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What's Happening with the Caloosahatchee River Watershed?

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The Caloosahatchee River begins in Lake Hicpochee, approximately 10 miles west of Clewiston. The Caloosahatchee River Watershed (CRW) is the 424 square miles of terrain that contain numerous streams and rivers that flow into the Caloosahatchee. In addition to nutrients from Lake Okeechobee, excess nutrients also flow from the watershed into the Caloosahatchee as it meanders for 67 miles before entering the Gulf of Mexico, just a couple of miles from the J.N. "Ding" Darling National Wildlife Refuge. Because of the impact the excess nutrients have on our water quality, the condition of the CRW is vitally important to the Refuge. This article will provide an overview on the process being used to improve the CRW. The goal is to help readers understand how complex this process is, and hence why it is taking so long.

The Northern Everglades and Estuaries Protection Program (NEEPP)

NEEPP was established by the Florida Legislature to improve the quality, quantity, timing, and distribution of water in the northern Everglades ecosystem. NEEPP requires the creation of a watershed protection program for each of the three relevant watersheds: Lake O, the St. Lucie River, and the CRW. The watershed protection programs are driven by Florida Department of Environmental Protection's (FDEP's) Basin Management Action Plans (BMAPs) and supported, in part, by the Watershed Protection Plans (WPPs) developed by the South Florida Water Management District (SFWMD). They are also integrated with FDEP and the Florida Department of Agriculture and Consumer Services' (FDACS) programs to control nutrient sources at the local, sub-regional, and regional levels. For more on these watershed protection programs, see [here](#).

The SFWMD's CRW Workshop

The SFWMD recently held a workshop to review the progress of the work being done to protect the Caloosahatchee Watershed. The workshop is part of a broader multi-agency process, the goals of which are to:

- Engage the public in a collaborative approach to achieve the goals of NEEPP;

- Use adaptive management techniques to build on the existing CRW WPP:
- Review Caloosahatchee Watershed characteristics, projects and programs, and recent monitoring data;
- Identify deficiencies and areas of concern;
- Identify projects, activities, and programs that can be implemented with coordinating agencies to provide additional watershed improvements.

To make this article understandable to nonscientists, it will contain relatively little of the technical details discussed at the workshop. For those who are interested in those details, a video of the workshop can be found [here](#).

Key Metrics

During the workshop, the SFWMD stated that it relies on two key metrics to evaluate progress and plan for future activities within the CRW. The two metrics are the Total Maximum Daily Load (TMDL) and the Minimum Flows and Minimum Water Levels Rule. Below is a summary of these metrics.

Total Maximum Daily Load (TMDL)

The Clean Water Act (CWA) specifies that each state must develop TMDLs for all waterbodies that don't meet the state's water quality standards. One of the objectives of a TMDL is to determine the loading capacity of a waterbody for the water quality parameters that are not meeting state standards; i.e., nitrogen, phosphorus.

Another objective is to allocate a target load for the water quality parameters for the waterbody in question so that the appropriate control actions can be taken and the state's water-quality standards can be achieved. Associated with the target load for each water quality parameter is the percentage the actual load of that water quality parameter must be reduced to meet the TMDL. For more on TMDLs, see [here](#).

The FDEP has established 2 TMDLs for the CRW. One of the TMDLs is for the Caloosahatchee estuary. It was established in 2009 and the only water quality parameter included in this TMDL is Total Nitrogen (TN)¹. The target load is roughly 9 million pounds of TN a year entering the Caloosahatchee estuary. Meeting the target load requires that the flow of TN into the Caloosahatchee estuary be reduced by 23%.

¹ Total Nitrogen (TN) is the sum of nitrate-nitrogen (NO₃-N), nitrite-nitrogen (NO₂-N), ammonia-nitrogen (NH₃-N) and organically bonded nitrogen.

The second TMDL was established in 2019 and it includes TN, Total Phosphorous (TP)², and [Biological Oxygen Demand](#) (BOD)³. This TMDL is focused on the following five freshwater tributaries of the Caloosahatchee River:

- S-4
- C-19
- Lake Hicpochee
- Long Hammond Creek
- Townsend Canal

Since there are three target loads (one for TN, one for TP, and one for BOD) for each of the five tributaries, there are 15 target loads in total. As you might guess, the target loads vary widely as does the amount of reduction in the water quality parameters that is necessary to meet the TMDL. For example, the target load for TN in the C-19 canal is roughly 78 thousand pounds per year while in Lake Hicpochee it is just over 4 million pounds per year. The target reduction for TN in the C-19 canal is 48% while in Lake Hicpochee it is just 2%.

For a detailed analysis of this TMDL see [here](#)

During the workshop, the SFWMD stressed that the reductions discussed above are for the five tributaries and not the estuary. They added that they anticipate that improving the quality of the water in each of the tributaries will have a commensurate benefit to the estuary. The SFWMD stated that [the 2020 BMAP update](#) has documented projects performed by local municipalities, drainage districts, state agencies, and others that have, as of October 2019, resulted in a reduction in the Caloosahatchee estuary of approximately 560,000 pounds of TN and 56,000 pounds of TP. These projects were of varying types, including septic to sewer conversion, wetland restoration, retention and detention systems, and [agricultural Best Management Practices \(BMPs\)](#).

The Caloosahatchee Minimum Flow Level (MFL) Rule

One of the tools that the SFWMD uses to plan for adequate water supplies and also protect water resources from significant harm is Minimum Flow Levels (MFLs). The SFWMD has established MFLs for lakes, wetlands and aquifers, rivers, streams and estuaries. See [more](#).

A minimum flow is defined as the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area. As explained in [a previous article](#), if too little water flows down the Caloosahatchee, it can result in increased levels of salinity. This can be detrimental to the tape grass habitat which is important to the health of the estuary because it helps filter pollutants from the water, stabilize sediments, and provide food for aquatic animals like snails and waterfowl. In 2019, the SFWMD revised the existing Caloosahatchee River MFL

² Total phosphorus (TP) is a measure of all the forms of phosphorus, dissolved or particulate, that are found in a sample.

³ This is a measure of the amount of oxygen required to remove waste organic matter from water in the process of decomposition by aerobic bacteria.

to where it currently calls for a minimum flow at [the Franklin Lock and Dam](#) (a.k.a., S-79) to be 457 cubic feet per second, measured as a 30-day moving average.

For more on MFLs, see [here](#).

The Five CRW River Basins

Within the CRW, there are five river basins. As shown in Figure 1, these are the Coastal, Tidal Caloosahatchee, West Caloosahatchee, East Caloosahatchee, and S-4 river basins. However, because the coastal basin has large areas of open water that do not drain directly to the Caloosahatchee estuary, the workshop focused on the four upstream basins.

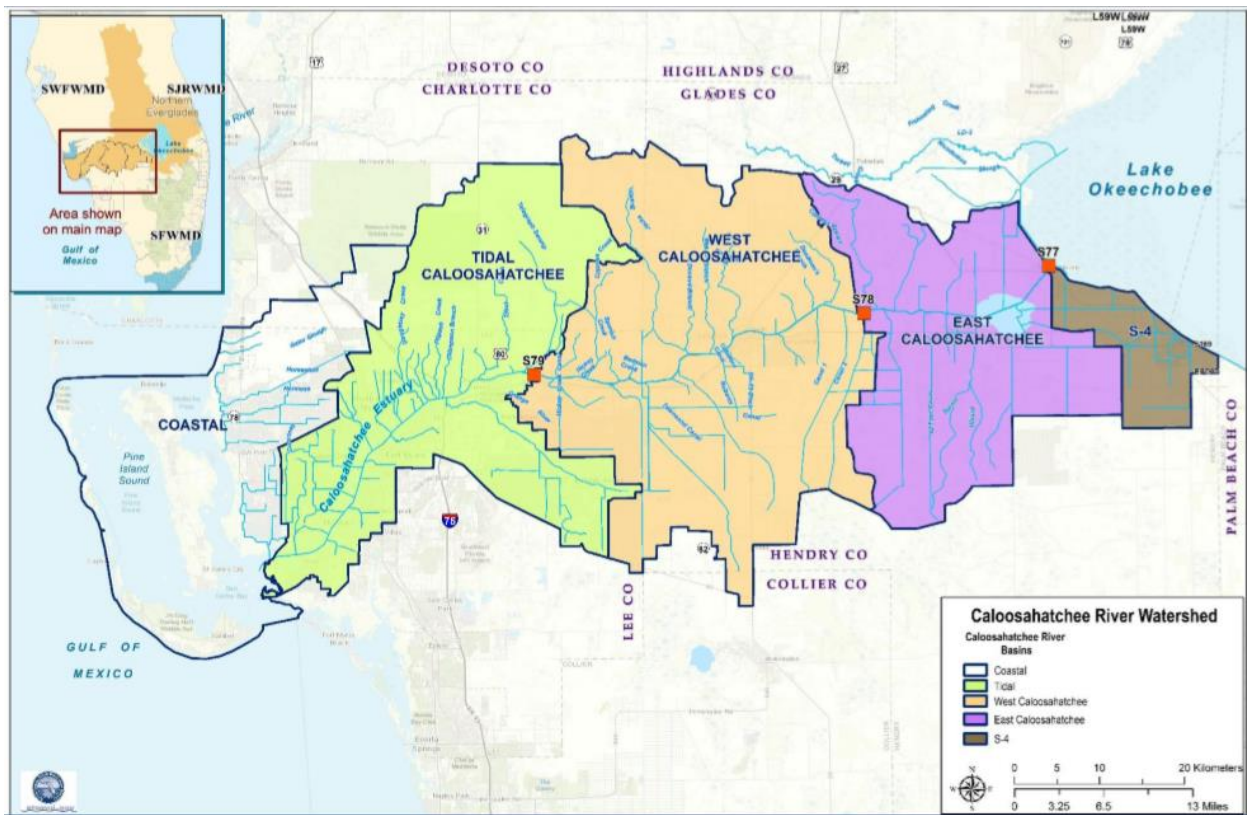


Figure 1: The Five Basins of the CRW

Projects and Initiatives

The SFWMD stated that the Caloosahatchee WPP has two primary objectives. One of those objectives is focused on water quality and it is encompassed primarily in the previously mentioned TMDLs. The other objective is water quantity or flow, and it is encompassed primarily in the previously mentioned MFL. They added that they have several initiatives and projects in place that are designed to accomplish those objectives.

One of the initiatives is the expanded monitoring in the CRW. This was authorized by the SFWMD in August 2019. The data that results from the expanded monitoring enables the SFWMD to perform more detailed and insightful analysis of key factors such as water flow, water quality, and precipitation.

Multiple construction projects were discussed during the workshop including [the Lake Hicpochee Hydrologic Improvement Project](#). One of the key goals of this project is to provide additional water storage and increased capacity for water quality enhancements in the east basin of the Caloosahatchee. Part 1 of that project, which is currently in the construction phase, focuses on 670 acres of land that the SFWMD owns north of Lake Hicpochee. Part 2 of the project is moving towards construction. This phase focuses on 2,488 acres of land that is adjacent to the land being used in Part 1 of the project.

During the workshop, there was a brief discussion of [the C-43 reservoir](#), which is located in the west basin of the Caloosahatchee. As described in [a previous article](#), the C-43 reservoir is being built on 10,700 acres in Hendry County, slightly west of Labelle and just south of Route 80. One of the key goals of the reservoir is to capture and store stormwater runoff from the Caloosahatchee River basin, and by doing so, reduce excess water flow to the Caloosahatchee estuary. Another key goal is to improve the salinity balance for the Caloosahatchee estuary by controlling peak flows during the wet season and providing essential flows during the dry season.

Associated with the C-43 reservoir is a water quality feasibility study. The purpose of this study is to evaluate conventional and innovative biological, physical, and chemical technologies to determine the most technically estuarfeasible and cost-effective methods of providing additional treatment and improving the quality of water leaving the C-43 reservoir. The study began in July 2018 and is expected to be finished in December 2020. For more, see [here](#).

Basin Evaluations

The workshop reviewed both the flow and nutrient contributions to the Caloosahatchee estuary from several sources. Those sources were: Lake Okeechobee, the East Caloosahatchee River basin, the West Caloosahatchee River basin, the combination of the East and West Caloosahatchee River basins (a.k.a., the Caloosahatchee basins), and the Tidal Caloosahatchee River basin. The goal of this review was to identify deficiencies and areas for additional focused assessments.

Water Flow

The SFWMD stated that in [water year 2020](#), Lake O contributed 13.6% of the flow to the Caloosahatchee estuary, while on average it contributed roughly 35% of the flow. In contrast, in water year 2020, the Caloosahatchee basins contributed 60% of the flow, whereas on average, they contribute roughly 50% of the flow.

TN and TP Contributions

The SFWMD presented data that showed the average annual contribution of TN into the Caloosahatchee estuary from five key sources. Those contributions were:

- Lake O: 1,388 metric tons
- West basin: 1,128 metric tons
- East basin: 513 metric tons
- Tidal basin: 510 metric tons
- S-4 basin: 80 metric tons

Below is the contribution of TP from those five key sources.

- West basin: 136 metric tons
- Lake O: 112 metric tons
- East basin: 64 metric tons
- Tidal basin: 54 metric tons
- S-4 basin: 9 metric tons

Conclusions

In [a previous article](#), we explored why some water-related projects, such as the creation of the C-43 reservoir, take so much time. We wrote that article because it is easy to get frustrated thinking that little progress is being made towards improving our water resources. The reality is that while there continues to be [significant threats](#) to our water resources, substantial progress is being made.

As this article demonstrated, the process for improving the quantity and quality of the water in the CRW can be difficult for nonscientists to understand, in part because it requires a somewhat detailed understanding of moderately arcane technical topics such as water years, TMDLs, and MFLs. The article also demonstrated that the process is lengthy in part due to the number of local, regional, state, and federal agencies that must coordinate their activities. Another reason why it is a lengthy process is because the problem it addresses is fundamentally difficult. For example, being able to better control the flow of water in the Caloosahatchee River requires the completion of the C-43 reservoir, which as mentioned, is itself a complex, lengthy project.

The SFWMD accepted feedback both during and after the CRW workshop. The two next steps they identified were to:

- Perform detailed assessments to identify contributing sources and responsible entities;
- Conduct future workshops to discuss findings and recommendations.

In Case You Missed It:

A couple of updates on the release of Harmful Algal Blooms (HABs) from Lake O:

The U.S. Army Corps of Engineers announced the approval of a planned deviation from the water control plan for Lake O in order to reduce risk from HABs. See [more](#).

A federal judge has ordered the U.S. Army Corps of Engineers to evaluate the harm to wildlife caused by water released from Lake Okeechobee. See [more](#).

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