

## **Vital Sign: Forest Ecotones and Community Structure** [shortened name: Forest\_Vegetation]

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

BICY, BISC, BUIS, DRTO, EVER, SARI, VIIS – SFCN will evaluate existing monitoring and where possible build upon it or develop new sampling plan

**Justification/Issues being addressed:** Forest Ecotones and Community Structure ranked 14<sup>th</sup> among the 44 SFCN vital signs. Plants are important primary producers and dominant physical structure components in terrestrial natural systems. They are the quintessential primary focus component of most natural land resource management agencies. Vegetation community composition and structure change may indicate transformation of successional state, time since disturbance, eutrophication, hydro-pattern (including groundwater), water quality, fire regime, disease or insect outbreak effects, changes in relative cover by native/non- native species, etc.

Ecotones are transition zones between habitats and are generally dynamic locations for flora and fauna. Due to the transition between habitats, tracking the position of ecotones can indicate their long-term trajectory. Understanding the physical conditions which drive ecotone location change is critical for resource management. Ecotones are expected to move, for example, in response to changes in water management, sea level rise, and fire management. Both hammocks and pinelands are important habitats for rare and endemic plant species and for wildlife. Hammocks are spatially limited vegetation communities within a matrix of pinelands. Pinelands are fire adapted whereas hammock species are less so. In the absence of fire, hammock species expand into pinelands, though fire can reduce or eliminate hammocks. Fire management is critical to maintaining a habitat balance. Invasive species could also impact relationships between these habitats.

### **General Monitoring Questions to be addressed by the Vital Sign:**

- Are ecotones shifting due to physical conditions (e.g., hydrology, climate change, anthropogenic factors, sea level rise, fire, episodic meteorological and storm wave events, etc.)?
- What are the status and trends in plant community composition and structure?

### **Measures:**

Community composition and physical structure (e.g., canopy height, vegetative cover of each plant species, canopy cover in each stratum (canopy, herb layer, shrub layer, etc)), shifts in community boundaries (e.g., hammock/pine), soil depth, litter depth

### **Basic Approach:**

SFCN in cooperation with Jenny Richards of FIU have hired a post-doc to work on vegetation monitoring protocols. SFCN is developing a "Forest Ecotones and Community Structure" protocol which will detail its approach both with new monitoring by SFCN and regarding coordinating with existing programs. Some key points include:

- SFCN will coordinate with existing programs where appropriate; such as fire

monitoring plots in Long Pine Key in Everglades and long-term plots on VIIS and BISC. These existing programs will need to be evaluated for statistical rigor, compatibility of objectives and willingness to share reports and/or data.

- SFCN will evaluate ecotonal change using both aerial photography monitoring and field monitoring via belt transects or a series of plots set up along a longer transect. Table 1 shows the types of ecotones to be monitored and which methods will be used. Revisit time is likely to be once every 5 years or after a major disturbance event and administered in a rotating panel.
- SFCN will evaluate long-term change within plant communities via field plots revisited approximately once every 5-10 years (see Table 2).

Table 1. Plan for Ecotone Monitoring

A= monitored with aerial photography

F= monitored with field plots

	Pineland to Hammock	Coastal to Inland	Forest to Wet Prairie	Wet Prairie to marsh/slough
BISC		A,F	A	
BICY	A,F	A,F	A	
EVER	A,F	A,F	A	A,F
DRTO		A,F		
SARI		A,F		
BUIS		A,F		
VIIS		A,F		

Table 2. Plan for Long-term within-community monitoring plots

+ = SFCN monitoring

◆ = Existing monitoring program

	Pineland	Hardwood Hammock	Mangroves	Marshes	Island Moist Forest	Island Deciduous Forest	Island Scrub/Shrub
BISC		+,◆	+				
BICY	◆	+	+				
EVER	◆	+,◆	◆	◆			
DRTO			+				
SARI			+				
BUIS			+			+	+
VIIS			+		+,◆	+,◆	+

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

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- Jennifer Richards, Florida International University, Jennifer.Richards@fiu.edu, 305-348-3102
- Jim Snyder, Fire ecologist, U.S. Geological Survey-Big Cypress National Preserve, (941) 695-2000 ext. 21, jim\_snyder@usgs.gov
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- Prof. Mike Ross, Florida International University, rossm@fiu.edu, 305-348-1420 (tree island monitoring)
- Thomas J. Brandeis, Ph.D. USDA Forest Service, Southern Research Station, Forest Inventory and Analysis, 4700 Old Kingston Pike, Knoxville, TN 37919, (865) 862-2030, tjbrandeis@fs.fed.us, <http://srsfia2.fs.fed.us/states/vi/USVI%20FIA.htm>
- Pete Weaver, USDA/FS, Puerto Rico

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

The “Forest Ecotones and Community Structure” protocol development is expected to be completed by 2010. Implementation is expected to take 0.33 FTE/year each for the community ecologist and two wildlife technicians across all habitat types including mangroves and marshes which are covered under other vital signs. For the evaluation of change via aerial photography, this is expected to take the GIS/Data technician approximately 2 months/year. Cost is estimated to be \$10,000/year to cover helicopter time plus stakes, etc. Table indicates proposed SFCN workload upon full monitoring implementation for all 3 vegetation monitoring protocols.

Expected SFCN staff time requirements once program is fully implemented in 5 years. Time estimates are for all 3 vegetation protocols.

SFCN Staff	Full Time Equivalent (FTE)
Coordinator	
Marine Ecologist	
Fisheries Biologist	
Marine Biologist Technician (So FL)	
Marine Biologist Technician (VI)	
Community Ecologist	0.3
Wildlife Technician (Wildlife)	0.4
Wildlife Technician (Vegetation)	0.4
Quantitative Ecologist	0.06
Data Manager	0.04
GIS/Data Tech	0.2
Interns	0.3
SFCN Total	1.7