

Summary of Greater Everglades Restoration Workshop:

3. Ecological Modeling and Processes, May 9-10, 2002

The Workshops

During April and May 2002, the United States Geological Survey's (USGS) Greater Everglades Place Based Studies (PBS) held five information workshops in south Florida to discuss status of greater Everglades ecosystem research, and to solicit suggestions for additional studies from Everglades restoration partners. The Ecological Modeling and Processes Workshop was held at NOVA Southeastern University in Fort Lauderdale, May 9-10, 2002.

Background

The greater Everglades restoration program is prescribing ecosystem-wide changes to some of the physical, hydrological, and chemical components of this ecosystem. The ability to accurately understand the complex interactions between contaminants, nutrients, hydrology and other related processes within the greater Everglades ecosystem

in the present, recent past, and prior to significant human alteration of the environment, is crucial for success of greater Everglades ecosystem restoration and successful implementation of the Comprehensive Everglades Restoration Plan (CERP). Understanding these processes within the greater Everglades allows better-informed planning, project implementation, and land management decisions.

Many organizations and programs are dependent on scientific knowledge and more accurate models for restoring the greater Everglades ecosystem. These include federal, state, and local agencies, Native American tribal governments, as well as private organizations. USGS' Across Trophic Level System Simulation (ATLSS) is providing models for assessing effects of greater Everglades restoration hydrologic scenarios on indicator species and key biotic components.

Research Needs

Research needs, including those directly related to ecosystem modeling and those relevant to other research topics, were compiled during the workshop based on discussions among the represented organizations and individuals having interests and roles within greater Everglades restoration. For the purposes of this summary, these needs have been divided into 1) ecological modeling and related research needs and 2) other needs discussed that are relevant to one of the other four workshop topics.

Ecological Modeling Needs

Develop spatially explicit species index (SESI) models for southwest Florida indicator species (i.e., wading birds, manatees, seagrasses, oysters, red cockaded woodpeckers, panthers, amphibians, and/or others) to assist in establishing restoration targets.

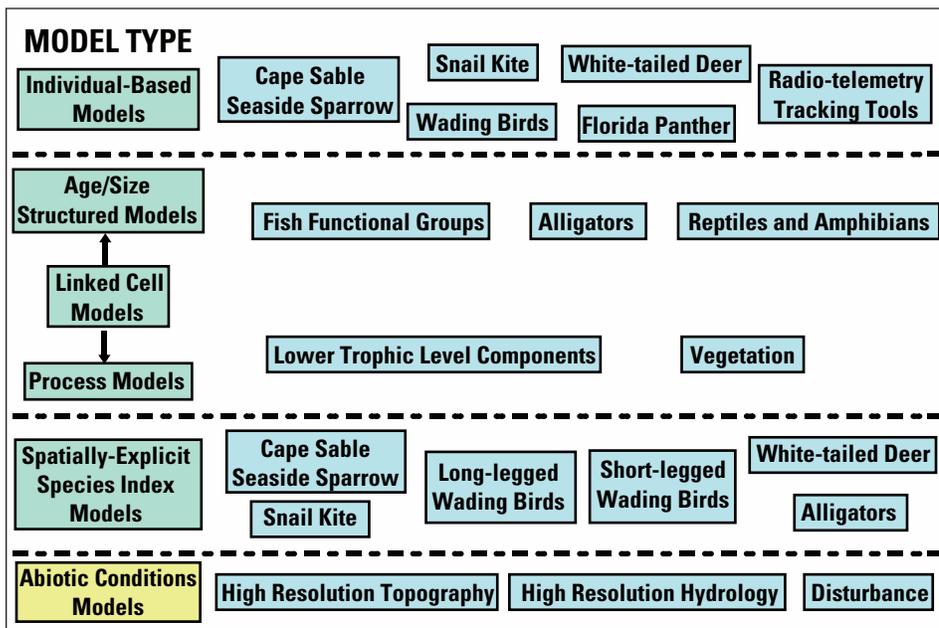
Incorporate fire impacts into SESI models.

Extend vegetation, landscape, and mangrove models into southwest Florida.

Develop an estuarine model that can be integrated with a hydrologic model that predicts seagrasses, oysters, fish populations, and crab populations based on surface-water management.

Create a fish migration/spawning model for major tributaries, such as the Caloosahatchee River and tributaries in the Ten Thousand Islands.

Develop freshwater amphibian, reptile, insect, and forage fish models to predict success of restoration efforts in short hydroperiod wetlands (i.e., seasonal marshes/pine flatwoods com-



Across Trophic Level System Simulation (ATLSS) Structure

plexes, wet prairies, hydric pine and mixed/pine/cypress systems).

Wet prairie communities appear to be extremely important in providing prey organisms for higher trophic level animals. Research efforts should closely examine hydrology, fire, nutrient loading, and effects of exotic species on the dynamics of wet prairies.

Model patterns of saltwater- versus freshwater-wetlands use by wading birds, with special emphasis on wood storks and roseate spoonbills.

Create user-friendly predictive tools for evaluating effects of floods and droughts on availability of habitat for wading birds, snail kites, and other indicator species.

Integrate model results into tools that match analyses with specific decision-making objectives and tools that guide conflict resolution among multiple objectives.

Ensure capability to run ATLSS ecological models using the Natural Systems Model (NSM). Plus, couple ATLSS models with evolution of the NSM and the South Florida Water Management Model (SFWMM) to ensure long-term compatibility.

Develop comparable/repeatable protocols for monitoring status and trends in amphibians and reptiles, migratory birds, and wading birds (i.e., link modeling and monitoring).

Draft additional documentation for ecological models that includes: parameter certainty, appropriate model use, description of model input sources, and model logic.

Evaluate historical water quality, water quantity, and fire on current vegetation patterns with recommendations for future water and fire management.

Create user-friendly predictive models for evaluating effect of floods, droughts and different control strategies on exotic plant proliferation (specifically, *Lygodium* and *Melaleuca*).

Study changes in manatee behavior and critical habitat based on surface water input through canals and natural habitat restoration.

Determine conditions under which (model variables) sawgrass out-competes cattails. Include species-specific pesticide sensitivity within models.

Continue Florida panther monitoring at historical levels (i.e., collaring all captured cats).

Investigate and model *Lygodium* control mechanisms.

Research Needs Relevant to Other Workshops Topics

Develop a tool to establish estuarine flow targets.

Extend existing coastal models (i.e. SICS and TIME) east of Route 1 to cooling canals at Turkey Point.

Collect additional topographic and bathymetric data.

Collect topographic data with higher spatial resolution for unique and/or critical habitat.

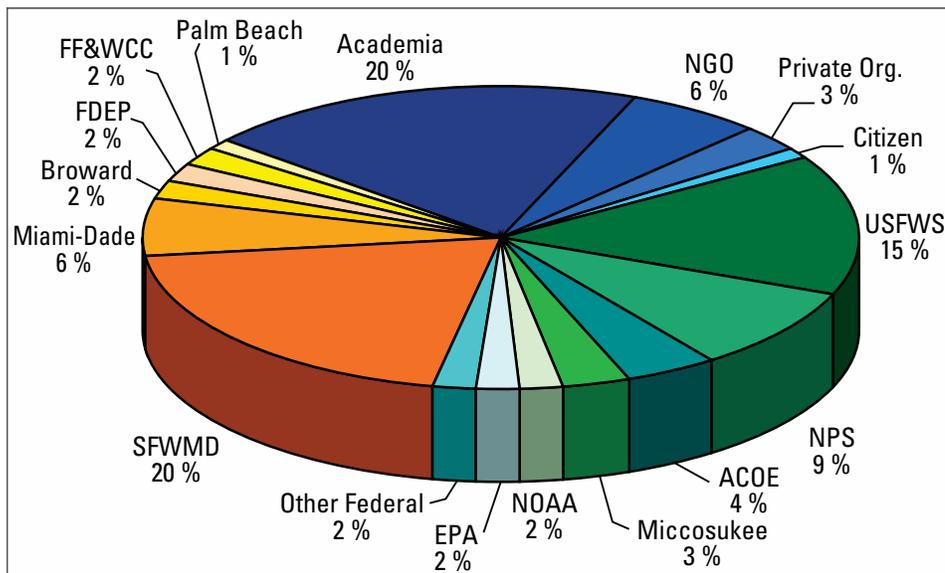
Create updated land cover data using classes predetermined to be compatible with ecological modeling classification schemes.

For Further Information

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Participation by greater Everglades restoration partners during the 91-person Ecological Modeling Workshop (excluding USGS participants).