

ANNUAL ADMINISTRATIVE REPORT (FY 2008) AND WORK PLAN (FY 2009) FOR INVENTORIES AND VITAL SIGNS MONITORING

FY 2008-FY 2009

South Florida / Caribbean Network

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

South Florida / Caribbean Network Approval Signatures

Matt Patterson, Network Coordinator, South Florida / Caribbean Network	Date
Dan Kimball, Everglades/Dry Tortugas National Parks Chair, Network Board of Directors	Date
Larry West, Inventory and Monitoring Branch Chief Southeast Region	Date
Sherri Fields, Science and Natural Resources Division Chief Southeast Region	Date
Paul Hartwig, ARD Natural Resources Stewardship & Science Southeast Region	Date
David Vela, Regional Director Southeast Region	Date

South Florida/Caribbean Network Summary of Major Network Accomplishments and Public Interest Highlights for FY 2008

Executive Summary

The South Florida/Caribbean Network (SFCN) includes seven national parks with significant natural resources in the Southern tip of the state of Florida and the U.S. Virgin Islands of St. Croix and St. John: Big Cypress National Preserve, Biscayne National Park (BISC), Buck Island Reef National Monument (BUIS), Dry Tortugas National Park (DRTO), Everglades National Park (EVER), Salt River Bay National Historical Park and Ecological Preserve (SARI), and Virgin Islands National Park (VIIS). In FY 2008 the SFCN received \$1,770,087 in funding from the Inventory and Monitoring (I&M) program, as well as from the NPS Vegetation Mapping program, and the NPS Water Resources Division. This funding was used to certify completed inventories of vertebrates and vascular plants; conduct monitoring on marine resources following SFCN prototype monitoring protocols, and to complete the development of the SFCN Vital Signs monitoring plan for review and adoption during FY08. In FY08, biological inventories were conducted, including inventories for small and medium sized mammals.

SFCN completed its Vital Signs Monitoring Plan, which shifted the program's primary focus from planning to implementation of monitoring. This significant shift required increased office space and staff. The SFCN expanded their Palmetto Bay office with seven new workstations and a conference room that doubles as our secure storage during extreme weather events for central files and sensitive equipment. SFCN conducted marine benthic community Vital Sign monitoring in BISC, DRTO, VIIS, and BUIS. Marine Fish Community monitoring was conducted in DRTO, VIIS, VICRNM, and BUIS. SFCN hired a marine ecologist, a GIS/data management specialist, a wildlife biological technician and a vegetation biological technician. Two postdoctoral researchers were funded to develop protocols for marine fish communities and vegetation Vital Signs. SFCN completed a vegetation map for BISC, continued work on a vegetation map for western BICY and NW EVER, and BUIS. Benthic habitat maps were completed for DRTO and offshore BISC.

The FY08 budget was spent primarily on personnel, accounting for 53% (\$936,376), 3% (\$59,251) was spent on cooperative agreements, 18% (\$314,948) on contracts, 20% (\$355,139) on operations, 5% (\$81,773) on travel, and 1% (\$22,600) on Regional assessments.

The FY09 budget proposes spending \$1,844,493 with the following allocations: 55% (\$1,019,546) on personnel, 9% (\$169,000) on cooperative agreements, 14% (\$253,600) on contracts, 14% (\$255,457) on operations, and 6% (\$110,000) on travel, and 2% (\$36,890) on Regional assessments.

Program Accomplishments

Inventories

- In FY2008, the network completed and submitted certified datasets for all outstanding biological inventories.
- SFCN staff continued assisting USGS/University of Florida researchers with the Small and Medium Sized mammal inventory for Everglades National Park and Big Cypress National Preserve.
- A vegetation map was completed for Biscayne National Park.
- A benthic habitat map was completed for Dry Tortugas National Park in partnership with the Florida Fish and Wildlife Research Institute.
- A benthic habitat map was completed for the offshore portions of Biscayne National Park in partnership with the Florida Fish and Wildlife Research Institute.
- Progress continued on a vegetation map for western Big Cypress National Preserve and NW Everglades National Park.

Vital Signs Monitoring

- SFCN completed its Vital Signs Monitoring Plan!
- SFCN conducted marine benthic community Vital Sign monitoring in Biscayne National Park, Dry Tortugas National Park, Virgin Islands National Park, and Buck Island Reef National Monument.
- SFCN conducted marine fish community Vital Sign monitoring in Dry Tortugas National Park, Virgin Islands National Park, Virgin Islands Coral Reef National Monument, and Buck Island Reef National Monument in partnership with NOAA, Florida Fish and Wildlife Conservation Commission, and park staff.
- Two postdoctoral researchers were funded to develop protocols for marine fish monitoring and vegetation community monitoring Vital Signs.

Water Quality Monitoring

- Data connectivity was established between SFCN and the DataForEver South Florida water quality database, maintained by the Physical Resource Branch of Everglades National Park.
- SFCN and VIIS staff had duplicate samples collected and sent to two labs to perform a blind check of water quality results.
- SFCN purchased two Hobo weather stations for installation at BUIS and SARI.
- SFCN constructed a stage gage for installation at the head waters of SARI.
- A draft of the *Coral Reef Water Temperature Monitoring Protocol* was completed and comments were received from NPS-WRD. Reef temperature data was collected at all coral monitoring sites.
- SFCN continues supporting Biscayne National Park staff with negotiations between the park and Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project.

Public Interest Highlights

SFCN completes its Vital Signs Monitoring Plan!

SFCN is pleased to announce that we have received approval from WASO for our plan! This has been a monumental effort from many years of planning and we are now very excited to be shifting from planning to monitoring in the field. Special thanks to Andrea Atkinson, who led the effort of revising the Phase 3 plan to the final plan incorporating many comments from the peer review, as well as comments from Steve Fancy. The plan has been reformatted and looks fantastic!

Progress on a standardized South Florida Cooperative Reef Fish Sampling Protocol

On March 26, SFCN hosted the South Florida Reef Fish Sampling Methodology workshop organized by Todd Kellison of NOAA. There were about 29 attendees present from NOAA, University of Miami-RSMAS, Florida Fish and Wildlife Conservation Commission, and NPS. The revised “Draft Cooperative Reef Fish Sampling Protocol” is a joint effort to standardize reef fish monitoring protocols and sampling design in the Florida Keys ranging from Biscayne National Park through Dry Tortugas National Park. Past years have had two disparate methods of reef fish visual surveys, and this workshop was a follow-up to a meeting in spring 2006, which for the first time achieved agreement for the standardization of reef fish monitoring across all agencies. The workshop helped familiarize everyone involved with the different aspects of the newly revised protocol, answer questions, get agreement on definitions, identify areas that needed adjusting, agree on the different types of training that would occur, and assign leads. Training occurred in April, with classroom training on the revised, shared protocol, and in-water training to examine biologists’ ability to determine distance from the observer, fish species, and fish length in order to better calibrate the many observers involved and create minimum thresholds of expertise required. SFCN staff assisted with taking notes during the workshop and a SFCN funded post-doc with UM-RSMAS is working to pull-together the protocol from the different section authors, edit sections, write missing sections, and conduct analyses to fine-tune the habitat data collection portion of the protocol and allow improvement of sampling design stratification. SFCN also participated in implementation of the protocol in Dry Tortugas National Park.

SFCN installs DRTO coral monitoring sites

On three separate cruises, from May 11-16, May 25-31, and June 14-27, SFCN installed and conducted their first monitoring videos at 18 new coral monitoring sites in the new extensive design at Dry Tortugas National Park.using 1600 sq. m sites of 4 permanent transects each. Nine sites were installed inside the newly established Research Natural Area (RNA) in the park and nine sites outside the RNA. During the June cruise, the team also re-surveyed the 40 permanent transects at Bird Key Reef and SFCN was joined by the RSMAS/Univ. of North Carolina Southeast Florida Coral Reef Evaluation and Monitoring Program “SCREAM” team who also conducted their coral/sponge/algal monitoring protocol on the SFCN transects. This will allow the two groups to compare their methods and it is hoped will also allow SFCN permanent transects to be relatable to the random transects conducted by the SCREAM team in tandem with the RSMAS/NOAA fish monitoring conducted at DRTO. All three trips utilized the M/V Fort Jefferson as well as SFCN’s new boat.

Coral Disease Cruise

During the June 2008 coral monitoring cruise to the Dry Tortugas National Park, SFCN staff observed a severe outbreak of white plague disease, a coral disease syndrome that often results in partial or even full mortality of affected coral colonies. The outbreak appeared to be most severe at the highest coral cover sites located on a reef called 'Loggerhead forest' located 3-5 km NNW of Loggerhead key. Initial data suggest that up to 15-25% of coral colonies on this reef were affected by active disease. This outbreak was quite recent; SFCN's initial surveys of these sites during two cruises in May revealed that disease rates were around 2-3%. These rates are higher than normal, but much lower than were observed in June.

In response to the disease outbreak, SFCN organized a short cruise to return to the affected sites from July 15-18. This trip included SFCN staff as well as collaborators from George Mason University, who are experts in coral disease. We resurveyed permanent transects at the affected sites and collected tissue samples from colonies with active disease. Samples will be analyzed in collaboration with the US Coral Disease Consortium. Fortunately, the disease outbreak appeared to have stopped by mid-July; while there was some evidence of recent coral mortality, incidence of active disease were greatly reduced relative to June, back down to 2-3%.

Coral Reef Index Site Monitoring

A draft of the *Coral Reef Monitoring Protocol* was completed in December 2007. SFCN completed annual coral reef monitoring at all nine index sites across four parks. Monitoring includes filming 20 transects per site and collecting data on the presence of black spiny sea urchins and coral disease. Additional measurements in rugosity, the verticality of the reef was measured along each transect. At Ball Buoy and Amanda's Reef index sites, comparison transects were filmed with both Digital Video (DV) and High Definition Digital Video (HD) to evaluate the transition to HD video transects in the future.

SFCN presents at the U. S. Coral Reef Task Force meeting

Matt Patterson and Ben Ruttenberg attended the Coral Reef Task Force meeting in Kona, Hawaii. While on island, they met with the Pacific Islands Network staff to discuss collaborative opportunities, as well as presented to the task force the story of a rapid response to a disease outbreak in Dry Tortugas National Park this summer.

I. Overview and Objectives

The South Florida/Caribbean Inventory and Monitoring Network includes Biscayne National Park, Big Cypress National Preserve, Buck Island Reef National Monument, Dry Tortugas National Park, Everglades National Park, Salt River Bay National Historical Park and Ecological Preserve, and Virgin Islands National Park. The network has expanded to include eleven National Park Service staff, two post doctoral researchers, and several interns. Staff are primarily located in Palmetto Bay, Florida along the NW corner of Biscayne National Park, with two staff stationed in St. John, U.S. Virgin Islands. The network has roughly a dozen core vital signs which will be the primary focus of the staff's efforts over the coming years, focusing on marine fish and benthic communities, vegetation communities, invasive exotic plants and animals, freshwater fish and macroinvertebrates, colonial nesting birds, and land-use change.

Objectives for Biological Inventories:

- Compile and evaluate existing data for each park into NPS databases.
- Complete the documentation of 90% of vertebrate and vascular plant species in the parks through targeted field investigations.
- Complete vegetation mapping for network parks, with known accuracy.
- Complete benthic habitat maps with bathymetry for network parks, with known accuracy.

Objectives for Vital Signs Monitoring

- Conduct marine benthic community monitoring for network parks.
- Complete marine fish community monitoring protocol and conduct monitoring for network parks.
- Complete colonial nesting bird protocol and conduct monitoring.
- Complete Invasive/Exotic Plants: Corridors of Invasiveness protocol and conduct monitoring.
- Complete Land Use Change protocol and perform analysis.
- Complete Marine Benthic Communities protocols/SOPs for Seagrass and Conch.
- Complete Soil Elevation protocol and conduct monitoring.
- Complete Standard Operating Procedures (SOPs) for Surface Water Hydrology: Weather stations – BUIS, SARI.
- Complete Standard Operating Procedures for Surface Water Hydrology: Hydrology - SARI - Adding crest gage.
- Assist Park/EPMT to develop Protocol/SOP for Fire Return Interval Departure.
- Assist Park/EPMT to develop Protocol/SOP for Invasive/Exotic Plants: SRF-Digital Sketch Mapping.
- Complete Supplemental Analysis SOP for Estuarine salinity patterns.
- Complete Supplemental Analysis SOP for Marine Exploited Invertebrates: harvest data for Lobster, Pink shrimp, Crabs (Stone, blue, others), Sponges.
- Complete Supplemental Analysis SOP for Nutrient Dynamics -BICY, BISC, DRTO, EVER.
- Complete Supplemental Analysis SOP for Sea Turtles.
- Complete Supplemental Analysis SOP for Surface Water Hydrology: Hydrology – BISC.
- Complete Supplemental Analysis SOP for Water Chemistry-BICY, BISC, DRTO, EVER.
- Summarize/post reports for American Alligator, American crocodile, Focal fish species, Marine Benthic Communities: Seagrass - Florida Bay & Biscayne Bay, Marine Exploited Invertebrates: Pink shrimp, and Surface Water Hydrology: Hydrology – EVER, BICY.

II. Accomplishments and Scheduled Activities

The accomplishments and scheduled activities are described separately under the three SFCN branches:

- IIA. Marine Ecology Branch
- IIB. Community Ecology Branch
- IIC. Data Management, Analysis and Reporting Branch

Each section describes new staff, inventory activities and vital signs monitoring activities that relate to their branch. Water quality accomplishments and scheduled activities are described separately under the Data Management, Analysis and Reporting Branch.

II.A Marine Ecology Branch

Overview

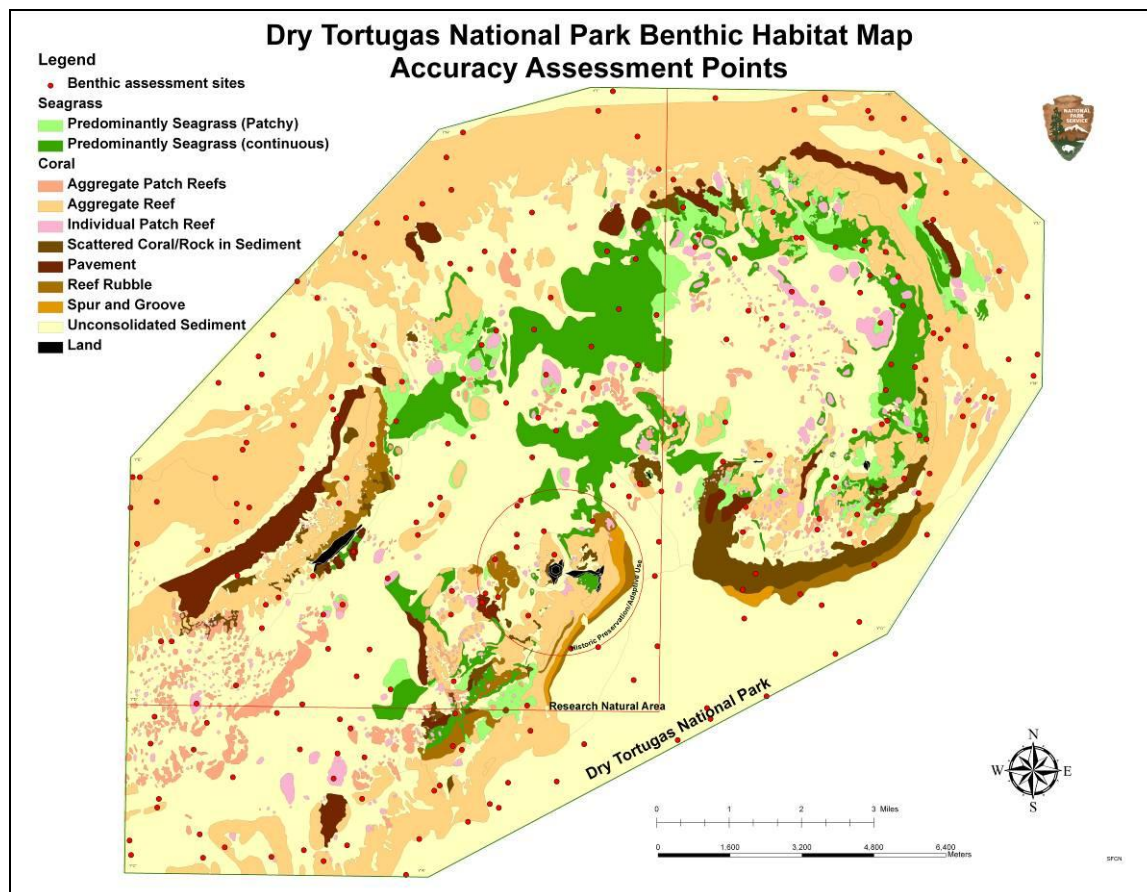
During FY08, the Marine Ecology Branch hired a marine ecologist to lead the branch and employed a number of interns. The group made a number of significant accomplishments including mapping, monitoring, and even organizing an emergency response to a coral disease outbreak.

Benthic habitat maps were created for DRTO and BISC, and over 250 sites were visited in DRTO to evaluate the accuracy of that map. The Marine Ecology Branch also successfully completed annual coral monitoring at all current index sites. Index sites are specifically selected reefs, each with 20 randomly placed transects. There are 2 index sites in DRTO (Bird Key Reef and Bird Key North), 2 index sites in BISC (Amanda's Reef and Ball Buoy Reef), 5 index sites in VIIS (Tektite Reef, Haulover Reef, Yawzi Reef, Mennebeck Reef, and Newfound Reef), and 2 index sites in BUIS (South Fore Reef and Western Spur and Groove). The Marine Ecology Branch also assisted SFCN partners with annual reef fish monitoring at all current sites, including DRTO, VIIS, and BUIS, while NOAA partners conducted reef fish monitoring in BISC.

In addition, the Marine Ecology group installed 18 extensive coral monitoring sites each with 4 transects throughout DRTO. During work on this project in June, we detected a severe outbreak of white plague disease on some of the healthiest reefs in DRTO. We contacted the Coral Disease and Health Consortium, collected additional disease prevalence data, and organized a rapid response cruise that brought coral disease experts with SFCN staff back to DRTO to assess the situation and collect appropriate samples. Fortunately, the outbreak appeared to have stopped by the time the response team arrived a few weeks later.

Inventories

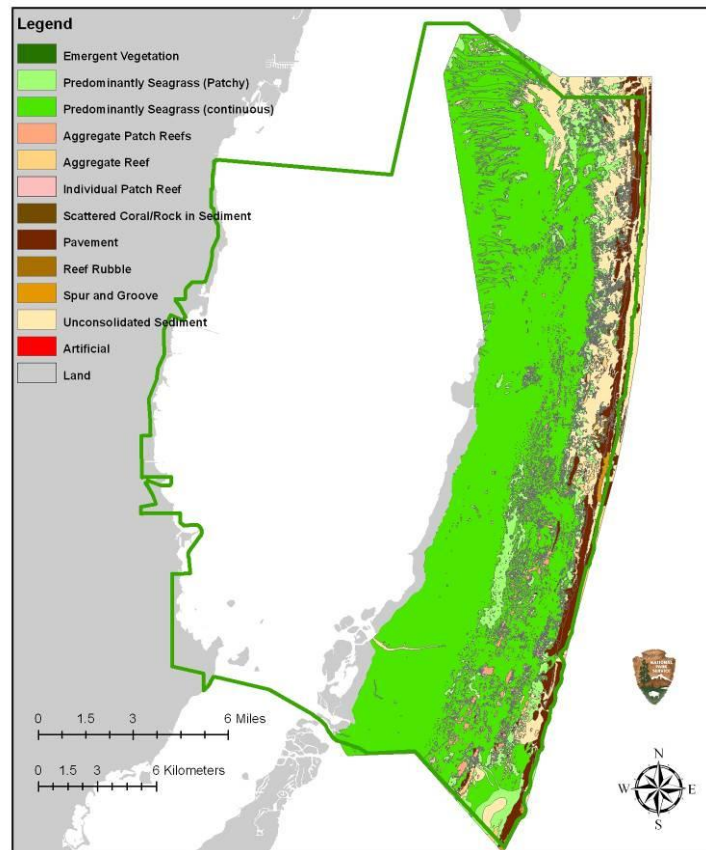
Dry Tortugas National Park Benthic Habitat Mapping Program



Project Overview: SFCN, in partnership with the Florida Fish and Wildlife Research Institute, has contracted with Avineon, Inc. to provide a full benthic habitat map for all of the submerged areas of DRTO. The map was generated using photointerpretation of Ikonos satellite imagery collected in 2006. The first draft of the full map is complete and over 250 accuracy assessment points throughout the park were chosen randomly and visited in June 2008. Assessments were made using drop camera surveys, SCUBA surveys with photography for selected deeper sites, and snorkeling surveys with photography for selected shallow sites.

Project Status: Interferometric sonar survey for bathymetry of deeper sites has been postponed due to equipment problems but will be conducted during fall 2008. Accuracy assessment of the map from data collected during June 2008 is ongoing. By the end of FY09, we expect to have a complete accuracy matrix and benthic habitat map along with full bathymetry layer for the entire park.

Biscayne National Park Benthic Habitat Map

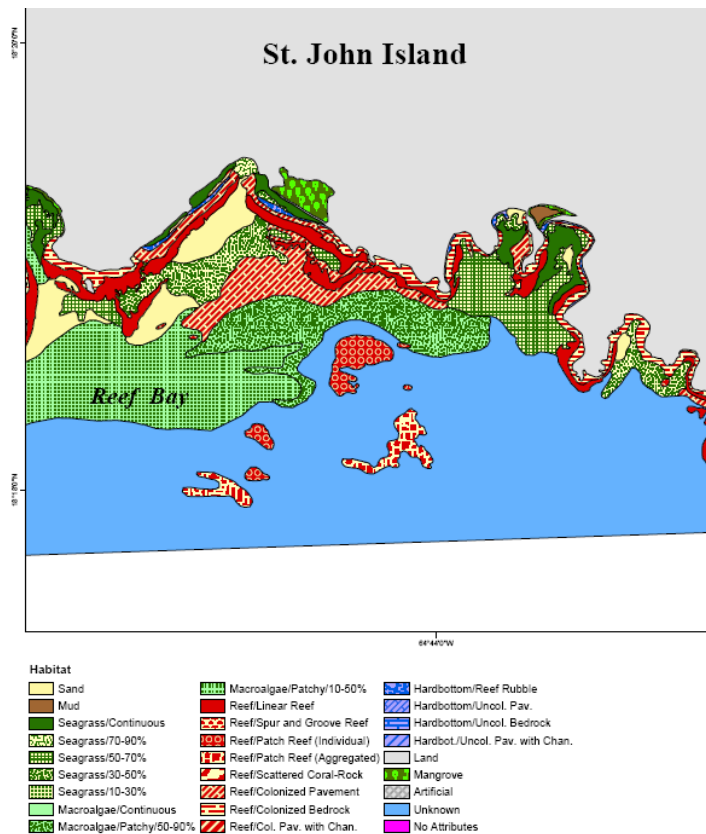


Project Overview: SFCN in partnership with the Florida Fish and Wildlife Research Institute, has contracted photointerpretation of aerial photography (1 ft resolution) collected in 2006 for the seaward portion of the park (contracted to Avineon, Inc.). LiDAR will be flown for the seaward portion of the park November 2008. The first draft of the benthic habitat map of seaward portion of the park was delivered in October 2008.

Project Status: LiDAR will be collected for the seaward portion of the park during November 2008, with 5 m horizontal resolution and 50 cm vertical (depth) resolution. During the first half of FY09 we will conduct full accuracy assessment of the benthic habitat map (200-300 points). We plan to have an accuracy matrix, a complete benthic habitat map, and complete bathymetry layer of the seaward portion of the park by end of FY09.

USVI parks

Project Overview: WRD Oceans and Coastal Programs Branch funded a benthic habitat map for VIIS and VICRNM (FY08 funding) that will provide much higher resolution than existing maps; work on this map will be conducted during FY09. First draft of benthic habitat map may be completed by end of 2008. Accuracy assessment of the first draft of the benthic habitat map will occur during second quarter FY09. Our goal is to have a complete benthic habitat map by end of FY09.



Benthic habitat map of part of VIIS produced by NOAA's Biogeography Team. Resolution of this map is low and large areas are unknown.

Vital Signs Monitoring

Marine Benthic Communities Vital Sign

DRTO

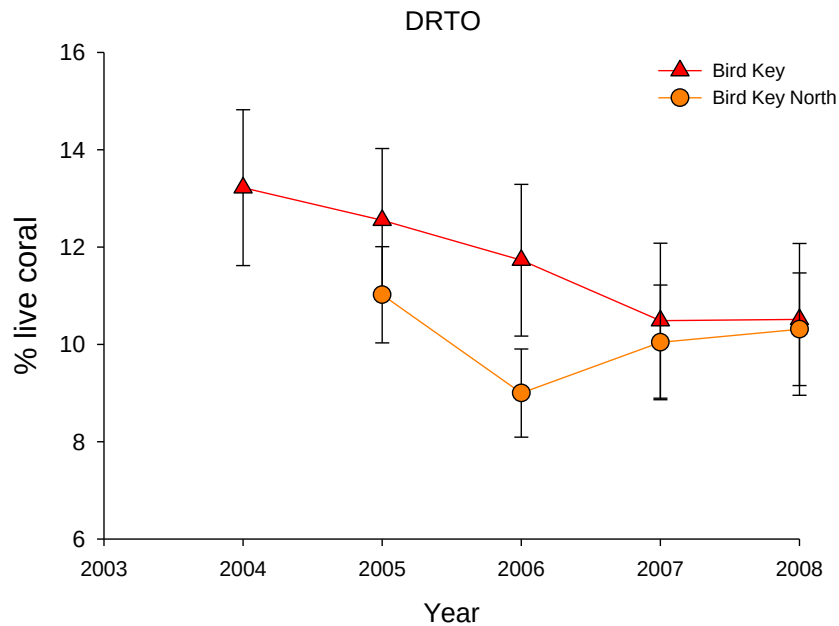
Accomplished in FY08: SFCN staff installed 18 extensive sites for coral reef monitoring, including 9 sites inside and 9 outside of the newly established Research Natural Area (RNA). Sites were selected based on rapid habitat assessment data collected at 157 sites during summer 2007. This effort included collaborative fieldwork with the Sanctuary Coral Reef Ecosystem Assessment and Monitoring (SCREAM) team scientists (UNCW & UM staff) to collect year 1 data on coral communities as permanent transects were installed. SFCN staff concurrently conducted annual coral reef index site monitoring at the two index sites (Bird Key Reef and Bird Key North). These index sites now include four and five years of data.

SFCN staff detected an outbreak of white plague disease on Loggerhead Forest, a reef NNW of Loggerhead Key. SFCN staff communicated with Coral Disease and Health Consortium and organized a rapid response cruise, including SFCN staff, DRTO staff, scientists from George Mason University (GMU), and NOAA. Outbreak sites were resurveyed ~1 month after initial outbreak and tissue samples were collected for analyses by GMU. During rapid response cruise, divers noted that the disease outbreak appeared to have stopped.



Montastrea faviolata with white plague disease, DRTO, June 2008

Continuation in FY09: SFCN staff, led by the marine ecologist and quantitative ecologist, will evaluate year 1 coral community data from the extensive sites. Specifically, we will examine levels of variation to determine if sufficient power exists to detect changes over time and differences between RNA and non-RNA areas of the park. SFCN staff will conduct annual sampling of both index and extensive sites throughout the park.

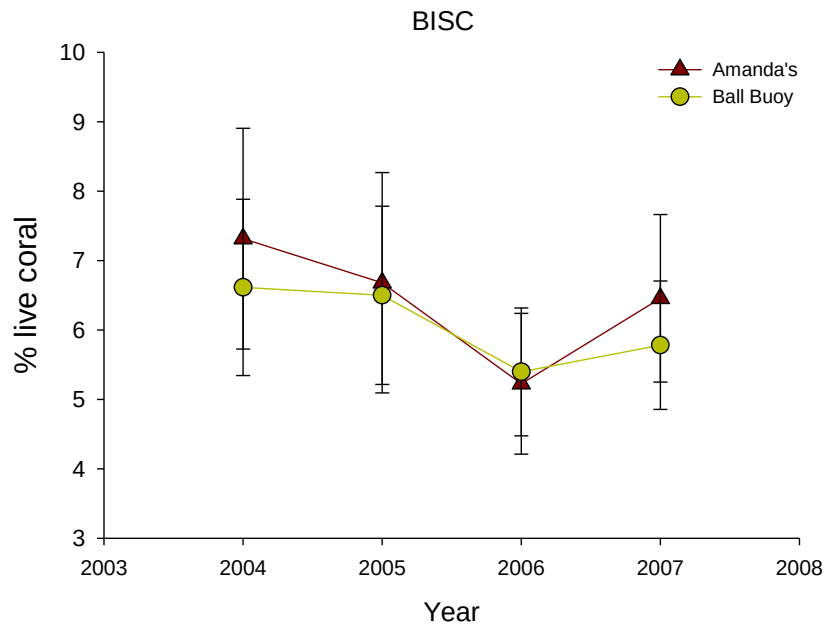


Trends in live coral cover at Bird Key Reef and Bird Key North, DRT0

BISC

Accomplished in FY08: SFCN staff conducted annual coral reef community monitoring of index sites at Ball Buoy Reef and Amanda's Reef, both of which now include 4 years of data.

Continuation in FY09: SFCN staff will conduct rapid habitat assessments (RHAs) at randomly selected points (ideally >100) to identify appropriate locations for installation of permanent extensive sites for coral reef monitoring, similar to the process conducted in DRT0 during FY07. SFCN will install and survey ~20 permanent extensive sites. Exact sample sizes will depend on levels of variation in the initial RHA data, and will be determined by the marine ecologist and quantitative ecologist. SFCN staff will also conduct annual coral reef index site monitoring.



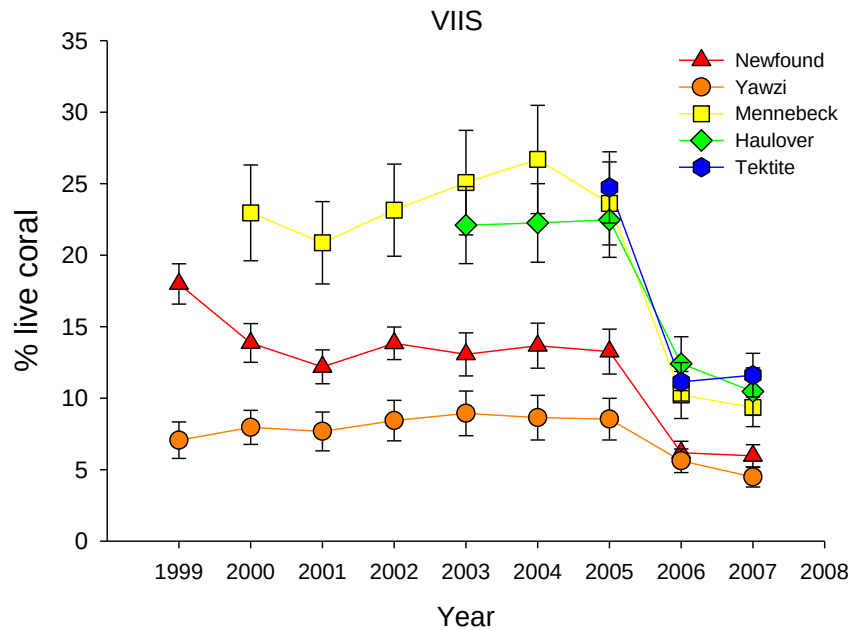
Trends in live coral cover at Ball Buoy Reef and Amanda's Reef, BISC



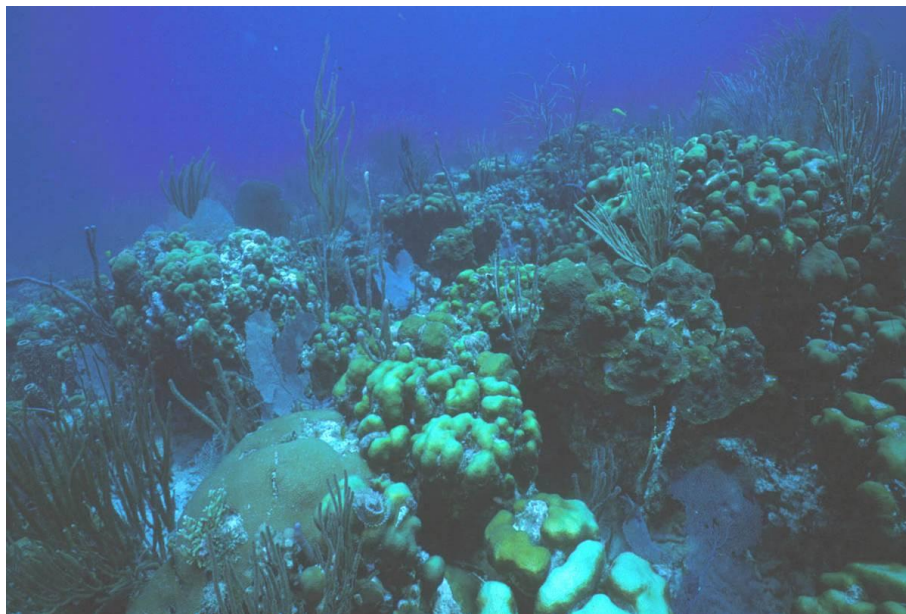
Coral reef and gorgonians at Amanda's Reef, BISC

USVI parks (VIIS, VICRNM, BUIS)

Accomplished in FY08: SFCN staff conducted annual coral reef index site monitoring in VIIS (Tektite Reef, Haulover Reef, Yawzi Reef, Mennebeck Reef, and Newfound Reef) and BUIS (South Fore Reef and Western Spur and Groove). For sites in VIIS, we now have between 4-10 years of data, and 7 and 9 years of data for sites in BUIS.

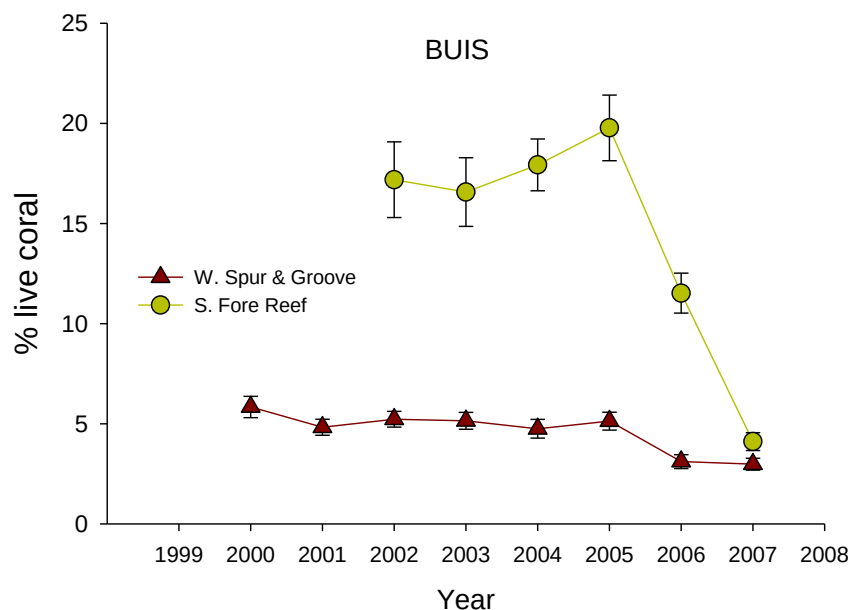


Trends in live coral cover at sites throughout VIIS



Coral reef community at Newfound Reef, VIIS

Continuation in FY09: SFCN will conduct annual coral reef index site monitoring at sites in VIIS and BUIS.



Trends in live coral cover at Western Spur and Groove and South Fore Reef, BUIS

Marine Benthic Communities – Seagrass and Conch

Initiated in FY 2009: SFCN will get copies of seagrass protocols and conch protocols currently in use in the Florida Keys National Marine Sanctuary, Florida Bay, and the US Virgin Islands and will conduct pilot work to test protocols and determine the level of effort involved in order to provide information to evaluate feasibilities of different sampling designs in light of park priorities and SFCN workload. However the protocol/sops are unlikely to be completed until late FY 2010.

Marine Fish Communities Vital Sign

Accomplished in FY08: SFCN funded Marilyn Brandt as a post-doc through the University of Miami-RSMAS program under Prof. Jerry Ault starting December 2007. Dr. Brandt has

- Completed analyses on eight recreationally and commercially important fish species and their relationships to benthic metrics (e.g. vertical relief, depth, coral cover, etc.).
- Compared the accuracy of fish observers in estimating benthic characteristics, such as live coral cover, relief, etc., by comparing this data with data collected during surveys specific to benthic habitats. These results have been used to refine the habitat stratification used by UM-RSMAS to determine sample sizes and direct the reef fish sampling effort conducted by NOAA, UM-RSMAS, FWC, and NPS in BISC, DRTO and the Florida Keys.
- Worked on optimal sample size estimates for BISC using variance estimates for habitat strata within BISC and throughout the keys. Similar analyses are ongoing to optimize sampling effort in DRTO.
- Worked on the cooperative Marine Fish Communities monitoring protocol for South Florida reef fish communities which is a joint effort by UM, NPS, NOAA, and FWRI and



Divers collect fish monitoring data near DRTO (Photo from J. Ault., UM-RSMAS)

involved both assembling and editing parts written by other groups as well as writing major portions herself.

In DRTO, a series of interagency cruises, including staff from FWC, NOAA, UM, and SFCN conducted biannual reef fish monitoring. This effort combined to sample ~300 sites in and around DRTO in over 1000 dives. A similar, albeit smaller, effort occurred in BISC, primarily undertaken by NOAA staff with some assistance from UM, and included 68 sites in the park.

In the USVI, reef fish monitoring is conducted annually by a joint effort of SFCN, NPS, and NOAA's Biogeography Team, and collects quantitative habitat data (benthic cover data, rugosity, etc.) in addition to data on the full community of fishes. At VIIS and VICR, divers sampled 169 sites in and around the park. At BUIS, divers sampled 122 sites.

Continuation in FY09: Working with the marine ecologist and quantitative ecologist, Dr. Marilyn Brandt will complete the optimal sample size estimates for BISC and DRTO and finalize the reef fish monitoring protocols for South Florida parks and USVI parks.

In DRTO, reef fish communities are normally sampled every other year; however, to provide additional data for the evaluation of the newly-implemented Research National Area, additional sampling of reef fish communities will be conducted in FY09. Staff at SFCN and EVER/DRTO are pursuing funding for this additional effort, which will likely include representatives from SFCN, UM, NOAA, and FWC.

In BISC, SFCN staff will collaborate with scientists at NOAA and UM to conduct reef fish

monitoring, using sample sizes and habitat allocation determined by Dr. Brandt's analyses. In the USVI, SFCN staff will continue reef fish monitoring with staff from NOAA's Biogeography Team. This effort will cover VIIS, VICR, and BUIS.

Other Projects

SFCN Marine Ecology SCA Intern Andrew Estep has proposed a study on bioerosion erosion rates and styles in BISC. Since reef persistence is a function of both constructive and destructive forces, understanding rates of reef bioerosion is critical to better management of coral reef habitat. This pilot project aims to examine rates and styles of bioerosion associated with dead *Acropora palmata* rubble located in a variety of rubble fields in BISC. The field component of this project will involve sampling a series of random points within distinct rubble fields designated from habitat maps of BISC. Samples of dead *A. palmata* rubble (<30 cm diameter) will be photographed in place and then collected for lab analysis. Samples will be slabbed and scanned at high resolution. Quantative measures of bioerosion will be attained using Adobe Photoshop and NIH ImageJ, following standard procedures for bioerosion studies.

II.B Community Ecology Branch

Overview

The Community Ecology Branch grew exponentially this year. We hired two permanent employees, and funded a postdoctoral researcher and full-time Resource Management Intern (ReMI). In addition to the new staff, we have purchased a number of physical resources for the branch including a field truck, electroshocking boat, all terrain vehicles, microscopes, camera, and GPS units. This has allowed the community ecology group to develop a critical mass of expertise and self-sufficiency needed to deliver the vital signs monitoring related to the community ecology branch. Also, this team expansion has allowed more progress in supporting inventories and mapping.

The small and medium mammal's inventory has documented 20 mammal species in BICY and 21 in EVER over the last year and this project will continue to work to detect and document the more elusive mammals over the next year. There are currently five vegetation mapping projects in progress, and one study of the vegetation classification. Initial progress towards the monitoring of indicators has begun with the evaluation of Soil Elevation Table sites in BISC, Colonial bird nesting, Forest Ecotones and Community Structure, Mangrove-marsh Ecotone, Wetland Ecotones and Community Structure, Freshwater Fish and Large Macroinvertebrates, and Periphyton Vital Signs. The Community Ecology Branch has made three presentations of its work this year as well.

Inventories

Small Mammals Inventory

Project Overview: Twenty mammal species have been detected in BICY and 21 in EVER to date. Between the two parks, 22 total species have been inventoried. The following species have not been detected in either park: the long-tailed weasel (*Mustela frenata*), Everglades mink (*Mustela vison*), the striped skunk (*Mephitis mephitis*), the eastern mole (*Scalopus aquaticus*), the southern flying squirrel (*Glaucomys volans*), the norway rat (*Rattus norvegicus*), and the red fox (*Vulpes vulpes*). The spotted skunk (*Spilogale putorius*) has not yet been detected in EVER, while the least shrew (*Cryptotis parva*) and the gray fox (*Urocyon cinereoargenteus*) have yet to be detected in BICY.

Thirteen and 11 live trapping sessions occurred since the beginning of the study in BICY and EVER, respectively. Since the start of the inventory, there have been 25 temporary camera sessions and 9 permanent camera sessions in BICY. There were 19 temporary and 7 permanent camera sessions that have been conducted in EVER.

The three original employees working on the mammal inventory moved on in early 2008. These technicians were replaced with Emily Pifer (project manager located at Davie office), Jennifer Eells (EVER technician), Danielle Payne (BICY technician), and Jean Olberte (BICY technician).

Project Status: The delayed annual report (March 2007 – June 2008) will be completed and sent to NPS by October 31, 2008, along with a trimester report describing our progress from July

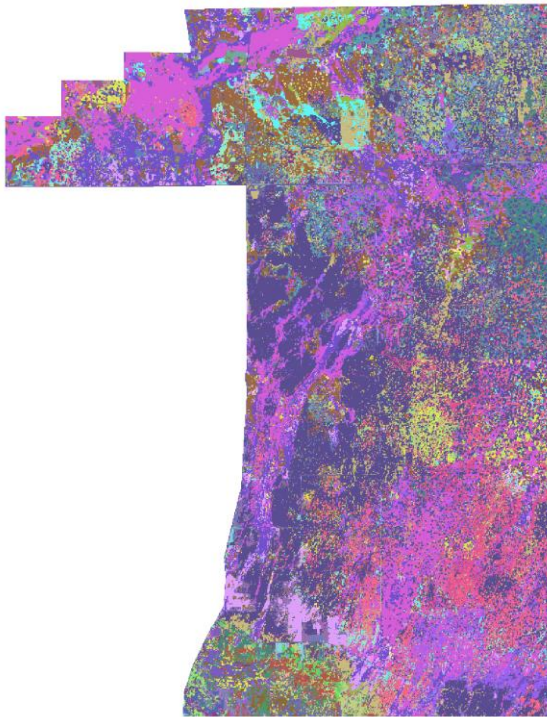
through October 2008. This should get us back on the original schedule of deliverables as stated in the proposal.

Permanent remotely triggered digital camera trap sessions will continue in each park, with the downloading of pictures every three weeks. Two week skunk and cottontail camera sessions will also continue for each park until March 2009. Camera traps will be set at remote sites as needed. Three monthly hiking surveys, along with three monthly dusk/dawn surveys will be completed for both parks through March 2009. Any scat and owl pellets collected during these surveys will be dissected and examined for mammal hairs, bones, etc. Mink scent stations for both BICY and EVER will be built in September, and mink trapping will be conducted from October through February. Aerial muskrat surveys will also be conducted during the dry season when lodges are more readily seen.

Two sessions of live trapping of *Glaucomys volans* will be conducted in EVER west of Royal Palm and at the pinelands in August and October. Feeder platforms with camera traps will be set up, and vocalization surveys will be conducted to increase our chances of detecting *G. volans* in EVER and BICY. One final session of *Rattus norvegicus* live trapping will be conducted in BICY.

During the final year, efforts will be focused on detecting those species found in only one of the two parks and those not yet detected in either park. All fieldwork should be completed by the end of March 2009, with report writing following until the end of June 2009.

**Draft Terrestrial Vegetation of western Big Cypress National Preserve (BICY), FL, and
northwestern Everglades National Park (EVER), FL, Derived From Aerial Photography
– Near Completion**



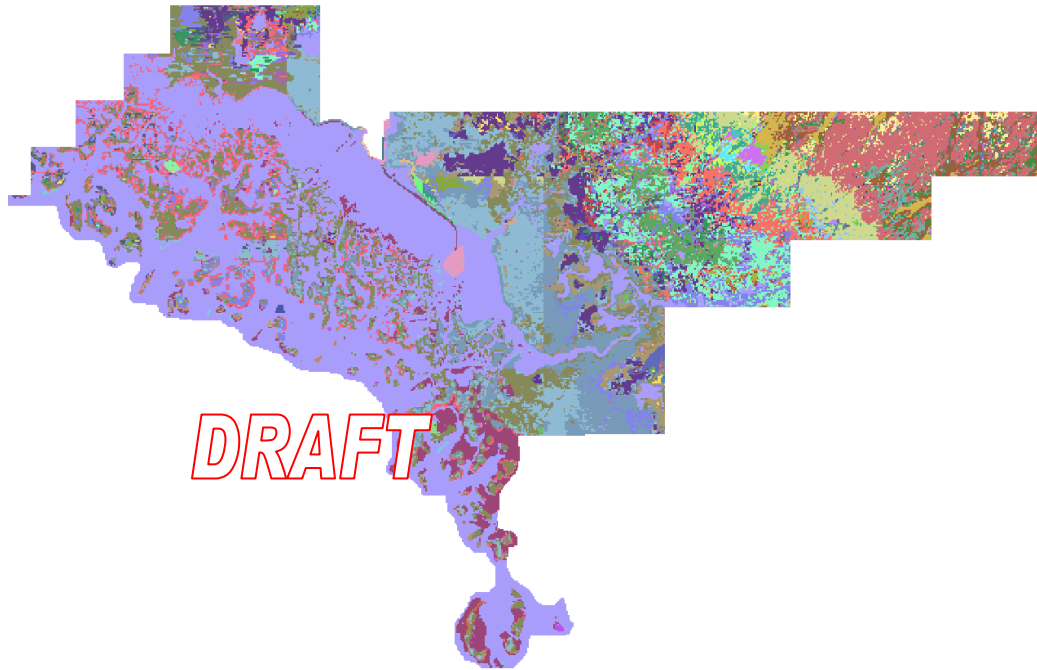
DRAFT

Project Overview: SFCN has contracted with Avineon, Inc. to map 1/3 of BICY and a small portion of EVER. We are using the same approach as the CERP RECOVER mapping project using a 50m x 50m grid cell approach and the Vegetation Classification system for South Florida Natural Areas by Rutchev et al (2005). The project is broken into 4 sections. Accuracy assessment points were randomly chosen in each section and were classified by two botanists in a helicopter concurrently with the mapping process.

Project Status: Section 1 (Florida Panther NWR): The 3rd revision of Section 1 (4th try) was accepted with a raw accuracy of 78% with a lower 90% confidence level of 72.5% accuracy. We chose to accept this section despite its low accuracy in order to provide the accuracy assessment points to the contractor as training points and as this was outside the NPS boundaries. The contractor was required to update the map using the accuracy assessment points.

Section 2 (Northwestern BICY): The 1st revision of Section 2 (2nd try) was accepted with a raw accuracy assessed to be 84% (240/285 points) with a lower 90% confidence level of 80.2% accuracy.

Section 3 (Southwestern BICY): The 1st revision of Section 3 (2nd try) was accepted with a raw accuracy assessed to be 84% (241/286 points) with a lower 90% confidence level of 80.2% accuracy.

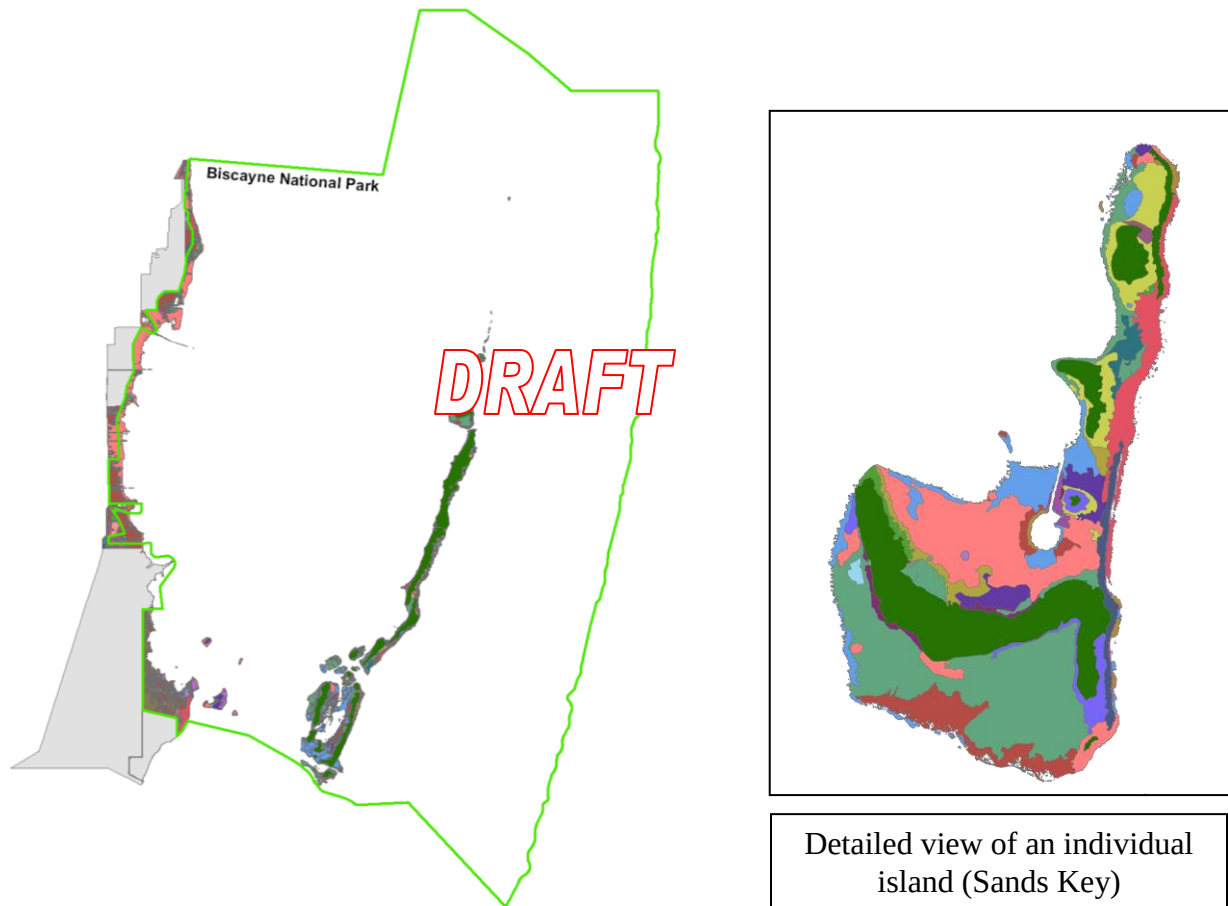


Section 4 (Northwestern EVER): The 1st version of Section 4 was not accepted with a raw accuracy assessed to be 63% (114/180 points) with a lower 90% confidence level of 57.0% accuracy. It has been sent back to the contractor for further improvement.

Once all 4 sections are complete, a report summarizing the vegetation categorical accuracy assessment by map, by park, and by vegetation category will be generated and all products submitted to the National Vegetation Mapping Program.

Rutchev, K., T. Schall., R. Doren, A. Atkinson, M. Ross, K. Bradley, J. Snyder, J. Burch, T. Pernas, B. Witcher, and others.
2005. Vegetation classification system for South Florida natural areas. National Park Service, South Florida / Caribbean Network, open-file report 2006-1240, Miami, FL.

Draft Terrestrial Vegetation of Biscayne National Park (BISC), FL, Derived From Aerial Photography, NDVI, and LIDAR – Near Completion



Project Overview

- Vegetation map was created by Pablo L. Ruiz, Patricia A. Houle, and Michael S. Ross of Florida International University.
- BISC includes 41 mangrove-dominated islands with extensive areas of tropical hardwood hammock, as well as a narrow strip of mangrove-dominated shoreline on the mainland.
- Polygon creation depended primarily upon 2005 aerial imagery (30cm, 5-band) as well as 2002 LIDAR data (mainland only).
- The vegetation map features a six-tiered hierarchical vegetation classification system, with all polygons defined to at least the third tier.

Project Status

- Map deliverables were received in February, April, May, and June 2008, with the latest draft covering all terrestrial portions of the park. Metadata still needs to be created.
- The June draft divides 20,913 acres into 4,998 polygons representing 103 vegetation classes.
- During map creation, 1,081 ground check points were visited by boat, on foot, or helicopter by the FIU & SFCN staff.
- SFCN's accuracy assessment of the map has begun. We have selected 392 accuracy assessment points. Upon completion, final products will be submitted to the National Vegetation Mapping Program.

Buck Island Reef National Monument Vegetation Map – In Progress



Project Overview: A draft of 206 polygons have been created for the 379 acres at BUIS based on observation of the USDA Orthophotograph image. Additionally Normalized Difference Vegetation Index (NDVI) has been calculated using the IKONOS image to help determine further differentiation of vegetation types. The vegetation classification for the BUIS vegetation was generated by using the previously cross-walked National Vegetation Classification System (NVCS) formations defined by Gibney 2000 for the USVI, which were then cross-walked against the NVCS formations listed in Areces-Mallea 1999. These community types were then cross-walked with species data from a 2003 vascular plant inventory (Ray 2003), which was updated during an interview with Dan Clark, a supervisory Exotic Plant Management Specialist with 5 years of field experience on BUIS.

Project Status: A trip to BUIS has been scheduled for the week of October 20th, with the goal of attributing 40 training sites.

Areces-Mallea, A. E., A. S. Weakley, X. Li, R. G. Sayre, J. D. Parrish, C. V. Tipton, T. Boucher. 1999. A guide to Caribbean vegetation types: preliminary classification system and descriptions. The Nature Conservancy, International Institute of Tropical Forestry – USDA Forest Service, Eros Data Center – U.S. Geological Service, USAID, Washington.

Gibney, E., T. Thomas, R. O'Reilly, B. Devine. 2000. U.S. Virgin Islands vegetation community classification: basic community descriptions – habitat mapping in support of land use and biodiversity planning in the Virgin Islands. Eastern Caribbean center.

Ray, G. 2003. Vascular plant inventory and mapping of Buck Island Buck Island Reef National Monument St. Croix, U.S. Virgin Islands. University of the Virgin Islands & the National Park Service.

Salt River Bay National Historic Park & Ecological Preserve Vegetation Map - In Progress



Project Overview: We will utilize the sources listed below to generate the National Vegetation Classification System (NVCS) formations. A similar methodology used at BUIS will be used to create the vegetation classification for SARI.

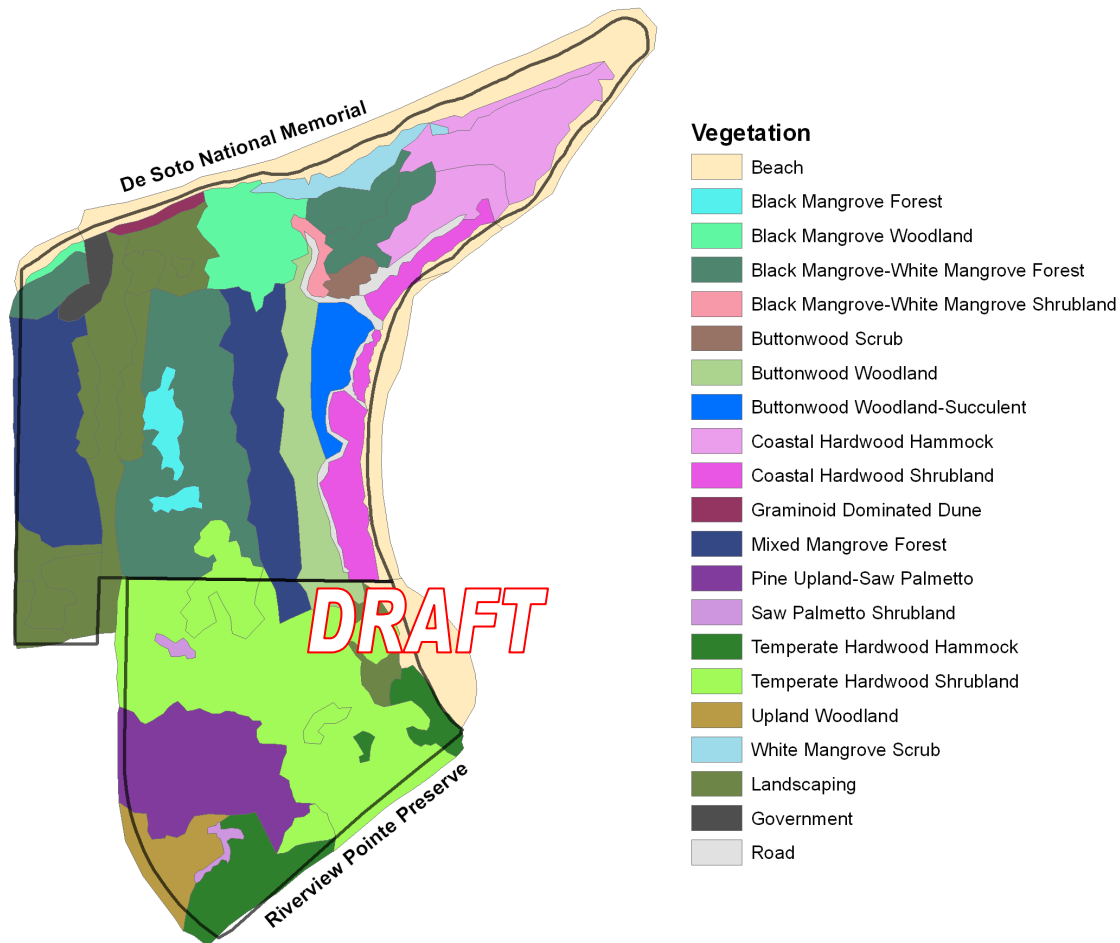
Project Status: Polygons have not been drawn for SARI, but an initial scoping site visit will be occurring October 23, 2008.

Areces-Mallea, A. E., A. S. Weakley, X. Li, R. G. Sayre, J. D. Parrish, C. V. Tipton, T. Boucher. 1999. A guide to Caribbean vegetation types: preliminary classification system and descriptions. The Nature Conservancy, International Institute of Tropical Forestry – USDA Forest Service, Eros Data Center – U.S. Geological Service, USAID, Washington.

Gibney, E., T. Thomas, R. O'Reilly, B. Devine. 2000. U.S. Virgin Islands vegetation community classification: basic community descriptions – habitat mapping in support of land use and biodiversity planning in the Virgin Islands. Eastern Caribbean center.

Ray, Gary. 2003. Vascular plant inventory and mapping of Buck Island Buck Island Reef National Monument St. Croix, U.S. Virgin Islands. University of the Virgin Islands & the National Park Service.

Draft Terrestrial Vegetation of De Soto National Memorial (DESO), FL, Derived From Aerial Photography and LIDAR (funded by NRPP; non-VMP)



Project Overview

- Project funded by NRPP. Purpose was to create and expand SFCN internal mapping capabilities.
- Vegetation map was created by Kevin R. T. Whelan and Eric Sudalter of the NPS South Florida/Caribbean Network.
- Initial polygon creation for this vegetation map utilized available 1m DOQQ imagery as well as bare-earth and first-return LIDAR data for Manatee county.
- Field work for this project was completed over two days in December 2007.

Project Status

- The latest draft divides 40.5 acres into 54 polygons representing 21 vegetation classes.
- The map is currently being fine-tuned for release as part of a comprehensive geodatabase of GIS resources for use by both park and network staff.

Dry Tortugas National Park Vegetation mapping

Dry Tortugas National Park was impacted by 5 hurricanes in 2004-2005. This has caused substantial change to the vegetation community. Initial scoping of the vegetation types present in the park were completed by Kevin R. T. Whelan (SFCN Community Ecologist) and Jimi Sadle (EVER/DRTO Botanist) in May 2008. Initial data was collected to determine dominant vegetation types present on this unique island system. The SFCN hopes to initiate on the ground vegetation mapping in 2009.

Assessment of an existing Virgin Islands National Park Vegetation Map.

Virgin Island National Park has a vegetation map produced by the Eastern Caribbean Center, Conservation Data Center at the University of Virgin Islands. There are 25 vegetation types within the national park that cover from the shoreline to the highest peak, Bordeaux Mountain. The park staff that have used the map feel that the map is relatively accurate; however, there was not an accuracy assessment of the product at the time it was created. A preliminary estimate suggests 350 accuracy assessment points are needed to adequately assess the map categories. This would require extensive site visit time in VIIS due to the limited roads and no DOI helicopter access, so most of the work will be accomplished by walk-in access. SFCN anticipates this assessment might be spread over FY 2009 and FY 2010.

Accuracy assessment of SFWMD EVER/BICY map

In the future SFCN hopes to do an independent accuracy assessment of the EVER/BICY map created by the SFWMD. Their project is divided into more than 20 sections. They currently assess the accuracy of each section as it is completed using 210 grid cells in which two in-house photointerpreters use stereoscopes to see if they concur with the classification and only visit the field if there appears to be an error through the interpretation of the aerial photography. This is more a measure of consistency in photointerpretation classification across the map. Their level for acceptance is that at least 90% (189/210) of the points must be accurately classified. We want to ensure their accuracy by conducting an accuracy assessment with our own 100% field check accuracy assessment methodology used to assess our BICY/EVER map to make sure their approach isn't introducing systematic errors into the map and to provide a direct comparison of the accuracy of the two mapping efforts before they are joined into a single seamless map at the end. SFCN hopes that we can find funding either through the national vegetation mapping program, the Comprehensive Everglades Restoration Plan, or other funding sources to ensure this broad area is well characterized from a vegetation mapping standpoint.

South Florida Data driven vegetation classification, Phase 1 project - Near Completion

Project Overview: The purpose of this project was to pull together existing vegetation data sets from the region's researchers, run a classification analysis on one major category (in this case the freshwater graminoid and herbaceous wetlands), compare the results with the existing vegetation classification (Rutchev et al, 2005) to see how well it is supported, and make recommendations based upon the amount, types, and quality of existing data on how to proceed with analyzing and/or field work in the other major vegetation categories (i.e. pinelands, hardwood hammocks & tree islands, cypress forests, coastal wetlands).

Project Status: Project PIs (Dr. Mike Ross and Dr. Jay Sah) at Florida International University held their second workshop on March 21, 2008. They have assembled all the various data that

had been provided to them (33 datasets for nearly 8,000 sites.) into a geodatabase. They have run a classification analysis on the freshwater graminoid and herbaceous wetlands portion of the system and presented their results at the Greater Everglades Ecosystem Restoration conference. Their final report is expected soon.

Based upon the results plus advice from the workshop, additional areas for analysis and vegetation plot data collection to assess the vegetation classification were identified in proposals discussed further below.

Rutchev, K., T. Schall., R. Doren, A. Atkinson, M. Ross, K. Bradley, J. Snyder, J. Burch, T. Pernas, B. Witcher, and others.
2005. Vegetation classification system for South Florida natural areas. National Park Service, South Florida / Caribbean Network, open-file report 2006-1240, Miami, FL.

Data Driven Vegetation Classification for South Florida – Phase 2.

SFCN would like to continue working with FIU (Dr. Mike Ross and Dr. Jay Sah) and have them use the geodatabase of vegetation data assembled in Phase 1 to complete analyses of several woody groups for which existing high quality, well-distributed data are dense enough to support a regional classification, or could quickly become sufficient with an additional data collection effort. These groups are: pine woodlands, hammock and swamp forests. SFCN will determine whether this can be funded and/or accomplished during FY09.

Future plans for Vegetation Classification System in South Florida.

The Rutchev et al (2005) classification contains 612 categories in a hierarchical classification system with about 336 vegetation categories at the lowest level not including exotics which add another 102 categories. To try and put 3-5 plots in the field for each of 336 categories would require 1008-1680 field plots which would be prohibitively expensive (2-3 plots per day would take 560-840 field days, a minimum of 2 people/field crew, helicopter/boat/airboat expenses, analysis time and writeup). This would be a very expensive project. For this reason we decided to see what existing data could be useful, and developed the “Data Driven Vegetation Classification, phase 1” project to gather existing plot and transect data for analysis. This resulted in a successful analysis of the marshes and prairies portion of the system without additional field data collection. Pinelands and some of the forests appear to have sufficient data for analysis as well. For the remainder, we suggest a prioritized strategy with plot work conducted in areas of higher management interest. However to test all portions of the classification with plot data does not seem realistic to us at this time. We suggest instead that some portions of the field classification may simply have a note that the category has not yet been tied to field data, although field experts feel it exists.

We suggest waiting until SFCN’s BISC and BICY/EVER mapping projects are complete as well as phase 2 of the vegetation classification project and use the results of all three to improve the classification and then seek funding for writing the classification in the NVC format with FY10 funding probably with NatureServe as the project lead and assistance from Mike Ross of FIU.

Summary of SFCN Expanded Mapping Capabilities

To expand SFCN internal mapping capabilities, SFCN conducted its first in-house vegetation mapping effort in De Soto National Memorial in addition to contract management and field assistance with the other SFCN WASO funded mapping projects. Our office has acquired

additional skills and tools to improve upcoming mapping projects. These include:

- SFCN staff include experienced local botanists with increased experience developing, applying and trouble-shooting the Rutchey *et al* (2005) vegetation classification for South Florida and practical experience applying the knowledge in a real mapping project as well as assisting with the contracted vegetation mapping projects.
- SFCN staff has experience designing and applying accuracy assessment procedures for both raster-based and vector-based vegetation maps.
- SFCN's GIS Specialist and Data Manager also bring expertise in field use (and troubleshooting) of GPS units and data collection and can assist with streamlined GIS editing and the development of topology rules to avoid common errors in raster and vector based vegetation maps.
- New equipment
 - Garmin GPSMap 60CSx units – (3) – These hand-held units feature a high-sensitivity GPS receiver that we have field tested to maintain satellite reception even in dense canopy cover. The realtime accuracy is typically 2-6 meters, with the capability to average collected points to obtain an improved reading. These units represent a huge improvement over our existing handheld and backpack units that struggle to maintain adequate signal strength in moderate canopy. (\$1,000)
 - Transsource Roadrunner M230 Rugged notebook – (2) – These laptops include 14" sunlight readable touch screens and are fully ruggedized to protect against water and drops during field use. (\$10,000)
 - Helicopter safety gear (personal protective equipment - \$3,000)

Vital Signs Monitoring

Colonial Nesting Birds Vital Sign

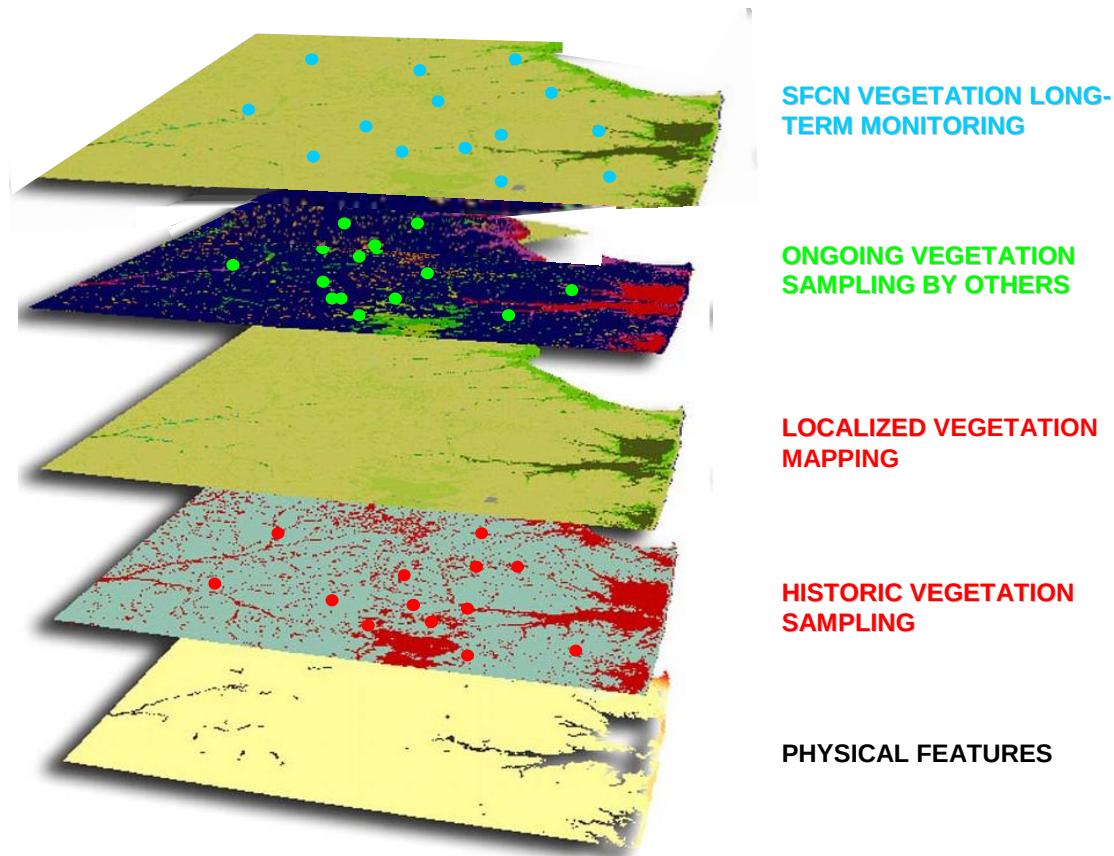
Accomplished in FY 2008: SFCN became familiar with methods and equipment used in the monitoring of wading bird colonies in Everglades National Park (EVER) by sending Raul Urgelles with Lori Oberhofer of EVER for a reconnaissance flight of eagle nests and wading bird colonies. SFCN staff then conducted an initial flight over Biscayne National Park (BISC) to determine fuel consumption and flight time for a complete census of the park's land area. A Bell Jet Ranger helicopter was used to fly over the entire coastline and islands of BISC. SFCN purchased a Nikon D200 10-megapixel digital SLR camera and a Nikon 300 mm VR (vibration reduction for image stabilization) zoom lens as part of the equipment necessary for Colonial Nesting Birds vital sign monitoring in BISC. Discussion of colonial bird surveys was initiated with Buck Island Reef National Monument staff. The SFCN is currently reviewing a report summarizing ten years of monitoring and status of wading bird nesting colonies in EVER.

Continuation in FY 2009: For 2009, SFCN will begin a pilot study of colonial nesting birds in BISC and develop a protocol for the monitoring. SFCN will also develop Standard Operating Procedures (SOPs) for the pilot study in BISC, as well as gather and report the data from existing monitoring programs in the other parks.

Forest Ecotones and Community Structure, Mangrove-marsh Ecotone, Wetland Ecotones and Community Structure Vital Signs

Historical and Ongoing Vegetation Monitoring Geodatabase

Accomplished in FY 2008: In order for SFCN to help designate sites for long-term vegetation monitoring, SFCN is creating a geodatabase to spatially display locations of historic vegetation sampling, vegetation mapping, and locations of current and ongoing vegetation sampling. To



collect information to go into the geodatabase, Steve Wathen visited the museum archives at Everglades National Park and also with current researchers at Big Cypress National Preserve and Everglades National Park.

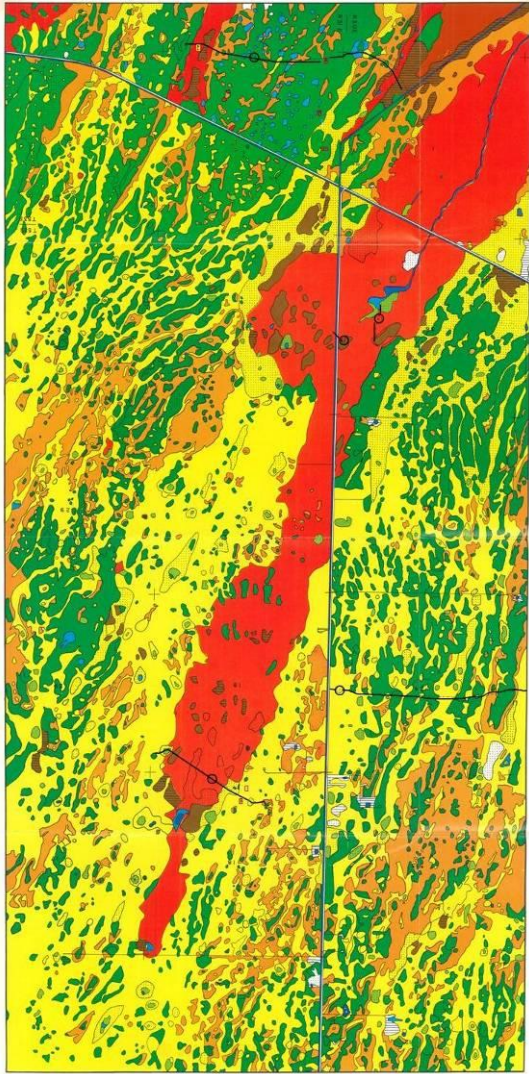
Continuation in FY 2009: For 2009, SFCN will finalize the geodatabase and databases for the four Florida parks and begin researching and building a geodatabase for the three Virgin Island parks.

Scanning and Georectification of Community level Vegetation Maps (circa 1980s)

Accomplished in FY 2008: The SFCN located eight plant community level inventories that were created in the early 1980's by Gunderson and Loope or by Olmsted et al. Four of the inventories of plant communities are located in BICY and four are located in EVER. The oversized paper vegetation maps were scanned at high resolution. Thus far two of these maps

(Turner River area and Flamingo to Joe Bay) have been georectified to describe their proper geographic location. Work has also begun to hand digitize the vegetation polygons.

Continuation in FY 2009: In 2009 SFCN will continue to georectify the scanned maps and digitize polygons as needed to support field activities.



Historic BICY vegetation map.

Coastal Geomorphology Vital Sign

Soil Elevation Tables (SET) pilot work

Accomplished in FY 2008: From January 2008 to May 2008 we visited 15 potential SET locations for establishment in BISC. These initial areas were based on the use of aerial photography for evaluation of minimum distance from park boundary and areas of relatively undisturbed mangrove forest. These sites were then visited by SFCN staff via motorboat to assess: access to area, presences of berm, possible inclusion in area restoration, DBH and tree

height, relative amount of trash. Additionally, initial construction of catway support devices also was accomplished.

Continuation in FY 2009: We will develop the SET protocol and accomplish pilot work related to establishment of two sites in BISC.

Invasive/Exotic Plants Vital Sign

To be initiated in FY09: The Vital Sign for monitoring invasive-exotic species seeks to discover whether new invasive plants are establishing themselves in SFCN parks. The SFCN monitoring objectives for 2009 will include a pilot study utilizing “corridors of invasiveness” (roadside surveys) to detect existing invasive plant species and develop a protocol for future monitoring. SFCN will also collect additional information on invasive species by creating a website database where researchers and park staff can fill out exotic plant reports for their areas of research. To accomplish this, SFCN will team with the Southeast Exotic Pest Plant Council (SE-EPPC) to create the geo-referenced database powered by Google Map. Brochures promoting the website database will be made and distributed to the parks for circulation to permitted researchers. Standard Operating Procedures (SOPs) for annual retrieval of website reported data will be developed.

Invasive/Exotic Animals Vital Sign

Accomplished in FY 2008: SFCN purchased an electrofishing boat for use in the exotic fish component of the Invasive/Exotic Animals vital signs monitoring. The 20-foot all-aluminum boat is being built by Oquawka Boats and Fabrication Inc. in Oquawka, Illinois. Electrofishing equipment was purchased from Smith-Root Inc. in Vancouver, Washington.

Initiated in FY 2009: The boat and equipment will be used in a pilot study that will sample along canals adjacent to Everglades National Park (EVER). The monitoring will be a collaborative effort between SFCN staff and EVER staff.

Freshwater Fish and Large Macroinvertebrates Vital Sign

Accomplished in FY 2008: SFCN purchased Leica stereomicroscope equipment for use in the identification of organisms collected in the Freshwater Fish and Large Macroinvertebrates vital sign monitoring.

Initiated in FY 2009: SFCN plans to initiate a pilot study that includes selection of sites for long-term monitoring and sample collecting in Big Cypress National Preserve (BICY).

Periphyton Vital Sign

Accomplished in FY 2008: SFCN established a purchase order with Michigan State University for Periphyton sample processing and for the creation of an interpretive report of the data that would indicate the ecological condition of the collection site based on the taxonomic grouping and other relevant published work. Additionally, the data will be investigated to determine if there is sufficient differentiation between sample locations to use periphyton (i.e. diatoms and/or soft algae, separate or combined) as a long-term indicator of ecologically impacted sites. Additionally, a recommendation will be included in the report that will indicate if just diatom counts are sufficient for differentiation between sample locations. The field collection of

periphyton will begin in early FY09.

Initiated in FY 2009: For 2009, SFCN plans to initiate a pilot study that includes selection of sites for long-term monitoring and sample collecting in Big Cypress National Preserve (BICY).

SFCN continues supporting Biscayne National Park staff with negotiations between the park and Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project:

Accomplished in FY 2008: Dr. Kevin Whelan assisted Biscayne National Park during FY08 several times to address the requests for professional assistance evaluating the Miami-Dade Water and Sewer Department's proposal for the development of a Wastewater Reuse facility adjacent to the park's western boundary. NPS concerns include the ability for the pilot project to adequately demonstrate the treatment process having no negative impacts to the park ecosystems and adjacent lands. SFCN continues to assist in order to ensure any pilot project that goes forward would be able to produce scientifically defensible results to more fully understand the consequences of treated wastewater entering the park.

II.C Data Management, Analysis, and Reporting Branch

Overview

The Data Management, Analysis and Reporting Branch worked this year to finalize Inventory projects; finalize the Vital Signs Monitoring Plan; provide sampling design, GIS, data management, and analytical support to the various vital sign and water quality monitoring projects underway; provide general IT support to SFCN and handle the office expansion; and provide information support to the parks. Presentations were given at the NPS Data Management and GIS Conference in April as well as the ESRI International User Conference in August 2008. A new GIS/Data Management Technician was hired as well as a succession of SCA interns.

2008 saw the doubling of the SFCN office with seven new workstations added to the network in the new office space and voice-over IP phones were added. New computers were also purchased for the VIIS office of SFCN. VPN connectivity was established to the VIIS office and also to DataForEver in EVER. In FY09 we expect to establish connectivity to the SFCN Boat Storage facility from the SFCN server.

SFCN fulfilled more than 20 requests for spatial data from national parks, universities, and state/federal agencies. Examples include Florida Bay aerial imagery sent to EVER to assist with seagrass scar mapping, proposal maps for a proposed visitor use area in BISC, and general GIS support for incidents in BISC.

SFCN will host a South Florida/Caribbean GIS Meeting in early 2009. This meeting will provide an opportunity for the WASO-NR Coordinator, SER Region GIS Specialist, and Park and SFCN GIS Specialists to discuss GIS project directions.

Inventories

Wrapping up multiple inventory projects

Project status: Metadata for the following inventories was completed and GIS files were uploaded to the NRDataStore:

- Freshwater fish (VIIS, BICY, BISC),
- Cryptic reef fish (BISC, BUIS),
- Reptiles and amphibians (BICY, BISC, BUIS, EVER, VIIS),
- Vascular plants (BISC, BICY),
- Inventory of pelagic fish in non-reef areas (DRTO)

Inventory of bats – all network parks

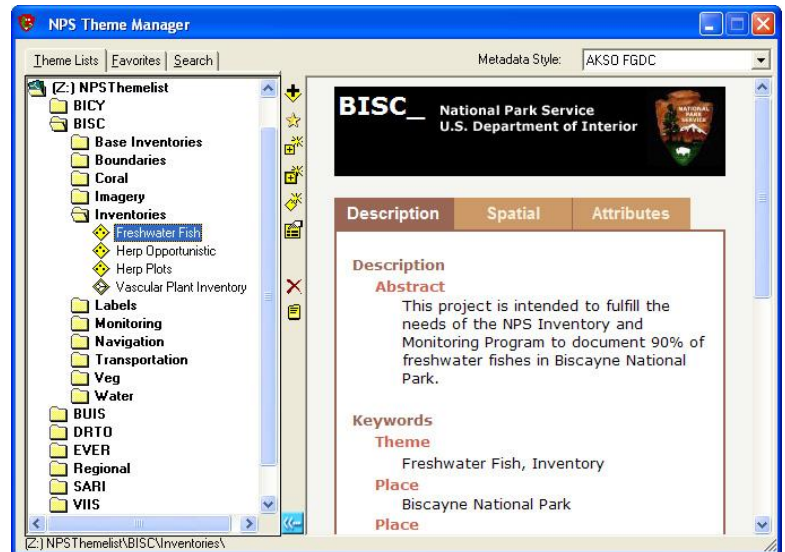
Project status: Initial cleanup of data files was started. In FY09 we will finish conversion of the raw data files, review GIS files, and post the GIS files to NRDataStore.

Small and medium sized mammal inventory – BICY, EVER

Project status: We provided basic database design support for preliminary field data. In FY09 we expect to assist with metadata creation, review the final report and data, and post GIS files to NRDataStore.

Complete and distribute full GIS ThemeManager datasets; implement in parks and train park staff in use where needed

Project status: Throughout the year the SFCN GIS / Data Management Technician has been editing and updating ThemeManager to include datasets from completed inventories as well as data from other cooperators. Updates to the SFCN ThemeManager list will be distributed to each of the parks and training provided as necessary for GIS ThemeManager.



Datamining

Project status: The data management team will be working to provide a searchable intranet interface to allow access of the 16 GB of articles that were scanned during the 2006 Datamining Project.

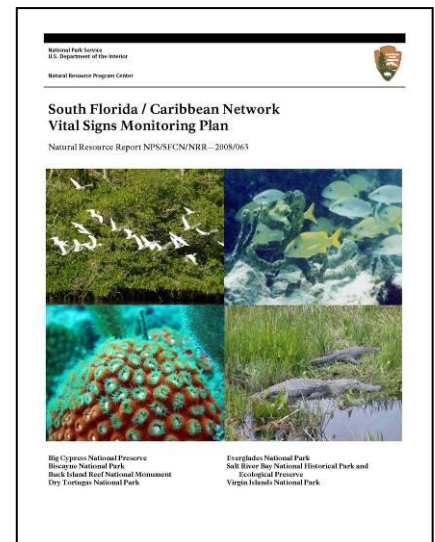
Vital Signs Monitoring

Vital Signs monitoring Plan

Accomplished in FY08: SFCN completed the Phase 3 draft of the SFCN Vital Signs Monitoring Plan in December 2007, received external peer review plus review from WASO, NPS-WRD and NPS-ARD, incorporated comments, converted the plan into 3 column format, and finalized the plan on September 30, 2008.

Marine Benthic Communities – Index sites, *Diadema*

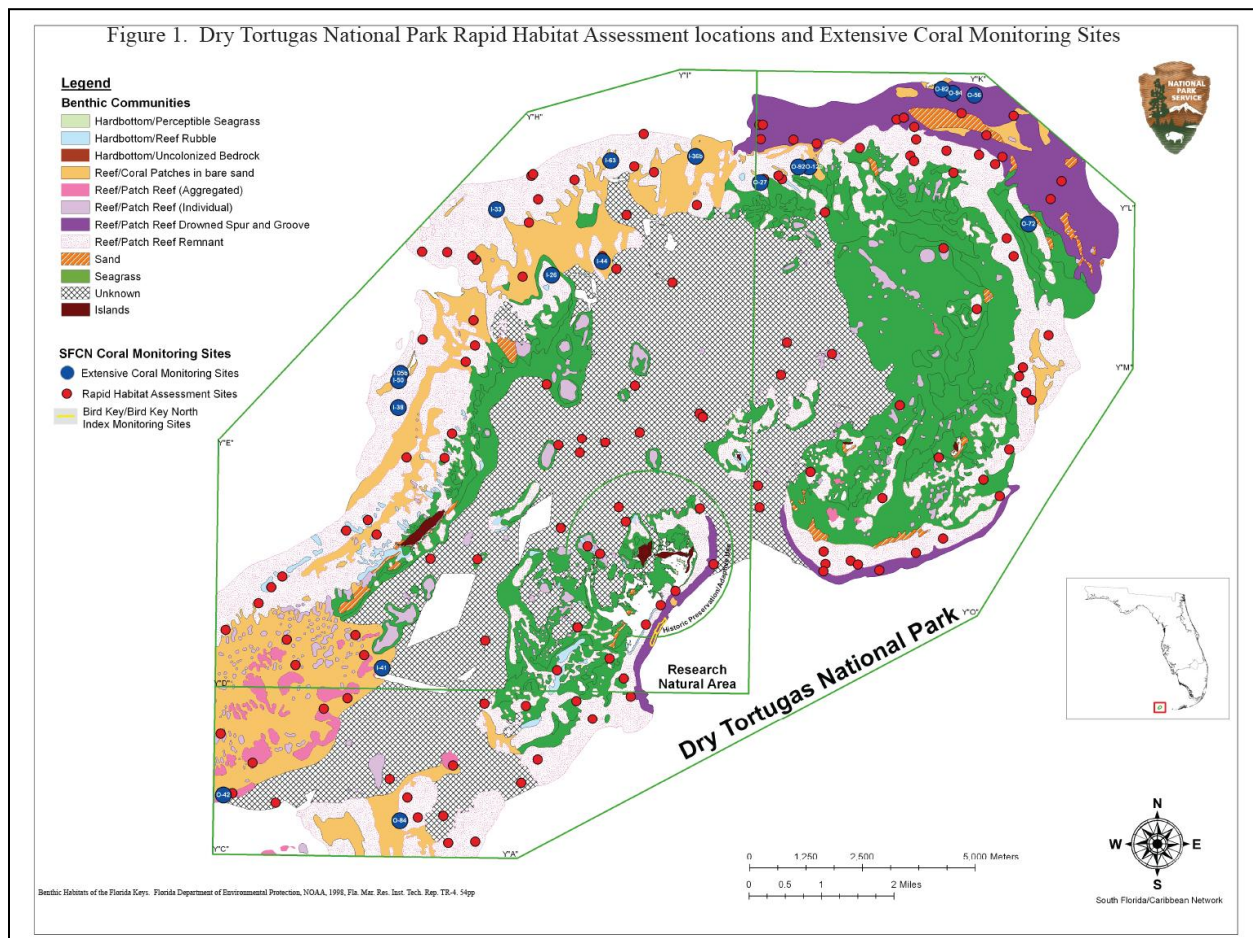
Accomplished in FY08: The core of the coral database was completed. New capabilities were also added, including the ability to quickly generate summary reports for SFCN reef sites. These reports combine a variety of measures such as percent cover and coral species richness into a concise handout. As part of the development of the Coral Disease Database, the ability to enter and store *Diadema* information has been added to the primary database. An outline was completed for a comprehensive analysis report for all index sites. SFCN staff compared High Definition video (HD) to existing digital video in a pool and in the field. The HD video frame capture is the same width as the previous imagery but is smaller in height. This leads to an increase in the number of video frames captured and if 10 dots/frame are still used this will lead to a slight increase in the number of dots identified per transect which should improve precision. We developed a new dotting script in Adobe Photoshop CS3 for the new HD video.



Continuation in FY09: Sections on analysis, reporting and extensive sites monitoring will be added to the *Marine Benthic Communities* protocol (formerly the *Coral Reef Monitoring Protocol*). Additional automated reporting will be added into the coral database. The coral disease SOP will be updated to reflect changes made after testing the SOP in DRTO. Automated reporting will be developed for coral disease and *Diadema*. A comprehensive analysis report and resource briefs will be created for the coral index sites monitoring data collected to date. We will complete the comparison and determine any analysis adjustments needed to transition to High Definition video from existing digital video in the field.

Marine Benthic Communities – Extensive sites

Accomplished in FY08: Based upon DRTO Rapid Habitat Assessment points, 18 extensive coral monitoring sites were selected and installed at DRTO. A power analysis showed that shifting to 18 4-transect extensive sites would provide sufficient power to detect a 20-25% change in coral cover inside and outside the RNA in areas with >5% coral cover and between 2-20m depth and a 50% change at each 4-transect site with 80% power and 95% confidence.



Continuation in FY09: The sampling design and analysis SOPs will be added to the Marine Benthic Communities monitoring protocol and additional peer review sought. SFCN will follow a similar procedure for collecting Rapid Habitat Assessment points and establishing extensive sites in BISC. Initial analyses and reports will be generated for DRTO and possibly BISC.

Colonial nesting birds

Accomplished in FY08: Judd Patterson spent two days assisting Sonny Bass of EVER with sooty tern surveys at DRT0.

Continuation in FY09: We expect to assist with database development for BISC monitoring and possibly database development, analysis assistance and reporting for the other parks. Judd will again assist the DRT0 monitoring effort if requested.



Invasive/Exotic Plants – Digital Aerial Sketch Mapping

Accomplished in FY08: Lindsay Wieland, SFCN-SCA, provided post-processing and QA/QC for all of the GIS files generated during the 2008 Everglades CISMA Digital Aerial Sketchmapping by the NPS-EPMT program. Over 2.68 million acres were mapped during the 2008 field season. Results are available on the Everglades CISMA web site <http://www.evergladescisma.org/DASM/>.

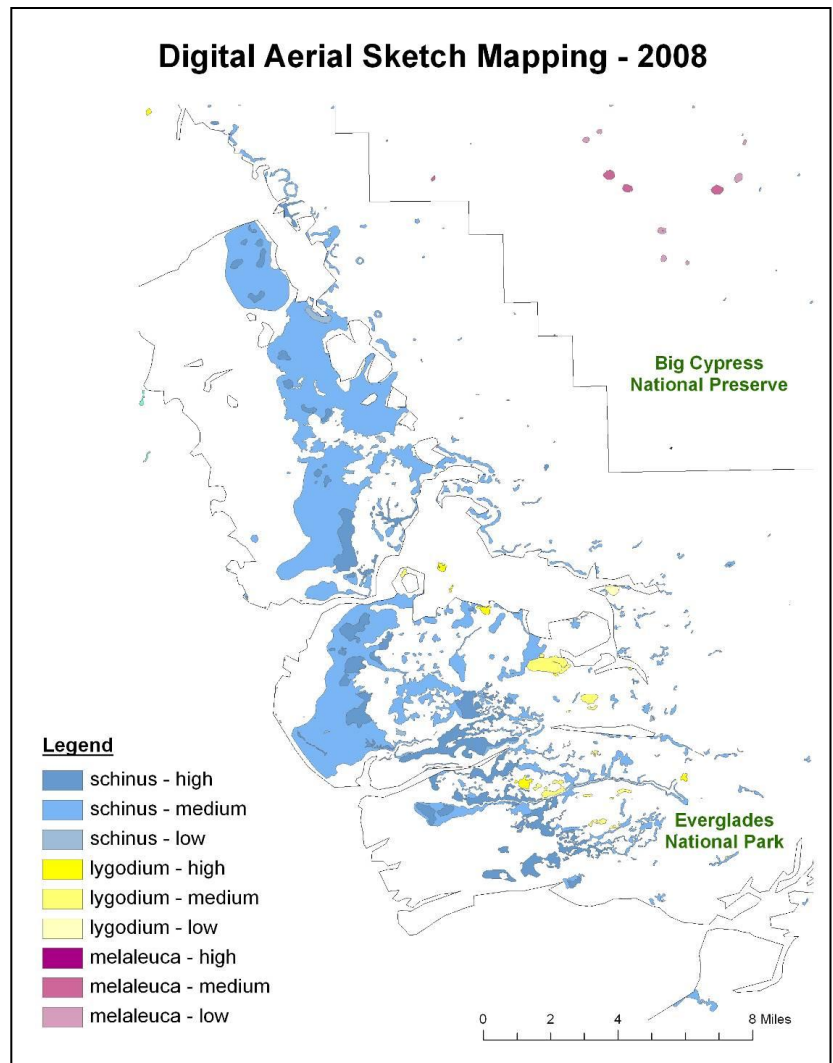
Continuation in FY09: The Data Management, Analysis and Reporting Branch will work with Tony Pernas of the NPS-EPMT program to develop a protocol/SOP for the Digital Aerial Sketch Mapping that Tony currently conducts. We assume that EPMT staff will be taking a lead role and we will be providing assistance. SFCN will be providing assistance in post-processing of the digital sketch mapping with the SFCN-SCA contributing 2 weeks of time.

Land use change

Initiation in FY09: SFCN will develop a protocol for the Land Use Change vital sign. This document will largely draw from the protocol developed by the Gulf Coast Network, as well as WASO.

Marine Benthic Communities – Seagrass, conch; Invasive/Exotic Plants – Corridors of Invasiveness; Invasive/exotic animals – canals; Coastal Geomorphology – Soil Elevation; Forest Ecotones and Community Structure; and Mangrove-Marsh Ecotones.

Initiation in FY09: We expect to assist with sampling design, database development, geospatial analysis needs; and possibly statistical analysis and reporting.



Sea Turtles

Accomplished in FY08: SFCN followed up on work by NOAA (who converted the legacy FoxPro database into the Microsoft Access formatted tables) by creating relationships between the converted tables and forms to finish the conversion and make the database functional for data entry. We also added additional forms and code based upon feedback from BUIS staff.

Continuation in FY09: We will add automated reporting to make it easier to get data back out of the database, including multi-year trends reports previously discussed with the BUIS resource manager. We will talk with VIIS, BISC, and EVER to see if they are interested in the database.

PrimaryTag	SecondaryTag	TagPosition	ApplyDate
XXB819	XXB819	L3	7/27/2004
XXB819	XXB879	LH/T	7/27/2004
XXB819	XXB878	R3	7/27/2004
XXB819	XXB818	RH/T	7/27/2004
XXB819			

Fire return interval departure

Initiation in FY09: We will work with Rick Anderson of EVER to develop a protocol/SOP for the fire return interval departure vital sign. We assume that EVER staff will be taking a lead role and we will be providing assistance.

Marine Fish Communities- harvest data; Marine Exploited Invertebrates – harvest data; and Focal Fish Species

Initiation in FY09: SFCN will create links to the state harvest data reporting and as necessary create additional summaries of the data for South Florida. SFCN will also post links to BISC and EVER fish and lobster harvest data reports from their creel surveys.

Summarize/Post reports for Vital Signs conducted by other groups

Accomplished in FY08: Straw-man resource briefs were created for Florida Panther and Small-toothed Sawfish to help jumpstart reports discussions. No progress was made on Protected Marine Mammals.

Continuation in FY09: SFCN will seek additional guidance from the parks on the level of reporting effort the network will put towards reports/web pages to create for vital signs monitored by the parks and other organizations. SFCN will generate web page links to existing monitoring program documents and summaries as indicated in the guidance for Florida Panther, Small-toothed Sawfish, Protected Marine Mammals, American Alligator, American crocodile, Marine benthic communities-seagrass Fl & Bisc Bays, and Marine Exploited Invertebrates – Pink Shrimp.

Water Quality Monitoring

Nutrient Dynamics and Water Chemistry

Accomplished in FY08: Data connectivity was established between SFCN and the DataForEver database, maintained by the Physical Resource Branch of Everglades National Park.

Continuation in FY09: SFCN will work to fund a water quality post-doc to begin synthesizing, analyzing and posting water chemistry data and reports to the SFCN web site as described in the Vital Signs Strategy. SFCN will collect and archive copies of protocols/SOPs used by cooperators and will develop simple SOPs for the steps SFCN uses to collect and report data/reports. With EVER's permission, we will work with WRD to migrate DataForEVER to Storet. For VIIS we will be working with the VIIS Data manager to finish their water quality monitoring database.

Nutrient Dynamics-VIIS

Accomplished in FY08: In FY08 the SFCN and VIIS staff had duplicate samples collected and sent to two labs to perform a blind check of water quality results. There were 18 samples taken in triplicate for 54 samples that we had analyzed for NO₂, NO₃, Total Nitrogen, NH₄ and SRP or DIP. Currently the SFCN is in the process of acquiring the MDL (Method Detection Limit) PQL (Practical Quantitation Limit) in order to determine the standard deviation for each test so that samples can be compared.

Continuation in FY09: The samples will be compared and used to guide future water quality collections.

Estuarine Salinity patterns – BISC, EVER

Initiation in FY09: SFCN will work to fund a water quality post-doc to link to and combine NPS continuous station monitoring data with the FIU-SERC monthly grab samples to krig salinity and temperature profiles for Biscayne and Florida Bay.

Surface water hydrology-Biscayne Bay, Florida Bay

Initiation in FY09: SFCN will work to fund a water quality post-doc who will, for BISC and EVER, generate annual reports at specific sites for freshwater discharge into the estuary, using the DataForEVER (for Everglades) database maintained by the Physical Resources Branch, Kevin Kotun, at EVER and data from the Florida Coastal Everglades Long Term Ecological Research Center (FCE-LTER).

Surface water hydrology –BICY, EVER

Continuation in FY09: For BICY and EVER the SFCN will continue to maintain links to regional hydrology summaries by Bob Sobczak of BICY and EVER; additionally, SFCN will use the Everglades Depth Estimation Network (EDEN) pulling together hydro patterns at key long term hydrology stations (e.g. P205 station).

Surface water hydrology – Weather stations

Accomplished in FY08: SFCN purchased two Hobo weather stations for installation at BUIS and SARI. The basic structure and functionality of the Weather database was completed and tested

with data from the SFCN office weather station.

Continuation in FY09: SFCN plans on installing the weather stations at BUIS and SARI. We also plan to develop basic reporting procedures and develop an SOP for transferring data to the DataForEver database, hosted by the Physical Resources Branch of Everglades National Park.

Surface water hydrology - SARI

Accomplished in FY08: SFCN constructed a stage gage for installation at the head waters of SARI.

Continuation in FY09: The SFCN plans on installing the crest gage.

Marine Benthic Communities – Coral Reef Water Temperature

Accomplished in FY08: A draft of the *Coral Reef Water Temperature Monitoring Protocol* was completed and comments were received from NPS-WRD. Reef temperature data was collected at all coral index sites and a pilot project was implemented at DRTO in which HOBO temperature data loggers were established at all Coral-Extensive sites to see how much spatial variability occurs across sites within the park and determine whether monitoring will be needed at all extensive sites. The database for this project has been sent to WASO WRD.

Continuation in FY09: The *Coral Reef Water Temperature Monitoring Protocol* will be revised to become an extensive SOP under the Marine Benthic Communities protocol. We will work to get historical data into the database as well as new data and develop analysis and reporting procedures.

Contaminants

Proposed pilot work planned for FY09: The SFCN initiated a request for interest in assessing background levels of Emerging Pollutants of Concern (EPOCs) due to concerns generated with the Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project. From this inquiry the SFCN, in association with the US Geological Survey Florida Integrated Science Center (Dr. Tim Bargar), is attempting to begin a pilot project collecting water samples to evaluate background Emerging Pollutants of Concern (EPOCs) in near shore waters of Biscayne Bay and Florida Bay. SFCN is providing field and equipment support and USGS is providing funds to run samples.

Other water quality related monitoring

A number of other vital signs strongly relate to water quality but are covered under the vital signs monitoring section including periphyton, aquatic invertebrates, freshwater fish and large macroinvertebrates, seagrass, and coral.

SFCN continues supporting Biscayne National Park staff with negotiations between the park and Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project:

Dr. Kevin Whelan assisted Biscayne National Park during FY08 several times to address the requests for professional assistance evaluating the Miami-Dade Water and Sewer Department's proposal for the development of a Wastewater Reuse facility adjacent to the park's western boundary. NPS concerns include the ability for the pilot project to adequately demonstrate the treatment process having no negative impacts to the park ecosystems and adjacent lands. SFCN

continues to assist in order to ensure any pilot project that goes forward would be able to produce scientifically defensible results to more fully understand the consequences of treated wastewater entering the park.

III. Staffing

SFCN Staff, Associated Post-docs, and Interns

Matt Patterson, Network Coordinator
Andrea Atkinson, Quantitative Ecologist
Ben Ruttenberg, Marine Ecologist
Kevin R. T. Whelan, Community Ecologist
Brian Witcher, Data Manager
William “Jeff” Miller, Fisheries Biologist
Judd Patterson, GIS/Data Management Specialist
Andy Davis, Marine Biological Technician
Brooke Shamblin, Vegetation Technician
Raul Urgelles, Wildlife Technician
Rob Waara, Marine Biological Technician
Marilyn Brandt, Marine Postdoctoral Research Assistant
Steven Wathen, Vegetation Postdoctoral Research Assistant
Jonathan Moser, Resource Management Intern
Lindsay Weiland, Student Conservation Association Intern
Mike Echevarria, Student Conservation Association Intern
Rachel Vargas, Student Conservation Association Intern
Andy Estep, Student Conservation Association Intern

Board of Directors

Pedro Ramos, Superintendent, Big Cypress National Preserve
Mark Lewis, Superintendent, Biscayne National Park
Joel Tutein, Superintendent, Buck Island Reef National Monument/ Salt River National
Historical Site and Ecological Preserve/ Christiansted National Historic Site
Dan Kimball, Superintendent, Everglades National Park/ Dry Tortugas National Park
Mark Hardgrove, Superintendent, Virgin Islands National Park / Virgin Islands Coral Reef
National Monument
Matt Patterson, Network I&M Coordinator
Larry West, Regional I&M Coordinator

Science and Technical Committee

Ron Clark, Resource Management Chief, Big Cypress National Preserve
Elsa Alvear, Resource Management Chief, Biscayne National Park
Zandy Hillis-Star, Resource Management Chief, Buck Island Reef National Monument/ Salt
River National Historical Site and Ecological Preserve
Robert Johnson, South Florida Natural Resource Center Director, Everglades National Park / Dry
Tortugas National Park
Rafe Boulon, Resource Management Chief, Virgin Islands National Park / Virgin Islands Coral
Reef National Monument
Carol Daniels, South Florida / Caribbean Cooperative Ecosystem Studies Unit Coordinator

Volunteers in the Park (V.I.P)

Two Florida International University students worked on their independent study projects under Dr. Kevin R. T. Whelan, an affiliated professor with the Environmental Studies Department. Jonathan M.'s independent study work included testing the Hobo weather station installation instructions and generating a detailed standard operating procedure for station data download, gaining efficiency in ARC GIS skills, assistance with vegetation mapping, soil elevation table (SET) pilot site evaluation and construction of cat walk materials. Jose L.'s independent study work included assistance with vegetation mapping of Boca Chita Key, soil elevation table (SET) pilot site evaluation, and construction of cat walk materials. The VIP worked over 295 hours with an approximate value of the volunteer effort to the SFCN was \$5,321.80.

IV. Reports, Publications and Presentations

Published journal articles, open file reports, reports, presentations, and volunteer in the parks (VIP)

Journal Articles

Rogers C, J Miller, E Muller. 2008. Coral diseases following massive bleaching in 2005 cause 60 percent decline in coral cover and mortality of the threatened species, *Acropora palmata*, on reefs in the U.S. Virgin Islands. US Geological Survey Fact Sheet.

Rogers CS, Miller J, Muller EM, Edmunds P, Nemeth RS, Beets JP, Friedlander AM, Smith TB, Boulon R, Jeffrey CFG, Menza C, Caldow C, Idrisi N, Kojis B, Monaco ME, Spitzack A, Gladfelter EH, Ogden JC, Hillis-Star Z, Lundgren I, Schill WB, Kuffner IB, Richardson LL, Devine BE, Voss JD (2008) Ecology of Coral Reefs in the US Virgin Islands. In: Riegl MB, Dodge RE (eds) Coral Reefs of the USA. Springer, pp303-373

Rothenberger P, J Blondeau, C Cox, S Curtis, W Fisher, V Garrison, Z Hillis-Starr, C Jeffrey, E Kadison, I Lundgren, J Miller, E Muller, R Nemeth, S Paterson, C Rogers, T Smith, A Spitzack, M Taylor, W Toller, J Wright, D Wusinich-Mendez, J Waddell. 2008. The State of Coral Reef Ecosystems of the US Virgin Islands. pp 29-73. In: J. E. Waddell and A.M. Clarke (eds.), The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008. NOAA Technical Memorandum NOS NCCOS 73. NOAA/NCCOS Center for Coastal Monitoring and Assessment's Biogeographical Team. Silver Springs, MD. 569pp.

Woody, K., A. Atkinson, R. Clark, C. Jeffery, I. Lundgren, J. Miller, M. Monaco, E. Miller, M. Patterson, C. Rodgers, T. Smith, T. Spitzak, R. Warra, K. R. T. Whelan, B. Witcher, and A. Wright 2008. Coral Bleaching in the U.S. Virgin Islands in 2005 and 2006 pages 68-72. in Wilkinson, C., Souter, D. Status of Caribbean coral reefs after bleaching and hurricanes in 2005. Global Coral Reef Monitoring Network, and Reef and Rainforest Research Centre, Townsville, Australia, 152p.

Zhang, K., M. Simard, M. Ross, V. H. Rivera-Monroy, P. Houle, P. Ruiz, R. R. Twilley, and K. R. T. Whelan. 2008. Airborne Laser Scanning Quantification of Disturbances from Hurricanes and Lightning Strikes to Mangrove Forests in Everglades National Park, USA. Sensors 8:2262-2292.

Submitted for publication

Boulon R, M Monaco, A Friedlander, C Caldow, J, Christensen, C Rogers, J Beets, J Miller. An ecological correction to marine reserve boundaries in the US Virgin Islands. Submitted to ICRS proceedings

Miller J, Muller E, Rogers C, Waara R, Atkinson A, Whelan K, Patterson M, Witcher B (2008) Coral disease following massive bleaching in 2005 causes 60% decline in coral cover on reefs in the US Virgin Islands. Submitted to Coral Reefs:

Rogers CS, E Muller, A Spitzack, J Miller. The future of coral reefs in the US Virgin Islands: Why *Acropora palmata* is more likely to recover than *Montastraea annularis* complex. Submitted to ICRS proceedings

Smith III, T. J., G. H. Anderson, K. Balentine, G. Tiling, G.A. Ward, and K. R. T. Whelan Mangrove Forests, Storm Surges, and sediment Deposition: Comparative Impacts of Four Major Hurricanes on the Southwest Coastal Everglades. In Review Wetlands (Special Issue)

Whelan, K. R. T., and J. Moser Who lives there and Mangroves provide habitat for species of interest Two articles submitted for publication in A summary of our Knowledge of the South Florida Ecosystem (tentative title). EPA and Sea Grant public outreach document. Invited submission

Whelan, K. R.T., T. J. Smith III, G. H. Anderson, and M. L. Ouelette. Hurricane Wilma's (2005) impact on mangrove forest soil elevation and soil zones within the soil profile, SW Florida, USA. In Review Wetlands (Special Issue)

Open file reports

Brock, J.C., Wright, C.W., Nayegandhi, A., Patterson, M., Travers, L., USGS-NPS-NASA Topography - Sagamore Hills National Historic Site, USGS Open File Report 2007-1394 (CD), URL: <http://pubs.usgs.gov/of/2007/1394/start.html>

Brock, J.C., Wright, C.W., Nayegandhi, A., Patterson, M., Wilson, I., Travers, L., USGS-NPS-NASA Topography - Gulf Islands National Seashore – Florida, USGS Open File Report 2007-1422 (DVD), URL: <http://pubs.usgs.gov/of/2007/1422/start.html>

Brock, J.C., Wright, C.W., Nayegandhi, A., Patterson, M., Wilson, I., Travers, L., USGS-NPS-NASA Topography - Gulf Islands National Seashore – Mississippi, USGS Open File Report 2007-1377 (DVD), URL: <http://pubs.usgs.gov/of/2007/1377/start.html>

Brock, J.C., Wright, C.W., Nayegandhi, A., Woolard, J., Patterson, M., Wilson, I., Travers, L., USGS-NPS-NASA EAARL Submarine Topography - Florida Keys National Marine Sanctuary, USGS Open File Report 2007-1395 (DVD), URL: <http://pubs.usgs.gov/of/2007/1395/start.html>

Brock, J.C., Wright, C.W., Patterson, M., Nayegandhi, A., Travers, L., USGS-NPS-NASA Bare-Earth Topography - Cape Cod National Seashore, USGS Open File Report 2007-1375 (DVD), URL: <http://pubs.usgs.gov/of/2007/1375/start.html>

Brock, JC, Wright, CW, Nayegandhi, A, Patterson, M, Wilson, I, and Travers, L., USGS-NPS-NASA Submarine Topography - Northern Florida Reef Tract (2001-2002), USGS Open File Report 2007-1432 (DVD), URL: <http://pubs.usgs.gov/of/2007/1432/start.html>

Brock, JC, Wright, CW, Nayegandhi, A, Patterson, M, Wilson, I, and Travers, L., USGS-NPS-NASA Bare-Earth Topography - Padre Island National Seashore, USGS Open File Report 2007-1431 (DVD), URL: <http://pubs.usgs.gov/of/2007/1431/start.html>

Open file reports in review

Nayegandhi, A., Brock, J.C., Wright, C.W., Patterson, M., Yates, X., and Bonisteel, J.M., EAARL Coastal Topography–St. John, U.S. Virgin Islands 2003: First Surface, USGS Data Series Report 2008-XXX (On DVD). *Submitted to internal review for Director's approval.*

Nayegandhi, A., Brock, J.C., Wright, C.W., Patterson, M., Yates, X., and Bonisteel, J.M., EAARL Submerged Topography–U.S. Virgin Islands 2003, USGS Data Series Report 2008-XXX (On DVD). *Submitted to internal review for Director's approval.*

Reports and other miscellaneous publications

Patterson, M. E., A. J. Atkinson, B. D. Witcher, K.R.T. Whelan, W. J. Miller, R. J. Waara, J. M. Patterson, B. I. Ruttenberg, A. D. Davis, R. Urgelles, R. B. Shamblin. 2008. South Florida / Caribbean Network Vital Signs Monitoring Plan. Natural Resource Report NPS/SFCN/NRR—2008/063. National Park Service, Fort Collins, Colorado.

Whelan, Kevin R. T. and Andrea J. Atkinson. 2008. Report on the Accuracy Assessment of the Avineon Vegetation Map Section 4 deliverable on Contract No. C211705992 to National Park Service South Florida / Caribbean Inventory and Monitoring Network. June 2008

Witcher, Brian, 2007. South Florida/Caribbean Network Data Management Plan. Natural Resource Report NPS/PWR/SFCN/NRR—2008/064. National Park Service, Palmetto Bay, Florida

Presentations

Balentine , K. M., M. Butler, G. Tiling, K. R. T. Whelan, and T. J. Smith III. 2007 Crab Burrow and sediment surface elevation in the mangrove forests of Tampa Bay and Everglades National Park, FL, USA. 18th Biennial Estuarine Research Federation Conference, Nov 4-8, 2007, Providence, RI.

Miller J, M Patterson, A Atkinson, A Davis, R Waara, B Witcher. Better reef monitoring means better reef management. SERO Workshop Integrating Science with Park Management Decisions. 11 June 2008. Chattanooga Tennessee USA.

Miller J, M Patterson, A Atkinson, A Davis, R Waara, K Whelan, B Witcher. Coral Monitoring: What we're doing. What we've learned. Briefing to SERO Resource Management Chief Sherri Fields during site visit to VIIS. 05 Nov. 2007.

Miller J, M Patterson, A Atkinson, A Davis, R Waara, K Whelan, B Witcher. Coral Monitoring: What we're doing, What we've learned. Briefing to visiting board members from National Parks Conservation Association during visit to VIIS. 24 April 2008.

Miller J. Reef Life. Weekly presentation on coral ecology of the Virgin Islands at Maho Bay Camps. October 2007-April 2008.

Miller J. Status and Trends of Virgin Islands Coral Reefs. Briefing to Secretary of Interior Dirk Kempthorne during site visit to Virgin Islands National Park. 22 Aug. 2008.

Miller, J., E. Muller, C. Rodgers, A. Atkinson, R. Waara, A. Davis, K. R. T. Whelan, M. Patterson, and T. Spitzack. Catastrophic losses in Coarl Cover in US Virgin Islands follow 2005-06 Coral Bleaching and Disease. 11th International Coral Reef Symposium July 2008, Fort Lauderdale, Florida, USA.

Muller E, C Rogers, J Miller, R Van Woesik. Testing the compromised-host hypothesis during the 2005 Caribbean coral-bleaching and disease event. 11th International Coral Reef Symposium 2008, Fort Lauderdale, Florida, USA.

Patterson, J., B. Witcher, L. Wieland. Modeling and Mapping Underwater Monitoring Sites. NPS GIS/Data Management Conference. Ft. Collins Colorado. 3 April 2008.

Patterson, M. Rapid Response to Coral Disease event in Dry Tortugas National Park. Coral Reef Task Force Meeting, Kona, HI. August 29, 2008.

Patterson, M., A. Atkinson, J. Miller, A. Davis, R. Waara, B. Witcher. Measuring success in coral reef management for South Florida and Caribbean National Park Service units – one size doesn't always fit all. 11th International Coral Reef Symposium 2008, Fort Lauderdale, Florida, USA.

Ruiz, P. L., M. S. Ross, P. Houle, K. R. T. Whelan, and A. Atkinson. 2008 The Vegetation of Biscayne National Park, Homestead, FL, USA. Greater Everglades Ecosystem Restoration Planning, Policy and Science Meeting, July 28-August 1, 2008 Naples FL

Tiling, G., T. J. Smith III, G. H. Anderson, K. M. Balentine, G. A. Ward, K. R. T. Whelan. 2007. Changing Spatial Patterns of Mangrove Stems during Recovery from Catastrophic Disturbance. 18th Biennial Estuarine Research Federation Conference, Nov 4-8, 2007, Providence, RI.

Wathen, Steve F. 2008. Another Inconvenient Truth: 2,000 Plus Years of Abrupt Climate Change and Ecosystem Response in the Sierra Nevada. Invited lecture. Department of Biology. Florida International University. September 2, 2008.

Whelan, K. R. T., J. Miller, O. Sanchez, M. Patterson. Impact of the 2005 coral bleaching event on *Porites Porites* and *Colpophyllia natans* at Tektite Reef, US Virgin Islands. 11th International Coral Reef Symposium 2008, Fort Lauderdale, Florida, USA.

Whelan, K. R. T., T. J. Smith III, G. H. Anderson and M. L. Ouelette. 2008. Hurricane Wilma's Sediment Deposition Impacts on Mangrove Forest Soil Elevation and Changes within Constituent Soil Zones Greater Everglades Ecosystem Restoration Planning, Policy and Science Meeting, July 28-August 1, 2008 Naples FL

V. Connect the Dots – Vital Signs Supporting Table for each Park

The “Connect the Dots” effort is a strategic, long-term framework (over a period of years to decades) for coordinating the efforts of the I&M networks, Watershed Condition Assessment Program, park planning (e.g., Foundation Statement, General Management Plan, Resource Stewardship Strategy), park-funded monitoring and research relevant to assessing natural resource condition, and other research and monitoring efforts. A Natural Resource Summary Table will eventually be developed for each park as part of the park’s Resource Stewardship Strategy document. The Natural Resource Summary Table framework demonstrates the connection of science to management through the planning process.

This year, the 32 I&M networks were required to develop a first draft of a Vital Signs Supporting Table for each park, which will feed into the larger Natural Resource Summary Table. The draft excel spreadsheets listed on our IntrAnet site below summarize the key measures of resource condition that the I&M network will routinely provide data for as part of our ‘Job 1’ duties of measuring the condition of selected park resources. If the park superintendent or Chief of Natural Resources thinks this Connect the Dots framework is a good idea and requests assistance from network staff to populate additional rows and columns of the Natural Resource Summary Table, network staff should contribute data and expertise to the extent that data and staff time are available to assist the park.

SFCN draft Connect the dots Excel spreadsheets can be downloaded from the URL link below:

<http://www1.nrintra.nps.gov/im/units/sfcn/connect.cfm>