

below the surface

an in-depth
look at...



Everglades Stormwater Treatment Areas

Managed wetlands improving water quality

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Excess nutrients found in stormwater runoff pose a risk to the Everglades. These nutrients flow from lawns, farms, roadways and other developed areas. Stormwater treatment areas are constructed wetlands that remove excess nutrients. They play a vital role in protecting and restoring America's Everglades.

Rainfall is South Florida's primary source of fresh water. It nourishes plants, fills ponds and seeps into the underground aquifer, replenishing the drinking water supply. In excess, it drains away in the canal system that protects South Florida from flooding.

Stormwater runoff also carries nutrients off the landscape, especially fertilizers used in suburban, agricultural and urban settings. Scientists have determined that a common ingredient in fertilizer, phosphorus, has put the fragile Everglades environment at risk. Phosphorus is a mineral that is essential for all life. It forms genetic material, builds bones and teeth and aids metabolism. But when excess phosphorus reaches natural wetlands like the Everglades, it does more harm than good.





Stormwater treatment areas use “green” technology to remove excess phosphorus, a nutrient that can harm the Everglades environment.



Plants are sometimes airlifted and released into an STA to help establish submerged aquatic vegetation.



Collecting and analyzing water samples is vital to wetland management.

Phosphorus and Its Impact

Nutrient concentrations, particularly phosphorus, were naturally ultralow in the Everglades. Its native wetland plants are adapted to this condition and thrive there. When a nutrient, such as phosphorus, enters this ecosystem in excess, plant growth is stimulated, producing an overabundance of undesirable vegetation. Cattail and other species respond with vigor, crowding out native wetland plants such as sawgrass and preventing the sun’s rays from reaching plants in the water. When this happens, aquatic insects, crustaceans and other invertebrates do not have enough to eat or enough oxygen to live, which means the fish and birds do not have enough to eat either.

Investing in a Solution

The State of Florida has invested more than \$1.8 billion in water-quality improvements aimed at lowering phosphorus levels. Two decades ago, before these improvements were put into place, phosphorus concentrations in Everglades-bound waters averaged more than 170 parts per billion (ppb). Today, as a result of Florida’s efforts, the concentrations in some discharges to the Everglades are as low as 12 ppb. Recognizing that more needs to be done to achieve the ultralow phosphorus water quality standard established for the Everglades, the State is committing significant additional funding and resources toward implementing further strategies.

“Green” Technology at Work

Florida’s Everglades Forever Act of 1994 provided the momentum for this success story to date. It mandated and funded construction of treatment wetlands, known as Stormwater Treatment Areas (STAs). At present, 57,000 acres of land south of Lake Okeechobee have been converted to STAs. In western Palm Beach County, STA-3/4, at more than 16,000 acres, is the largest constructed wetland in the world. And more STAs are on the way, along with additional water storage features designed to improve STA performance.

Everglades Stormwater Treatment Areas use “green” technology to remove phosphorus from the water. Wetland plants, such as

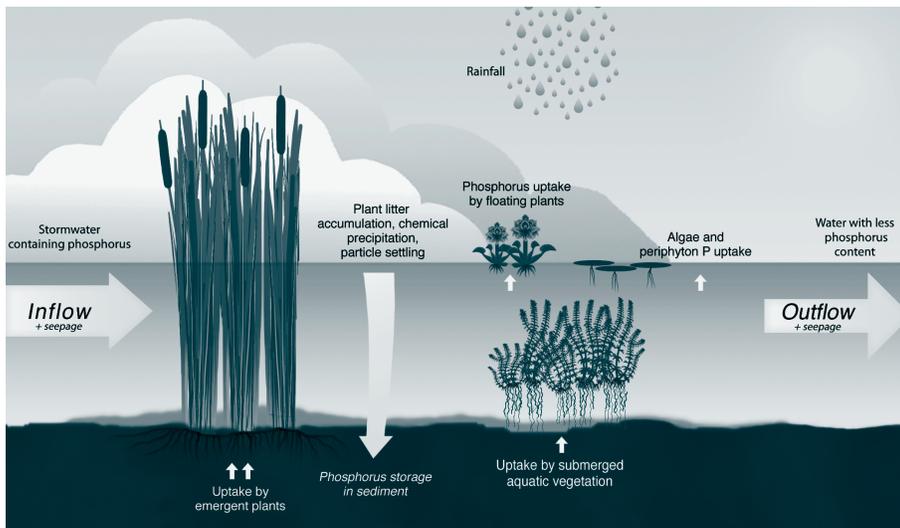
cattail, southern naiad and algae, uptake phosphorus and use it in metabolic life processes. Phosphorus is stored in their roots, stems and leaves. Even after the plants die, sediments in the wetland retain phosphorus from the decaying plant matter. As a result, water flowing out of an STA has significantly less phosphorus than stormwater runoff flowing in.

By building STAs in key locations north of the Everglades, phosphorus in stormwater runoff can be reduced before it flows south into protected wetlands. The South Florida Water Management District’s regional canal system brings water to the treatment wetlands and then carries it into the Everglades.

Meeting Mandated Goals for Reducing Phosphorus

The Everglades Forever Act and other legal requirements provided the District with specific guidelines to improve Everglades water quality. A regulatory source control component required the implementation of improved farming methods to reduce phosphorus amounts leaving the Everglades Agricultural Area and the C-139 Basin. Another key component was the Everglades Construction Project, which provided for initial construction of the STAs now in operation. At most locations throughout the Everglades, the long-term target concentration of 10 parts per billion of phosphorus is already being met.

In 2003, the Florida Legislature adopted the Long-Term Plan to provide for structural and vegetation enhancements to the STAs, including STA expansions completed in 2006 and 2012. To further improve water quality, in 2012, the State of Florida and the U.S. Environmental Protection Agency reached consensus on additional Everglades Restoration Strategies. The agreed-upon technical plan includes more than 6,500 acres of new treatment area and 116,000 acre-feet of additional water storage. Expanded source controls will also be implemented, and a science plan will ensure continued research to further improve STA performance.



Stormwater treatment areas are constructed wetlands that remove and store nutrients through plant growth and the accumulation of dead plant material in a layer of sediment.

Operating and Maintaining an STA

An STA is a living wetland, affected by natural conditions such as weather (rainfall, drought, hurricanes), plant growth rates, wildlife and invasion of undesirable plant species. STAs have never before been used on the large scale now at work in the Everglades, so their operation and management is a process of ongoing learning and continual improvement.

Water quantity and water quality monitoring is a vital part of STA operations. Each treatment cell is monitored regularly to determine how the STA is performing. Operational decisions are then based on real-time data. STA performance data are continually assessed and are reported weekly, monthly and yearly. An annual summary is available in the South Florida Environmental Report, viewable online at www.sfwmd.gov/sfer.

Structural components of the STAs must be operated and maintained as well. These include more than two dozen pump stations, 350 water control structures and more than 600 miles of levees and canals. Mechanical repairs, preventative maintenance, erosion control and debris cleanup are essential and ongoing tasks.

Responding to extreme weather is a large part of the job, too. In 2005, hurricane winds uprooted much of the aquatic vegetation in the STAs and stirred up sediments. Repairing these living wetlands presented challenges, and the District has incorporated new design strategies to help protect STAs during high wind and rainfall events. The District has also learned to deal with prolonged droughts by altering STA operation and incorporating more water pumping flexibility into STA designs.

Sustainability for the Future

Protecting Everglades water quality is a core mission responsibility and a strategic priority. STAs will continue to play a vital role in this effort. Sustaining and improving their effectiveness is essential. Continued construction, research and monitoring will help optimize the performance of water quality treatment technologies. The State of Florida and the South Florida Water Management District remain committed to achieving optimum phosphorus-reducing results.

Wildlife in the Wetlands

Stormwater treatment areas are built specifically for improving Everglades water quality. However, their vast, shallow waters and rich plant life also make them outstanding habitat for wildlife, including threatened and endangered species.

Wading birds, ducks and American alligators are found year-round in the treatment wetlands. Migratory birds use them, too, visiting in abundance during winter months. Rabbits, bobcats, wild hogs, deer and the occasional Florida panther roam the banks and levees.

Because the STAs have a specialized cleansing function, public recreation is limited to activities that do not disturb the water and soils. Visitors can enjoy nature viewing, and some fishing and hunting is allowed, under guidelines of the Florida Fish and Wildlife Conservation Commission.

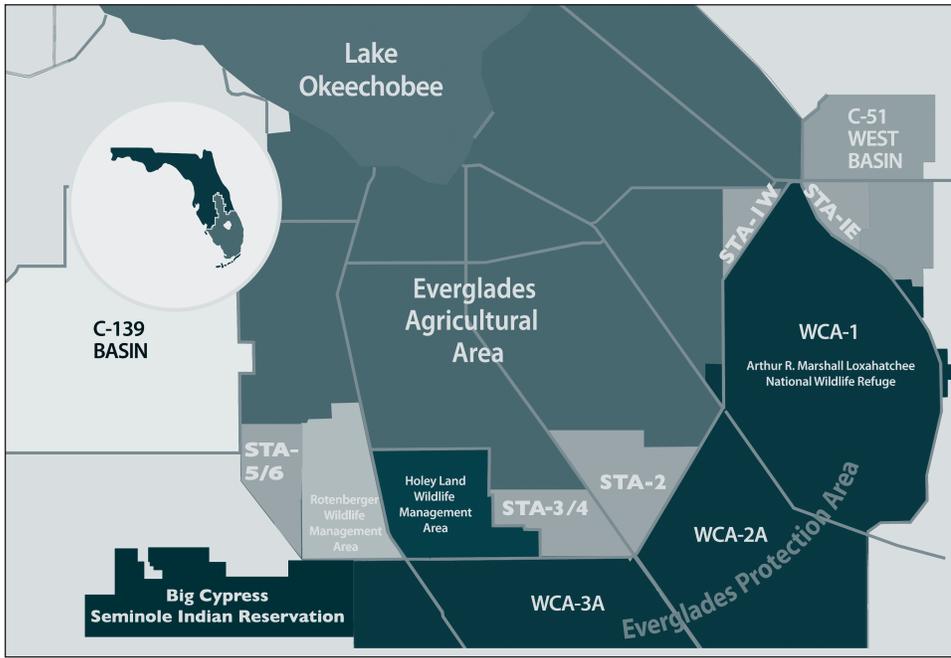
Keeping the treatment wetlands healthy and undisturbed is vital for Everglades restoration. Enhanced wildlife habitat is a great bonus!



Great egret



American alligator



Varying in size, configuration and period of operation, STAs are shallow, freshwater marshes divided into treatment cells by interior levees, with water flows managed via pump stations, gates or culverts. By building STAs in key locations north of the Everglades, phosphorus in stormwater runoff can be reduced before it flows south into protected wetlands. The Everglades Stormwater Treatment Areas collectively comprise 57,000 acres of effective treatment area.

For more information

Up-to-date information about STA research, enhancement projects and other components of managing and improving the stormwater treatment areas can be found at www.sfwmd.gov/sta.



For more information on this subject, scan this QR code using a barcode reader app on your smartphone.

The South Florida Water Management District is a regional, governmental agency that oversees the water resources in the southern half of the state. It is the oldest and largest of the state's five water management districts.

Our Mission is to manage and protect water resources of the region by balancing and improving water quality, flood control, natural systems and water supply.

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DID YOU KNOW?

- Plants that cleanse water in stormwater treatment areas include emergent aquatic vegetation (EAV) like cattail, bulrush and spikerush. Submerged aquatic vegetation (SAV) examples include hydrilla, southern naiad and algae.
- Vegetation management is vital to STA success. Some herbicides are used to prevent invasive species from crowding out target plants.
- Treatment wetlands are also used in other parts of South Florida to improve water quality. North and east of Lake Okeechobee, treatment wetlands remove nutrients from water flowing into the lake, St. Lucie estuary and Indian River Lagoon.
- During the dry season, the STAs provide important foraging habitat for a wide variety of wading birds and ducks.
- Birds found in the treatment wetlands include roseate spoonbills, whistling ducks, white storks, little blue herons, eagles and hawks.