

Everglades National Park

South Florida Natural Resources Center

National Park Service
U.S. Department of the Interior



The Conceptual Ecological Model for Everglades Tree Islands

Greater Everglades Restoration
Conference 2010

Naples, Florida

July 2010

Agnes R. McLean



Acknowledgements

- Fred Sklar, SFWMD
- Lorraine Heisler, retired FWS
- Carlos Coronado, SFWMD
- Colin Saunders, SFWMD
- Gregory Kiker, UF
- Pamela Fletcher, NOAA
- And the numerous scientists who participated in the 2007 – 2008 tree island workshops

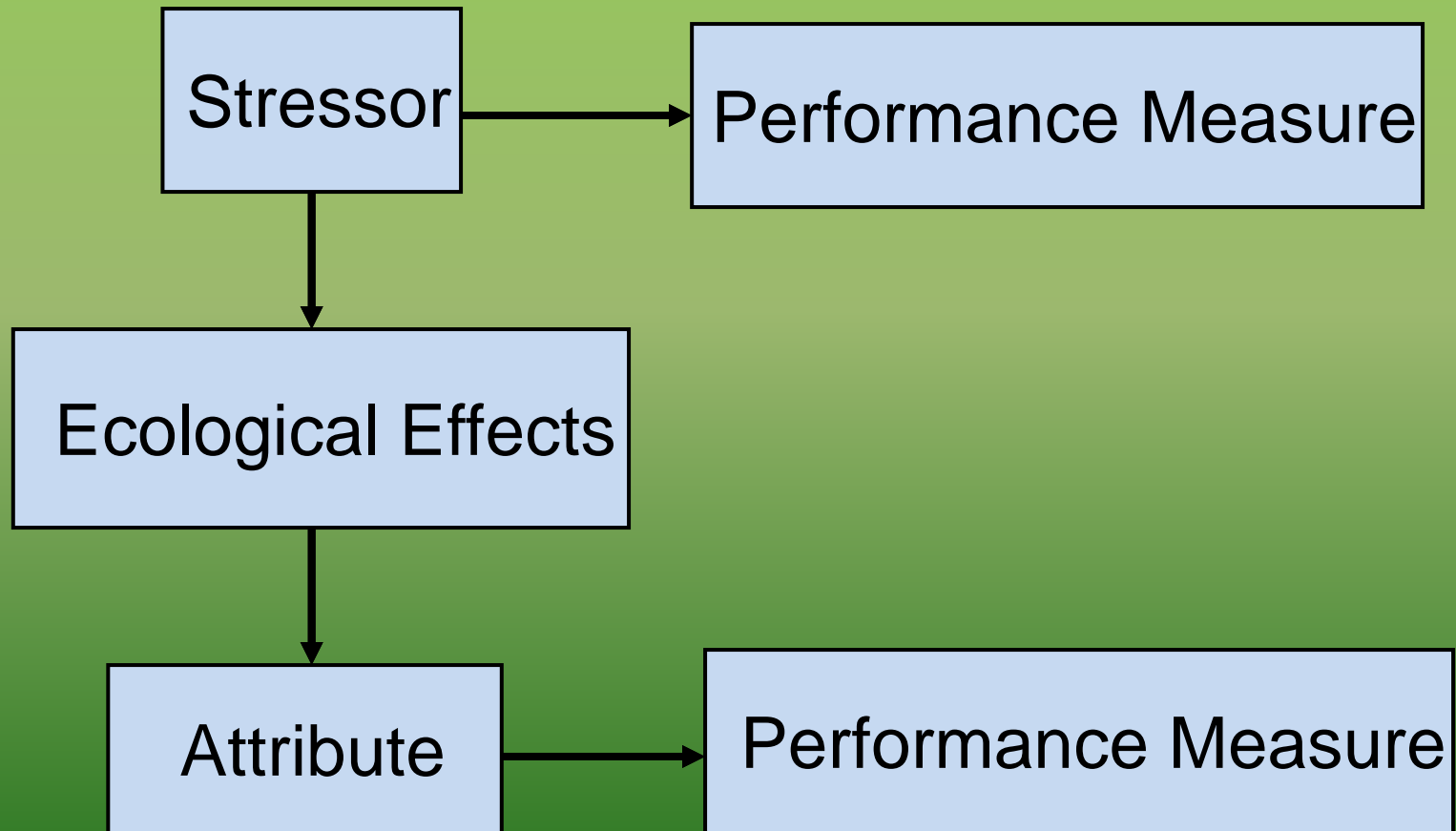


Presentation Outline

- Background
- Methods
- The model
- Selected results
- Lessons learned



Background: Conceptual Ecological Models



Background:

A conceptual model for tree islands has lagged behind the development of all other keystone conceptual ecological models for the Everglades because scientific debates regarding tree island resilience and restoration strategies have been contentious.

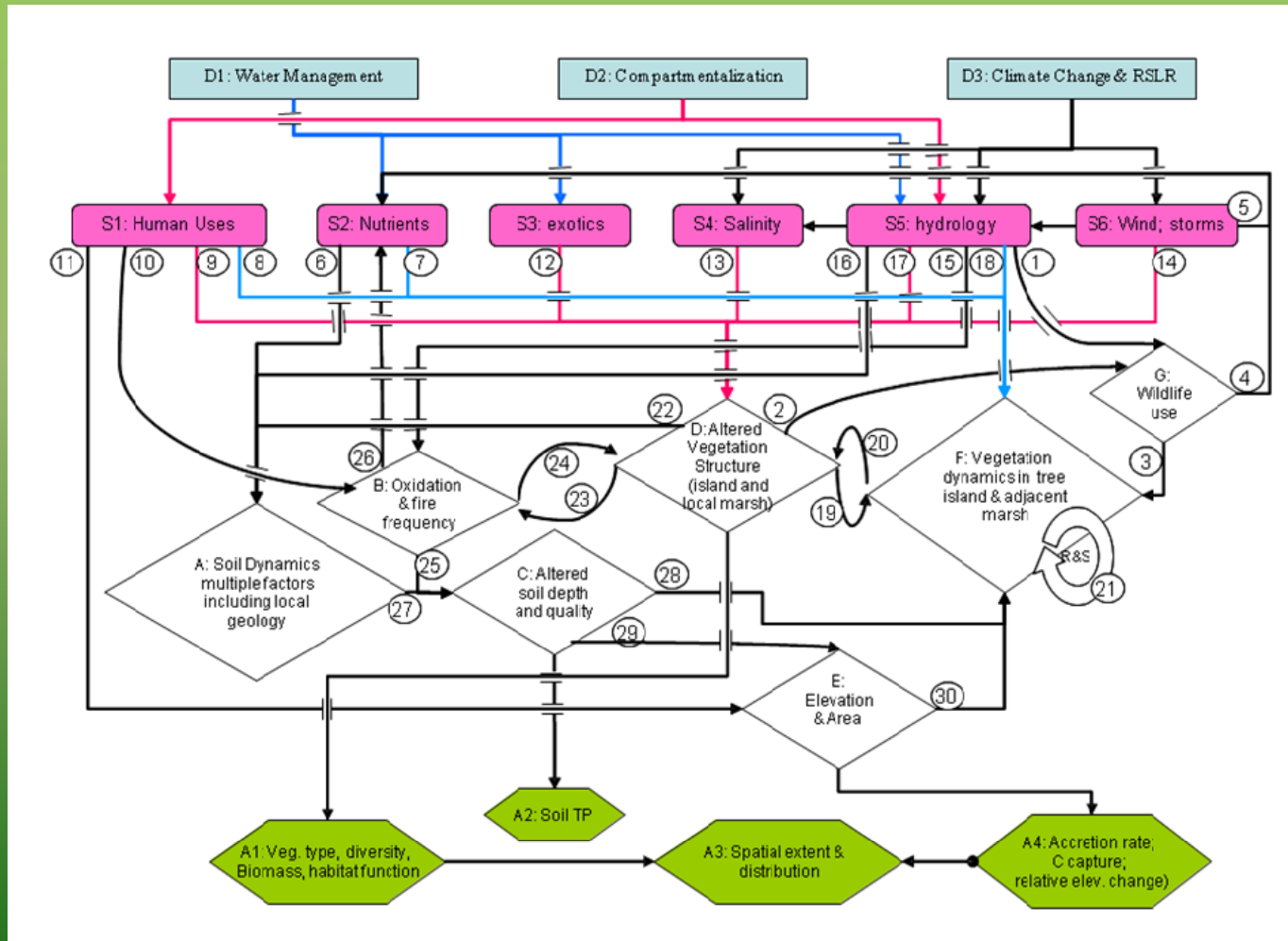
Uncertainties associated with flooding tolerances, subsidence rates, and causes of tree island degradation needed to be flushed out. Workshop developers took this opportunity to evaluate a participatory modeling approach and test the real-time TurningPoint[®] polling system.



Methods: Conceptual Ecological Model Development

- **Tree Island Workshop I**
 - Stressors and drivers
 - Ecological interactions
 - Attributes
 - Over 100 science-based hypotheses developed that related system stressors to ecological attributes of tree islands
- **Working group**
 - Hypotheses consolidated into 7 stressor-based categories
 - Draft CEM diagram

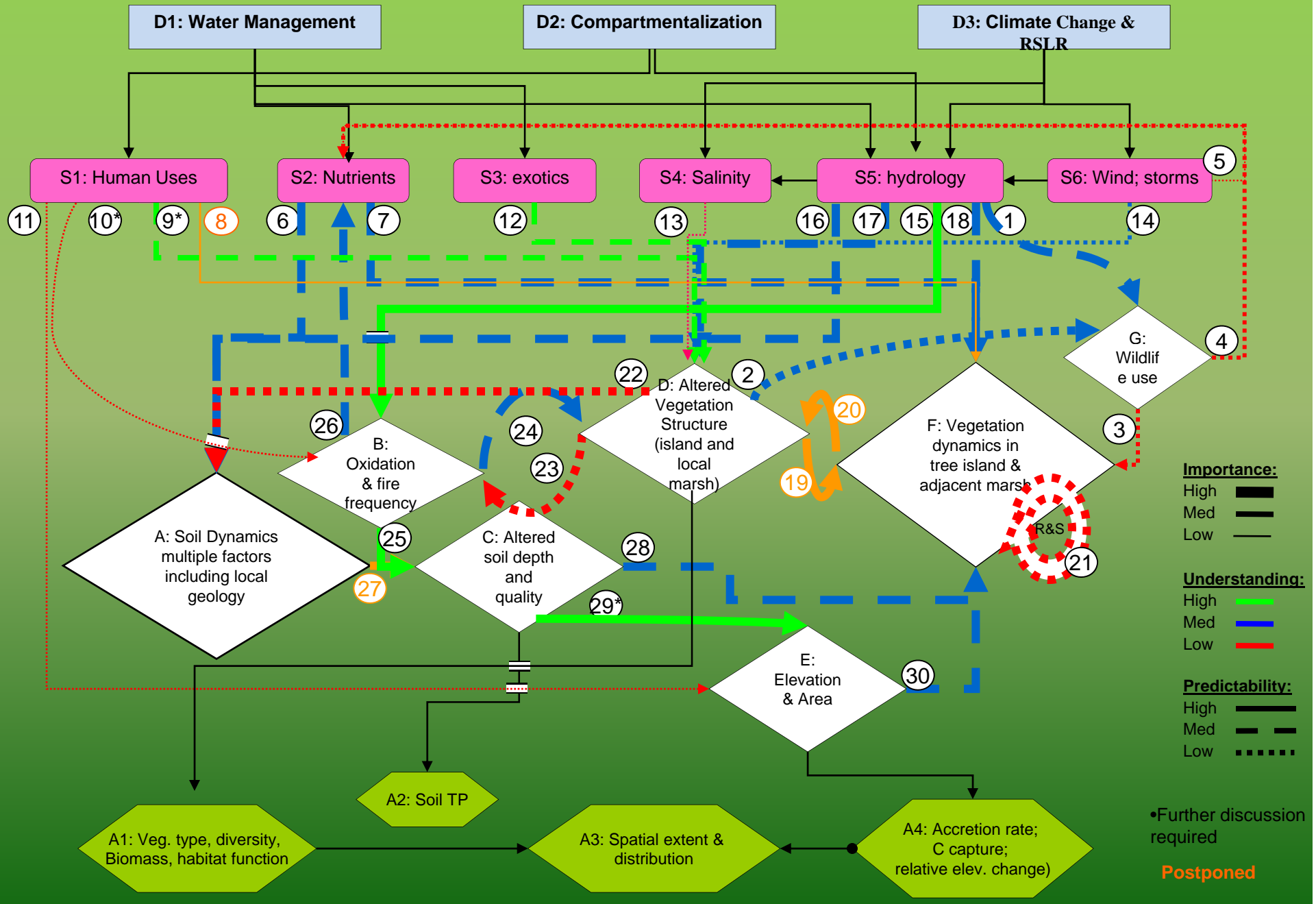
Draft Tree Island Model following Workshop I



Methods: Conceptual Ecological Model Development

- **Tree Island Workshop II**
 - CEM diagram refinement through the use of a real-time, interactive polling system (TurningPoint®)
 - Linkages in the draft model rated by experts on importance, understanding and predictability (CalFed and Coastal Louisiana programs)
 - Revised model presented to larger audience
 - Polling system used to rate which stressors, attributes and effects were most suitable for the development of tree island performance measures
- **Review/comment**
 - Final CEM and select workshop results presented today

Tree Island Model following Workshop II



Selected Results

Generally, there was consensus that –

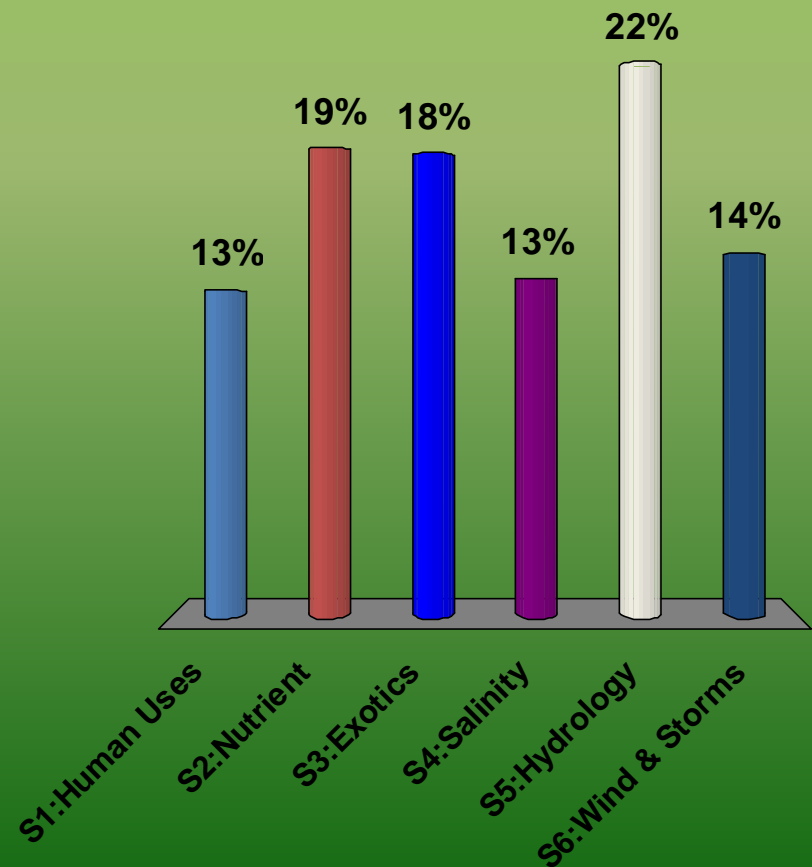
- Hydrology and nutrients are the most important stressors on tree islands**
- Island vegetation structure, oxidation and fire frequency, soil dynamics and wildlife use are well understood and fairly predictable**
- A high to moderate understanding of a linkage does not necessarily translate into the ability to quantify and predict dependencies reliably**

Selected Results continued

- **One of the workshop goals was to discuss the best indicators for assessing and evaluating tree island change**
- **This discussion was to help us focus on the most important stressors, attributes and ecological effects from the conceptual model for which we would begin the development of tree island performance measures**

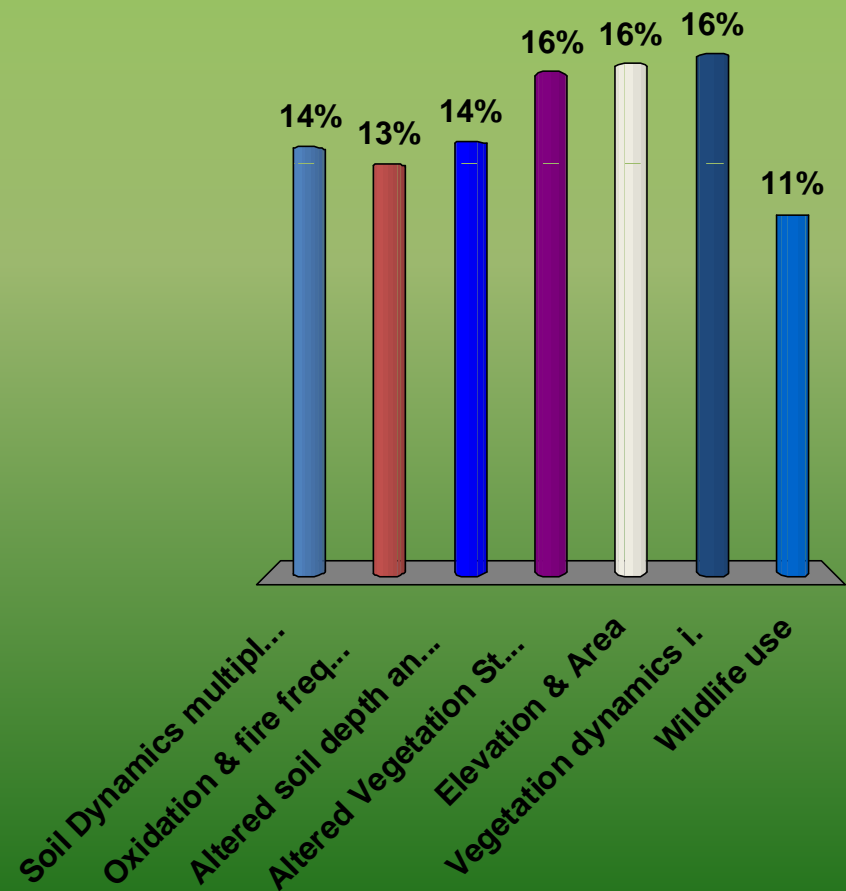
Which set of stressors should we focus on first? (select in order of preference: highest to lowest)

1. S1:Human uses
2. S2:Nutrient
3. S3:Exotics
4. S4:Salinity
5. S5:Hydrology
6. S6:Wind & storms



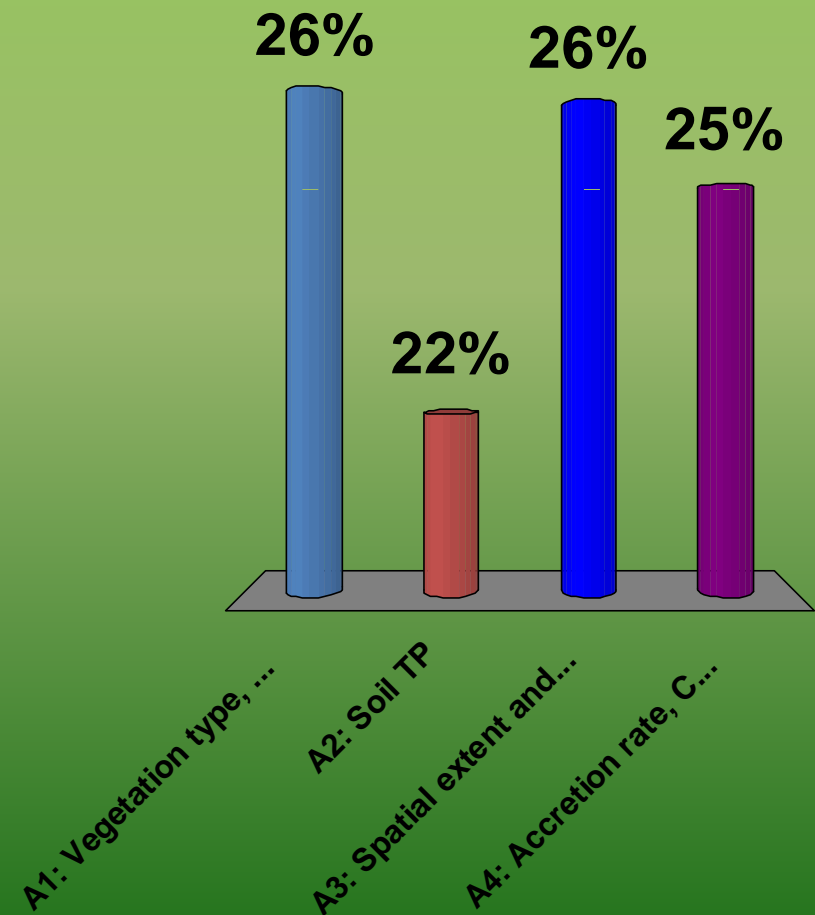
Which set of ecological effects should we focus on first? (select in order of preference: highest to lowest)

1. Soil dynamics multiple factors including local geology
2. Oxidation & fire frequency
3. Altered soil depth and quality
4. Altered vegetation structure (island and local marsh)
5. Elevation & area
6. Vegetation dynamics in tree island & adjacent marsh
7. Wildlife use



Which set of attributes should we focus on first? (select in order of preference: highest to lowest)

1. A1: Vegetation type, diversity, biomass, habitat function
2. A2: Soil TP
3. A3: Spatial extent and distribution
4. A4: Accretion rate, C capture; relative elevation change



Lessons Learned

- **Conceptual ecosystem models provide a scientifically sound basis for evaluating and identifying stressors, attributes and processes associated with an environmental restoration project**
- **The incorporation of the TurningPoint[®] polling system into the participatory modeling process is ideal because it provides rapid assessments of information and opinions within a “safe” environment (when voting is anonymous)**

Lessons Learned

- **The incorporation of a polling system into CEM development workshops can create a rich database for categorizing ecological features into levels of predictability, understanding and importance**
- **This can be used to prioritize uncertainty-reducing research associated with restoration success and to develop an environmental monitoring program associated with restoration assessment**

Lessons Learned

- **The linkages of a CEM that cause more than one third of an expert audience to postpone the categorization process are the elements that either are poorly understood or are in need of a new conceptualization**
- **Using a polling system to create a CEM requires extensive pre-workshop preparation including, well defined attributes and stressors, clear narratives for each linkage, a draft conceptual model that captures most, if not all ecological hypotheses, and a broad spectrum of expert participants**

Everglades National Park

South Florida Natural Resources Center

National Park Service
U.S. Department of the Interior



Thank You

Questions?

