

Biological and Ecological Science for *Florida* “The Sunshine State”

Florida is rich in sunshine and other natural resources essential to the State’s economy. More than 100 million tourists visit Florida’s beaches, wetlands, forests, oceans, lakes, and streams where they generate billions of dollars and sustain more than a million jobs. Florida also provides habitat for several thousand freshwater and marine fish, mammals, birds, and other wildlife that are viewed, hunted, or fished, or that provide valuable ecological services. Fertile soils and freshwater supplies support agriculture and forest industries and generate more than \$8 billion of revenue annually and sustain thousands of jobs.

The USGS Ecosystems Mission Area

The U.S. Geological Survey (USGS) Ecosystems Mission Area, the biological research arm of the Department of the Interior, provides science to help Florida achieve sustainable management and conservation of its biological resources and the ecosystems that sustain these resources. This work is done within the broader mission of the USGS — to serve the Nation with science that advances understanding of our natural resources, informs land and water stewardship, and helps safeguard communities from natural and environmental hazards.



In 2016, almost one million park visitors spent an estimated \$91 million in and around Everglades National Park. Watchable wildlife, like alligators and wading birds found in the park, are valuable to the State not only economically — the industry brings in about \$3 billion a year — but ecologically.



USGS research showed that protected sites within Dry Tortugas National Park and the surrounding areas of the Florida Keys National Marine Sanctuary are important to green sea turtles.

Charismatic Sea Turtles

Along with their charismatic appeal, sea turtles help maintain coral and seagrass in Florida, which are important for tourism and fisheries. Five species (loggerhead, green sea turtle, leatherback, Kemp’s ridley, and hawksbill) of protected sea turtles nest on Florida beaches. Using modern technologies, USGS scientists track these species to determine habitat use, migration routes, and feeding areas. Managers use the information to assess the effectiveness of marine protected areas and develop management strategies, particularly in areas with high numbers of visitors.

Big Reptile Problem

Burmese pythons and Argentine black and white tegus arrived in Florida from different continents, but they are similar in being large, unwelcome, a threat to native species and pets, and difficult to manage. The USGS contributes to the development of genetic tools and tracking technologies for early detection and characterization of the reptiles’ occurrence and spread. State and Federal wildlife managers use USGS information in control programs to remove these unwanted invasive species and protect Florida’s native wildlife.

Florida considers the Burmese python to be a species of high environmental, economic, and social concern.





Predatory non-native lionfish have negative effects on reef systems as they consume native fishes and invertebrates and compete with native predators. Managers can forecast the spread of lionfish using life-history and sighting data from the USGS Nonindigenous Aquatic Species Database.

Keeping Tabs on Biological Threats

Recognizing the need to document non-native fishes, the USGS and Florida partnered to develop the Florida Non-Native Fish Action Alliance. This group of agencies, universities, and nongovernmental organizations assembles fish experts twice a year in South Florida for a 2-day “hunt” for non-native and invasive freshwater fishes. Known as “Fish Slam,” this monitoring helps locate newly introduced species and documents expansions of existing populations.



More than 500 nonnative fish and wildlife species have been observed in Florida. The Fish Slam crew discovered 13 non-native fish species in Big Cypress National Preserve in 2017, including one species previously not detected in the Preserve.

Altered water patterns have reduced wading bird numbers throughout the Everglades by about 90 percent since the turn of the 20th century. With accurate information about depth and species responses, managers can simulate effects of management strategies on species of concern and decide which strategy is best for a desired outcome.



The USGS documented the 2016 Lake Okeechobee and St. Lucie estuary algal bloom to guide management response.

The Science of Slime

An over-abundance of nutrients and the right physical factors can allow blue-green algae (*cyanobacteria*) to create harmful algal blooms. Large blooms can move from lakes into waterways and onward to estuaries and beaches, creating a path of green slime, reduced oxygen for aquatic organisms, health hazards, and disruption of water-related activities. The USGS monitors water quality and bloom organisms to help water managers in South Florida understand and anticipate the timing, extent, and effects of algal blooms.

Recovery of Florida’s State Marine Mammal

The West Indian manatee helps make Florida a top tourist destination. The decision by the U.S. Fish and Wildlife Service to “downlist” this species from Federally endangered to threatened status incorporated the results of joint analyses by USGS and Florida scientists. Long-term study by USGS biologists of the life history, population characteristics, and ecology of the manatee in Florida helped managers restore degraded habitats, reduce the frequency of watercraft collisions with manatees, and minimize other negative effects on manatees in Florida and elsewhere in its range.



USGS works with partners around Florida to monitor manatee populations using photographs of boat-propeller scar patterns of more than 4,200 manatees.

Informing Everglades Restoration

The Everglades is a unique subtropical wetland and the cornerstone of the tourist, outdoor recreational, and agricultural economies of South Florida. A priority for Florida is to restore the quality and distribution of water to the Everglades while maintaining flood control and water supply for more than 7 million people. The slow-moving, shallow nature of this “River of Grass,” where small differences in water depth can have significant water-management and ecological outcomes, requires precise tools for measuring change. The Everglades Depth Estimation Network is a USGS-created and managed network of monitoring and modeling tools that provide real-time water-depth information to monitor the Everglades’ responses to hydrologic change and guide restoration strategies.

Author: U.S. Geological Survey

For more information:

Ecosystems Mission Area
<https://www.usgs.gov/ecosystems/>
<https://www.usgs.gov/ask/>
 1-888-ASK-USGS (1-888-275-8747)

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