Applied Science and Adaptive Management in Everglades Restoration

Matt Harwell, USFWS

June 27, 2011

Andy LoSchiavo, USACE
Agnes McLean, NPS
Steve Traxler, USFWS

Overview

- CERP Overview
- CERP Applied Science Strategy
- CERP Adaptive Management Overview
- CERP AM Integration Example
- ★Challenges of Implementing CERP AM
- ★Avoiding AM Pitfalls

- DOI AM activities of interest

Players in Everglades Restoration
(in no specific order)

Federal:

USACE
FWS
NPS
USGS
NOAA
USDA
EPA
FKNMS
NMFS
NOS

State:

SFWMD
FDEP
FFWCC
FDACS
DCA
FDOT

Counties

Others:

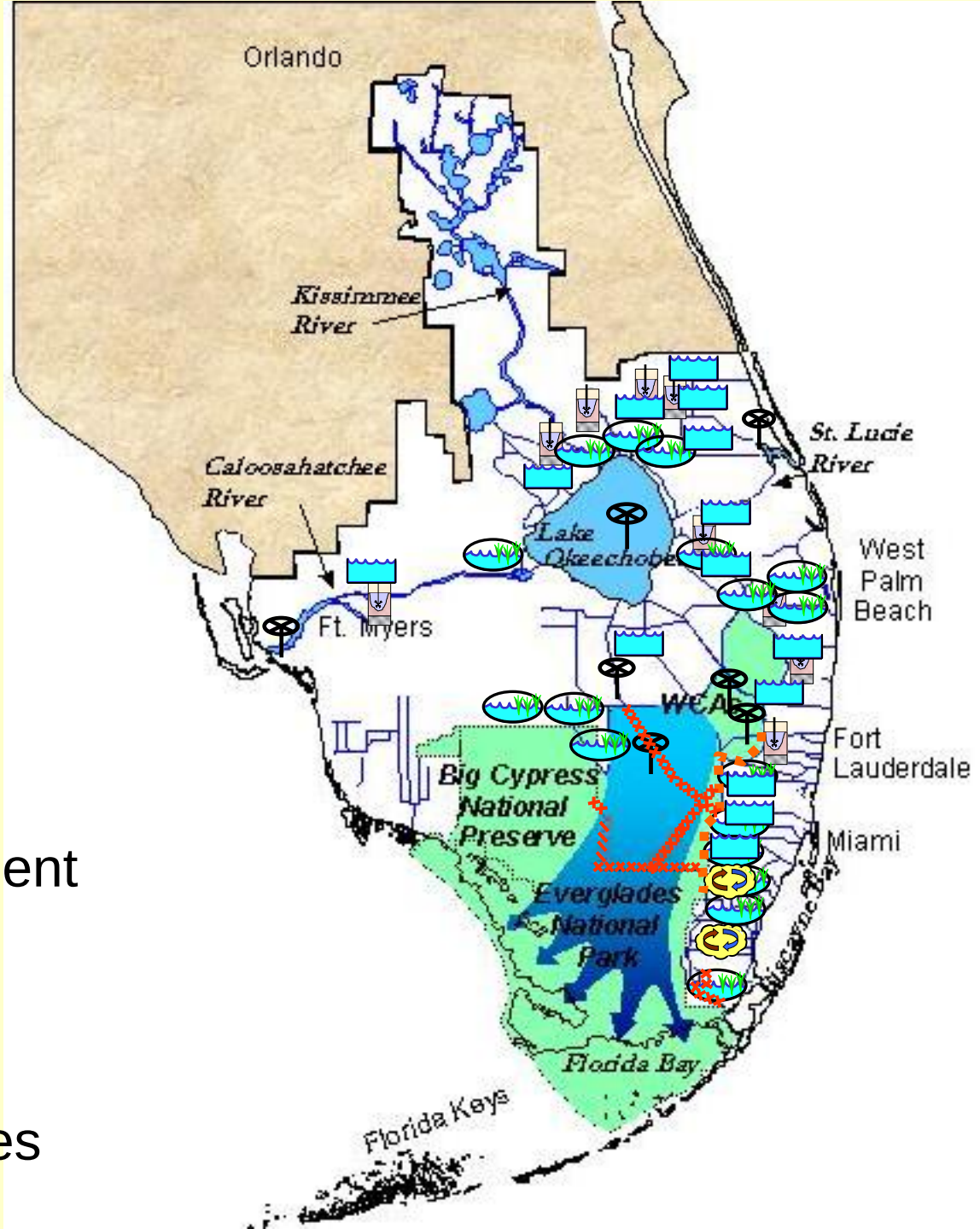
Miccosukee Tribe
Seminole Tribe

NGOs

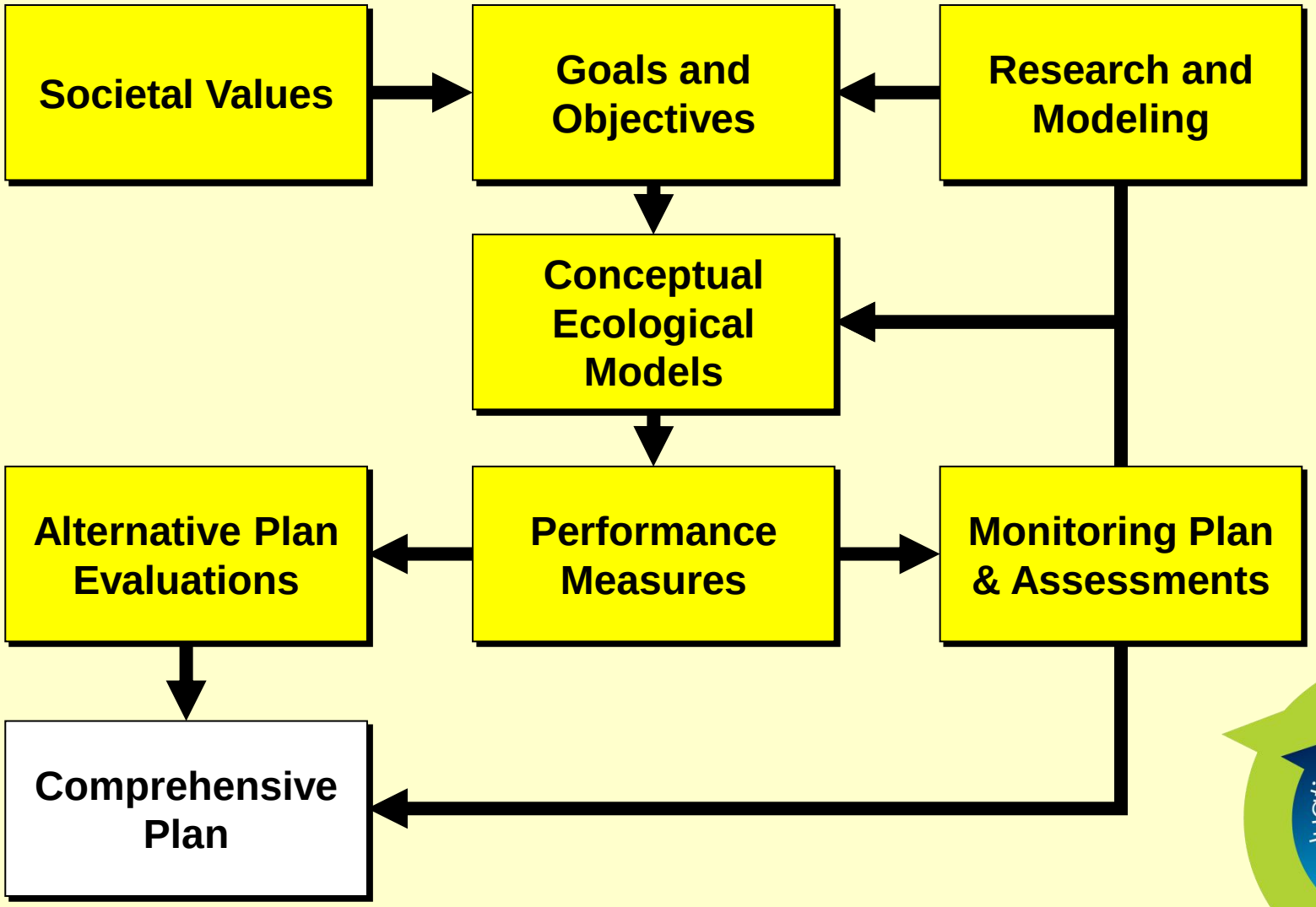
Academia

CERP Components

- Aquifer Storage & Recovery
- Surface Water Storage Reservoir
- (STAs) Stormwater Treatment Areas
- Reuse Wastewater
- Seepage Management
- xxxxxx Removing Barriers to Sheetflow
- Operational Changes



CERP Applied Science Strategy



http://www.evergladesplan.org/pm/recover/recover.aspx

Effective Use of Science

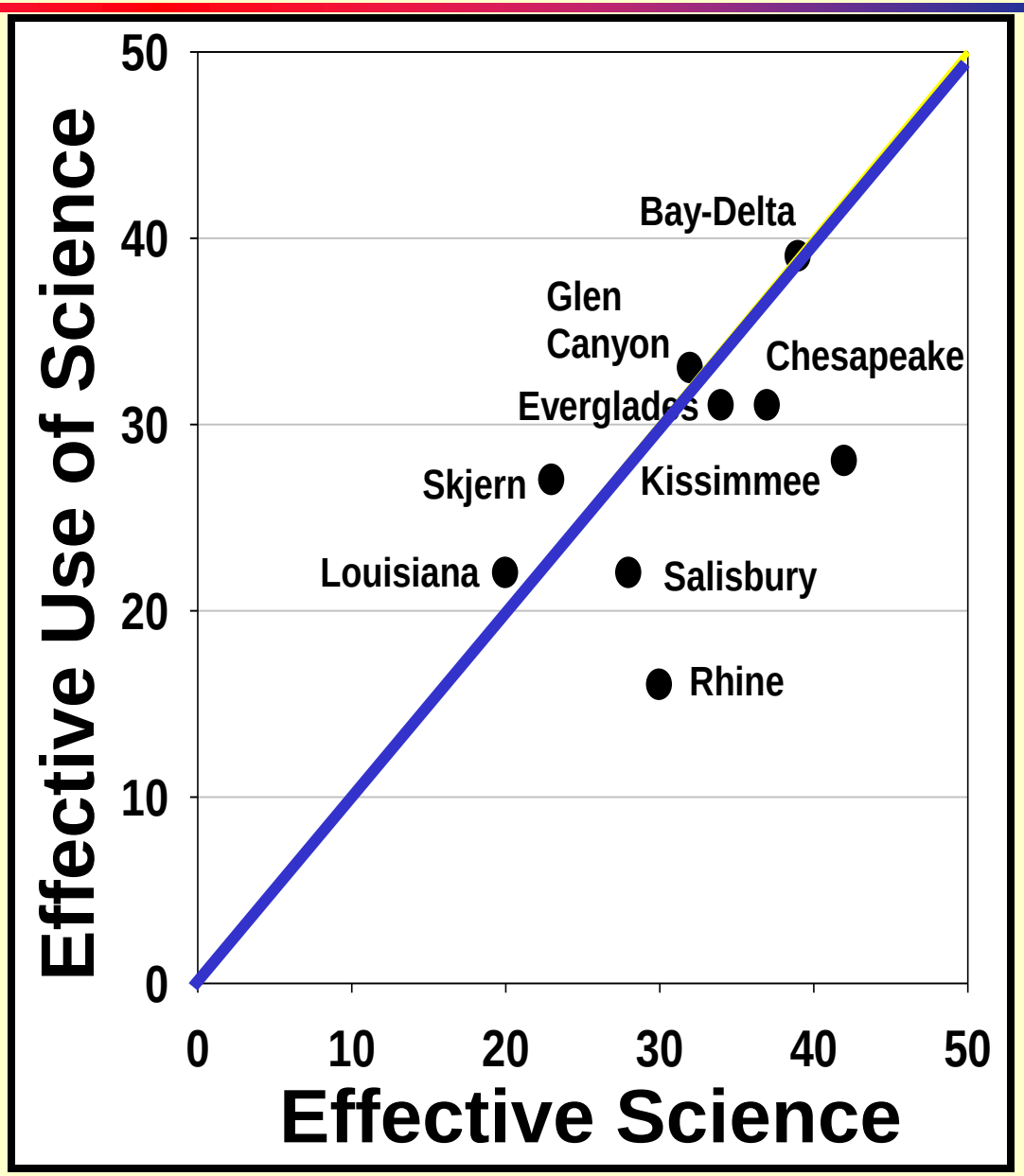
Effective Science

- Content
- Quality

Effective Use of Science

Institutional process where science is:

- Generated
- Evaluated
- Applied ★



From: Van Cleve et al. (2006) Environ. Manage. 37:367-379

A structured process of learning & doing

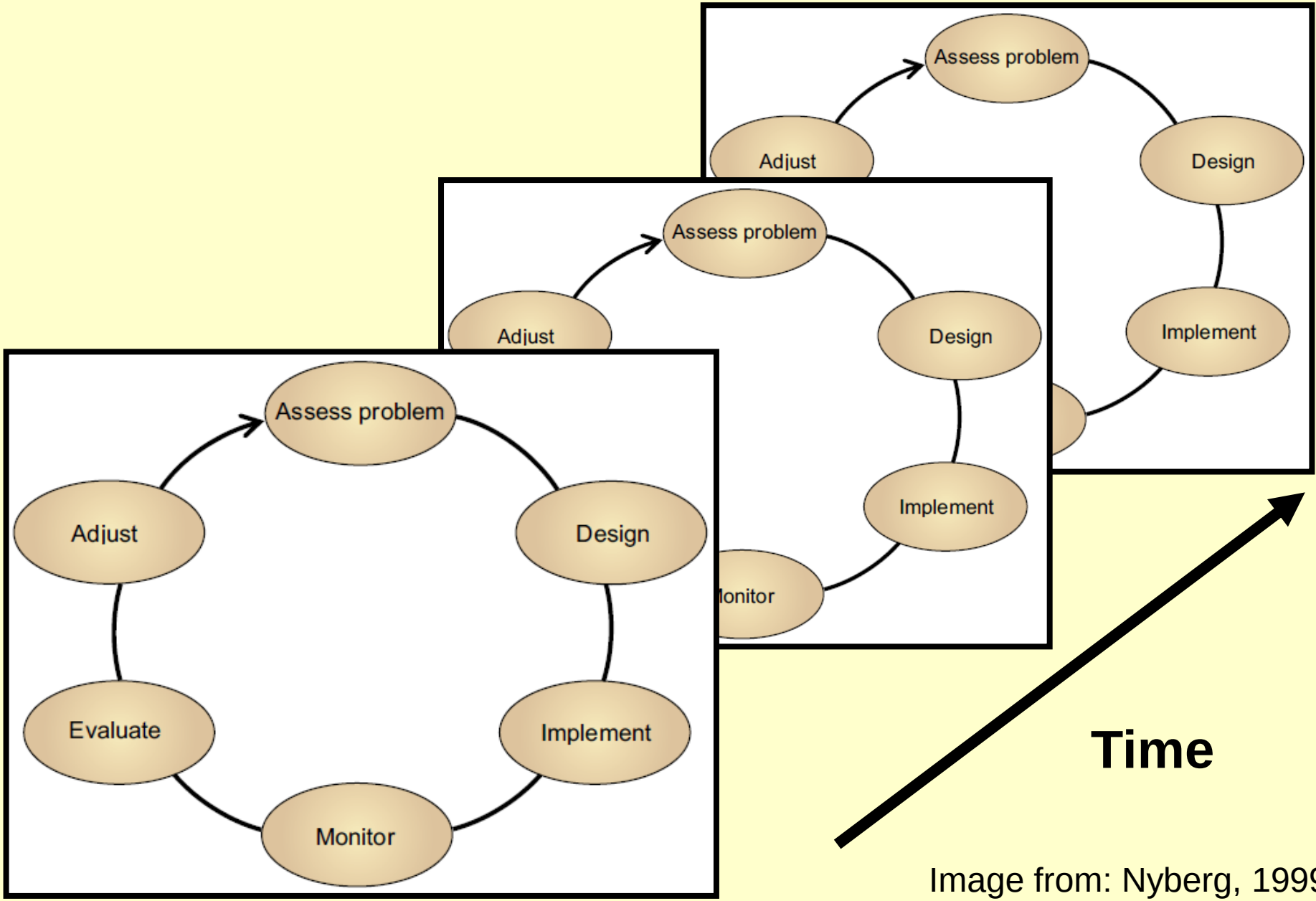
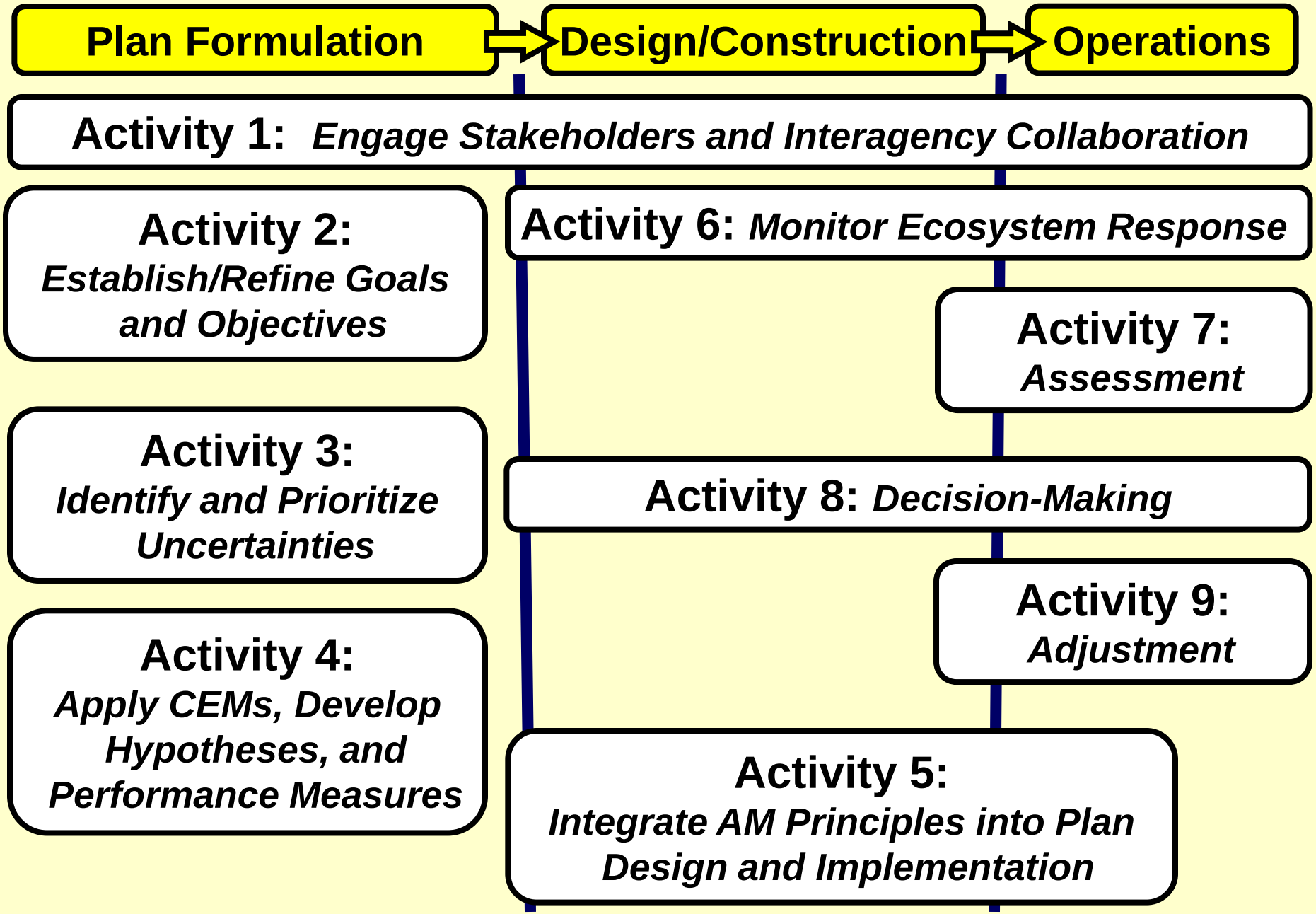


Image from: Nyberg, 1999

Adaptive Management Activities for CERP

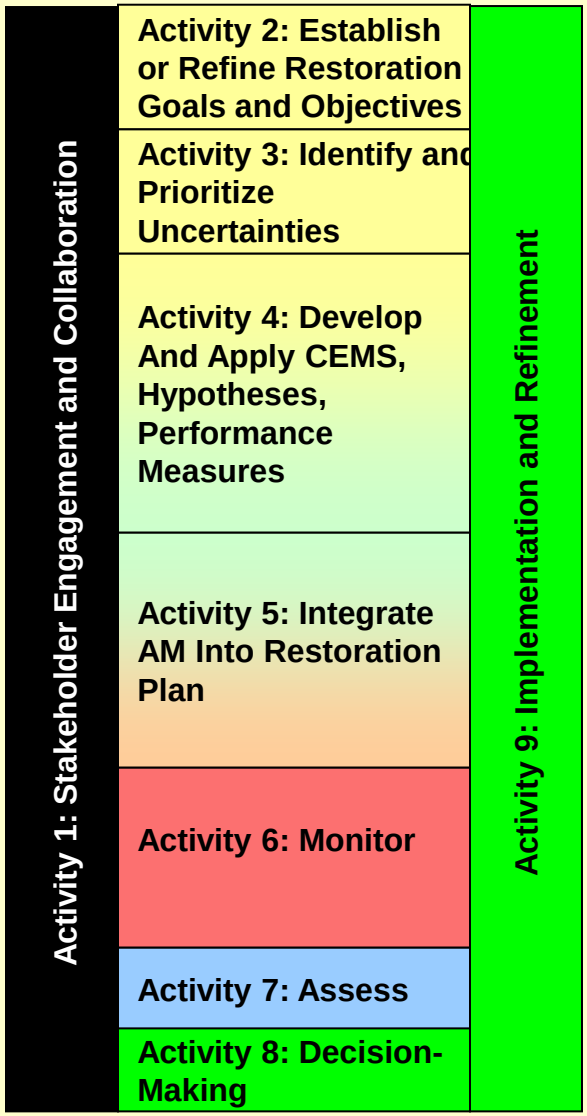


CERP AM Integration Process

USACE Six Step Planning Process

- Step 1: Identify Problems and Opportunities
- Step 2: Inventory and Forecast Conditions
- Step 3: Formulate Alternative Plans
- Step 4: Evaluate Alternative Plans
- Step 5: Compare Alternative Plans
- Step 6: Select Plans
- Project Life-Cycle: Design
- Project Life-Cycle: Construct
- Project Life-Cycle: Operation and Maintenance

Nine AM Activities For CERP



http://www.evergladesplan.org/pm/program_docs/adaptive_mgmt.aspx

Integrating AM into Existing Processes

Water Management **Water Treatment** **Habitat Alterations**

Reservoirs

Stormwater Treatment Areas

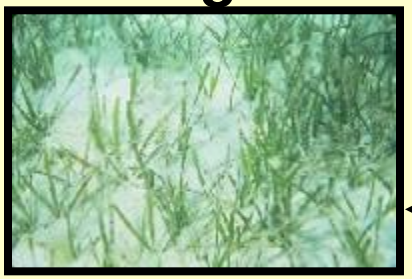
Muck Removal

Wetlands Rehydration

Improve salinity patterns, water quality and habitat

Artificial Habitat

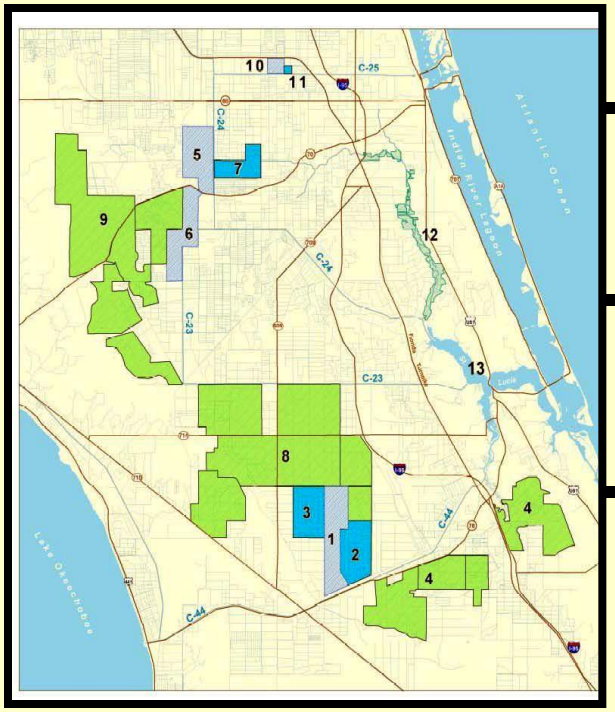
Seagrass



to restore

Oysters

Oysters – Example



IRL-S Implementation

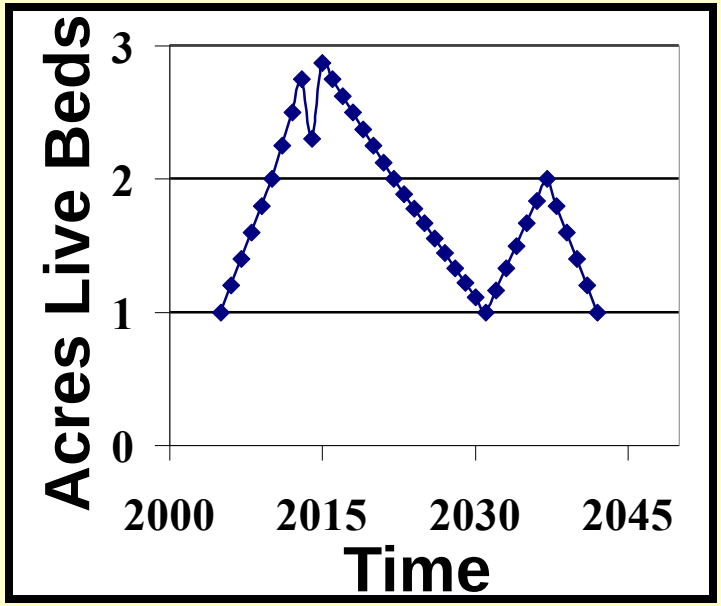
Substrate Suitability

Nutrient Reductions

Flow/Salinity Envelope

Oyster Distribution, Quantity and Health

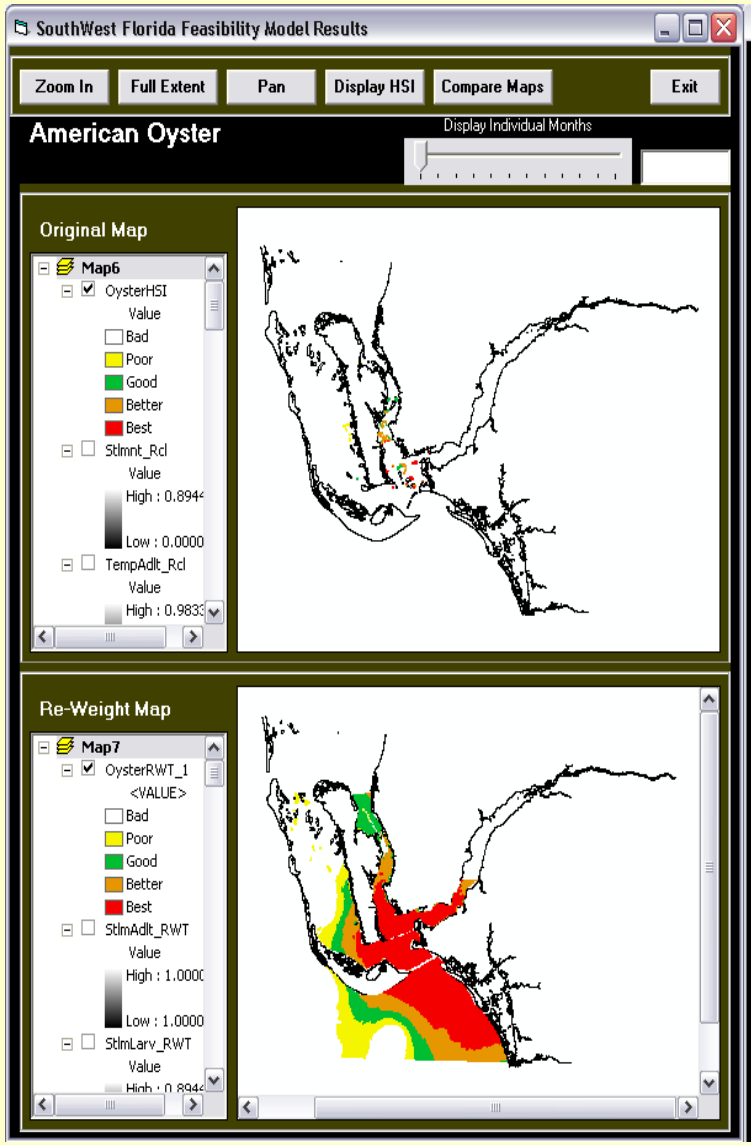
Adaptive Management Entry Points

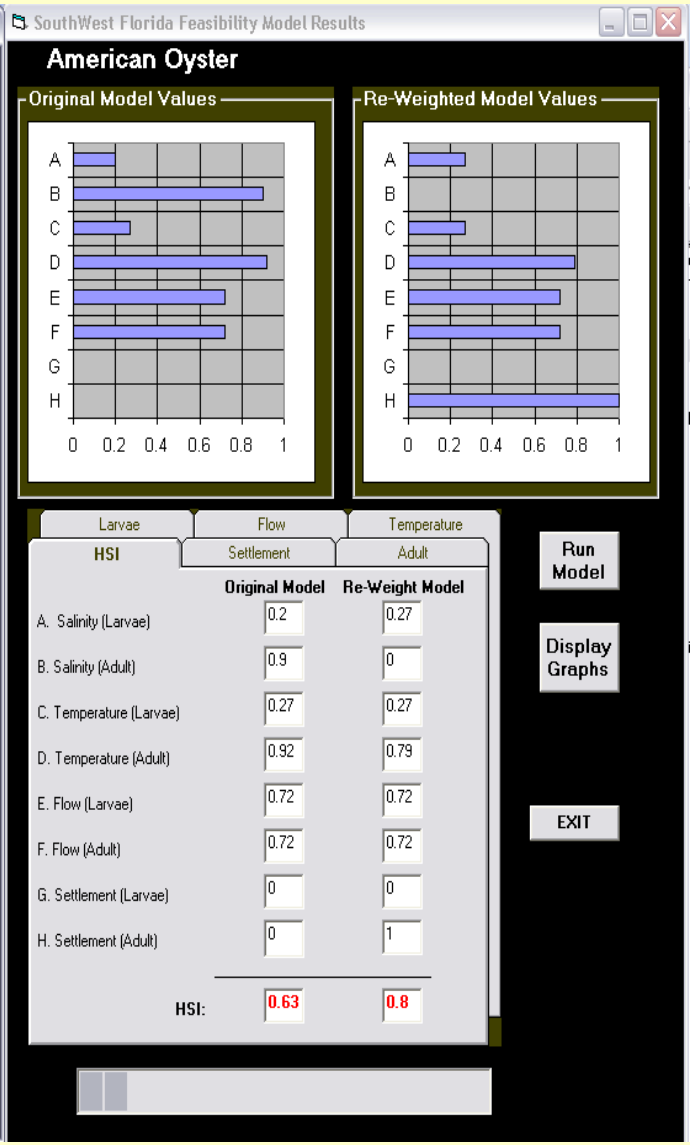


Monitoring designed to assess the success of implementation over time

Oysters – Example

HSI to predict suitable Oyster Habitat based on differing flow/salinity scenarios that will occur as an outcome of implementation





Oysters – Example

Linking of science to management options

Stressor metric	Target	Management Action OPTION 1	Management Action OPTION 2	Management Action OPTION 3
Salinity	Salinity range of 10-25 ppt	Change operations to meet flows		
Recruitment	Presence Absence adults and larvae	Stock larvae	Stock adults	Operations to avoid too much or too little flow in key months
Substrate	Acres of Suitable habitat	Add oyster shell cultch	Try different substrate e.g., concrete	Dredge muck

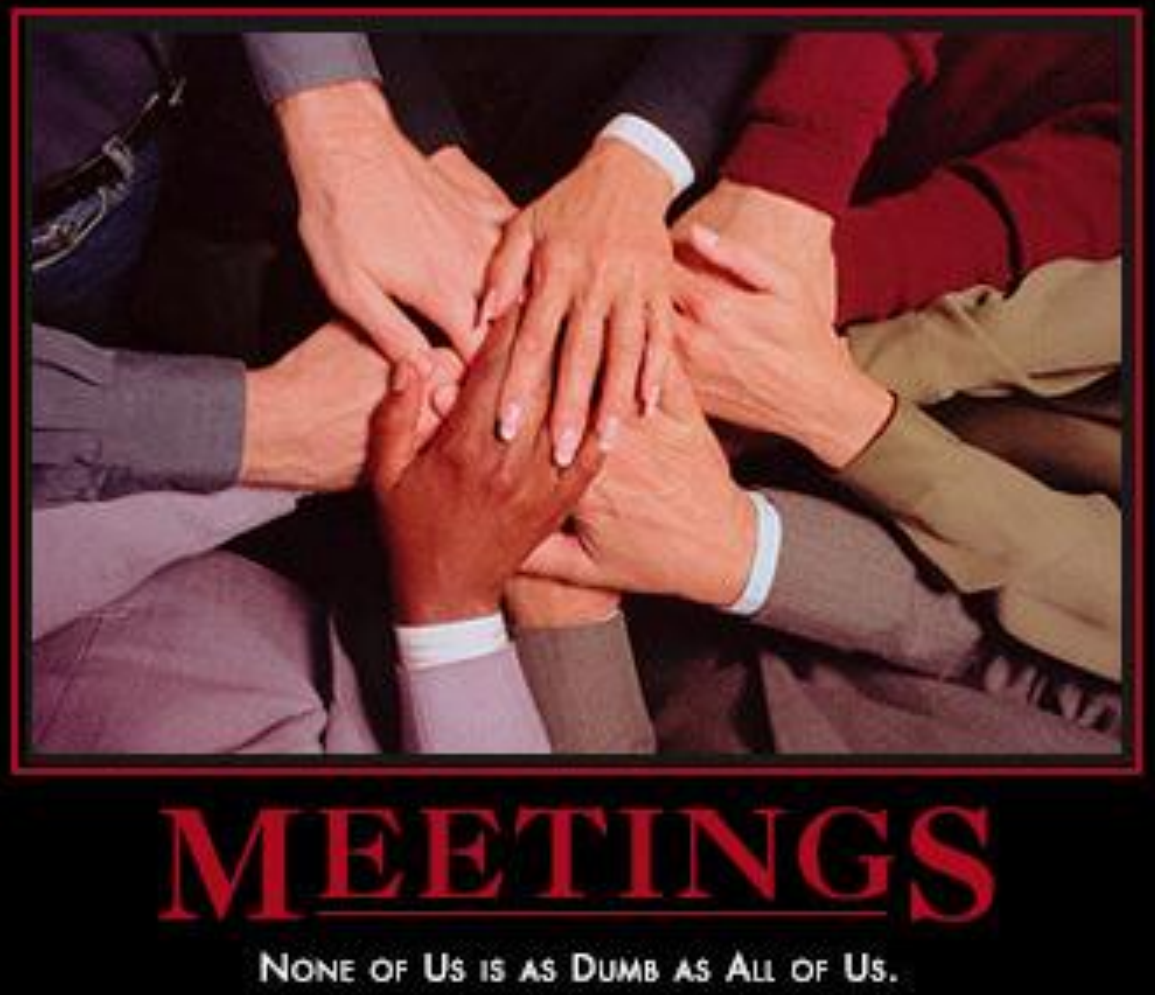
Challenges of Implementing CERP AM

- **Clarifying roles** for implementation, decision-making, refinement
- **Stakeholder engagement** and collaboration with non-agency stakeholders
- Establishing clear ecosystem restoration goals and objectives (**endpoints**) at multiple scales
- Integrating **applied science**; science tools
- **Science momentum**: funding; targets; start/end
- Achieving **institutional change** that embraces AM principles

Avoiding AM Program Pitfalls

- **Governance Model**
  - Establish while developing AM strategy; Legislative mandate
  - Scientists alone cannot create effective AM program
- **Effective Use of Science**
  - Directly inform management actions; secure monitoring $
- **Stakeholder Engagement**
  - Develop strategies up front for different levels
- **Management/Policy Buy In**
  - Work at all levels, especially budget decision levels
- **Flexible AM designs**
  - Different types of AM plans for different types of projects

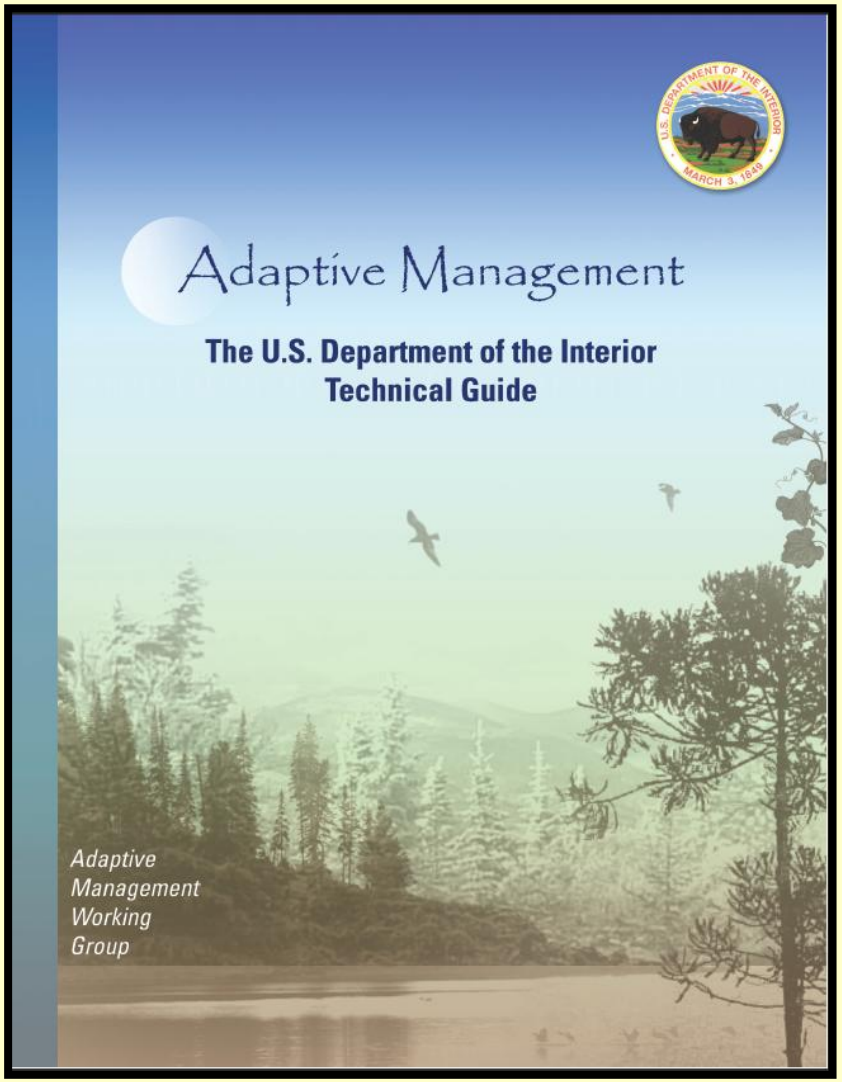
Conducting Ecosystem Restoration …
*…. one meeting at a time**



***Disclaimer**: The opinions expressed herein do not necessarily reflect those of DOI.

Department of Interior & AM

2007/2009



2011 Draft In Review

ADAPTIVE MANAGEMENT: The U.S. Department of the Interior Applications Guide

Adaptive Management Working Group
Chair: Olivia Barton Ferriter

Lead Authors

Byron K. Williams, Eleanor D. Brown, and Carl D. Shapiro

Thematic Writing Teams

Climate Change
Mary Boatman - Lead
Donna Brewer
Sarah Converse
Greg Eckert
Kristina Heister
Kurt Johnson
Harold Laskowski
Dan Lechefsky

Water Resources
Art Coykendall - Lead
Leigh Espy
Todd Hopkins
David Jacob
Dennis Kubly
Michael Mayer

Energy
Jim Woehr - Co-Lead
Lianne Ball - Co-Lead
John Craynon
Jay Hestbeck
Lindy Nelson
Margaret Van Gilder

Interface of Natural and Human Systems
Bruce Peacock - Lead
John Dennis
Marietta Eaton
Carmen Fells
Melinda Knutson
Kirsten Leong
Clinton Moore

Other Contributors

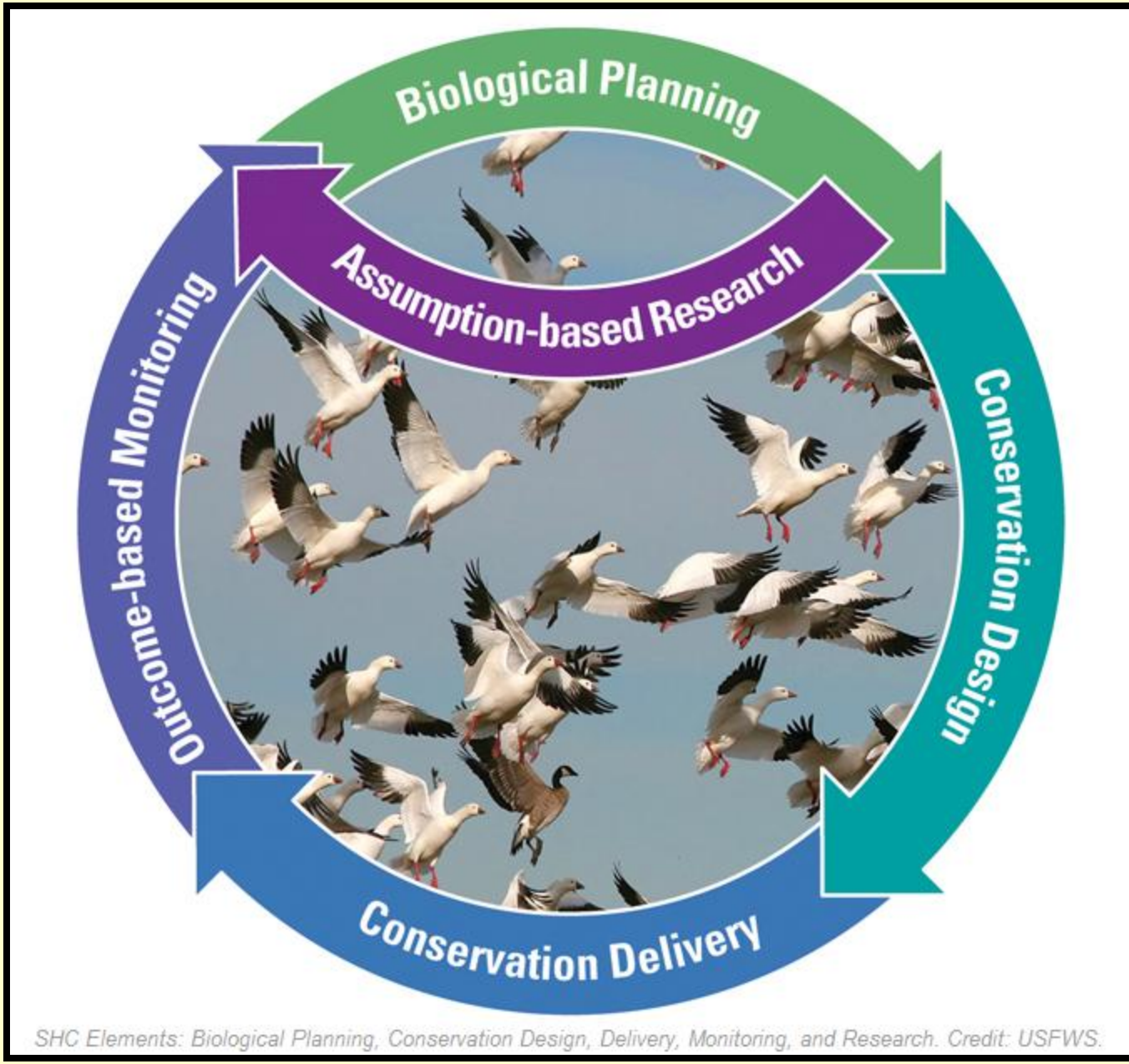
Ellen Bean, Bernard Bormann, Elise Irwin, Fred Johnson, Conor McGowan, James Nichols, Jonathan Steele

http://www.doi.gov/archive/initiatives/AdaptiveManagement/

Strategic Habitat Conservation & AM

Substitute Restoration for Conservation

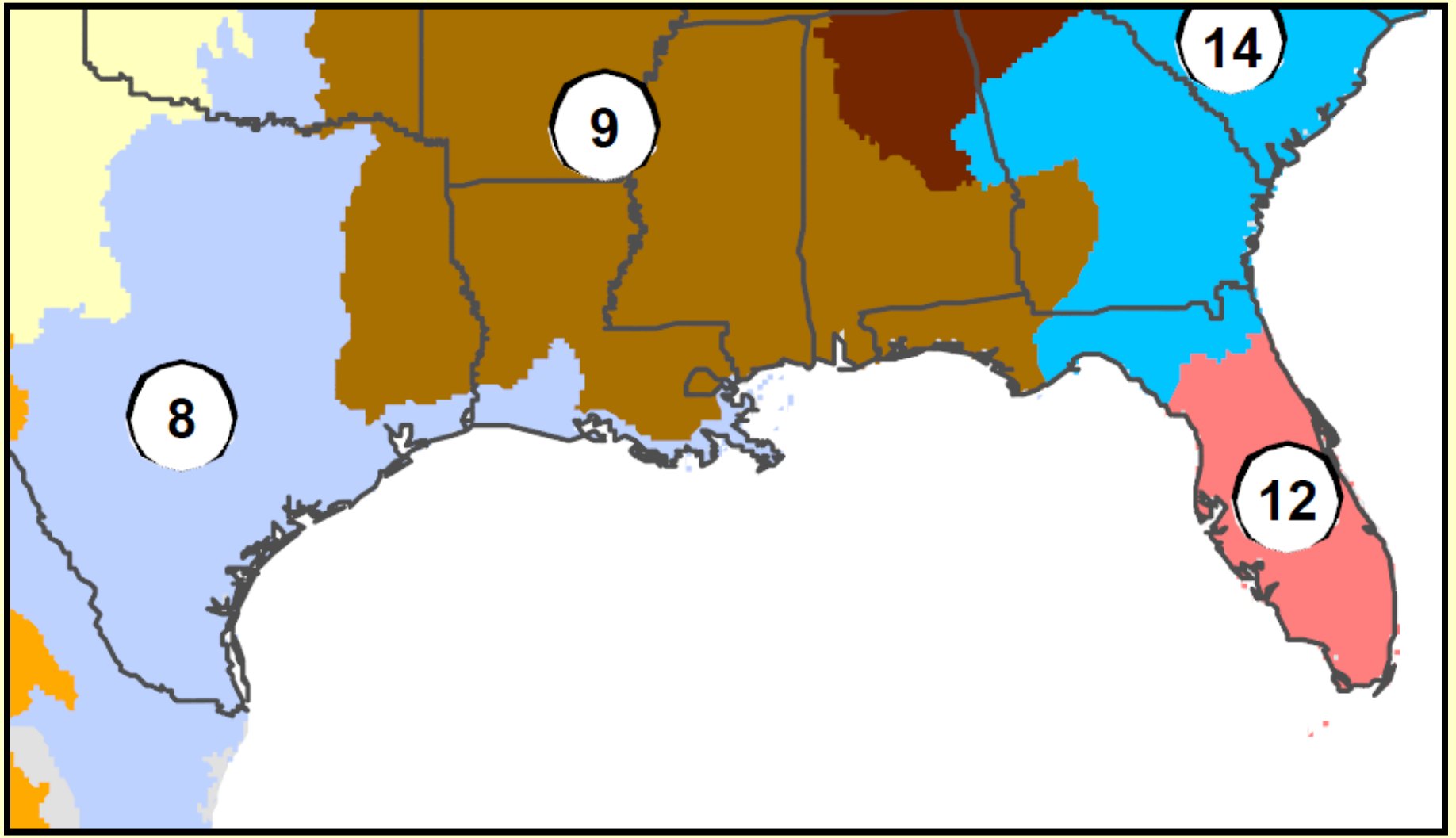
Landscape Conservation Cooperatives are vehicle for Implementing SHC Principles



SHC Elements: Biological Planning, Conservation Design, Delivery, Monitoring, and Research. Credit: USFWS.

Landscape Conservation Cooperatives (LCCs)

Public-private partnerships applying a networked approach to conservation — holistic, collaborative, adaptive and grounded in science



http://www.doi.gov/lcc/index.cfm