Getting The Water Right: Addressing Quantity, Quality, Timing, and Distribution Problems

Both the problems with declining ecosystem health and the solutions to Everglades restoration can be framed by four interrelated factors: quantity, quality, timing, and distribution of water. The principal goal of restoration is to deliver the right amount of water, of the right quality, to the right places, and at the right time. The natural environment will respond to these hydrologic improvements, and we will once again see a healthy Everglades ecosystem. The Comprehensive Plan consists of over 60 components that work together to accomplish this.

Quantity

Significantly less water flows through the ecosystem today compared to historical times. In fact, on average, 1.7 billion gallons of water that once flowed through the ecosystem are wasted each day through discharges to the ocean or gulf. The Comprehensive Plan will capture most of this water in surface and underground storage areas where it will be stored until it is needed. Specifically, this water will be stored in more than 217,000 acres of new reservoirs and wetlands-based treatment areas and 300 underground aquifer storage and recovery wells. These features vastly increase the amount of water storage available in south Florida. The Plan will ensure a reliable, adequate supply of fresh water for the environment, as well as urban and agricultural users. Of the "new" water captured by the Plan, 80 percent will go to the environment and 20 percent will be used to enhance urban and agricultural water supplies.

Quality

The quality of water in the south Florida ecosystem has been diminished significantly. Excess phosphorus, mercury, and other contaminants harm the region's surface water and groundwater. The water quality of the Everglades Water Conservation Areas, the coastal estuaries, Florida Bay and the Keys show similar signs of significant degradation. The Comprehensive Plan will help improve the quality of water discharged to natural areas by first directing it to surface storage reservoirs and wetlands based stormwater treatment areas. Further opportunities to improve water quality will be incorporated into the design of the Plan's features. The recommended study to develop a comprehensive integrated water quality plan for the region will provide further water quality improvements to the ecosystem.

Timing

Alternating periods of flooding and drying, called hydroperiods, were vital to the historical functioning of the Everglades ecosystem. These natural hydroperiods have been severely altered by human activities. Restoring these variations in water flows and levels is an integral part of the Comprehensive Plan. Specifically, the timing of water held and released into the ecosystem will be modified by the Plan so that it more closely matches natural patterns. The Plan will reduce the harmful water levels that damage Lake Okeechobee and its shoreline. Improved water deliveries to the Caloosahatchee and St. Lucie rivers will reduce damage to the estuaries caused by too much or too little fresh

water. Detrimental high flows to the Lake Worth Lagoon will be reduced. Florida and Biscayne bays will receive improved fresh water flows. In other areas, an operational plan that mimics natural rainfall patterns will enhance the timing of water sent to the Water Conservation Areas, Everglades National Park, and other wildlife management areas.

Distribution

The areal extent and movement of water through the system is the final factor in the water equation. Over 50 percent of the original Everglades have been lost to urban and agricultural development. Further, the remaining ecosystem has been separated, or compartmentalized, by canals and levees. To improve the connectivity of natural areas, and to enhance sheetflow, more than 240 miles of levees and canals will be removed within the Everglades. Most of the Miami Canal in Water Conservation Area 3 will be removed and 20 miles of the Tamiami Trail (U.S. Route 41) will be rebuilt with bridges and culverts, allowing water to flow more naturally into Everglades National Park. In the Big Cypress National Preserve, the levee that separates the Preserve from the Everglades will be removed to restore more natural overland water flow.

In summary, the Comprehensive Plan will store much of the water that is now sent to the sea so there will be enough water for the ecosystem and urban and agricultural users in the future. The Plan includes a number of features to improve the quality of water flowing to the natural environment. It will continue to provide the same level of flood protection for south Florida. Three additional feasibility studies - Florida Bay and the Florida Keys, Southwest Florida, and a Comprehensive Integrated Water Quality Plan - will add information and details to enhance the restoration of the south Florida ecosystem. The Plan is a comprehensive solution for ecosystem restoration, water supply, and protection from flood damages. It is a vital step to a sustainable south Florida.

(For more information, please refer to Section 9, *The Recommended Comprehensive Plan*, in the final report.)

Comprehensive Plan Based on Sound Science

Sound science has always served as the basis for restoration of the south Florida ecosystem. In order to preserve scientific integrity, peer review has been used to provide independent evaluation of the science being applied to restoration efforts and to solicit advice on difficult issues. Specifically:

❖ The basic understanding of the link between hydrologic changes and ecological responses was developed by a group of prominent scientists with many years of experience in the south Florida ecosystem.

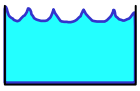
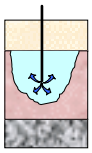
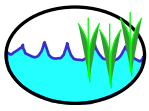
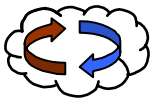
❖ An inter-disciplinary, inter-agency team of biologists, ecologists, and others with extensive experience in the south Florida ecosystem has been working on the Plan since 1993.

❖ The Alternative Evaluation Team was composed of 80 specialists, mostly ecologists, hydrologists, and planners from the Corps of Engineers; the South Florida Water Management District; other federal, state and local resource and environmental protection agencies; county water utilities; and other entities, representing many years of research in south Florida. The team developed a set of performance measures to evaluate each alternative plan, analyzed how well each alternative met the targets, and identified areas for improvement.

❖ The primary models used in the development of the Plan - the Natural System Model and the South Florida Water Management Model - have undergone technical peer review and represent the best understanding of the hydrology of both the pre-drainage and current system.

❖ The Across Trophic Level System Simulation, a state-of-the-art model, was developed to predict animal species responses to hydrologic changes.

Principal Features of the Comprehensive Plan

	Quantity Quality Timing	**Surface Water Storage Reservoirs.** A number of water storage facilities are planned north of Lake Okeechobee, in the Caloosahatchee and St.Lucie basins, in the Everglades Agricultural Area, and in Palm Beach, Broward and Miami–Dade counties. These areas will encompass approximately 181,300 acres and will have the capacity to store 1.5 million acre-feet of water. Two rock mining areas in Miami-Dade County will be converted to in-ground storage areas.
	Quantity Timing	**Aquifer Storage and Recovery.** More than 300 wells will be built to store water 1,000 feet underground in the upper Floridan aquifer. The wells will be located around Lake Okeechobee, in Palm Beach County, and in the Caloosahatchee Basin. As much as 1.6 billion gallons a day may be pumped down the wells into underground storage zones. Since water does not evaporate when stored underground and less land is required for storage, aquifer storage and recovery has some advantages over surface storage.
	Quantity Quality Timing	**Stormwater Treatment Areas.** Approximately 35,600 acres of man-made wetlands will be built to treat urban and agricultural runoff water before it is discharged to the natural areas throughout the system. Stormwater treatment areas are to be located in basins draining to Lake Okeechobee, the Caloosahatchee River Basin, the St. Lucie Estuary Basin, the Everglades, and the lower east coast. These are in addition to over 44,000 acres of areas already being constructed under the Everglades Forever Act.
	Quantity Quality Timing	**Reuse Wastewater.** Two advanced wastewater treatment plants are planned in Miami-Dade County. The plants are capable of making more than 220 million gallons a day of the county's treated wastewater clean enough to discharge into wetlands along Biscayne Bay and for recharging the Biscayne aquifer.
	Quantity Distribution	**Seepage Management.** Millions of gallons of groundwater are lost each year as it seeps away from the Everglades towards the east coast. Seepage generally occurs either as underground flow or through levees. The plan includes features to reduce unwanted water loss and redirect this flow westward to the Water Conservation Areas, Everglades National Park, and northeast Shark River Slough. The three features to reduce seepage are: (1) adding impervious barriers to the levees to block loss of water; (2) installing pumps near levees to redirect water back into the Everglades; and (3) holding water levels higher in undeveloped areas between the Everglades and Palm Beach, Broward and Miami-Dade counties.
	Distribution	**Removing Barriers to Sheetflow.** More than 240 miles of project canals and internal levees within the Everglades will be removed to reestablish the natural sheetflow of water through the Everglades.
	Timing	**Operational Changes.** Changes in water delivery schedules will be made in some areas to alleviate extreme fluctuations. Lake Okeechobee water levels will be modified to improve the health of the lake. In other areas, the rainfall driven operational plan will enhance the timing water flows.