

“The” Conceptual Ecological Model for Everglades Tree Islands

Fred H. Sklar, PhD

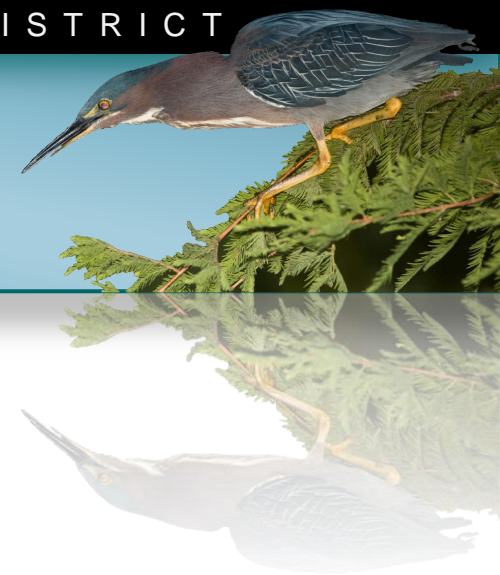
Director

**Wetland Watershed Sciences,
Applied Sciences Bureau, Water Resources Division**

To contact me after my presentation, text S36 to INTRO (46876)



“The” Conceptual Ecological Model for Everglades Tree Islands



Fred H. Sklar,
fsklar@sfwmd.gov

Co-authors:

Lorraine Heisler², Agnes McLean³, Carlos Coronado-Molina¹, Colin
Saunders¹, *To contact me after my presentation, text S36 to INTRO (46876)*
Gregory Kiker⁴ and Pamela Fletcher⁵

¹South Florida Water Management District, Palm Beach, FL, USA

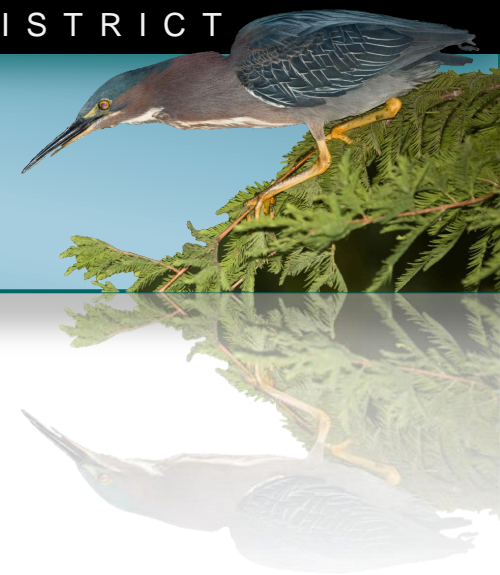
²US Fish and Wildlife Service, Vero Beach FL, USA

³Everglades and Dry Tortugas National Parks, Homestead, FL, USA

⁴University of Florida, Gainesville, FL, USA

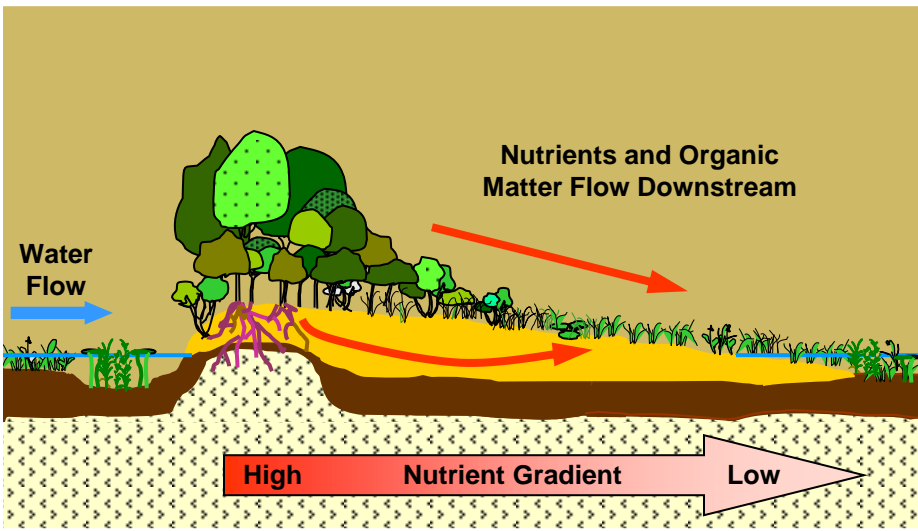
⁵National Oceanic and Atmospheric Administration, Miami, FL, USA

Why do we care about Tree Islands?



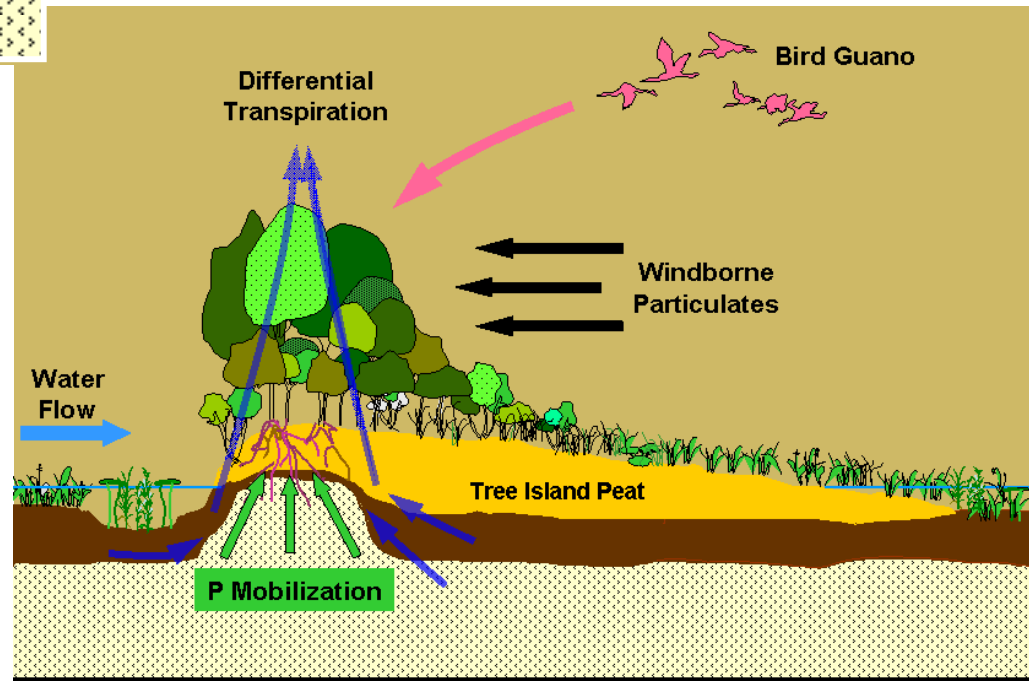
- **Biodiversity hotspots**
- **Rookery habitat**
- **Wildlife refuge during high water**
- **Breeding and nesting ground for reptiles, amphibians, mammals and birds**
- **Archaeological resource**
- **Public aesthetic and recreational value**
- **Physiographic function:**
 - **Nutrient sink**
 - **Driver of oligotrophy**

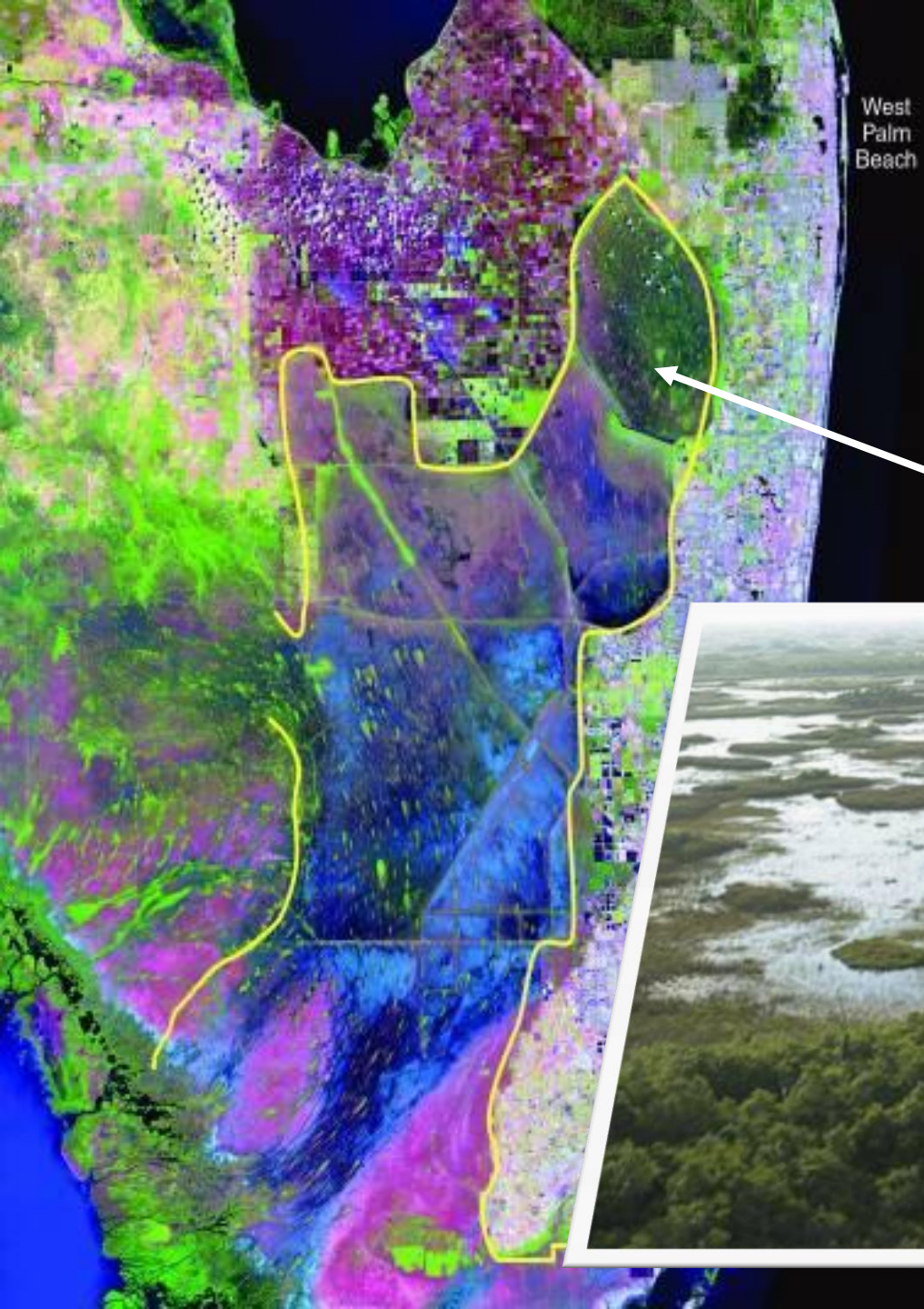
Tree Island Physiographic Function: *Discovery and Restoration move hand-in-hand*



Focused redistribution of nutrients maintains Everglades oligotrophy

Net autotrophy creates a nutrient sink

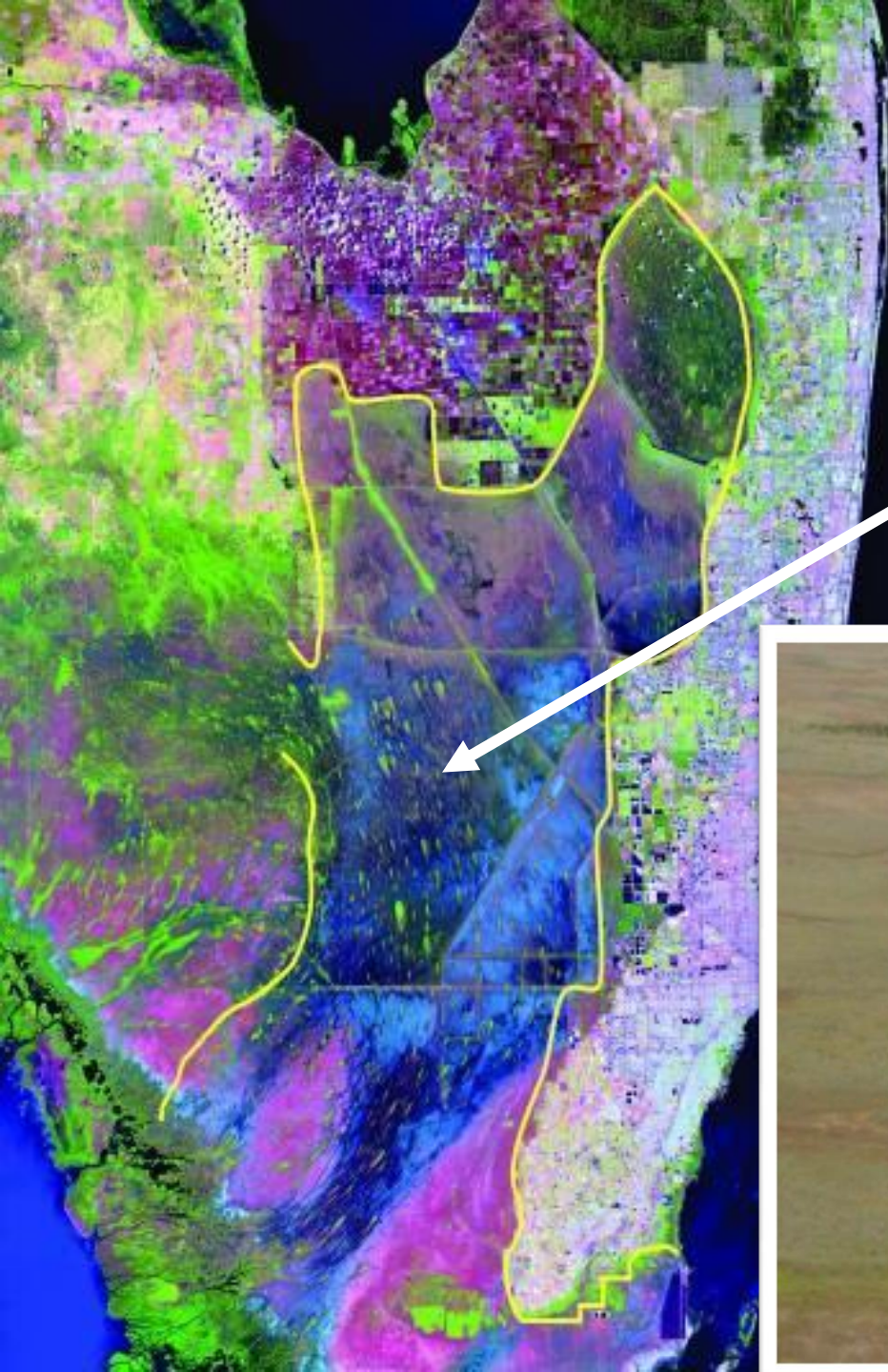




The Tree Island Landscape is Diverse

Loxahatchee National Wildlife Refuge





West
Palm
Beach

The Tree Island Landscape is Diverse

Islands dispersed across
a broad landscape in
WCA-3A

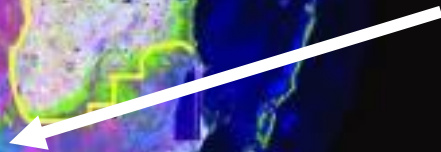


The Tree Island Landscape is Diverse

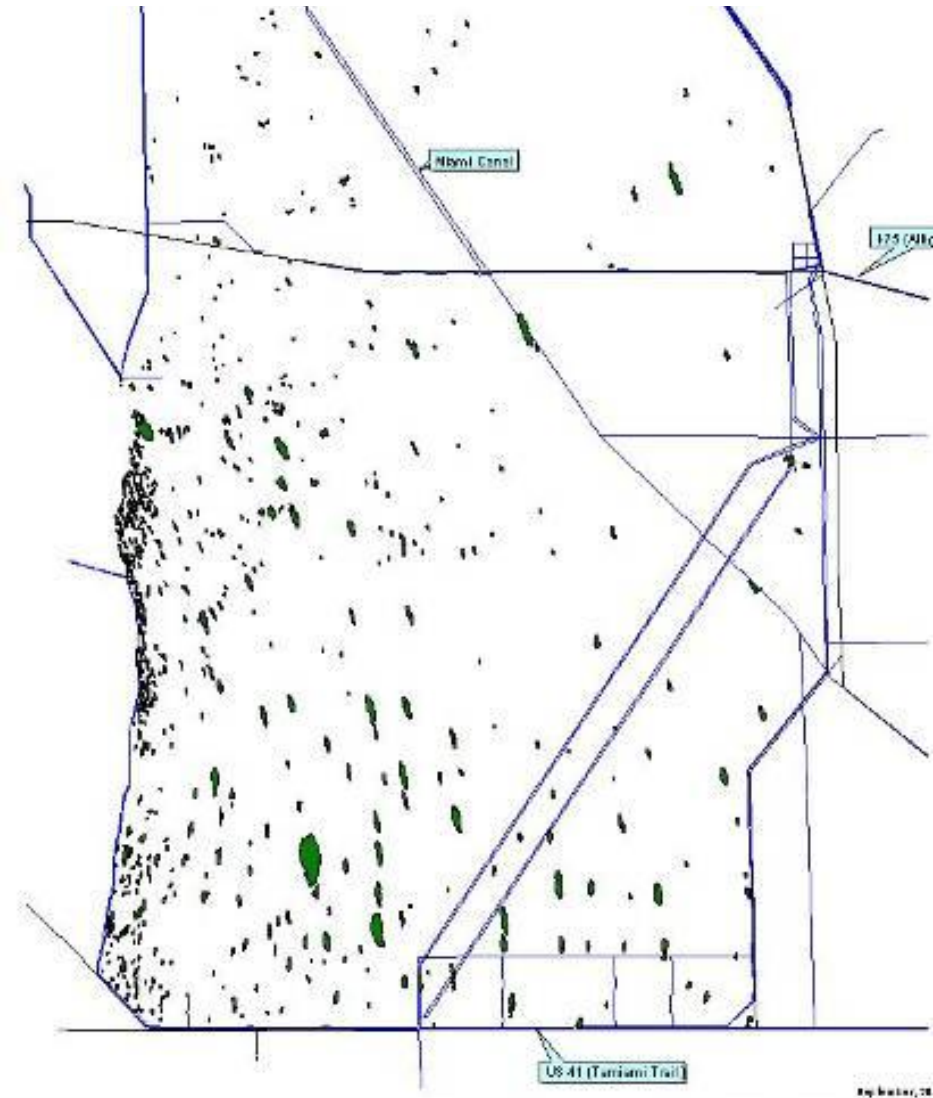
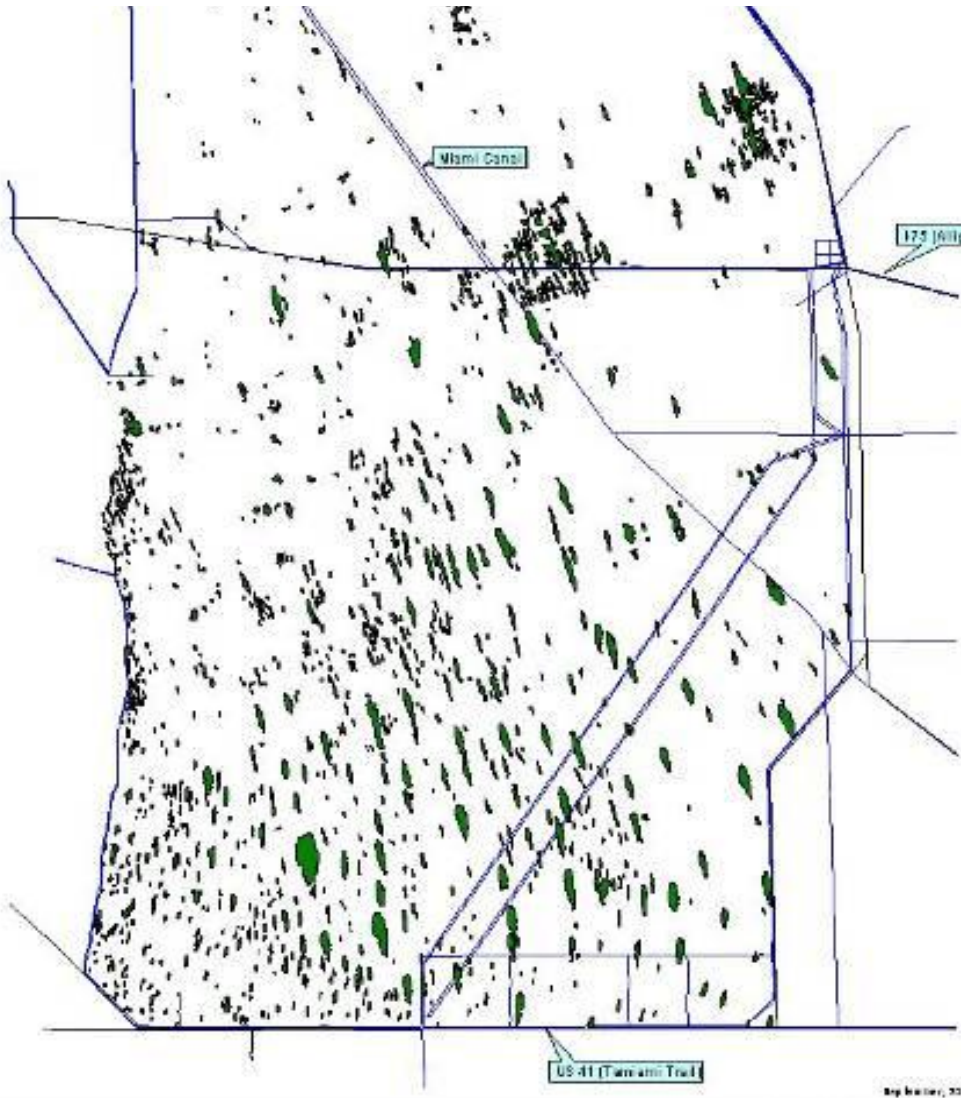
West
Palm
Beach



Coastal Hammocks in
Everglades National Park



The Tree Island Landscape is Disappearing!



1940 Tree Islands

1995 Tree Islands

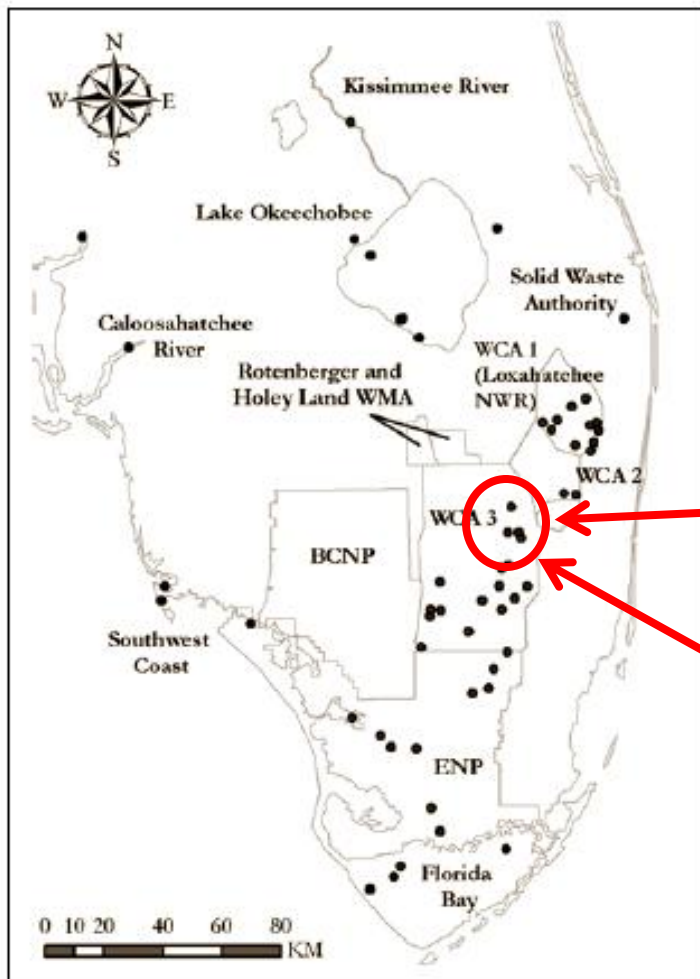
Why develop a Conceptual Model?



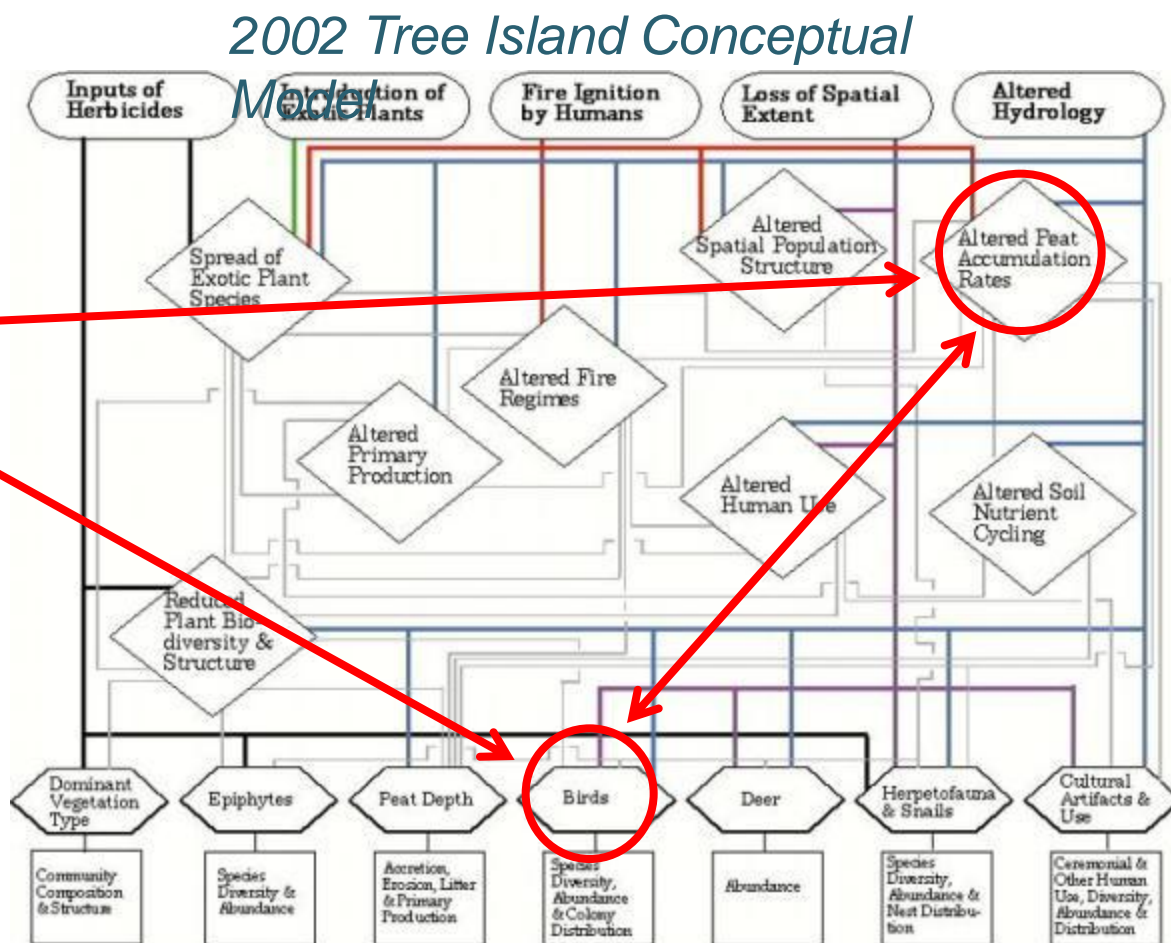
- Provides an understanding of the state of knowledge
- Focuses the socio-economic and scientific debates
- Creates a forum for stakeholder participation
- Has the potential for consensus building
- Prioritizes research dollars
- Facilitates adaptive management

Tree Island Conceptual Model Workshop Phase 1

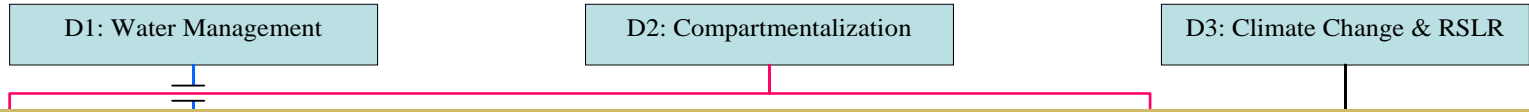
(December 3-5, 2007)

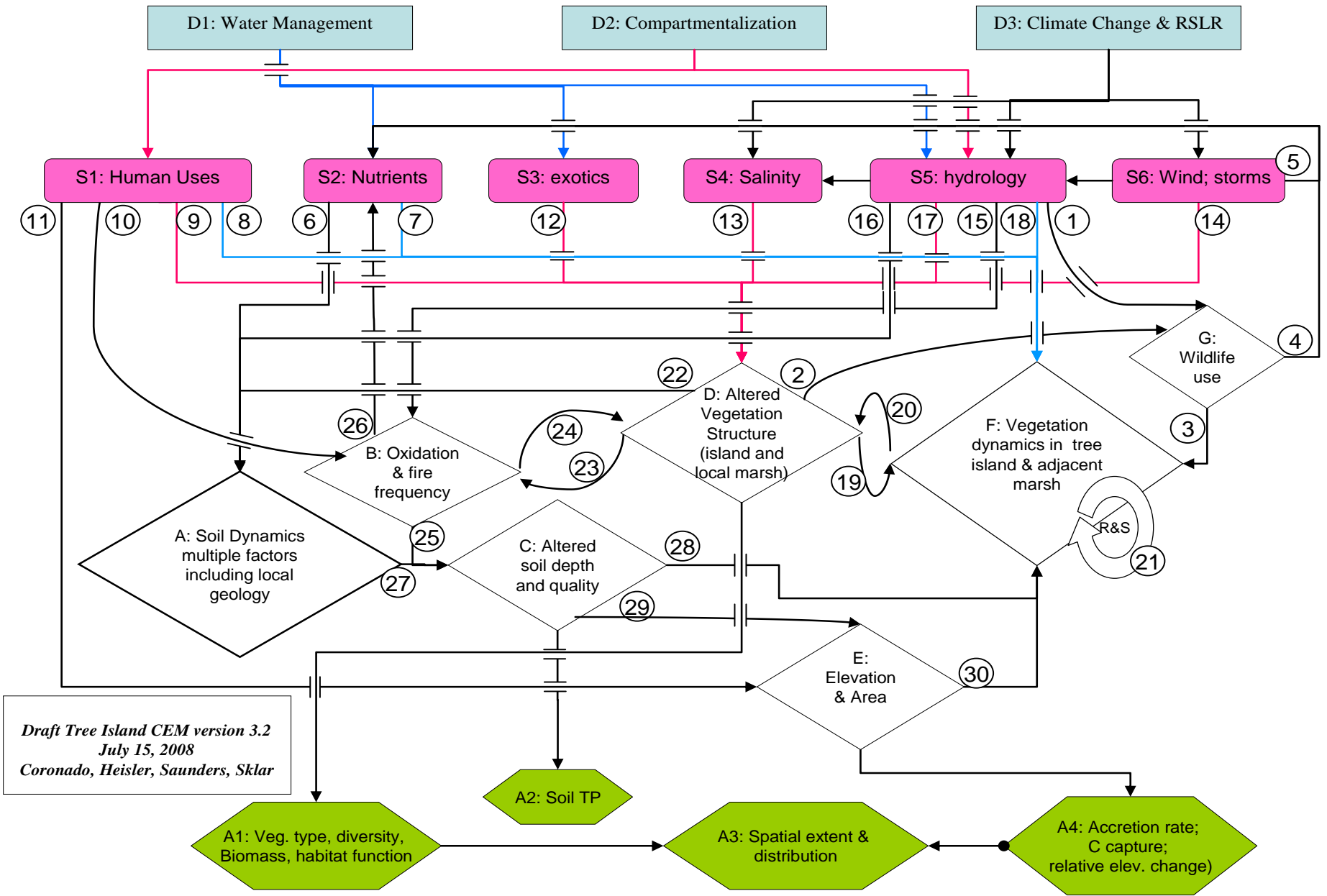


2007 Wading Bird Nests



Tree Island Conceptual Model Workshop Phase 2.



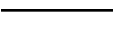




*Draft Tree Island CEM version 3.2
 July 15, 2008
 Coronado, Heisler, Saunders, Sklar*




Rating Rules – 3 votes for each linkage

Importance: (Line Thickness)

	High – thick line
	Med – medium line
	Low – thin line




Do you think the linkage is important?

Understanding: (Line Color)

	High – Green line
	Med – Blue line
	Low – Red line

Do we have an understanding of the linkage?

Predictability: (Line Type)

	High – Solid line
	Med – Dashed line
	Low – Dotted line

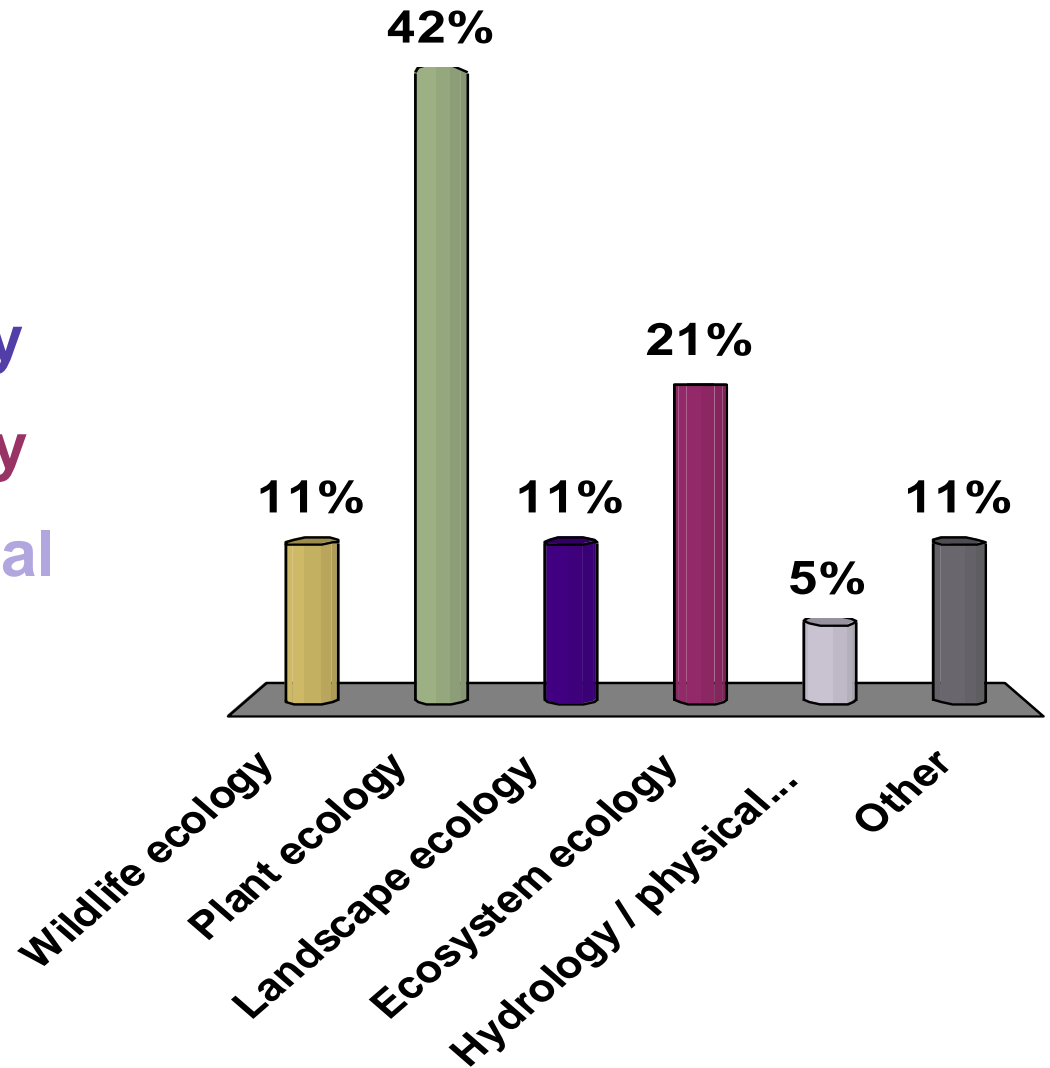
Can we predict the effects of this linkage? (Is there a logic or mathematical expression that can predict the interactions as a function of the driver?)

Voting Procedures

- Used a portable TurningPoint[®] audience polling system in a theater-style setting
- Each slide highlighted one model relationship/linkage
- Limited clarifying questions/comments to 5 minutes
 - Voted on the **importance**, **understanding** and the **predictability** of this relationship
 - Options include: **High**, **Medium**, **Low**, **Postpone**, **Abstain**
 - “**Postpone**” vote if more time is needed to discuss the question
 - Agree to postpone for $\leq 25\%$ vote
 - “**Abstain**” only if you cannot place any other vote
- Confidentiality of individual votes was maintained
- Poll did not record who had which voting unit

My area of interest / expertise is...

1. **Wildlife ecology**
2. **Plant ecology**
3. **Landscape ecology**
4. **Ecosystem ecology**
5. **Hydrology / physical sciences**
6. **Other**

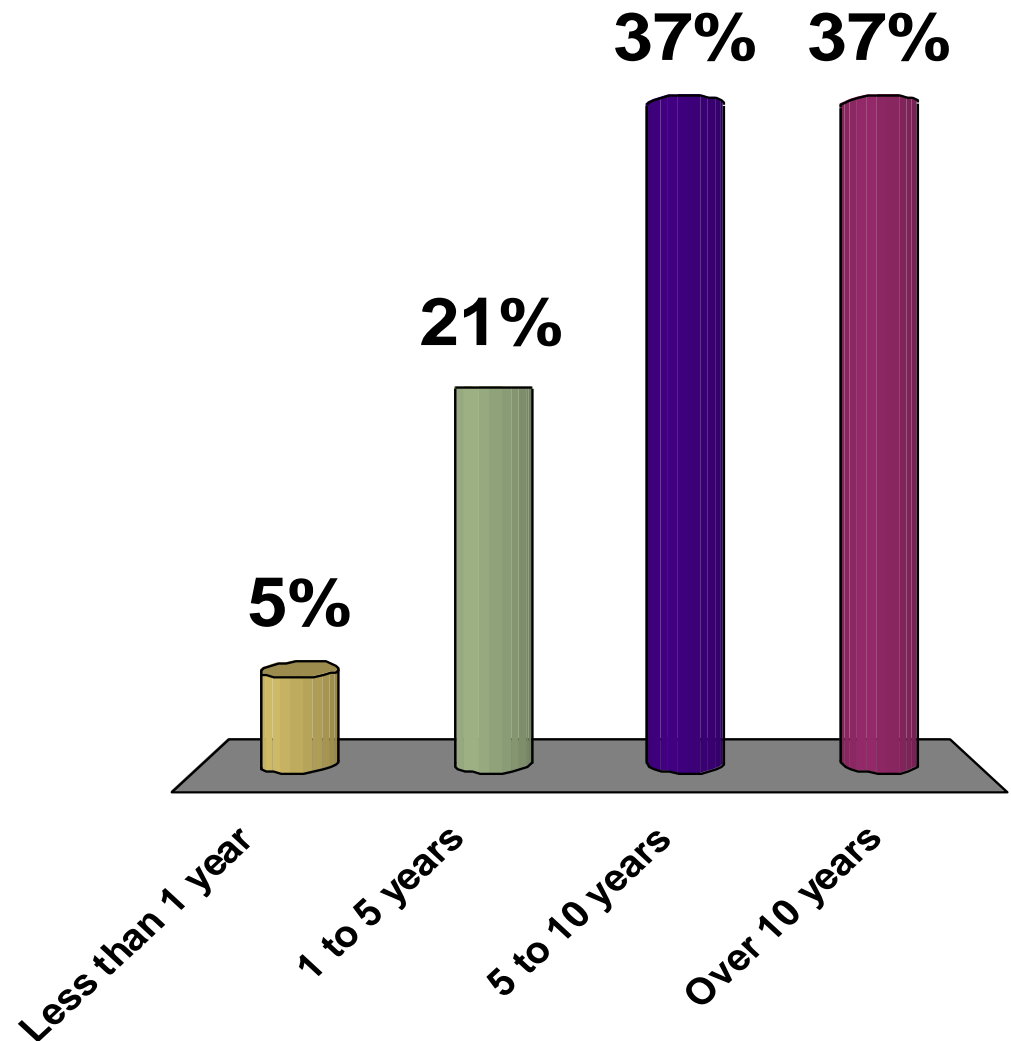


Results from 31 workshop participants considered Everglades experts

Experience in Tree Island Research

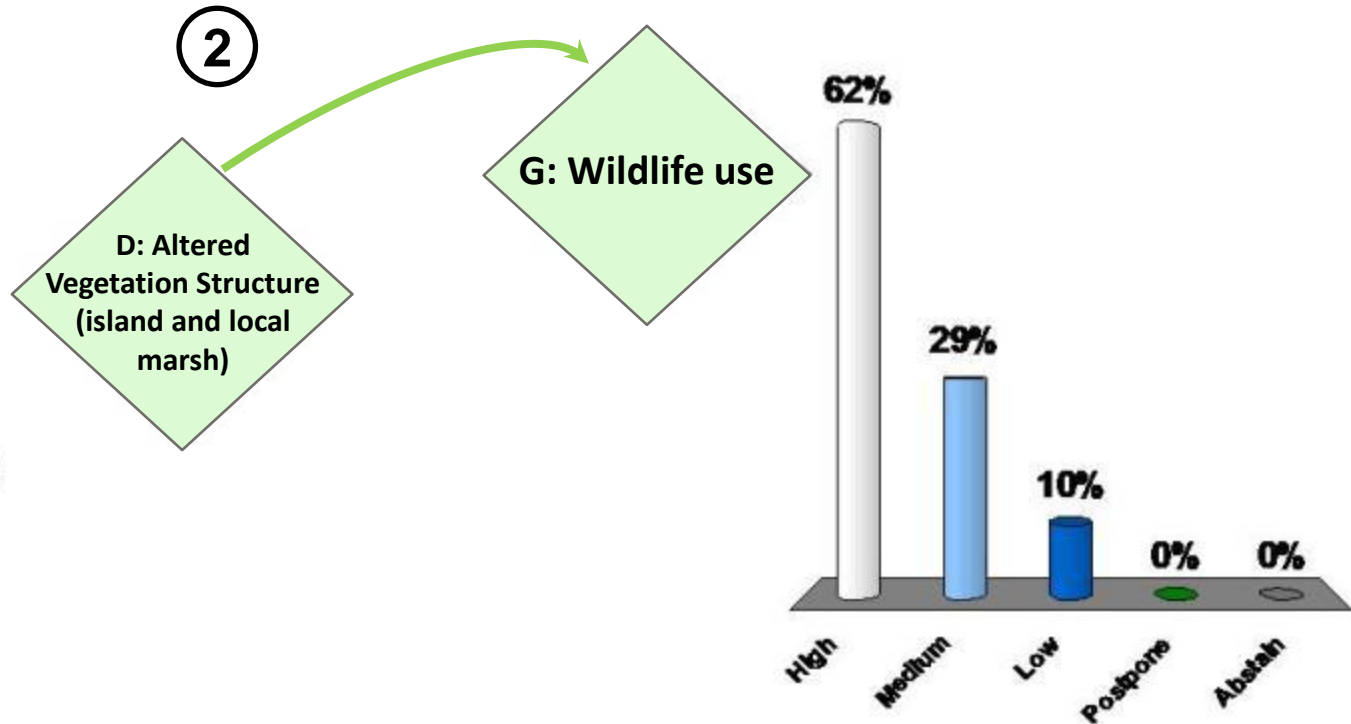
1. Less than 1 year
2. 1 to 5 years
3. 5 to 10 years
4. Over 10 years

Results from 31 workshop participants considered Everglades experts



What is the *importance* of this linkage?

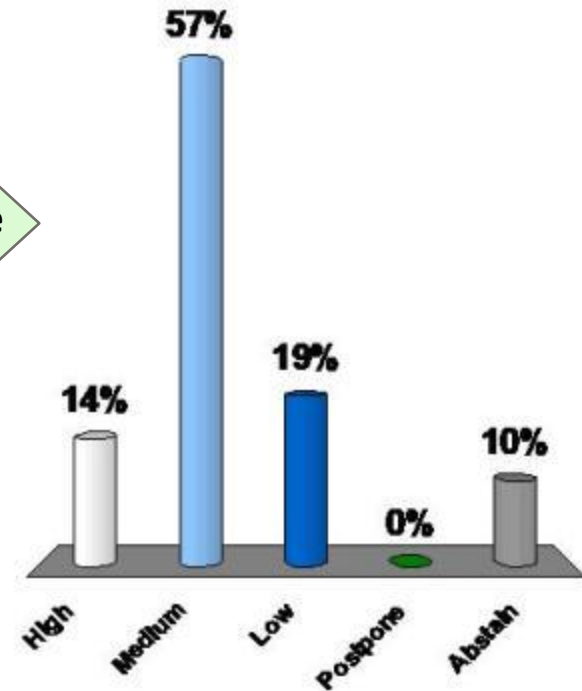
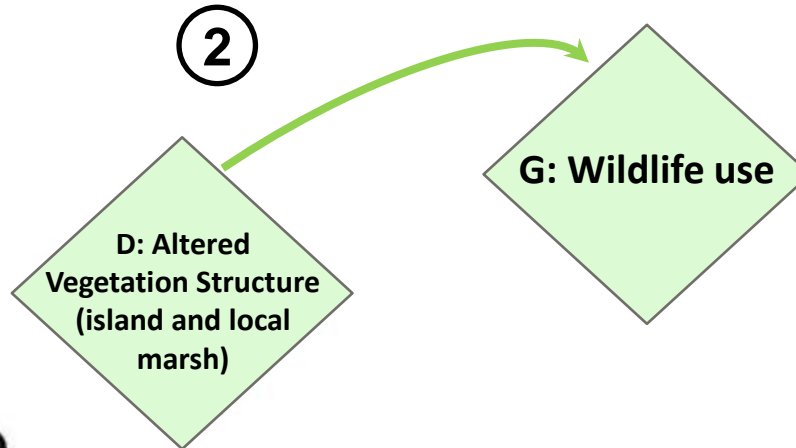
1. High
2. Medium
3. Low
4. Postpone
5. Abstain



2. Altered Vegetation Structure (D) to Wildlife Use (G): This linkage represents the influence of the vegetation structure (dry species vs. wet species) of a tree island and the surrounding slough on its utilization by wading birds, mammals, reptiles, insects, and migratory bird species.

What is the *understanding* of this linkage?

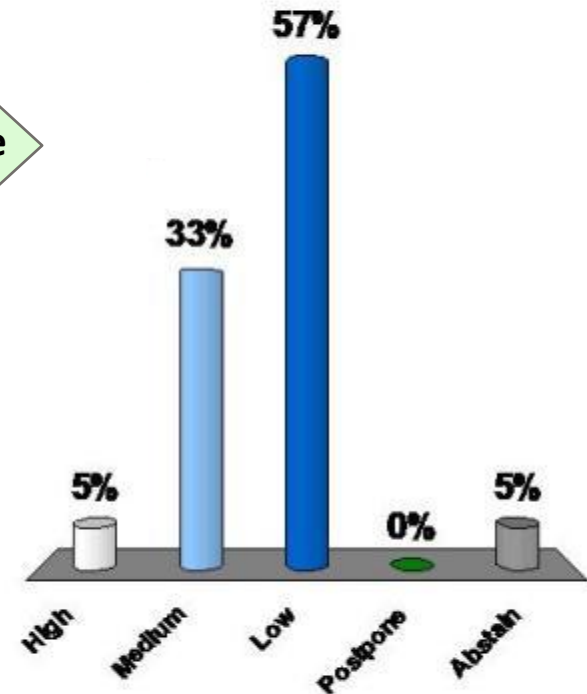
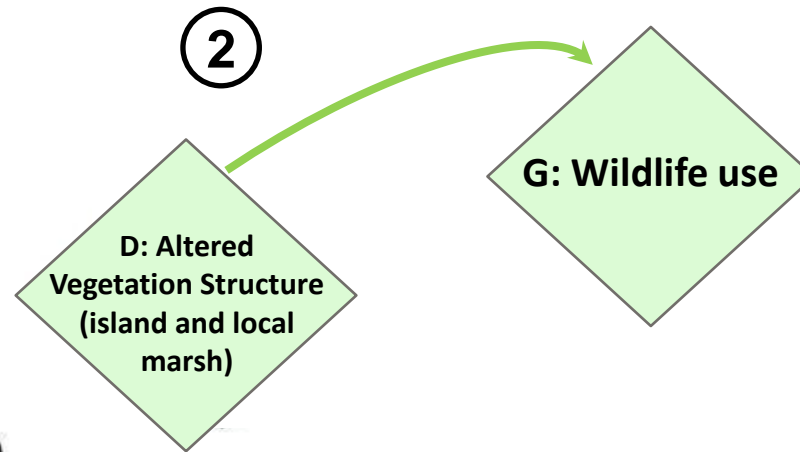
1. High
2. Medium
3. Low
4. Postpone
5. Abstain



2. Altered Vegetation Structure (D) to Wildlife Use (G): This linkage represents the influence of the vegetation structure (dry species vs. wet species) of a tree island and the surrounding slough on its utilization by wading birds, mammals, reptiles, insects, and migratory bird species.

What is the *predictability* of this linkage?

1. High
2. Medium
3. Low
4. Postpone
5. Abstain



2. **Altered Vegetation Structure (D) to Wildlife Use (G):** This linkage represents the influence of the vegetation structure (dry species vs. wet species) of a tree island and the surrounding slough on its utilization by wading birds, mammals, reptiles, insects, and migratory bird species.

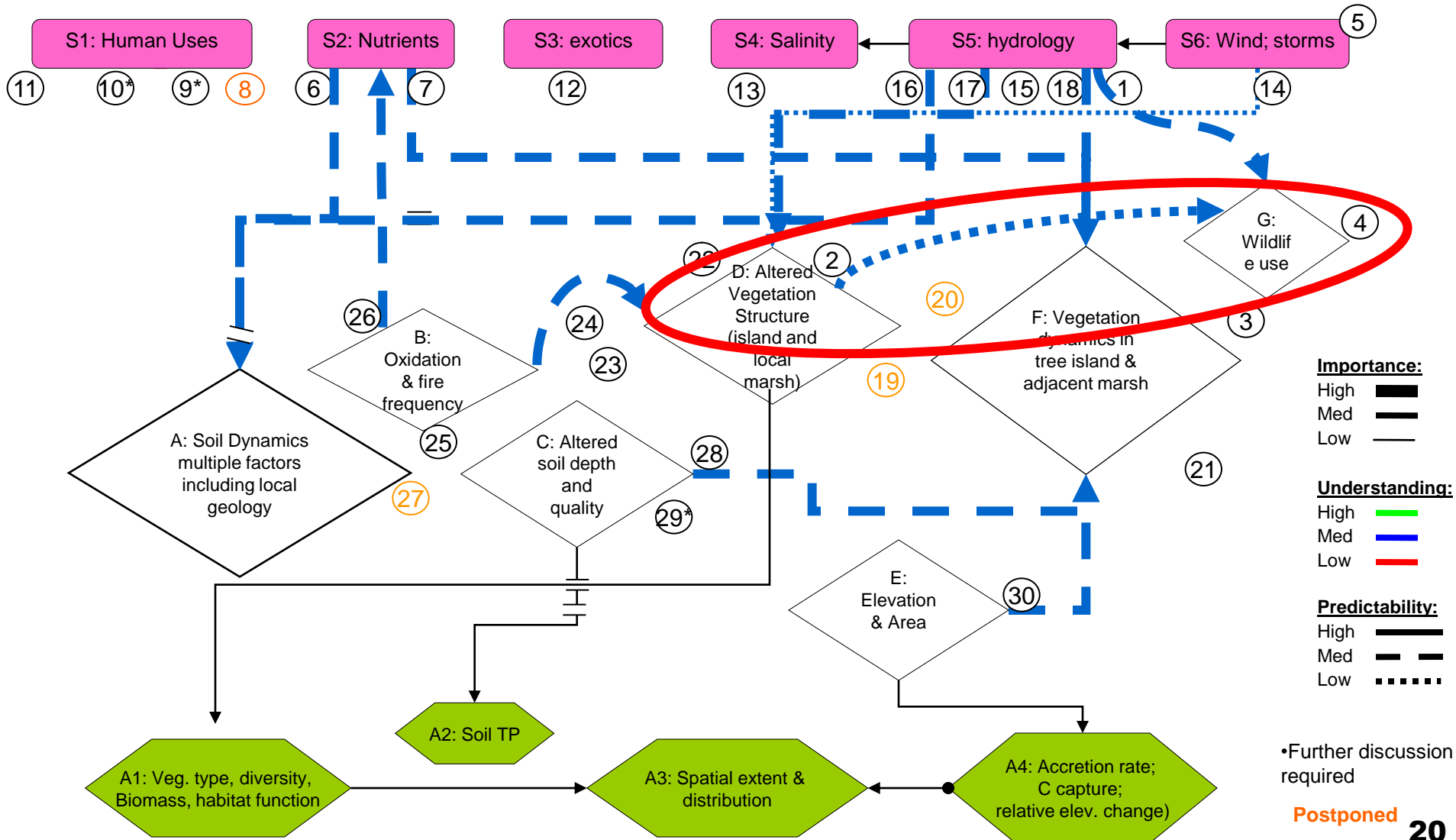
“Blue” Links:

- 1) No low importance links;
- 2) One medium importance link;

3) All medium understood links are unpredictable.

Recommendation:

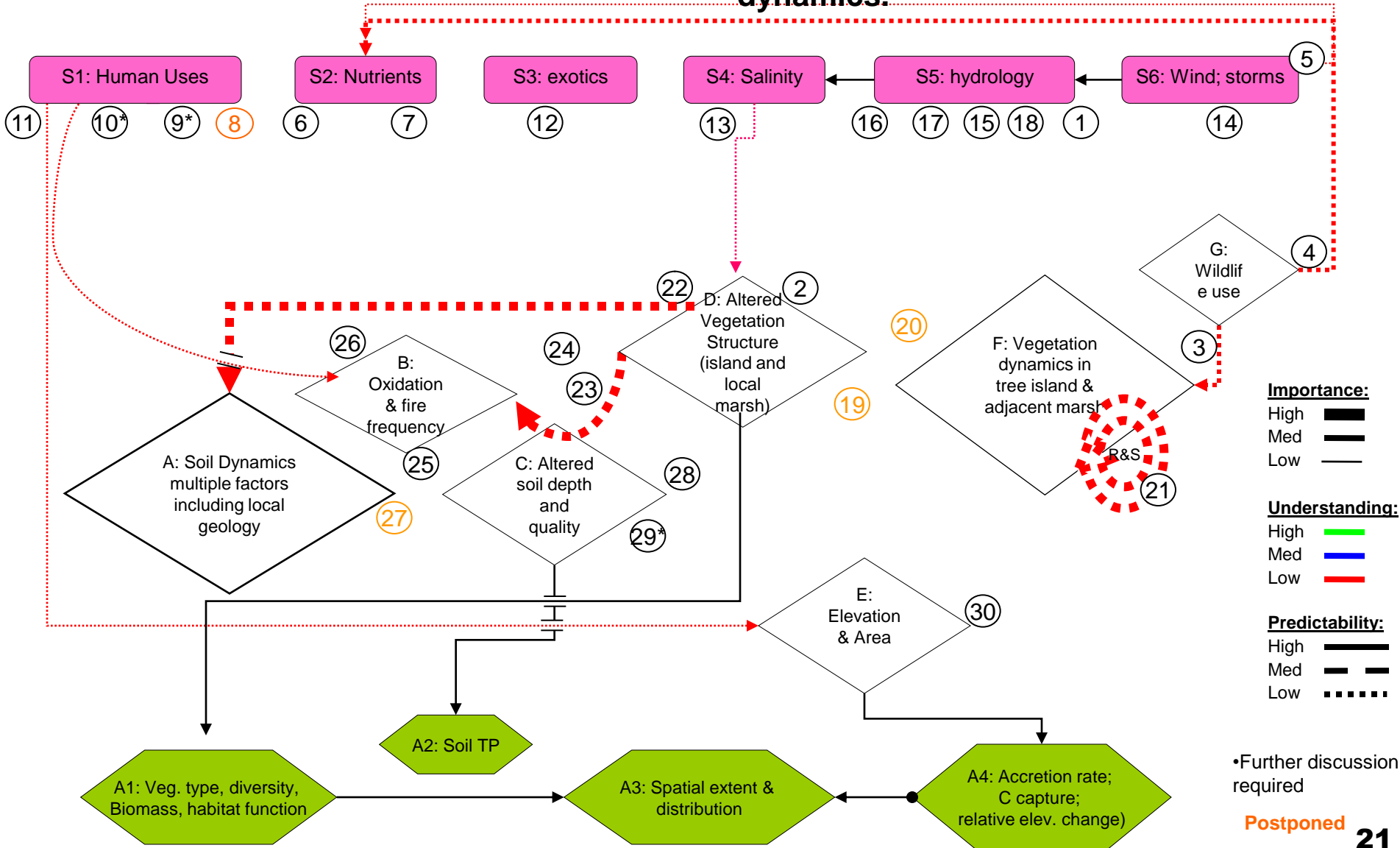
Develop modeling tools for these links.



“Red” Links:

- 1) 8 out of 30 links are poorly understood;
- 2) 3 out of the 8 were considered important.

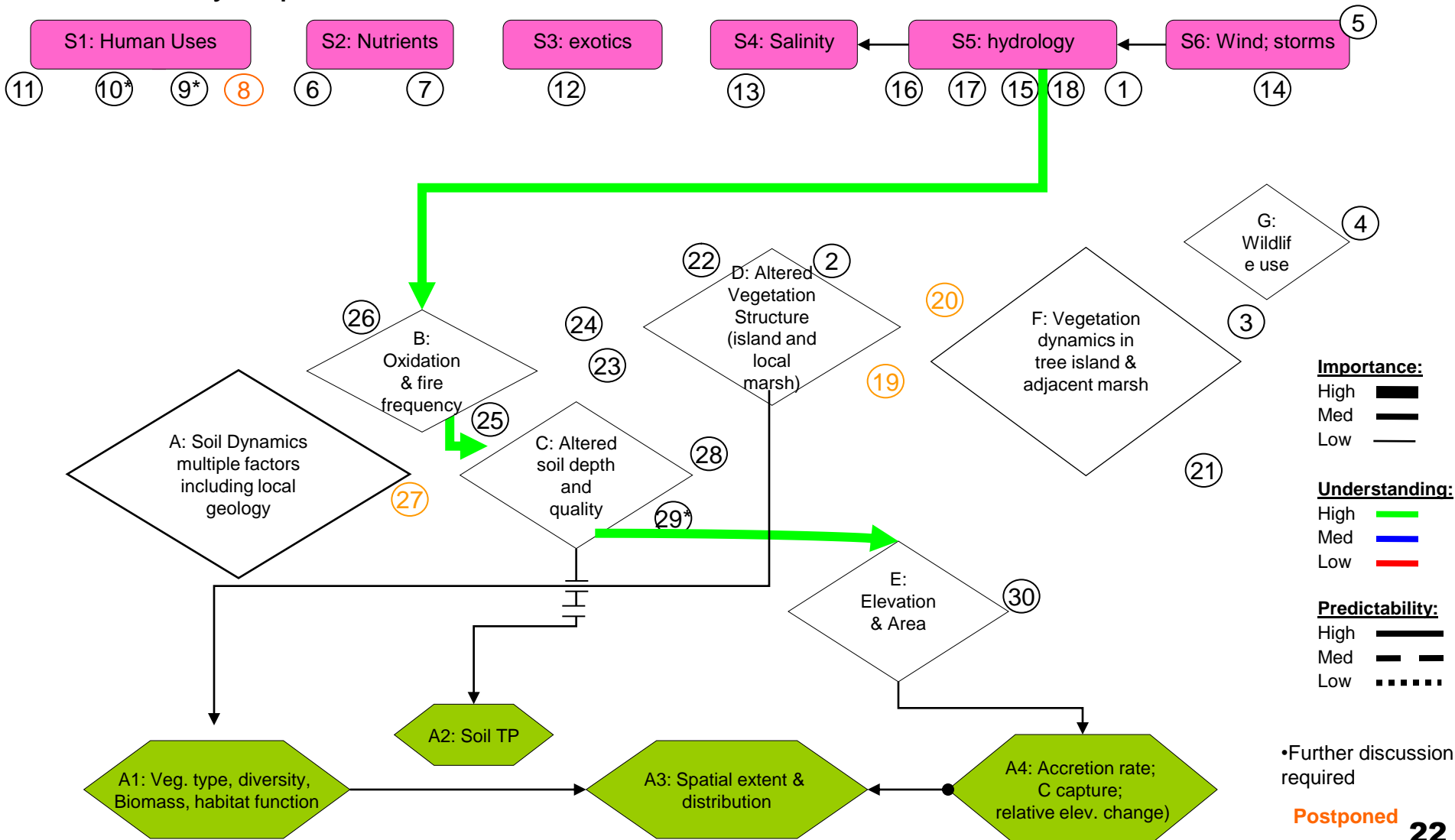
Recommendation: Focus research on island interactions with adjacent marsh and the effects of vegetation structure on soil dynamics.



“Green” Links:

- 1) Only 3 out of 30 links well understood;
- 2) Luckily, they are also highly predictable and very important.

Recommendation:
Keep up the good work!

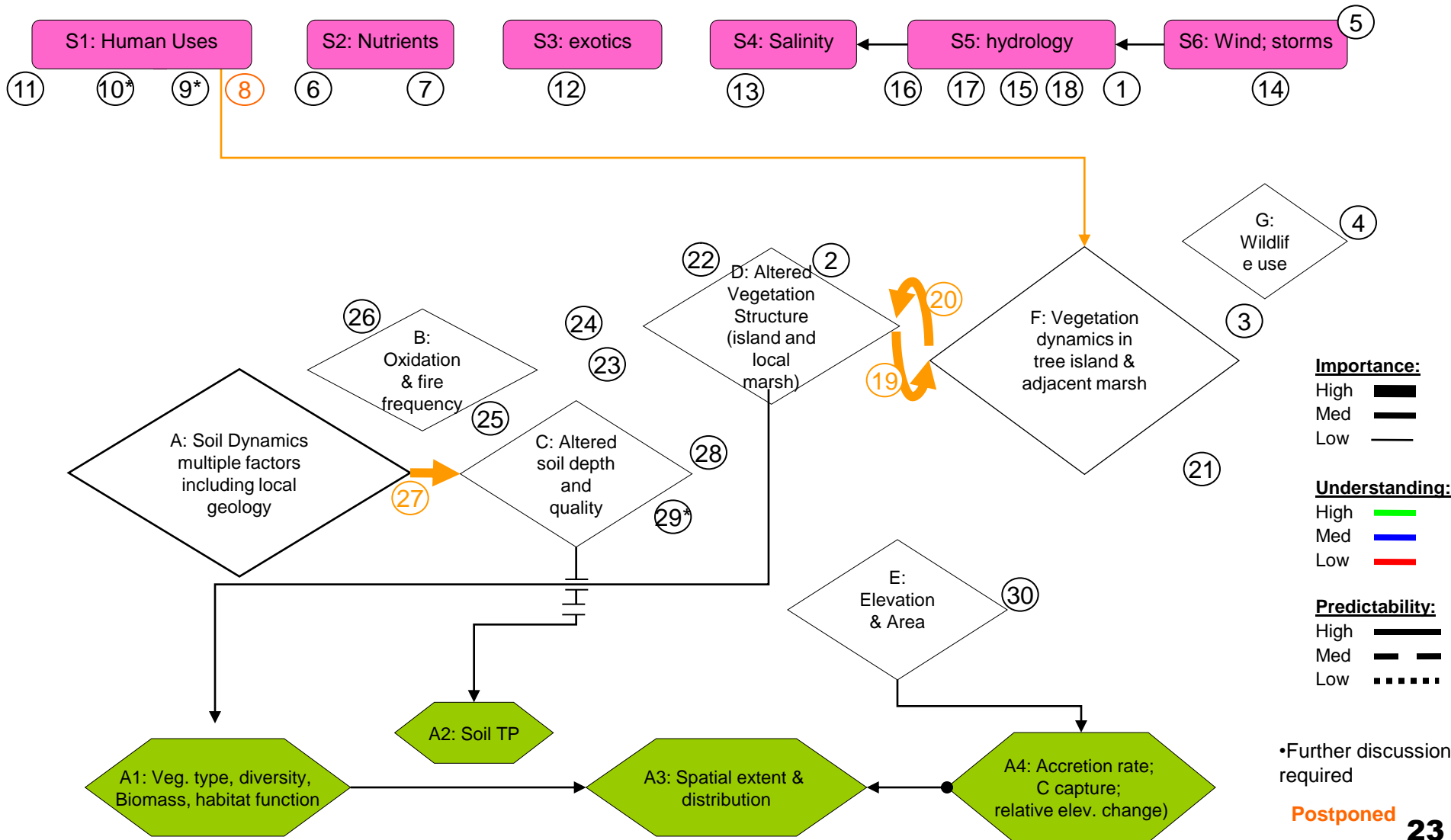


“Gold” Links:

1) Decisions on 4 out of 30 links had to be postponed;

2) In most cases, this was due to concern that the linkage was too simple and did not capture important internal interactions.

Recommendation: Refine the conceptual model.



Problems with Participatory Modeling



- **Most scientists may have issues with this type of simplification, especially if it looks like a life-long body of work is being trivialized**

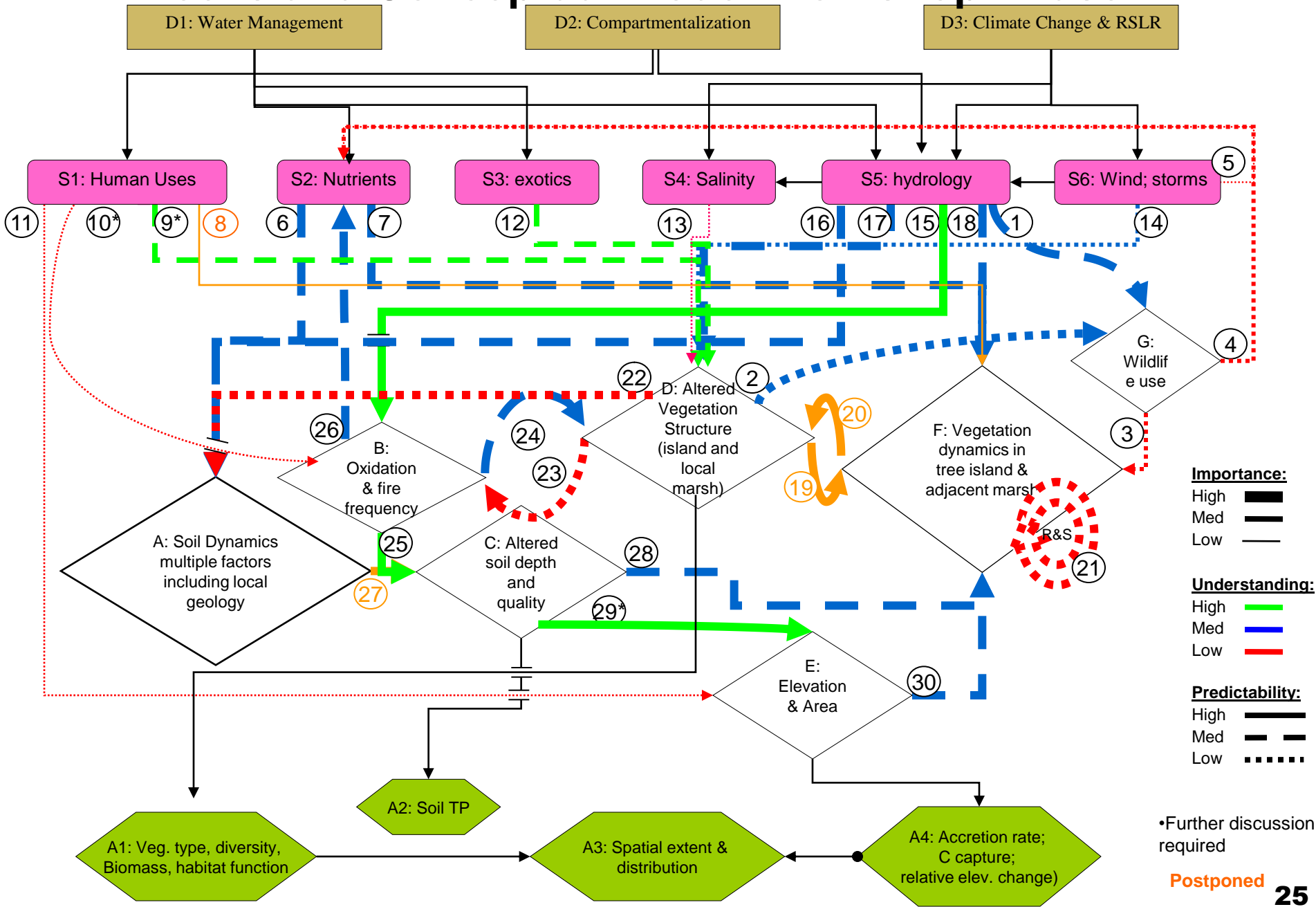
Solution:

- Links to socio-economic drivers must be made explicit
 - Maximize scientist interactions during the Phase 2 modeling
 - Remember that it is “A” model, not “The” model
- **Most managers will glaze over at the sight of another “spaghetti” diagram**

Solution:

- Describe the model step-by-step, as an incremental thought experiment
- Identify which are the most important linkages to resource management and restoration options
- Never show the completed model until all the developmental steps are described. (Imagine seeing the next slide first)

Tree Island Conceptual Model Workshop Phase III



•Further discussion required

Questions?

By providing a risk-free forum for scientific and stakeholder participation, audience polling combined with conceptual models can create:

- 1) A better understanding of the state of knowledge,
- 2) A process for focusing the scientific uncertainties and prioritizing research dollars; and
- 3) A strategy for an adaptive management program

To contact me after my presentation, text S36 to INTBO (46876)