The Role of Science in Ecosystem Restoration and Management:

The South Florida Ecosystem Restoration Initiative

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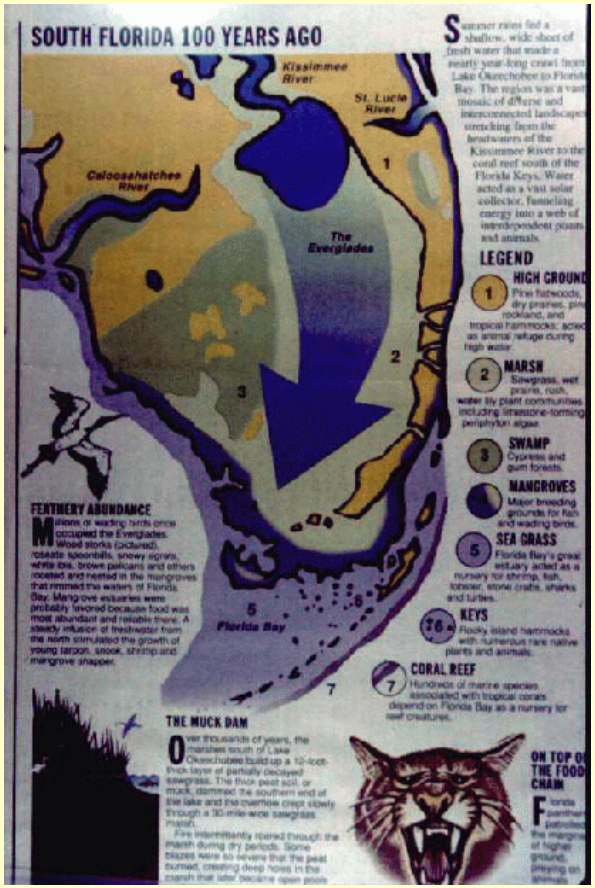
"***There are no other Everglades in the world.*** **-** Marjorie Stoneman Douglas

Why do we need science?

- Best decisions possible
- Build confidence and consensus in decisions
- Provide consistency to decision-making
- Reconcile conflicts between protection and use
- Prevention is cheaper than restoration

The Everglades System Was Defined by Space, Heterogeneity, Hydrology, and Water Quality



With two important landscape linkages.

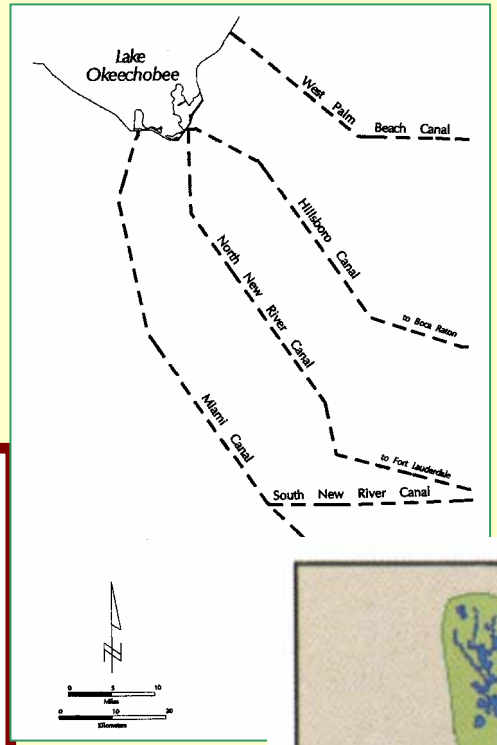
Uplands/wetlands

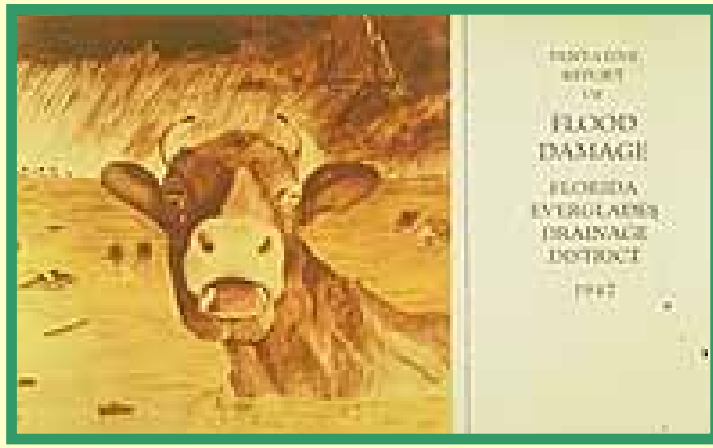
Freshwater/saltwater

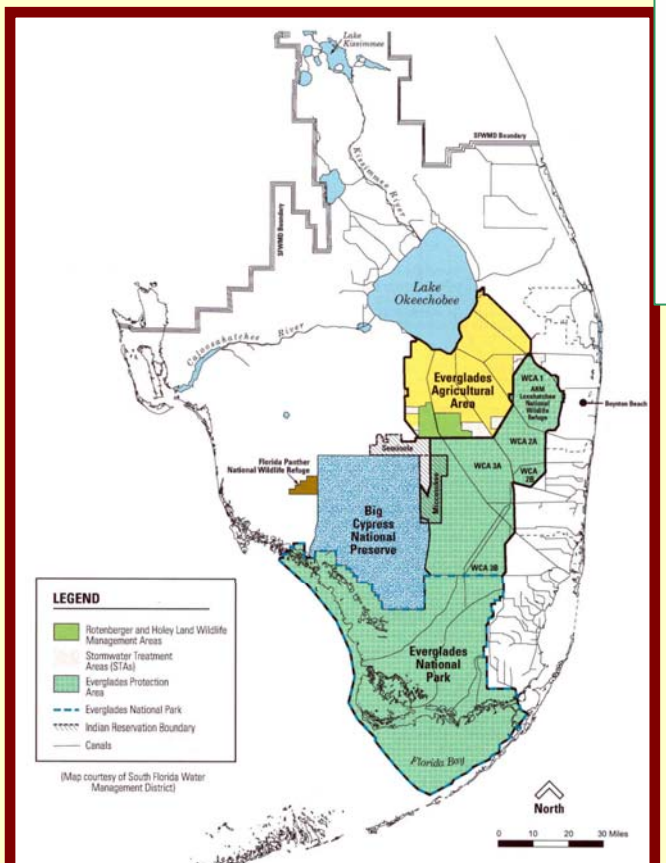
What Happened?

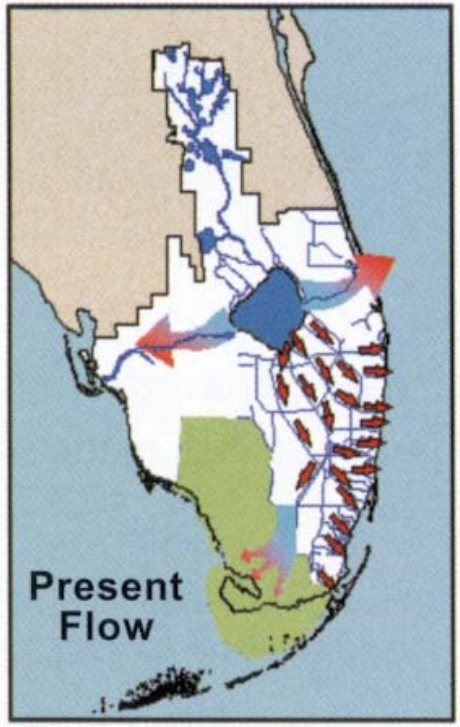
Eras of water management

- Drainage
- Flood control
- Water supply
- Ecosystem restoration



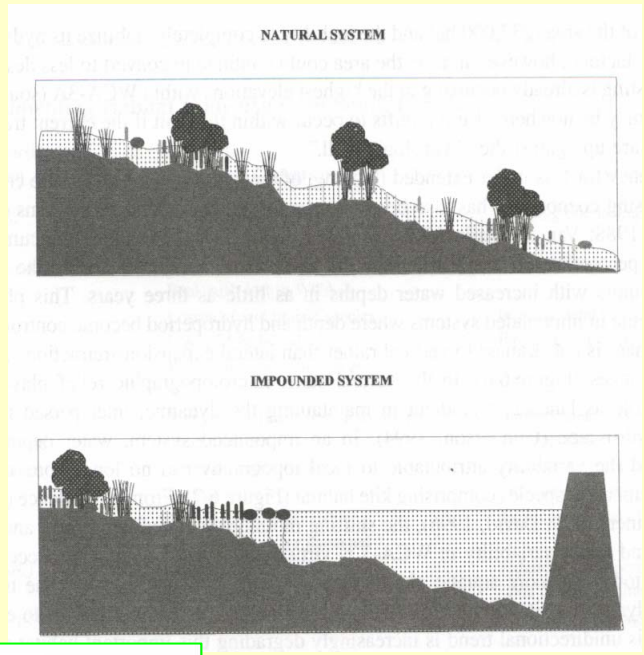


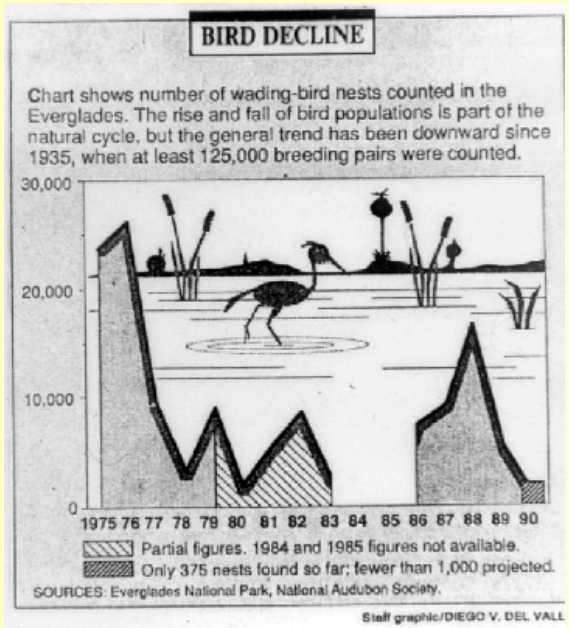


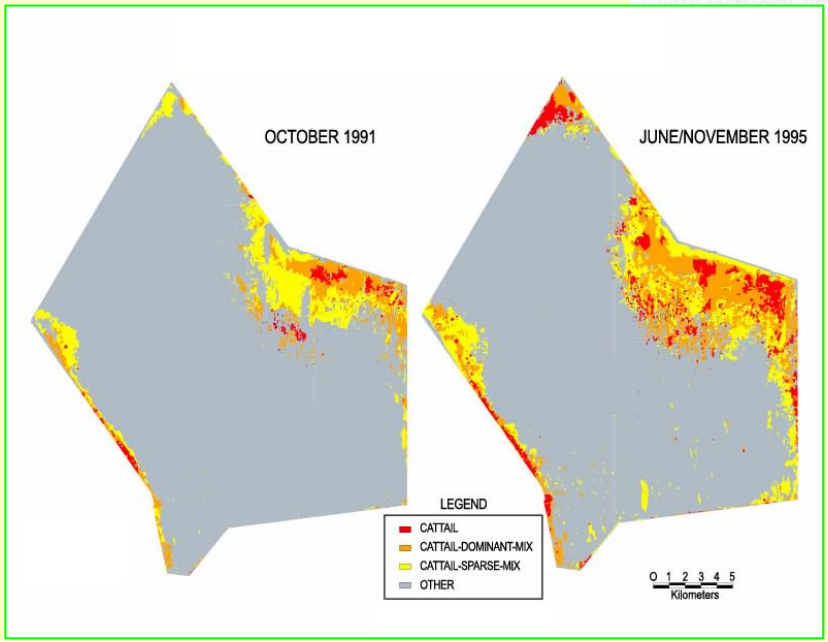


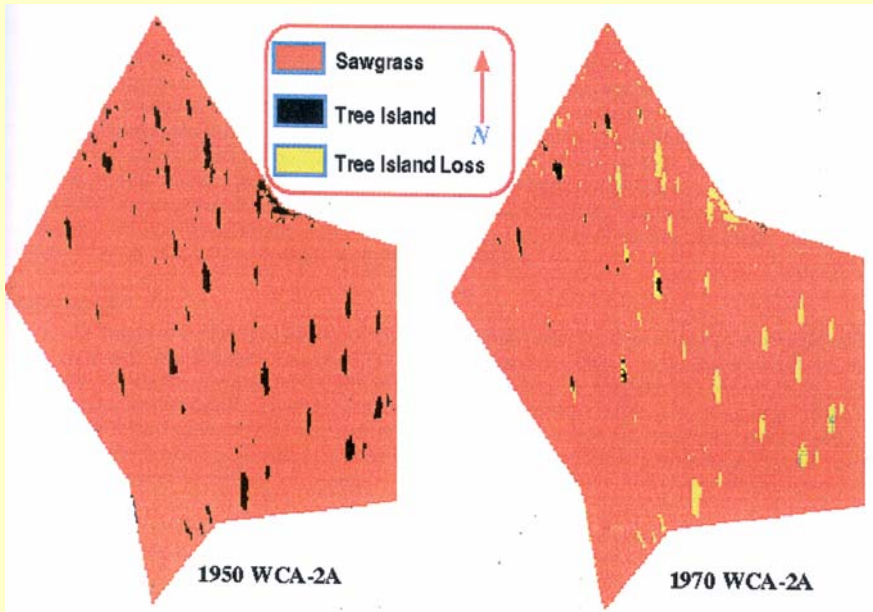
Impacts

- Loss of habitats
  - Amount
  - Fragmentation
  - Diversity
- Compartmentalization
- Loss of flow
- Altered hydropatterns
- Altered water quality
- Soil subsidence
- Invasive species

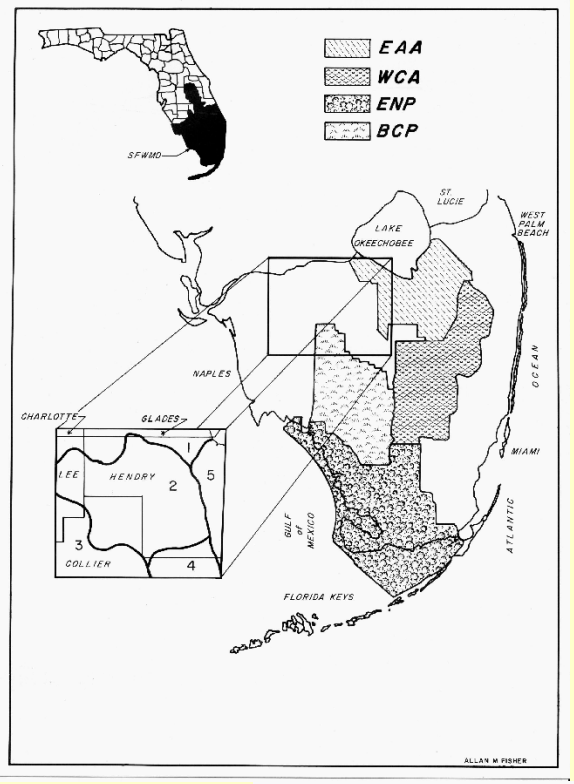


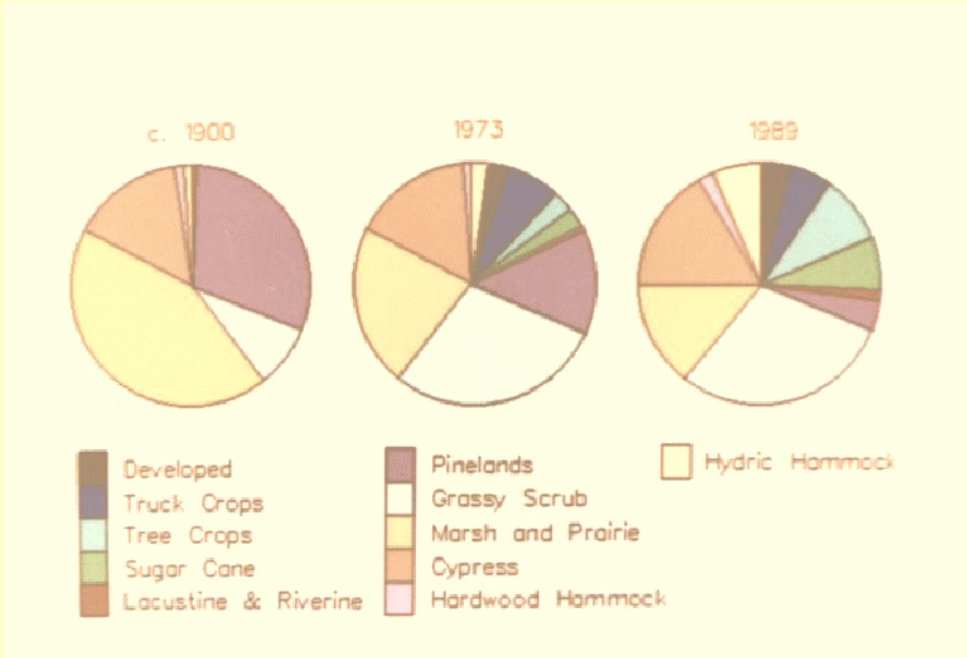






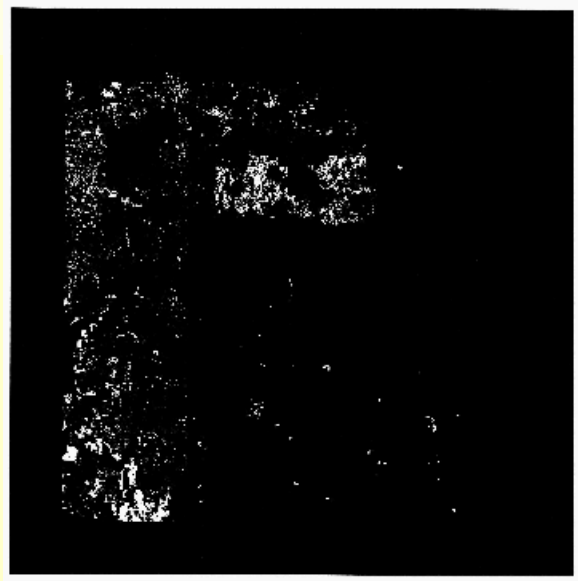
Changes in Land Cover





1900

1989



Pine Flatwoods

South Florida Restoration Initiative

- Federal, State, Local, and Tribal "partnership"
  - Task Force
  - Working Group
  - Science Coordination Team
- Multiple Efforts
  - Restudy - COE
  - **CERP – COE, SFWMD, RECOVER**
  - MSRP - FWS
  - Mod Waters – COE, NPS
  - Kissimmee River Restoration - SFWMD
  - Everglades Construction Project - SFWMD
  - Land Acquisition – State, Federal
  - CWMP - EPA

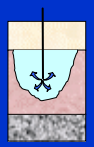
Goal and Objectives

- Enhance Ecologic Values
  - Natural areas (condition, extent and diversity)
  - Native plants and animals (T&E spp)
- Enhance Economic and Social Values
  - Water supply and flood protection
  - Cultural and archeological resources
  - Recreational and navigational opportunities

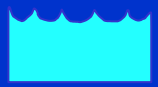
Cost of SFRI is 15 billion dollars split almost evenly among CERP and non-CERP projects

Authorized by Water Resources Development Act

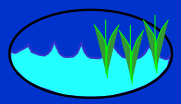
CERP Components



Aquifer Storage & Recovery



Surface Water Storage Reservoir



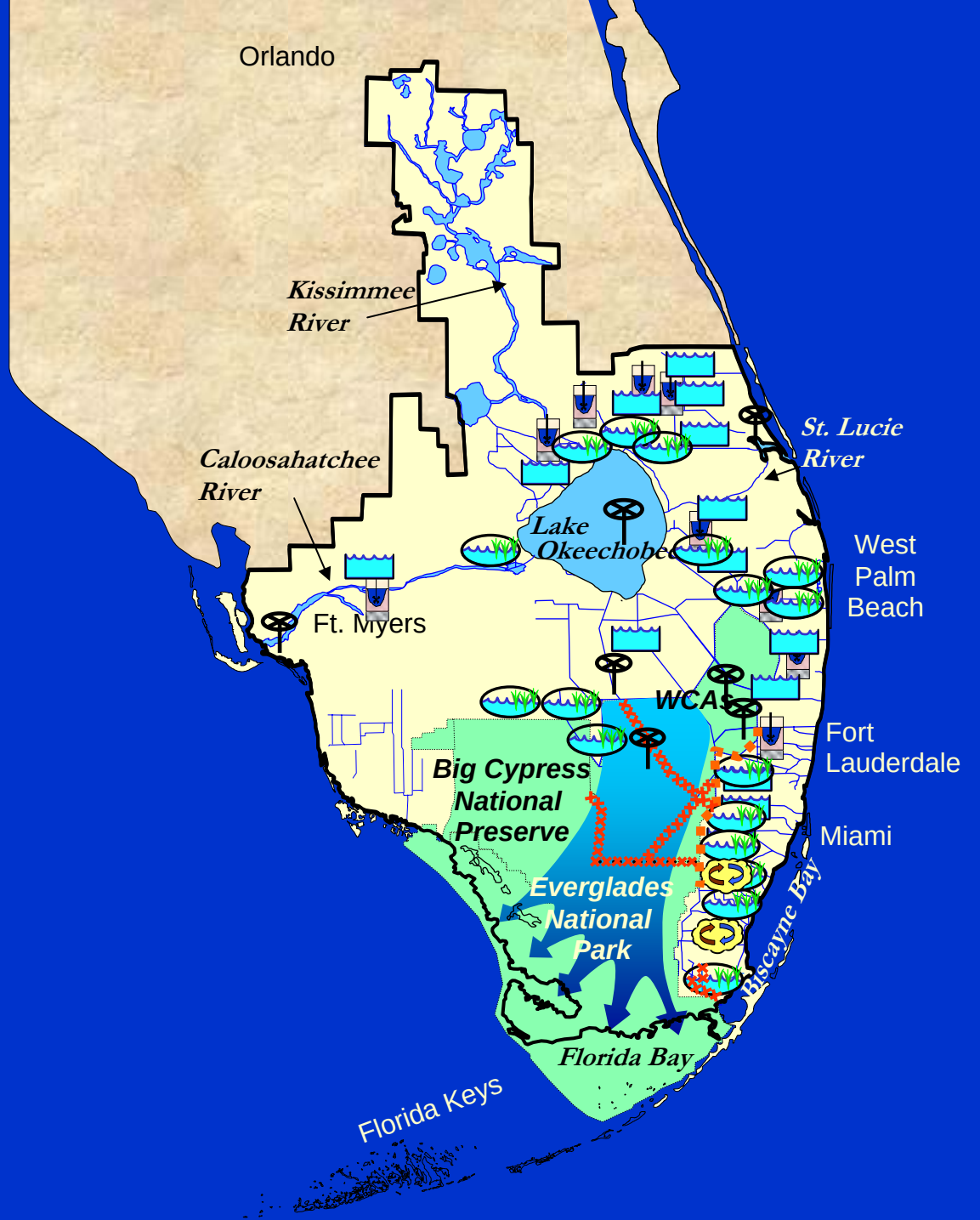
Stormwater Treatment Areas (STAs)

Reuse Wastewater

Seepage Management

Removing Barriers to Sheetflow

Operational Changes

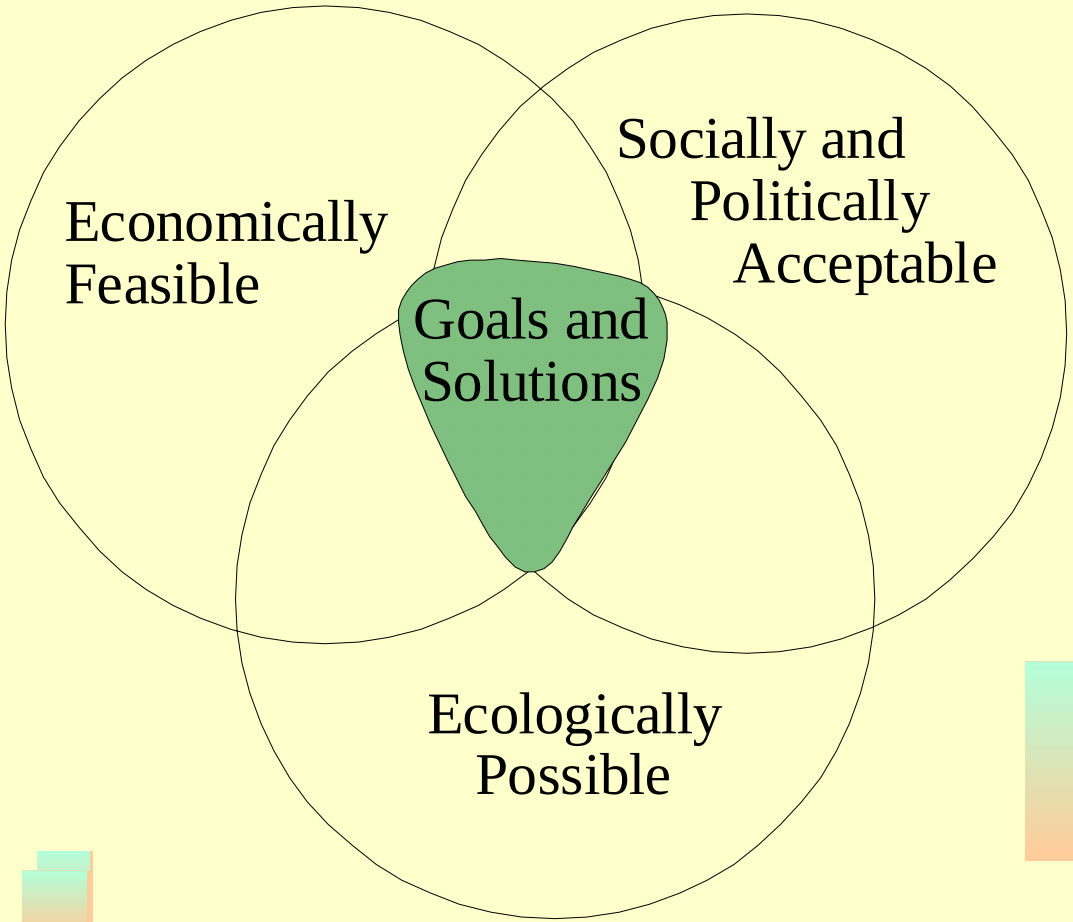


The Future of the Ecological Integrity of South Florida is Based on Decisions of Private Landowners

- Incentives and education
- Acquisition
- Regulation

If you want private landowners to conserve wildlife habitat; make it worth their while and teach them how to do it.

Integration of Ecology, Economics, and Socio-Political Components



Research, Modeling, and Monitoring

(how science is done)

- Hydrology
- Water quality
- Spatial extent and arrangement of cover types
- Biological diversity (species richness)
- Listed species
- Indicator species
- Non-native species

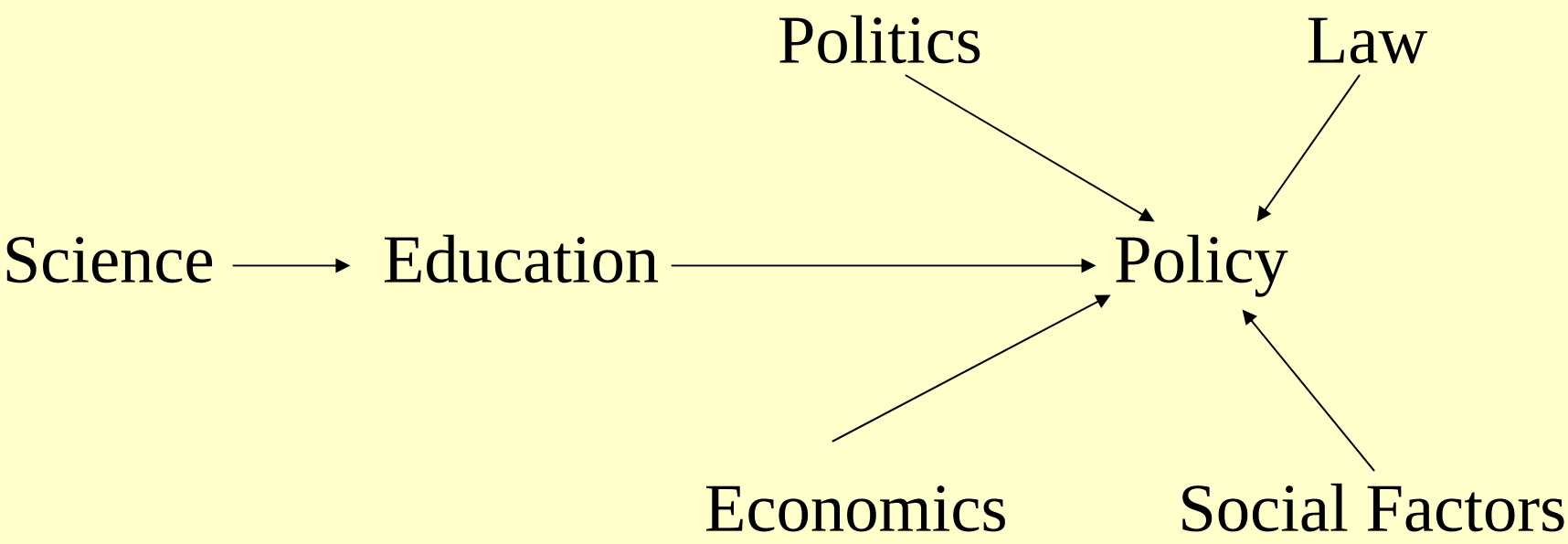
Adaptive Management

Increasing certainty in an uncertain world

- Research - Experiments
- Modeling – Risk Assessment
  - Conceptual models
    - Stressors
    - Attributes
    - Targets
    - Uncertain Linkages
  - Policy screening models
    - Habitat suitability
    - Stressor response
- Monitoring – Evaluating Success

Does Adaptive Management Work?

Proved controversial at best



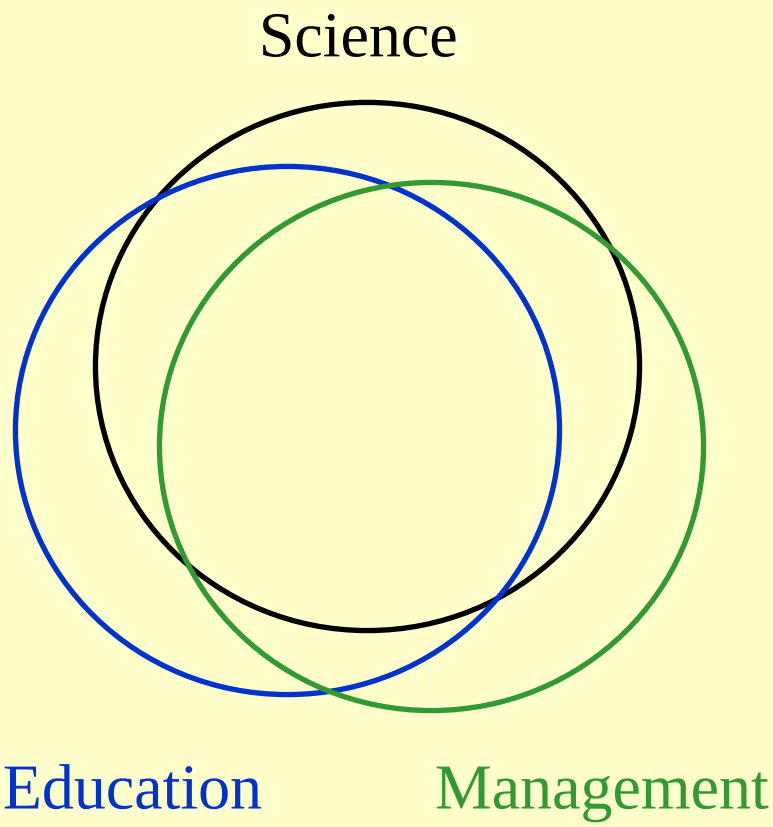
Science does not arrive at policy unscathed

Barriers to Progress

- Process not followed
- Institutional limitations – CERP, MSRP, CWMP,…
- Lack of goals and objectives – Who sets goals?
- Science has a weak voice in policy making
- Lack of integration
- Sustainability and economic expectations
    - Who pays and when? and Who benefits?
    - Lack of socio-economic component
- Re-engineer, restore, or rescue
- We do not have environmentally literate adults

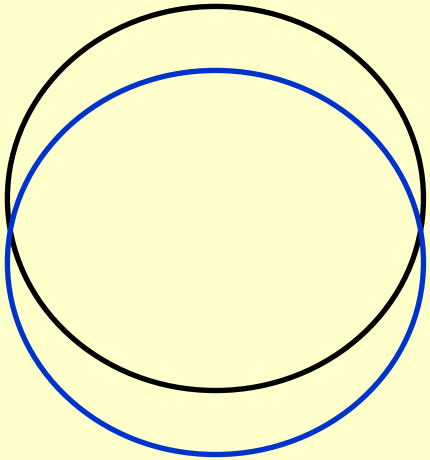
A Mad Tea Party – Lewis Carroll

Ideal Situation



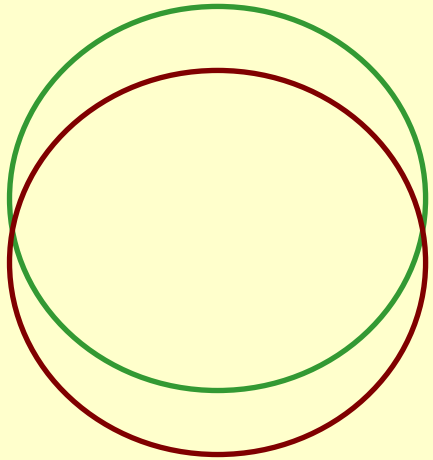
Current Models of Science/Policy Interaction

Science



Education

Policy



Public Relations

It is clear that our ability to collect good scientific information has outpaced our ability to deliver it to decision- and policy-makers.

Deliberate, Systematic Effort to Educate Decision- and Policy-makers

- Politicians
- Upper level management
- Staff
- Landowners
- Voters/Taxpayers

In the end, we will conserve only what we love.
We will love only what we understand.
We will understand only what we are taught.
– Baba Dioum

We need to educate adults now

The Challenge

- Need to communicate - speak and listen
- Recognize that science is uncertain and inconvenient
- Unified vision – common goals
- Comprehensive, regional, land and water use planning and regulation
- Sustainable economic and ecological expectations
- Education not just PR

Final Caveats

- Educate not advocate
- There is no substitute for common sense
- **Funded**

We can’t solve problems by using the same kind of thinking we used when we created them - Albert Einstein

Lessons Learned - Recommendations

- Prevention **is** cheaper than restoration
- Get out in front and stay out in front
  - Identify problems and solve them yourself
  - Identify benefits and communicate them