

Vital Sign: Surface Water Hydrology

[shortened name: Hydrology]

Parks Where Vital Sign will be implemented:

BICY, BISC, BUIS, DRTO, EVER, SARI, VIIS,

Justification/Issues being addressed: Surface Water Hydrology ranked 3rd among the 44 SFCN vital signs. Hydrology is an important driver in most ecosystems. Understanding the quantity, timing, duration, and flow of the hydrology allows a basic comprehension of how this major process affects the ecosystem and is a necessary covariate to interpret other indicators. CERP/MOD Waters Everglades restoration is fundamentally expected to affect South Florida regional hydrology. In addition, freshwater input is a major estuarine ecosystem driver. Freshwater input, coupled with hydrodynamics and evaporation, determines spatial and temporal salinity patterns. Anthropogenic alteration of freshwater input is a major estuarine ecosystem stressor, likely the most important for Biscayne Bay, Florida Bay, and the gulf coast estuarine ecosystems. Additionally, adequate archiving and reporting of rainfall is critical for the understanding of how each year's weather will affect the flora, fauna, and the ecosystem overall.

General Monitoring Questions to be addressed by the Vital Sign:

- What are the spatial and temporal patterns (quantity, timing, duration, flow) of freshwater input (surface water, and to a point groundwater) into estuaries/bays?
- What is the general hydrology (quantity, timing, duration, flow) of the freshwater marsh part of the ecosystem?
- What is the general annual weather pattern, especially in regards to rainfall?

Measures:

Water stage, flow, timing, and duration, discharge of freshwater to specific estuaries, rainfall

Basic Approach:

1) BISC, EVER, SARI, VIIS

For BISC, EVER, VIIS SFCN will generate annual reports at specific sites for freshwater discharge into the estuary, using the ForEVER (for Everglades) database maintained by Kevin Kotun at EVER and data from the Florida Coastal Everglades Long Term Ecological Research (FCE-LTER). For VIIS, the SFCN needs to gather rainfall data from the established air monitoring station at Lind Point Biosphere and private sites to compile in an annual report. For SARI, the SFCN is establishing a single crest gage station to be placed on Salt River near the park boundary at the input culvert to the park. SFCN expects park staff assistance in maintaining the station and downloading the data.

2) BICY, EVER

For BICY and EVER the SFCN will continue to maintain links to regional hydrology summaries by Bob Sobczak of BICY and EVER; additionally, SFCN will use the

Everglades Depth Estimation Network (EDEN) pulling together hydro pattern at key long term hydrology stations (P205 station).

3) BISC, BUIS, DRTO, SARI,

SFCN will establish new weather stations at a few select sites. At BISC the need is to generate annual rainfall at offshore islands sites and additionally record wind speed and direction for the central and the southern parts of Biscayne Bay which was cited as a critical data gap in the South Florida / Caribbean Network Weather and Climate Inventory Report (Davey *et al.*, 2007). At BUIS SFCN will generate an annual rainfall report from the soon to be newly installed weather station. At DRTO the national weather service is maintaining a station and should be approached to see if we can supplement instrumentation to the station. The station has min and max temperature, air temperature and rainfall. At SARI SFCN will establish a weather station mainly for rainfall data which will be correlated to the Crest-stage gage at the culvert under the road at headwaters of SARI. Weather stations at BUIS, DRTO, and SARI will be placed using best judgment as SFCN will be placing only one station in each park. Variability in air temperature and rainfall across these parks are assumed to be small enough that use of this data as covariates for other indicators is not jeopardized.

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Development Schedule, Budget, and Expected Interim Products:

SFCN expects to adapt existing Standard Operating Procedures rather than submit an independent peer-reviewed protocol and is expected to take about 6 months of SFCN staff time to draft and test. SFCN staff (Marine Ecologist and Marine Technician will be responsible for this indicator, with some assistance from Community Ecologist). One time equipment cost of \$10,000.00 at maximum plus travel to USVI and DRTO for maintenances at 6 month interval probably for DRTO. SOPs completed by 2009 with implementation by 2010 for estuarine discharge and specific sites, general indication of surface water hydrology, and weather stations.

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

SFCN Staff	Full Time Equivalent (FTE)
Coordinator	
Marine Ecologist	0.02
Fisheries Biologist	0.02
Marine Biologist Technician (So FL)	0.02
Marine Biologist Technician (VI)	0.02
Community Ecologist	
Wildlife Technician (Wildlife)	
Wildlife Technician (Vegetation)	0.02
Quantitative Ecologist	0.02
Data Manager	0.02
GIS/Data Tech	0.04
Interns	
SFCN Total	0.18

Davey, C. A., K. T. Redmond, and D. B. Simeral. 2007. Weather and Climate Inventory, National Park Service, South Florida / Caribbean Network. Natural Resource Technical Report NPS/SFCN/NRTR—2007/037. National Park Service, Fort Collins, Colorado.