



Department of the Interior Vision and Plan for Successful Everglades Restoration

Introduction

This document:

- reaffirms and refines the Department of the Interior (DOI) vision for a successfully restored greater Everglades wetlands, and
- proposes pathways and priorities to achieve this vision expeditiously.

Disturbing delays have slowed implementation of restoration projects specifically designed to directly benefit the Everglades. At the same time, these freshwater and estuarine wetlands continue to deteriorate ecologically. Together, these circumstances are creating a growing sense of urgency within DOI for Everglades restoration in central and South Florida. Through this “white paper”, which responds to that sense of urgency, Interior hopes to stimulate broader discussion with partners and stakeholders about priorities and processes to expedite Everglades restoration.

Vision

The vision for restoring the Everglades is to recover, given modern constraints, a natural system with the ecological functions and hydrological connectivity, spatial and temporal patterns, and diversity and abundance of species that characterized the historical greater Everglades wetland basin. The restored ecosystem will be altered from and smaller than the pre-drainage system yet still retain the essential characteristics of the historic “River of Grass.”

Successful restoration will be achieved when the new system no longer acts like a set of managed, disconnected wetlands but rather reestablishes the defining characteristics and connectivity of a natural Everglades system.

Background

Restoration of the greater Everglades ecosystem includes numerous integrated projects, programs, and land acquisitions designed to return the degraded ecosystem to a more natural and sustainable condition. Three strategic goals help focus these efforts:

- increase and improve water deliveries for the environment while improving water quality throughout the entire Everglades ecosystem;
- restore habitat and species; and
- foster compatibility of the built and natural systems.

The success of these efforts is critical to DOI because the Department manages numerous trust wildlife species as well as about one-half of the remaining Everglades, including 4 national parks and 15 national wildlife refuges. For this reason and notwithstanding the importance of the overall ecosystem, the DOI focus regarding the greater Everglades is on the restoration of the central and southern Everglades, the adjacent Big Cypress basin, Biscayne Bay, Florida Bay and other downstream estuaries. Without a successful restoration program in these regions, many of the missions, goals, and objectives of



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Interior agencies in south Florida will not be achieved. Restoration is also needed to improve conditions within other lands and waters managed by DOI such as A.R.M. Loxahatchee National Wildlife Refuge, and Ding Darling National Wildlife Refuge.

Implementation of restoration programs and projects over the next several decades requires bold short-term actions and carefully crafted long-term processes to resolve essential policy, management, scientific, and engineering issues and objectives. As restoration progresses, continual improvements will be needed in plans and projects that incorporate new information and lessons learned.

A September 2008 biennial report from the National Research Council emphasizes the continuing and serious decline of the Everglades ecosystem and expresses concern that the restoration effort is seriously lagging. The NAS report suggests that projects with restoration benefits for the natural system, including decartmentalization and sheet flow enhancement, should be implemented as soon as possible. To accomplish this objective, it is necessary to streamline procedures and to consider alternative funding and authorization measures to accelerate achieving restoration benefits.

According to a recent science review of species conservation and Everglades restoration, the status quo is not an option if recovery of imperiled species is a key objective. Simply stated, Everglades restoration is needed if we hope to move beyond the threat of species extinction toward the reality of species recovery. A total of 67 federally listed imperiled species are under DOI's stewardship, and Everglades restoration is urgently needed to conserve wildlife and the natural resources upon which they depend.

Restoration is needed and is needed now to achieve both landscape and species recovery. Restoration will also help restore the carbon storage function of a healthy and functioning Everglades wetland, while combating the effects of climate change, including sea level rise, increasing temperature, altered precipitation patterns, and changes in the intensity and frequency of hurricanes.

Emerging Issues

Three emerging issues are shaping Interior's vision for successful restoration and the urgency for action:

- the continued—perhaps accelerating and in some places irreversible—decline of the Everglades in areas of special importance to DOI;
- the growing recognition that additional flow, above and beyond that provided by current restoration plans, is needed for restoration; and
- an emerging scientific consensus that restoration is the most-effective strategy for addressing the effects of climate change on the Everglades and south Florida landscape through carbon sequestration and increased fresh water within the system.

These three issues—coupled with the state's bold initiative to secure additional lands in the Everglades Agricultural Area for water storage and treatment—provide the catalyst



for DOI to reaffirm and refine its vision for Everglades restoration and to reexamine the scope and timing for specific projects intended to provide ecological improvements.

Priorities

The successful and timely implementation of projects to remove barriers and restore a more natural and unobstructed flow is our highest priority. We must press for completion of the Modified Water Delivery (Mod Waters), C-111 projects, Caloosahatchee and St. Lucie estuaries restoration, and Picayune Strand projects. Water deliveries within the Central and South Florida Project must be revised to more closely reflect the natural timing, distribution, and flow of water within the system through a revision of the System Operating Manual.

Importantly, a bold policy priority is required for three tasks that form the “center of gravity” of our restoration effort:

- Complete construction of the Tamiami Trail one-mile bridge and the C-111 spreader canal phase one;
- Immediately begin an integrated planning process and sequential implementation for the southern Decompartmentalization (DECOMP) and seepage management projects, a phase two for additional bridging of the Tamiami Trail, and a phase two of C-111 Spreader Canal; and
- Complete construction of the necessary storage and treatment capability in the EAA to provide the entire natural system with sufficient clean water.

Objectives of Everglades Restoration

Reversing the decline of the central and southern Everglades is vital for DOI and its partners. We define restoration success for this region at two scales: landscapes and components. At each of these scales, no specific historical time period is used to set restoration targets. Rather, restoration objectives reflect the best understanding of the defining characteristics and processes of a healthy Everglades ecosystem.

Key landscapes

1. **Ridge and Slough Everglades:** Restore the historical patterns of soil accretion and transport, long hydro-periods, and flow velocities needed to recover and sustain the ridge-slough-tree island landscape – from the A.R.M. Loxahatchee National Wildlife Refuge to Everglades National Park, including a mosaic of deep and shallow water habitats.
2. **Florida Bay:** Restore the historical timing, distribution, and volumes of freshwater flow into northern and western Florida Bay needed to recover historical salinity and submerged aquatic vegetation patterns and moderate unnatural algal blooms, so that large populations of water birds, crocodiles, and pink shrimp can flourish.
3. **Southern Mainland Estuaries:** Restore the historical timing, distribution, and volumes of flow into and through the southern mainland mangrove ecotone to recover submerged aquatic vegetation and waterfowl in imbedded lakes, improve fish production, and recover Florida Bay roseate spoonbill nesting colonies.



4. **Southern Marl Prairies:** Restore the historical patterns of annual hydro-periods and dry season groundwater levels needed to recover the ecological integrity of the marl prairies, including an abundant network of alligator holes and healthy periphyton communities.
5. **Big Cypress Basin:** Recover the historical patterns of flow volume and fire across the eastern and southern Big Cypress basin needed to re-establish and sustain natural mosaics of cypress strand, wet prairies and hardwood hammocks.

Key Components

1. **Super Colonies:** Recover historical patterns of “super colonies” of nesting wading birds, as exemplified by the abundance of wood stork and white ibis, which depend on historical ecological dependencies and linkages among ridge and slough, mainland estuaries, and southern marl prairies.
2. **Imperiled Species:** Create conditions that provide stability and recovery of rare and unique habitats and the region’s overall biodiversity, including improving conditions for highly imperiled species (e.g., Florida panther, manatee, wood stork, Everglade snail kite, Cape Sable seaside sparrow) and setting them on the road to recovery.
3. **Alligators:** Recover historical patterns of alligator abundance and distribution, including reestablishment of centers of abundance in the marl prairies and mainland estuaries.
4. **Exotic Species:** Reduce the spread and threat of exotic species.
5. **Water Quality:** Improve water quality throughout the ecosystem.

Flow, Water Storage and Water Treatment Needed to Achieve the Vision

Achieving the objectives outlined above for the restoration of the central and southern Everglades depends on a substantial increase in the unobstructed flow of clean water from Lake Okeechobee and the northern part of the watershed into and through the Everglades. During the wet season in the pre-drainage Everglades, periodic high-flow events played a key role in establishing and maintaining the ridge and slough landscape and for delivering large volumes of freshwater into downstream estuaries. Inherent “dynamic” storage areas within the Everglades system filled during the wet season and naturally attenuated the release of water during the dry season when rain is scarce. The ability to replicate this storage and naturally attenuated flow of clean water, adjusted for alterations in the landscape and size of the remnant Everglades, is critical to achieve the restoration vision.

Flow Volumes

Determining the flow volumes necessary to achieve restoration of ecological functions is essential but challenging. Recent paleo-ecological studies and new Natural Systems Model (NSM) flow estimates conclude that a healthy Everglades system will require much more water than would be provided by the initial Comprehensive Everglades Restoration Plan (CERP). These analyses suggest that 1.5 million acre-feet of additional water above current wet-year flow volumes and 0.5 million acre-feet of additional water above current dry-year flow volumes across the Tamiami Trail into Shark River Slough would be required to match these updated pre-drainage estimates. Flow distributions into



eastern Shark River of 60% of the wet-year water flows and 80% of the dry-year water flows will be needed to achieve the desired ecological responses.

Storage and Treatment Requirements

These updated analyses support the need for additional regional storage capability of 1.5-2 million acre-feet above current levels to sustain the natural system through prolonged multi-year dry periods, with an additional requirement to meet irrigation and municipal water supply needs during these periods. This storage requirement can be achieved via a number of options within or north of the Everglades Agricultural Area (EAA). At a minimum, the surface storage component within the EAA would require 35,000 acres to provide the 360,000 acre-feet of storage that is necessary to handle local EAA basin runoff.

For very wet years, these data also indicate that water quality treatment will be needed for peak annual flows of an additional 2-2.5 million acre-feet of water – equivalent to a one in ten-year event, with an additional average annual flow of 1-1.2 million acre-feet – to provide water delivery to the Everglades system and concurrently relieve the stress on the northern estuaries. These increased flows to the downstream Everglades would have to be matched with conveyance improvements beyond what was envisioned in the initial CERP WCA 3 Decompartmentalization and Sheetflow Enhancement project. Roughly 2/3 of this water would be delivered via sheetflow along the northern boundary of WCA 3A and would need to flow through an open system to avoid harmful durations of high water in the central Everglades. The remaining 1/3 would be delivered to Loxahatchee Refuge, WCA 2, and to the western basins.

Updated Project Requirements to Achieve the Vision

Reestablishing the hydrologic connection from Lake Okeechobee to the Everglades, coupled with eliminating all non-essential water management structures and water management actions, are key elements to provide the flow of water into and through the Everglades needed to achieve ecological restoration. Specific and timely action is critical because continued delay in implementing restoration plans will increase the difficulty of recovering the essential defining characteristics of the Everglades; increase the probability and extent of irreversible damage; reduce the options and potential for recovery, increase the cost for recovery; and further threaten many imperiled species such as the Everglade snail kite, Cape Sable seaside sparrow, and wood stork.

The successful and timely implementation of projects to remove barriers and restore a more natural and unobstructed flow is our highest priority, including a focus on three tasks that form the “center of gravity” of our restoration effort.

1. **Complete construction of the Tamiami Trail one-mile bridge and the C-111 Spreader Canal phase one.** The most certain way to bring early, incremental restoration benefits to the southern Everglades and Florida Bay and to begin to answer important questions about ecosystem responses to increases in flow rates and volumes is to complete phase one of these two core projects beginning immediately. A monitoring program must be in place to show ecological



responses to new flows across the Tamiami Trail and increased flows into lower Taylor Slough, respectively, as a basis for extrapolating the larger hydrological requirements for meeting restoration objectives.

- 2. Immediately begin integrated planning and implementation for a phase two package of essential southern Everglades projects: southern DECOMP, seepage management, Tamiami Trail phase two, and C-111 Spreader Canal phase two.** These projects comprise the heart of the plan to restore the central and southern Everglades through the restoration of flow through the River of Grass. Thus, their implementation is critical to the overall restoration of the system and must be accomplished as soon as possible. They are being pursued as individual efforts within the overall restoration plan. To ensure that the individual projects are cohesive and properly integrated, a coordinated planning initiative should be established.

This planning initiative would identify regional volume and flow requirements and delivery options for the central and southern Everglades, southern marl prairies, eastern Big Cypress, mangrove estuaries and Florida Bay. This initiative would also define an implementation strategy using incremental adaptive restoration and adaptive management principles to ensure the proper sequence of implementation for the various parts. That is, the integrated plan would ensure that seepage management along the eastern boundary of the central and southern Everglades is provided concurrently with the restoration of flows. Those flows would be accomplished through completing modifications to elevate and bridge Tamiami Trail, create an open (free flowing) system in the central Everglades by removing the adverse effects of the L-67, L-29, and L-28 canals/levees on the natural system, and deliver more natural volumes of water into the Big Cypress/southwestern estuaries and the Taylor Slough/Florida Bay southern estuaries.

Tamiami Trail will continue as a major constraint to restoring the Everglades and Florida Bay until substantial additional hydrological connectivity is established across the Trail. Numerous studies of potential solutions along the Trail exist from which to pull together policy recommendations within 12 months for a phase two Tamiami Trail plan to increase and restore more natural water flow across the WCA-3 and Everglades National Park interface, thereby reconnecting areas of the historic Everglades that are now separated.

- 3. Complete construction of the necessary storage and treatment capability in the EAA.** Successful restoration will require the capability to send large quantities of treated water from Lake Okeechobee to the Everglades, to re-establish the historic flow connection within the watershed. It will also require sufficient storage to replace the natural dynamic storage that once existed in the Everglades. Treatment for 1-1.8 million acre-feet and storage of 1.5-2 million acre-feet of water is needed to restore natural flows into the Loxahatchee Refuge, Central/Southern Everglades, and downstream estuaries.



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Transition Learning and Incremental Adaptive Restoration (IAR)

The future vision for the Everglades centers on emulating the historic characteristics of the natural Everglades system, while recognizing that perfect replication of pre-alteration conditions is not possible. Because the pace of restoration must be significantly accelerated, careful planning and monitoring is essential, both to maximize learning opportunities for key unanswered questions and to measure the system responses during the “transition” period from the current to the future ecosystem. Adaptive management strategies will allow for adjustments to be made where needed when threatened species and/or landscapes respond in undesirable ways, when restoration trade-off situations develop and must be evaluated (i.e., decisions may need to be made that would prioritize one restoration objective over another), and when results fall short of expected goals. Potential trade-off situations could include, (1) tree islands or deeper water, (2) water for Taylor Slough or Shark Slough, (3) increased volumes or better water quality, (4) species needs or ecosystem objectives, and (5) recreational priorities or ecosystem needs. Undesirable responses and trade-off situations may often only become known during and following project implementation and are not readily predicted prior to project implementation.

Incremental Adaptive Restoration (IAR) was recommended by the National Research Council as a means of aggressively seeking early restoration benefits while maximizing learning on key unanswered questions. Because the objectives of IAR can best be achieved through large-scale projects or multi-project designs, DOI believes the most effective IAR program will be achieved through a single, integrated planning process for the key southern Everglades projects collectively (DECOMP, seepage management, Tamiami Trail Phase 2, and C-III spreader canal Phase 2).

Through a single planning process, questions about the most-effective distribution of the volume of water available for restoration in the southern Everglades will be collectively addressed in the context of all project objectives. Key uncertainties that need to be evaluated in the central and southern Everglades include questions of rates of flow needed to recover the ridge and slough system, volumes of flow needed to recover estuarine communities and production in the southern estuaries and Florida Bay, and the best structural designs for achieving the optimal hydropatterns.

Implementing the Vision

Achieving the DOI vision will require the best available science and knowledge, significant resources, and an improved federal process for project implementation to substantially improve the pace of progress. Implementing the vision will require strategic leadership, collaboration, and creative policy decisions. Given the continued decline of the Everglades, the threat of irreversible declines if action is not taken soon, and the reality of finite federal and state resources, it is critical that meaningful restoration be achieved in the shortest possible time.

Refining and updating the vision is a key to advancing Everglades restoration. However, an updated vision alone is insufficient to assure success. Agencies and organizations,



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including policymakers, scientists, and interested organizations, need to reexamine decision-making and governing structures; work out clear procedures for integrating new science into the decision process and improve integration of science products for policymakers; and improve federal administrative and budgeting processes to assure more timely implementation and add certainty to restoration investment timelines. The upcoming revision to the Army Corps of Engineers' Programmatic Regulations for CERP (33 CFR Part 385) provides an opportunity to address the above.

Messages

The restoration of the Everglades ecosystem is unprecedented in its scale and ambition. We have the opportunity to "write the book" on how to structure our organizations and our thinking in order to best achieve ecosystem restoration in the shortest amount of time. The Department is committed to working collaboratively with our partners to restore America's Everglades. The Department's highest primary policy interests are to:

- Provide new momentum for the three "centers of gravity"—additional Tamiami Trail modifications; DECOMP/seepage management and the C-111 Spreader Canal; and achieving the necessary storage and treatment in the EAA.
- Strengthen the state-federal partnership, including endorsing State's efforts to acquire significant portions of the EAA and reconciling state and federal priorities for Everglades restoration.
- Work closely with the State and Corps to reformulate portions of the CERP to focus on the centers of gravity.
- Assure critical monitoring programs continue to form the foundation for the adaptive management strategy
- Strengthen opportunities for nongovernmental organizations and the scientific community to help shape and implement priorities.
- Examine ways to improve the governance and decision making processes to facilitate timely action and focused results.

Recommendations

1. Planning should begin now to achieve the next phase for Tamiami Trail.
2. An integrated planning initiative should be established to ensure the coordinated and appropriate incremental implementation of the Tamiami Trail, C-111, Decomp, and Seepage management projects to achieve important restoration benefits sooner than now planned.
3. Preparation of an enhanced budget to identify the funding requirements that support completion of these key projects within 5 years should be undertaken.
4. Senior Interior leaders should explore with senior leaders of our restoration partners the establishment of a standing stakeholder Commission/Council.
5. Interior should assure highest-level departmental focus on Everglades Restoration and provide ongoing means for feedback from science and policy advisors.