumptive Use

Since 1997, the SWFWMD has not aggregated water quantity data at the watershed scale.

However, the Withlacoochee Watershed lies within the SWFWMD Northwest Planning unit where data is aggregated. According to this data, public supply is by far the largest consumer (82%) of water followed by industrial/mining (23%) and agriculture (19%).

According to SWFWMD, consumptive water demand through 2030 can be met using groundwater “provided existing and anticipated local impacts are mitigated or avoided” (SWFWMD, 2010). SWFWMD does not identify the local impacts to be mitigated or avoided.

Recommendation: SWFWMD should identify “existing and local impacts to be mitigated and avoided and implement policies to ensure that these existing and

anticipated local impacts are in fact mitigated and avoided, in order to ensure that high quality groundwater remains the sole source of drinking water within the watershed.

According to SWFWMD, no water will be required for restoration purposes in the Withlacoochee Watershed through 2030. This seems to be at odds with need to mitigate existing local impacts described in its report.

Florida law authorizes the reservation of water for environmental purposes. However there are currently no existing or proposed reservations of water in the Withlacoochee Watershed.

Best Policy Practices: Reservations of water for environmental purposes have been adopted for specific waterbodies in three water management districts, including the Southwest Florida Water Management District. In SWFWMD, the Reservation reserves “all available water from the Morris Bridge Sink but not greater than 3.9 million gallons of water on any given day...to be used to contribute to achieving or maintaining the Minimum Flows for the Lower Hillsborough River.”

Springs

Within the Withlacoochee River watershed there is one 1st magnitude spring, two 2nd magnitude springs, and many smaller springs that contribute to the surface water quantity and quality of the watershed.

The boundaries of the contributing area for these springs (i.e. springsheds) are not clearly defined and some extend beyond the topographically defined watershed.

Recommendation: *Watershed management decisions must take into account those springshed boundaries that extend beyond the surficial watershed boundary. Priority should be given to improved mapping of springshed boundaries.*

The Stevenson (2004, 2007) EPA studies illuminate the uncertainty regarding the direct linkages between nutrient concentrations and algal cover in the springs of Florida. That study shows that the Rainbow Springs group contains high nitrogen concentrations and low algal cover as compared to other springs within the state, suggesting that additional factors may be responsible for ecosystem change.

Recommendation: *The scientific understanding of the drivers of algal proliferation in springs is incomplete; therefore, an examination of a full suite of ecosystem factors should be conducted, focusing on: dissolved oxygen levels, food web interactions, sedimentation rates, and spring flows.*

Despite this uncertainty, delivery of excess nutrients to the Withlacoochee estuary via the Rainbow River and other watershed tributaries can lead to estuarine degradation.

Recommendation: Actions for the reduction of nutrient contamination in the Rainbow River should continue in order to reduce nutrient transport to the Withlacoochee estuary.

Herbicide Use

The invasive aquatic plant hydrilla (*Hydrilla verticillata*) is considered a problem in Lake Rousseau. In the past the entire lake has been treated with fluridone. Currently, the Lake is being spot treated using the contact herbicide diquat. The lower Withlacoochee is fed by Lake Rousseau through the Inglis Spillway.

There are anecdotal accounts of decreasing native submerged aquatic vegetation (SAV) and increasing turbidity in the River downstream from Lake Rousseau and concerns that the herbicide treatments may be responsible.

Currently, no monitoring for herbicides or their by-products is conducted downstream of the Inglis Spillway.

The issue of treating invasive aquatic plants with herbicides is a complex topic. Jason Evan's Ph.D. chapter on the issue "Ecosystem Implications of Invasive Aquatic Plants and Aquatic Plant Control in Florida Springs" is an in depth summary of the issue. It can be downloaded from this web address:

http://waterinstitute.ufl.edu/research/projects/downloads/p001-Ch5_SpringsNutrients.pdf

Recommendation: A monitoring plan in the river that investigates the levels of herbicides and turbidity that results from herbicide treatments and their effects on native SAV should be implemented.

Wetlands Mitigation

There are no wetland mitigation banks in the Withlacoochee River watershed. Additionally, there is very little overlap between mitigation service areas for banks located outside of the watershed and the watershed. Therefore, little opportunity exists for mitigating wetland impacts to the watershed through wetland banks that serve the watershed, potentially resulting in a net loss of wetlands to the Withlacoochee Watershed.

Recommendation: local governments within the Withlacoochee River watershed should require wetland mitigation as a condition of development approval to occur within the watershed to the extent permitted by law.

Recommendation: local governments should require that wetland impacts be mitigated on-site first if possible. When on-site mitigation is not possible, mitigation should occur within the sub-watershed unit most proximate to the impacts that is possible.

Best Policy Practice: The City of Gainesville requires that mitigation occur if possible on-site then within the sub-basin or basin within which the impacts are occurring. Only when these possibilities have been exhausted is it permissible to mitigate for wetland impacts beyond watershed boundaries.

Watershed Governance

The Withlacoochee River has a nested governance structure at the watershed level that creates an institutional framework for watershed management, and water supply development and delivery

These institutions include the Southwest Florida Water Management District, the Withlacoochee River Basin Board and the Withlacoochee River Water Supply Authority.

The statutory authority that governs these institutions positions the water resources of the Withlacoochee watershed for water supply development and other anthropogenic modifications, including, potentially, outside the watershed boundaries.

Recommendation: A watershed scale resource protection mechanism should be developed to complement the current institutional framework for water resource development. This could be accomplished by expanding the mandate of the Withlacoochee Basin Board or through an Interlocal Agreement.

Note: At its May, 2011 meeting, the Southwest Florida Water Management District abolished all Basin Boards, including the Withlacoochee Basin Board.

Best Policy Practice: the Wekiva Parkway and River Protection Act creates the Wekiva River Basin Commission with a broad mandate to “protect the resources of the Wekiva River System.” The Commission includes elected officials and watershed stakeholders.

Best Policy Practice: the St Marys River Management Committee was established as an advisory body pursuant to an inter-local agreement between four counties to develop consistent policies across the watershed. The Committee includes appointed and elected officials and meets regularly. The Committee promoted a uniform septic tank setback for its member counties, and this was adopted.