



## Inventory and Monitoring Program

Achieving the National Park Service’s mission to manage park resources “unimpaired for future generations” requires basic knowledge of the condition of the ecosystems and species within our national parks. To address information gaps and facilitate integration of reliable data into resource management, NPS has established a service-wide Inventory and Monitoring Program, composed of 32 “networks” of parks grouped by proximity and ecological similarity. There are two major components to the Inventory and Monitoring Program:

- 1) baseline inventories of park natural resources,
- 2) long-term monitoring of key indicators of ecological health called “vital signs”.

The 7 parks in the South Florida/Caribbean Inventory and Monitoring Network (SFCN) encompass a wide variety of freshwater and marine habitats including: wet prairies, marshes, pinelands, hardwood hammocks, cypress forests, mangroves forests, beaches, salt ponds, barrier islands, bays, coral reefs, seagrass, and deep oceanic areas.



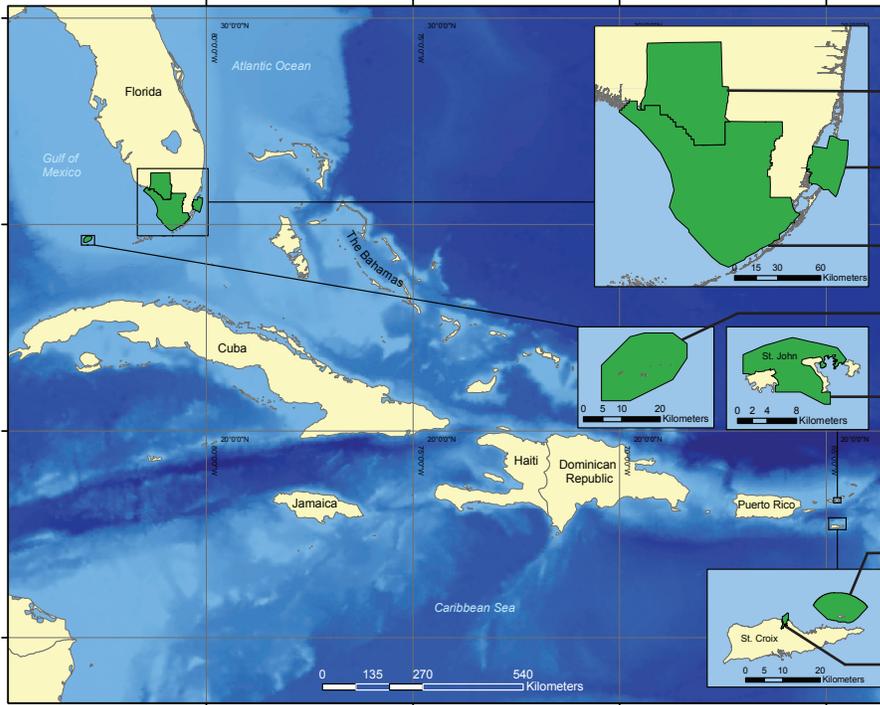
A research diver films a benthic transect, which will be used to collect various coral data.



Biologists collecting soil elevation data in the Everglades.

These parks face many challenges: regional large-scale changes in water management, land use changes around parks, coral reef declines, sustainable fisheries, nutrient enrichment, mercury toxicity, sea level rise, global warming, invasive species, rising visitor use, and protection of 270 federal, state, or territorial species of concern.

**The South Florida / Caribbean Network (SFCN) includes seven park units in South Florida and the U.S. Virgin Islands:**



- Big Cypress National Preserve (BICY)
- Biscayne National Park (BISC)
- Everglades National Park (EVER)
- Dry Tortugas National Park (DRTO)
- Virgin Islands National Park (VIIS)
- Buck Island Reef National Monument (BUIS)
- Salt River Bay National Historic Park and Ecological Preserve (SARI)

## Monitoring Vital Signs

“Vital Signs” are a “subset of physical, chemical, and biological elements and processes of park ecosystems that are selected to represent the overall health or condition of park resources, known or hypothesized effects of stressors, or elements that have important human values.”

The SFCN has identified a prioritized list of 44 vital signs and is developing protocols and field monitoring for 17 of them. Park staff, other government agencies, and NGOs already completely or partially monitor 33 vital signs.

The SFCN works closely with these organizations to collaborate on ongoing monitoring activities across the network and report those vital signs. Some vital signs remain unfunded or only partially funded at this time.

Monitoring of the vital signs is described in the “South Florida / Caribbean Network Vital Signs Monitoring Plan.”, which can be downloaded from our web site. It was completed in 2008 after a 4 year planning process involving input from over 100 area scientists and agency staff.

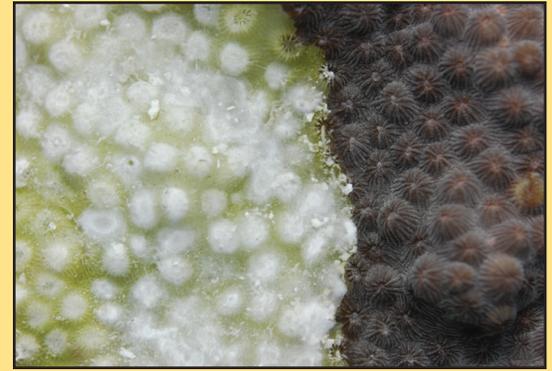
### SFCN Vital Signs

- ✓ Network is completely or partially responsible for monitoring
- Park staff or other agency is completely or partially responsible for monitoring
- ✗ Deferred due to time or monetary constraints

✓○ Marine Benthic Communities	✓○ Invasive/Exotic Animals	✗ Land Birds	○ Protected Marine Mammals
✓○ Marine Fish Communities	○ Visitor Use	✓ Amphibians	✗ Wetland Substrate
✓○ Surface Water Hydrology	✓○ Periphyton (Freshwater)	○ Sawfish	✗ Bats - USVI
○ Nutrient Dynamics	✓○ Mangrove-Marsh Ecotone	✓○ Coastal Geomorphology	✗ Reptiles - USVI
✓○ Invasive/Exotic Plants	○ Contaminants	○ Focal Fish Species	✗ Florida Box Turtle
✓○ Land-use Change	○ Phytoplankton (Marine)	○ Water Chemistry	✗ Marine Infaunal Community
✓○ Colonial Nesting Birds	○ Sea Turtles	✗ Imperiled & Rare Plants	✗ Island Insects
○ Estuarine Salinity Patterns	○ American Crocodile	✗ Butterflies	○ Air Quality - Deposition
✓○ Marine Exploited Invertebrates	○ American Alligator	○ Florida Panther	○ Air Quality - Mercury
✓○ Marine Invertebrates - Rare, Threatened, and Endangered	✓○ Wetland Ecotones & Community Structure	✓○ Benthic Communities Extent & Distribution	✓○ Forest Ecotones & Community Structure
✓○ Vegetation Communities Extent & Distribution	✓○ Freshwater Fish & Large Macro-Invertebrates	○ Fire Return Interval Departure	✓ Aquatic Invertebrates in Wet Prairies & Marshes

# Examples of Network Vital Signs Monitoring

*Marine Benthic Communities* include coral reefs, seagrass beds, and other submerged vegetation (algae). The SFCN is currently developing both coral reef and seagrass monitoring protocols. Beside the habitat they provide, reefs help people by providing recreation, supporting fisheries, protecting the shoreline, and creating tourism. Corals are very sensitive to water conditions such as temperature, clarity, and nutrient enrichment, and become severely weakened and susceptible to disease when conditions aren't good. Annual monitoring by SFCN captured the unusually warm ocean temperatures in the U.S. Virgin Islands in September 2005 which triggered a widespread coral bleaching event followed by massive disease outbreaks and loss of 41-79% live stony coral cover at monitored reefs.



The white coral skeleton of a *Montastrea franksii* colony is exposed as disease spreads across it.



Schoolmasters, chubs, sergeant majors, and blue-striped grunts schooling in BISC.

*Marine Fish Communities* make up vital trophic levels in the marine ecosystem and are valued by humans mainly for the fisheries they support, as well as tourism they draw. The health of fish communities can give us insight into the quality of their habitats, fishing pressure, and the state of the ecosystem. Many fish species are heavily fished and in some cases the parks are functioning as partial or complete marine protected areas within the overall South Florida and Virgin Islands seascape. The SFCN is working with many agencies to coordinate annual fish monitoring in and around its parks. Monitoring helps track the status of valuable grouper, snapper, parrotfish and surgeon fish and provides data to those managing fishing regulations. Other ecologically and economically important species such as spiny lobster, queen conch, long-spine urchins, and rare corals are documented at the same time.

*Colonial Nesting Birds* live on the boundary of two environments - needing both land and water resources to survive. Because they are sensitive to the conditions of both fisheries and terrestrial habitat and are susceptible to contaminants, monitoring of these birds gives insight into overall ecosystem health on a broad scale. The SFCN is developing a protocol for monitoring nesting effort of colonial birds' (cormorants, egrets, herons) in BISC. Nesting effort is a good metric for providing insight into colonial bird population status, sustainability of forage supply, and predictability in rookery resources. Monitoring is conducted via photographs, taken from helicopters and small boats, which are used to record location and size of rookeries and peak nest counts. The SFCN is also collaborating with partners conducting monitoring in other parks.



A roseate spoonbill and hatchling in their mangrove nest in Biscayne National Park.



*Bischofia javanica* tree with *Schinus terebinthifolius* shrubs, both invasive plants, along a road in EVER.

*Corridors of Invasiveness* are the preferential pathways along which invasive plants may be introduced into natural areas. Humans unknowingly accrue seeds while travelling and transport them to disturbed areas, like trails and campgrounds, where they quickly take root. Invasive plants are then able to grow and reproduce quickly in the new environment, because native limiters such as diseases, insects and herbivores aren't adapted to exploiting them. The SFCN is working closely with the Florida and Caribbean Exotic Plant Management Team to monitor Corridors of Invasiveness. Ground surveys of invasive corridors are done along roads, trails, beaches, canals, boat ramps, and campgrounds. Once problem areas are identified the park can take action. The sooner a population is identified and eradicated the better, as large and established stands are more difficult and expensive to treat.

# Taking Inventory

An important first step in creating effective monitoring programs is knowing the presence and distribution of the natural resources in the parks. The Inventory and Monitoring program is funding and working with partners to conduct natural resource inventories, including:

- Species Lists (vertebrates and vascular plants)
- Species Distribution (species of concern)
- Vegetation Inventory (maps)
- Base Cartography Data (maps)
- Soils Resources Inventory (maps)
- Geological Resources Inventory (maps)
- Water Body Location and Classification
- Baseline Water Quality Data
- Air Quality Data
- Air Quality-Related Values
- Climate Inventory
- Natural Resource Bibliography

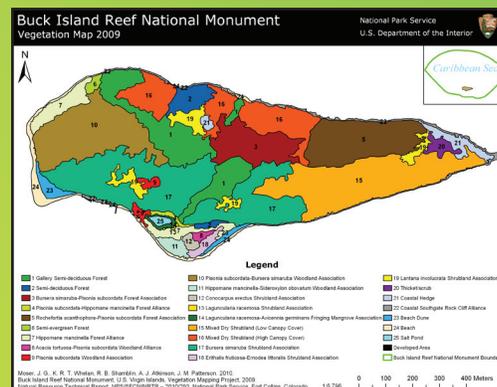
## Inventory Highlights



The largest population of *Consolea corallicola*, a state endangered, semaphore prickly-pear cactus, was discovered in Biscayne National Park; adding 570 individuals to the previously known 9.



The small & medium mammal inventory in EVER and BICY showed coyotes, a new species to south Florida, are now found throughout the parks.



SFCN is heavily involved directly or with partners in creating vegetation maps and underwater benthic maps of SFCN parks. The vegetation map of Buck Island Reef National Monument was completed in 2009.



*Ogcocephalus radiatus*, the Polka-Dot Batfish, one of the 66 fish species added to the BISC species list. DRTO's fish species list was increased by 17 species and BUIS added 60 fish species to their list.

## For More Information

Visit our website at <http://science.nature.nps.gov/im/units/sfcn/>

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