

Progress Toward Restoring the Everglades Second Biennial Review



Photo courtesy of the South Florida Water Management District.

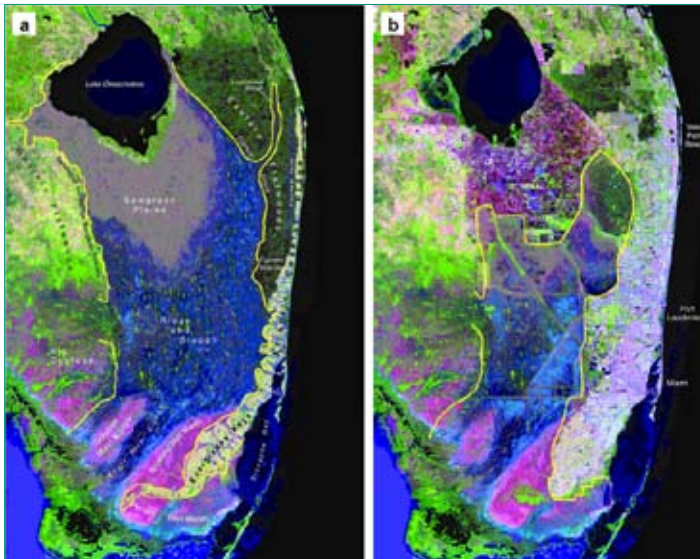
If environmental restoration goals for the Everglades are to be realized, demonstrable progress needs to come soon. Science and engineering supporting the restoration program has been of high quality, but the Comprehensive Everglades Restoration Plan has made only scant progress toward achieving restoration goals and is mired in budgeting, planning, and procedural matters. Without appreciable progress, the system will continue to lose vital parts, and more importantly, the effort will lose the support of the public. To expedite Everglades restoration and to begin reversing the decades of decline, clear funding priorities; modifications to the project planning, authorization, and funding process; and strong political leadership are needed.

The Florida Everglades is one of the world's treasured ecosystems. Its vast area of sawgrass plains, ridges, sloughs, and tree islands once supported a high diversity of plant and animal life. However, an extensive water-control infrastructure designed to improve flood control and provide urban and agricultural water supply has drastically altered the flow of water that shaped the ecosystem, changing the landscape of the entire Everglades area. Remnants of the original Everglades now compete for vital water with these urban and agricultural interests, and contaminated runoff further impairs the ecosystem.

In an effort to reverse the decline of the Everglades ecosystem, the state of Florida and the federal government launched the Comprehensive Everglades Restoration Plan (hereafter, the Restoration Plan) in 2000. The founders of this unprecedented project envisioned that billions of dollars would be invested over several decades in efforts to, where feasible, restore the hydrologic characteristics of the Everglades and to create a water system that simultaneously serves both natural and human needs.

Based on Congress's mandate in the Water Resources Development Act of 2000 and with support from the U.S. Army Corps of Engineers, the South Florida Water Management District, and the U.S. Department of the

Interior, the National Research Council convened a committee to review the Restoration Plan's progress in a series of biennial evaluations. This report (the second biennial review) concludes that the Plan is making only scant progress toward achieving restoration goals. The project is bogged down in budgeting, planning, and procedural matters while the ecosystem that it was created to save is in peril.



Reconstructed pre-drainage and current satellite images of the Everglades. The yellow line in (a) outlines the historical ecosystem; the yellow line in (b) outlines the remnant ecosystem. Courtesy of the South Florida Water Management District.

Meanwhile, construction costs are escalating and population growth and associated development make restoration increasingly difficult. To avert further declines, the report recommends that the Restoration Plan address major project planning and authorization hurdles and move forward expeditiously with projects that have the greatest potential for making progress in the restoration of the ecosystem.

Challenges Contribute to the Urgency for Restoration

The report identifies several overarching challenges to Everglades restoration:

Ecosystems continue to decline. Ongoing delay in Everglades restoration has not only postponed improvements—it has allowed ecological decline to continue. For example, recent water management strategies have

not produced conditions conducive to restoring the endangered Cape Sable seaside sparrow and appear to be negatively impacting the snail kite, an endangered hawk. Additionally, tree islands, which are visually striking biodiversity “hotspots” in the Everglades landscape, have declined in number and area over the past few decades—a trend that appears likely to continue until significant res-



The endangered snail kite.

Fish & Wildlife Conservation Commission photo.

toration progress has been made. Parts of the region are experiencing continued water quality and habitat degradation; meanwhile, invasive species are increasingly widespread and represent a major challenge to restoration.

Human population is expanding.

Increasing population growth in South Florida and the continued expansion of the footprint of urbanized areas are putting human demands for land and water in potential competition with ecosystem restoration. Integrating the needs of environmental restoration with human development plans can lessen the negative impacts of population growth if the Restoration Plan, cities, counties, and the state are all involved.

The climate is changing. Precipitation, evaporation, and the intensity of rainfall events in South Florida are all expected to change during the current century. These effects of climate change

are likely to impact the effectiveness of Everglades restoration projects; therefore, planners should factor the most recent projections of the impacts of climate change into project planning and implementation. Impending climate change should not be an excuse for delay or inaction in the restoration but instead should provide further motivation to restore the resilience of the ecosystem.

Evaluation of Restoration Efforts

No Restoration Plan projects have been completed. The Plan is essential to improve the condition of the Everglades ecosystem and strengthen its resiliency to future stresses. However, as of mid-2008, the first components of the project have not been completed. Furthermore, key foundational projects, such as Mod Waters (see Box 1), remain far behind schedule. Some partial benefits have been produced from a few phased Restoration Plan projects, but overall, progress has been limited.

Unless progress is made in the near term, opportunities for restoration may close with further species loss and habitat deterioration. Additionally, the continuation of such limited progress could increase frustration among stakeholders and agency staff, diminishing public support.

Several related projects are positive harbingers of future Restoration Plan programs. For example, the success of the Kissimmee River restoration effort, which has restored portions of the channelized river to its former meandering course, demonstrates the potential for successful restoration of the Everglades ecosystems.

Box 1: Modified Water Deliveries to Everglades National Park

The history of the Modified Water Deliveries to Everglades National Park project—known as Mod Waters—is one of the most discouraging stories in Everglades restoration. The project was initiated in 1989, long before the Restoration Plan was established. It aims to restore more natural water flows into Everglades National Park and serves as a foundation for much of the Restoration Plan effort that follows.

Unfortunately, Mod Waters has been plagued for nearly 20 years by changes in direction and scope, parochial interests, litigation, cost escalation, engineering constraints, and a lack of coordinated leadership. Although some of these events may have been unavoidable, the outcome has been a loss of support from Congress and a loss of enthusiasm from the public. Worst of all, the history of delay further damages Everglades National Park.

In 2008, the plan for modifying Tamiami Trail, a roadway that restricts water flow into the park, was reduced in scope after Congress rejected an earlier plan as too expensive. The revised plan provides some environmental benefits, but it also shifts increased responsibility and cost to the Restoration Plan. Although it is critical to implement these modifications quickly, they are only a first step toward restoration. If even this relatively modest restoration project cannot proceed and provide some restoration benefits, the outlook for the Plan is dismal.

Box 2: Lake Okeechobee: Vital to Restoration

Lake Okeechobee, located in the northern part of the Everglades, is plagued by both high and low water levels and poor water quality. Management of the lake has major implications for the region's biota and on the success of the restoration of downstream ecosystems, including the northern estuaries and Everglades National Park. Although there are sizeable efforts to improve the lake's water quality and expand water storage in the Northern Everglades, achieving these goals will not be easy or inexpensive. The report concludes that achieving the water-quality goals for the lake might take decades with current strategies. A system-wide accounting of phosphorus and other contaminants are needed to achieve the restoration goals for the South Florida ecosystem. Goals for the lake, the northern estuaries, and downstream interests might not be mutually compatible in all respects, and, tradeoffs will likely be necessary.

Progress is impeded by planning and implementation hurdles. Restoration is being delayed as a result of a complex and sometimes contentious planning process, funding uncertainties, a lack of clear priorities, and statutory and regulatory impediments.

The greatest challenge in the project planning process has been developing technically sound project plans that are acceptable to the many agencies and stakeholders involved, and the process of resolving disagreements has caused significant delays. Federal funding for the Restoration Plan has fallen far short of what was originally envisioned. This lack of funding, however, is more a symptom of the complex and lengthy planning and authorization process for each project than the most serious cause of Plan delays. State efforts to construct projects in spite of funding limitations and other obstacles are commendable. But, with both state and federal partners facing budget constraints, funding issues are threatening to affect the speed of future Restoration Plan progress.

A foundation for adaptive management has been built. To facilitate restoration progress despite some scientific and engineering uncertainty, Congress mandated that the Restoration Plan take an adaptive management approach, which relies on scientific information, ecosys-

tem monitoring, and explicit feedback mechanisms to refine and improve future management decisions.

Nearly all of the elements needed to implement this adaptive approach have now been produced. These are significant accomplishments and their importance should not be underestimated. However, the adaptive management scheme could be improved by:

- *Keeping ecosystem monitoring a priority.* Although monitoring itself does not ensure restoration progress, it is essential to support sound management decisions.
- *Developing integrated modeling tools.* Integrated ecological, hydrologic, and water quality models are needed to compare predicted and monitored ecosystem responses to restoration efforts.

Addressing the Challenges: Looking Forward

The results of the Restoration Plan may not be exactly what were envisioned, and some tradeoffs may be necessary to make progress. However, the report expresses optimism that if the Plan's efforts are implemented under an effective adaptive management framework and, above all, are undertaken expeditiously, the restoration will create more resilient ecosystems that should fare better in facing future environmental stresses.

The report recommends the following changes to address weaknesses in the restoration effort and to improve the pace of progress:

Develop systemwide planning mechanisms and a sound project sequence. The Restoration Plan is designed as a system of related projects that work together to produce overall restoration benefits; however, it lacks a systematic approach to analyze costs and benefits across multiple projects. The current planning process appears to reward the least contentious projects, regardless of their potential contribution to restoration. Without clear priorities, projects with large potential restoration benefits may face lengthy delays while less contentious projects that address only isolated portions of the ecosystem tie up available funding. Given increasing fiscal pressures, it is critical that planners prioritize and properly sequence restoration projects so that funds are allocated according to



Human development encroaches on natural ecosystems, affecting the quality and quantity of water available to them. Here, a highway divides a development from a water conservation area in South Florida. Photo courtesy of the South Florida Water Management District.

the degree to which projects are essential to restoration of the ecosystem, rather than in accordance with stakeholder support or other factors.

Revisit the current project-by-project review, authorization, and yearly funding framework. The federal government should evaluate this traditional framework to benefit the Restoration Plan and other projects across the nation. It may be more effective—scientifically, managerially, and economically—to design an approach to comprehensive restoration programs that provides assured funding over a multiple-year period.

Develop a stronger conceptual basis for multi-species planning and management. Currently, no scientifically credible plan exists for managing multiple species at risk in South Florida. Although implementation of the Endangered Species Act has become focused increasingly on single-species management, the Act does provide mechanisms to facilitate the recovery and management of multiple listed species. However, achieving the goals of recovery and effective management requires a high degree of integration of scientific knowledge about individual species and species interactions. To expedite multi-species restoration in the Everglades, the Department of the Interior should lead the development of

a South Florida multi-species adaptive management strategy to accompany the South Florida Multi-Species Recovery Plan.

Continue active land acquisition efforts. Successful Everglades restoration depends on the acquisition of particular sites and the protection of general areas within the ecosystem. The report commends the state of Florida for its aggressive and effective financial support for acquiring important parcels, including the recent announcement of the potential purchase of 187,000 acres from U.S. Sugar for \$1.75 billion. This acquisition has the potential to significantly affect restoration efforts; however, uncertainties about the timing and details of the purchase make it impossible to predict its effects at this early stage. Active land acquisition efforts should be continued, accompanied by monitoring and regular reporting on land conversion patterns throughout the ecosystem.

Encourage strong leadership. Building and maintaining support for restoration progress requires strong leadership. If there is insufficient political leadership to align research, planning, funding, and management with restoration goals, the Restoration Plan could become an abbreviated series of disconnected projects that ultimately fail to meet the restoration goals.

USGS photo.



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This report brief was prepared by the National Research Council based on the committee's report. For more information or copies, contact the Water Science and Technology Board at (202) 334-3422 or visit <http://nationalacademies.org/wstb>, or see the Board on Environmental Studies and Toxicology at <http://nationalacademies.org/best>. Copies of *Progress Toward Restoring the Everglades: The Second Biennial Review, 2008* are available from the National Academies Press, 500 Fifth Street, NW, Washington, D.C. 20001; (800) 624-6242; www.nap.edu.

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