

**Vital Sign:      Freshwater fish and large macro-invertebrates**  
[shortened name: FW\_fish\_lg\_inverts]

**Parks Where Vital Sign will be Implemented:**

BICY – SFCN expands/implements monitoring in NW BICY in cooperation with existing program in NE BICY.

EVER – SFCN summarizes reports from existing program

VIIS- deferred

**Justification/Issues being addressed:** Freshwater fish and large macro-invertebrates ranked 18<sup>th</sup> among the 44 SFCN vital signs. Regional populations of wet prairies and marsh fishes and other aquatic fauna reflect regional hydrology (water depth, timing, duration, quantity, quality) and are the prey base for wading birds and other higher consumers in the Greater Everglades and Big Cypress ecosystem. Water diversions and altered water management practices have resulted in declines in regional populations of fish and aquatic invertebrates with cascading impacts on higher food web levels. CERP will be rehabilitating system hydrology that is expected to affect these populations.

**General Monitoring Questions to be Addressed by the Vital Sign:**

- What are the status and trends of fish and large macro-invertebrate assemblages, community composition, abundance (density & relative abundance), size structure, and distribution, especially in relation to hydrological patterns and water quality in wet prairies and marshes? What is relative abundance and distribution of exotic species?

**Measures:**

Community composition, abundance (density and relative abundance), size structure, invasive species present

**Basic Approach:**

SFCN will develop the protocol “Freshwater fish, invertebrates, and periphyton” for monitoring in Northwestern BICY and will seek to report on existing monitoring efforts underway in EVER and Northeastern BICY:

1) Long-term monitoring funded by CERP RECOVER MAP is underway in Shark River Slough that is designed as a GRTS design and is re-randomized every year (58 sample sites occurred in EVER and BICY in 2005). Throw traps are used and fish are collected, counted and sized by species. (Philippi, 2003, 2005) Periphyton samples are collected simultaneously.

Long-term sentinel site monitoring is also occurring by Joel Trexler and Jeff Kline.

SFCN feels this monitoring is sufficient and does not anticipate expanding this monitoring.

2) SFCN plans to work with the CERP funded effort in northeastern BICY to develop a similar sampling design and protocols for northwestern BICY. In NE BICY pilot studies are underway to study different protocols for monitoring fishes in cypress forests and in the mangrove/marsh interface paid for by CERP RECOVER MAP. It is unclear whether it will be funded long-term. Monitoring implementation in NW BICY will involve a pilot sampling period and writing of a full protocol prior to full implementation and would be conducted in cooperation with CERP funded effort in Northeastern BICY so that the two data sets could be compared and if appropriate combined. Sampling would focus in the area of northwest Big Cypress, north of Interstate 75 and west of the Florida National Scenic Trail entrance. Periphyton samples & micro-invertebrate samples would be collected simultaneously. A pilot study funded by CERP RECOVER in the northeastern portion of BICY found that throw traps similar to those used in Everglades National Park and the Water Conservation Areas appear to be the best method to use (compared with drop traps, lift traps, drift fences, gill nets) (Liston *et al.*, 2006). However additional methods may be needed to sample deeper areas in Okaloacoochee Slough and East Hinson Marsh (Joel Trexler, personal communication).

Sampling in Everglades is done at approximately 10-12 sampling units per landscape unit with about 2-5 throwtrap samples per sampling unit. Landscape units are chosen to be homogenous. If we assume that this area will include at least 1 landscape unit then about 12 sites would be visited 2 times each year with 3 throw-traps each. As with the NW BICY effort, a subset (3 sites) may be visited 5 times a year during the pilot monitoring phase (early, mid and late wet season, early & mid dry season) to determine optimal times to sample with sampling tied to number of days since drydown and water stage at nearby stations. The remainder of sites would be sampled in the late wet season (October) and possibly mid dry season (March).

In the future if additional funds become available, expansion to more of BICY and sampling in VIIS guts and Salt River should be considered. However this sampling is deferred for now due to insufficient funds.

**Principal Investigators/Key Contacts and NPS Lead:**

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**Development Schedule, Budget, and Expected Interim Products:**

SFCN will coordinate with Jerry Lorenz and Bill Loftus who are the Principal Investigators for the NE BICY pilot program to develop monitoring for NW BICY. SFCN will seek to coordinate with CERP RECOVER MAP for reporting of monitoring results in EVER and northeast BICY in 2011. SFCN expects to conduct pilot monitoring using the protocols in development by Jerry Lorenz and Bill Loftus (Liston *et al.*, 2006) implemented in 2008-2010. The formal protocol “Freshwater fish, invertebrates, and periphyton” will be written by 2011 with full implementation in 2012. Initial design will require assistance of Quantitative Ecologist as well as subsequent analyses. If all sites are accessed by helicopter, assume about \$7000/yr. Field equipment and supplies are estimated at \$5000/yr. Table indicates proposed SFCN workload upon full monitoring implementation.

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

SFCN Staff	Full Time Equivalent (FTE)
Coordinator	
Marine Ecologist	
Fisheries Biologist	
Marine Biologist Technician (So FL)	
Marine Biologist Technician (VI)	
Community Ecologist	0.15
Wildlife Technician (Wildlife)	0.2
Wildlife Technician (Vegetation)	0.05
Quantitative Ecologist	0.04
Data Manager	0.02
GIS/Data Tech	0.02
Interns	
SFCN Total	0.48

**References**

Liston, Shawn E., Jerome J. Lorenz, William F. Loftus, Carole C. McIvor. 2006. Development and Testing of Protocols for Sampling Fishes in Forested Wetlands in Southern Florida: October 2005 to September 2006. Annual Report to US Army Corps of Engineers and Florida Integrated Science Center of US Geological Survey. 59 pages.

Philippi, Tom. 2003. Final Report- CERP Monitoring and Assessment Plan: Stratified Random Sampling Plan, SFWMD Agreement C-C20304A September 24, 2003

Philippi, Tom. 2005. Final Report- CERP MAP Implementation: Transect and Sentinel Site Sampling Design, SFWMD Agreement CP040131, April 28, 2005, Revised 20 May 2005 and 10 June 2005