

South Florida / Caribbean Network

Climate Change Resource Brief

Southeast Region
Inventory & Monitoring Program
National Park Service
U.S. Department of the Interior



Impacts of Climate Change and Related

Vital Signs

Climate change is expected to affect South Florida / Caribbean Network (SFCN) parks in several ways:

- 1) With 2467 miles of shoreline in SFCN parks, sea level rise is expected to result in inland movement of mangroves, alteration and loss of coastal habitats, and alterations in estuarine salinity patterns, consequently affecting important habitat for endangered and exploited species (e.g., sea turtles, sooty terns, rare plants, juvenile pink shrimp and fish, etc.);
- 2) Changes in frequency of extreme weather events, such as major hurricanes, droughts, extreme ocean temperature events, and frost frequency, are expected to accelerate the impacts of sea level rise, strongly impact coral reefs, and further stress inland communities;
- 3) Changes in temperature and precipitation are expected to impact hydrology, fire patterns, species migratory patterns, species ranges, reproductive timing and success, and phenology, including exotic species;
- 4) Ocean acidification is expected to impact coral and other marine species.

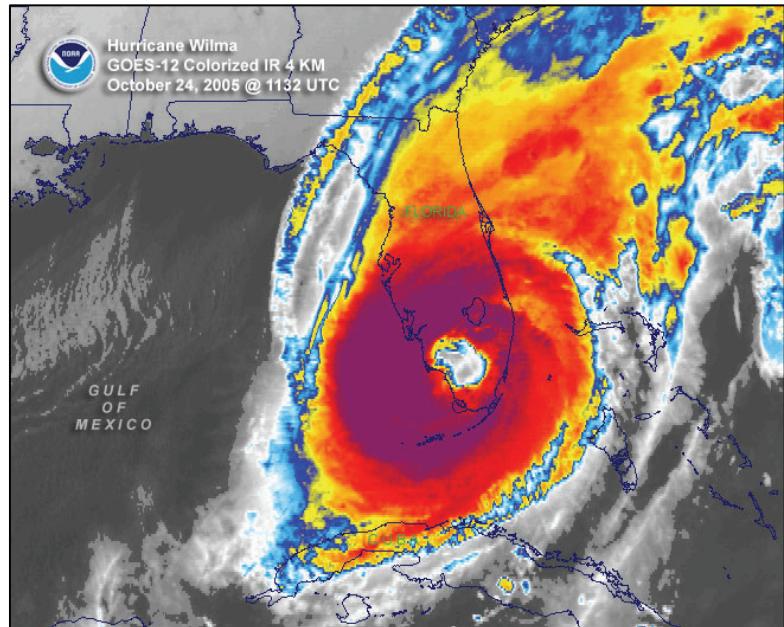
SFCN is directly monitoring several climate change-related vital signs and will be working with partners to report on additional vital signs.

Marine Benthic Communities

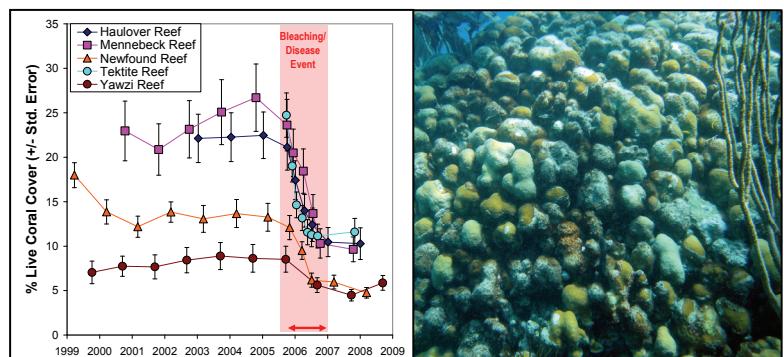
Climate change is expected to impact coral reef communities by increasing the frequency of extreme water temperature events (which result in coral bleaching), ocean acidification, and major storms. SFCN is monitoring coral communities and ocean temperatures in Biscayne National Park, Dry Tortugas National Park, Buck Island Reef National Monument, and Virgin Islands National Park. Monitoring captured the unusually warm ocean temperatures in the U.S. Virgin Islands which averaged 1.1°F higher in September 2005 than previously recorded temperatures (14 year data set), triggering a widespread coral bleaching event in the U.S. Virgin Islands that was followed by massive disease outbreaks and loss of 41-79% live stony coral cover at monitored reefs.

Coastal Geomorphology

Mangroves accumulate and retain sediment as well as add to soil with root biomass in a complex process that is also influenced by storms. Hurricane Wilma left 7cm of sediment at one site; however some has been lost in subsequent years. The extent to which these processes can keep pace with sea level rise is unknown. Soil Elevation Tables (SETs) are used to monitor soil elevation changes in mangrove communities in South Florida by multiple agencies including SFCN. SFCN also plans to implement SETs in U.S. Virgin Islands parks.



Hurricane Wilma in 2005. Although uncertainty exists, climate change is expected to increase the frequency of extreme weather events such as major hurricanes, droughts, and extreme ocean temperature events. Photo courtesy of NOAA.



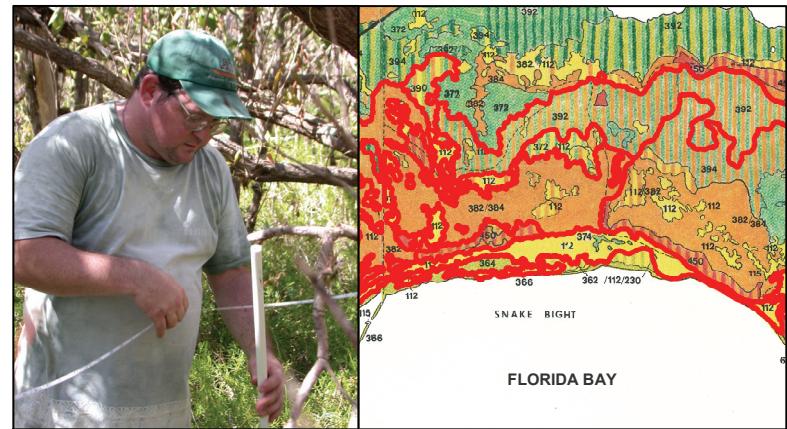
Monitored reefs in the Virgin Islands suffered losses of 41-79% live stony coral cover after warm ocean temperatures in 2005 caused widespread coral bleaching followed by massive disease outbreaks.



Left: Soil Elevation Table (SET) site among mangroves. Right: Leaf litter (green arrow) and sediment (black arrow) accumulated after Hurricane Wilma's storm surge. White arrow is previous soil surface level.

Mangrove-Marsh Ecotone and Other Vegetation Community Monitoring

As sea level rise occurs mangrove and other coastal plant communities will move inland into marshes. SFCN will be implementing a two-tiered monitoring approach to monitor changes in vegetation communities, combining field plot monitoring with regional change monitoring via aerial assessment and mapping. Inland vegetation communities also have long-term monitoring efforts to help understand impacts from climate induced changes in precipitation, exotic species, and frost frequency. SFCN has mapping and assessment efforts underway for Biscayne National Park, Dry Tortugas National Park, Buck Island Reef National Monument, Salt River Bay National Historical Park and Ecological Preserve, Virgin Islands National Park and portions of Big Cypress National Preserve and is assisting the South Florida Water Management District to map Everglades National Park.



Mangroves move inland with sea level rise. Monitoring combines field work with regional mapping using historical Olmstead vegetation maps and field plots.

Colonial Nesting Birds and Sea turtles

Species nesting in coastal areas such as sooty terns and sea turtles may lose critical habitat due to sea level rise. Considerable monitoring is already being conducted by park staff, University of Florida, Audobon, and other agencies. SFCN is extending monitoring of colonial nesting birds to Biscayne National Park and is updating and revising the Buck Island sea turtle monitoring database.



Sea level rise may affect important habitats such as nesting beaches and coastal wetlands for sea turtles, sooty terns, rare plants, and other species.

Other Climate Change Related Vital Signs Monitored by Partners

Considerable monitoring is already underway by park staff and partner agencies in South Florida and the U.S. Virgin Islands parks that provide information for other climate change related vital signs such as Surface Water Hydrology, Estuarine Salinity Patterns, Wetland Ecotones and Community Structure, Marine Fish Communities (in bays), Focal Fish Species, Marine Exploited Invertebrates (pink shrimp), American Alligator, Imperiled & Rare Plants, Invasive Exotic Plants and Animals, and others. SFCN plans to work with these existing programs to report these vital signs.



Opuntia corallicola is a state endangered prickly pear cactus found only on two islands, one in Biscayne National Park and the other in the Florida Keys. Sea level rise is a concern for this and other rare plant species. The population in Biscayne was located during a SFCN plant inventory and is monitored by park staff.

Contact Information

For more information, visit us on the web at:
<http://science.nature.nps.gov/im/units/sfcn/>

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South Florida / Caribbean Network Parks

Big Cypress National Preserve
Biscayne National Park
Buck Island Reef National Monument,
Dry Tortugas National Park
Everglades National Park
Salt River Bay National Historical Park & Ecological Preserve
Virgin Islands National Park