

Vital Sign: Phytoplankton (Marine)

[shortened name: Phytoplankton]

Parks Where Vital Sign will be implemented:

BISC, BUIS, DRTO, EVER, SARI, VIIS – checking MODIS imagery for presence of algal blooms

Justification/Issues being addressed: Phytoplankton (Marine) ranked 34th among the 44 SFCN vital signs. Phytoplankton are important primary producers in aquatic food webs. Although these communities help regulate the availability of dissolved oxygen (DO) in marine systems at dynamic equilibrium, the community composition and biomass respond to water quality, especially turbidity and nutrient load changes. Increased turbidity reduces the availability of light and decreases photosynthetic activity, while algal blooms may occur due to an increase in nutrient load and this in turn also increases turbidity. As the algae die, the decaying phytoplankton cause a net decrease of DO. Such events have been shown to impact fish and benthic habitat communities that depend on these resources and may cause die-offs. Some species can be especially harmful and/or toxic (e.g., red tides and "black water" events). Phytoplankton monitoring is thus an invaluable indicator of marine habitat conditions.

General Monitoring Questions to be Addressed by the Vital Sign:

- What are the status and trends in frequency, size, and distribution of algal blooms in and around SFCN park waters?
- When and where are algal blooms occurring?

Measures:

Location, size, duration, and type of algal bloom events

Basic Approach:

During our Indicator workshops many valuable indicator details were listed to monitor in regard to phytoplankton. They included Community density and composition, species abundance, Chlorophyll a, other pigments (taxonomic indicator), microscopic validation of pigment indicator, possible bioassay for red tide, location, and light extinction/turbidity. However, at this time, the SFCN will focus primarily at using remote sensing technology using Chlorophyll a as a proxy for blooms to track frequency, size, and movement around parks. Additional Chlorophyll a monitoring is occurring around South Florida and will be used to provide additional information on the bloom event. Phytoplankton monitoring is one ecosystem indicator being evaluated as part of a Comprehensive Everglades Restoration Plan report card. The SFCN will track progress with both the indicator assessment point determination as well as the other indicators that will be used for this reporting tool.

The SFCN Data Manager will periodically review the MODIS imagery site to identify bloom events. Daily MODIS Direct Broadcast products from the University of South Florida are available to show Sea Surface Temperature (SST) as well as Chl. A at <http://modis.marine.usf.edu/index.html> for South Florida, the USVI and other areas of

interest around the hemisphere. Those blooms can be identified as Harmful by checking the Harmful Algal Bloom Forecasting System website at:

<http://www.csc.noaa.gov/crs/habf/> . If an event is at or near a park, the data manager will contact park resource management staff to ensure they are aware of the bloom and will continue to track its movement and fate via these web sites. The Harmful Algal Bloom forecast site will be checked to ensure the type of bloom occurring. These bloom event details will be captured and reported on in summary reports.

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
- USF – Center for Remote Sensing
- FWRI- Harmful Algal Bloom group
- DERM-Steve Blair & Susan Markley
- MOTE-Gary Kirkpatrick
- NOAA – Harmful Algal Bloom Forecast Website
- NOAA – SE Fisheries Science Center Water Quality Monitoring – Peter Ortnier
- FIU – SERC –Water Quality Monitoring Program - Joe Boyer

Development Schedule, Budget and Expected Interim Products:

There is no protocol schedule to implement this protocol at this time, as higher priority vital signs are being given precedence.

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