National Park Service
U.S. Department of the Interior

Everglades National Park
Florida

Everglades Water Quality

Today's efforts to restore the Everglades hinge on "getting the water right" and clean water is a key requirement for success. But repairing the widespread damage that began over a century ago is no easy task. Over time, nearly half of the Everglades has been converted to agricultural and urban lands, and 30 percent of the remainder has been divided into isolated units called Water Conservation Areas. These conservation areas have been transformed by runoff from agricultural lands, laden with fertilizers and other chemicals.

Due to its close proximity to the agricultural areas south of Lake Okeechobee, the U.S. Fish and Wildlife Service's Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR) has been particularly susceptible to damages caused by nutrient inputs. There, part of the environment has been so altered that it is now unsuitable for many native species, a scenario that is beginning to unfold in Everglades National Park (ENP) as well. This region, too, has shown signs of water quality degradation.

But changing attitudes regarding the importance of the Everglades ecosystem may lead to a reversal of this deterioration. In 1988, the federal government – which manages both LNWR and ENP – sued the state of Florida for allowing the degradation of water quality in the Everglades. Settled with a federal Consent Decree in 1992, the lawsuit charged the South Florida Water Management District (SFWMD) with implementing agricultural best management practices, such as reducing the phosphorus (P) content of fertilizers.

The SFWMD also was tasked with constructing more than 40,000 acres of Stormwater Treatment Areas (STAs) intended to reduce total P concentrations to less than 50 parts per billion (ppb) and eventually to less than 10 ppb, a value established by scientists whose studies showed that total P concentrations must be kept below this threshold to prevent degradation. The deadline for meeting this 10 ppb requirement in LNWR and ENP is the end of 2006, but a 2003 amendment to the state's 1994 Everglades Forever Act extends the date to 2016 for other areas of the Everglades.

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South Florida Natural Resources Center

Water Quality Program

Water Quality Program

Within the South Florida Natural Resources Center (SFNRC) of ENP, the Water Quality Program is responsible for analyzing and disseminating information on water quality issues. Staff work in partnership with LNWR to track the progress of restoration efforts and with universities, other agencies, and Native American tribes to improve understanding of how water quality shapes and impacts the Everglades ecosystem.

Everglades Program Team

In June 2000, the federal government, including the Department of the Interior and the Department of Justice, created a team to monitor the implementation of the Consent Decree. The Everglades Program Team (EPT) comprises members of the SFNRC and LNWR who provide scientific and technical recommendations regarding water quality issues.

Members of the EPT also provide advice on implementing technologies that will help lower P levels in the water, assess the impacts of restoration efforts, including the Comprehensive Everglades Restoration Plan (CERP), on Everglades water quality, and serve as expert witnesses for the federal government in court proceedings. Some

Under low nutrient conditions, Everglades wetlands consist of open water sloughs, sawgrass covered ridges, and a diverse mix of plant species. photo by William Perry, ENP

members of the EPT also serve on an interagency Technical Oversight Committee monitoring the implementation of the Consent Decree. This committee includes representatives from the U.S. Army Corps of Engineers, SFWMD, and Florida Department of Environmental Protection, as well as LNWR and ENP.

Cover, Everglades National Park
photo by Quan Dong, ENP

Water Quality Monitoring

Information about water quality is essential to the development of Everglades restoration strategies. Water Quality Program staff work together with the SFWMD to monitor water quality on a monthly basis at numerous stations in ENP and LNWR. In particular, these scientists evaluate the changes in water quality resulting from the implementation of agricultural best management

Water quality monitoring is essential for restoration of the Everglades ecosystem. photo by William Perry, ENP

practices and operation of STAs, both mandated by the Consent Decree.

The scientists have found that STAs – large constructed wetlands containing aquatic plants that absorb pollutants and aid in their retention in the soil – have successfully removed significant amounts of P from the water. Yet, not all of the STAs are functioning properly. Presently, one of them is performing below expectation due to high water inflows and effects from hurricanes. Its poor performance may have contributed to higher-than-expected total P concentrations in water flows into LNWR and may be responsible for documented exceedances of the Consent Decree's interim levels. The SFWMD is currently working to correct these problems.

Water inflows to ENP's Shark River Slough have had P concentrations below the interim limit, yet still higher than the long-term limit. If these higher P concentrations persist, the park could experience further degradation. So far, water flows into Taylor Slough and the coastal basins to the south have had P levels consistently lower than the Consent Decree's long-term limits.

Improving water quality depends on more than just reducing P levels. Monitoring by the SFWMD shows that some locations occasionally do not meet the state's water quality standards for dissolved oxygen, alkalinity, pH, and conductivity. And, of the 12 pesticides that have been detected in the Everglades, atrazine, a carcinogen, and naled, a neurotoxin, have consistently been of concern. In addition, mercury – emitted during fossil fuel combustion and by medical waste incinerators – is found in the Everglades and is converted by sediment bacteria to methylmercury, which is toxic to plants and animals, including humans. Excess sulfate, primarily from agricultural fertilizers, stimulates the conversion of mercury to its toxic form. While concentrations of methylmercury have dropped by 40 to 80% in some areas of the Everglades, they remain high within ENP.

Applied Science

Water Quality Program staff work with universities and other groups to study water quality issues related to restoration. Projects underway include examining ecosystem effects of contaminants; monitoring water quality patterns in ENP; evaluating the abilities of STAs to remove contaminants from water; and determining the best ecological indicators of water quality impacts in the ecosystem. The DOI has invested $7 million toward these efforts from 2005-2008.

High phosphorus levels can turn ridge and slough habitat into dense stands of cattail that out-compete native plants and fill in the open water habitats important to a variety of species. photo by SFWMD