

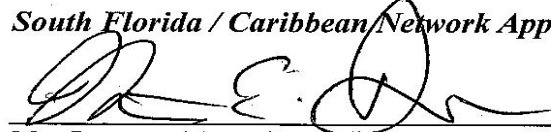
**ANNUAL ADMINISTRATIVE REPORT (FY 2009) AND
WORK PLAN (FY 2010) FOR INVENTORIES AND VITAL SIGNS
MONITORING**

FY 2009-FY 2010

South Florida / Caribbean Network

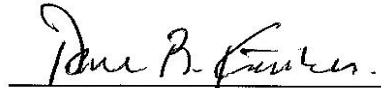
Includes: Biscayne National Park, Big Cypress National Preserve, Buck Island Reef National Monument, Dry Tortugas National Park, Everglades National Park, Salt River Bay National Historical Park and Ecological Preserve, and Virgin Islands National Park.

South Florida / Caribbean Network Approval Signatures



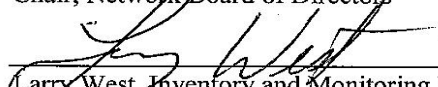
Matt Patterson, Network Coordinator, South Florida / Caribbean Network

11/5/09
Date



Dan Kimball, Everglades/Dry Tortugas National Parks
Chair, Network Board of Directors

11/5/2009
Date



Larry West, Inventory and Monitoring Branch Chief
Southeast Region

11/5/2009
Date

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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 2009 the SFCN received \$1,932,373 in funding from the Inventory and Monitoring (I&M) program, as well as from the NPS Vegetation Mapping program, the NPS Water Resources Division, and Everglades National Park. This funding was used to conduct monitoring on marine and community resources as the network begins operational monitoring for core vital signs. In FY09, biological inventories were conducted, including year two for inventories for small and medium sized mammals as well as multiple vegetation and benthic habitat mapping efforts.

SFCN implemented its Vital Signs Monitoring Plan, which shifted the program's primary focus to operational monitoring. This significant shift required increased office space and staff. SFCN conducted marine benthic community Vital Sign monitoring in BISC, DRTO, VIIS, and BUIS. Marine Fish Community monitoring was conducted in BISC, DRTO, VIIS, VICRNM, and BUIS. SFCN hired and lost a marine ecologist. An administrative assistant was hired, a wildlife biological technician was hired through a SCEP appointment, and two SCA's were identified as great candidates for SCEP appointments in FY10. A lionfish SCA was hired to assist with lionfish surveys with the marine team. The marine postdoctoral researcher developed protocols for marine fish communities titled "*A cooperative multi-agency reef fish monitoring protocol for the Florida Keys coral reef ecosystem*" while a second postdoctoral researcher was hired and his contract was not renewed for the vegetation Vital Signs. SFCN completed a vegetation map for De Soto National Memorial (DESO), continued work on a vegetation map for western BICY and NW EVER, BISC, SARI, DRTO and BUIS. Benthic habitat maps were completed for DRTO and offshore BISC.

The FY09 budget was spent primarily on personnel, accounting for 53% (\$1,023,197), 18% (\$339,465) was spent on cooperative agreements, 11% (\$211,951) on contracts, 13% (\$246,622) on operations, 5% (\$86,896) on travel, and 1% (\$24,243) on Regional assessments.

The FY10 budget proposes spending \$2,018,156 with the following allocations: 59% (\$1,197,742) on personnel, 12% (\$245,245) on cooperative agreements, 13% (\$262,279) on contracts, 10% (\$202,993) on operations, and 4% (\$80,000) on travel, and 1.5% (\$29,897) on Regional assessments.

Program Accomplishments Summary

Inventories

- Vegetation Maps:
 - SFCN completed a vegetation map product for De Soto National Memorial (DESO).
 - SFCN completed a draft vegetation map product for Buck Island Reef National Monument (BUIS) which is in review.
 - SFCN received a vegetation map product for Biscayne National Park (BISC) from cooperators at Florida International University; SFCN completed an accuracy assessment and a final map product is in development.
 - SFCN completed polygon work for a vegetation map of Dry Tortugas National Park (DRTO) on 4 of the 6 islands. Remainder of work will be completed in FY10.
 - SFCN received a final vegetation map deliverable for the western Big Cypress National Preserve / Northwestern Everglades National Park (BICY/EVER). A report of the accuracy assessment process and a final map product will be completed in FY10.
 - SFCN conducted field work and digitizing of vegetation map polygons in Salt River National Historical Park and Ecological Preserve (SARI). A final map product will be completed in FY10.
 - SFCN conducted a first visit to collect accuracy assessment points in Virgin Islands National Park (VIIS).
 - A classification analysis of the Everglades marsh plant communities by Dr. Ross and Jay Sah of Florida International University was completed and final edits to the report are pending. A geodatabase of the various vegetation projects in the Greater Everglades area was submitted and summarized.
- Benthic community map: SFCN and the Florida Fish and Wildlife Research Institute received a draft benthic habitat map for the offshore portions of Biscayne National Park from the contractor. SFCN staff collected 288 accuracy assessment points. A report of the accuracy assessment and a revised final map product using the accuracy assessment data plus LiDAR data will be completed in FY10.
- SFCN staff continued assisting USGS/University of Florida researchers with year two of the Small and Medium Sized mammal inventory for Everglades National Park and Big Cypress National Preserve. This inventory is in the final report-writing phase.

Vital Signs Monitoring

- Marine Benthic Communities:
 - SFCN combined with the Pacific Islands Network to produce the report *Coral Reefs in U. S. National Parks: A Snapshot of Status and Trends in Eight Parks*.
 - SFCN conducted marine benthic community monitoring in Biscayne National Park, Dry Tortugas National Park, Virgin Islands National Park, and Buck Island Reef National Monument.

- Marine Fish Communities:
 - The protocol “*A cooperative multi-agency reef fish monitoring protocol for the Florida Keys coral reef ecosystem*”, representing an cooperative interagency effort to monitor reef fish consistently from Biscayne National Park, through the Florida Keys, to the Dry Tortugas, was completed. First steps on a US Virgin Islands protocol were initiated.
 - SFCN conducted marine fish community monitoring in Biscayne National Park, Dry Tortugas National Park, Virgin Islands National Park, Virgin Islands Coral Reef National Monument, and Buck Island Reef National Monument in partnership with NOAA, University of Miami, Florida Fish and Wildlife Conservation Commission, and park staff.
- Colonial Nesting Birds: A pilot study of monitoring colonial nesting birds in Biscayne National Park was completed. The protocol is in development.
- Mangrove-Marsh Ecotone, Forest Ecotones and Community Structure:
 - To assist long-term vegetation monitoring design, a geodatabase was created showing locations of historic vegetation sampling, vegetation mapping, and locations of current and ongoing vegetation sampling.
 - Four 1982 Gunderson and Loope historic pineland plots were relocated and sampled near the Turner River area in Big Cypress National Preserve. 18 plots established by Bradley Bennet in 1995-96 were relocated and sampled in Big Cypress National Preserve. A Coot Bay transect established in the 1980’s was re-sampled in Everglades National Park. SFCN assisted Jimi Sadle of EVER to resurvey transects in Dry Tortugas National Park.
 - Two maps created in the early 1980’s by Gunderson and Loope or by Olmsted et al. are being digitized by SFCN interns, and will be compared with 1980’s imagery and recent imagery to help development of a vegetation ecotonal movement protocol.
- Coastal Geomorphology: Preliminary field work to evaluate potential areas for Soil Elevation Table site installation was conducted.
- Invasive/Exotic Plants:
 - Pilot work was conducted for the Corridors of Invasiveness protocol involving 6 trips covering 58 miles.
 - SFCN provided assistance to NPS-EPMT by post-processing digital aerial sketch-mapping results for spatial distribution of exotic invasive plants.
- Invasive / Exotic Animals
 - SFCN staff acquired 20 foot aluminum electrofishing boat, as well as attended electrofishing training to ensure safe operation of electrofishing surveys, and a better understanding of electrofishing theory.
 - SFCN with funding from NPR WRD Coastal and Ocean Branch hired a SCA conservation intern; Lindsay Jones to search for lionfish in South Florida SFCN parks. When a lionfish was spotted by divers, she joined an investigative team and captured the first lionfish found in Biscayne National Park.

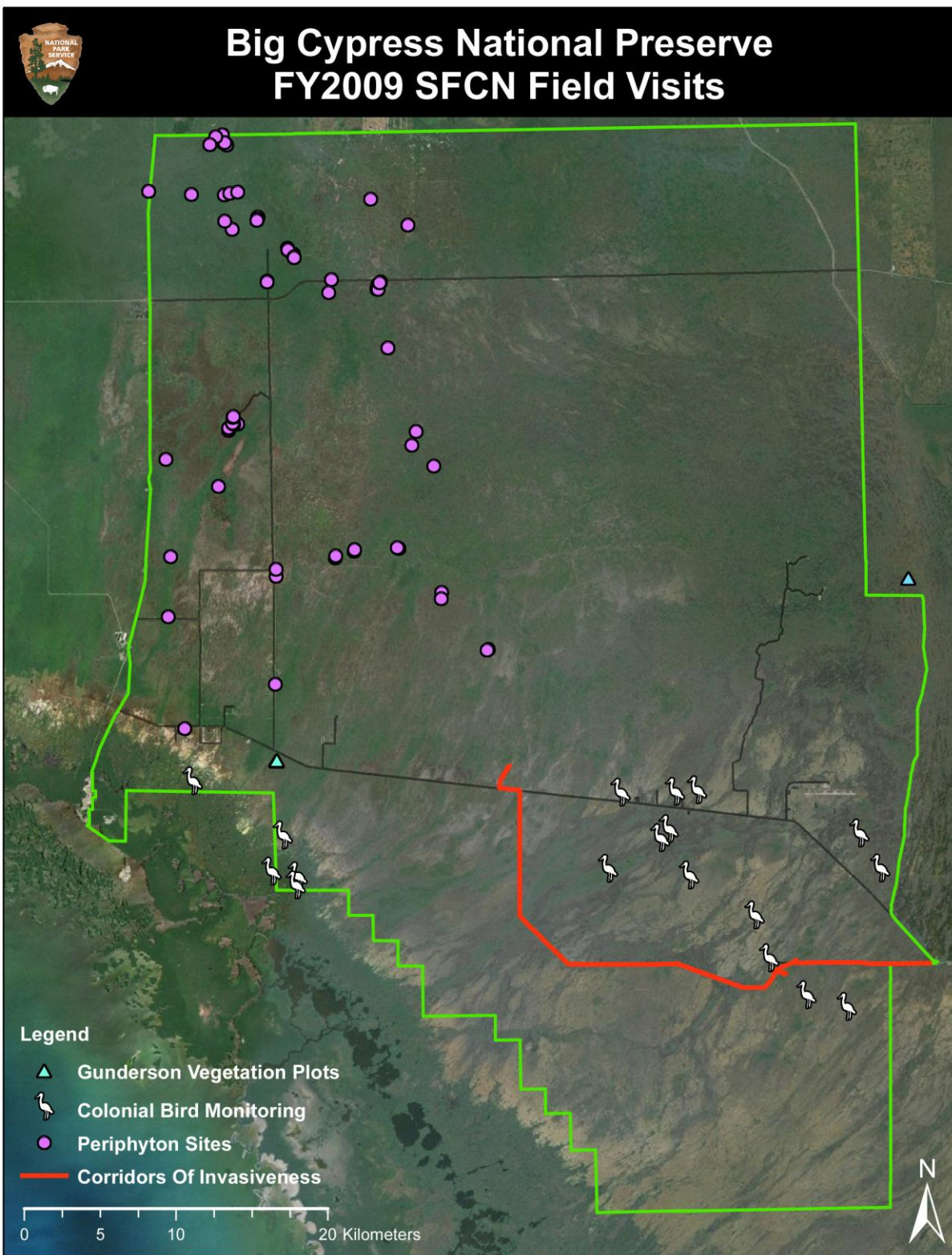
- Periphyton: SFCN conducted a pilot study in Big Cypress National Preserve. Preliminary analysis suggests that there are distinct differences in diatom communities in impacted versus unimpacted sites; suggesting this may be a useful diagnostic Vital Sign for that park.

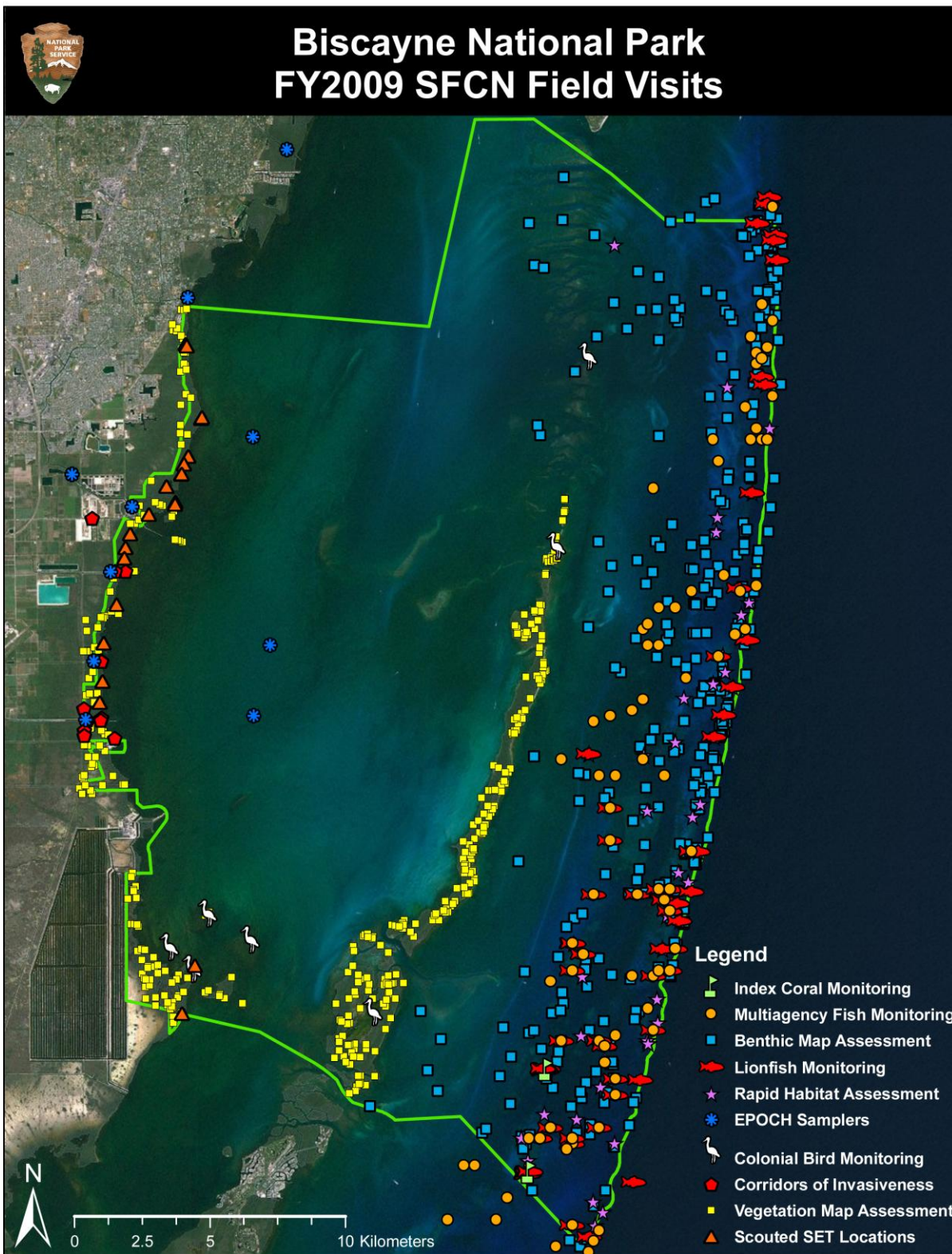
Water Quality Monitoring

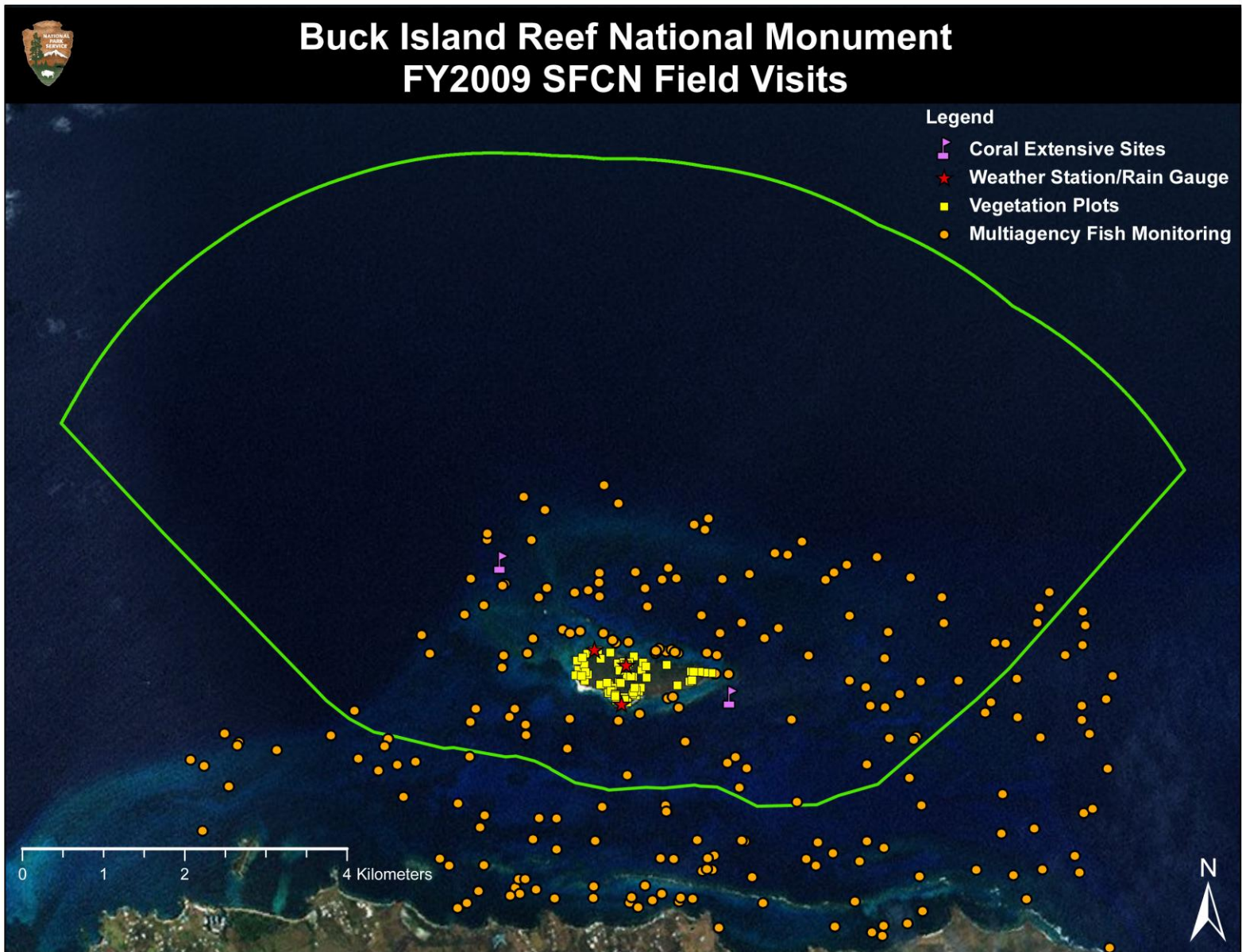
- Marine Benthic Communities: Ocean reef water temperature data was used in Virgin Islands National Park to help accurately track the potential for coral bleaching after NOAA issued an alert for high potential for coral bleaching in August in the Caribbean. However data showed average monthly temperature was within the 15 year historical range at VIIS sites; thus additional response measures were not triggered.
- Nutrient Dynamics and Water Chemistry: SFCN funded a post-doc position to work on the Nutrient Dynamics and Water Chemistry vital signs via a cooperative agreement with Jim Fourqurean and Joe Boyer of Florida International University. The position should start mid- FY10.
- Surface Water Hydrology: SFCN installed a weather station and crest gauge station at Salt River Bay National Historical Park and Ecological Preserve and a weather station and two rain gauge stations on Buck Island Reef National Monument. The protocol is nearly complete.
- Contaminants:
 - SFCN is working with the U.S. Geological Survey who initiated a pilot project to assess levels of Emerging Pollutants of Concern (EPOCs) in near shore waters of Biscayne Bay due to concerns generated by the Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project. SFCN is responsible for deploying and retrieving the samplers.
 - SFCN continues supporting Biscayne National Park staff with negotiations between the park and Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project.

FY2009 SFCN Field Work Maps

As most of SFCN's vital sign protocols and reporting strategies with partners are still in development, we are providing maps showing work accomplished in the park this year by SFCN (or in the case of the reef fish monitoring, SFCN with partner agencies).

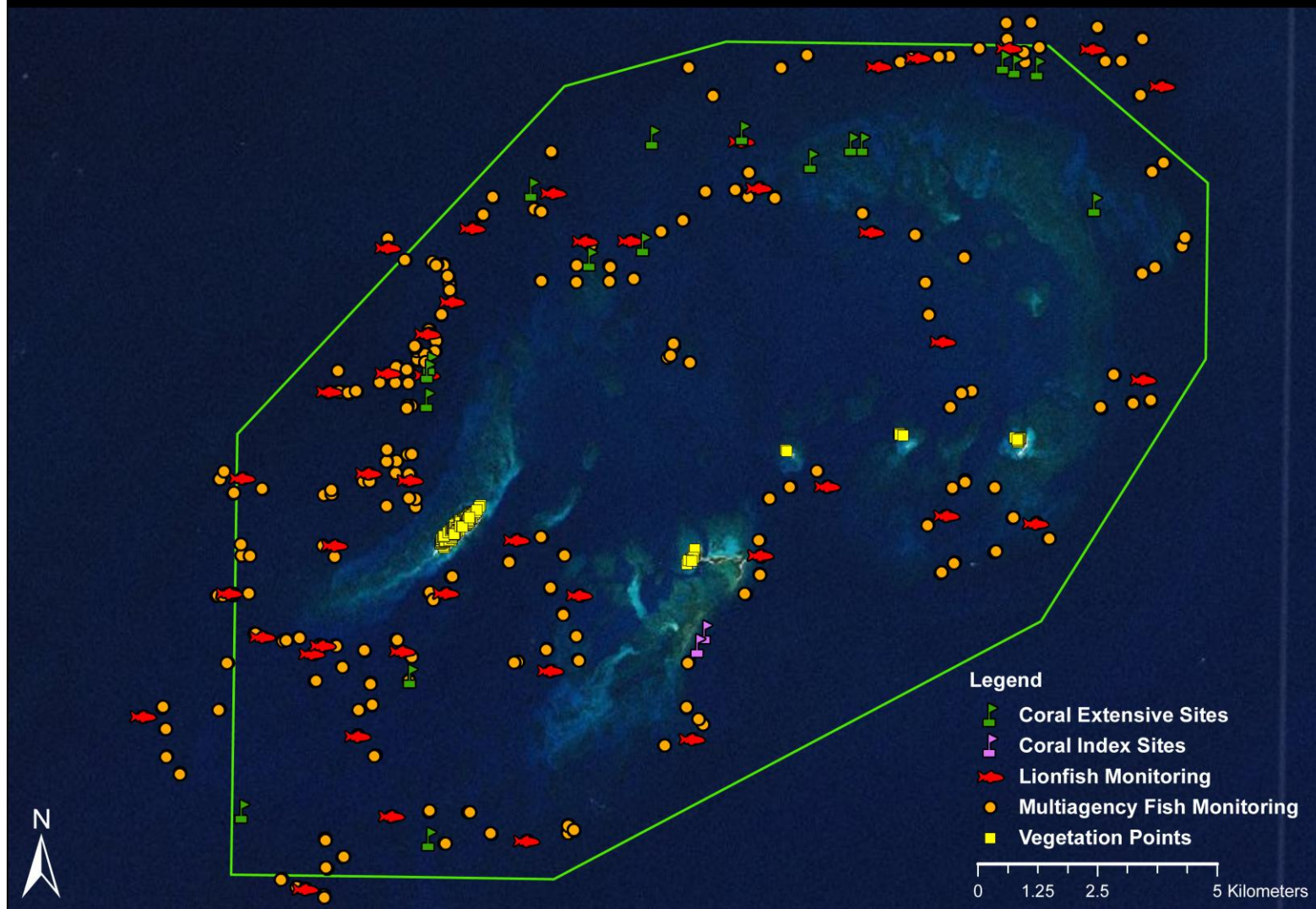


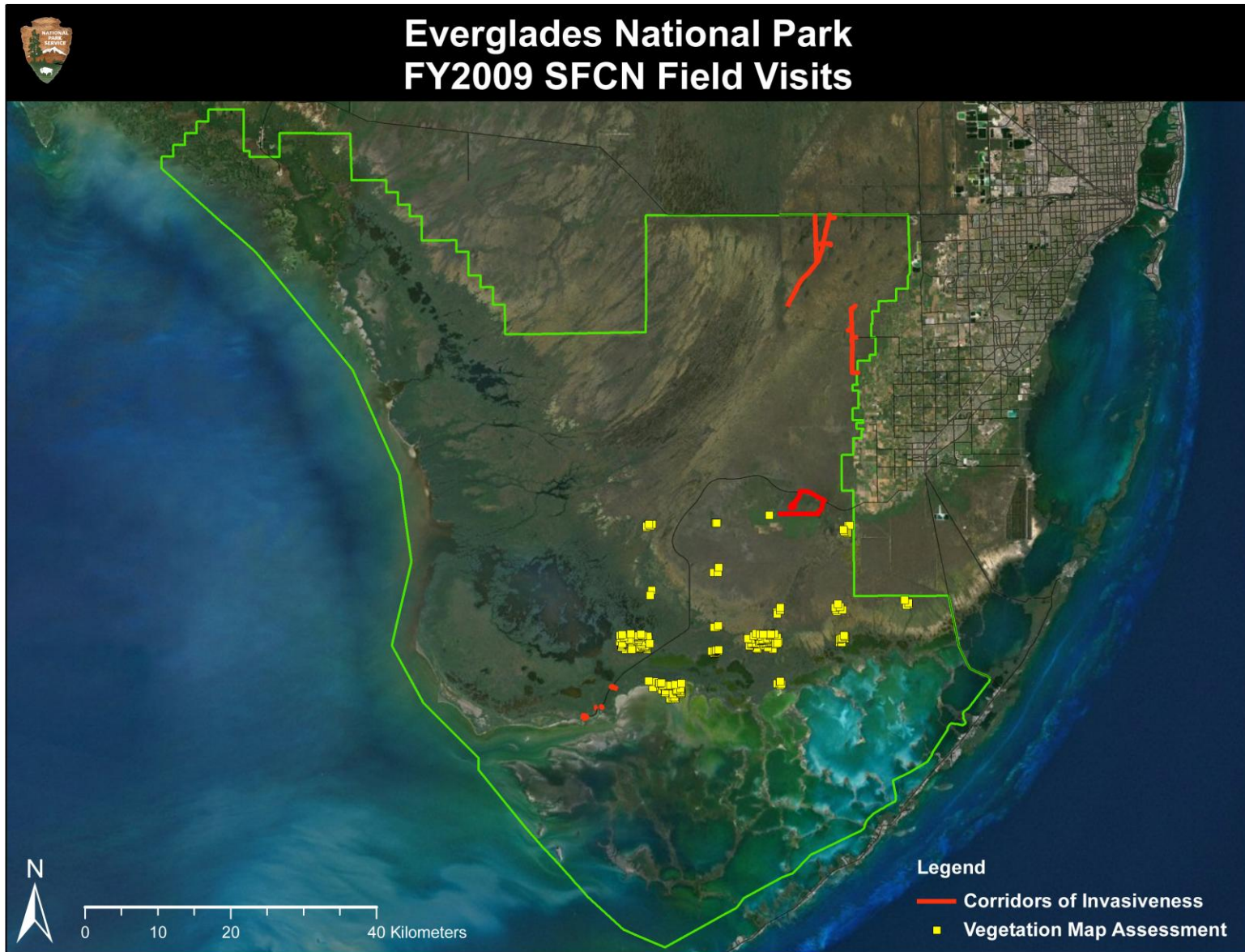






Dry Tortugas National Park FY2009 SFCN Field Visits

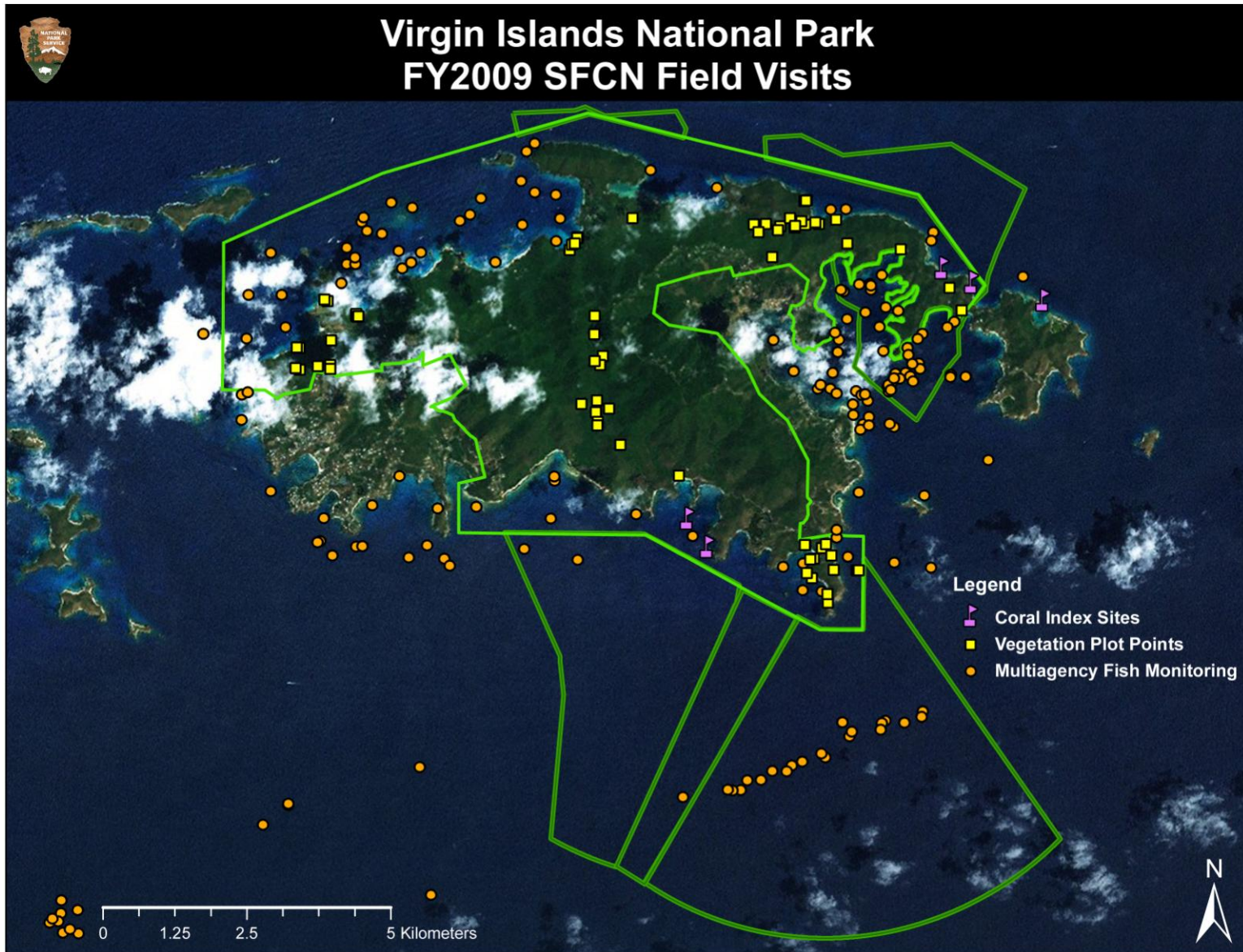






Salt River Bay NHP and EP FY2009 SFCN Field Visits





I. Program Accomplishments

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.

I.A Marine Ecology Branch

Overview

During FY09, the Marine Ecology Branch lost their marine ecologist to NOAA, and employed a number of interns. The group made a number of significant accomplishments including mapping, monitoring, and even assisting with an emergency response to an invasive lionfish observation.

Benthic habitat maps were created for DRTO and BISC, and over 300 sites were visited in BISC 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, VICRNM, BUIS, and BISC.

In addition, the Marine Ecology group surveyed 18 extensive coral monitoring sites each with 4 transects throughout DRTO. During work on this project in May and June, reef water temperature was collected at all sites.

The SFCN garage was completed in April of 2009. With the completion of this facility, SFCN is able to store the 29' Twin Vee research vessel along with a full Nitrox membrane dive tank fill station. This station has the ability to fill 5 dive tanks at a time with minimal effort due to the large Nitrox storage banking system and length of the fill whips. The longer whips allows the ability to fill dive tanks on the boat (Twin Vee) while it is parked in the garage. Included in this facility were a dive locker and a scientific processing room. There were additional purchases for the garage, such as a full complement of tools, work bench area and storage shelves. The garages construction also allows for the airboat and electro fishing boat to be stored inside during severe weather events.

Biscayne National Park BioBlitz

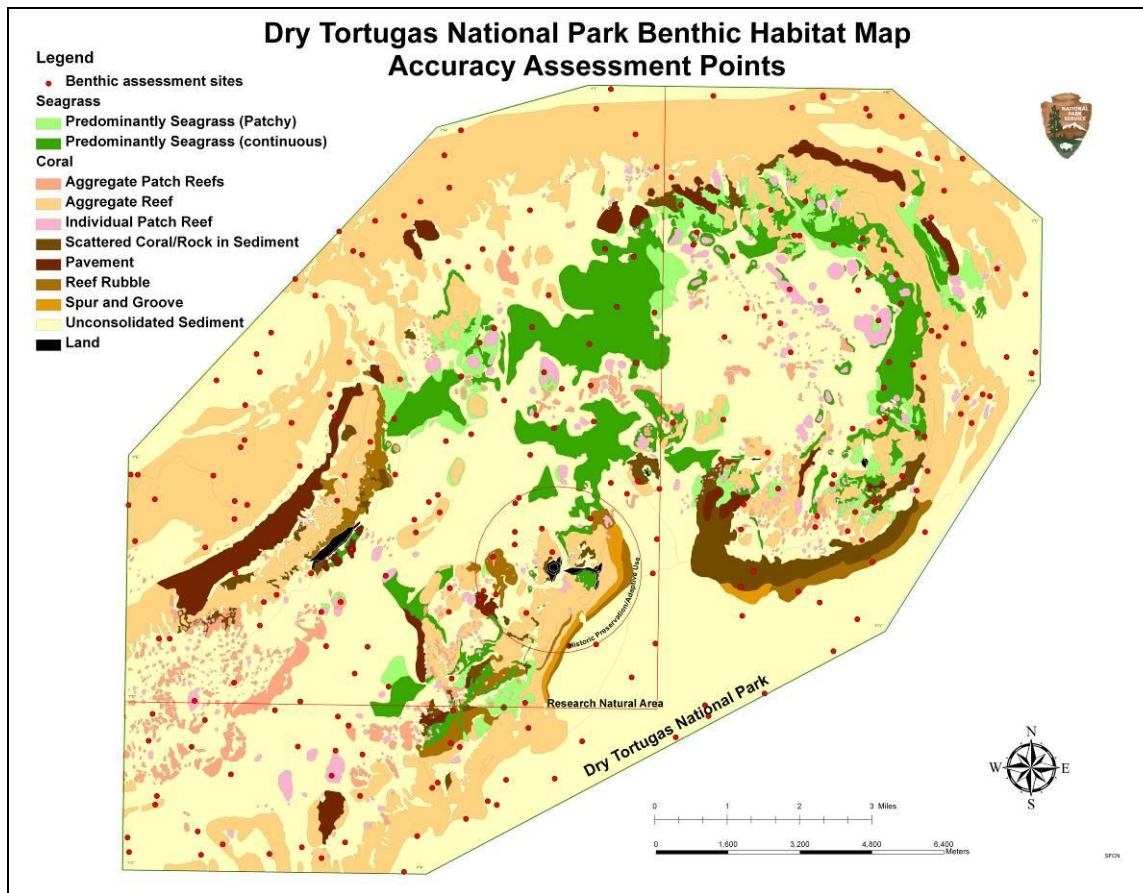
SFCN has assisted with Biscayne National Park and National Geographic in the planning of the park's bioblitz scheduled for April 30 through May 1, 2010. This 24 hour natural resource inventory will be the first in a marine park and logistically very complicated. These challenges have required many conversations to determine how best to transport scientists and visitors, how to collect and enter data, and basic carrying capacity issues. The event will be very exciting and we are very optimistic it will help us better understand what lives inside the park. Data gaps we hope to address will include bacteria, viruses, and invertebrates.

Inventories

Dry Tortugas National Park Benthic Habitat Map

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.

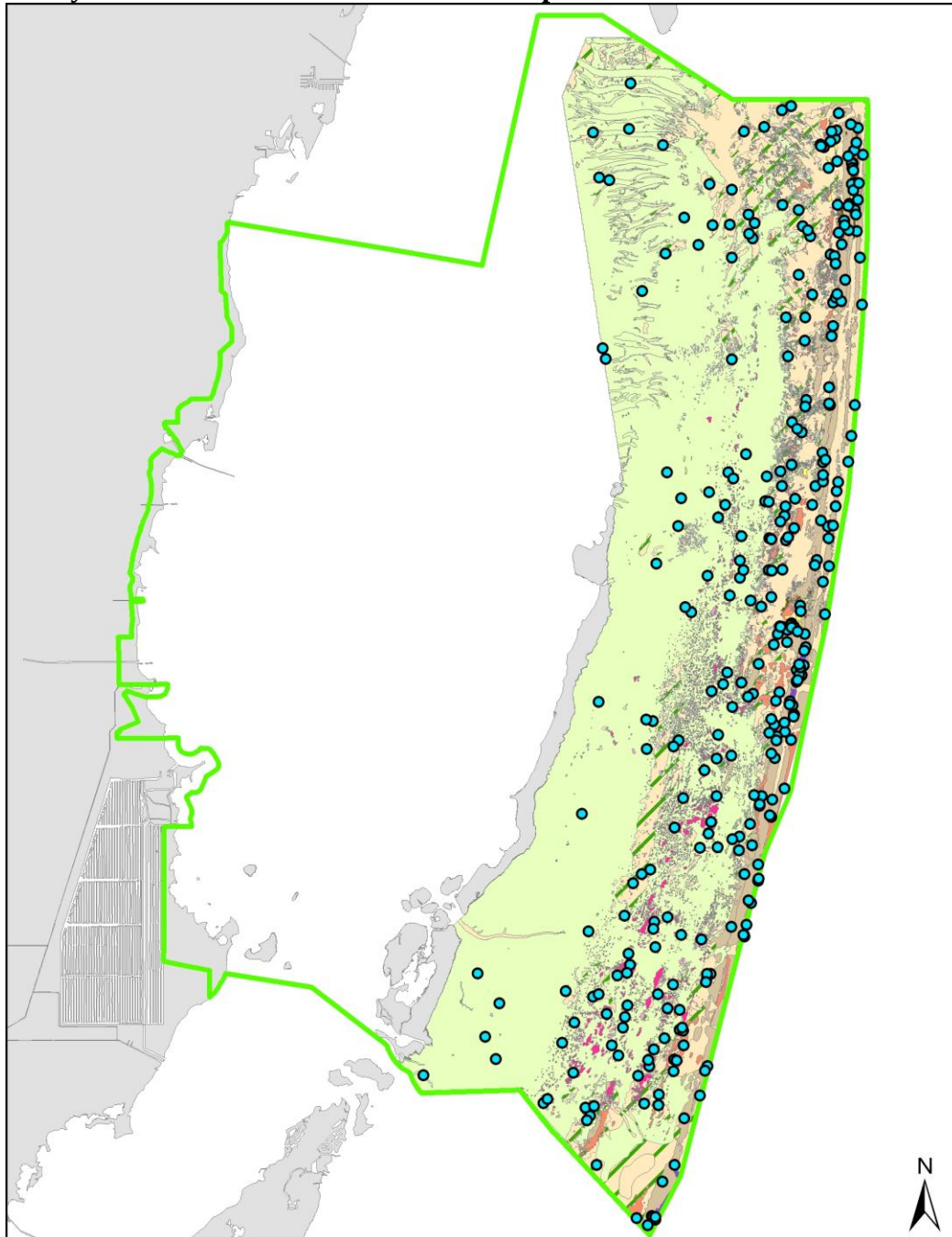
Project Status: Accuracy assessment of the map from data collected during June 2008 has been completed. Sonar survey for bathymetry of deeper sites required three separate cruises due to equipment problems but were completed in 2009. Final processing of the sonar and bathymetry layers is still in progress and expected by Spring 2010. By the middle of FY10, we expect to have a complete accuracy matrix and benthic habitat map along with full bathymetry layer for



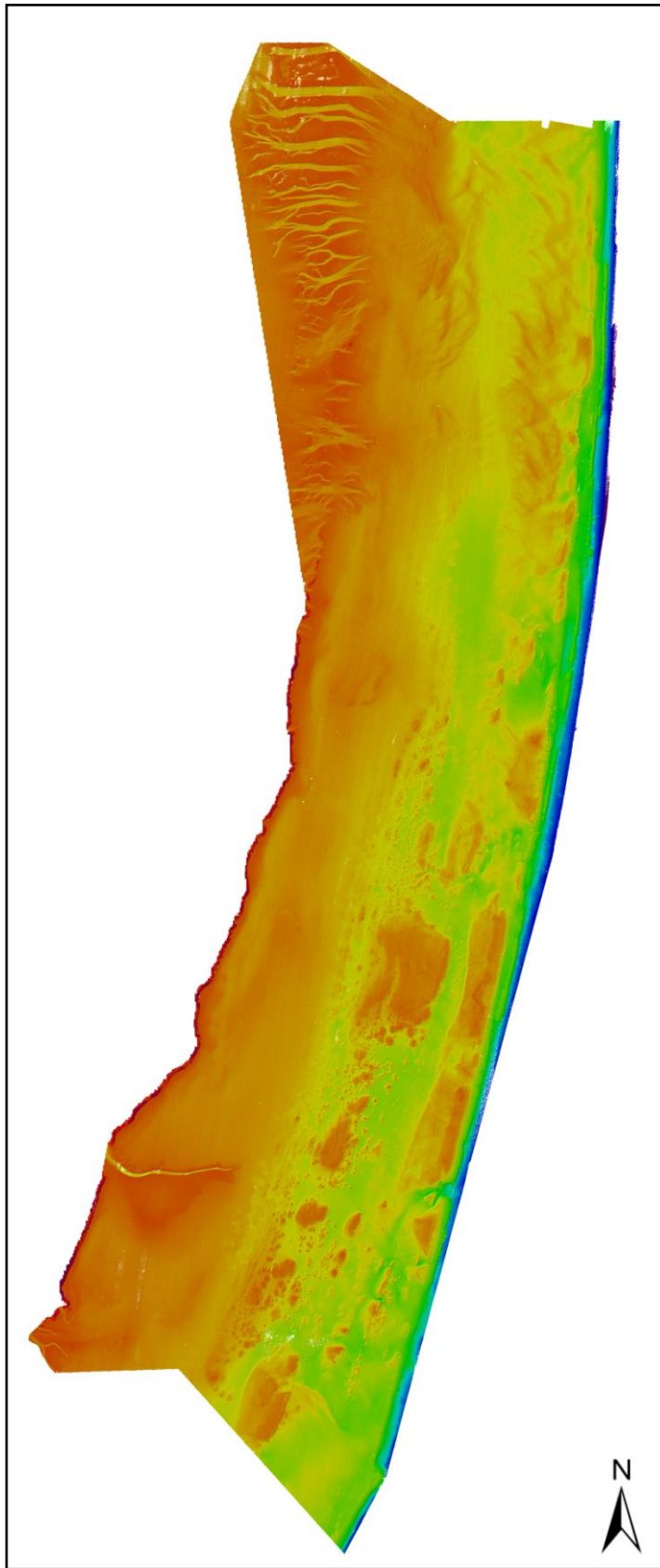
Benthic Habitat Map of Dry Tortugas National Park. Red points indicated accuracy assessment points visited by the SFCN.

the entire park. In FY10, SFCN staff plans to join the photointerpreted data acquired in 2008 with the SONAR data collected in 2009 to make improvements on the DRTO benthic habitat map. Habitat data collected during field work in DRTO will continually be used to check map accuracy and revise errant habitat classifications. This includes the Reef Fish Visual Census (RVC) and Rapid Habitat Assessment (RHA) datasets. A comparison will be made between the NPS, vector based benthic habitat map with RSMAS's raster-based map. The merging process and changes made will all be outlined in the BISC benthic habitat map report to be published in FY10.

Biscayne National Park Benthic Habitat Map



Benthic Habitat Map of Biscayne National Park. Blue points indicated accuracy assessment points visited by the SFCN.



Project Overview: SFCN in partnership with the Florida Fish and Wildlife Research Institute contracted Avineon, Inc. to conduct photointerpretation of aerial photography (1 ft resolution) collected in 2005 for the seaward portion of Biscayne National Park. The first draft of the benthic habitat map was delivered in October 2008 followed by a 288 point accuracy assessment by SFCN staff.

LiDAR data was also collected for the same region in December of 2008 with a first draft (left) delivered at the end of January 2009. The data has 5 m horizontal resolution and 50 cm vertical (depth) resolution.

Project Status: SFCN staff completed the accuracy assessment of the new benthic habitat map draft in March of 2009 for the offshore portion of Biscayne National Park. SFCN staff visited 288 randomly selected accuracy assessment sites as well as 17 control sites selected by Avineon and evaluated habitats *in situ* using underwater video camera surveys, snorkeler surveys, and SCUBA surveys. The draft map performed well, with an 85.7% acceptable accuracy when classifying habitats into broad categories and with 33.2% of points with a 100% match.

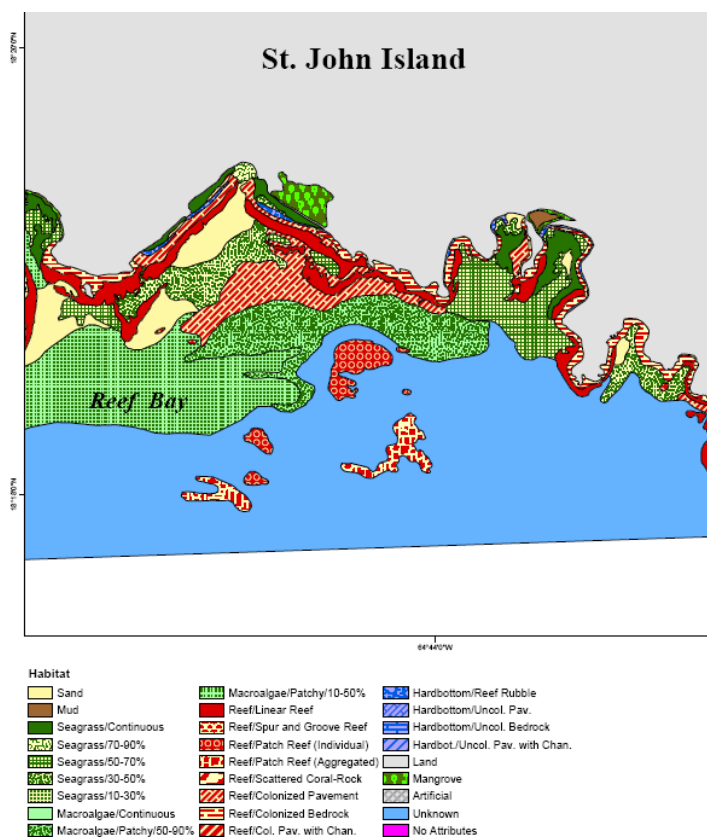
SFCN used the benthic habitat map over the summer of 2009 to conduct the first phase of Rapid Habitat Assessments to locate potential sites for installation of long term coral monitoring sites. SFCN also plans to use this map to improve the reef fish monitoring program inside BISC.

In FY10, SFCN staff plans to join the photointerpreted data acquired in 2008 with the LIDAR collected in 2009 to make improvements on the BISC benthic habitat map. Habitat data collected during field work in BISC will continually be used to check map accuracy and revise errant habitat classifications. This includes the Reef Fish Visual Census (RVC) and Rapid Habitat Assessment (RHA) datasets. A comparison will be made between the NPS, vector-based benthic habitat map with RSMAS's raster-based map. The merging process and changes made will all be outlined in the BISC benthic habitat map report to be published in FY10.

USVI parks benthic habitat maps

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. A meeting on the draft map was held at VIIS in February 2009, with a final map delivered on DVD to VIIS on August 27, 2009.

Project Status: In FY10, NOAA biogeography has been funded by the NPS WRD Oceans and Coastal Branch to complete benthic habitat mapping in St. Croix NPS waters, as well as conduct a GIS Gap Analysis project for USVI and Pacific park units. SFCN is working with NOAA and the USVI parks to ensure map products will meet monitoring needs, as well as assisting in organizing the data gap analysis effort to minimize duplication and ensure the NPS can get as much from the project as possible.

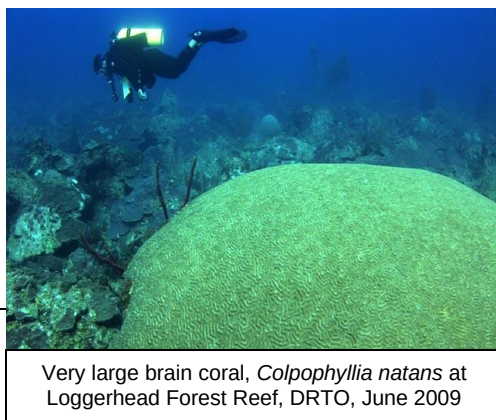
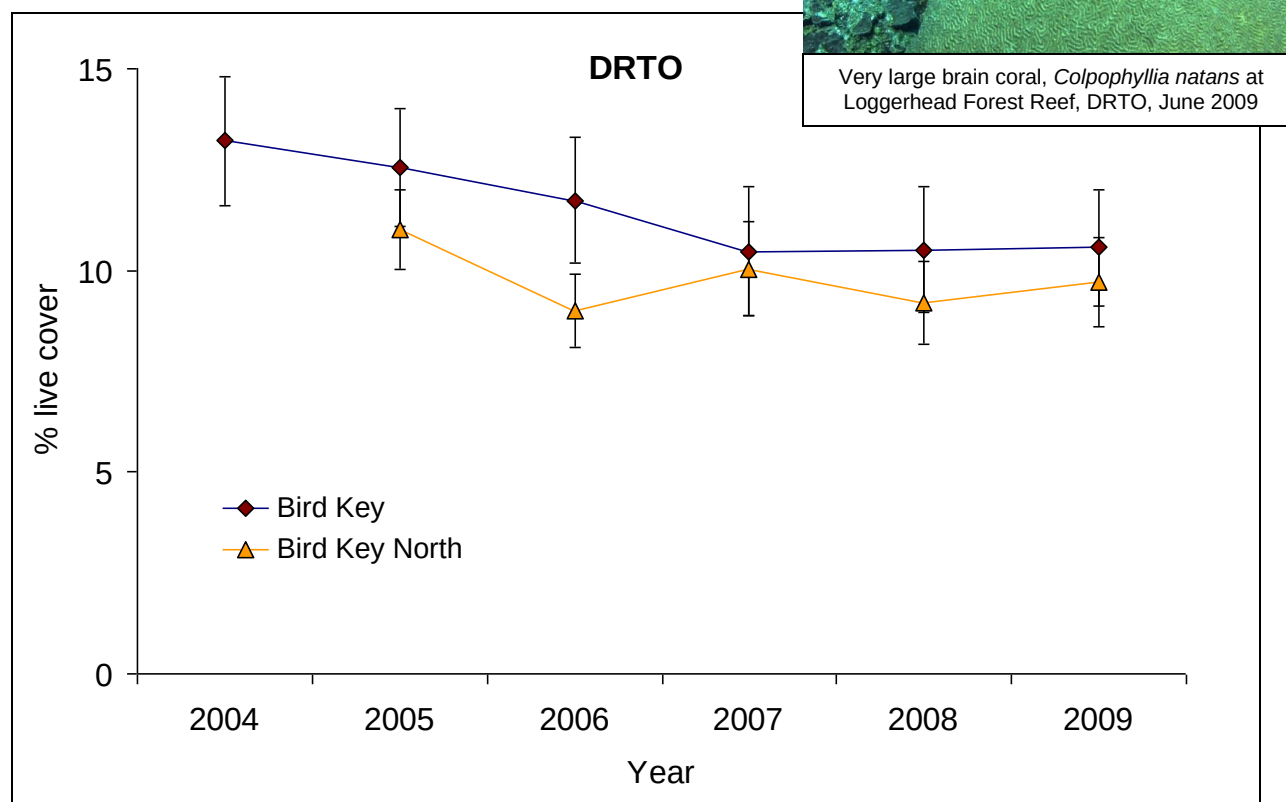


Benthic habitat map of part of VIIS produced by NOAA's Biogeography Team. Resolution of this map is low and large areas are unknown.

Vital Signs Monitoring

Marine Benthic Communities Vital Sign

Dry Tortugas National Park (DRTO)

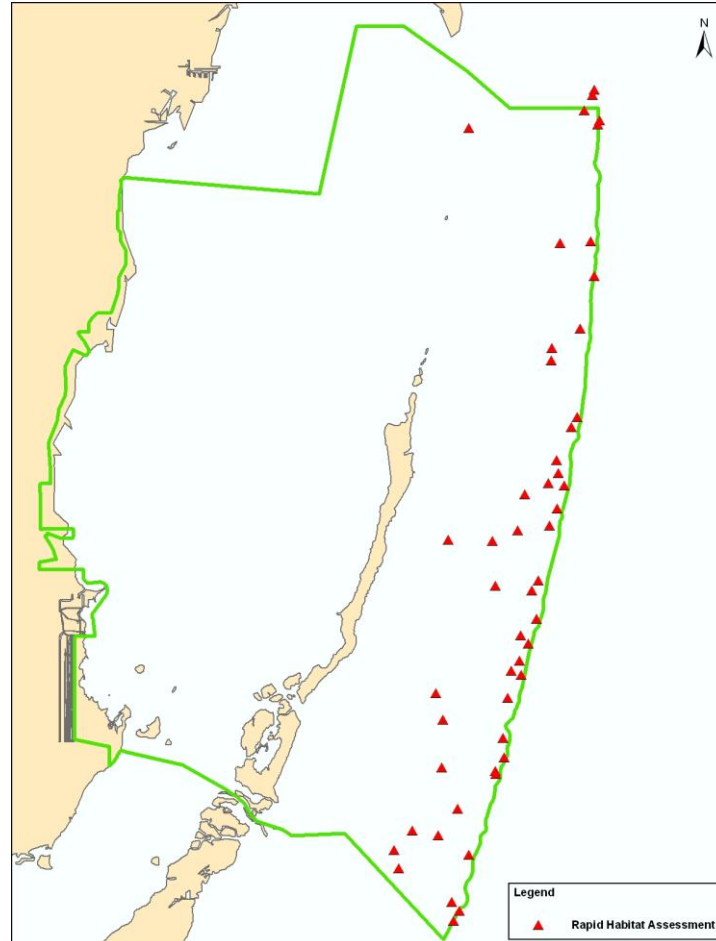


Trends in live coral cover at Bird Key and Bird Key North Reefs, DRTO

Accomplished in FY09: SFCN staff visited and monitored the 18 sites for coral reef monitoring, installed in FY 08 (9 sites inside and 9 outside of the newly established Research Natural Area [RNA]). Data was collected using the Benthic Community protocol which includes the HD video for benthic component cover (analysis pending), *Diadema antillarum* abundance, coral disease presence/type and measurements, and reef-depth water temperature co-located at each sample site. SFCN staff concurrently conducted annual coral reef index site monitoring, (protocols and data collected as listed above) at the Bird Key and Bird Key North Reefs (analysis complete and included within this report). These index sites now include five and six years of data.

Continuation in FY10: SFCN staff will evaluate year 2 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. Also, SFCN will evaluate including additional well-developed hard-bottom reef communities recently identified into existing sample domain, modifying sampling allocation as practical. SFCN staff will conduct annual sampling of both index and extensive sites throughout the park.

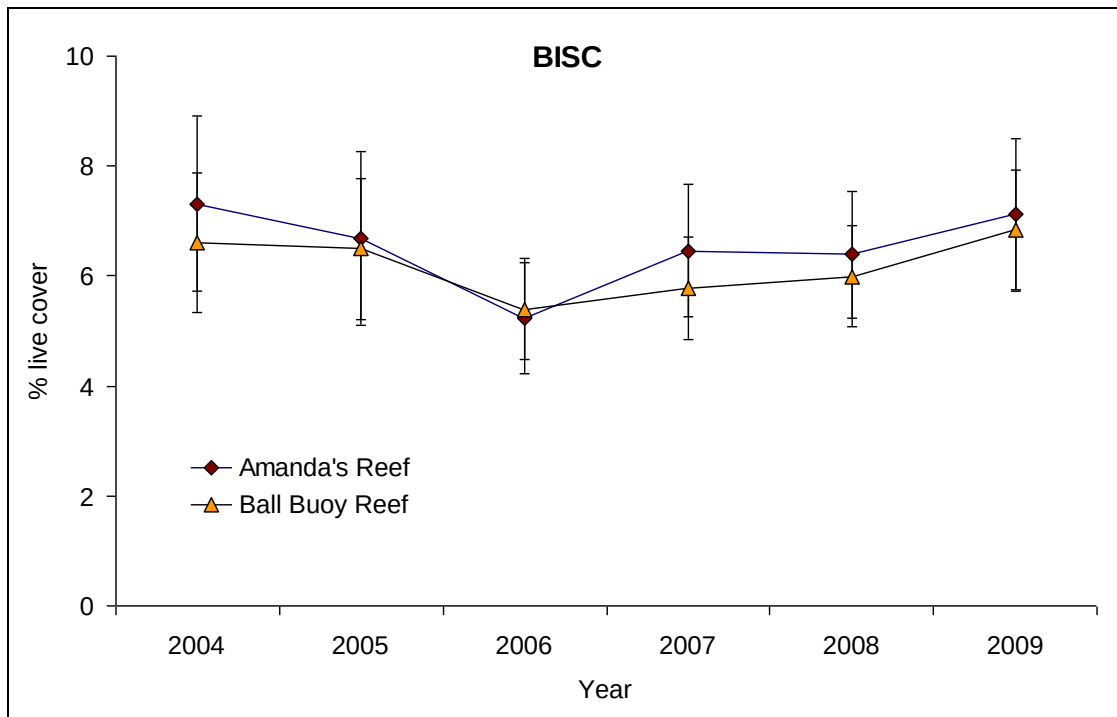
Biscayne National Park BISC



Rapid Habitat Assessment sites in Biscayne National Park

Accomplished in FY09: SFCN staff conducted rapid habitat assessments (RHAs) at 50 randomly selected points to identify appropriate locations for installation of permanent extensive sites for coral reef monitoring. SFCN staff conducted annual coral reef community monitoring of index sites at Ball Buoy Reef and Amanda's Reef, both of which now include 6 years of data. Data was collected using the Benthic Community protocol which includes the HD video for benthic component cover, *Diadema antillarum* abundance, coral disease presence/type and measurements, and reef-depth water temperature co-located at each sample site.

Continuation in FY10: SFCN will install and survey ~20 permanent extensive sites. Exact sample sizes will depend on levels of variation in the evaluation RHA data along with multiple benthic data sources (e.g.: accuracy assessment data and data from fish habitat characterizations). SFCN staff will also conduct annual coral reef index site monitoring.

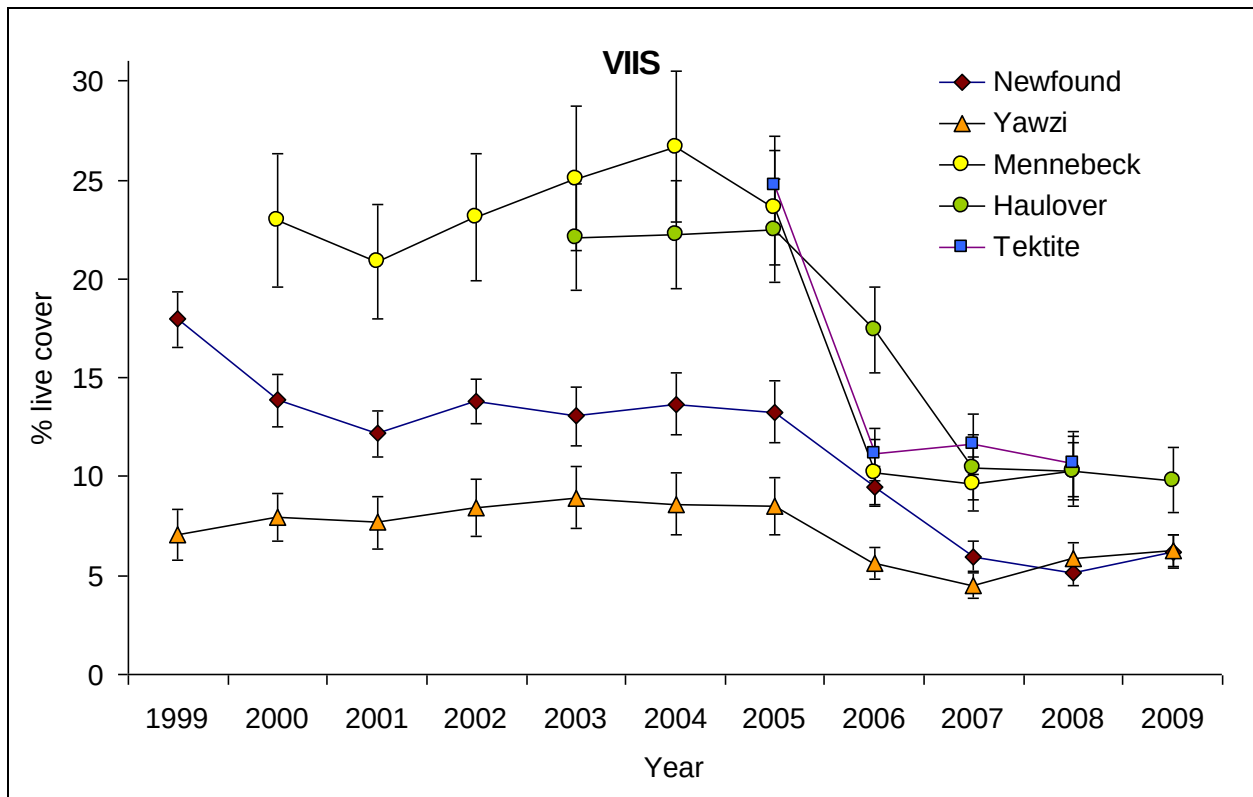


Trends in live coral cover at Ball Buoy Reef and Amanda's Reef, BISC



Spawning brown encrusting octopus sponge, *Ectyoplasia ferox* at Ball Buoy Reef, BISC

Virgin Islands National Park (VIIS) and Buck Island Reef National Monument (BUIIS)
 Accomplished in FY09: SFCN staff conducted annual coral reef index site monitoring in VIIS (Tektite Reef, Haulover Reef, Yawzi Reef, Mennebeck Reef, and Newfound Reef) and BUIIS (South Fore Reef and Western Spur and Groove). Data was collected using the Benthic Community protocol which includes the HD video for benthic component cover (analysis pending), *Diadema antillarum* abundance, coral disease presence/type and measurements, and reef-depth water temperature co-located at each sample site. The sites in VIIS have between 5-11 years of data, and BUIIS sites have 8 and 10 years of sampling data.

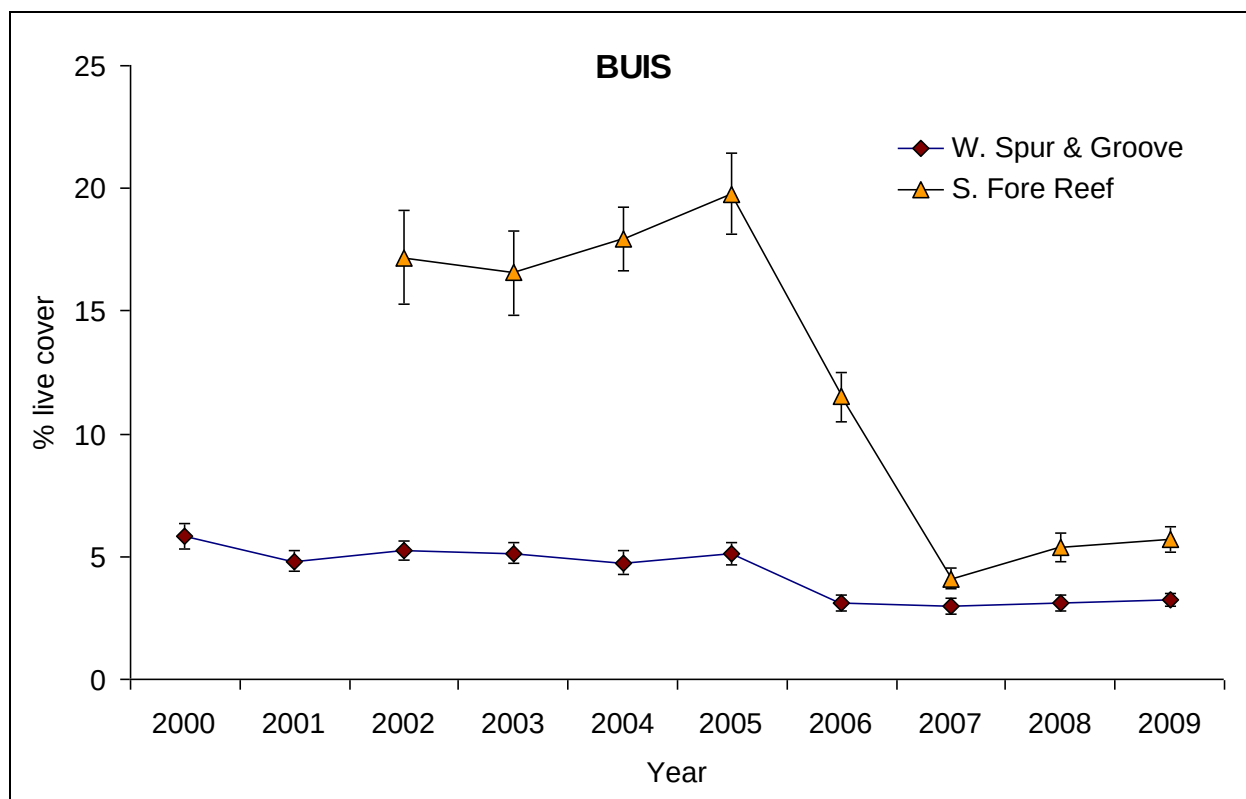


Trends in live coral cover at index sites throughout VIIS



Listed as threatened under the US Endangered Species Act, this Elkhorn Coral, *Acropora palmata*, is found in W. Spur and Groove Reef, BUIS.

Continuation in FY10: 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 Reefs, BUIS

Data Management, Reporting, and Protocol development

Accomplished in FY09: The paper "Coral disease following massive bleaching in 2005 causes 60% decline in coral cover on reefs in the US Virgin Islands" was published in the journal *Coral Reefs*. A public-friendly document "Coral Reefs in U. S. National Parks: A Snapshot of Status and Trends in Eight Parks" was created in cooperation with the Pacific Islands Network and distributed at the Coral Reef Task Force in February 2009 and at the International Marine Conservation Congress at George Mason University in May.

An overarching reporting strategy is in development that will include annual resource briefs, annual data summary reports, and multi-park comprehensive reports (every few years). Draft park resource briefs were created.

Additional QA/QC procedures were implemented for the DRTTO Extensive Sites with a 10% data verification step of video monitoring data by a second researcher. The coral disease database was updated with basic proofing and reporting queries. Historic SFCN diadema data is being collated.

Progress was made on revising and adding SOPs on

- Coral disease monitoring
- Coral colony counts per transect
- Coral species counts per transect

Some draft sections were added on the extensive site monitoring design to the protocol.

Continuation in FY10: A comprehensive reporting strategy for coral monitoring index sites and extensive sites will be drafted and implemented. Additional automated reporting will be added into the coral database and automated reporting will be developed for coral disease and *Diadema* to support these reports. Annual data summaries and resource briefs will be created and delivered to the parks. A multi-park comprehensive analysis report will at least be started and hopefully completed.

The Coral Reef Monitoring Protocol will be updated and revised as follows: Sections on analysis, reporting and extensive sites monitoring will be added to the *Coral Reef Monitoring Protocol*. The coral disease SOP will be updated to reflect changes made after testing the SOP in DRTO and SOPs on Coral Colony Counts and Species Counts will be added. A description of the transition to High Definition video from existing digital video in the field will be added.

Sampling design for the extensive sites in DRTO and BISC will be revisited as initial video transect data results for the extensive sites in DRTO had lower coral cover estimates than the Rapid Habitat Assessment results indicated. As a result the Rapid Habitat Assessment Protocol has been revised for use in BISC by doubling the number of sampling points and crews must completely lay out tapes and tie them off before data collection can proceed to reduce possibility of bias.

Marine Benthic Communities – Seagrass and Conch

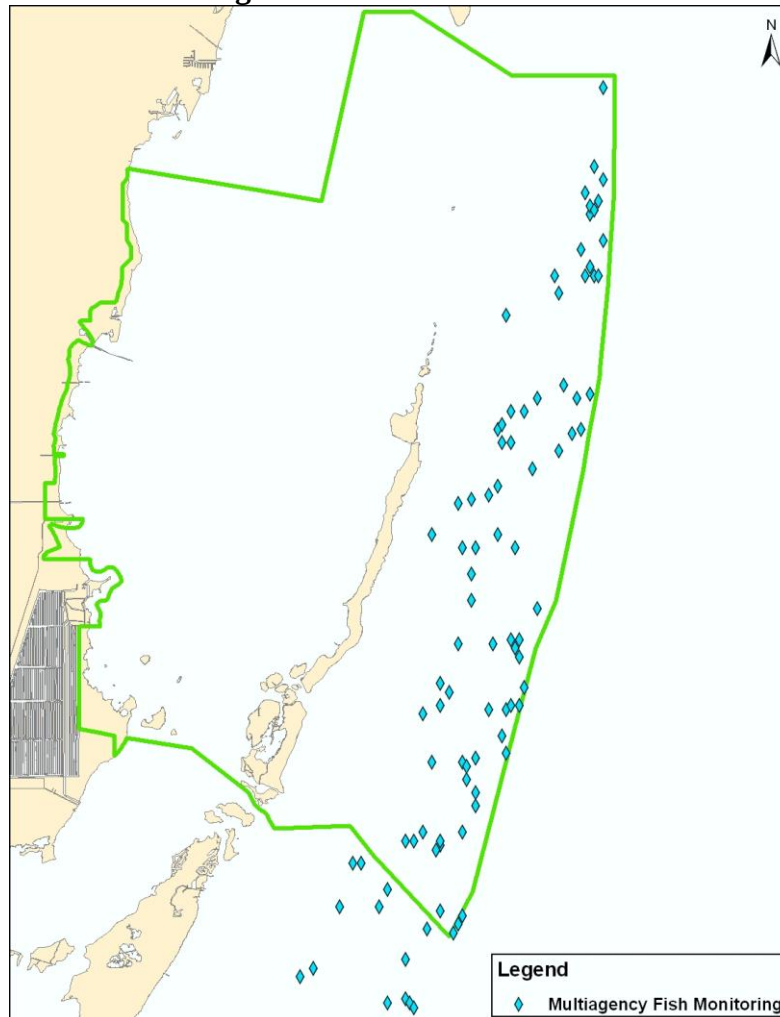
Initiated in FY09: SFCN will get copies of seagrass protocols and conch protocols currently in use in the Florida Keys National Marine Sanctuary, Florida Bay, and the US Virgin Islands and will conduct pilot work to test protocols and determine the level of effort involved in order to provide information 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.

Two seagrass protocols are currently being studied by SFCN for acceptance/modification. One protocol currently in use in the Florida Keys National Marine Sanctuary (FKNMS) uses the Braun-Blanquet method to perform seagrass surveys. Variations of this method are being used to collect seagrass data in Biscayne National Park (BISC), Everglades National Park (EVER), Dry Tortugas National Park (DRTO) and the FKNMS. Using this method would enable direct comparison of data between SFCN parks in Florida as well as with the FKNMS, thus complementing existing monitoring efforts already established in these areas. Another protocol developed by Virgin Islands National Park (VIIS) and Jacksonville University, and historically implemented in St. John, U.S. Virgin Islands (USVI), uses a short shoot count survey method. The method most effective for use in the USVI parks shall be determined in consultation with the VIIS, Buck Island Reef National Monument (BUIS) and Salt River Bay National Historic Park and Ecological Preserve (SARI) resource management teams.

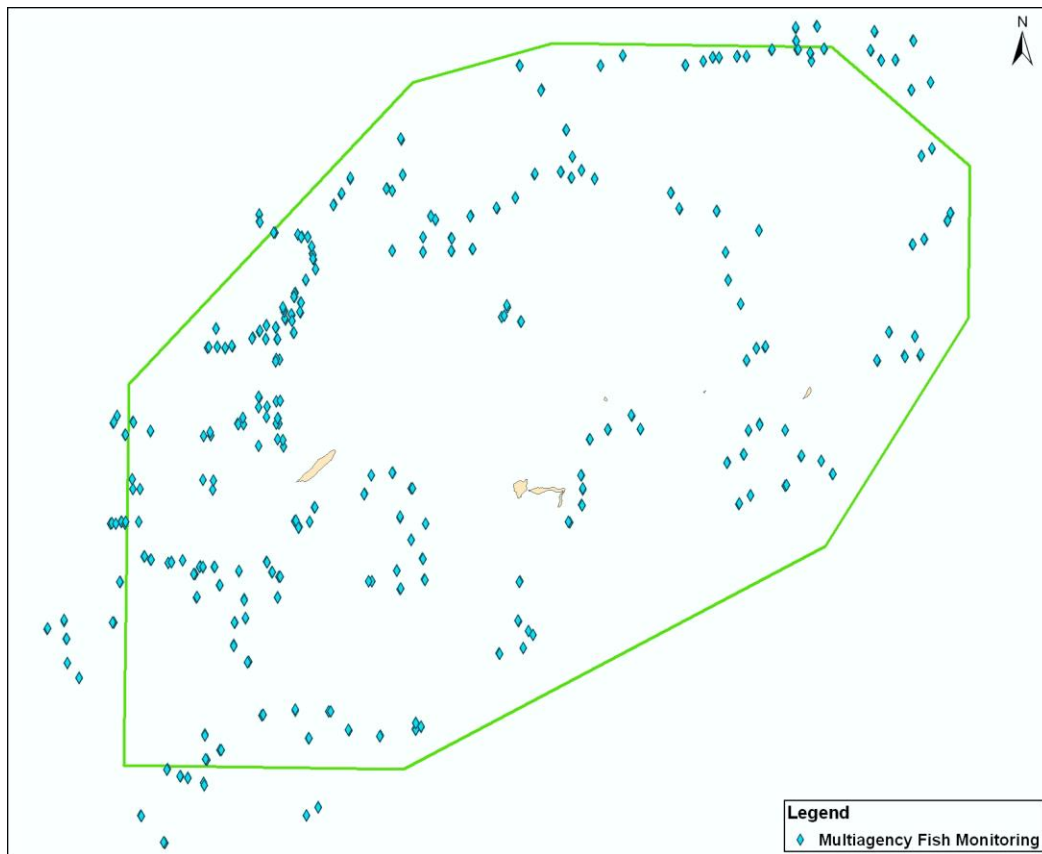
In an effort to increase effectiveness and efficiency of the vital sign program within SFCN, the network shall evaluate the feasibility of performing queen conch (*Strombus gigas*) surveys in conjunction with the seagrass method. This species is listed under the vital sign “Marine Exploited Invertebrates”, thus incorporating this survey as a standard operating procedure (SOP) in the seagrass protocol can provide a significant added-value benefit to the vital sign program..

The additional effort is relatively minimal while no significant added resources may be necessary. The results of such data not only may fulfill the needs of the vital sign for this species, but the information will also enrich the seagrass data collected. SFCN shall attempt to prepare a seagrass protocol for submission by late 2010 and implementation by 2011.

Marine Fish Communities Vital Sign



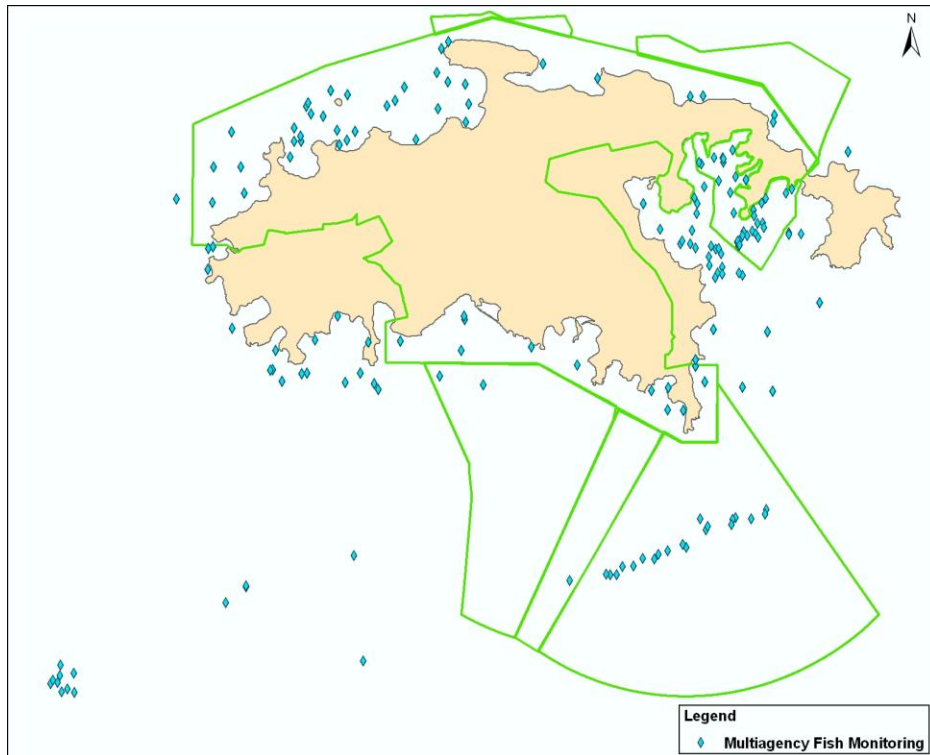
Multiagency Fish Monitoring Sites in Biscayne National Park
Total Sites monitored: 91; Total sites monitored by SFCN: 54
(each site consists of 2 sub-sites)



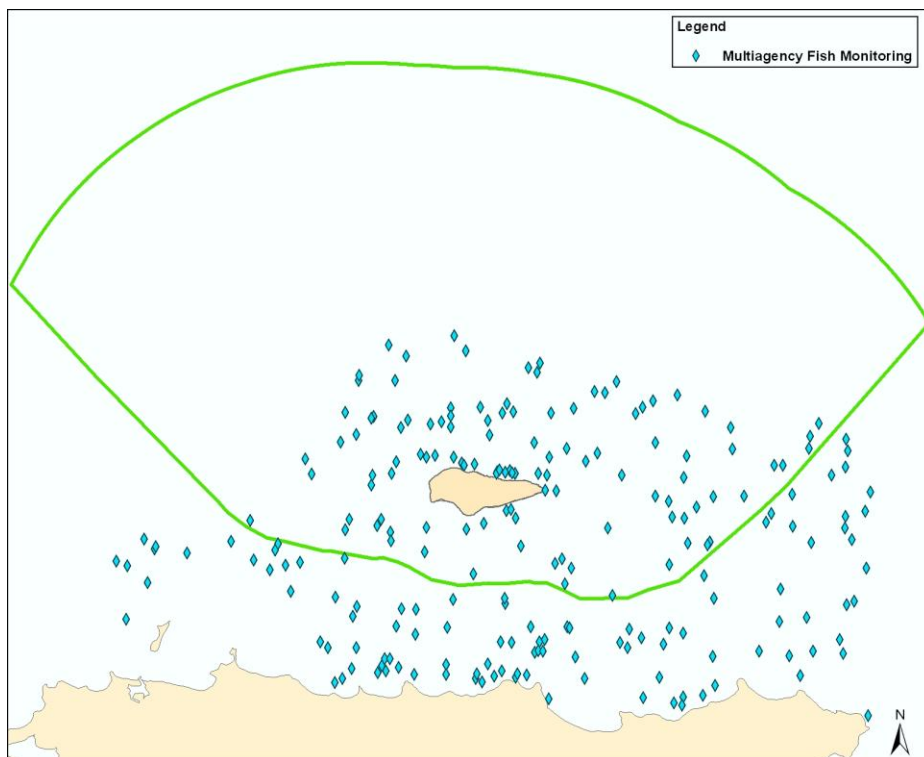
Multiagency Fish Monitoring Sites in Dry Tortugas National Park
Total Sites monitored: 210 (each site consists of 2 sub-sites)



Diver performing an RVC assessment in DRT0.



Multiagency Fish Monitoring Sites in Virgin Islands National Park and Coral Reef National Monument. Total sites monitored: 170



Multiagency Fish Monitoring Sites in Buck Island Reef National Monument
Total Sites monitored: 240

Accomplished in FY09: In February 2009, SFCN Marine Ecologist Ben Ruttenberg, SFCN post-doc Marilyn Brandt and UM-RSMAS research technician Natalia Zurcher met with Vanessa McDonough and associates from BISC in order to introduce them to the methods and operations of the reef fish visual census (RVC) monitoring program to visually census reef fish on the Florida Keys reef tract. They agreed to combine efforts for sampling in BISC in the summer of 2009.

On April 4th, 2009 an interagency meeting involving FWRI, NOAA, UM-RSMAS, SFCN and BISC took place at the SFCN office building. At this meeting RVC sampling for the 2009 season was planned and training presentations were given.

In July 2009 SFCN funded and SFCN staff participated with staff from FWRI, NOAA, and UM-RSMAS in a 10 day reef fish monitoring cruise in DRTO. The cruise in 2009 was implemented in order to provide additional data for the evaluation of the newly-established Research National Area. Normally, DRTO is sampled on only even years and sampling consists of two 10-day cruises to all three bank formations. This cruise had only one 10-day leg and was limited to the confines of DRTO. A total of 210 sites were surveyed.

After the completion of the 10-day cruise, SFCN staff in conjunction with BISC staff began surveying sites for reef fish in BISC in August. This sampling was completed on October 1, with a total of 91 sites surveyed.

Marilyn Brandt continued as a post-doc through the University of Miami-RSMAS program under Prof. Jerry Ault. In continuation of her post-doc Dr. Brandt:

- a) Completed the cooperative Marine Fish Communities monitoring protocol for South Florida reef fish communities, which is a joint effort by UM-RSMAS, NPS, NOAA, and FWRI. This document was completed in May 2009 and was reviewed by three experts in the field in May-June. Edits were made based on the reviews and a finalized document was completed in August. The document was then approved by I&M to be published as a Natural Resource Report and was issued a TIC number in September. It was formatted and a final copy was sent to the printer on October 1.
- b) Began preparing a manuscript for submission to a peer-reviewed journal discussing the process of collaboration on the protocol. The working title of this manuscript is "The opportunities and challenges in development of a multi-agency program to monitor and assess reef fish populations in the Florida Keys coral reef ecosystem" and it is planned to be submitted to the journal *Fish and Fisheries*.
- c) Began preparing the cooperative protocol for monitoring reef fish communities in the U.S. Virgin Islands. In support of this effort, she participated in reef fish monitoring in St. John in July 2009 in conjunction with the NOAA Biogeography team.

In the U.S. Virgin Islands parks, the pilot study to co-locate surveys of fish assemblage along the benthic video transects at the index sites at VIIS and BUIS continued. Beginning in January 2009 and all sites sampled thereafter, transect selection changed from a fish survey on each 20x10 meter video transects, to surveying 12 of the 20 transects but expanding the transects to 25 meters.

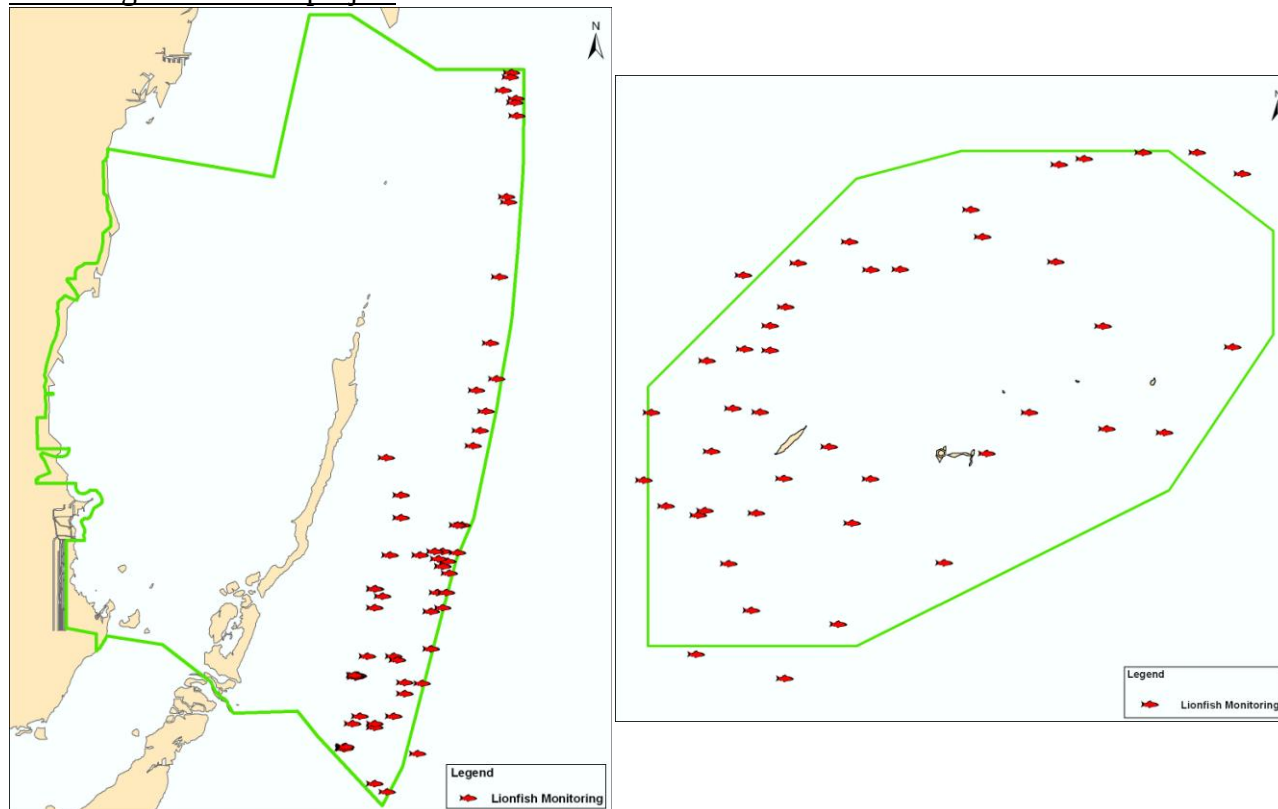
SFCN scientists partnered with NOAA biogeography and NPS resource managers at BUIS and VIIS during three two-week missions designed to inventory, characterize and monitor fish and fish-associated communities around St. John and Buck Island Reef National Monument. Missions in BUIS took place in October 2008, and March 2009 sample 120 locations each period. Sampling around St. John took place in July 2009 at 170 locations. At each sample location, the fish assemblage characterizations are co-located with estimates of benthic cover along a 25 meter transect.

Continuation in FY10: Dr. Brandt will complete the manuscript on the reef fish monitoring collaboration and submit it for publication. Dr. Brandt will also finalize the reef fish monitoring protocols for USVI parks.

In DRTO, reef fish communities will be sampled in conjunction with UM-RSMAS, NOAA, and FWRI in two 10-day cruises in July of 2010. SFCN staff will continue to collaborate with BISC and NOAA to conduct reef fish monitoring in BISC sometime to be determined during the summer of 2010. SFCN will continue co-locating fish surveys on benthic video transects at the index sites within VIIS and BUIS and will continue to partner with the NOAA Biogeography group during fish and benthic habitat characterization missions in BUIS and VIIS.

Other Projects

Searching for Lionfish project



Lionfish Monitoring sites in Biscayne National Park and Dry Tortugas National Park

Lionfish (*Pterois volitans/miles*), the first successful invasive marine species, are quickly overtaking the Western Atlantic. These venomous fish feed on anything and have been found to especially target juvenile grunts, snapper, and grouper. Lindsay Jones was hired on as a Student Conservation Association Intern to survey for lionfish in South Florida parks and to remove any that are discovered. Lionfish surveys accompanied Rapid Habitat Assessments and Reef fish Visual Censuses in order to begin immediate monitoring in BISC. A 40m by 10m belt transect was conducted at each RHA site surveyed: the diver swimming along with a dive light checking the reef and cryptic habitat. During RVCs several survey techniques were tested. First a simple roving diver survey was done by every observer within their 15m diameter cylinder following the 10 minutes sample time to determine the presence or absence of lionfish at that site. Later it was decided that data for density estimates were desired and another 40m by 10m transect was initiated, to be carried out following each RVC by each dive pair. This increased the area surveyed at each site, while minimizing time spent on the bottom. During coral monitoring trips in both BISC and DRTO roving diver surveys were conducted at index and extensive sites. Currently 65 sites in DRTO and 101 sites in BISC have been surveyed with zero lionfish found. In addition, zero lionfish were reported during monitoring of 5 coral monitoring index sites and 170 fish monitoring sites in and around VIIS/VICR and 2 coral monitoring sites and 240 fish monitoring sites in and around BUIS. However, over the last few months lionfish have been reported and captured within and surrounding both BISC, DRTO and around St. Croix. The first successful capture mission was in June on a wreck just outside BISC boundaries. Since then 4 have been reported in BISC (2 speared) and at least 3 immediately outside it. A single lionfish was reported 6 km outside DRTO, which was not captured. Lindsay will continue lionfish surveys through the first half of FY10.

Infaunal bioerosion study

SFCN Marine Ecology SCA Intern Andrew Estep initiated a study on basal levels of infaunal bioerosion communities in BISC. Since reef persistence is a function of both constructive and destructive forces, understanding various community structures 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 distributed in various rubble fields in BISC. Two pieces of dead *A. palmata* rubble (<15 cm diameter) were collected from a series of random points within distinct rubble fields designated from the BISC benthic habitat map, rapid habitat assessments, and reef visual censuses field efforts. Samples were collected from each site for lab analysis and four photographs in cardinal directions were taken of the habitat in which rubble was collected.

Samples will be slabbed in two and each half will be scanned at high resolution. Quantitative measures of bioerosion will be attained using Adobe Photoshop to trace individual erosional galleries and NIH ImageJ to quantify the area of said galleries. The final product will provide basal levels of infaunal bioerosion due to macroboring bionts (sponges, bivalves, worms) present in *Acropora palmata* rubble which may display varying trends in macroboring communities and basal levels of infaunal bioerosion within BISC.

I.B Community Ecology Branch

Overview

The Community Ecology Branch grew again this year. One term employee (Joaquin Alonso) was hired, a postdoctoral researcher was funded, and we hired another full-time Resource Management Intern (ReMI, Jose Luciani), and one Chicago Botanical Garden's Conservation and land Management Intern (Carolyn "Lara" Ariori). We did not continue our contract with the Vegetation post-doc and we are going to rehire this position in FY10.

Currently, the small and medium mammals' inventory project is in the report writing phase summarizing and analyzing the information related to the massive amount of field work related to this project. The small and medium mammals' inventory did not document any of the elusive species in its second year of work in BICY or EVER.

There are currently five vegetation mapping projects in progress (BICY, BISC, BUIS, DRTO, SARI), two vegetation map assessments (EVER, VIIS), one study of the vegetation classification (SFla) and one map project completed (DESO). Some of these map projects are in their final stages of field data collection, or have reports in the process of being written and reviewed.

Initial progress towards the monitoring of vital sign indicators has begun. We completed a pilot study on the monitoring of colonial nesting birds (Great White Heron, Great Egret, Double-crested Cormorant) in BISC with monthly systematic helicopter flights. For the vegetation vital signs a number of different parts were worked on. We established and populated a geodatabase with previous historical vegetation work. Because of this work a number of historical vegetation sampling plots have been located or are in the process of being located (BISC, BICY, EVER, DRTO). We scanned and georectified a number of early 1980 detailed section vegetation maps and a few of these vegetation maps have been digitized. We relocated a few long term vegetation plots associated with these vegetation mapping projects. One plot was able to be resampled for a proof in concept that useful data can be extracted from this work.

We visited and evaluated 5 additional pilot sites for a total of 21 locations assessed for Soil Elevation Table sites in BISC. Initial pilot field work and protocol development has occurred for corridors of invasiveness. Some initial pilot work, equipment, or training for the exotic animals, freshwater fish and large macroinvertebrates, and periphyton vital signs also occurred. The Community Ecology Branch has made three presentations of its work this year as well.

Inventories

Small Mammals Inventory

Project Overview: The University of Florida and U.S. Geological Survey have been collaborating on year two of the small and medium sized mammal inventory for Everglades National Park and Big Cypress National Preserve. This inventory to date has detected twenty mammal species in BICY and 21 in EVER. Twenty-two species have been inventoried in the two parks. This project has not detected the following species in either EVER or BICY: long-tailed weasel (*Mustela frenata*), striped skunk (*Mephitis mephitis*), eastern mole (*Scalopus aquaticus*), southern flying squirrel (*Glaucomys volans*), norway rat (*Rattus norvegicus*), and red

fox (*Vulpes vulpes*). Also not detected were spotted skunk (*Spilogale putorius*) and Everglades mink (*Mustela vison*) in EVER, or the least shrew (*Cryptotis parva*) in BICY.

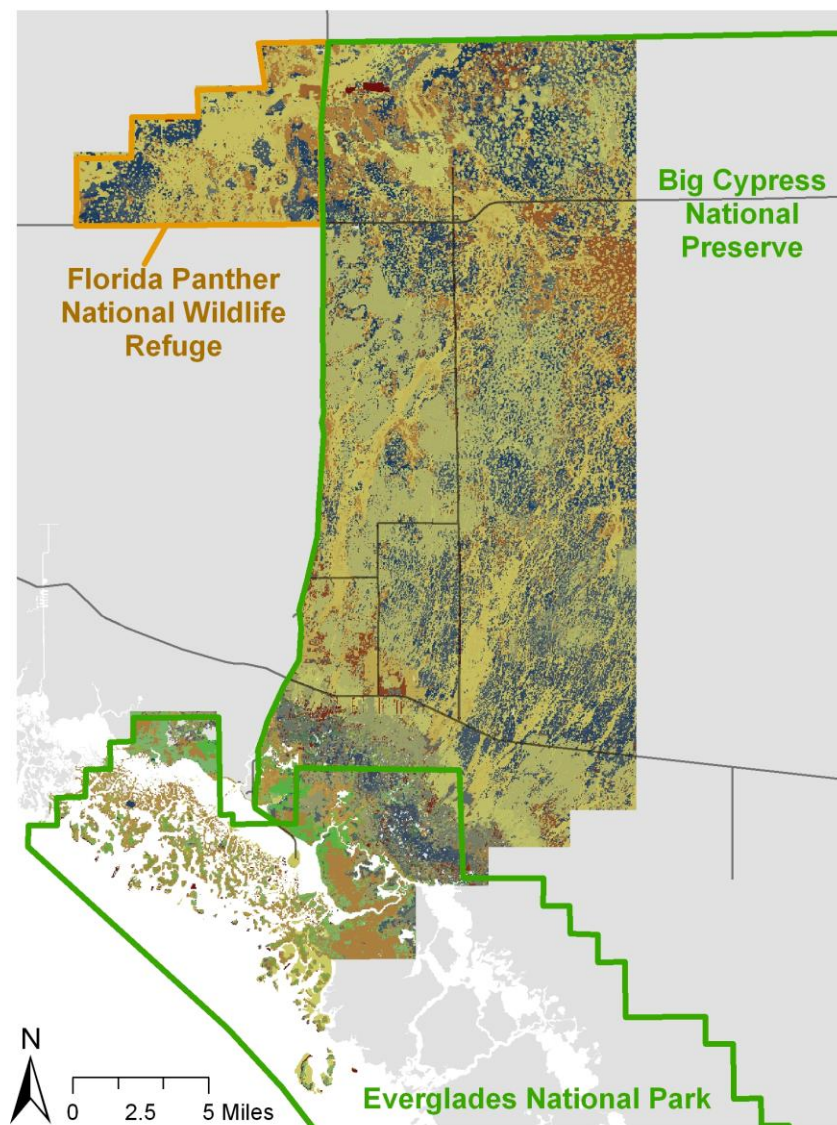
This inventory conducted thirteen and eleven live trapping sessions since the beginning of the study in BICY and EVER, respectively. Live trapping was not conducted in either EVER or BICY from October 2008 through June 2009. Since October 2008, 5 temporary camera sessions and 13 permanent camera sessions have been conducted in BICY, and 2 temporary and 12 permanent camera sessions in EVER.

The three original employees working on the mammal inventory moved on in early 2008. They were replaced by Emily Pifer (project manager located at Davie office), Jennifer Eells (EVER technician), Danielle Payne (BICY technician), and Jean Olbert (BICY technician). In 2008, Danielle Payne and Jean Olbert moved on, with Amanda Breon to replace them. Then in 2009, Amanda Breon and Jennifer Eells moved on, and were not replaced since the project field effort had been completed.

Project Status: The project completed the annual report (March 2007 – June 2008) and was sent to NPS by October 31, 2008, along with a trimester report describing progress from July through October 2008. The NPS was also sent trimester reports in February and June 2009. The project is currently working on the final report, and the structure of the report has been agreed upon by all parties involved. SFCN data management staff provided technical support for merging of ThumbsPlus databases and assisted with review of the final database and development of metadata.

During the final year, efforts were focused on detecting those species not yet detected. All fieldwork was completed by the end of June 2009 and the final report is currently in process. Permanent remotely triggered digital camera trap sessions were continued in both EVER and BICY from October 1, 2008 through June 30, 2009, with pictures downloaded every three weeks. Skunk and cottontail camera sessions were also continued through May 2009. These cameras were set out for 2 weeks, then removed, and at a later date were placed in another location for another 2 week period. Hiking surveys were conducted every one to three months, as well as dusk/dawn surveys for both EVER and BICY through June 2009. Collected scat and owl pellets were dissected and examined from these surveys. Mink scent stations were built for both BICY and EVER in September, and mink trapping was conducted from September 2008 through June 2009. Squirrel platform feeders were constructed in September and flying squirrel camera trapping was conducted from September 2008 through June 2009. In addition, three aerial muskrat surveys were completed, two in EVER over Shark and Taylor Sloughs, and one on the eastern side of BICY.

**Draft Terrestrial Vegetation Map of western Big Cypress National Preserve (BICY) and
northwestern Everglades National Park (EVER)**
– *Final Deliverable Accepted, Final Report in Development*



Project Overview: SFCN contracted with Avineon, Inc. to map FPNWR, 1/3 of BICY, and a small portion of EVER using the same approach as the CERP RECOVER mapping project using a 50m x 50m grid cell and the Vegetation Classification system for South Florida Natural Areas by Rutchey 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. Mapped cells were attributed based on dominant vegetation community.

Project Status: All 4 sections have been accepted with the following levels of overall accuracy:

	Total AA pts	# acceptable	% acceptable	Std err	Lower 90% CL
sect 1 (Florida Panther NWR)	171	134	78.4%	0.031581	73.8%
sect 2 (NW Big Cypress NP)	285	240	84.2%	0.021638	81.1%
sect 3 (SW Big Cypress NP)	286	241	84.3%	0.021569	81.2%
sect 4 (NW Everglades NP)*	180	150	83.3%	0.027855	79.2%
overall	922	765	83.0%	0.012386	81.3%
within NPS parks	751	631	84.0%	0.013379	82.2%

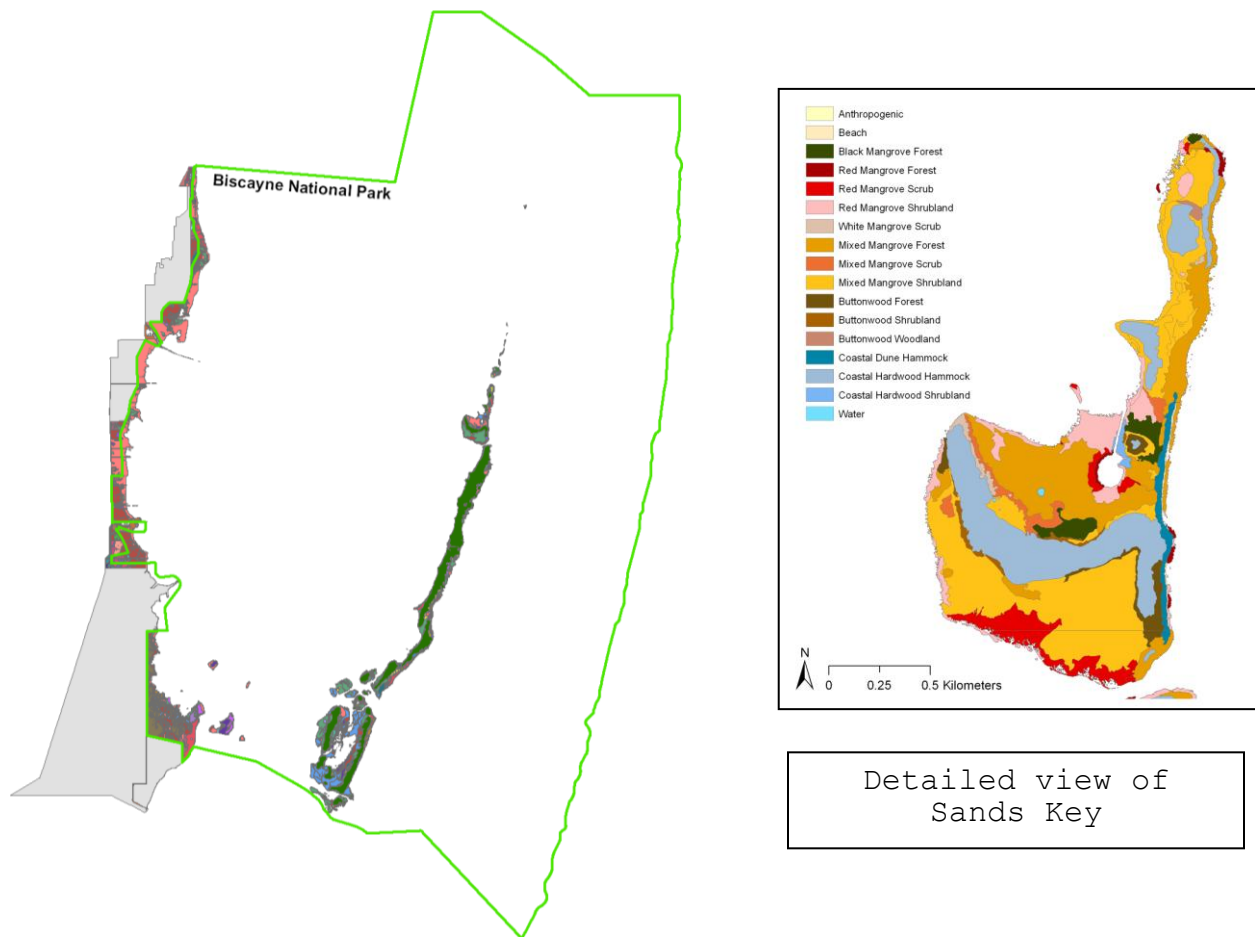
The contractor has just completed and submitted final corrections to the map and submitted an accompanying technical report, all field training point data, and metadata. SFCN has approved these final deliverables and the contract is complete.

SFCN staff will be writing an Accuracy Assessment report and bundling it with the Technical Report from the contractor into a single vegetation map report for the final deliverable for the National Vegetation Mapping Inventory Program, as well as the parks and their partners.

* We note that the Section 4 (4th try) classification accuracy was assessed to be 83% (150/180 points) with a lower 90% confidence level of 79% accuracy. However, if the various combinations of mixed mangroves classes (level 4) are rolled up to Level 3 (FMX) general mixed mangrove classification, the Section 4 classification accuracy was assessed to be 86% (154/180 points) with a lower 90% confidence level of 82% accuracy.

Rutchey, 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 Map of Biscayne National Park (BISC)
– Final Map Deliverable Accepted, Final Report in Development



Project Overview: 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. The vegetation map was created by Pablo L. Ruiz, Patricia A. Houle, and Michael S. Ross of Florida International University. Polygon creation depended primarily upon 2005 aerial imagery (30cm, 5-band), Normalized Difference Vegetation Index (NDVI), as well as 2002 LIDAR data (mainland only). The vegetation map features a six-tiered hierarchical vegetation classification system (Rutche *et al*), with all polygons defined to at least the third tier.

Project Status: Map deliverables were received in February, April, May, June, and December 2008, with the latest version covering the entire park. Metadata for the geodatabase has also been completed. The December draft divides 20,913 acres into 4,987 polygons representing 102 vegetation classes. During map creation, 1,081 ground check points were visited by boat, on foot, or helicopter by the FIU & SFCN staff. Pablo Ruiz wrote an accompanying report detailing how the map was created, and detailing how eCognition was used in the map generation and for what it was useful (shorelines and obvious distinctions) and not useful (subtle vegetation distinctions). He also made recommendations for changes to the vegetation classification.

SFCN checked the positional accuracy of the vegetation polygons with field visits to clearly identifiable features including corners of docks, seawalls, sidewalks, and lighthouse and centers of small red mangrove tree islands. A total of 25 points were visited with Trimble ProXR or GeoXT GPS units in January 2009. The average error was 1.3m, with an RMSE of 1.4m and maximum detected error of 2.9m.

SFCN checked the horizontal accuracy of the aerial imagery in November 2007 with field visits to 13 ground control points. Using both Trimble ProXR and GeoXT GPS units, the average error was 1.5m, with an RMS error of 1.6m.

SFCN's accuracy assessment of the map classification began in August 2008 and was completed in January 2009. 5-30 classification accuracy assessment points per vegetation category were randomly selected for a total of 390 accuracy assessment points. Points were 314 m² (circle with radius 10m) and randomly chosen from all possible vegetation category area or randomly chosen from possible small polygons. Points closer than 10m to an edge were moved inwards towards center of the polygon. The current 2008 BISC Vegetation Map's overall accuracy was assessed to be 83% (326 of 390 points correct) with a lower 90% confidence level of 80.5% accuracy. SFCN has completed its accuracy assessment report.

The SFCN met with FIU cooperators and made final corrections to the map based upon the accuracy assessment report. The next step is to create a summary project report document which contains the FIU report and SFCN's accuracy assessment report as appendices. The final products will be submitted to the National Vegetation Mapping Inventory Program, as well as the park and its partners.

Buck Island Reef National Monument (BUIS) Vegetation Map – In Review

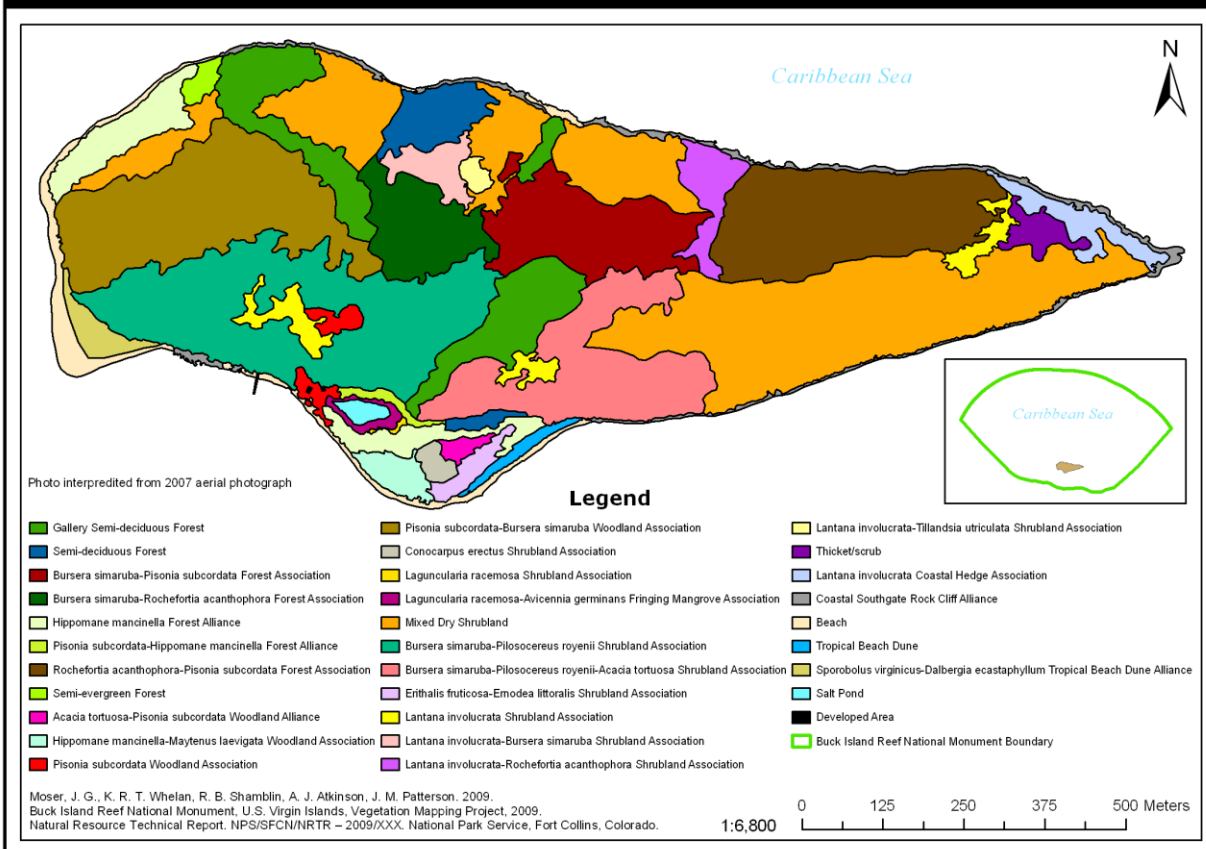
Project Status: The map and report are complete and have been reviewed by Dan Clark (former NPS EPMT specialist with familiarity of the island), Zandy Hillis-Starr (Chief Resource Manager for Buck Island Reef National Monument), and Eleanor Gibney (botanist familiar with Buck Island terrestrial vegetation). We are currently addressing their comments and will submit the final report to the National Vegetation Mapping Inventory Program in November 2009.

Project Report Summary: The National Park Service Vegetation Mapping Inventory Program (NPS-VMP) funded the NPS South Florida / Caribbean Network (SFCN) to map Buck Island of Buck Island Reef National Monument in 2007. The project was completed in 2009. SFCN established a cooperative agreement with Florida International University for the Resource Management Intern Program with one of the deliverables being development of a vegetation map of Buck Island Reef National Monument.

The Buck Island vegetation map was made in UTM, NAD 83, zone 20N coordinates with a minimum mapping unit of 400m². Photointerpretation was based on aerial imagery of a single U.S. Army Corps of Engineers natural color GeoTIFF orthophoto acquired as part of a larger collection in 2006-2007. SFCN field tests indicate that the horizontal accuracy (RMSE) of the aerial image to be 2.2m.

Buck Island Reef National Monument Vegetation Map 2009

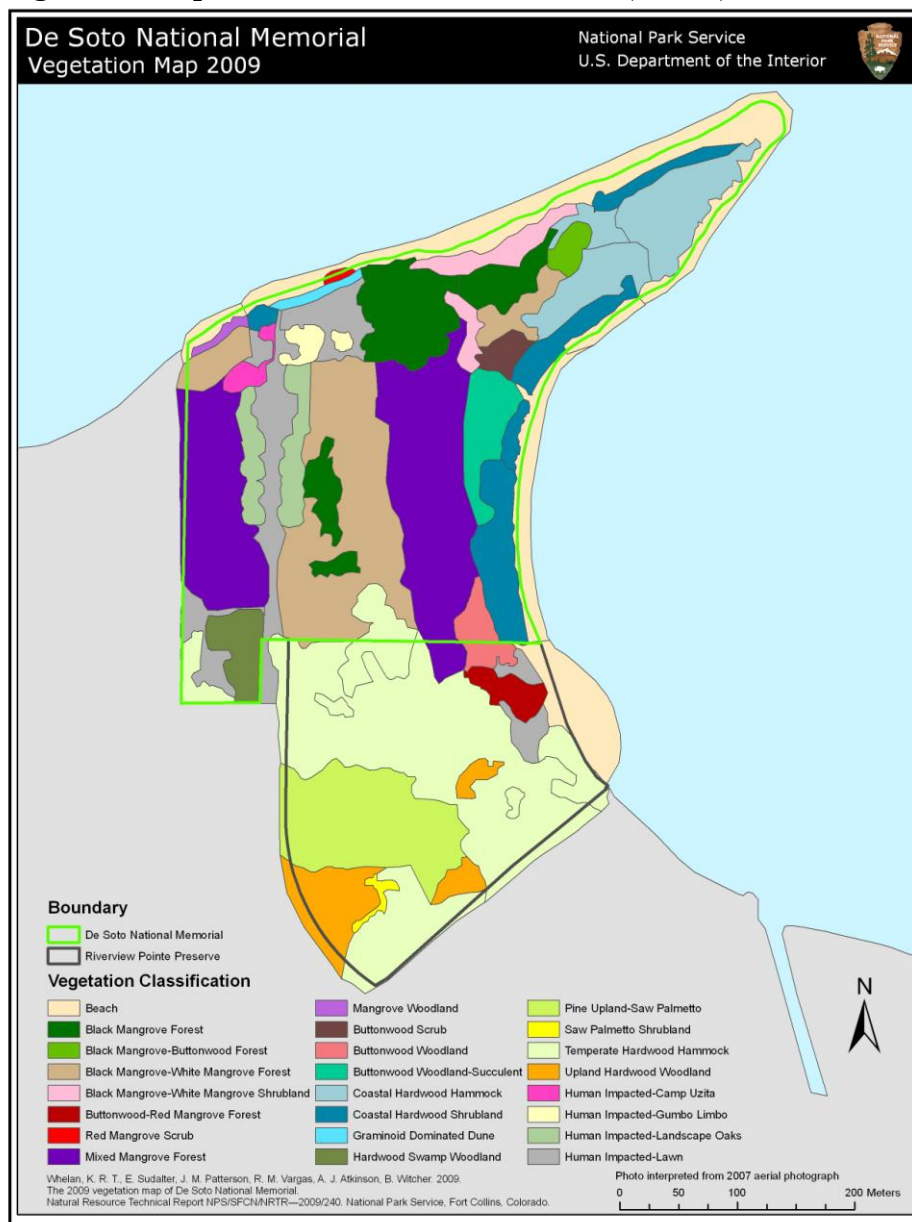
National Park Service
U.S. Department of the Interior



The final vegetation map has a total of 28 mapping classes and 55 polygons. A vegetation key and classification were generated as part of the project which included five proposed new Alliances, and 14 new Associations. The vegetation classification system was created based on vegetation physiognomic class, Caribbean Formations from *Areces-Mallea et al.* (1999), U.S. Virgin Islands Sub-formations from *Gibney et al.* (2000), and Alliances/Associations defined by the SFCN based on data from vegetation plots and field notes.

Also included are a photointerpretation key, a species list, a Buck Island vegetation species photo guide, and field data and photos that were collected for 67 field plots. Eighty-seven percent of the polygons either had vegetation data collection or were directly visited and confirmed; consequently SFCN concluded the map meets the NPS-VMP requirement of 80% accuracy with 90% confidence. The final product meets the FGDC metadata standard.

Terrestrial Vegetation Map of De Soto National Memorial (DESO)



Project Overview: This project was funded by a DESO NRPP Small Parks funding proposal. It's purpose was to create and expand SFCN internal mapping capabilities prior to making trips to the U.S. Virgin Islands. The map and project report are complete and reviewed, and both have been sent to the NPS Vegetation Mapping Inventory Program.

Project Summary: De Soto National Memorial (DESO) was created in 1948 to commemorate the 1539 landing of Hernando de Soto. De Soto National Memorial and the adjacent Riverview Pointe Preserve are part of the Shaw's Point Archaeological District which comprises a large prehistoric coastal village site that was inhabited by Florida Indians from about 356 B.C. to A. D. 110. The native vegetation consists primarily of mangroves, beaches, hammock, and pines. The majority of the park is comprised of wetlands (mangroves and associated shoreline mostly) that are intimately tied to the Manatee River and Tampa Bay. De Soto National Memorial provided

\$5,900 funded from the Natural Resources Preservation Program (NRPP) Small Parks Funding source through the Project Management Information System (PMIS) project number 105225 to the NPS South Florida / Caribbean Network (SFCN) to create a vegetation map of De Soto National Memorial and the adjacent Riverview Pointe Preserve (11 acres) in 2007.

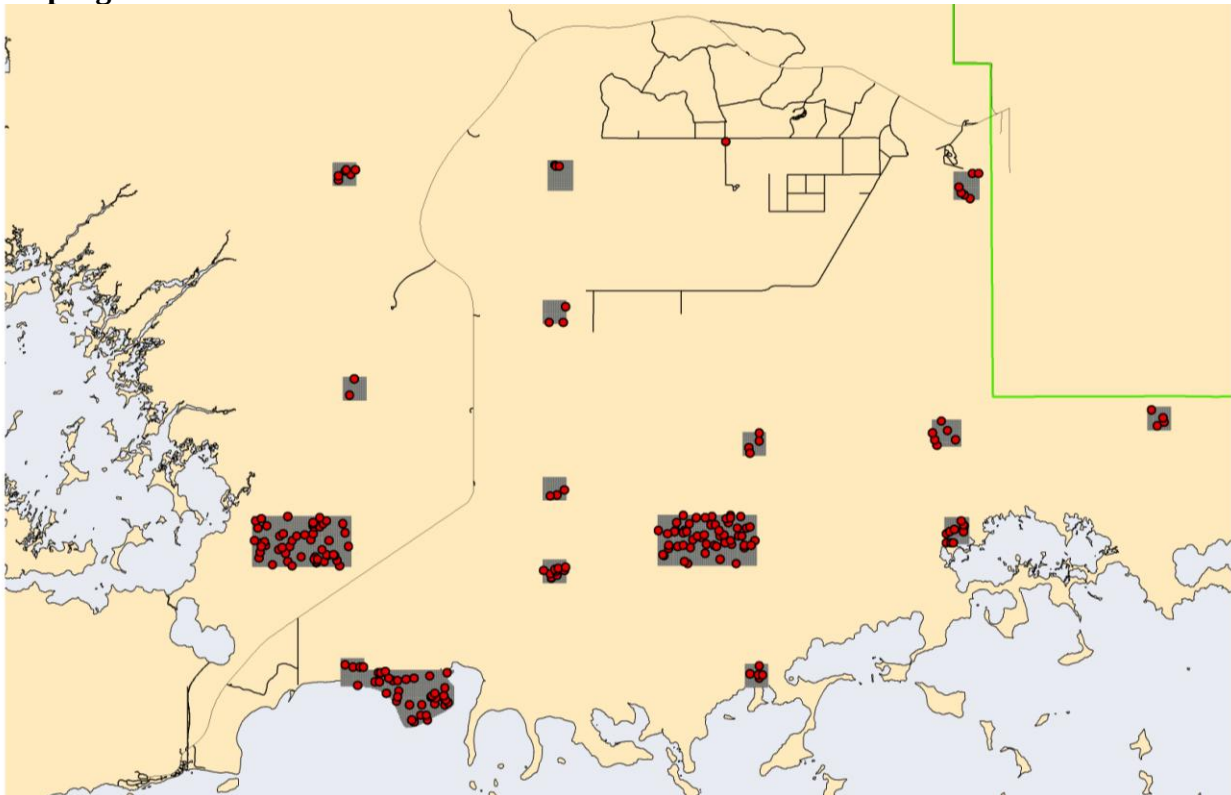
The De Soto National Memorial vegetation map was made in UTM, NAD 83, zone 17N coordinates with a minimum mapping unit of 400m². Aerial imagery from January 2007 and LIDAR imagery from 2003 were used for initial polygon development. These polygons were further refined with field data from December 2007 and June 2009. The final vegetation map has a total of 21 mapping classes and 56 polygons. Map class descriptions are provided in Appendix A of the final report with some adjustments to the Rutchey et al. (2006, v. 5/22/2007) vegetation key and classification provided in Appendix D (in actual final report). A species list is provided in Appendix B (in actual final report). Data were collected for 70 field points as well as additional points delineating 0.57 miles of drainages. Nineteen (19) shell mound polygons were created from data collected during this project and a previous effort by Daniel Stephens (DESO NPS). Eighty-four percent (84%) of the polygons had vegetation plot data collection and the remainder were visually confirmed.

Dry Tortugas National Park (DRTO) Vegetation Map - In Progress



Project Overview & Status: Dry Tortugas National Park (DRTO) was impacted by 5 hurricanes from 2004-2005. As a result, a substantial change in the vegetation community of the park occurred. Initial scoping of the vegetation types present in the park was completed by Kevin R. T. Whelan (SFCN community ecologist) and Jimi Sadle (EVER/DRTO botanist) in May 2008. In June 2009, Kevin and Jimi returned with Brooke Shamblin (SFCN botanist), and Jose Luciani and Jonathan Moser (Florida International University ReMI interns), and formed two-person walking teams that delineated vegetation polygons and collected data to map five of the park's seven islands: Loggerhead Key, Hospital Key, Middle Key, East Key, and Garden Key. SFCN defined new association or sub-association communities of species (25 m² minimum mapping unit) that reflect the DRTO unique vegetation and can be modified to catalog changes that may occur due to successional changes over time. A total of 24 vegetation classes were found which resulted in 167 polygons across five islands. Vegetation mapping was accomplished using Trimble GeoXT GPS units, and walking the boundary of each vegetation type. Each polygon was manually inspected and cleaned in the office to remove gaps and overlaps between polygons. The shoreline of the five islands was also mapped to help track the changes in these shifting islands. Loggerhead Key (pictured above) has the most vegetation polygons. A subsequent visit is planned on Oct 2009 to map the remaining two islands, Bush Key and Long Key using the same mapping procedure.

Everglades National Park (EVER) Independent Accuracy Assessment of SFWMD process - in progress



Project Overview: SFCN conducted an independent accuracy assessment of some preliminary areas mapped by the South Florida Water Management District (SFWMD) in Everglades National Park.

The SFWMD is mapping most of EVER and 2/3 of BICY as part of the Comprehensive Everglades Restoration Plan (CERP) RECOVER mapping project using a 50m x 50m grid cell approach and the Vegetation Classification system for South Florida Natural Areas by Rutchey et al (2005). Funding is from CERP RECOVER. This methodology is the same as used in the SFCN mapping of BICY/EVER and the two projects are designed to seamlessly merge when complete. The South Florida Water Management District has hired additional personnel and completed mapping of the Water Conservation Areas north of Everglades National Park and begun data collection for mapping of Everglades National Park using 2009 aerial imagery. The map will be completed in sections and is not expected to be finished for years.

The SFWMD project is divided into some 20+ sections. They currently assess the accuracy of each section as it is completed using 210 grid cells in which two in-house staff use softcopy displays to see if they concur with the classification and only visit the field if there appears to be an error. Their level for acceptance is at least 90% (189/210) points accurately classified.

SFCN has checked some areas mapped by SFWMD in EVER with a field based accuracy assessment method developed to assess our BICY/EVER map, to determine if additional resources are needed to achieve an accurate map, ensure 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.

Project Status: SFCN randomly selected 210 non-adjacent cells in the areas SFWMD had previously mapped in EVER. SFCN staff botanist Brooke Shamblin flew to 210 points during 5 helicopter visits. Forty-five cells were burned in a fire since the mapping effort and 10 fell on open water and had to be dropped from the analysis. The current SFWMD pilot map's raw accuracy was assessed to be 77% (127/165 points) with a lower 90% confidence level of 72% accuracy.

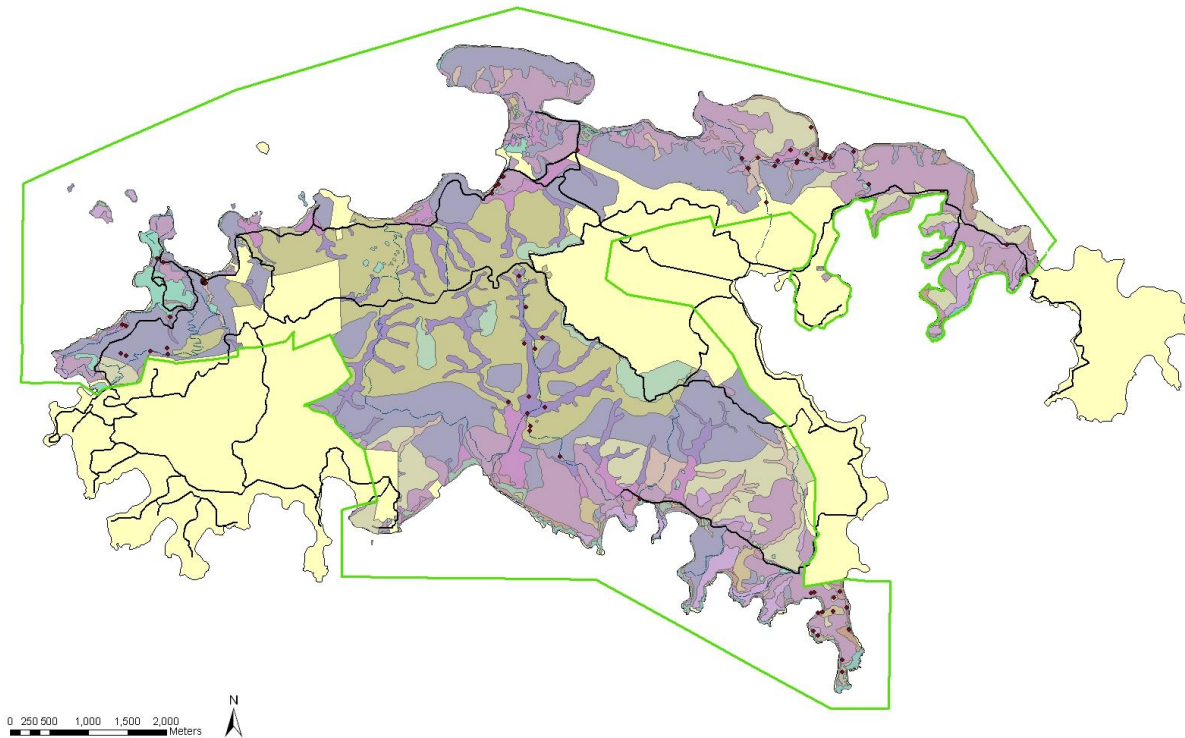
Salt River Bay National Historic Park & Ecological Preserve (SARI) Vegetation Map – *In Progress*



Project Overview: Three field trips have occurred collecting data for 150 field points, the latest in July 2009. Based on photointerpretation and data collected from these trips, 259 polygons have been delineated with preliminary vegetation classification for the first three layers of the hierarchy.

Project Status: Currently, development is still in progress for the final version of the community classification. The SARI_2007_ArmyCorp_30cm.tif image has replaced older, coarser resolution USDA Orthophotograph and IKONOS imagery. Similar to BUIS, we are utilizing similar sources to generate the National Vegetation Classification System (NVCS) formations, alliances and associations.

Virgin Islands National Park (VIIS) Vegetation Map Accuracy Assessment - *in Progress*



Accuracy Assessment points collected in FY09 in VIIS

Project Overview: Virgin Islands National Park has a vegetation map produced by the Eastern Caribbean Center, Conservation Data Center at the University of Virgin Islands covering the shoreline to the highest peak, Bordeaux Mountain. The park staff that has used the map felt that the map is relatively accurate; however, there was not a formal accuracy assessment of the product at the time it was created. SFCN is assessing the accuracy of the map to determine whether it meets NPS Vegetation Mapping Inventory Program requirements.

Project Status: SFCN staff is attempting to visit 262 points spread across 23 vegetation types. Access has proved difficult due to the limited roads and trails and lack of DOI helicopter availability, requiring most of the work to be accomplished by walk-in access. Although points were originally drawn randomly within each vegetation type, those that are inaccessible will be substituted with points closer to roads and trails.

SFCN staff ecologist Kevin Whelan and staff botanist Brooke Shamblin visited VIIS May 4-8, 2009. A total of 41 vegetation accuracy assessment points were visited. The attributed map classification was compared to the vegetation encountered at the point. An additional 11 sites in close proximity to the assessment points were also investigated. Of the 52 total points visited, 37 were determined to be correct, thus far attaining map accuracy of 71% correct. However some of the problems may be correctable using the LIDAR of the islands to better define slopes which are sharply associated with the distribution of and breakpoints between communities.

South Florida Data driven vegetation classification, Phase 1 project

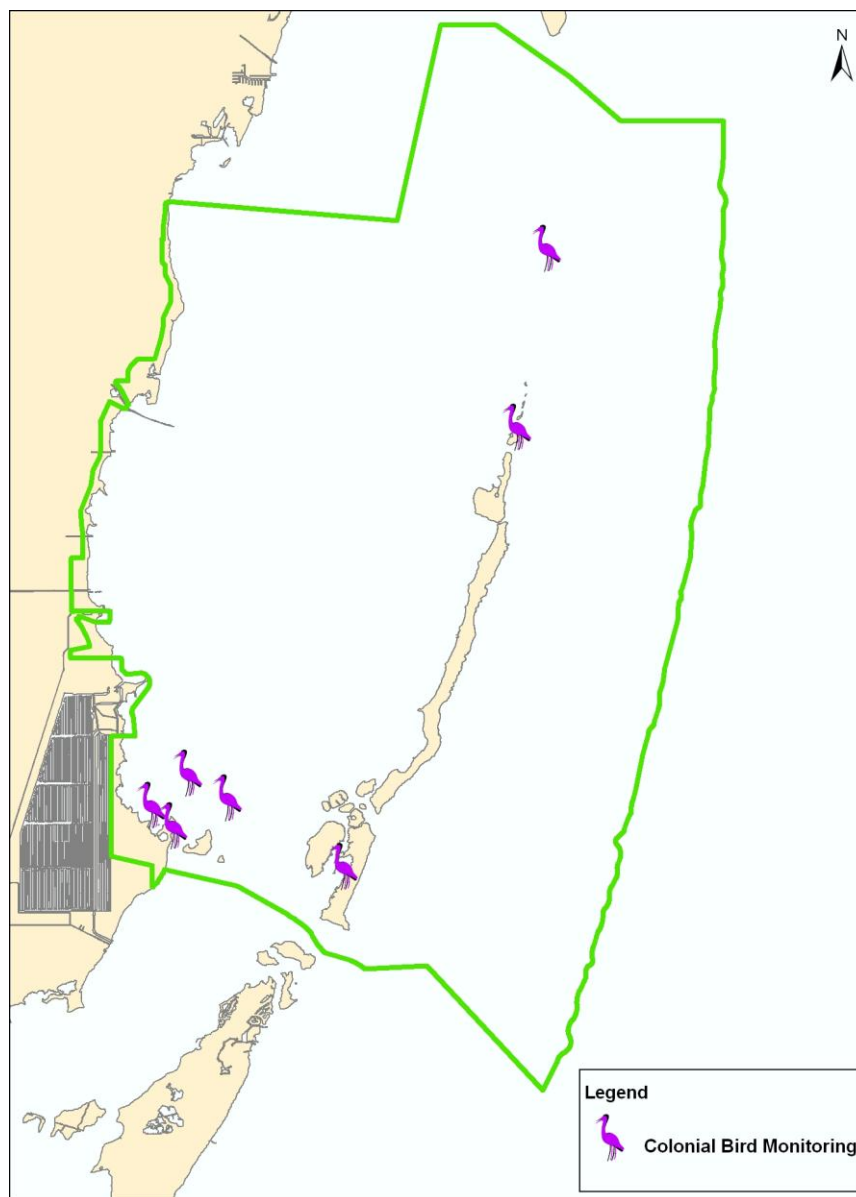
-Final Report Pending

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 analysis for and/or field work in the other major vegetation categories (i.e. pinelands, hardwood hammocks & tree islands, cypress forests, coastal wetlands).

Project Status: 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 draft final report was received, comments returned, and we are waiting to receive their final report. 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.

Vital Signs Monitoring

Colonial Nesting Birds Vital Sign (BISC)



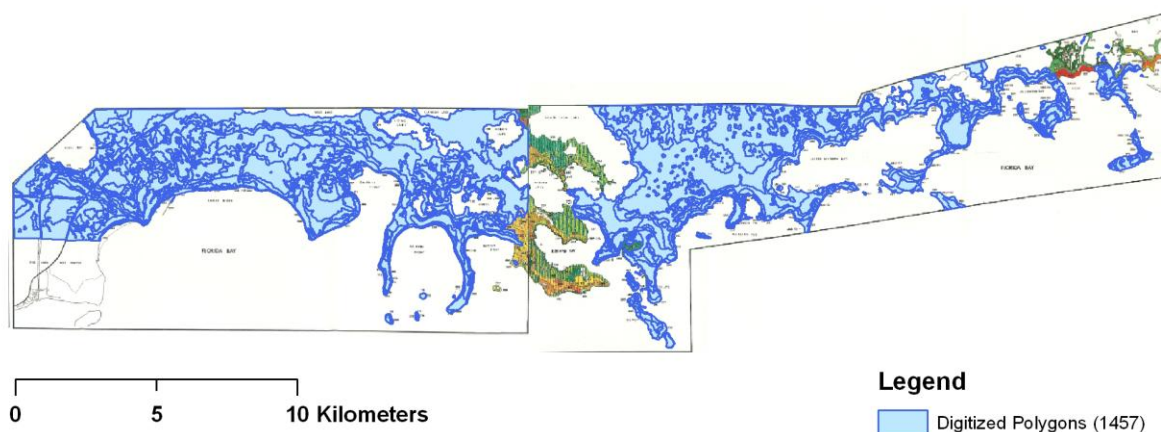
Monitored colonial nesting bird sites in Biscayne National Park

Accomplished in FY09: The SFCN completed a pilot study on the monitoring of colonial nesting birds in Biscayne National Park (BISC). The study consisted of monthly systematic helicopter flights over BISC, from January to July 2009, in order to monitor nesting activity of wading birds (e.g. Great White Heron, Great Egret) and other colonial nesting species (e.g. Double-crested Cormorant). During the flights, photographs, GPS coordinates, and field notes were taken wherever nesting activity was detected, which was usually in the canopies and shorelines of the smaller islands in the park. Photographs were analyzed for number of active nests and number of species.

The SFCN has begun the development of the BISC Colonial Bird Monitoring Protocol and associated SOPs. The SFCN has contacted the parks within the network to request information on current protocols, monitoring practices, and data to be included in the specific SOPs.

Continuation in FY10: SFCN will continue the monitoring of nesting birds in BISC and will continue to develop and finalize the BISC Colonial Bird Monitoring Protocol. SFCN will also continue to attempt to gather and report the data from existing monitoring programs in the network's parks.

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



Digitized polygons on top of the 1980 Olmstead vegetation map for the region between Flamingo and Joe Bay.

Historical and Ongoing Vegetation Monitoring Geodatabase

Accomplished in FY09: In order for SFCN to help designate sites for long-term vegetation monitoring, a geodatabase was created 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, the vegetation post-doctoral researcher visited the museum archives at Everglades National Park and also communicated with current researchers at Big Cypress National Preserve and Everglades National Park. This work has been processed in a GIS project for location, usefulness, and data present by Jose Luciani and other SFCN Staff.

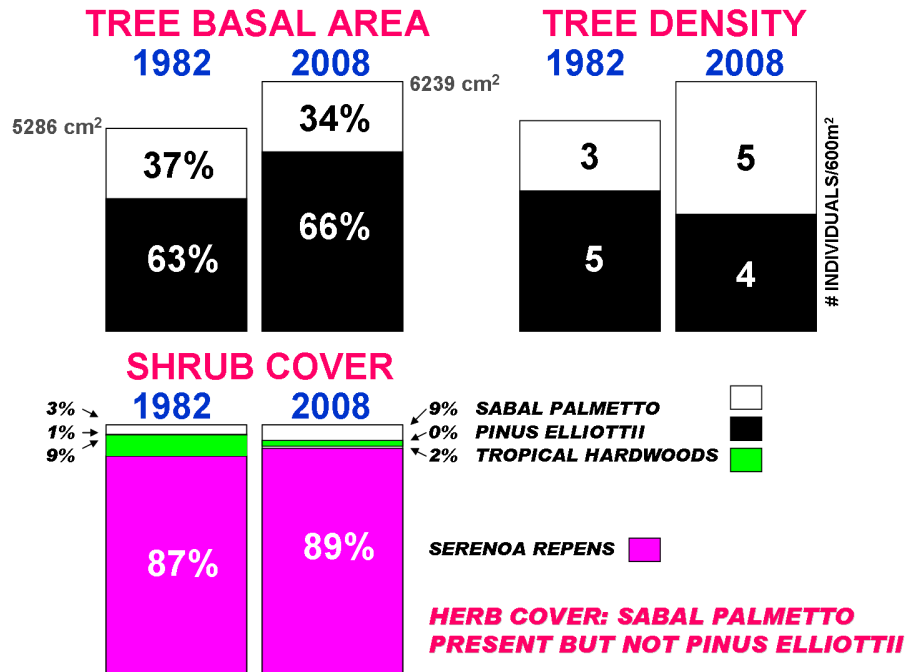
Continuation in FY10: For 2010, SFCN will progress forward to delineate more precisely the exact vegetation types that will comprise the vegetation vital signs with preliminary estimates of vegetation sampling metrics both in the field on a from remotely sense data types.

Long Term Forest Monitoring: Big Cypress National Preserve (BICY) - Relocation and sampling of historic Gunderson and Loope (1982) vegetation plots



Jim Burch of BICY helping SFCN with relocation of 1982 pineland vegetation plots originally established by Gunderson and Loope.

Accomplished in FY09: Four BICY pineland plots established near the Turner River area by Gunderson and Loope in the early 1980s were relocated and one plot was resampled by Brooke Shamblyn, Jonathon Moser, and the vegetation post-doctoral researcher in FY 2009 (See figure next page). Tree basal area increased slightly after twenty-six years, with tree densities continuing to remain low as only 9 trees were encountered in 2008, an increase of one tree over time. The understory shrub cover continued to be dominated by the saw palmetto (*Serenoa repens*).



Results from BICY Turner River Road pineland plots. Results are from the 1982 sampling by Gunderson, and the resampling by SFCN in late 2008.

Continuation in FY10: For 2010, SFCN will resample the three remaining Gunderson pineland plots in BICY.

Biscayne National Park (BISC) – Relocation of permanent forest plots



Relocation of forest plot on Totten Key in BISC. Of 32 plots that were established in the mid-1990's, 18 have been found, with the remainder of the plots due to be relocated in 2010.

Accomplished in FY09: Eighteen of 32 long-term forest plots were relocated in BISC. These plots were established by Bradley Bennett in 1995 and 1996 and sampled by Brooke Shamblin until 1998. The tree plots are 20m x 20m squares and include nested 5m x 5m sapling subplots and .5m x .5m seedling plots. There are eight tree plots each on four islands (Elliott Key, Sands Key, Old Rhodes Key, Totten Key).

Continuation in FY10: For 2010, SFCN will relocate the remaining twelve hammock plots and begin re-sampling the plots.

Everglades National Park (EVER) – Relocation and sampling of historic Olmsted and Loope (1982) vegetation plots



Sampling efforts in the transitional Manchineel plot along the Coot Bay Transect project. The 1m x 1m quadrat is used to sample seedlings.

Accomplished in FY09: The Coot Bay transect was relocated and re-sampled by ReMI intern Jose Luciani and University of North Carolina graduate student Kristie Wendelberger. This transect was established by Ingrid Olmstead in the early 1980s, was sampled again by EVER staff in 1998, and has now been re-sampled in 2009. This transect and associated plots sample mangrove habitat, halophytic prairie, transitional buttonwood woodland, and hardwood hammock. Data entry for this project was completed and now awaits preliminary analysis.

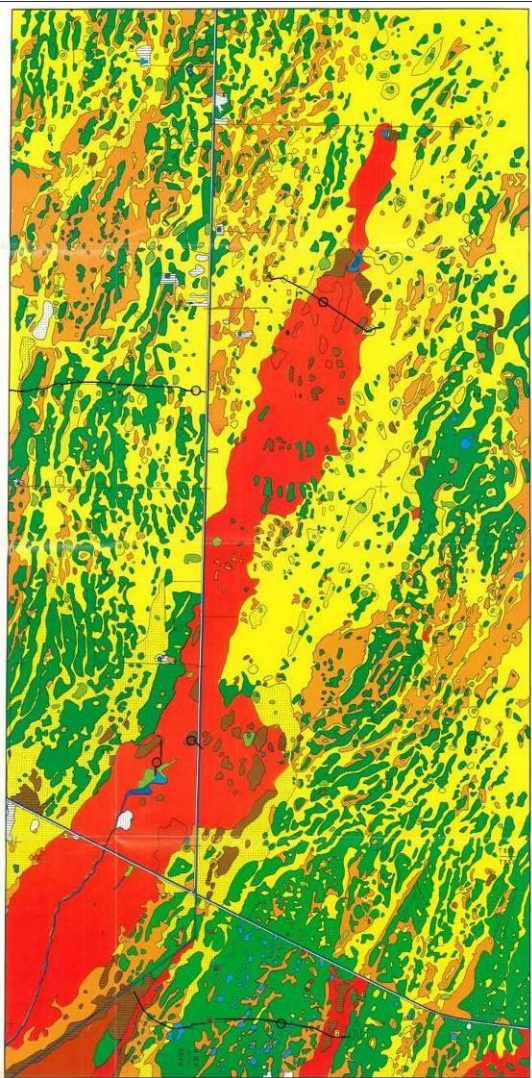
Continuation in FY10: Preliminary analysis on the Coot Bay Transect Project will be conducted in a joint effort between Kristie Wendelberger and SFCN staff.

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

Accomplished in FY09: 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.

SFCN interns assisted with digitizing polygons within the 1980 southern Everglades vegetation map by Olmstead. As of late September, 1,264 polygons had been digitized, representing nearly 90% of the mapped area. Attributes for approximately half of these polygons have been entered.

Continuation in FY10: In 2009 SFCN will continue to georectify the scanned maps and digitize polygons as needed to support field activities.



Historic BICY Turner River area vegetation map.

Dry Tortugas (DRTO) – Relocation of permanent vegetation transects

In DRTO, the SFCN was able to assist Jimi Saddle (EVER) in resurveying six permanently established vegetation transects on Loggerhead Key. These six transects are what is left from twelve transects that were originally established when the island was cleared of Australian Pine trees. We also assisted with long term fortification of the transects so that markers would not be lost due to storm activity.

Salt River Bay National Historic Park & Ecological Preserve (SARI) – Establishment of permanent exotic plant removal efficacy vegetation plots.

In SARI, the SFCN established five one acre treatment locations along with one vegetation plot (a circle with a 15m radius) at each location. Permanent tagged trees were measured and mapped. The goal is to understand treatment effects in a number of different vegetation types and to understand the long term recovery after exotic plant removal.

Coastal Geomorphology Vital Sign

Soil Elevation Tables (SET) pilot work

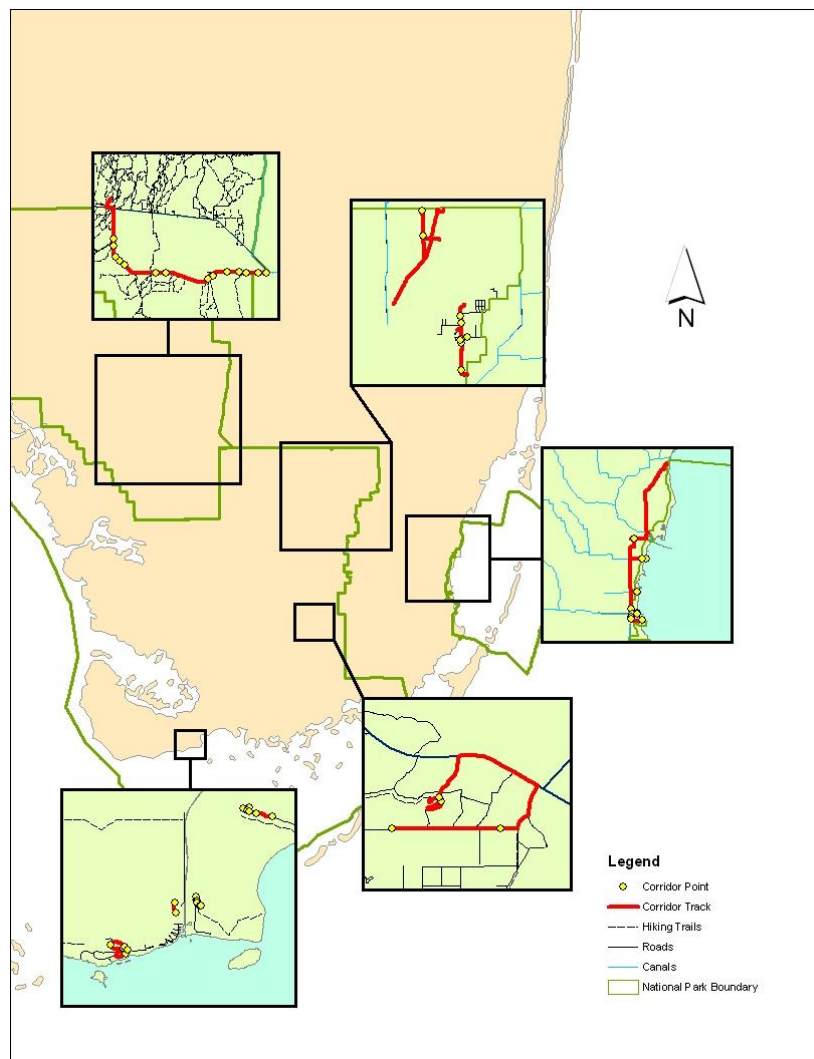


In total 21 sites in BISC have been assessed for SET analysis.

Accomplished in FY09: We visited an additional 5 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, and visited by boat to assess access to area, presence of a berm, possible inclusion in area restoration, Diameter at Breast Height (DBH), tree height, and relative amount of trash. Additionally, initial construction of catway support devices also was accomplished.

Continuation in FY10: We will develop the SET protocol and accomplish pilot work related to establishment of two sites in BISC.

Invasive/Exotic Plants Vital Sign - Corridors of Invasiveness



Tracks followed for invasive-exotic plant species observation in EVER, BISC and BICY.

Accomplished in FY09: The pilot study for Corridors of Invasiveness to date includes a total of six trips covering 58 miles and was accomplished in the three South Florida Parks. Areas covered in EVER include hiking trails in the Flamingo area, the Flamingo and Long Pine Key campgrounds, Shark Slough airboat trails east of the L-67 extension canal, and a roadside survey

in the East Everglades around the Chekika area. In BICY, one roadside survey of the Loop Road area, including the Mitchell's Landing campground, was conducted. In BISC, a roadside survey of the mainland canals, including Mowry Canal, Princeton Canal, and Military Canal were also completed. Summary reports for each of these surveys were completed and sent to both the respective parks and to Tony Pernas of the EPMT. Work was also begun on the Invasive Plant Early Detection protocol, which is due for completion in December 2009.

Continuation in FY10: 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 2010 will include finalization of the protocol derived from the pilot study, and distributing the website database brochures 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 FY09: SFCN wildlife technician Raul Urgelles and community ecologist Kevin Whelan attended a boat electrofishing course in San Antonio, Texas, May 20-22, 2009 (Boat Electrofishing: Principles and Practices). The course was taught by Dr. James B. Reynolds, retired USFWS fisheries biologist, and was attended by multi-agency personnel. The course provided Raul and Kevin with a thorough understanding of the different electrofishing methods employed by state and federal wildlife agencies elsewhere and, as a result, the ability to discuss the advantages and disadvantages of these methods when applied to invasive/exotic fish monitoring in the canals bordering our south Florida national parks (BICY, BISC, EVER). Raul communicated regularly with Jeff Kline, EVER fisheries biologist, and updated him on the status of the SFCN's progress toward the initiation of this collaborative effort. Raul also initiated conversations with other agencies involved in the use of electrofishing techniques in order to develop a boom design that will provide maximum efficiency in the capture and detection of invasive/exotic fish.

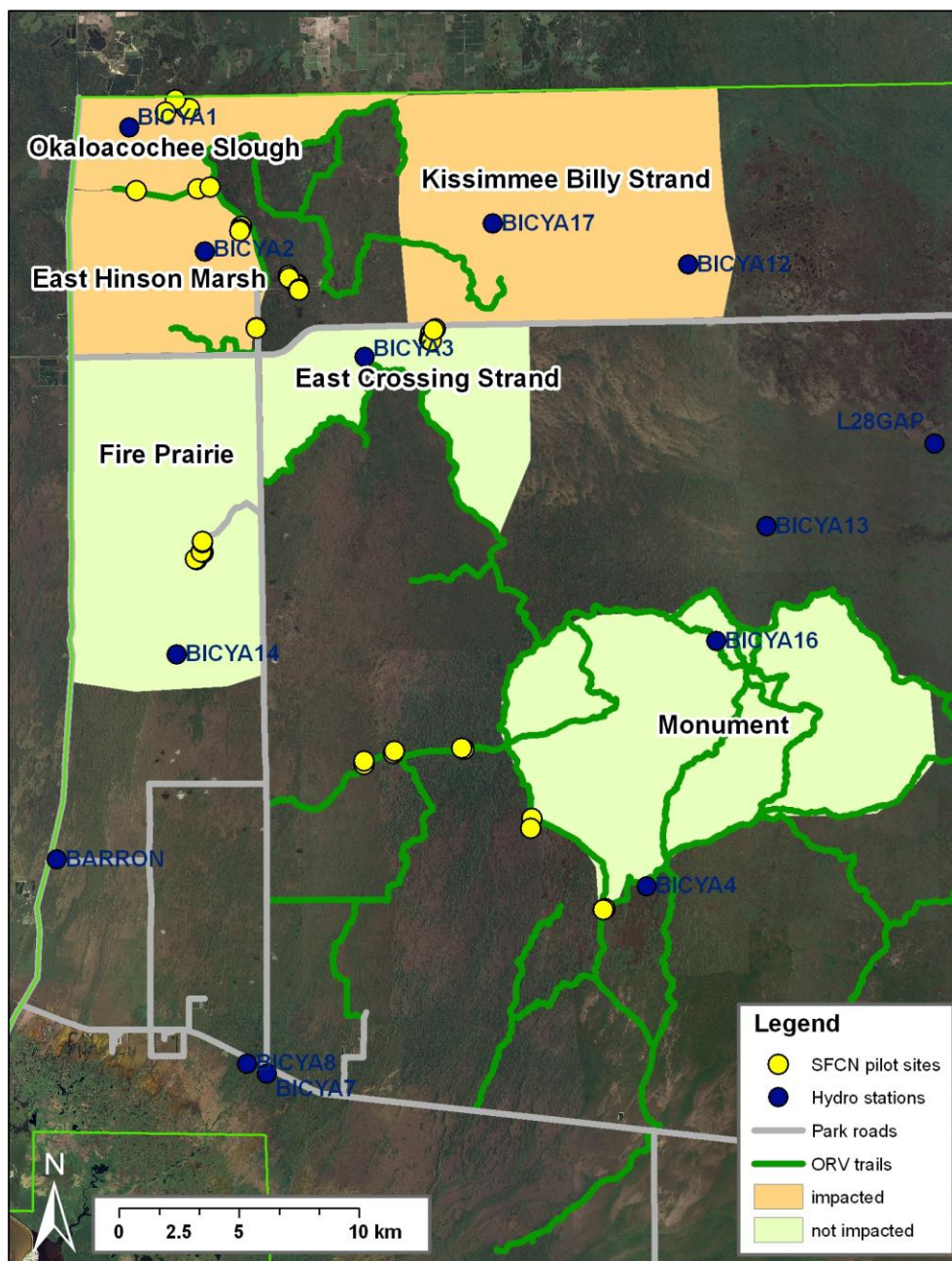
Continuation in FY10: Electrofishing boom equipment (anodes) will be purchased and installed. The boat and equipment will be used in a pilot study that will sample along canals adjacent to Everglades National Park (EVER). Dr. Jennifer Rehage of Florida International University (FIU) will also be a collaborator in the Invasive/Exotic Animals Vital Sign. Dr. Rehage was selected for funding through the NPS's Critical Ecosystem Studies Initiative (CESI) for a submitted proposal entitled: assessing the impact and potential for containment of non-native fishes across everglades habitats. Within this proposal, Kevin Whelan of SFCN and Jeff Kline of EVER pledged collaboration in this project.

Freshwater Fish and Large Macroinvertebrates Vital Sign

Accomplished in FY09: Preparation of sample-processing room was initiated. Room will accommodate equipment (stereomicroscopes, analytical balance, and video/computer equipment) used in the identification of organisms collected as part of SFCN monitoring for Freshwater Fish and Large Macroinvertebrates and Aquatic Invertebrates in Freshwater Prairies and Marshes.

Continuation in FY10: 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



Sites of pilot study periphyton sampling in BICY impacted basins in orange and unimpacted basins in green, December 2008.

Accomplished in FY09: In December 2008, the SFCN conducted a pilot study on periphyton sampling in the Big Cypress National Preserve (BICY). Forty-one periphyton samples were collected from nutrient-impacted and unimpacted hydrological basins within the northwest portion of the preserve. Samples from each basin were sent to Dr. R. Jan Stevenson at Michigan State University for community analyses on algal and diatom composition in the periphyton mat. The Stevenson lab processed the samples for diatom content; soft algae identification and an interpretive report are being finalized. However, preliminary analyses have suggested distinct

diatoms communities in impacted and unimpacted basins.

Continuation in FY10: The SFCN is collaborating with BICY staff (hydrologist Robert Sobzack) to continue periphyton sampling in BICY. The goal for this year's sampling is to have a better understanding of a nutrient gradient across the basins in the northwest portion of the preserve.

I.C Data Management, Analysis, and Reporting Branch

Overview

The Data Management, Analysis and Reporting Team worked this year to assist vegetation map production; GIS, data management, and analytical support to the various vital sign and water quality monitoring projects underway; provide IT support to SFCN; and provide information support to the parks. The team also helped with implementation of some of the vitals signs with Brian Witcher providing assistance with reef fish monitoring after Ben Ruttenberg left the program and Judd Patterson assisting with colonial nesting bird monitoring by Sonny Bass at DRTTO. Presentations were given at the 2009 George Wright Society Conference in March as well as NPS Data Management Conference in April. Brian assisted USFWS with their data management development. A new GIS/Data Management SCA intern was hired.

In 2009 we established connectivity to the SFCN Boat Storage facility from the SFCN servers, expanded to another 3 workstations within the SFCN office, purchased 1 laptop, and purchased a new server and automated tape backup system for the Florida office.

Robert Vega of SERO-IT visited SFCN and applied NPS-IT updates to all SFCN-florida machines, and helped us develop specifications and purchase a new server for Florida office and helped outline a plan for SFCN becoming part of the NPS-LAN. Elena Robisch, Regional GIS Coordinator, visited the office and discussed regional support and our various projects.

The team focused on completing reporting loop pathways by working on reporting strategies for marine benthic communities and the St. Croix weather stations and crest gage station as well as adhering closely to the National Vegetation Mapping Inventory Program guidance for producing vegetation map products.

SFCN staff provided assistance to Biscayne National Park during its development of a proposed Visitor Experience Area, collating data and providing maps to assist decision-making as well as providing scientific expertise. Staff also fulfilled more than 13 requests for spatial data, reports, and analysis assistance from national parks, universities, NGO's and state/federal agencies.

SFCN has supplied data and comments to the Biscayne Bioblitz effort being run by National Geographic.

SFCN data management also focused on teaching the office to use ThumbsPlus software to manage our field data photos. Also developed were methods for geotagging photos so that UTM coordinates are embedded into the photo file (Colonial Nesting Birds, Vegetation Map assessment). Techniques were developed for using Mapwell software to upload custom maps to the Garmin GPS units for use of field crews. The following SOPs were developed: GPS 101; Instructions for Realtime Tracking with Garmin GPS unit in ESRI ArcMap; Field Return Checklist; SFCN Directory Structure; Generic Data Sheets; Conference Room Filing System; Uploading/Downloading files using the NPS FTP server; NRPC Sharepoint Access.

The sections below only addresses issues not covered in other branches above.

Inventories

Inventory of bats – all network parks

Project status: Initial cleanup of data files was started. In FY10 we will finish conversion of the raw data files, review GIS files, and post the GIS files to NRDataStore.

Datamining

Project status: Initial cleanup of the 2006 Datamining Project database occurred. 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

Colonial nesting birds – DRTO, BISC

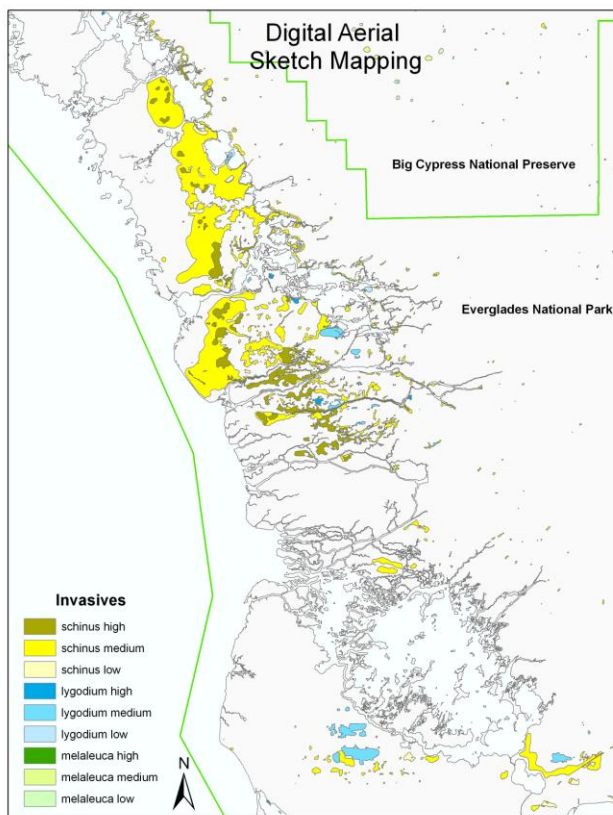
Accomplished in FY09: Judd Patterson spent two days assisting Sonny Bass of EVER with colonial bird monitoring at DRTO. Judd also assisted for 2 days with colonial nesting bird helicopter surveys in BISC, where we perfected our technique for geotagging images. Geotagging involves the collection of a GPS coordinate for the location where an image is taken, and directly embedding the coordinate into the photograph.



Female magnificent frigatebird landing on her nest

Continuation in FY10: 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 DRTO and BISC monitoring efforts if requested.

Invasive/Exotic Plants – Digital Aerial Sketch Mapping



2008 cleaned-up digital aerial sketch mapping polygons

Accomplished in FY09: Rachel Vargas, SFCN-SCA, provided post-processing and QA/QC for GIS files generated during the 2009 Everglades Cisma Digital Aerial Sketchmapping by the NPS-EPMT program as well as cleaning up the 2008 database of some overlapping polygons. Over 2.68 million acres were mapped during the 2009 field season. Results are available on the Everglades Cisma web site <http://www.evergladescisma.org/DASM/>.

Continuation in FY10: 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. 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

Accomplished in FY09:

SFCN worked with the WASO office on their national land use change effort, determining areas of analysis for the SFCN parks.

Continuation in FY10: SFCN will meet with local government entities in charge of permitting/zoning for each park and develop SOPs for obtaining relevant information as part of developing the 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.

Sea Turtles

Accomplished in FY09: SFCN responded to several requests from BUIS staff for modifications and additional functionality, including a data entry form for hatchlings for the sea turtle relational database.

Continuation in FY10: We will work with BUIS staff to better document database fields, as well as convert existing location system to UTM coordinates. We also plan to 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 using the database.



Hawksbill Sea Turtle

Fire return interval departure

Initiation in FY10: We will work with Rick Anderson of EVER to develop a protocol/SOP for the fire return interval departure vital sign. 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 FY10: SFCN will post links to BISC and EVER fish and lobster harvest data reports from their creel surveys. SFCN will create links to the state harvest data reporting and as necessary create additional summaries of the data.

Summarize/Post reports for Vital Signs monitoring conducted by other groups

Accomplished in FY09: Little progress was made on summarizing data or posting reports from other groups in FY09 as the bulk of our time was spent meeting the needs of the Marine and Community Ecology Branches.

Continuation in FY10: 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

Air Quality

Florida Panther

Small-toothed Sawfish

Protected Marine Mammals (Manatees)
Estuarine salinity patterns (*)
American Alligator (*)
American crocodile (*)
Marine benthic communities-seagrass Fl & Bisc Bays (*)
Marine Exploited Invertebrates – Pink Shrimp (*)
Coastal Geomorphology (*)
Freshwater fish and large macroinvertebrates (*)
Periphyton (*)
Visitor Use

In some cases this may simply involve creating links to the CERP RECOVER System Status Report which will shortly be released (marked with *).

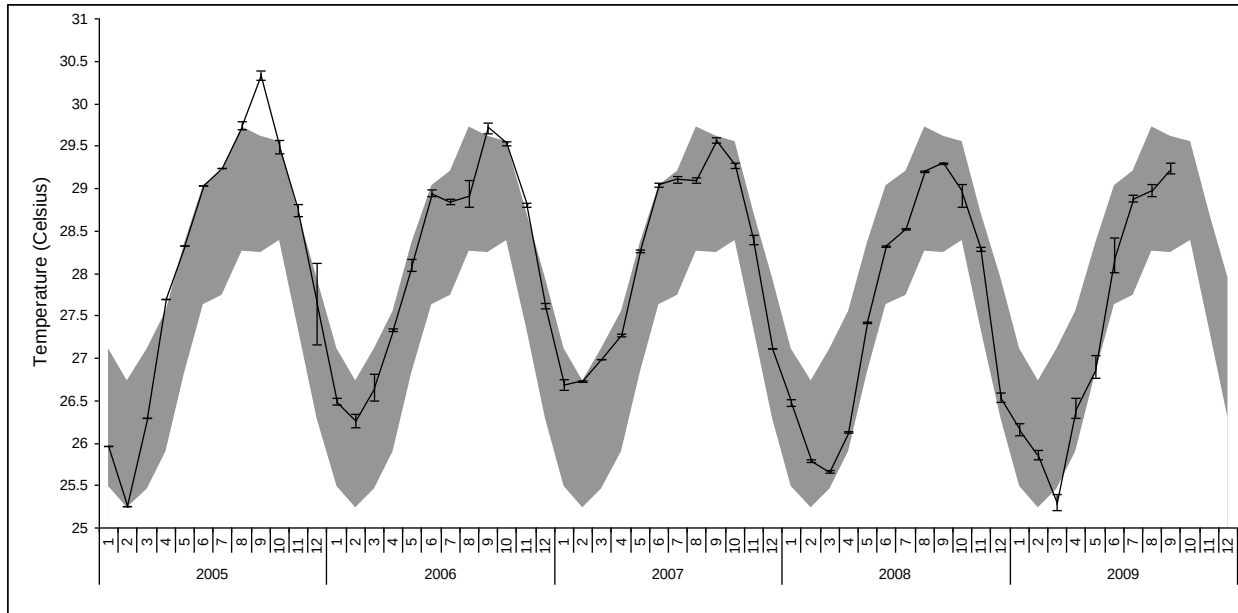
Big Cypress National Preserve Watershed Condition Assessment

Initiation in FY10: SFCN will hire a term GS-11/12 ecologist to work on the Big Cypress National Preserve Watershed Condition Assessment. We hope this position will work for multiple years, producing the report for Big Cypress the first two years, and a report for Everglades National Park for the following two years.

Water Quality Monitoring

Marine Benthic Communities – Coral Reef Water Temperature

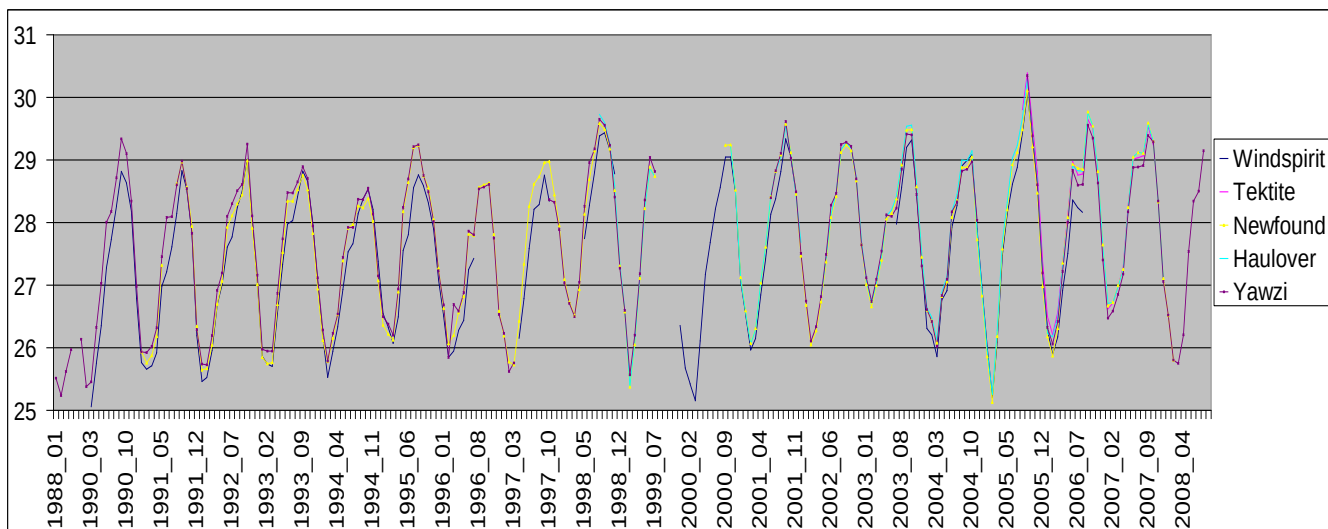
Accomplished in FY09: On July 16, 2009, The NOAA Coral Reef Watch Coral Bleaching Thermal Stress Outlook indicated “a significant potential for coral bleaching in the Caribbean in 2009, especially in the Lesser Antilles.” Based on this information SFCN scientists increased the frequency of downloading reef-depth sea water temperatures from data loggers to once a month at the index sites deployed around St. John. This frequent monitoring allowed for the accurate tracking of potential coral bleaching during the period identified in the NOAA outlook. However data showed average monthly temperature was within the 15 year historical range at VIIS sites.



St. John ocean temperatures at reef depth in 2005-2009 compared with 1988-2004 data. Line represents average, minimum, maximum of monthly average temperatures recorded at 3 reefs at St. John from 2005-2007 (HA, NF, TK), and 5 reefs (HA, NF, TK YZ, MB) from 2007-2009. Grey shows range (minimum-maximum) of monthly average temperatures recorded at 3 reefs (HA, NF, YZ). Number of sites with data varied by month and year.



SFCN “scientists” retrieve temperature data using data logger and underwater data shuttle.



Preliminary graph results of ocean temperatures at reef depth from five sites at St. John in 1988-2008. Historical data still needs QA/QC before results can be published. Not all 5 sites were operational in any given time period.

Reef temperature data was collected at all coral index sites and at coral extensive sites (DRTO only). The coral water temperature database was updated to handle monitoring of two sensors at a site and basic QA/QC procedures have begun. Historical water temperature data was loaded into the database. All sites were added to DataForEver and a test data upload was completed. A reporting strategy is in active development.

Continuation in FY10: Water temperature data will continue to be collected at all sites in FY10. Historical data will be QA/QC'd and added to DataForEver. Code to increase ease of data importation into the database will be added. The reporting strategy will be finalized and implemented and the protocol updated accordingly. SFCN plans to publish the long-term water temperature data record at VIIS. Analysis of DRTO water temperatures will be conducted to see if there are spatial/depth patterns across the park.

Nutrient Dynamics and Water Chemistry

Accomplished in FY09: SFCN has funded a cooperative agreement with Jim Fourqurean and Joe Boyer of Florida International University to fund a post-doc position.

Continuation in FY10: The post-doc position is expected to start in mid-FY10, once office space is available. The objectives of the agreement include:

- Identify and collect all available data pertaining to water quality and Vital Signs status for the marine and estuarine areas of the National Park Service lands in the SFCN. Data will be, to the extent possible, entered into a centralized relational database. The cooperator will work with SFCN staff, as well as staff from the member National Park Service units and academic and government scientists in the region to identify the available data.
- Document the SOPs used by the collectors of data.
- Develop SOPs for accessing and reporting nutrient and water chemistry data from cooperators.
- Produce a graphical and pictorial summary of the spatial and temporal extent of the available water quality and Vital Sign data. Develop initial data summaries of nutrient

and water chemistry data for reporting SFCN Vital Signs and to the extent possible put into context of status using, for example, state regulatory values or pristine site values. Once data collection tasks are accomplished, statistical models will be created in coordination with SFCN staff, relating to water quality and the state of Vital Signs to explore:

- How changes in water quality parameters (especially N, P, DO, salinity, turbidity) relate to changes in estuarine seagrass communities, phytoplankton, hardbottom communities, and associated biota?
- How changes in water quality parameters (especially N, P, DO, turbidity) relate to changes in marine seagrass, coral reef communities, and phytoplankton?
- How should the ecological and water quality data be reported to communicate effectively the linkages and when water quality is likely causing a problem in the ecological communities?

With EVER's permission, SFCN 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.

Estuarine Salinity patterns – BISC, EVER

Accomplished in FY09: Andrea Atkinson met with Sarah Bellmund and worked together to develop simple but effective reporting graphics for the CERP salinity indicator in Biscayne Bay.

Continuation in FY10: SFCN Data Management and Reporting Staff will further work with Sarah Bellmund to report this CERP indicator and NPS vital sign on the SFCN web as well as provide links to the CERP RECOVER System Status Report.

Surface water hydrology – BICY, EVER

Continuation in FY10: 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 hydropatterns at key long term hydrology stations (e.g. P205 station).

Surface water hydrology – Weather stations

Accomplished in FY09: SFCN installed the weather stations and independent rain gauges at BUIS and SARI. A SOP was written for the weather stations, independent rain gauges, and crest gauge. The basic structure and functionality of the BUIS/SARI Surface Water Hydrology database was completed and tested with data from the SFCN office weather station.

Continuation in FY10: SFCN will finish developing basic reporting procedures and associated database queries and develop a SOP for transferring data to the DataForEver database, maintained by the Physical Resources Branch of Everglades National Park.

Surface water hydrology – SARI

Accomplished in FY09: The SFCN installed a crest gauge at a road culvert in Salt River as it enters SARI.

Continuation in FY10: Park staff has started sending monthly data to SFCN. SFCN will finish developing basic reporting procedures and associated database queries.

Contaminants

Accomplished in FY09: The SFCN initiated a pilot project to assess levels of Emerging Pollutants of Concern (EPOCs) in near shore waters of Biscayne Bay due to concerns generated by the Miami-Dade Water and Sewer Department's Wastewater Reuse Pilot Project. The SFCN is working in conjunction with the US Geological Survey Dr. Tim Bargar (Florida Integrated Science Center) and Dr. David Alvarez (Columbia Environmental Research Center) to complete the project. The project consists of deploying polar organic chemical integrative samplers (POCIS) and semi-permeable membrane devices (SPMD) at 12 locations in Biscayne Bay. The POCIS and SPMDs are designed to sample water-soluble (polar or hydrophilic) organic chemicals from aqueous environments. Chemicals sampled can include complex mixtures of pesticides, prescription and nonprescription drugs, personal care and common consumer products, industrial and domestic use materials and degradation products of these compounds. The samplers will remain submerged for approximately 30 days before they are recovered by SFCN staff. The SFCN is providing field and equipment support and logistics to deploy and recover the samplers.



Continuation in FY10: Retrieval of the POCIS and SPMD samplers must be completed approximately 30 days after deployment (submersion) and returned to the USGS laboratories for analysis.

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 macro-invertebrates, 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 FY09 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. Public Interest Highlights

Cooperative Multi-Agency Reef Fish Monitoring Protocol for South Florida complete

SFCN, in partnership with the State of Florida Fish and Wildlife Research Institute, NOAA, and the University of Miami published a reef fish monitoring protocol titled “*A cooperative multi-agency reef fish monitoring protocol for the Florida Keys coral reef ecosystem*”. This protocol, and the three years leading up to its creation has all the primary fish monitoring groups of South Florida using a single method for counting fish up and down the Florida Keys from Miami to the Dry Tortugas. This collaborative approach improves efficiency, and provides a highly robust regional data set for the reef fish community. These fish are a considerable economic driver of South Florida, supporting a multi-million dollar fishing industry.

SFCN and PBS document reef fish monitoring!

SFCN partners with Miami PBS to produce reef fish monitoring documentary – SFCN scientists organized a 10 day fish monitoring cruise from July 20-30 at Dry Tortugas National Park. Twenty six scientists from NPS, NOAA, Florida Fish and Wildlife Conservation Commission, University of Miami, and the Tampa Aquarium, as well as a 3 person PBS film crew made over 900 dives, totaling over 480 hours of bottom time, which equates to roughly 20 person days underwater counting fish. PBS is hoping to develop a 30 minute documentary on the South Florida multi-agency fish monitoring activity as part of their “Changing Seas” program.

SFCN meets with Everglades National Park Superintendent and Everglades Foundation to discuss climate change monitoring for Miami-Dade County

Matt Patterson and Kevin Whelan met with Dan Kimball and Mark Krauss to discuss how best to implement expanded Vital Signs monitoring of key Climate Indicators for Miami-Dade county. Miami-Dade County has taken a proactive approach to evaluating impact to county infrastructure and resources over the past year in hopes to plan appropriately with potential sea level rise impacts to such a low lying area. Dan Kimball chairs the natural resources subcommittee for the County’s climate change efforts.

Capture of lionfish on border of Biscayne National Park

Ms. Lindsay Jones was hired through the Student Conservation Association to assist with Lionfish surveys and eradication with the SFCN marine monitoring team for the South Florida parks. Within weeks of being hired, Ms. Jones assisted Biscayne National Park staff remove a lionfish just outside the park boundary. Lionfish are the first marine invasive species to impact the SFCN parks.

SFCN participates in the Fairchild Challenge Environmental Immersion Day

On March 31, 2009, SFCN hosted 10 high school students, giving them a taste of SFCN’s marine monitoring work and helping them experience vegetation plot data collection, using GPS units, and conducting basic data entry and analysis. Fairchild Tropical Botanical Gardens, in partnership with Miami-Dade schools organized Environmental Immersion Day to educate high school students about their environment during a full day of shadowing natural resource professionals. The ten students were provided an experience on the water learning how the NPS monitors coral reefs and fish, how we monitor vegetation, and how we use GIS to evaluate

changes in these resources.

George Wright Society

SFCN staff attended the GWS conference March 2-6 with Matt Patterson, Jeff Miller, Andy Davis, Ben Ruttenberg, and Kevin Whelan giving talks and an additional 8 posters being presented. The I & M program combined its annual meeting with the conference to save travel costs, and it provided the opportunity for many fruitful side meetings and networking opportunities.

SFCN combined with the Pacific Islands Network to produce the report *Coral Reefs in U.S. National Parks: A Snapshot of Status and Trends in Eight Parks*.

The South Florida/Caribbean Network, working with the Pacific Islands Network decided that the two could develop a synthesis document regarding coral reef resources across eight parks from the U.S. Virgin Islands to American Samoa. This document explained about reefs, their threats, and the current status of reef resources in these parks based on the most up-to-date data from the I&M programs. This booklet was released at the February Coral Reef Task Force Meeting in Washington, D.C., as well as the 1st International Marine Conservation Congress in May.

NPS helps better determine false NOAA prediction for coral bleaching in the Caribbean

On July 16, 2009, The NOAA Coral Reef Watch Coral Bleaching Thermal Stress Outlook indicated “a significant potential for coral bleaching in the Caribbean in 2009, especially in the Lesser Antilles.” Based on this information SFCN scientists increased the frequency of downloading reef-depth sea water temperatures from data loggers to once a month at the index sites deployed around St. John. This frequent monitoring allowed for the accurate tracking of potential coral bleaching during the period identified in the NOAA outlook. However data showed average monthly temperature was within the 15 year historical range at VIIS sites.

SFCN helps Biscayne National Park with General Management Plan zoning meeting

SFCN and BISC staff met on October 7, 2008 to evaluate a variety of spatial data sets with the hopes of providing a GMP alternative which contained a Visitor Use zone where visitors would be able to appreciate a marine ecosystem with minimized user conflicts from extractive uses. They were able to evaluate data that included marine fish data, benthic habitat data, bathymetry, visitor use, cultural resource sites, and aids to navigation. This discussion allowed NPS scientists and park managers to look for areas in the park which would provide a variety of visitor experiences, ensure the zone would be easily defined, and identify several options to put forward.

SFCN evaluates effects of Hurricane Omar at Buck Island Reef NM and Salt River Bay National Historical Park and Ecological Preserve

Kevin Whelan, Raul Urgelles, and Brooke Shamblin visited St. Croix the week of October 20, 2008. The original trip was planned to complete the new vegetation map created for Buck Island. After the hurricane, the trip was modified to document the impacts to the vegetation based on the vegetation map. SFCN collected vegetation damage ranked from none, minor, moderate, to severe. An assessment of Salt River was also conducted during this trip, collecting photos and information on observed damage.

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
Joaquin Alonso, Community Technician
Rick Jacobson, Administrative Assistant
Marilyn Brandt, Marine Postdoctoral Research Assistant
Vegetation Postdoctoral Research Assistant
Jonathan Moser, Resource Management Intern
Jose Luciani, Resource Management Intern
Rachel Vargas, Student Conservation Association Intern
Andy Estep, Student Conservation Association Intern
Lindsay Jones, Student Conservation Association Intern
Kelly Bowman, Student Conservation Association Intern
Carolyn “Lara” Ariori – Conservation and Land Management 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)

One Florida International University student worked with Dr. Kevin R. T. Whelan, an affiliated professor with the Environmental Studies Department. Tiara T.'s volunteer work included scanning the original 1979 aerial photography for use in the long term vegetation sampling effort for Big Cypress Preserve and Everglades National Park. George D. was a Dade County High School Student who worked with Dr. Kevin R. T. Whelan, an affiliated teacher with Dade County Schools. When George came to our office he had no experience in Geographic Information System (GIS) and limited knowledge regarding how to relate things spatially using aerial imagery and vegetation maps. Now George has taken 9 modules of ARC GIS tutorials to gain proficiency in ARC GIS specifically in digitizing with the ARC GIS system. George's project while in our office was to digitize the 1980 Olmstead Vegetation Map of Flamingo, Everglades National Park. George has digitized 631 polygons covering more than 15,000 acres (see images below). This work is important because the digitization is high quality and that will allow us to compare past vegetation communities (i.e., 1980's) locations with current vegetation locations being mapped from more recent imagery. This type of monitoring will allow the National Park Service to investigate the impact of things like sea-level rise due to global warming, hurricane impacts, and impacts from management decisions. The VIP worked over 200 hours with an approximate value of the volunteer effort to the SFCN was \$3,608.00.

IV. Reports, Publications and Presentations

Published journal articles, open file reports, reports, resource briefs, presentations

Journal Articles

Miller, J., E. Muller, C. Rogers, R. Waara, A. Atkinson, K. R. T. Whelan, M. Patterson and B. Witcher. 2009. Coral disease following massive bleaching in 2005 causes 60% decline in coral cover on reefs in the US Virgin Islands. *Dig Coral Reefs* DOI 10.1007/s00338-009-0531-7.

Whelan, K. R. T., T. J. Smith III, G. H. Anderson, and M. L. Ouellette. 2009. Hurricane Wilma's impact on overall soil elevation and zones within the soil profile in a mangrove forest. *Wetlands*, Vol. 29, No. 1, March 2009, pp. 16–23

Smith III, T. J., G. H. Anderson, K. Balentine, G. Tiling, G. A. Ward, and K. R. T. Whelan. 2009. Cumulative impacts of hurricanes on Florida mangrove ecosystems: sediment deposition, storm surges and vegetation. *Wetlands*, Vol. 29, No. 1, March 2009, pp. 24–34

Reports and related products

Brandt, M. E., N. Zurcher, A. Acosta, J. S. Ault, J. A. Bohnsack, M. W. Feeley, D. E. Harper, J. H. Hunt, T. Kellison, D. B. McClellan, M. E. Patterson, and S. G. Smith. 2009. A cooperative multi-agency reef fish monitoring protocol for the Florida Keys coral reef ecosystem. *Natural Resource Report NPS/SFCN/NRR—2009/150*. National Park Service, Fort Collins, Colorado.

Nash, C., A. Atkinson, L. Basch, S. Beavers, E. Brown, P. Brown, P. Craig, M. Capone, A. Davis, V. Doan, T. Jones, K. Kageyama, G. Kudray, J. Miller, J. Patterson, M. Patterson, B. Ruttenberg, and R. Waara. 2009. *Coral Reefs in U. S. National Parks: A Snapshot of Status and Trends in Eight Parks*. *Natural Resource Report NPS/NRPC/NRR – 2009/091*. National Park Service, Fort Collins, Colorado

Whelan, K. R. T., E. Sudalter, J. M. Patterson, R. M. Vargas, A. J. Atkinson, B. Witcher. 2009. The 2009 vegetation map of De Soto National Memorial. *Natural Resource Technical Report NPS/SFCN/NRTR—2009/240*. National Park Service, Fort Collins, Colorado.

Presentations, Posters, and Resource Briefs

Atkinson, A., W. J. Miller, B. Ruttenberg, B. Witcher, J. Patterson, M. Patterson, A. Davis. 2009. Expanding coral reef index site monitoring to an extensive design at Dry Tortugas National Park. The 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, OR. Poster

Davis, A. 2009. Depth matters: Differential coral mortality at Tektite Reef in US Virgin Islands after coral bleaching. The 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, OR. Presentation

Jones, L. 2009. Lionfish Surveys: Assessing establishment of the invasive lionfish (*Pterois volitans/miles*) in South Florida National Parks. Resource Brief.

Miller, J., M. Patterson, E. Muller, R. Waara, B. Witcher, A. Davis, C. Rogers, A. Atkinson, B. Ruttenberg, J. Patterson. 2009. Coral Diseases: A threat to reefs, fishes, and island nations. The 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, OR. Presentation

Patterson, J. 2009. Electronic Data Collection: Weather Stations. NPS Data Management Conference. Tucson, AZ. 23 April 2009. Presentation

Patterson, J. 2009. Using 3D to Showcase Marine Resources in Dry Tortugas National Park. George Wright Society Meeting Portland, Oregon March 2-6, 2009. Poster

Patterson, M. 2009. NPS South Florida/Caribbean Vital Signs Monitoring Program. South Florida National Park's Trust Board of Directors Meeting. Presentation

Patterson, M. 2009. NPS South Florida/Caribbean Vital Signs Monitoring Program. South Dade Business Association Earth Day meeting. Presentation

Patterson, M. 2009. Coral Reef Monitoring – Tracking the Tropical Pulse of global climate change. The 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, OR. Presentation

Shamblin, B., R. Vargas, K. R. T. Whelan, A. J. Atkinson, J. Patterson. 2009. Accuracy Assessment of the 2008 Terrestrial Vegetation Map of Biscayne National Park. The 2009 George Wright Society Biennial Conference on Parks, Protected Areas, and Cultural Sites, March 2-6, 2009, Portland, OR. Poster

Urgelles, R. and J. C. Trexler. 2009. Response of a dragonfly assemblage to hydrology and vegetation in freshwater marshes of the Florida Everglades. George Wright Society Meeting Portland, Oregon March 2-6, 2009. Poster

Wathen, S., J. Patterson, B. Shamblin, and K. R. T. Whelan. 2009. Developing a long-term vegetation monitoring plan for South Florida and the Virgin Islands. George Wright Society Meeting Portland, Oregon March 2-6, 2009. Poster

Whelan, K. R. T. and A. J. Atkinson. 2009. Accuracy Assessment of Vegetation Map for Western Big Cypress National Preserve and Everglades National Park. George Wright Society Meeting Portland, Oregon March 2-6, 2009. Poster

Whelan, K. R. T. 2009. Vegetative changes in southern Florida ecosystems as a result of climate change, restoration, and hurricanes. George Wright Society Meeting Portland, Oregon March 2-6, 2009. Presentation

V. Connect the Dots – Resource Condition Summary Tables

Abbreviated SFCN draft Connect the Dot Resource Condition Summary tables are can be downloaded from

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

Only data from coral reef monitoring and EPMT monitoring are included this year in the tables with placeholders for remaining vital signs.

Background

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.

Last 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 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.