

Florida Everglades: Saving the River of Grass

Building Climate Resilience for Fish and Communities through Land and Water Conservation Projects

Jewel of Florida

At the tip of the Florida peninsula, just south of the Everglades, lies Florida Bay, the shallow, clear lagoon that is home to the world's largest contiguous seagrass meadows stretching along the Florida Keys and out to the Florida Shelf. Anglers flock to unrivaled saltwater fly fishing to catch game fish like Redfish and Snook in the bay's clear water, fueling a \$500 million per year recreational fishing industry.

Highly diverse and productive seagrass beds are the cornerstone of this marine ecosystem, providing nursery and spawning grounds for juvenile fish and food and habitat for hundreds of marine species. Prized catches such as Bonefish, Red Drum, and Seatrout rely on seagrass to hide while growing to maturity.

The freshwater nourishing Florida Bay filters through the Everglades. When water is diverted, salinity increases and water circulation decreases, resulting in a die-off of seagrass, lowered oxygen in the water, and algal blooms with impacts across the food web. Healthy seagrass communities support healthy fisheries.

Climate Stressors: Drought and Sea Level Rise Bring More Saltwater Intrusion

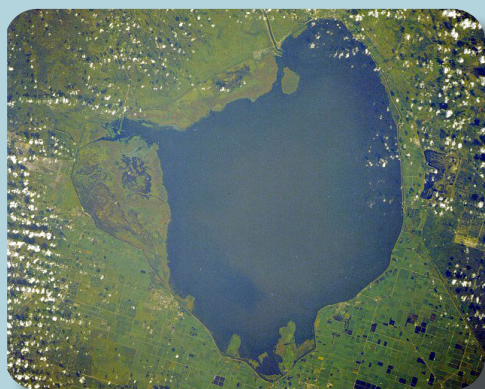
Over the last half-century, the freshwater-saltwater transition zone in the Everglades has moved inland by at least a half-mile, due both to rising sea levels and to the reduction of freshwater flow from Lake Okeechobee into the Everglades. It's a simple problem of water pressure. Freshwater flowing down off the land, or in below-ground aquifers, pushes toward the sea. If that tap is slowed to



Hypersalinity is when water becomes even more salty than seawater. These high salinities occur when more water is being lost to evaporation than is coming as freshwater.

Florida Bay has been experiencing higher salinities since the 1950s due to reduced freshwater flows and impaired water circulation from the Atlantic. Today, only a quarter of the historic average of freshwater flows into the bay. During the 2015 drought, the central region of the bay suffered an extensive turtle grass die-off of over 40,000 acres and a cascade of ecological impacts.

a trickle and freshwater pressure is reduced, the seawater meets less resistance and can drive farther inland. It's a problem many coastal communities around the world have faced when overdrawing from coastal aquifer wells: removing too much freshwater at once allows seawater to sneak in and poison the well. Add rising sea levels to the mix, and the lowlying Everglades face a double hit of saltwater intrusion above ground and below. As seas rise, saltwater intrudes into freshwater marshes. That can kill sawgrass, allow salt-loving mangroves to move inland, and shift the ecosystem and local fisheries. As saltwater from the oceans flows inward, it impacts freshwater wildlife, and threatens the aquifers that supply drinking water for more than 7 million Floridians.



Lake Okeechobee covers 730 square miles but only averages 12-15 feet deep. Bounded on three sides by farms, the lake collects fertilized run-off, including pesticides and phosphorus. Large volumes of polluted waters then flow out of the lake resulting in poor water quality, high loads of sediment, and adverse impacts to fish, oysters, and aquatic plants in Florida's estuaries. This influx of high nutrient lake waters, combined with higher temperatures, spur rapid growth of microscopic algae, or phytoplankton, to high levels that result in blooms.

Nutrient-laden lake waters also cause periodic algal blooms on the both coasts and in Florida Bay. Harmful algal blooms, also known as HABs, deplete the oxygen in the water and result in fish kills and close off areas to recreation. Some of the algae that form HABs can cause skin and respiratory irritation, further impacting swimming, boating, and fishing. HABs also create odors when they die, and therefore have the potential to lower waterfront property values.

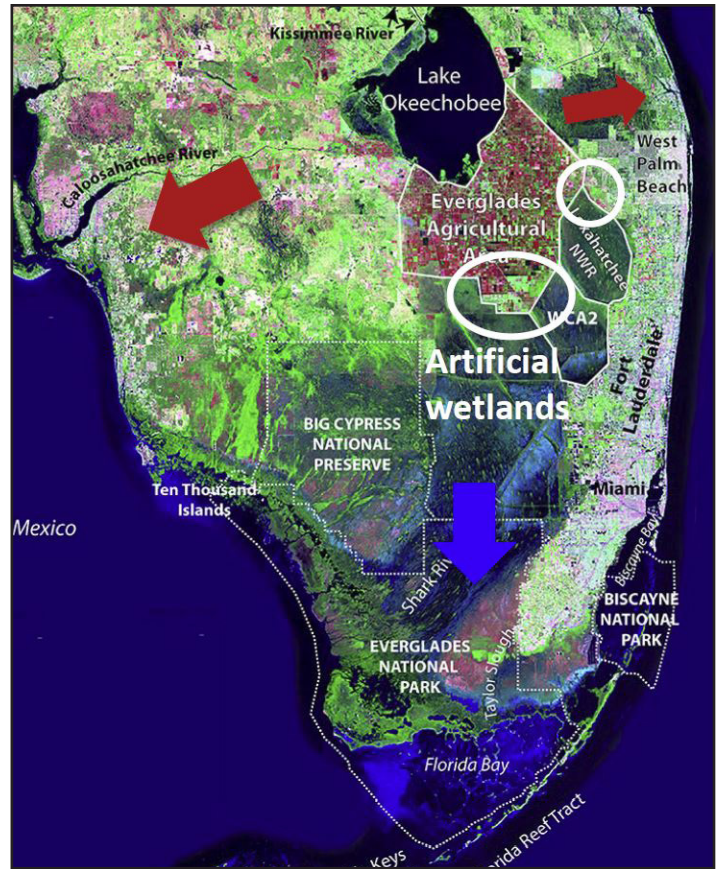
Going with the Flow

Historically, most of Florida south of Orlando drained into the Everglades, with much of that flow routed into and out of Lake Okeechobee. Heavy rain events would often result in the flooding of low lying areas east, west and south of the lake. Surface water that used to flow freely from the lake into the Everglades was cut-off by dams and canals built to reduce flooding. Today most controlled discharges from the lake flow west into the Caloosahatchee River and east into the St. Lucie River leading to a significant decrease of the freshwater supply to Florida Bay and saltwater intrusion into the Everglades.

During the journey, some of the freshwater flowing south would also seep into the ground, replenishing the Biscayne Aquifer, a limestone layer that underlies much of the southeastern part of the state. Diverting the water away from its natural overland course also means less water is available to replenish the Biscayne Aquifer, which provides drinking water to the Miami area.

Congress approved a 35-year, \$10.5 billion project in 2000 to send more freshwater south into the River of Grass. That project, the Comprehensive Everglades Restoration Plan, or CERP, remains the largest hydrologic restoration project ever undertaken. CERP has shown signs of success, but construction of a vast new water reservoir would collect much of the fertilizer-polluted water from Lake Okeechobee to keep it from running to northern estuaries where it stimulates harmful algal blooms. Within the reservoir, the water would be cleaned before being directed south to nourish the Everglades' important wetlands and on into Florida Bay.

Hurricane Irma provided a glimpse of what would happen to Florida Bay with higher freshwater flows. Salinities dropped, water levels rose, more fish began to spawn, and the most successful wading bird nesting season on record occurred.



Everglades Fact: Artificial wetlands south of the Everglades Agricultural Area (EAA) clean fertilized water but are too small to handle all of the lake's water.

By the Numbers

Saltwater recreational fishing in Florida contributes **\$11 billion** to the economy and supports close to **110,000 jobs**.

The state is No. 1 in the country with **5.4 million anglers** making **22 million fishing trips**.

LAND AND WATER CONSERVATION SOLUTIONS



Action to reduce nutrient inputs to estuaries, the coastal ocean, lakes, and rivers



Address routing of water to increase freshwater flows, especially in the eastern Everglades



Increase Everglades Agricultural Area (EAA) Storage Reservoir area by 50-70% more acres



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