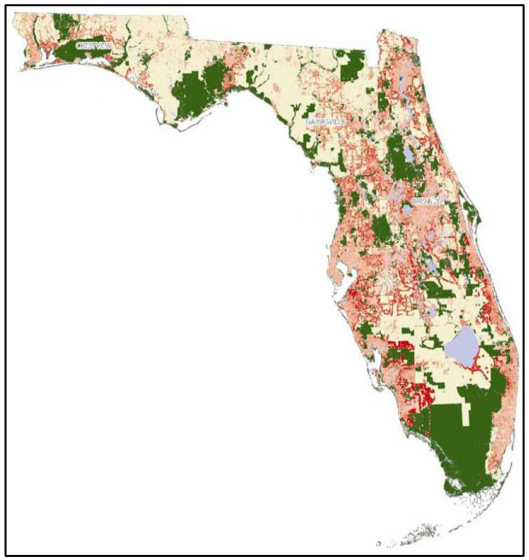
www.epa.gov/ecology

ECOSYSTEM SERVICES RESEARCH PROGRAM

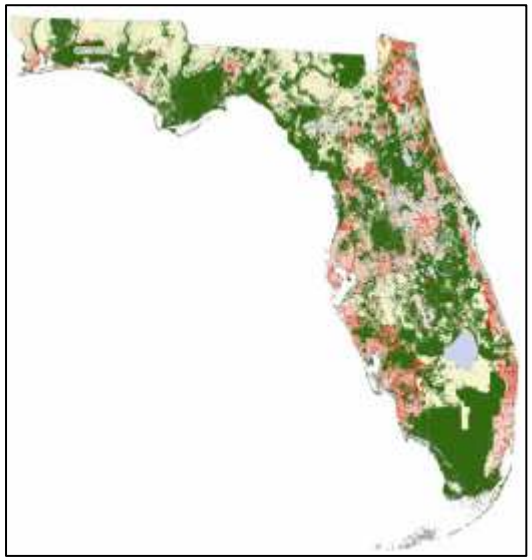
BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

2060 Current Trend



or

2060 Alternative



Tampa Bay Ecosystem Services Demonstration Project

2010 Update

U.S. Environmental Protection Agency
Office of Research and Development

May 2010

Marc J. Russell
Gulf Ecology Division

Introduction

Alternative Futures

Ecosystem Services

Benefits

Functions, Services, and, Benefits

Ecological Functions

=

Final Service

+

Use

=

Well-being

Tampa Bay Project Conceptual Model

Stressors are identified

Ecosystems are categorized

FY 2010-2011

Production functions are developed

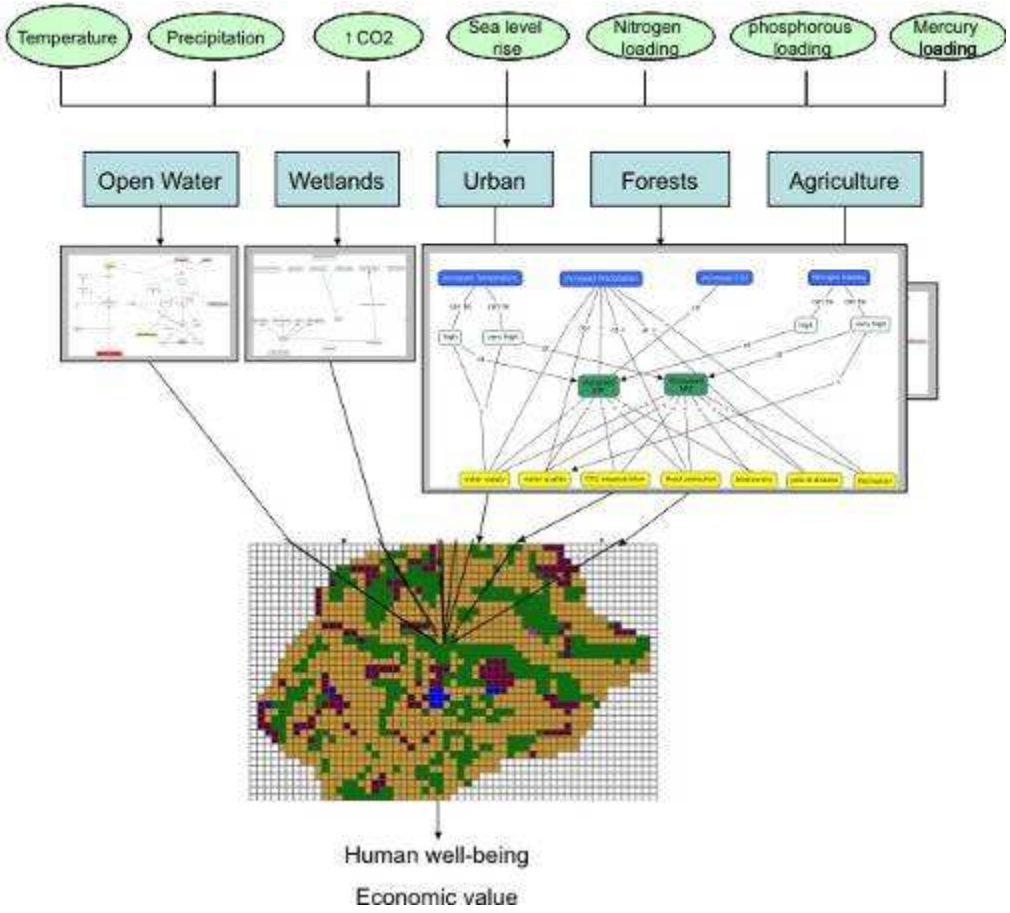
Unit models are produced

Models are refined and calibrated

Models are linked via connectivity map – supply and demand

Model output is valued for human well-being

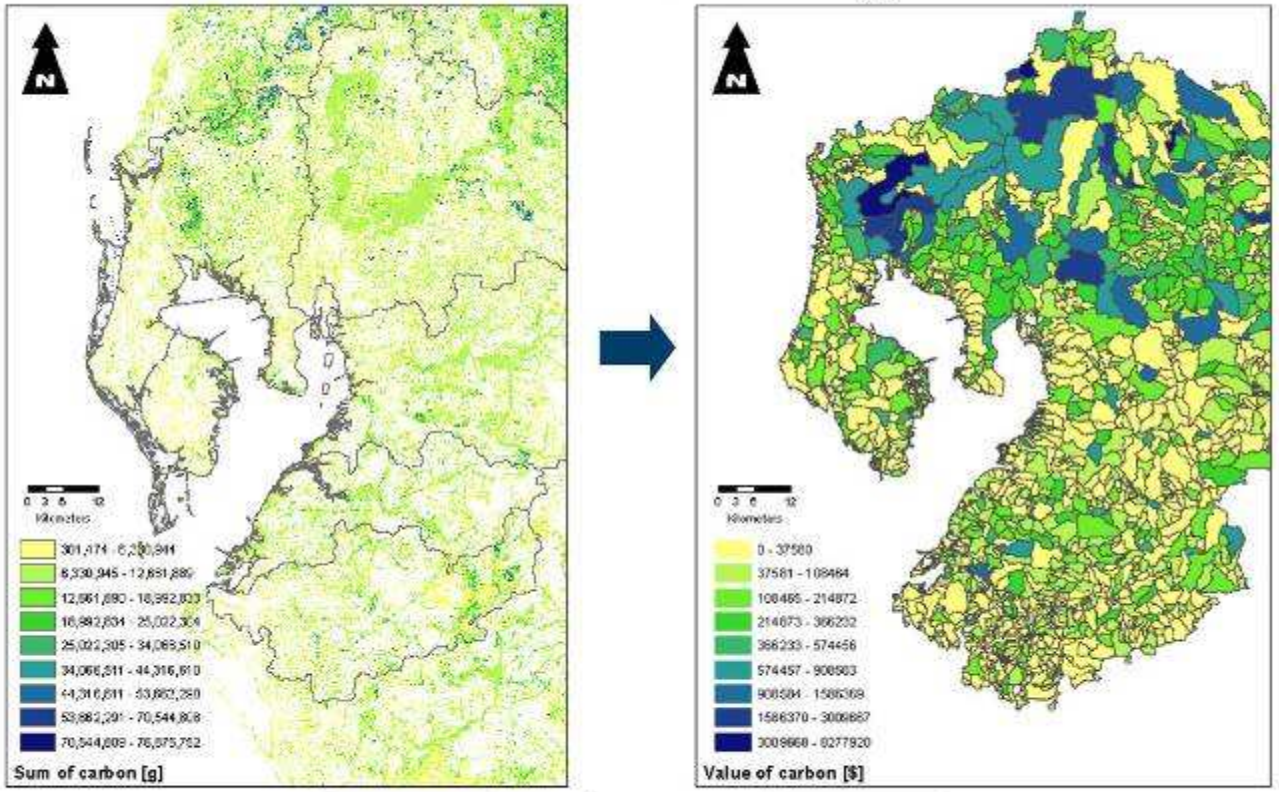
Future scenarios run



Decision Support System Goal

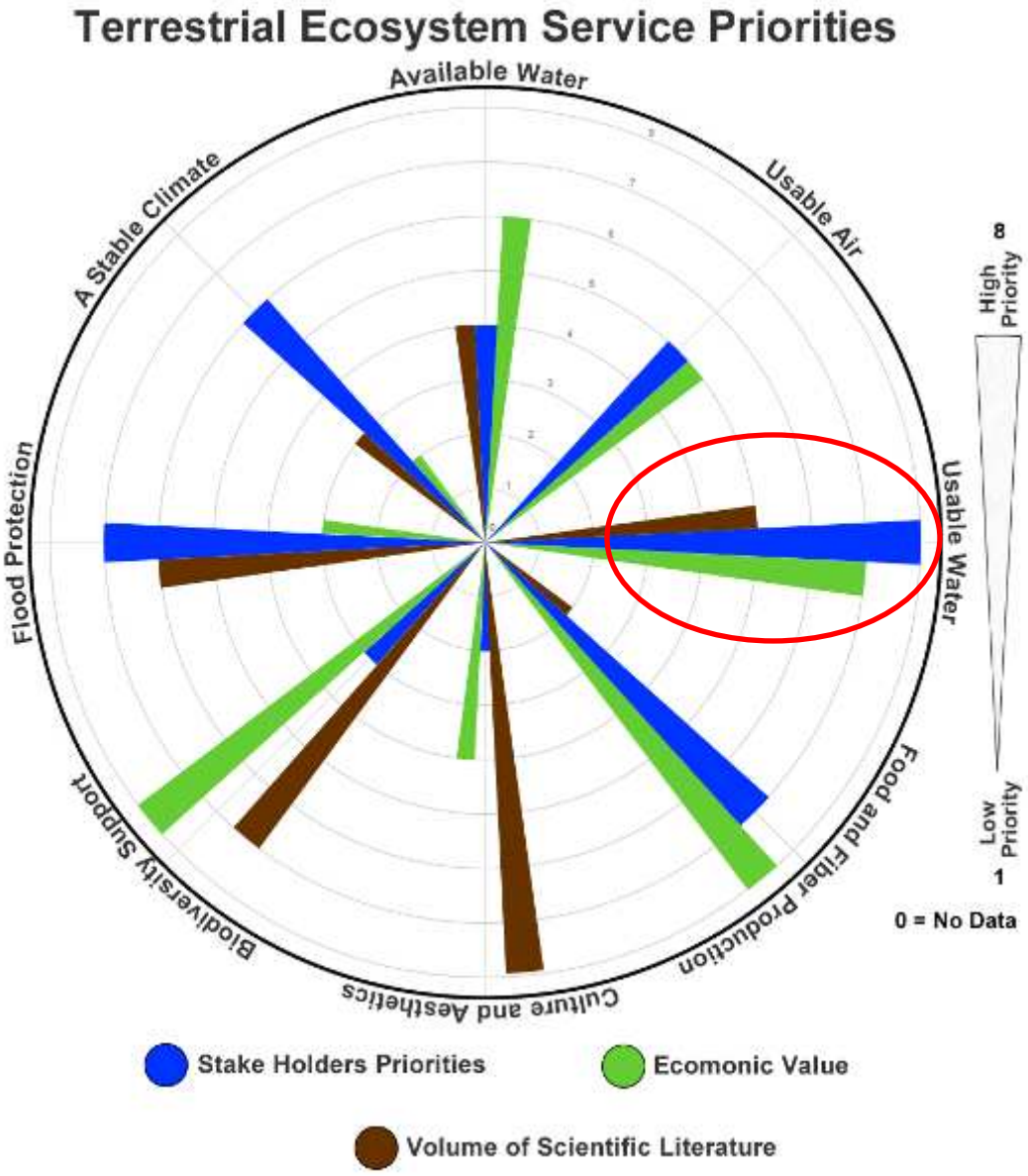
- Provide tools for local to regional scale managers to make informed decisions on economic development and land use change in the context of climate change.
  - *Restoration and conservation prioritization*
  - *Storm water ruling and green infrastructure*
  - *Regional development planning*
- *Products:*
  - *Atlas of ecosystem services under various alternate futures*
  - *Interactive regional map showing connectivity between ecosystem services production and demand by humans*
  - *Fully customizable map tool for running new scenarios at the regional scale*

Carbon storage



2006 Foundation Year Maps (Many functions/services).

Apply value from Chicago Carbon Exchange ($10 / ton C)
and apportion to NHD+ basins.



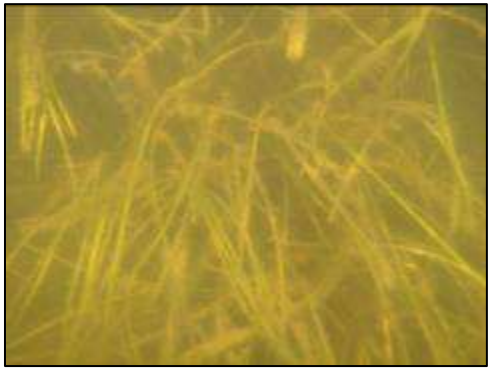
Harvey, James, Marc Russell, Darrin Dantin, and Janet Nestlerode. 2009. Integrated Approaches to Estuarine Use and Protection: Tampa Bay Ecosystem Services Case Study. In: Estuaries: Types, Movement Patterns and Climatical Impacts. Editors: Julian R. Crane and Ashton E. Solomon. Nova Publishers, Hauppauge, NY. (ERL,GB 1378). ISBN: 978-1-60876-859-2

Yee, S. H., J. E. Rogers, J. Harvey, W. Fisher, M. Russell, P. Bradley. Concept mapping for ecosystem goods and services (accepted book chapter).

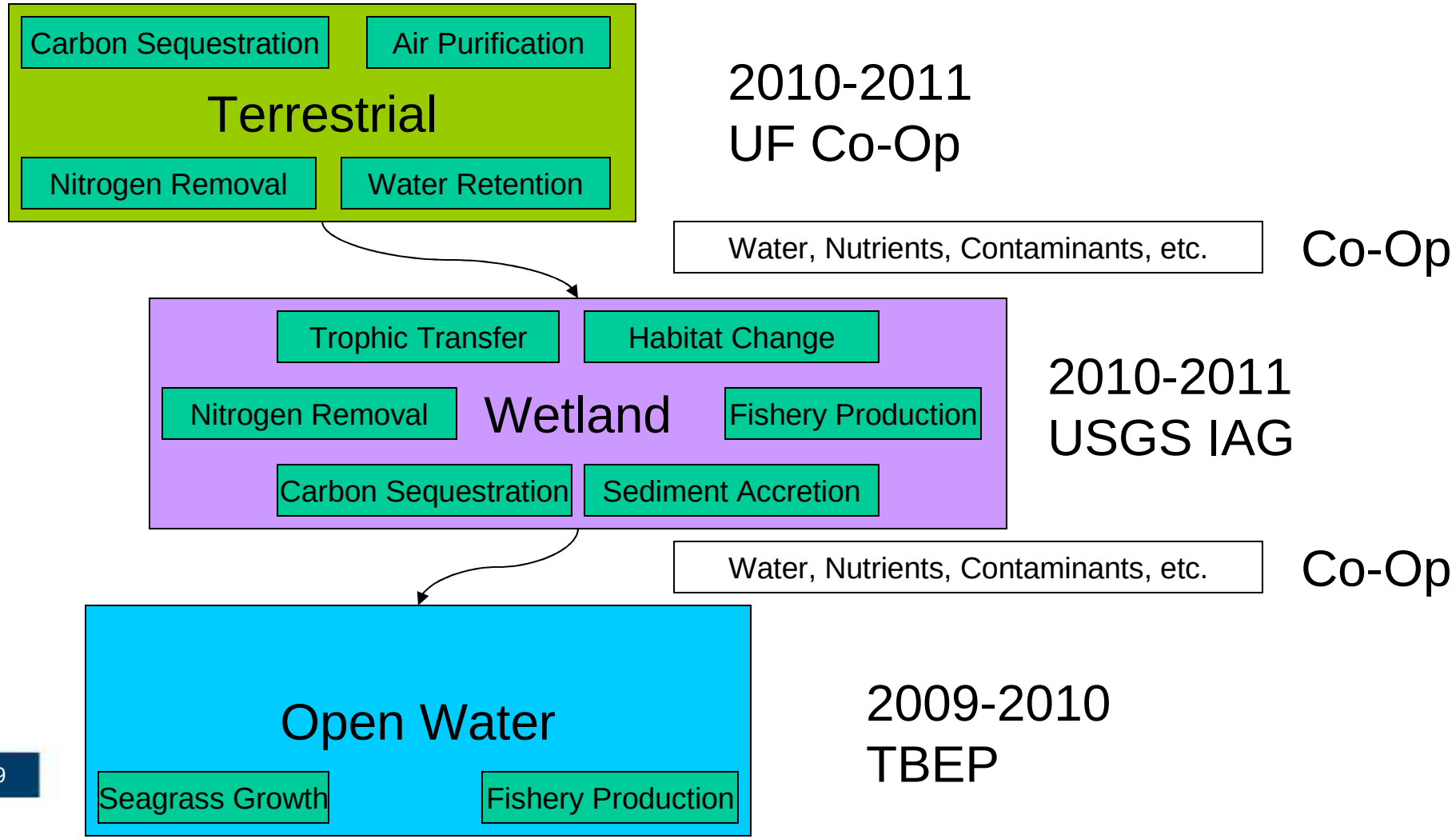
Russell, M. J., J. Rogers, S. Jordan, D. Dantin, J. Nestlerode, and J. Harvey. MS in review. Ecosystem services research prioritization. *For submission to Environ. Man*.

2010-11 Research Elements

- Terrestrial
  - Urban Forestry – Nitrogen removal
- Wetland
  - Nitrogen Removal
  - Carbon Storage
  - Hydrology
  - Links to Condition Assessments
- Open Water
  - Impacts on Seagrass Growth
  - Fishery Production
- All feed into a spatially linked predictive ecosystem services model



SIMILE Ecosystem Function Modules



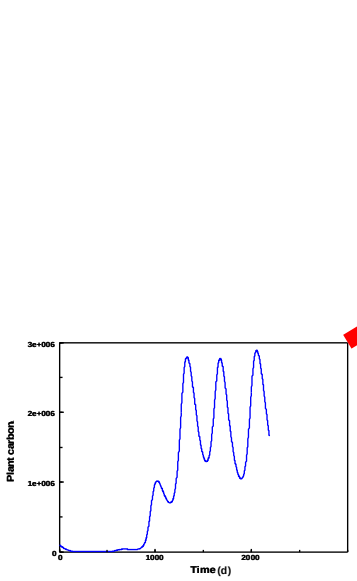
What is the range of possible scenarios?

- Human population ↑100%
- Tree cover ↑5-10%
- New development ↑1.6-7 mil. acres
- Ag, pasture, forest ↓11%
- Impervious surface ↑ to 38%
- TN loads ↑3000 tons/yr
- Atmospheric CO_2 ↑190 ppm
- Precipitation ↓7.7%
- Temperature ↑4-9 ^{o}F
- Sea level rise ↑15 inches
- Hurricanes ↑intensity

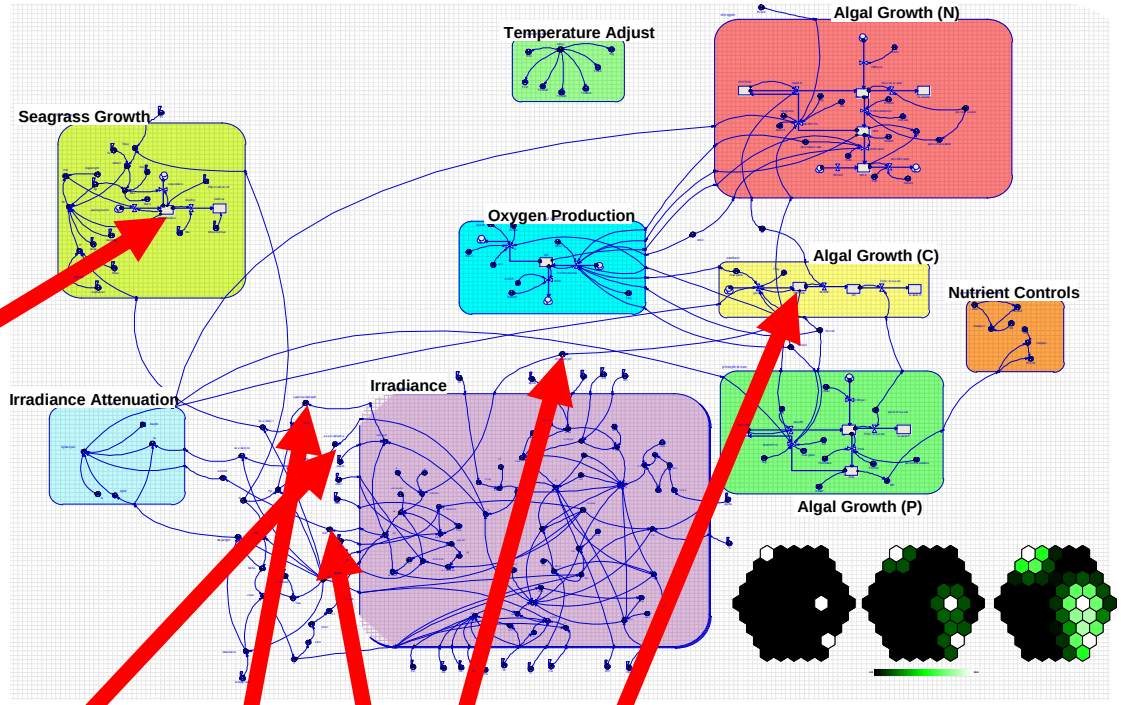
We have to be able to model the net response of ecosystem functions to all of these simultaneously (in space and time).

*Better information on production functions needed.

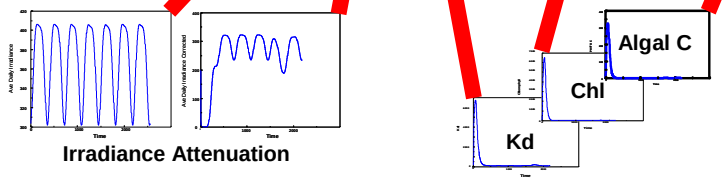
Dynamic Simile-Based Unit Models for Predicting the Effects of Development and Climate Change Predictions on a Suite of Ecosystem Services



Seagrass Biomass
(N Pulse Simulation)



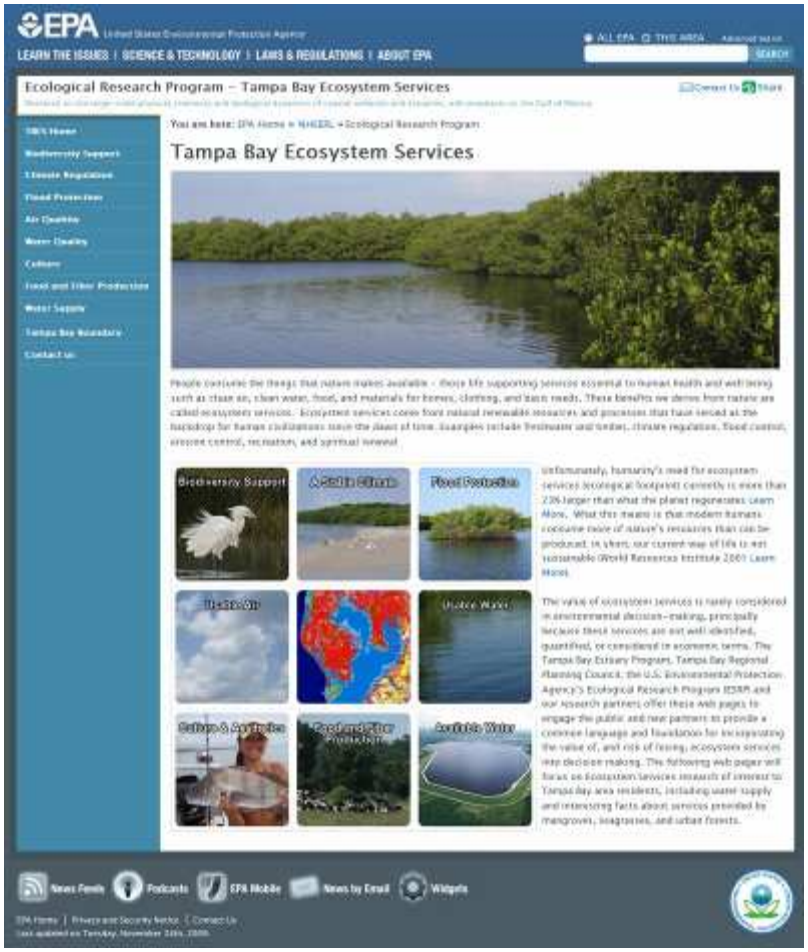
Seagrass Growth Linked to Hexagon Grid



Irradiance Attenuation

Yoskowitz, D., M. Russell, S. Jordan, and J. Rogers. In prep. Recreational fishery value of seagrasses in Tampa Bay. *Targeted for Ecol. Econ.*

Website Delivery – Public Focused Digital "Coffee Table" Atlas



Phase One:
Static maps and general info

Phase Two:
Interactive maps and static projections

Phase Three:
Interactive scenarios

Questions?

Skyway bridge across bay

Hillsborough River Cypress

Downtown Tampa

Little Manatee River

Alafia Banks Spoonbills