

Vital Sign: Marine Fish Communities

[shortened name: Marine_Fish]

Parks Where Vital Sign will be Implemented:

BISC, BUIS, DRTO, EVER, SARI, VIIS – SFCN augments existing monitoring; conducts additional park-specific analyses as necessary; summarizes reports

Justification/Issues being addressed: Marine Fish Communities ranked 2nd among the 44 SFCN vital signs. Fish communities in the coastal shelf and oceanic areas are an important higher trophic level of the marine system, valued by humans as fisheries. Community status, structure and trends reflect changes in marine habitat quality, connectivity, fishing pressure, and long-term ecosystem resilience. Community status also affects seabird communities and large marine vertebrates. Balancing resource extraction with sustainability is a management concern. The exploited reef fish assemblage contains intermediate and higher trophic level piscivores although herbivores are added in heavily fished USVI. These species are under heavy fishing pressure within and outside SFCN parks boundaries. The impacts of fishery management tools such as "no-take" zones are of critical interest to resource managers and the public. Several fish species within parks are at or near local or regional extirpation.

General Monitoring Questions to be Addressed by the Vital Sign:

- What are the status, trends, and variability in exploited fish assemblages (e.g., Grouper/Snapper/Parrotfish/Surgeonfish), reef fish communities, and nearshore and estuarine (bay) fish communities? Are there differences among areas with different management regimes?
- If present within parks, what are the locations and size of spawning aggregations?

Measures: Fish community taxonomic composition, species richness, targeted species (Grouper, Snapper, (parrotfish, surgeonfish in USVI), baitfish) spatial/temporal distribution, abundance/density, size structure, recruitment, biomass, fishing pressure, spawning aggregation characteristics

Basic Approach:

Considerable existing monitoring efforts are underway for South Florida and the US Virgin Islands Parks. Rather than designing new programs, SFCN will instead seek to coordinate with these existing programs and augment sampling as needed to allow for park assessment of trends as well as regional assessments. If these programs are cut, SFCN will focus on filling the need with existing staff time using the following priorities: reef fish within parks, reef fish in neighboring areas outside protected areas in parks (to allow management comparison), fish in seagrass/bays. The justification for prioritizing monitoring fish on the reef is that many juvenile fish species which inhabit seagrass and nearshore areas, migrate to adult lives on the reefs. Monitoring fish in bays provides important information about this stage in the life cycle for management, but some of these changes will be reflected in the reef fish counts as well. Until a power analysis for

BISC and DRTO reef fish monitoring is completed, SFCN won't know how much effort will be required to augment reef fish sampling in those parks and what resources are remaining to cover nearshore areas and bays. Currently SFCN staff are working about 17 weeks a year on fish monitoring activities. SFCN proposes to more than double that effort to 1 FTE equivalent a year of effort. SFCN has entered a cooperative agreement to fund a post-doctoral fellow in collaboration with Jerry Ault of the University of Miami – RSMAS to work out the details of how the groups will collaborate, conduct power analyses, work on the habitat component of the protocol and ensure that a written protocol document is completed.

Reef fish: For monitoring reef fish communities SFCN will be using visual point count or transect methods. Existing programs in south Florida parks and USVI parks are using different methodologies which are discussed below. The exploited fish species are a subset of the reef community and both objectives are met using a single protocol. However power analysis will need to focus on the exploited species to make sure there is enough power to assess trends in those species as well as aggregated community metrics.

Reef fish – South Florida

SFCN will be collaborating with the ongoing NOAA and University of Miami fish monitoring (Jim Bohnsack and Jerry Ault respectively) being conducted at BISC and DRTO. The sampling design is a two-stage stratified random design on coral reef habitats only with 8 different types of coral hard-bottom defined as different strata. Primary 200m x 200m sampling units are re-randomized each year with 2 second-stage units randomly located in each primary unit and two diver stationary visual point counts per secondary unit conducted by scuba divers (Menza *et al.*, 2006). Currently the sample size is designed to assess changes in the Florida Keys and greater Dry Tortugas region. Monitoring in the Florida Keys is currently conducted annually and in the Dry Tortugas every two years. SFCN is funding a post-doc to work with NOAA and the University of Miami to determine power and additional sampling needed to be able to report trends within the park boundaries plus assess trends inside and outside the newly established DRTO Research Natural Area (a no-fishing marine protected area). This monitoring is also critical to meet the needs of the *DRAFT Research Natural Area monitoring (RNA) and research plan: a joint Florida Fish and Wildlife Conservation Commission-National Park Service plan to assess the conservation efficacy of the RNA* (Hunt *et al.*, 2007).

The major fish monitoring efforts in the Florida Keys held a workshop in April 2007 in order to better coordinate among their protocols and sampling designs (Acosta *et al.*, 2007) so some adjustments in protocols to allow for pooling of data are under discussion.

SFCN staff has already assisted with the DRTO fish monitoring cruises in the past and expects to assist with the supplemental fish monitoring needed to report on trends within BISC and DRTO. SFCN also anticipates conducting some reef fish monitoring at

DRT0 during the “off” years that RSMAS is not conducting it. SFCN will also provide assistance with the park-specific supplemental analyses, if needed.

To provide a general measure of fishing pressure SFCN will assess trends in south Florida commercial harvest data and numbers of recreational saltwater fishing licenses and recreational vessel registrations. This is easily obtainable information in south Florida and provides an estimate of the fishing pressure in south Florida in and around the parks. Unfortunately it is unclear whether this information is consistently tracked in the USVI.

Marine Fish Communities - USVI

The NOAA Center for Coastal Monitoring and Assessment (CCMA) Biogeography Team Coral Reef Ecosystem Monitoring Program (CREMP) has been monitoring reef fish in and outside BUIS, VIIS, and VICR as well as La Parguera, Puerto Rico since 2001 using a multi-agency effort. Strata involve benthic habitat (hardbottom vs soft-bottom), management (inside vs. outside protected area) and geographic zone. Please note that this involves more habitats than the South Florida efforts which focus only on hardbottom and reef bottom in particular. The overall design is stratified random with the sampling unit protocol being a visual belt transect and visual point count conducted by scuba divers. Simultaneous measurements of benthic habitat (seagrass, coral), and other species of interest (lobster, conch, diadema) occur. Although the south Florida and USVI protocols are very aware of each other’s efforts, it is unclear at this point whether the south Florida and the USVI protocols will be standardized or not. SFCN has already assisted with the BUIS and VIIS/VICR fish “blitzes” monitoring efforts and expects to continue doing so in the future.

The CREMP effort described above was originally funded for 3 years through a BUIS NRPP project which ended in 2007. It is unclear whether the effort will continue now that NRPP funding is no longer available. If this effort ceases to be funded, SFCN plans to continue the efforts within the parks, but may evaluate the data to determine the consequences if monitoring is restricted to hard-bottom only sites or restricting monitoring to within-park boundaries.

Bays & Mangroves – South Florida & USVI

SFCN will first seek to coordinate with existing efforts that are monitoring fish along mangrove (Joe Serafy/NOAA in BISC; and Ed Matheson, Robert McMichael/FFWCC in Florida Bay). Funding is provided by CERP and long-term funding is unclear. SFCN will look at these existing programs and see if they are sufficient or if additional effort is warranted. SFCN also has a juvenile fish monitoring program underway in the USVI. This program is at a point where analysis of the data for trends and power would be very useful and this will be a task for the new SFCN marine post-doc.

Spawning aggregations

Regarding spawning aggregations, SFCN will investigate by contacting researchers to determine if and where spawning aggregations occur in or near the parks and what work is being done.

Principal Investigators/Key Contacts and NPS Lead:

- Ben Ruttenberg, National Park Service, South Florida/Caribbean Inventory and Monitoring Network. Ben_Ruttenberg@nps.gov, 305-252-0347 [SFCN lead]
- Jeff Miller, c/o VINP, 1300 Cruz Bay Creek, St. John, VI, 00830, 340-693-8950 x227, 340-693-9131 – fax, William_J_Miller@nps.gov
- Andrea Atkinson, SFCN, National Park Service, 18001 Old Cutler Road, Suite 419, Palmetto Bay, FL 33157, (305) 252-0347, (305) 253-0463 – fax, Andrea_Atkinson@nps.gov
- Jerald S. Ault, Ph.D. Professor of Marine Biology and Fisheries, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149, jault@rsmas.miami.edu, (305)421-4884 ph (305)421-4791 fax
- Todd Kellison, Research Fishery Biologist, National Marine Fisheries Service, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, FL 33149, 305.361.4496 todd.kellison@noaa.gov
- Jim Bohnsack, NMFS, Supervisory Research Fish Biologist, Protected Resources and Biodiversity Division 305-361-4252 x252 jim.bohnsack@noaa.gov
- Steven Smith, Rosenstiel School of Marine and Atmospheric Science, University of Miami, 4600 Rickenbacker Causeway, Miami, FL 33149, 305-421-4783 sgsmith@rsmas.miami.edu
- Mark Monaco, PhD ,Marine Biologist, Team Leader CCMA Biogeography Team, 1305 East West Highway NSCI1 SSMC4, Silver Spring, MD 20910 301-713-3028 x 160 mark.monaco@noaa.gov
- Alan Friedlander PhD, Marine Biologist, CCMA, 808-259-3165, alan.friedlander@noaa.gov
- Richard Nementh UVI, Proff. Director, 340-693-1380 rnemeth@uvi.edu
- Tom Schmidt Marine Biologist EVER 305-224-4269 Tom_Schmidt@nps.gov
- Vanessa McDonough Fishery Biologist Biscane National Park, 305-230-1144 x:3013 Vanessa_McDonough@nps.gov
- Jim Beets Department of Marine Science University of Hawaii at Hilo 200 W. Kawili St. Hilo, HI 96720-4091 Phone: 808-933-3493 Fax: 808-974-7693, beets@hawaii.edu

Development Schedule, Budget, and Expected Interim Products:

SFCN is working in collaboration with the University of Miami-RSMAS, National Marine Fisheries Service and FWRI to ensure a written protocol is produced covering the collaborative monitoring underway between RSMAS, NOAA, FWRI and NPS. The NOAA-Biogeography team already has a different written protocol and the SFCN/post-doc will work out details of interactions between the two groups. SFCN is currently an

active participant in multi-agency fish monitoring with both the South Florida and USVI groups. Implementation of a sample design for reef fish monitoring in network parks will be completed by 2009; nearshore and estuarine will be completed by 2010. Estimated staff time for fish community monitoring is 1 FTE.

Expected SFCN staff time requirements once program is fully implemented in 5 years:

SFCN Staff	Full Time Equivalent (FTE)
Coordinator	0.04
Marine Ecologist	0.2
Fisheries Biologist	0.2
Marine Biologist Technician (So FL)	0.2
Marine Biologist Technician (VI)	0.2
Community Ecologist	
Wildlife Technician (Wildlife)	
Wildlife Technician (Vegetation)	
Quantitative Ecologist	0.06
Data Manager	0.04
GIS/Data Tech	0.04
Interns	
SFCN Total	0.98