Vital Sign: Benthic Communities Extent & Distribution

[shortened name: Benthic_Mapping]

Parks Where Vital Sign will be Implemented:
BISC, BUIS, DRTO, EVER, SARI, VIIS

Justification/Issues being addressed: Benthic Communities Extent & Distribution ranked 23rd among the 44 SFCN vital signs. The extent, distribution, and composition of major benthic communities (e.g., hardbottom, soft-bottom, dense Thallasia sp. seagrass, sparse seagrass, etc.) across bays and marine areas influence the fish, invertebrate, and larger vertebrate communities (e.g., sea turtles, manatees) they support. Benthic communities can change with alterations in location, quantity and quality of freshwater and sediment inputs (e.g., CERP), nutrient levels, major storm events, and heavy visitor use (e.g., repeated boat groundings, scarring, and anchoring damage). Analysis of remotely-sensed data provides the spatial extent and composition of major benthic communities across relevant areas of marine parks allowing tracking of changes in large-scale patch size and shape at a broader scale than site-specific studies.

This vital sign, which is focused on mapping of communities using remote sensing, compliments the Marine Benthic Communities vital sign which involves field monitoring using divers to assess the community composition and health.

General Monitoring Questions to be Addressed by the Vital Sign:

- What is the extent and distribution of marine benthic communities and how are they
  changing?

Measures:
Extent, distribution, and characterization of benthic community types using remote sensing.

Basic Approach:
If funds are available, the SFCN marine ecologist will contract on a decadal frequency interval or event dependent (in response to a major natural disaster) to map SFCN marine park areas in rotation. Mapping will be accomplished using a combination of data sets, including imagery (plane or satellite based), bathymetry (derived from SONAR or LIDAR), and ground truthing via SCUBA or drop cameras/Remotely Operated Vehicles. These three data sets are to be homogenized into a single map theme which will consist of a structure/cover classification scheme based on a nested hierarchy using a proven classification system that enables the map product to mesh with other mapping activities in the area.

Ground-truthing should occur the same year the image capture occurs to ensure both data sets represent the benthos at that time. Two anticipated problems that could be mitigated by appropriately timed ground-truthing are as follows: drift algae in seagrass

beds could provide for a confusing signature if the seagrass was sparse but the algae made it look dense; and colonial zooanthids can be confused with corals from imagery as well as distant observations, and may require SCUBA reconnaissance to ensure proper classification. The ground-truthing information will assist with ensuring classification accuracy and help with training the contractor with known signatures of fixed points that would correspond to the image/data source for the spatial data layer.

Accuracy assessments will be performed by either SFCN staff, host park staff, contractors, or other cooperators.

SFCN staff will use spatial analysis techniques to look for areas of change across the benthos. Shifts in size and/or density of features will be the primary focus of analysis.

Principal Investigators/Key Contacts and NPS Lead

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Development Schedule, Budget, and Expected Interim Products:

Mapping efforts are underway for BISC and DRTO. Florida Bay was completed in 2004. BUIS and VIIS mapping is in progress. SARI has not been mapped for benthic habitats and this is needed. West Everglades was evaluated in Spring 2007 during which it was found that seagrass was sparse along the western coast of EVER--this may have been due to Wilma sediment movement or it may have always been sparse. Due to the impacts of Hurricane Wilma in 2005, West Everglades coast will be reevaluated within the next five years. Budget is size and scale dependant, as well as technology driven. Aerial and/or Satellite imagery is generally used for the base map for shallow areas, while LIDAR or acoustic sensors may be necessary to map deeper features or in areas of high turbidity. Typical project budgets can run from <$100K to $500K depending on size of area and mapping scale. Funds may be available in the future from the National Mapping Program, but currently base funding with some other WASO funding has been leveraged with local and state agency funds, or other federal partners (USGS, NOAA)

Initially the SFCN hopes to produce accurate benthic habitat maps which will aid in random stratified sampling design for all the marine Vital Sign indicators that are being developed. After completion of the first round of maps, it is envisioned that new map products will be generated every decade, or as otherwise warranted due to natural events or major impacts to the benthic communities. Opportunities will be leveraged to look for partners to help reduce costs.

The SFCN Marine Ecologist would be required to manage the mapping contract with assistance from the Network Coordinator, and organize the field efforts. An approximate 3-4 weeks of field time, with 3-4 weeks of office time would be required during years of mapping activity based on area mapped. Dive technicians and/or fisheries biologist would assist where necessary in both field and office activities.

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

SFCN Staff	Full Time Equivalent (FTE)
Coordinator	0.1
Marine Ecologist	0.1
Fisheries Biologist	
Marine Biologist Technician (So FL)	
Marine Biologist Technician (VI)	
Community Ecologist	
Wildlife Technician (Wildlife)	
Wildlife Technician (Vegetation)	
Quantitative Ecologist	
Data Manager	
GIS/Data Tech	
Interns	
SFCN Total	0.2