Florida Bay—and the plants and wildlife that are indicators of its ecological health—are extremely sensitive to salinity levels and fluctuations in freshwater flows from the Everglades. Historically, water pulsed south from Lake Okeechobee through wetlands, sawgrass sloughs, and tree islands, and fed the estuaries and the bay. Beginning in the 1920’s the Army Corps of Engineers began draining the wetlands to build roads, allow development, and control flooding. Agriculture and development interests will argue that water must be drained and diverted from its natural course to prevent catastrophic floods and open more land for development. The science behind the Comprehensive Everglades Restoration Plan clearly shows it is critical to balance the demands of human society with the water that nature needs to survive. Overdrainage and water management to accommodate urban sprawl are strategies that undermine achieving this balance and have seriously altered—and continue to threaten—the bay. This year’s nesting failure of roseate spoonbills and the persistent algae blooms, beginning in 2006, are indicators that the bay is collapsing, effectively threatening the region’s economy and quality of life. Immediate steps are needed to restore the freshwater sheetflow and allow ecological recovery of the southern Everglades and Florida Bay to begin.
Like Nowhere Else in the World

There is no other ecosystem in the world like the Everglades and Florida Bay. The correct mixing of freshwater sheetflow with the salt water system is critical to the ecological health of the estuary, plant species, and the wildlife it supports. A belt of mangroves, a zone largely responsible for the remarkable historical abundance and diversity of the Everglades, marks the transition between Florida Bay and the mainland. A major collapse of Florida Bay, characterized by persistent algae blooms and consequent seagrass die off, began in 1989. Currently, it appears the Bay is again suffering signs of collapse.

Florida Bay is home to one of the most species-rich assemblages of fish-eating birds in North America, hosting 14 species of long-legged wading birds, including the roseate spoonbill and wood stork, as well as brown pelicans, double-crested cormorants, numerous shorebirds and birds of prey, including osprey and the bald eagle. The estuary teems with wildlife, including Atlantic birds in North America, hosting 14 species of long-legged wading birds, including the roseate spoonbill and wood stork, as well as brown pelicans, double-crested cormorants, numerous shorebirds and birds of prey, including osprey and the bald eagle. The estuary teems with wildlife, including Atlantic bottlenose dolphin, and threatened and endangered West Indian manatee, American alligator, American crocodile, green, loggerhead, hawksbill and Kemp’s ridley sea turtles. Important fish and invertebrate communities, comprised of a mixture of Antillean, Carolinan, and Gulf of Mexico species, are also residents of the bay.

Florida Bay and the Everglades provide important ecosystem services, as well as quality of life and economic benefits to all who live in and visit the region. Annually, the bay supports an estimated $59 million shrimp fishery, and $22 million stone crab fishery. Bonefish are likely excellent indicators of the Florida Keys ecosystem health, and support a fishery that is worth an estimated $1 billion state-wide. Visitation to the bay for bird watching and nature walks, diving, sailing, and recreational fishing contributed $4.8 billion to the Miami Dade economy and $1.1 billion to the Monroe County economy in 2001, according to a 2003 study by the National Oceanographic and Atmospheric Administration.

The Bay Under Stress

Throughout South Florida, drainage and development have seriously disrupted flows of water in the major rivers, lakes, estuaries, and other habitats of the Everglades. The cumulative effect of accelerated drainage of developed lands amplifies harmful discharges of water to the estuary system during wet years and drains wetland systems, leaving too-little water to meet ecosystem and human needs during the long dry season.

Water management structures and practices are considered by scientists to be a principle cause of the ecological degradation of Florida Bay. The most evident symptoms are the state of wading bird populations, and the reoccurring algae blooms.

Wading Bird populations in the Everglades have declined between 85 and 90 percent because of extensive degradation of the Everglades ecosystem over the past century. This is perhaps one of the most widely viewed indications that the ecosystem is functioning at only a fraction of its potential. Formerly, most bird rookeries in the Everglades were located in the southern end of the Everglades along the tidal creeks of the expansive mangrove forests. As these areas degraded, many of the rookeries moved north to the Water Conservation Areas in search of more productive nesting grounds. The historic super colonies of the southern Everglades are now essentially gone.

Research performed by Audubon scientists in Florida Bay over the past 50 years has shown that roseate spoonbills respond markedly to changes in hydrology and corresponding changes in prey abundance and availability. Shifts in nesting distribution and marked declines in nest success are directly related to water management practices. This year Audubon scientists observed the worst nesting season for roseate spoonbills since the 1960’s, a decade the birds were showing signs of recovery from plume hunting and other impacts on their population. A total of 266 roseate spoonbill nests were identified in 1963. This increased to 1,260 pairs in 1979, but commensurate with the completion of modern water management infrastructure in 1984, nest numbers began to plummet. A total of 700 nests were found in 1991 and by 2006 it was down to 460. This year only 292 nests have been identified, indicating a 37 percent drop in spoonbill nests in just one year (Figure 2). Most importantly, there has been an even more dramatic decline in nesting in the Northeastern Basin, which is the region of the bay most impacted by water management practices. In 1963, there were 65 nests in the Northeastern Basin, which increased to 688 nests by 1978, indicating that the ecosystem was healthy during this period.

The trend changed dramatically following the completion of modern water management practices in 1984. By 1992, nest numbers were half of their 1978 peak (333 nests). This dropped to about 100 nests in the mid 1990’s and remained fairly constant through 2007 (Figure 2). In 2008 there were only 41 nests initiated in the Northeastern Basin. Current water management practices have had the same impact on spoonbills as the plume hunting era. Audubon believes that this indicator species is telling us that Florida Bay is on the brink of a monumental ecological collapse.

![Total Nests in Florida Bay and Northeastern Basin](image)

Figure 2. Steady decline of spoonbill nests. Roseate spoonbill nest counts have steadily declined since the early 1990’s, indicating the poor health of Florida Bay and the birds’ southern Everglades foraging grounds. This year the trend continues drastically downward, with the lowest number of nests observed since the 1960’s.
Declines of other fish-eating birds (e.g., pelicans, osprey, eagles), along with predatory fishes, alligators, and crocodiles have also been widely documented in Florida Bay, indicating a common-cause denominator, which is likely the decline in small fish and invertebrate populations that make up the base of the food chain for these species. For example, Florida Bay osprey populations have declined about 50%, likely because of poor habitat quality and reduced food supply.

Algae Blooms, typically comprised of a blue-green algae species, have also become common in Florida Bay since the mid 1980’s. These blooms contribute turbidity to the water column and effectively prevent adequate sunlight from penetrating the bay’s shallow waters to reach the seagrasses below. The seagrass die-offs that occurred between 1984 and 1994 were most likely the result of chronic light reductions. While seagrasses can generally withstand adverse conditions for short periods of time, combinations of various stressors can contribute to the degradation of the grass community. The algae may also effectively clog the filtering mechanisms of benthic invertebrates such as sponges.

Re-hydrating Florida Bay: Stemming the Tide of Further Ecologic and Economic Decline

A water management system that seriously degrades the bay is the C-111 canal complex, which was initiated in 1960 by the US Army Corps of Engineers. With operation beginning in 1968, this system drained more than half the headwaters basin of Taylor Slough, converting it to farmland and urban areas. Additions to the C-111 complex, the South Dade Conveyance System (SDCS), were completed in 1983 and resulted in the diversion of massive quantities of fresh water (that historically would have fed Florida Bay via Taylor Slough) into the C-111 canal system. Natural flow through the Finger Glades (Figure 1) was largely terminated by the construction and operation of the SDCS. Concern over the ecological consequences of these water management systems helped ensure that restoring the sheetflow by modifying the C-111 complex was included as a critical component of the state/federal Comprehensive Everglades Restoration Plan (CERP), authorized by Congress in 2000.

Simple steps taken immediately to help reduce seepage from the C-111 basin into the C-111 canal hold the promise of generating a positive ecological response (such as increasing seagrass coverage). For example, holding the water at higher stages in the lower C-111 canal would create a liquid barrier that would push water back toward Taylor Slough. Although only approximately 30 percent developed, the plan for the first phase of the C-111 spreader canal project calls for adding small amounts of infrastructure in order to reduce the overall damaging seepage of water from the surrounding wetlands into the C-111 canal. As discussed in the recommendations, this plan will not solve all of the problems of Florida Bay, but it is certainly a step in the right direction. Audubon is encouraged by the South Florida Water Management District’s (District) apparent willingness to pursue incremental steps to achieve immediate restoration benefits and looks forward to continuing to work together in this direction.

Figure 3. Algae bloom extent. The area shaded in green illustrates the large expanse of the algae bloom in 2007, which spread across the central portion of Florida Bay, passed through the Keys and hovered over the coral reef.

Simple steps taken immediately to help reduce seepage from the C-111 basin into the C-111 canal hold the promise of generating a positive ecological response.

Persistent algae blooms, such as those that occurred in the early 1990’s, have serious impacts on bay ecology, unleashing a series of disastrous impacts. In addition to seagrass loss, blooms in the early 1990’s caused almost 100 percent of the sponges to die off. Spiny lobster were likely impacted by the sponge die off because they depend on sponges for shelter during early life stages. Likewise, shrimp depend on seagrass beds for nursery habitat, and shrimp catches plummeted in this period.

Figure 4. Comparison of C-111 and Taylor Slough flow volumes. The dark bars represent flow volume in acre-feet per year released from C-111. The corresponding light bar represents water flow out of Taylor Slough. Often, the flow of water out of C-111 greatly exceeds the water flow through Taylor Slough, indicating the incredible capacity of the C-111 to seep water away from the natural system and successfully drain wading bird foraging grounds. This disparity in flow volumes contributes to extremely high salinities in portions of the Bay that formerly benefited from Taylor Slough flows. In order to begin restoration of the bay, the flows out of C-111 and Taylor Slough should become more equivalent, rather than the overall average of three times the flow exiting the C-111 than Taylor Slough.
Numerous Everglades restoration projects are held hostage by lack of fiscal support from the federal government, rising construction costs, and endless deliberations over appropriate project design.

In the meantime the Everglades ecosystem and Florida Bay continue to suffer from debilitating algae blooms, seagrass and invertebrate mortality, and further ecological degradation is indicated by wading bird population decline. Those that depend on the bay for their livelihood have suffered economic losses and setbacks as the health of the bay continues to deteriorate.

State and federal decision makers need to fast-track the first portion of the C-111 spreader canal project because it offers tremendous opportunity for ecological benefits. While this alone will not heal Florida Bay, it will provide some measure of relief in the form of increased water flow through Taylor Slough. This relief cannot come soon enough, and there is potential to make a measurable difference by enacting a plan using existing resources.

Stopping further degradation of Florida Bay requires at a minimum:

- **Rapid design and implementation of the plan for the first portion of the District’s C-111 spreader canal project including new structures to raise water levels, increased storage capacity, and a quick commitment to actually raise water levels in the lower C-111 to reduce seepage.** An operational plan, which outlines a rate to incrementally raise water levels, is needed.

- **Rapid mobilization of a consensus-driven process to complete the plan to achieve the maximum ecological benefits per dollar spent followed by implementation of the completed plan.**

- **An immediate commitment of $70 million from the District and the State of Florida to implement this first part of the plan followed by a prioritization of District Everglades funds toward completion of the project.**

- **Design the second phase of the C-111 restoration project to incorporate the lessons learned from implementation of the first phase of the restoration project.**

- In addition to these specific recommendations, Audubon believes it is important to follow through on the system-wide Everglades restoration plans, which are necessary to restore sheetflow and ensure the correct quantity, quality, timing and distribution of water flows through the ecosystem.

References:


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