



# Florida Everglades Restoration: Background on Implementation and Early Lessons

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## Summary

Several complex water resource systems are receiving increasing intergovernmental and private sector efforts to balance human and broader ecosystem values. Examples include the Florida Everglades, San Francisco Bay-Sacramento/San Joaquin River Delta, and the Chesapeake Bay, among others. The Florida Everglades is especially prominent because of its inclusion of Everglades National Park and because human impacts in and around the Park have caused a substantial erosion of the balance and diversity of the original ecosystem. Government and private sector efforts to mitigate the effects of large-scale human change in the broader Everglades ecosystem are complex and sometimes contradictory undertakings. Complexities and conflicts arise because of definitions and goals; because of uncertainty about achieving desirable goals; because of costs; and because of likely tradeoffs with established economic and business activities. The restoration initiative in the South Florida ecosystem (which includes the Everglades) is a recent intergovernmental effort that attempts to address the ecological and socio-economic factors involved with ecosystem restoration. An examination of what has been effective and what has been less effective in ecosystem restoration efforts in the Florida Everglades may give insights on how to proceed in the implementation of other restoration projects.

After being reduced to half its original size by flood control projects, agriculture, and urban development, the Florida Everglades is now targeted for a large restoration effort by an unusual partnership among federal, state, tribal and local stakeholders. A major step in this restoration effort was the authorization of the Comprehensive Everglades Restoration Plan (CERP) in the Water Resources Development Act (WRDA) of 2000 (P.L. 106-541). The objective of CERP is to restore the quantity, quality, distribution and timing of water supplies to natural areas without disrupting existing sources of water for agricultural and human needs.

There are several policy components within CERP that may be applicable to other ecosystem restoration efforts. They include multi-agency committees for coordination, programmatic regulations for project implementation, adaptive assessment and monitoring, assurances for water allocation, and funding. This report provides a description of each policy component as well as an analysis of its potential benefits and disadvantages in the restoration process. A proposed version of programmatic regulations is cited throughout this report. Programmatic regulations are expected to provide guidelines for project implementation, monitoring, adaptive management, and water allocation for restoration activities provided by CERP. A proposed version of the programmatic regulations was published in the *Federal Register* in August 2002; the final version is expected in December 2002. This report will be updated as warranted.

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## Introduction

In the last few decades, the United States has devoted enormous effort and billions of dollars towards restoring some of our most important ecosystems such as the Great Lakes, Florida Everglades (Everglades), and Chesapeake Bay. Restoration efforts have originated, in part, from controversies surrounding water supply and quality, federal laws (i.e., laws that protect endangered species or regulate water quality, and others), sport and commercial fishing, and environmental degradation. Ecosystem restoration initiatives have typically been accompanied with high expectations and publicity. Funding for these initiatives can amount to billions of dollars for each, and the duration of these initiatives can be 25 years or more. For example, in the San Francisco Bay-Sacramento/San Joaquin River Deltas (California Bay-Delta) a restoration program known as CALFED is expected to cost more than \$7.8 billion, with more than \$2.4 billion expected from the federal government, just for the first stage (7 years) of a 30-year restoration effort. Issues such as the coordination of multi-agency task forces, public participation, allocation of ecosystem resources (e.g., water supplies), and the science behind restoration projects have all been debated in ecosystem restoration efforts. Perhaps the greatest issue in ecosystem restoration efforts is that restoration can create “losers.” People may lose (or perceive loss of) property, income, and potential income among other things, as a result of restoration activities. In some cases, the threat of stakeholder loss has resulted in controversies or even barriers to restoration work.

## Definition

Ecosystem restoration is a process or activity that initiates the recovery of an ecosystem with respect to its health, integrity, and sustainability.<sup>1</sup> Ecosystem restoration implies the recognition of impairment or disturbance to an ecosystem to the extent that remediation is necessary. In most cases, ecosystems that require restoration have been degraded, destroyed, or transformed directly or indirectly by human activities. For example, an ecosystem can deteriorate from polluted waterways, endangered species, transformed landscapes (e.g., forests to agricultural fields), and human development (e.g., urban areas, roads, or housing).

Ecosystem restoration attempts to reverse the deterioration of an ecosystem, and to some extent, return it towards its “pre-disturbed” or Pre-Columbian state.<sup>2</sup> Ecosystem restoration does not necessarily mean the restoration of an ecosystem to its original state. Rather, ecosystem restoration means human management that allows desirable uses without the negative impacts being incurred under the pre-restoration regime. Once an ecosystem is recovering under a desired trajectory, human management is important. Management may be required to counteract invasive species, the impact of human activities, climate change, and other unforeseeable events.

One primary unknown of ecological restoration is the actual process of how to do it. Studying and monitoring current restoration initiatives and recording the lessons from these initiatives can provide insights for restoration. Policy makers creating or changing ecosystem restoration legislation may benefit from an understanding of the positive and negative aspects of previous

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<sup>1</sup> Society for Ecological Restoration Science and Policy Working Group, *The SER Primer on Ecological Restoration*, 2002, 9p.

<sup>2</sup> Preceding the time before the discovery of America by Columbus (i.e., before the development of European settlements in the Americas).

ecosystem restoration projects. In this paper, key policy components of the ecosystem restoration effort in the South Florida ecosystem, which includes the Everglades, are examined to provide potential lessons for other ecosystem restoration efforts.

## **Government Role**

Ecosystem restoration efforts pose several challenges for governance. In most cases, large-scale ecosystem restoration initiatives cross political boundaries, communities, and agency jurisdictions. Generally several stakeholders, ranging from environmentalists to users to government agencies, have an interest in restoration and its benefits. Restoration efforts can result in changes to farming practices and urban development; alterations in water supplies and access to other natural resources (e.g., minerals and timber); and laws that create programs to mitigate environmental damage and improve infrastructure. Because of the diverse interest in restoration, past restoration efforts have often been fragmented in dealing with specific problems or consequences of ecosystem degradation, instead of working on the root causes affecting the entire ecosystem. The federal government has a special role in coordinating multi-jurisdictional ecosystem restoration efforts in large part because of its involvement in altering natural systems (e.g., flood control in the Everglades and water transfers to the Central Valley in California). The federal government also must respond to legal obligations under laws that protect endangered species, and water quality. Additionally, it has the capacity to create multi-agency task forces, employ the expertise of multiple federal agencies (e.g., Fish and Wildlife Service with respect to endangered species or the U.S. Army Corps of Engineers for construction), and provide funds for restoration projects.

Congress plays a key role in large-scale ecosystem restoration efforts. Congress is generally responsible for authorizing federal agency involvement in restoration efforts and establishing guidelines for managing and implementing restoration projects. In some cases, such as in the Everglades, Congress has a role in authorizing individual restoration projects and their guidelines for implementation and management. Ecosystem restoration efforts are generally based on improving or rehabilitating one or more ecosystem services (e.g., water supply or habitat recovery for plant and animal populations). Congress can create guidelines for allocating ecosystem services (e.g., regulating water supplies for farmers and the environment), or in some cases, Congress may ensure the delivery of ecosystem services through legislative provisions (e.g., water supply assurances for farmers). Lastly, Congress is responsible for authorizing and appropriating federal funds for ecosystem restoration.

## **Ecosystem Restoration Efforts in South Florida**

After nearly 40 years of individual environmental restoration projects in South Florida, the federal government along with state, local, and tribal entities has begun a collaborative effort to restore the entire South Florida ecosystem. The Comprehensive Everglades Restoration Plan (CERP), authorized in the Water Resources Development Act of 2000 (WRDA 2000); (P.L. 106-541), was a major step toward coordinated, multi-agency ecosystem restoration. Title VI of WRDA 2000 outlines the coordination among various stakeholders involved in the restoration process, identifies funding responsibilities, and authorizes the creation of programmatic regulations, which will detail the implementation process of restoration projects. Title VI of WRDA 2000 also contains several policy functions intended to facilitate inter-agency coordination, satisfy stakeholder demands, and ensure the goal of ecosystem restoration. In some

cases these policy functions are complex and have potential drawbacks, yet in other cases, these functions have potential benefits and could be used as policy models for other ecosystem restoration projects.

The restoration of the Everglades represents a recent effort to deal with the myriad of issues related to ecosystem restoration. Described as the largest environmental project in American history, the restoration effort in the South Florida ecosystem is expected to cost more than \$14 billion and last 30 years. Restoration efforts in South Florida have several attributes similar to restoration elsewhere: multiple stakeholders are involved, including the federal, state, and local governments; water supply and distribution is a central issue; the effort is considered a solution to standing controversies or legal obligations; and environmental restoration is promoted as the main goal. Experiences in restoration efforts in South Florida might be viewed as a “test case” for future restoration projects. Indeed, an examination of what has been effective and what has been less effective in restoration efforts in South Florida may give insights on how to proceed in the successful development of other ecosystem restoration projects.

## **Factors Threatening the Florida Everglades**

Like many wetlands in the United States, the wetlands of South Florida, including the Everglades have been altered by the growing demand for urban and agricultural water, the encroachment of development into sensitive areas, attempts to control flooding by state and federal governments, and invasion of non-native species.

The South Florida ecosystem supports six million people, a huge tourism industry, a large agricultural economy, and a wide array of unique flora and fauna. The South Florida ecosystem covers 18,000 square miles and consists of a network of sub-tropical wetland landscapes, which once stretched from Orlando to Florida Bay, approximately 200 miles (see **Figure 1**).<sup>3</sup> It is also home to the Everglades, which are regarded as one of the world’s most valuable and unique wetlands.<sup>4</sup> The Everglades are located in the southern portion of the South Florida ecosystem that consists of disjointed freshwater marshes between the southern tip of Lake Okeechobee and the Florida Bay.<sup>5</sup>

An important ecological process in the South Florida ecosystem is the movement of freshwater from Lake Okeechobee south to the Florida Bay in a moving “sheet” that replenishes marshlands and swamps. This shallow sheet of water moved across the Everglades a few inches per second and in addition to rainfall was responsible for recharging the Biscayne Aquifer and nourishing plant and animal life.<sup>6</sup> Human development and manipulation of water flows have disrupted the natural flow of this sheet of water.

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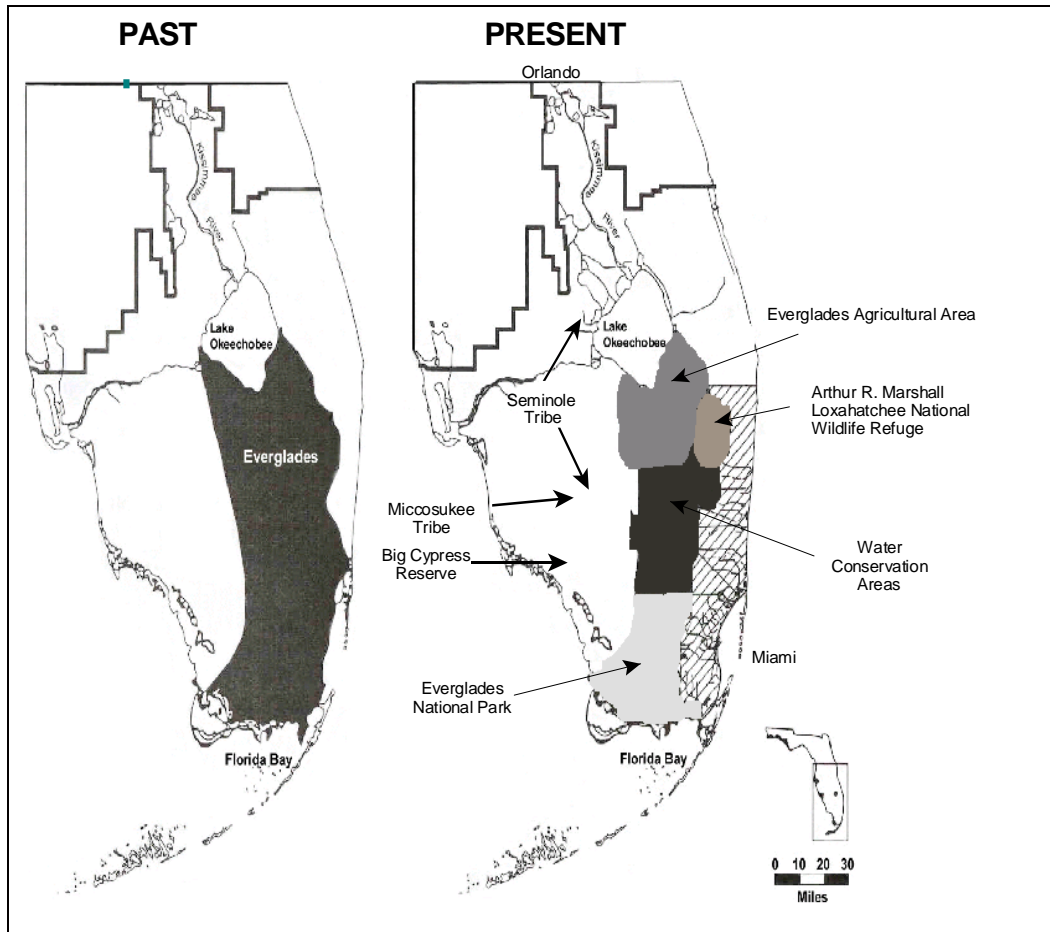
<sup>3</sup> The South Florida ecosystem is estimated to be 50% of its original size today.

<sup>4</sup> Everglades National Park was accepted for designation as a World Heritage Site, an International Biosphere Reserve, and a Wetland of International Significance.

<sup>5</sup> The Everglades ecosystem includes Everglades National Park as well as many other areas in South Florida that are low elevation, partially flooded wetlands.

<sup>6</sup> The U.S. Environmental Protection Agency has designated the Biscayne Aquifer, which provides fresh water to over 3.5 million people, as a sole source aquifer. A sole source aquifer is the principal source of drinking water for a community (§1424e of the Safe Drinking Water Act, P.L. 93-523, 42 U.S.C. 300h-3).

Figure 1. The South Florida Ecosystem—Past and Present



Source: Adapted from a map created by the South Florida Ecosystem Task Force

Partly in response to flooding and the need for agricultural lands, the U.S. Army Corps of Engineers (Corps) was asked by Congress to divert water in the Everglades. Specifically, water flow in the Everglades was altered to control flooding, to open land for agriculture, and to provide water supplies for urban areas. The cornerstone of this effort was the Flood Control Project Act of 1948.<sup>7</sup> This project initiated several years of construction by the Corps and the Central and Southern Florida Flood Control District to create nearly 1000 miles of canals, 720 miles of levees, and over 200 water control structures (e.g., dikes, dams and pumping stations).<sup>8</sup> In addition, nearly 700,000 acres of land were drained and designated for agricultural use in what is now called the Everglades Agricultural Area (EAA). Another 900,000 acres were used to construct five Water Conservation Areas (WCAs), which were designed to recharge well fields, prevent flooding and provide habitat for plant and animal life.<sup>9</sup>

<sup>7</sup> The Act of June 30, 1948 (ch. 771. 62 Stat. 1171) authorized the first phase of the plan; corresponding legislation was subsequently passed by the State of Florida (Florida Statute Chapter 378, 1949).

<sup>8</sup> The Central and Southern Florida Flood Control District was replaced by the South Florida Water Management District, which is under supervision of the Florida Department of Environmental Protection.

<sup>9</sup> Water Conservation Areas are shallow reservoirs of water that filter agricultural waters from the EAA before they head to urban areas or Everglades National Park.



The man-made water distribution system created in South Florida led to environmental degradation. This system reduced water flow to the Everglades by nearly two-thirds by channelizing water to agricultural and urban areas, and the Atlantic Ocean. The alteration of water flow to the Everglades is widely believed to have degraded the environment. For example, studies have shown that the wading bird population has declined by 90% since alterations to the South Florida ecosystem were implemented. Further, there are more than 69 species in South Florida, including the loggerhead turtle, Florida panther, and wood stork, which are listed as endangered or threatened species under the federal Endangered Species Act (16 U.S.C. 1531-1543; P.L. 93-205, as amended). The Everglades also suffer from mercury contamination, invasive plants, and high levels of phosphorous.

## **Restoration Efforts**

Restoration activities in South Florida progressed from a series of individual activities by various state and federal agencies to a coordinated multi-stakeholder effort in the late 1990s.<sup>10</sup>

Restoration efforts in the South Florida ecosystem were initiated by state and federal programs before the authorization of CERP in WRDA 2000. For example, Florida passed laws that authorized the clean-up of its bays, estuaries, lakes and rivers, and authorized the protection of certain wetlands in the public interest.<sup>11</sup> Restoration projects that involved construction and regulation of hydrology in the South Florida ecosystem began in 1992 with a partnership between the state and the Corps to restore natural water flow through the Kissimmee River and its floodplain. Later, in 1994, the state authorized other construction and regulation projects to restore portions of the South Florida ecosystem.

Federal involvement in restoring the South Florida ecosystem originated with projects aimed at restoring specific waterways or wetlands. One impetus for federal involvement began in 1989 when the federal government sued the State of Florida for not enforcing state water quality standards for agricultural run-off entering Everglades National Park. This lawsuit resulted in a pledge that created a federal and state partnership with local agriculture to improve water quality, increase water quantity, and construct artificial wetlands to filter pollutants from agricultural run-off. It also led to an understanding that improving water quality in the Everglades was an ecosystem problem that crossed property boundaries and required the cooperation of various stakeholders. To coordinate this effort to restore water quality in South Florida, a commission (termed the Working Group) consisting of representatives from various federal and state agencies was created.<sup>12</sup>

The Water Resources Development Act of 1996 (WRDA 1996; P.L. 104-303; 33 U.S.C. 2201-2330) changed the Working Group into a task force by expanding its membership to include state,

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<sup>10</sup> A similar evolution led to the creation of the CALFED Bay-Delta Program, and to a lesser extent the Chesapeake Bay restoration effort, at roughly the same time.

<sup>11</sup> The Florida Warren Henderson Act of 1984 authorized the protection of state wetlands, and the Florida Surface Water Improvement and Management Act of 1987 authorized the creation of plans to clean state estuaries, bays, lakes and rivers.

<sup>12</sup> The Working Group was initiated by the Secretary of the Interior to coordinate restoration efforts in the Everglades that were expected to modify the effects of engineering projects that had diverted water from the Everglades and to reduce agricultural pollutants in water entering the Everglades.

local and tribal representatives.<sup>13</sup> WRDA 1996 also initiated further federal involvement in restoration of the South Florida ecosystem by directing the Corps to develop a comprehensive plan (known as the Restudy) for restoring, protecting, and preserving the South Florida ecosystem. The choice to involve the Corps in restoration efforts stemmed from the realization that restoration problems in South Florida had hydrological solutions. Since the Corps was responsible for constructing and operating the existing water distribution and supply infrastructure and had expertise in hydrological projects, it was deemed the best agency to lead the restoration process.

The Restudy represented the first attempt to address environmental restoration in South Florida in a multi-agency, ecosystem-level framework. Congress authorized the implementation of a portion of the Restudy in Title VI of WRDA 2000. This portion was entitled the Comprehensive Everglades Restoration Plan (CERP)<sup>14</sup> and focused on restoring the natural hydrological functions and water quality, while maintaining water supplies for natural, agricultural, and urban needs.<sup>15</sup> CERP contains 68 components that are expected to be implemented over a 35-year span. CERP seeks to vastly increase the storage capacity and water supply for the natural system, as well as for agricultural and urban needs. Increased water flow to natural areas as a result of CERP is also expected to improve the environment by restoring and increasing habitat for native flora and fauna.

## **Parties Involved in the Restoration Effort**

One of the advancements in restoration planning and implementation is the understanding that all stakeholders (e.g., environmentalists; farmers) must be involved and committed to sustain restoration efforts. Stakeholder involvement creates the possibility for consensus, facilitates coordination, and provides an arena for discussion and interaction among stakeholders with different interests. Several stakeholders are involved in the restoration effort in South Florida, including environmentalists, agriculturalists, and federal, state, tribal and local governments. Most stakeholders have expressed their desire to restore the South Florida ecosystem, but differ on their views of who should pay for restoration, the priorities of project implementation, water allocation assurances, and the balance of water supply for natural and human needs.

## **Federal Government**

In restoration initiatives, the federal government can play a role in establishing a framework for governance, providing partial or full funding, and coordinating stakeholder participation through advisory committees. The federal government is often a partner in ecosystem restoration activities because of the numerous federal agencies with jurisdiction in areas of fish and wildlife, water allocation and construction, and federal lands. Further, if federal laws are applicable within an ecosystem (e.g., endangered species and water quality), the federal government and certain

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<sup>13</sup> The South Florida Ecosystem Restoration Task Force has 14 members, one each from the Department of the Interior, Department of Justice, Department of Transportation, Environmental Protection Agency, Department of Agriculture, US Army Corps of Engineers, National Oceanic and Atmospheric Administration, Office of the Governor of Florida, South Florida Water Management District, Florida Department of Environmental Protection, Seminole Tribe, Miccosukee Tribe, and governments of two Florida cities.

<sup>14</sup> For a detailed summary and pending issues regarding CERP, see CRS Report RS20702, *South Florida Ecosystem Restoration and the Comprehensive Everglades Restoration Plan*, by (name redacted) and (name redacted).

<sup>15</sup> See **Appendix** for a summary of federal legislation related to the restoration efforts.

agencies usually become involved. The federal role in the Everglades restoration effort is defined in CERP as restoring and preserving the South Florida ecosystem without sacrificing existing ecosystem services (e.g., water supplies) to agricultural and urban areas. The federal government is also responsible for providing 50% of the funding for restoration activities authorized by CERP. Congress, the Corps, and certain agencies within the Department of the Interior (DOI), such as the National Park Service (NPS) and Fish and Wildlife Service (FWS), have significant roles in the restoration effort that are discussed below.

### *Congress*

Congress is responsible for authorizing the implementation, major changes, and federal portion of funding for all restoration projects outlined in CERP. Congress, through WRDA 2000, has also established guidelines for project implementation and operation, coordination among agencies, and the relationship between federal and state authorities. Congress oversees CERP's progress toward achieving its restoration goals and monitors its adherence to legislation and policies. Congressional oversight is conducted through reviewing program reports, appropriating funds, and authorizing actions through legislation. Congress also authorizes restoration activities in the South Florida ecosystem outside of CERP. For example, the Everglades National Park Protection and Expansion Act of 1989 (P.L. 101-229) authorizes the Corps to improve water deliveries to Everglades National Park (ENP), and the Water Resources Development Act of 1992 (WRDA 1992; P.L. 102-580) authorizes the restoration of the Kissimmee River and its floodplain.

### *Federal Agencies*

The Corps and their non-federal sponsors are responsible for the planning and construction of restoration projects, which are expected to be done in consultation with other federal, state, local and tribal agencies. The Corps is also responsible for submitting and reviewing restoration project designs and plans, creating programmatic regulations that will detail project implementation, and monitoring restoration activities. DOI and its agencies have several responsibilities supporting interagency science efforts to implement CERP. DOI is expected to consult with the Corps during the development of the programmatic regulations (guidelines for project implementation); assist in monitoring, reviewing, and gauging the progress of restoration projects; and assist with the preparation of annual reports on the progress of CERP.<sup>16</sup> Other federal agencies involved in restoration efforts come from within the DOI (i.e., the FWS and NPS), Department of Agriculture, and the Department of Commerce. These agencies generally conduct restoration projects that are not authorized by CERP, yet contribute toward restoration in the South Florida ecosystem. Some of these agencies are responsible for acquiring land, conducting studies to evaluate individual components of the South Florida ecosystem (e.g., invasive plants, water quality, or endangered species), and providing input in implementation and planning decisions that involve CERP projects. (See **Table 1** for a description of agency tasks and funding history.)

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<sup>16</sup> There are several provisions within CERP that require the concurrence of the Secretary of the Interior and the Governor of Florida. They include the format and content of Programmatic Implementation Reports (PIRs), instructions for evaluating PIRs, guidance for system-wide evaluation of PIR alternatives, content of operating manuals for restoration projects, directions for monitoring activities, and instructions guiding the appropriate quantity, timing, and distribution of water for the natural system. From U.S. Senate, Committee on Environment and Public Works. *Oversight Hearing on Everglades Restoration Plan*, 107<sup>th</sup> Cong., 2<sup>nd</sup> Sess., September 13, 2002.

## **State Government**

State government and state agencies are generally involved in the operation and construction of restoration projects, and provide funds for restoration activities. States consider the economic impacts of restoration in terms of appropriations and development. These concerns are generally reflected in state legislation that promote restoration activities. State governments also aim to increase public awareness of restoration efforts.

Florida seeks to restore the South Florida ecosystem, while maintaining water supplies and flood control for existing and future human and agricultural needs.<sup>17</sup> The primary non-federal sponsor of the restoration effort for Florida is the South Florida Water Management District (SFWMD). SFWMD is one of five water management districts that have control over regional water allocation, supply, and quality. This level of authority over water supplies is high compared to water districts in most states, and may be one of the reasons why SFWMD was selected as the primary non-federal partner in restoration efforts. Under CERP, and with agreements made with the Corps, the SFWMD is expected to maintain its role of reserving and allocating water to natural, agricultural, and urban areas. SFWMD is also expected to assist in the implementation, construction, management, and monitoring of restoration projects. Further, SFWMD seeks to acquire land for restoration projects, as well as to assist in overseeing modifications to CERP (§601(e)(2)(A) of CERP).

Apart from the SFWMD, Florida has several other responsibilities under CERP. Florida is expected to provide half of the funding for restoration efforts under CERP as well as guarantee the allocation of water supplies (for each project and the entire restoration effort) and water quality standards under state laws. State representatives participate on several committees that analyze restoration policies, and state agencies are involved in scientific studies on restoration activities. The Governor of Florida, as provided by CERP, is expected to concur or assist on programmatic regulations related to project implementation, progress reports on CERP, and the development of dispute resolution mechanisms.<sup>18</sup>

## **Tribal Government**

Tribal lands are sometimes located in areas that are undergoing restoration efforts, such as in the South Florida ecosystem and the California Bay-Delta. Tribes are considered sovereign entities and generally have federal compacts or treaties defining water rights.<sup>19</sup> The Seminole and Miccosukee Indian tribes have reservations located within the South Florida ecosystem. Both tribes raise crops and livestock on their land and depend on flood protection for their well-being. The Miccosukee tribe supports the restoration effort in the Everglades, yet believes that the restoration process has been slow and should concentrate on improving water quality and interagency cooperation, and in taking a system-wide approach. Furthermore, some representatives from the Miccosukee tribe have emphasized that equal priority should be given to federal and tribal lands for restoration activities, and that flood protection should be extended to all inhabited lands.<sup>20</sup> The Seminole tribe also supports restoration efforts, emphasizing that

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<sup>17</sup> Michael Grunwald, "A Rescue Plan, Bold and Uncertain," *The Washington Post*, June 24, 2002, Section A, page 01.

<sup>18</sup> *Supra*, note 14.

<sup>19</sup> For example, in the Klamath Basin of Oregon, the Klamath and Yurok tribes have treaties that give them certain fishing and water rights in the Basin, which take precedence over any other water rights in the Basin.

<sup>20</sup> U.S. Senate, Committee on Environment and Public Works. *Oversight Hearing on Everglades Restoration Plan*, (continued...)

agricultural, human, and natural water needs should receive equal priority, and that the decision-making authority for water allocation should emphasize local participation.<sup>21</sup> In 2000, the Corps signed a contract with the Seminole Tribe of Florida to construct the Big Cypress Reservation Water Conservation Plan. This restoration project, which is part of CERP, is expected to improve water quality by reducing phosphorous in water that leaves the reservation, provide water for cattle and farming, and restore historic cypress slough systems, which are part of the tribal culture.

## **Environmentalists/Non-Governmental Organizations**

Non-governmental organizations (NGOs) can assist restoration efforts, but might oppose efforts if they are seen as inadequate or inappropriate. NGOs participate in the development of restoration plans, contribute insight into the local environmental conditions, suggest solutions to diverse issues such as the governance of restoration activities and science behind restoration projects, and uncover potential economic, social, and ecological impacts of restoration activities. NGOs are generally the primary representative for environmental concerns in ecosystem restoration activities. In recent years, NGOs have become active partners in the implementation and monitoring of restoration efforts. For example, the Chesapeake Bay Foundation monitors a set of ecological indicators measuring factors such as toxic chemicals, fisheries, and nutrients in the Chesapeake Bay and publishes their results annually.<sup>22</sup> The trends in these indicators and their reporting increase public and congressional awareness of the progress of restoration efforts in the Chesapeake Bay.

Most NGOs support the restoration of the South Florida ecosystem and argue that ecological restoration should have priority over flood protection and water supplies. One group of NGOs, collectively known as the Everglades Coalition,<sup>23</sup> advocates the restoration of the natural system as the first priority before supplying additional water to agricultural and urban uses. Further, they argue that the state of Florida should not have complete authority over land-use decisions in areas targeted for restoration, and should not determine water allocation only within state laws. Other environmental NGOs, such as the 1,000 Friends of Florida, have argued for the creation of quantitative assurances for water allocation to natural areas, and interim goals to gauge the success of restoration projects. Despite legislation and agreements stating that re-diverted water from CERP will go to natural areas first, some environmentalists (represented by NGOs) believe that CERP is primarily a water supply project and not a tool for ecological restoration. Indeed, some argue, CERP neglects to address the human activities that have harmed and continue to harm the Everglades.

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(...continued)

107<sup>th</sup> Cong., 2<sup>nd</sup> Sess., September 13, 2002.

<sup>21</sup> Views from the Miccosukee and Seminole tribes were taken from U.S. Senate, Committee on Environment and Public Works, *The Comprehensive Everglades Restoration Plan Proposed by the State of Florida, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers: Hearing before the Subcommittee on Transportation and Infrastructure*, 106<sup>th</sup> Cong., 2<sup>nd</sup> Sess., January 7, 2000, Rept. 106-729.

<sup>22</sup> "State of the Bay," Chesapeake Bay Foundation, 2002.

<sup>23</sup> The Everglades Coalition consists of 41 environmental groups such as the Sierra Club and National Wildlife Federation.

## **Agriculture**

Agriculture usually has significant economic importance and high water demands in rural areas where restoration activities can take place. Agriculture benefits from ecosystem services that provide water supplies and healthy soils. However, agriculture may contribute to ecosystem degradation by converting natural habitats to agricultural fields and by contaminating water supplies with fertilizers and pesticides as well as sediments. In recent years, farmers and ranchers have generally responded to ecosystem restoration efforts by incorporating Best Management Practices (BMPs) and using technologically improved crops that require less fertilizer or pesticides.

The dominant agricultural activities in the Everglades are sugarcane production, livestock ranching, and vegetable farming. Sugarcane production, considered the largest agricultural commodity (in terms of value) in the Everglades,<sup>24</sup> requires an abundant water supply and fertile soils. Most farmers and ranchers support CERP, and generally want assurances that existing water supplies and flood protection will not be lowered in agricultural fields in favor of water to natural areas. They believe that restoration efforts should give equal priority to the natural, agricultural, and urban water needs.<sup>25</sup> Some agriculturalists also want certainty in water allocation amounts and would like targets established for future water needs.<sup>26</sup> According to some farmers, if water deliveries fluctuate annually, obtaining credit for farm operations may become difficult, and the uncertainty of future crop production and personal income may increase.<sup>27</sup> To support restoration activities, farmers and ranchers in South Florida have begun to adopt BMPs to reduce phosphorous and pesticides into water supplies. These practices are employed voluntarily and have been developed by researchers to reduce the environmental impact of agriculture, while not threatening the viability of the industry.

## **Municipal Water Suppliers and Local Government**

Urban areas, represented by municipal water suppliers and local governments, require significant water supplies. Local governments are thought to have three primary roles in ecosystem restoration efforts that are in the vicinity of the cities they serve. Local governments are generally responsible for informing the public of restoration activities, and their effect on local water supply and land-use activities (e.g., agriculture). Some local governments often form, and have representatives sitting on, planning boards, task forces and commissions. And local governments, which are often the municipal water suppliers, are generally concerned with meeting current and future water demands in their region.

Local governments in South Florida represent a variety of stakeholders in the restoration effort in the South Florida ecosystem. Most local governments and municipal water suppliers in southern

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<sup>24</sup> Sugarcane production contributes two-thirds of the economic productivity of Everglades agriculture, and uses nearly 80% of the crop land in the Everglades.

<sup>25</sup> U.S. Senate, Committee on Environment and Public Works, *Oversight Hearing on Everglades Restoration Plan*, 107<sup>th</sup> Cong., 2<sup>nd</sup> Sess., September 13, 2002.

<sup>26</sup> *Ibid.*

<sup>27</sup> U.S. Senate, Committee on Environment and Public Works, *The Comprehensive Everglades Restoration Plan Proposed by the State of Florida, the U.S. Environmental Protection Agency, and the U.S. Army Corps of Engineers: Hearing before the Subcommittee on Transportation and Infrastructure*, 106<sup>th</sup> Cong., 2<sup>nd</sup> Sess., January 7, 2000, Rept. 106-729.

Florida seek assurances for water supplies to satisfy existing and future water needs. They emphasize that CERP should be implemented in a “balanced” manner that incorporates the considerations of natural, agricultural, and urban needs. In addition, water suppliers and local governments seek flexibility in implementing CERP so that water supply decisions can reflect the expected growth of urban water demands in South Florida.<sup>28</sup> For example, one county water management agency expressed that interim goals and quantitative water allocation levels should not be in the programmatic regulations because it will restrict the flexibility of CERP to change with different water needs.<sup>29</sup>

## **Components of Restoration Policy In CERP**

CERP is an example from which lessons on conducting ecosystem restoration can be drawn. CERP has completed early stages of planning and coordination, and presently has some projects being implemented. CERP is a widely supported restoration plan for a complex ecosystem and regional economies that contains many stakeholders with differing views and needs. Lastly, CERP is an example of a restoration effort that attempts to be adaptive. Flexibility in the project implementation and operations of CERP have been identified as successful attributes for restoration.

Several components and conceptual ideas in CERP may be useful for other large-scale ecosystem restoration projects. They include coordination of restoration efforts, implementation and operation of restoration projects, monitoring and adaptive management, assurances and allocation of ecosystem services (e.g., water supplies), and strategies for funding.<sup>30</sup> The section below summarizes these components as they are being used in the restoration effort in South Florida and lists the potential benefits and disadvantages of each one.

### **Coordination**

Individual state and federal agencies have been working for decades in South Florida to restore parts of the South Florida ecosystem. Restoration of the ecosystem progressed slowly, in part, because restoration projects focused on specific problems in localized areas. In some cases, agencies have disagreed on how to operate and implement restoration activities, and overlapping efforts became apparent. In an effort to reduce conflicts and foster inter-agency dialogue, the South Florida Ecosystem Restoration Task Force (SFERTF) was created in 1993 by the Secretary of the Interior. The purpose of SFERTF is to coordinate strategies, policies, and plans for restoration efforts in South Florida. This task force was formalized into law by WRDA 1996 and includes representatives from 12 federal agencies, the State of Florida, the Miccosukee and Seminole tribes, the South Florida Water Management District, and local governments. The task force resolves conflicts among stakeholders, tracks and assesses restoration projects, and fosters public participation.

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<sup>28</sup> The current population of South Florida is approximately 6 million people and is expected to double by 2050.

<sup>29</sup> Letter to Stu Appelbaum, U.S. Army Corps of Engineers, in response to the proposed programmatic regulations. Sent by the Broward County Public Works Department, September 30, 2002.

<sup>30</sup> For a review of legislative attributes needed for ecosystem restoration, Cynthia Koehler, *Putting it Back Together: Making Ecosystem Restoration Work*, (San Francisco, CA: Save the San Francisco Bay Association, June 2001), 68p.

The Task Force is assisted by various committees that have specific functions in the restoration effort. (See **Table 1**.) Some committees focus on stakeholder coordination, management, and policy, and others focus on the science and the impacts of restoration activities. The Task Force and the Working Group (a sub-committee of the Task Force) oversee these committees, and in some cases committees oversee issue teams or sub-groups of their own creation. (See **Figure 2**.) As authorized by §520(f) of WRDA 1996, these committees are exempt from the Federal Advisory Committee Act (FACA) (P.L. 92-463; 5 U.S.C. Appendix),<sup>31</sup> and have members appointed by federal, state, tribal, local and private stakeholders. Sub-committees to SFERTF are either temporarily or permanently created by the Working Group, and generally have specific tasks to complete or certain issues to establish a position on. For example, the Water Resources Advisory Commission was created to formulate and debate water allocation issues related to restoration efforts derived from CERP. It contains members from all stakeholder interests and recently was involved in providing stakeholder comments to the programmatic regulations.

The State of Florida also has commissions and committees that are devoted to discussing and debating restoration issues. The Governor's Commission was created in 1994 to work in conjunction with the Task Force in developing restoration plans that protected and fostered the environment and economy of South Florida. The commission contains a variety of regional stakeholders ranging from state and local officials to private entrepreneurs and farmers, and generally is concerned with how restoration efforts are going to affect the resources and economy of the state.

Committees working with SFERTF are expected to reach consensus on issues and decisions. If disputes occur, the Task Force is responsible for resolving them until a new resolution is adopted. To resolve a dispute, the Task Force provides a forum for disputes, identifies stakeholder concerns, and analyzes relevant information for solutions. Disputes that are not resolved by the Task Force are expected to be settled by litigation. If disputes occur between the Corps and the state of Florida, a specific dispute resolution is to be used. Section 601(i) of WRDA sets out the process for the creation of this resolution. The dispute resolution is expected to be used for disputes between the Corps and the SFWMD, as well as provide a mechanism for the SFWMD to initiate a dispute, appropriate time frames for resolution, and a limit of 180 days for the final resolution of a dispute from the date it was started. A dispute resolution agreement has recently been signed by the Corps and the SFWMD, however it is unclear if it being used.

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<sup>31</sup> The Federal Advisory Committee Act authorizes the use of advisory committees consisting of federal and non-federal participants to provide suggestions to federal departments and agencies. All records of meetings are required to be made available to the public, and advance notice of meetings is required in the *Federal Register*.

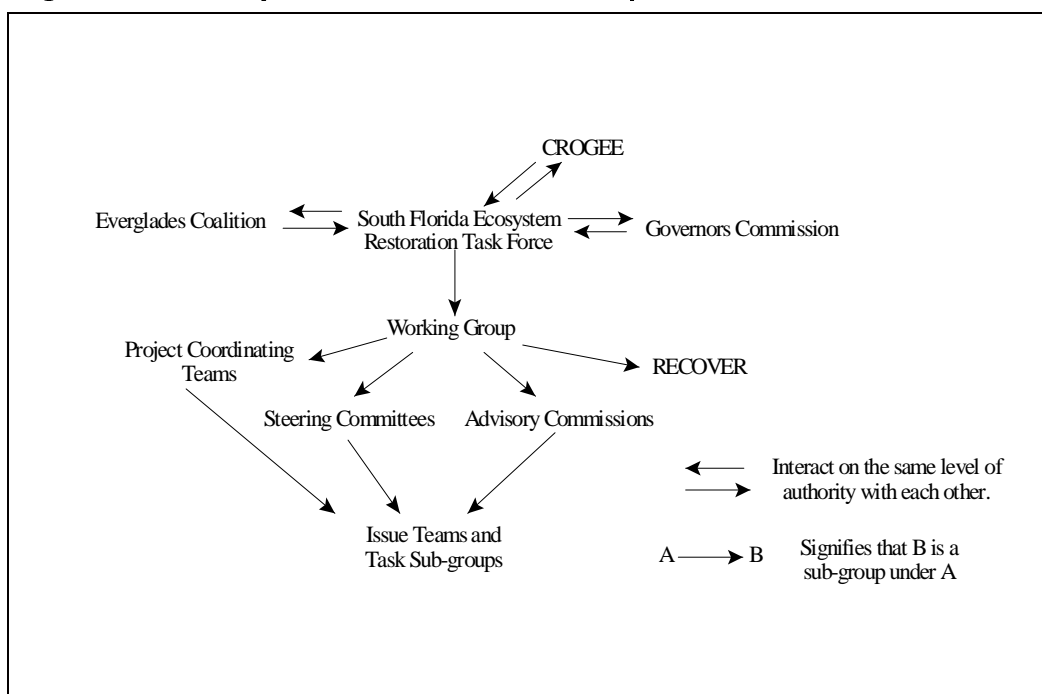


**Table I. Organizations and Committees Formed to Coordinate Restoration Activities in the South Florida Ecosystem**

<b>Restoration Committees— Stakeholder Coordination, Management and Policy</b>	<b>Function</b>
South Florida Ecosystem Restoration Task Force	Coordinates the development of policies, strategies, plans, programs, and priorities of restoration efforts in the South Florida ecosystem.
Working Group	Partners with other committees to facilitate consensus among stakeholders, and coordinate expert resources to work on a variety of issues related to the science, policy and economics of restoration activities.
Governors Commission	Develops restoration plans and promotes policies that protect the economy and environment of Florida. Members are appointed by and report to the Governor of Florida.
<b>Restoration Committees—Science and Monitoring</b>	
Advisory Commissions	Groups consisting of federal and non-federal stakeholders that monitor, examine the impacts, and advise activities regarding an issue (e.g., water resources issues).
Task sub-groups	Groups with specialized members who may analyze current or potential impacts of the restoration effort (e.g., a science sub-group may work with bio-indicators).
Restoration, Coordination, and Verification Team (RECOVER)	Monitors projects and assesses whether the goals and purpose of Plan are being achieved. Provides recommendations for improving the Plan. Serves as the primary tool for adaptive assessment.
Committee on the Restoration of the Greater Everglades Ecosystem (CROGEE)	An independent scientific review group created with the assistance of the National Academy of Sciences.
Everglades Coalition	A group of non-profit environmental organizations that have combined their efforts to promote restoring the environment as the top priority for CERP.
<b>Restoration Committees—Specific Tasks or Projects</b>	
Steering committees	Steering committees are formed for specific tasks that may include working with management, coordination, public information, education, social science, or scientific aspects of the Plan.
Project coordinating teams	A project coordinating team is assigned to one of seven sub-regions in Florida and operates as the local coordinating group on all aspects of the restoration effort.
Issue teams	These are temporary groups that work on a specific issue in the restoration process. Once the issue is resolved the team is disbanded.

**Source:** Congressional Research Service.

**Figure 2. Hierarchy of Committees and Groups Associated with the SFERTF**



Source: Congressional Research Service.

### Summary of Potential Benefits

- Committees expand the ability of the Task Force to focus on specific activities and tasks by decentralizing forces and authority.
- Committees generally have representatives from a variety of involved stakeholders. Therefore, when a committee meets, a forum is created where potentially conflicting ideas and views can be discussed and resolved with consensus among stakeholders.
- Because of their interactions in groups, state and federal agencies involved in restoration activities may avoid project overlap and combine their expertise to deal with the diverse issues facing the restoration effort that no one agency may be equipped to deal with.

### Summary of Potential Disadvantages

- Decision-making on restoration issues may get delayed in committees if a consensus cannot be reached. Indeed, the requirement for consensus may prevent controversial decisions from being made.
- The number of groups involved in the decision-making structure illustrate that coordination of the restoration effort is complex and confusing.
- The authority of the Task Force is limited since it cannot reprimand or penalize an agency or committee for not fulfilling its restoration tasks.

- Stakeholders with the greatest resources available for participation in committees can dominate the process and decision-making in committees.

## **Project Implementation**

In some ecosystem restoration efforts, implementation of restoration projects has been delayed or prevented, in part, by limited institutional ownership (i.e., no single entity was specifically required to either prepare or implement restoration plans), limited commitment by stakeholders and local governments, and lack of funding.<sup>32</sup> To avoid these problems and others, programmatic regulations detailing project implementation strategies have been developed for CERP.

Programmatic regulations provide details on construction plans, timetables for implementation, and operating procedures. Programmatic regulations may be viewed as a mechanism to formalize agreed-upon guidelines for project implementation at the beginning of a long-term restoration effort. The content and structure of programmatic regulations, as exemplified in CERP, can be discussed and debated by involved stakeholders before a final version is implemented. Also, through the process of adaptive management, programmatic regulations are expected to remain flexible throughout the restoration effort in South Florida.

The responsibility for implementing CERP lies primarily with the Corps and the SFWMD. The programmatic regulations that accompany CERP establish guidelines for project implementation and may facilitate achieving the purpose and goals of CERP. A draft of the programmatic regulations was released in December 2001 for public comment, and a proposed version (revised from the draft) was published in the Federal Register, August 2, 2002.<sup>33</sup> The final version is expected in December 2002. The final version of the programmatic regulations must have the concurrence of the Secretary of the Interior and the Governor of Florida before promulgation.

According to the proposed programmatic regulations, the process for implementing a restoration project follows a sequence that includes creating a project management plan, then a project implementation report, and lastly an operating manual and project cooperation agreement. (See “Glossary” for definitions.) At each step of the process, there are opportunities for agency and public comment, and independent scientific review.

The seminal report for each project is called the project implementation report, and it must be approved by Congress before project construction can take place. The purpose of the project implementation report is to present a detailed plan of each project, thus bridging the conceptual details of CERP with instructions for project construction and operation. WRDA 2000 states that project implementation reports must contain the following information: (1) the timing, quantity, and distribution of water for the natural system, (2) the amount of water reserved for the natural system, and (3) an analysis of the cost-effectiveness and engineering feasibility of the project.

The draft version of the programmatic regulations generated considerable controversy. Environmentalists argued that the programmatic regulations had few specific requirements and assurances for water allocation to natural areas, did not include quantitative goals for measuring

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<sup>32</sup> Cynthia Koehler, *Putting it Back Together, Making Ecosystem Restoration Work*, (San Francisco, CA: Save the San Francisco Bay Association, June 2001) 64p.

<sup>33</sup> “Programmatic Regulations for the Comprehensive Everglades Restoration Plan,” *Federal Register* 67, no. 149 (2 August 2002):50540.

success, and had no timetables for the implementation of some projects.<sup>34</sup> The proposed version addresses some of these issues. Assurances for water allocation for each project are expected to be provided through a Project Cooperation Agreement between the Corps and non-federal sponsors.<sup>35</sup> The identification of the appropriate quantity, timing, reservation, and distribution of water for the natural system is to be included in each project implementation report. To determine the amount of water each project will provide to users and the environment, “guideline memoranda” are expected to be followed. Guideline memoranda are not included in the proposed programmatic regulations and are expected to be created separately by the Corps with public and agency comment.<sup>36</sup> Despite modifications, criticisms still exist. Some environmental groups argue that interim goals and overall restoration targets should be included in the programmatic regulations.<sup>37</sup>

Other criticisms of the programmatic regulations have come from Congress. Some members have argued that the assurances for water allocation should be included in the programmatic regulations; that the DOI should have a larger role in determining the distribution of water required for ecosystem restoration; that scientific integrity in the restoration assessment process should be defined and open to public access and comment; and that interim goals should be defined in the programmatic regulations.<sup>38</sup> The proposed regulations clarify the role of the DOI in monitoring and assessing the implementation of CERP; however, on July 16, 2002 provisions allowing the DOI to share a “coequal role” with the Corps on the RECOVER team were stricken from the FY2003 Interior and Related Agencies Appropriation Act (H.R. 5093) when points of order were raised against them.

The proposed regulations establish a structure for adopting and implementing interim goals, yet do not define goals for restoration. Goals are expected to be determined by the RECOVER team by June 2003. The goals are expected to reflect the progress of CERP, and identify improvement targets in water quantity, timing, and distribution every five years beginning in 2005. Further, goals will include indicators for water quality and ecosystem conditions such as changes in wetlands, habitat quality, and animal and plant abundance. Interim goals are expected to be targets as opposed to set standards enforceable in court. Goals are expected to have the flexibility for changes through a reviewing process.<sup>39</sup>

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<sup>34</sup> Letter to Colonel Greg May, U.S. Army Corps of Engineers, from the Everglades Coalition, in response to the proposed programmatic regulations, January 3, 2002.

<sup>35</sup> Department of Defense. “Programmatic Regulations for the Comprehensive Everglades Restoration Plan; Proposed Rule.” *Federal Register*, vol. 67, no. 149 (August 2, 2002):50540—50575.

<sup>36</sup> *Ibid.*

<sup>37</sup> For a representative opinion, see a letter to the U.S. Army Corps of Engineers, in response to the proposed programmatic regulations. Sent by the Everglades Coalition, October 1, 2002.

<sup>38</sup> See letter to Secretary Gale Norton, Department of the Interior, from Joe Skeen and Norman Dicks, Chairman and Ranking member respectively, U.S. House of Representatives, Subcommittee on Interior and Related Agencies, dated March 20, 2002. And letters to the U.S. Army Corps of Engineers, in response to the proposed programmatic regulations, from Representative Peter Deutsch on September 26, 2002 and from Senators Bob Graham, Bill Nelson, Bob Smith, Jim Jeffords, and George Voinovich on September 27, 2002.

<sup>39</sup> Department of Defense. “Programmatic Regulations for the Comprehensive Everglades Restoration Plan; Proposed Rule.” *Federal Register*, vol. 67, no. 149 (August 2, 2002):5054—50575.

## **Summary of Potential Benefits**

- The proposed programmatic regulations provide greater detail to the procedures and regulations involved in implementing restoration projects than legislation.
- The proposed programmatic regulations may increase the opportunity for monitoring projects and discovering weaknesses in management plans or construction designs. They allow Congress the time and authority to check and authorize the contents of project implementation reports before a project is constructed.
- The proposed programmatic regulations strive to provide assurances that existing water supplies will be maintained for agricultural, urban, and natural needs.
- The proposed programmatic regulations attempt to create the opportunities for stakeholders to comment and view plans for the implementation and operation of restoration projects early in the restoration process.

## **Summary of Potential Disadvantages**

- The project implementation process for CERP can be viewed as a long, complex process that must undergo several stages. Indeed, the Corps expects the first five years of the restoration effort (FY2001-FY2005) to be spent predominantly on developing project implementation reports, agreements and plans.
- The complexity and multiple stages of the implementation process may delay restoration efforts. Lengthy delays could render original scientific findings and project plans irrelevant to ecological conditions when a plan is approved. For example, appropriations for some CERP projects are contingent upon the completion of a previously authorized project termed the Modified Water Deliveries Project (P.L. 101-229).<sup>40</sup> Delay in the completion of this project will delay the implementation of some CERP projects and may require their planning to be revised.
- The proposed programmatic regulations that detail the implementation process do not provide quantitative assurances for water delivery. The uncertainty of future water supplies may result in farmers not being able to plan for future crops, and scientists not being able to estimate the recovery potential for natural areas.

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<sup>40</sup> The Modified Water Deliveries Project seeks to improve water deliveries to Everglades National Park (ENP) and, to the extent possible, restore the natural hydrological conditions within ENP. To complete this project, land within the “8.5 Square Mile Area” would have to be bought from several owners and used to provide flood protection for the entire community. Some of the owners are unwilling to sell their land and have pursued legal actions to prevent the acquisition of their land. If this land is not acquired by the Corps, the Modified Water Deliveries Project as well as portions of CERP will be stalled. Legislation authorizing CERP provides that the Modified Water Deliveries Project must be completed before several CERP projects involving water flows on the east side of ENP can receive appropriations (§601(b)(2)(D)(iv) of Title IV, P.L. 106-541).

- The programmatic regulations do not hold any agency accountable for delays and do not guarantee the expeditious completion of restoration projects.

## **Monitoring and Adaptive Management**

Ecological systems are complex and understanding how they may respond to management efforts will always carry an expected level of uncertainty. For these and other reasons, ecosystem restoration generally is undertaken with a range of expected uncertainty in the restoration process (e.g., scientific uncertainty in the proficiency of some restoration projects). Specifically, restoration efforts may require the application of untested technologies, and may uncover unforeseen circumstances that may warrant a change in the initial restoration strategy. Indeed, some argue that identifying and eliminating all uncertainties involved with restoration is probably impossible. Trying to address all potential uncertainties, some argue, may delay the restoration process, consume time and money, and lead to further ecosystem degradation. Others argue that uncertainties must be reduced as much as possible with sound scientific studies before funds are devoted to restoration activities. Funds and time should not be spent on projects that are too ambitious or have a high risk of failure, according to some critics. To address uncertainty, some restoration initiatives have conducted scientific studies and pilot projects to better understand larger restoration projects. Further, policies that promote adaptive management and monitoring are being used to address uncertainty in restoration.

Adaptive management is incorporating new information from scientific studies and new or unforeseen circumstances into the plans of a restoration effort, to assure that the restoration goals are achieved most efficiently. Some believe that the built-in flexibility of adaptive management is the key to solving complex technical problems and changing restoration strategies that are not successful. Others fear adaptive management can be used to justify delays or abandon previously set goals. Adaptive management is largely untested in ecosystem restoration projects and some are concerned that policy makers do not know how to implement policies to govern adaptive management procedures.

In the restoration of the South Florida ecosystem, there is an anticipated level of uncertainty in some restoration projects and their desired outcomes.<sup>41</sup> To address this uncertainty, the Corps is planning to monitor progress and use adaptive management as warranted. CERP and individual projects within CERP are to be reviewed periodically to determine if operational and management procedures need to change. CERP authorizes a team to monitor and assess the success of project implementation and operation, and requires that the procedures for monitoring, assessing, and implementing changes to CERP be outlined in the programmatic regulations. Adaptive management is expected to be done by two groups, the Restoration, Coordination and Verification team (RECOVER) and the Committee on the Restoration of the Greater Everglades Ecosystem (CROGEE).

RECOVER is an interdisciplinary, and interagency scientific and technical team that is expected to use a system-wide perspective and the best scientific and technical information available to evaluate and implement CERP. RECOVER will be responsible for, among other things, developing system-wide performance measures for evaluating projects and goals, preparing project implementation reports, developing proposals for a monitoring plan for CERP, conducting adaptive assessment activities, considering proposed revisions to CERP, and developing interim

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<sup>41</sup> Michael Grunwald, "A Rescue Plan, Bold and Uncertain," *The Washington Post*, June 24, 2002, Section A, page 01.

goals for CERP. Every three years, RECOVER is expected to prepare a report detailing the results of adaptive assessment and suggest modifications to CERP. If CERP, or any of its components are to be changed, the Corps, in consultation with other federal, state and tribal agencies, will prepare a report detailing the changes.<sup>42</sup> If the changes to a project or to CERP are significant, Congress must authorize them. A procedure for implementing modifications to CERP is included in the proposed programmatic regulations.

RECOVER is expected to be overseen by the Corps and the SFWMD. Documents prepared by RECOVER are not self-executing and are expected to be reviewed by the Corps and SFWMD, in consultation with DOI, EPA, Seminole and Miccosukee Indian tribes, and others.<sup>43</sup> Some critics of RECOVER favor a larger role for DOI on RECOVER. They believe that the expertise that DOI has in environmental restoration would be valuable for RECOVER and that the presence of DOI on RECOVER would help to ensure that environmental restoration would remain a priority for CERP. DOI, along with the Governor of the State of Florida, has a concurring role in determining six guidance memoranda that establish guidelines for determining (1) the content and format of project implementation reports; (2) processes for developing cost effectiveness and impacts of alternatives to project implementation reports; (3) the process for evaluating project implementation reports; (4) the content of operating manuals; (5) guidelines for conducting assessment activities expected to be done by RECOVER; and (6) the process in project implementation reports for identifying the timing, quantity, and distribution of water.

The second group, CROGEE, is an independent panel of scientists organized by the National Academy of Sciences to review CERP's progress toward achieving restoration goals. CROGEE also evaluates technologies used in the restoration effort. For example, a CROGEE study evaluating the benefits and costs of the Aquifer Storage and Recovery Plan was published in 2002. CROGEE is authorized to prepare a biennial report on the assessment of ecological indicators and other measures that reflect the effectiveness of CERP (§601(j) of WRDA 2000). It is unclear if CROGEE will have the jurisdiction to freely conduct and report in-depth studies and analyses of specific components in CERP or if detailed studies will be restricted to requests made by the Task Force.

## **Summary of Potential Benefits**

- An expected high level of scientific uncertainty is a common criticism of CERP. Monitoring and adaptive management can allow agencies to learn lessons from the restoration process and projects, and incorporate them into CERP.
- The programmatic regulations are expected to provide guidelines and mechanisms for incorporating adaptive management. With these guidelines in place, the process of implementing new information and changes could reduce delays in project implementation.
- An independent panel monitoring the progress of CERP may enhance the scientific integrity of the restoration effort.

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<sup>42</sup> This report is referred to as the Comprehensive Plan Modification Report. It is to contain proper NEPA documentation and will thus be available for public comment.

<sup>43</sup> Department of Defense. "Programmatic Regulations for the Comprehensive Everglades Restoration Plan; Proposed Rule." *Federal Register*, vol. 67, no. 149 (August 2, 2002):50540—50575.

- Through adaptive management, pilot projects are expected to be created and tested to measure the potential for larger projects with high scientific uncertainty.

### **Summary of Potential Disadvantages**

- Adaptive management may allow the Corps and the SFWMD to change estimated goals of water supplies or distribution. This can increase uncertainty in water supplies for farmers and local governments who need assurances for water deliveries.
- Restoration goals may lose some value and integrity since technical uncertainties can be used to explain why restoration projects may not reach their goals.
- The responsibility for successful restoration can be diluted if adaptive management is used to explain shortcomings of restoration projects and activities.
- The promise of adaptive management can be used to justify the implementation of restoration projects with a high level of scientific uncertainty.

### **Water Allocation**

A strategy for water allocation in ecosystem restoration efforts is important when competing interests are vying for water that may be also needed to recover a degraded ecosystem. Indeed, water supply and allocation issues have been contentious in many ecosystem restoration projects in this country among stakeholders (e.g., California Bay-Delta and Klamath Basin, as well as the Everglades). Water allocation strategies seek to identify compromises between competing stakeholders, and generate commitments to a water allocation plan. Components of a water allocation strategy may include assurances for the delivery of future water supplies, or the maintenance of current water supply levels. Water assurances could be tied to rainfall and snowmelt levels from the previous year, or be based on quantitative values (e.g., 70% of water flow diverted to agricultural areas). Water assurances are important, because they can justify plans for ecological restoration, allow farmers to securely invest in cultivation or ranching, and increase the security of water supplies for urban areas.

The expected result of CERP will be to deliver sufficient water to the natural system without sacrificing the current water needs of agricultural and urban areas. CERP is expected to accomplish this by primarily capturing and storing excess freshwater currently being discharged to the ocean via canals, and using it to restore the natural hydrological functions of the South Florida ecosystem. To accomplish this, CERP must control the quantity, quality, distribution and timing of water deliveries to stakeholders. The Corps estimates that 80% of the additional water supplies (i.e., water beyond the existing needs) generated from restoration efforts will be used to benefit the natural system, and the remaining 20% will be used for agricultural and urban needs.<sup>44</sup>

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<sup>44</sup> The Secretary of the Army, "Central and Southern Florida Project Comprehensive Review Study," April 1999.



To deliver these demands for water, CERP will rely on assurances specified in WRDA 2000 and a strategy for allocating water supplies that will be specified in the programmatic regulations.<sup>45</sup>

## **Water Assurances**

Assurances for water delivery serve to meet concerns that existing water supplies and flood protection will be lowered when restoration projects are implemented. In addition, assurances seek to guarantee that newly re-allocated water from restoration projects will first be distributed to natural areas.<sup>46</sup> There are three primary policy mechanisms that attempt to provide assurances for water delivery in the Everglades. First, Title VI (§601(h)(5)) of WRDA 2000 states that existing legal sources and amounts of water cannot be depleted by CERP, unless a substitute source of water equivalent in quantity and quality is found to replace the original.<sup>47</sup> Second, an agreement that new water generated from CERP first will be allocated to the natural system for restoration purposes before being used by other consumptive uses (e.g., agriculture) was signed on January 9, 2002 by President George W. Bush and Florida Governor Jeb Bush (see §601(h)(2) for authorization of this agreement). Third, the allocation or reservation of water for the natural system is to be guaranteed under state water laws for each project (§601(h)(4)).

## **Water Allocation Strategy**

Determining the quantitative allocation of water for environmental, agricultural, and urban needs is a controversial issue in the Everglades (and many other places). Most stakeholders want to know what quantitative values of water they can expect to receive annually. Although WRDA 2000 assures stakeholders that water levels will not fall below existing levels, some stakeholders (notably farmers and municipal water utilities) are concerned that future demands for water may exceed current demands. This issue is addressed by the Corps and the SFWMD in the proposed programmatic regulations. Water made available from restoration projects will be quantified according to guidelines established by a “guideline memorandum.” The programmatic regulations provide direction for the development of guideline memoranda, yet do not provide specific formulas for determining water allocation values.

Water allocation values are expected to be calculated according to the “pre-CERP baseline.” The Pre-CERP baseline is the estimated hydrological conditions in South Florida before the enactment of CERP. This baseline is expected to be determined through models and hydrological records, and take into account seasonal variability in water supplies, land use, population, and water demand, as well as other factors relating to water distribution in South Florida.<sup>48</sup> After water allocation values are determined from the guideline memorandum and the pre-CERP baseline, the project implementation report is expected to identify the appropriate quantity, timing, distribution of water allocated to the environment, other uses (e.g., agriculture and urban areas), and storage.

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<sup>45</sup> CERP does not guarantee that 80% of redirected water will go to the environment and the remaining 20% to other uses. The percentages of water distribution for the environment and other uses are expected to be determined for individual projects.

<sup>46</sup> Increased water supply to natural areas is thought to be the primary mechanism to restore the ecosystem.

<sup>47</sup> Existing legal sources of water have not been defined in WRDA 2000 or the programmatic regulations. Some believe that this term needs to be clarified so that values of water supplies before WRDA 2000 was enacted can be quantitatively determined.

<sup>48</sup> “Programmatic Regulations for the Comprehensive Everglades Restoration Plan,” *Federal Register* 67, no. 149 (August 2, 2002):50540.

The reservation of water for the environment will be implemented by Florida Water Management Districts under the authority of state law. Based on values listed in the project implementation report, a project cooperation agreement between the Corps and the non-federal sponsor is to be made before project construction can take place. The project cooperation agreement is expected to serve as a contract between the Corps and the non-federal sponsor that the allocation of water to the natural system from each project will be available for the duration of the project.

### **Summary of Potential Benefits**

- Restoration is the primary federal objective for the South Florida ecosystem. Water assurances support this objective by seeking to channel re-allocated water from restoration projects to natural areas.
- Assurances that existing supplies of water and flood protection will not be reduced by restoration aim to meet the concerns of farmers, water utilities, and local governments who oppose any lowering of water supplies caused by restoration.
- With adaptive management, water allocation values are flexible and can be changed to allow project managers to allocate water supplies in the most efficient manner possible.

### **Summary of Potential Disadvantages**

- Water allocation decisions will ultimately be decided by guidance memoranda, which may not be subject to congressional authorization. Memoranda are expected to be developed with the concurrence with the Secretary of the Interior and the Governor of Florida.
- It is unclear how future agricultural and urban water demands will be met by CERP. Aside from *estimating* that 20% of the water allocated from restoration will go to urban and agricultural uses, there appear to be no provisions or assurances in WRDA 2000 that address future water needs for farmers and cities.
- Lack of quantitative assurances for water allocation in the programmatic regulations may create uncertainty in how much water is going to be allocated for urban, agricultural and environmental needs.<sup>49</sup> The assumed flexibility of water allocation values may increase uncertainty.
- The pre-CERP baseline will be based on models and data, which may include uncertainties. Uncertainty in the pre-CERP baseline will create uncertainty in the amounts of water expected to be re-directed from restoration projects.

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<sup>49</sup> The Corps' estimation that 80% of the newly directed water from restoration will go to the environment is not authorized by WRDA 2000. The Senate Committee on Environment and Public Works, however, states that it "fully expects that 80% of the re-directed water will be reserved to the environment." U.S. Senate Committee on Environment and Public Works, *Water Resources Development Act of 2000*, 106<sup>th</sup> Cong., 2<sup>nd</sup> Sess., July 27, 2000, S.Rept. 106-362.

## Funding

Initial and long-term funding is generally viewed as a critical aspect of implementing a large ecosystem restoration project. Some advocates of ecosystem restoration initiatives believe that funding must be guaranteed for the long-term duration of the initiative if restoration is to be successful. Funding for large scale ecosystem restoration efforts is generally distributed among stakeholders. However, in most cases, the majority of the funding has come from federal and state governments. From a federal perspective, funding for restoration efforts is typically given to specific agencies to carry out restoration activities or given to a restoration program authorized by legislation.

The federal government is sharing half the cost of implementing CERP with the state of Florida, and to a lesser extent with local tribes and other stakeholders. The total estimated cost for restoring the South Florida ecosystem is \$14.8 billion.<sup>50</sup> From FY1993—FY2002, federal appropriations for projects and services related to the restoration of the South Florida ecosystem exceeded \$1.7 billion and state funding has gone over \$3.6 billion.<sup>51</sup> In the next 10 years, the average annual Federal cost for restoration activities in Southern Florida is estimated at \$286 million per year.

Federal appropriations that contribute to restoration efforts in South Florida are predominately for project design, construction, and land acquisition. (See **Table 2.**) For example, from 1993-2001, 48% of all federal funding for restoration activities in South Florida went to DOI for land acquisition, scientific research, and monitoring, and 34% went to the Corps for construction and management projects. In comparison, the State of Florida has appropriated a majority of their restoration funds (an estimated 75%) to SFWMD for project construction, land acquisition, water management, and waterway restoration.

Restoration activities are conducted by several federal agencies in the South Florida ecosystem under CERP and other laws. For example, for FY2002, the Corps was appropriated \$92.8 million for restoration work in central and southern Florida, yet only \$30.3 million of this total was appropriated for projects authorized by CERP. The remaining \$62.5 million was for projects authorized by other laws, namely the Everglades National Park and Protection Act of 1989 (P.L. 101-229) and WRDA 1996 (P.L. 104-303). For FY2003, the Bush Administration has requested approximately \$260 million for restoration activities in the South Florida ecosystem, of which approximately \$46 million is for the implementation of CERP.<sup>52</sup>

Appropriations for restoration projects in the South Florida ecosystem have been included in several annual appropriations laws, including (a) Department of the Interior (DOI) and Related Agencies Appropriations,<sup>53</sup> (b) Energy and Water Development Appropriations (funding for the Corps), (c) Departments of Commerce, Justice, and State, the Judiciary, and Other Related Agencies Appropriations, (d) U.S. Department of Agriculture and Related Agencies

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<sup>50</sup> Of this cost, \$7.8 billion over 20 years is estimated for implementing CERP.

<sup>51</sup> These figures represent an estimated cost of all CERP and non-CERP related costs for restoration in the South Florida ecosystem.

<sup>52</sup> Restoration funding in the South Florida ecosystem for the DOI is summarized in CRS Report RL31306, *Appropriations for FY2003: Interior and Related Agencies*, by (name redacted) and (name redacted).

<sup>53</sup> DOI conducts CERP and non-CERP activities in Southern Florida through the National Park Service (NPS), Fish and Wildlife Service (FWS), U.S. Geological Survey (USGS), and Bureau of Indian Affairs (BIA).

Appropriations, and (e) VA, HUD, and Related Agencies Appropriations (funding for the Environmental Protection Agency (EPA)).

**Table 2. The Role and Funding History of Federal Agencies in Restoration Activities in the South Florida Ecosystem**

<b>Agency</b>	<b>Agency Role in South Florida Restoration Efforts</b>	<b>Appropriations FY1993 - FY2002 (U.S.\$, in thousands)</b>
Dept. of Interior	Feasibility studies, project planning, analysis, rule-making, monitoring, technical support and coordination (CERP). Land acquisition and the conservation of endangered species.	<b>\$831,247</b>
Dept. of Army	Restoration project plans, construction and implementation. Responsible for operating restoration projects and distributing water supplies.	<b>\$640,310</b>
Dept. of Commerce	Research, monitoring and management of coastal and marine resources.	<b>\$144,515</b>
Dept. of Agriculture	Technical assistance for conservation management and practices, and research.	<b>\$61,643</b>
Environmental Protection Agency	Water quality research, habitat protection programs, and coordination of regulatory programs.	<b>\$57,596</b>
<b>Federal Total</b>		<b>\$1,735,311</b>

**Source:** South Florida Ecosystem Restoration Program, "Cross-cut budget FY2003" and Cross-Cut Budget FY2000, 2001 and 2002, and <http://www.sfrestore.org> on October 8, 2002.

**Note:** CERP related funding (FY2001) constituted only 13.5% of the total funding that can be attributed to restoration activities in the South Florida ecosystem.

### Summary of Potential Benefits

- The funding responsibility is shared by different stakeholders, which lowers the financial burden on just one stakeholder.
- If assurances for funding the entire ecosystem restoration effort are in place, stakeholders will have greater confidence in the successful outcome of restoration.

### Summary of Potential Disadvantages

- Federal funding of restoration efforts could be used to improve infrastructure that may promote development in the state, yet not completely serve the national interest for restoration. For example, federal funding may be used in part to construct water purification plants. These plants may be necessary infrastructure for the state to develop and expand urban areas, which may impact the ecosystem.
- If funding held back by or unavailable from one stakeholder, restoration efforts may cease even if funding is available from other stakeholders.

## Conclusion

Policies that drive ecosystem restoration efforts are complex. Ecosystem restoration efforts generally strive to meet the desires and meet the concerns of multiple stakeholders, as well as address issues of environmental deterioration and regional development. Further, some ecosystem restoration efforts may plan to spend billions of dollars on projects that cross state boundaries and overlap private, state and federal lands. Ecosystem restoration in South Florida is considered the largest restoration initiative to date in this country in terms of money and resources. Other ecosystem restoration initiatives may look to the policies and lessons learned in restoring the South Florida ecosystem to better their efforts. Although restoration in South Florida is relatively new, several lessons can be learned from the structure and experiences of this restoration effort so far:

- Involvement of all stakeholders in restoration planning. Ecosystem restoration represents a long-term commitment of time and resources from several stakeholders. Decisions reached through consensus among stakeholders, as opposed to unilateral decisions, may be more enduring and likely to be implemented.
- Establishment of guidelines for stakeholder input and disputes. Guidelines for participation in meetings and committees are expected to create equitable stakeholder input into the decision-making process and lower delays.
- Application of adaptive management to deal with uncertainty in scientific and other factors in the restoration effort. The use of adaptive management is expected to allow restoration activities to be implemented with fewer delays and provide flexibility for improving activities once they have been implemented.
- Use of interim goals to set targets for restoration activities. Interim goals are expected to help restoration efforts focus on pre-determined objectives. Further, interim goals can create a basis for evaluating the progress of restoration (i.e., whether or not restoration activities meet their goals).
- Use of monitoring and assessment to measure progress in restoration activities. Monitoring and evaluation restoration efforts are expected to answer the basic question of whether restoration is working. In addition, deficiencies or opportunities for improvement in the restoration effort uncovered by monitoring can be used by adaptive management to improve restoration.

## Glossary

<b>Project Implementation Report (PIR)</b>	Detailed plan for each restoration project that specifies the distribution of water supplies, the amount of water reserved for the natural system, and the cost-effectiveness of each project. Project implementation reports must be authorized by Congress before project construction.
<b>Project Cooperation Agreement (PCA)</b>	A contract between the Secretary of the Army and the non-federal sponsor to ensure that the allocation of water made available to the natural system pursuant to state law will be available for the duration of the project.
<b>Project Management Plan</b>	List of project funding, implementation schedules, and resources needed for the design and construction of a project.
<b>Adaptive Management</b>	Incorporating new information from scientific studies or from unforeseeable circumstances into the restoration effort to assure that the effort reaches its goals.
<b>Guidance Memorandum</b>	A policy tool that provides greater detail to procedures necessary to implement parts of the Plan. For example, the Corps and SFWMD will develop a guidance memorandum for specifying the quantity, distribution and reservations of water allocated for the natural system. Guidance memoranda are to be made by the Corps and SFWMD in consultation with tribal and federal agencies, and subject to public comment.
<b>Operating Manual</b>	Details of the operations used for reserving and allocating water for the natural system (as reflected in the PIR and PCA), created for each project and for the entire system.

## Appendix. Federal Legislative History of Restoration Efforts in South Florida<sup>54</sup>

**Everglades National Park Authorization Act of 1936 (16 U.S.C. 410).** Set aside 1.3 million acres as wilderness to create Everglades National Park. The Park was dedicated by President Truman in 1947.

**River Basin Monetary Authorization and Miscellaneous Civil Works Amendments Act of 1970 (P.L. 91-282; §2).** Set minimum water flow of 315,000 acre/feet per year from the Central and Southern Florida Project to Everglades National Park.

**Supplemental Appropriations Act of 1984 (P.L. 98-181, Title XI).** Authorized Corps to modify water delivery to Everglades National Park, thereby increasing water flowing into the Park.

**The Everglades National Park Protection and Expansion Act of 1989 (P.L. 101-229; 16 U.S.C. 410(r)(8)).** Expanded Everglades National Park and authorizes restoration projects (e.g., Modified Water Deliveries Project) to increase the natural water deliveries to the Park.

**Water Resources Development Act of 1992 (P.L. 102-580).** Authorized the restoration of the Kissimmee River projects (§101(8)) and creation of the Central and Southern Florida Project Restudy (§301(1)).

**1994 Amendment to Everglades National Park Protection and Expansion Act of 1989 (P.L. 103-219; 16 U.S.C. 410).** Authorized federal funds to assist the State of Florida to acquire land adjacent to the Park to improve water flows for restoration.

**Water Resources Development Act of 1996 (WRDA 1996, P.L. 104-303; Title V, §528).** Expanded the task force to include tribal, state and local governments and authorized the task force to address the entire scope of the restoration process. Directed the US Army Corps of Engineers to devise a Comprehensive Plan for restoration.

**Water Resources Development Act of 2000 (WRDA 2000, P.L. 106-541; Title VI, §601).** Approved Comprehensive Everglades Restoration Plan (CERP), which outlines 68 infrastructure projects to modify water delivery systems to improve water quality, distribution, quantity and timing to the natural system without sacrificing urban and agricultural needs. Appropriated \$686 million in funds to carry out projects, modifications, and monitoring.

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<sup>54</sup> Excludes the authorization for appropriations given for restoration efforts in the South Florida ecosystem.

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## **Acknowledgments**

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