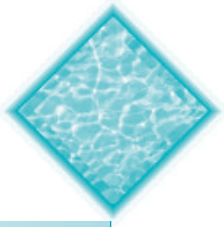
Chapter 6

Forward to the Past

"The strength of the many is greater than the strength of the individual organization."

— Participant in Indiana Grand Kankalee Marsh Restoration Project (Yaffee et al. 1996)



"You can't look at ecosystem management only in terms of what it can do for native plant and animal species. From the standpoint of sustainability, people have to be strongly involved."

— Participant in Oak Mountain Partnership, Colorado (Yaffee et al. 1996)

KEY IDEAS

- Many of Florida's natural systems have been radically changed and fragmented by human development.
- Water no longer flows unimpeded from uplands to coastal estuaries.
- Florida has responded to the loss, degradation and fragmentation of the natural environment with one of the most aggressive and farsighted land acquisition programs in the nation.
- Land acquisition alone is not enough. These lands must be managed and in many cases effectively restored.
- Throughout Florida, ecosystems are being restored.
- We cannot return to what used to be, but we can restore, protect and better manage what we have.

VOCABULARY

Degradation

Edge habitat

Finger-fill canals

Habitat fragmentation

Invasive exotics

Land restoration

Stormwater treatment areas

Beginning in the 1800s, many of Florida's natural systems were radically changed. Thousands of acres were drained for agriculture. Thousands more were drained for houses for the steady stream of new residents. Rivers were straightened and canals were dug for drainage and flood control and to make travel easier for ships and barges. Rivers were dammed for hydroelectric power and to create lakes for recreation. Forests were cut and trees were tapped for turpentine and rosin. In northern Florida, centuries-old longleaf pine trees were replaced with acre upon acre of fast-growing slash pine. Farther south, ancient cypress were logged and the land left bare.

Today, agricultural enterprises, businesses, houses, cities and roads cover 43 percent of the Florida landscape. Forests and wetlands comprise the other 57 percent. However, humans have left their imprint on nearly all of this remaining land. Most of the forests are now straight rows of young trees, the original trees having been logged. Also, many natural areas have been affected by **invasive exotics** (plants and animals from elsewhere) that "crowd out" native species (Kautz et al. 1998).

A serious consequence of the conversion of the natural Florida landscape to human uses has been the fragmentation of remaining natural habitats. Water no longer flows unimpeded from uplands to coastal estuaries. Wide-ranging species such as the endangered Florida panther and the black bear face hazards as they cross barriers such as

roads and levees that isolate and fragment their habitats. **Habitat fragmentation** increases the amount of "**edge**" **habitat**. Although edges are desirable for some game species, such as deer and rabbits, and for some birds, such as song sparrows and cardinals, excessive amounts of edge are undesirable for interior forest dwellers. Edges of forests are also hotter and drier than the forests themselves and may become dominated by common weeds, whereas forest interiors are more diverse and support more rare species (Kautz et al. 1998).

Florida has responded to the loss, **degradation** and fragmentation of the natural environment with one of the most aggressive and farsighted land acquisition programs in the nation. As of March 2001, 8.7 million acres, covering nearly a quarter of the state, were publicly managed conservation lands (Florida Natural Areas Inventory, unpublished data). But public acquisition is not enough: there must be land management and in many instances, **land restoration**. In the past century, conservation efforts focused on acquisition and preservation, basically putting a fence around what's left, according to former U.S. Secretary of the Interior Bruce Babbitt. "We have finally come to recognize that that's not enough. We cannot meet our obligation to the protection of creation by saying 'fence off the back 40,' put somebody in a uniform from the National Park Service here and say we've taken care of our obligation." Today an "ecological revolution," in Babbitt's words, is occurring: it is ecological, not political, boundaries that are critical. You can't preserve or manage or restore public lands in isolation from the landscapes of which they are a part.

Restoration

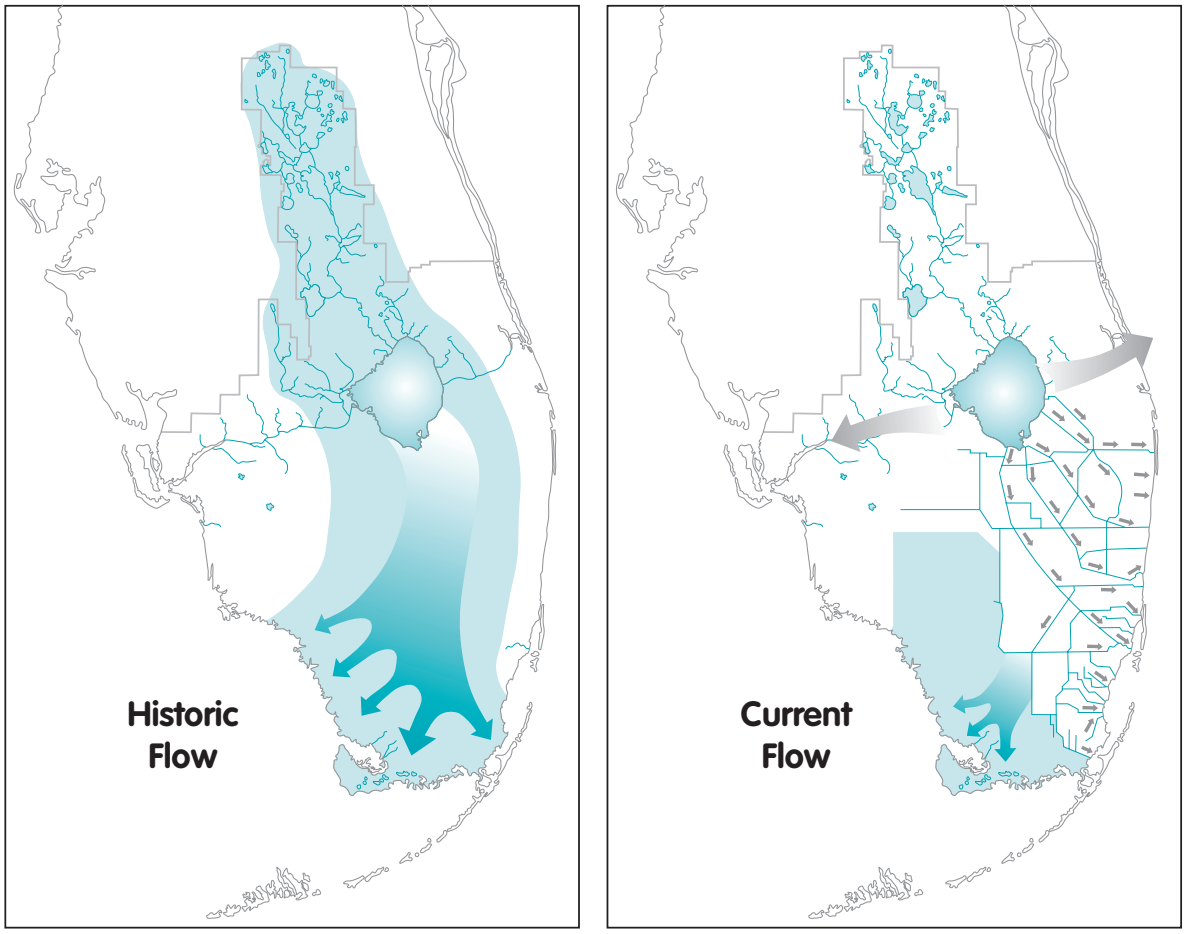
Many things can be taken apart, but some, such as biological systems, are very difficult to put back together again. On the surface, a biological system may look like it's "fixed," but it might not work. Some parts may be missing, some may be forgotten or some may not be put back in the proper relationship to other parts. Complexity and diversity tend to be hallmarks of unaltered systems, and this makes restoration very difficult. Like a broken eggshell, a fragmented and altered ecosystem that is put back together may never be as strong and resilient as the original. In spite of these challenges, throughout Florida, ecosystems are being "put back together."

KISSIMMEE-OKEECHOBEE-EVERGLADES RESTORATION

The U.S. Army Corps of Engineers and the South Florida Water Management District are embarking on the most ambitious ecosystem restoration ever undertaken in the United States. At an estimated cost of $7.8 billion, a 50-year plan provides the road map for reviving what was once an uninterrupted ecosystem from the Kissimmee River valley, through Lake Okeechobee, through the water conservation areas and Everglades National Park, to Florida Bay and the coral reefs. This plan is the culmination of eight years of scientific study and unprecedented cooperation among local, state and federal governments, Indian nations, environmentalists, farmers and urban water utilities.

Many people think of the Everglades as Everglades National Park. They picture a vast expanse of saw grass immortalized by Marjory Stoneman Douglas in her famous book, *The Everglades: River of Grass*. But the Everglades ecosystem is much larger and more diverse. It begins near Orlando, north of the chain of lakes that feeds the Kissimmee River and Lake Okeechobee, and it ends at Florida Bay and the coral reefs.

The natural landscape of the Everglades system was designed to hold water. During wet periods, water overflowed the southern banks of



Source: South Florida Water Management District

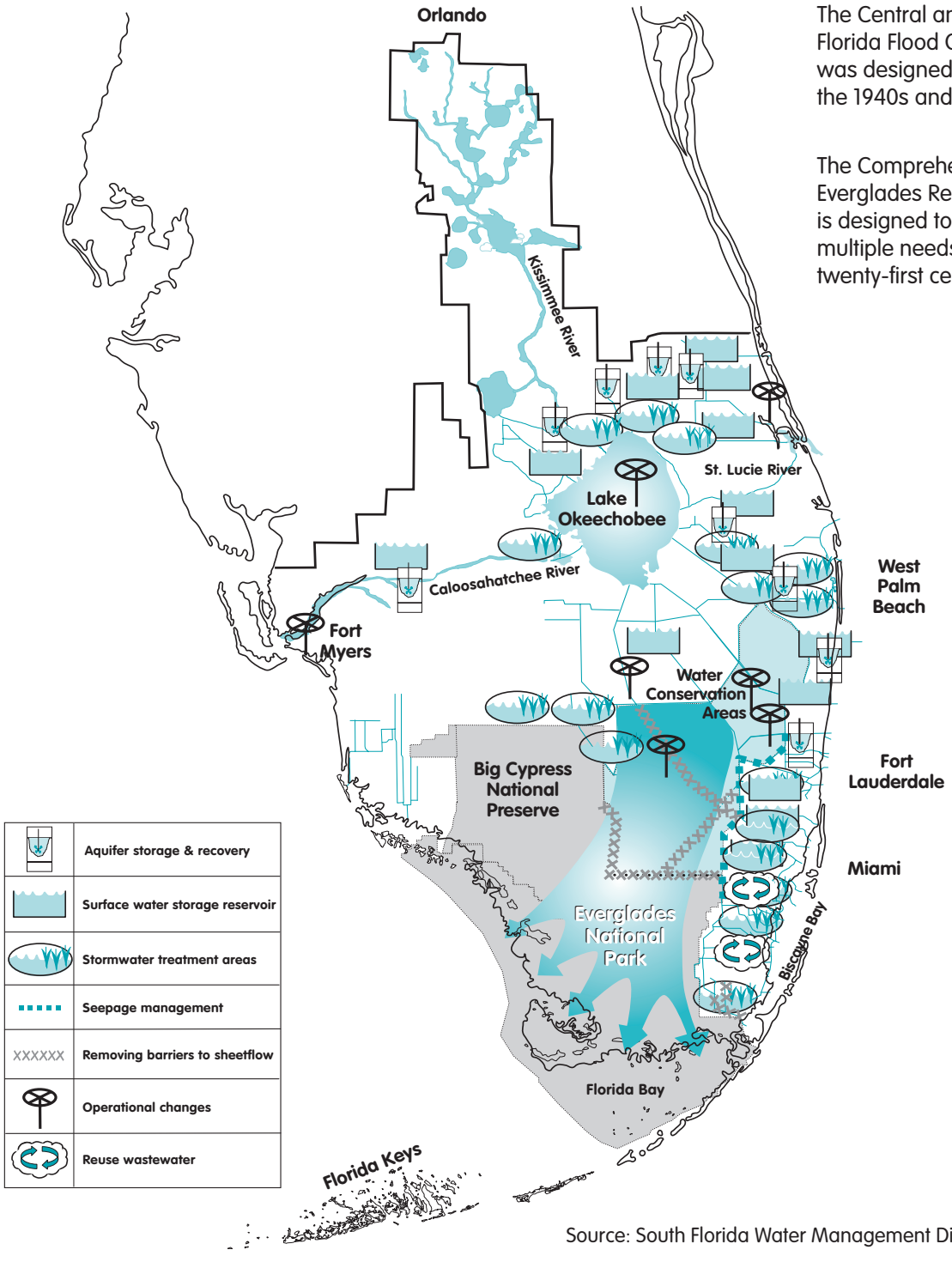
Lake Okeechobee and continued in a sheetlike fashion across the Everglades. Immediately south of Lake Okeechobee was a custard apple and cypress forest where Seminole Indians hid from federal troops during the Second Seminole War. An eastern coastal ridge and a western inland ridge bound this "river of grass" that slopes imperceptibly from north to south, about one inch per mile. Just south of the lake, in what is now the vast sugar cane and vegetable fields of the Everglades agricultural area, saw grass was the dominant species. The current water conservation areas were once a mixture of sawgrass marsh and tree islands, and were home to huge flocks of birds and other wildlife, including endangered and threatened species such as black bear and the Florida panther. Uplands were pine/palmetto flatwoods and hardwood hammocks. Taylor Slough and Shark River Slough moved water through what is now Everglades National Park to salt marshes and mangrove swamps along Florida Bay and the Gulf of Mexico. During dry times, wildfires were common and were a vital force that helped maintain the balance of natural communities.

The Everglades landscape began to change in 1882 when Hamilton Disston attempted to channelize the Caloosahatchee and the Kissimmee rivers. In 1904, modification of the south Florida environment accelerated when Napoleon Bonaparte Broward was elected governor of Florida on a promise to "drain the Everglades." Between 1905 and 1927, six major canals and channelized rivers were connected to Lake Okeechobee for drainage and navigation. People began to settle and farm newly drained land south and east of Lake Okeechobee.

In 1926, and again in 1928, hundreds of people died when hurricane winds blew water out of Lake Okeechobee and flooded

surrounding areas. As a consequence, an 85-mile-long dike was built encircling Lake Okeechobee. In 1947, two more hurricanes flooded south Florida. In response, in 1948, Congress authorized the Central and Southern Florida Flood Control Project, a massive public works project. The project encompassed 18,000 square miles, covered 16 counties and included 1,000 miles of canals, 720 miles of levees, and almost 200 water-control structures. With the completion of the project, the Kissimmee-

Comprehensive Everglades Restoration Plan



The Central and Southern Florida Flood Control Project was designed and built in the 1940s and 1950s.

The Comprehensive Everglades Restoration Plan is designed to meet the multiple needs of the twenty-first century.

Source: South Florida Water Management District

Okeechobee-Everglades ecosystem became a managed watershed. People, not nature, determined where and, to some degree, how much water would flow.

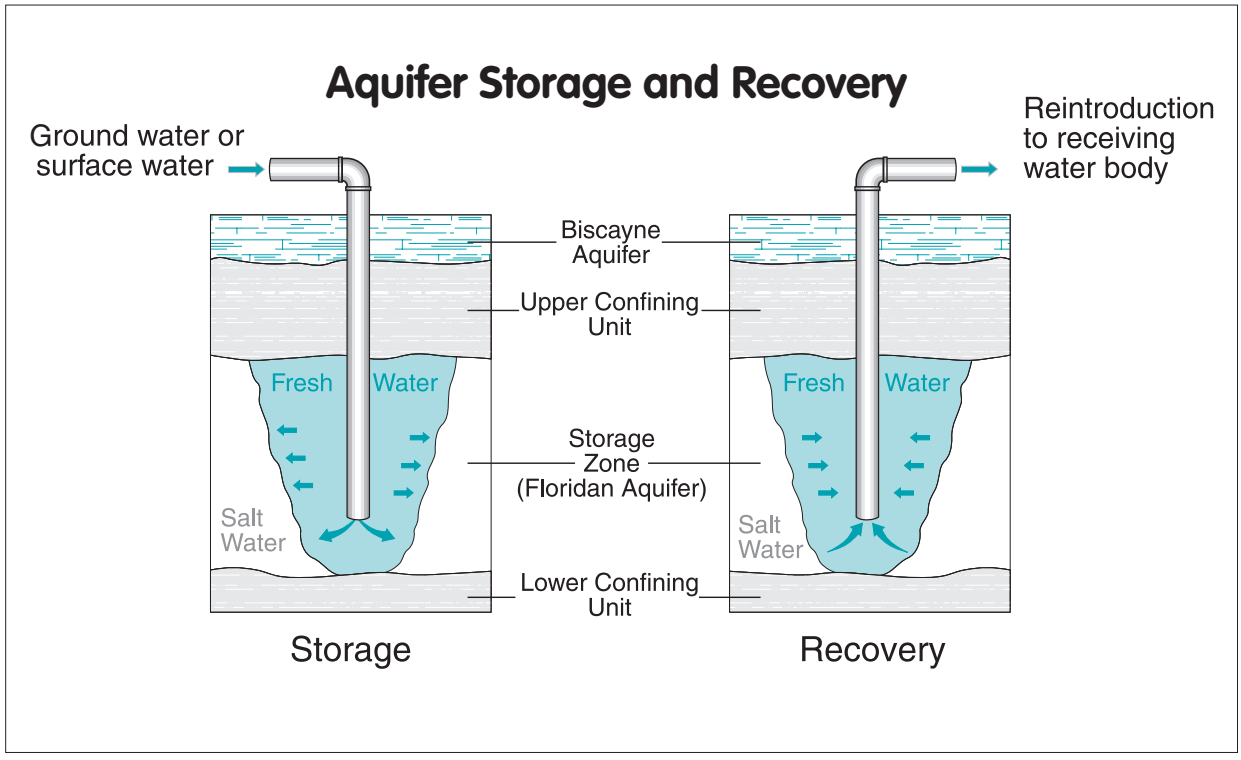
The Central and Southern Florida Flood Control Project opened vast areas for agriculture and urban development, making it possible for more and more people to live in south Florida. It did so at tremendous ecological cost to the Everglades. While the population of *people* in south Florida has risen from 500,000 in the 1950s to more than 6 million today, the number of wading birds in Everglades National Park has declined by 95 percent. Sixty-eight plant and animal species are threatened or endangered and over 1.5 million acres are infested with invasive exotic plants. And, because of seasonal rainfall, subtropical climate extremes and very flat topography, south Florida still occasionally experiences both floods and water shortages.

The Comprehensive Everglades Restoration Plan passed by Congress in 2000 addresses all these concerns. It is a blueprint that aims to:

- Improve the health of over 2.4 million acres of south Florida ecosystem, including Everglades National Park and the Water Conservation Areas.
- Improve the health of Lake Okeechobee.
- Eliminate damaging freshwater releases to estuaries.
- Improve water deliveries to Florida and Biscayne bays.
- Improve water quality.
- Enhance water supply.
- Maintain existing flood protection.

The current Everglades is only about half the size of the Everglades that existed 100 years ago. While the historic Everglades can never be regained, much of what remains can be improved. Restoration addresses four fundamental issues regarding water: quantity, quality, timing and distribution.

Quantity: Each day an average of 1.7 billion gallons of fresh water that once flowed through the ecosystem are discharged to the ocean and gulf. This water is lost for both humans and natural systems. Under the restoration plan, much of this water will be captured in surface and



Source: South Florida Water Management District

underground storage areas until it is needed. More than 217,000 acres of new reservoirs and wetlands and 300 underground storage and recovery wells are planned. Most of the water captured will be used for environmental restoration with some reserved for urban and agricultural uses.

Quality: Increased nutrients, especially phosphorus, cause negative changes to the plant communities of the Everglades. Florida's 1994 Everglades Forever Act addresses this water quality issue by mandating the construction of artificial wetlands, called **stormwater treatment areas**, to reduce nutrients and improve water quality before water enters the Everglades. The Comprehensive Plan employs storage and treatment areas that further improve water quality in freshwater releases to the Everglades and Lake Okeechobee and that reduce undesirable freshwater discharges to coastal waters.

Timing: Cycles of flood and drought were vital to the historic functioning of the Everglades ecosystem. Under the restoration plans, the timing of water held and released into the ecosystem will more closely match natural patterns.

Distribution: To improve natural area connectors and to enhance overland flow, more than 240 miles of levees and canals will be removed from the Everglades. Portions of the Tamiami Trail (U.S. Highway 41) will be rebuilt with bridges and culverts, allowing a more natural flow of water across the land into Everglades National Park. In the Big Cypress National Preserve, the levee that separates the preserve from the Everglades will be removed, restoring more-natural overland water flow.

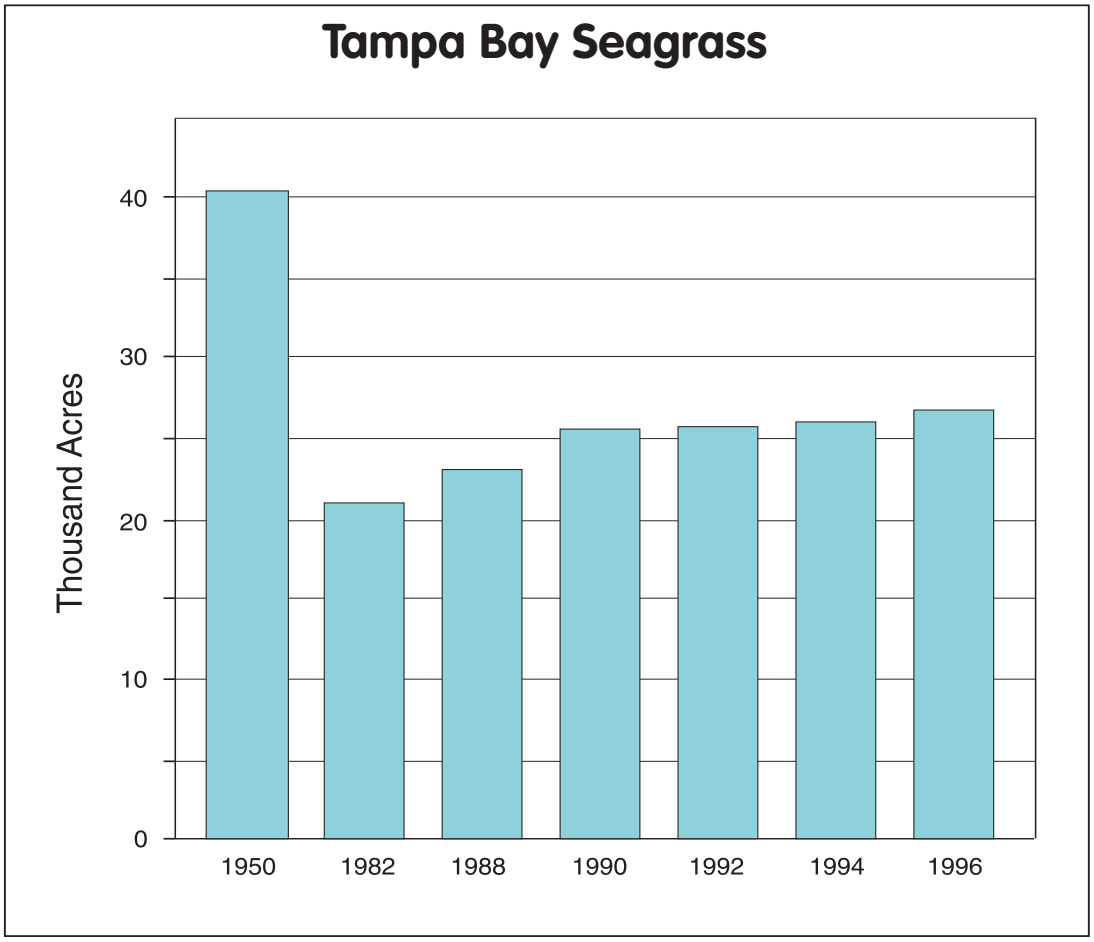
TAMPA BAY

Tampa Bay is Florida's largest open-water estuary, with a surface area of nearly 400 square miles and a watershed of 2,200 square miles. Tampa Bay borders portions of Polk, Pasco, Hillsborough, Pinellas and Manatee counties. Up to 70 percent of saltwater fish, crabs and shrimp spend part of their life cycles in estuaries where there is shelter, abundant food and protection from large predators that swim in the open sea. Tampa Bay is the year-round home to more than 100 dolphins and a winter refuge for the endangered Florida manatees that congregate around the warm-water outfalls of power plants. Economically, the bay yields $5 billion annually from trade, tourism and fishing. Along the bay are three major seaports, and more than 100,000 boats are registered to residents of Pinellas, Hillsborough and Manatee counties. Tampa Bay has been designated an "estuary of national significance" by the National Estuary Program.

Beginning in 1950, population in the bay area began to soar. Industrial and residential development, **finger-fill canals**, farms and causeways altered nearly all of the bay's original shoreline. In 1961, following devastating flooding from Hurricane Donna, the Florida Legislature created the Southwest Florida Water Management District to work with the U.S. Army Corps of Engineers to provide flood control around Tampa Bay. During the resulting Four River Basins, Florida Project, a regional flood detention area, a major canal and several shorter canals were constructed. These facilities were designed to store and (if needed) divert floodwaters around Tampa, but they also altered the timing and quantity of fresh water flowing into the bay — factors that are important to the bay's productivity. Also impacting the bay was the discharge by Tampa of 70 million gallons a day of partially treated wastewater.

Algal blooms and fish kills were common in the bay. Water was so murky that divers couldn't see their own hands. Forty percent of the seagrass beds were lost, and bottom sediments were nearly devoid of life. Populations of fish and birds declined, along with their habitats.

The biggest culprit in the decline of the bay was nutrients, primarily nitrogen, from wastewater discharges and stormwater runoff. In the late 1960s, in response to citizen complaints, a federal investigation recommended substantial reduction in the amount of nutrients entering the bay. The Florida Legislature responded by requiring that wastewater be



Source: Kautz et al. 1998

treated to advanced standards before it was discharged to the bay. In 1979, the city of Tampa, with substantial help from the federal government, upgraded its sewage treatment plant.

The bay responded. Seagrass grew where it had not grown for decades, indicating a healthier, more productive system. Water became clearer and bottom sediments again supported life. In Hillsborough Bay, once the most polluted portion of the Tampa Bay system, soft corals and sea squirts have begun growing. Scallops, which completely disappeared from Tampa Bay during the 1960s due in part to heavily polluted water, have recently returned.

In 1998, local governments, regulatory agencies and the Southwest Florida Water Management District signed the Tampa Bay Estuary Program Interlocal Agreement, a comprehensive long-term plan for preserving and restoring Tampa Bay. Goals of the plan include restoring at least 2,000 acres of coastal habitat and increasing seagrass beds to 40,000 acres. The Southwest Florida Water Management District has acquired 14,100 acres of land within the Tampa Bay/Anclote River watershed and has proposed acquisition of another 1,673 acres. The Southwest Florida Water Management District is in the process of restoring 2,500 acres of coastal habitat. The number of fish species in one restored area, Peanut Lake, increased from 12 to 26, and the number of popular game and commercial species such as mullet, menhaden, snook, redfish and black drum also increased. Restored coastal areas are also being used by many endangered, threatened or protected species of birds.

Wastewater discharges have decreased, but population growth is expected to continue. The challenge will be to control pollution from industries and automobiles and from stormwater runoff from streets, parking lots and lawns.

UPPER ST. JOHNS RIVER BASIN

The St. Johns River arises in the freshwater marshes of St. Lucie and Indian River counties and flows north 440 km (273 miles) to Jacksonville. At Jacksonville, the river turns and continues east 40 km (25 miles) to empty into the Atlantic Ocean at Mayport. The St. Johns River drops only 8 meters (26 feet) in elevation from source to mouth, resulting in many shallow pools — referred to as lakes — along its length. The Upper St. Johns River Basin extends nearly 80 miles from Ft. Drum Creek to the confluence of the Econlockhatchee River, and encompasses over 1 million acres. Remember, because the river flows north, "up is down." That is, the Upper St. Johns River Basin is the southernmost part of the river.

Through the 1800s, there were over 400,000 acres of floodplain marsh in the Upper St. Johns River Basin. Beginning at the turn of the century and accelerating in the 1940s and 1950s, thousands of acres of marsh were diked and drained for agriculture. By the 1970s, nearly two-thirds of the floodplain marsh was lost, resulting in flooding, declines in water quality and decreases in fish and wildlife populations. Remaining wetlands suffered from increased nutrients pumped from untreated agricultural runoff into the marsh.

In 1954, following devastating flooding from hurricanes in the 1940s, Congress authorized construction of engineering works in the Upper St. Johns River Basin as part of the Central and Southern Florida Flood Control Project. Flooding was to be reduced by diverting large amounts of water from the St. Johns Basin to the Indian River Lagoon through a canal. Large upland reservoirs west of the river valley were to detain flood flows. In 1972, the

Photo credit: St. Johns River Water Management District

Slough and cypress head in Upper St. Johns River Basin

project was halted for a study required by the National Environmental Protection Act of 1969. After the study cited adverse environmental impacts from stormwater discharges to the Indian River Lagoon, as well as increased likelihood of water quality and habitat degradation in the upper basin, the state withdrew its sponsorship of this project, and it was abandoned.

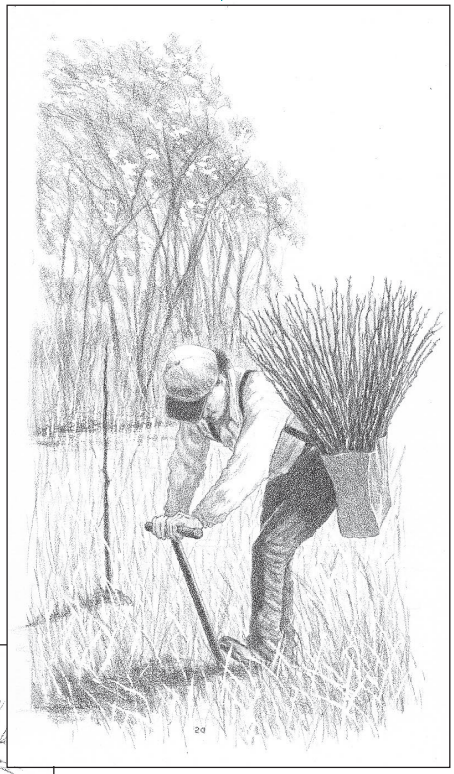
In 1977, the basin became the responsibility of the St. Johns River Water Management District. After extensive study, the District developed a new plan and in 1988 embarked on one of the most ambitious and innovative river restoration projects in the nation. Unlike the original plan that relied exclusively

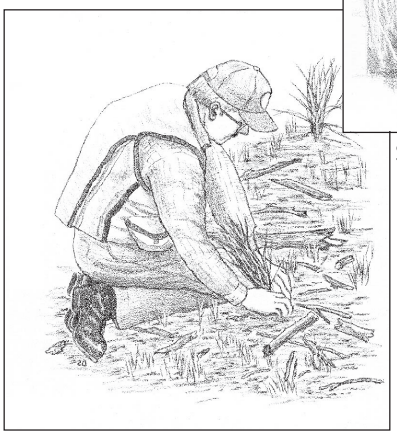
on engineering works, the new plan was semi-structural in design. As part of the plan, water-control structures allow water to sheetflow unimpeded through the river's marshes.

Nearly a century after they were first altered, 125,000 acres of marsh (many of which had been drained and converted to pastureland) in Indian River, Brevard and Osceola counties have been restored. Since restored areas were so large, the District relied on natural processes to restore wetlands. Natural soil moisture and processes of seed dispersal and germination occurred. When the vegetation was well established, the site was hydrologically connected to the adjacent marsh.

These restored marshes have reduced damage from floods, improved water quality, drastically reduced stormwater discharge to the Indian River Lagoon, restored fish and wildlife habitat and increased opportunities for public recreation.

To further improve water quality, 20,000 acres of reservoirs have been created as a buffer between agricultural land and the marshes. These reservoirs collect water from surrounding citrus groves and cattle ranches. Some contaminants settle in the reservoirs, resulting in cleaner water flowing into the marshes and ultimately into the river.





Source: Diane Sterling

Wildlife now abounds in the restored marshes. The basin supports an estimated 60,000 wading birds. In 1990, the federally endangered Everglades snail kite returned to its historic nesting area in the Upper St. Johns River Basin. It was estimated in 1991 that habitat for more than 25 percent of the entire statewide population of Everglades snail kite is in the Upper St. Johns River Basin due to improved habitat there.

LONGLEAF PINE RESTORATION

Longleaf pine forests — also known as sandhills and flatwoods on sandhill sites — originally stretched from Virginia to eastern Texas, covering 6.9 million acres in Florida's upper peninsula and Panhandle regions. These forests are home to hundreds of species, including the federally endangered red-cockaded woodpecker and the declining gopher tortoise. Longleaf pine forests have one of the most diverse plant populations on Earth because of frequent lightning fires, which keep one species from outcompeting the other. Twenty-seven federally listed species and 99 federal candidate species are associated with longleaf pine forests.

Many longleaf pine forests are important groundwater recharge areas. In portions of northwest Florida, water percolates through sandy soil in longleaf pine forests and re-emerges downslope where it forms steephead valleys and ravines.

Destruction of longleaf pine forests began in earnest after the Civil War and has accelerated in the last 50 years. Since

World War II, Florida's longleaf pine forests have been cut at an annual rate of 130,000 acres and largely replaced by single-species plantations of slash pine. These plantations do not support the diversity of the original sandhill and flatwoods communities. Habitat fragmentation and alteration of natural fire regime have left the remaining longleaf pine forests in poor condition.

The Northwest Florida Water Management District is restoring thousands of acres within its 16 counties, including many where longleaf pine once thrived. The District has purchased more than 180,000 acres of environmentally important lands, primarily along river systems and other sensitive water resources areas within the Panhandle. Since 1993, more than 8,000 acres have been restored to their natural state and condition along the Choctawhatchee, Chipola, Apalachicola, Escambia and Yellow rivers and the Holmes and Econfina creek areas. Efforts have focused on reforestation of areas that once contained extensive stands of longleaf pine and wiregrass habitat, although restoration activities also included other pine species such as loblolly, slash and shortleaf, as well as mixed hardwoods. About 4.4 million longleaf pines have been planted on District lands, as well as 563,000 wiregrass plugs, 85,000 loblolly pines, 452,000 slash pines, 28,000 shortleaf pines and 482,000 mixed hardwoods. More than four thousand acres have been restored within the Econfina Creek Water Management Area, along the Econfina Creek corridor. Econfina Creek is an especially sensitive area, since the creek flows into Deer Point Lake Reservoir, which serves as the public water supply source for Panama City and the surrounding area.

SUWANNEE RIVER BASIN

Dredging, draining, and pumping have not occurred on the Suwannee River, so the river has not been altered or impacted by such activities. Water quality has declined due to increasing urban and agricultural development. However, the Suwannee River Water Management District has the opportunity to address the problems before they become excessive. The solutions in the Suwannee watershed are non-engineering and non-structural and involve buying floodplains to filter out nutrients and other contaminants naturally and to provide flood protection. In addition, the water management district seeks to secure the cooperation of local governments, agriculture, industry and residents in preventing pollution.

Conclusion

Florida once had extensive and highly productive ecosystems, many of which were altered and degraded by urban and agricultural development. Much of the activity resulted from a lack of knowledge concerning how ecosystems function, how they are interrelated and the ways in which they help sustain people. There is currently a need to restore the function and integrity of what remains.

We cannot return to what used to be, but we can restore, protect and more effectively manage what we have. Sound science needs to be the foundation, and communication, education and public involvement, the cornerstones.