Solutions for Bridging the Gap between Science and Engineering

Eliza Hines & Rebecca Burns
Atkins North America

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Overview

- Defining the problem
- Changing the way we think…
- “Real World” example
- Potential Solutions – Integration
  - Planning
  - Design/Construction
  - Operations & Maintenance
- Summary

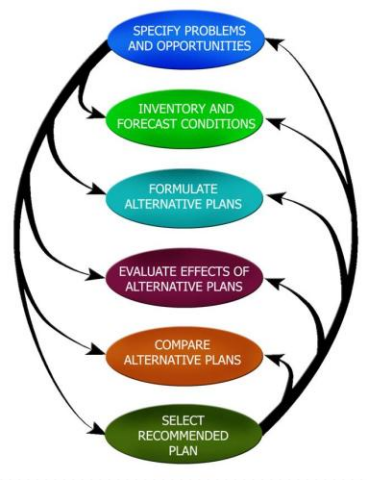
Large-scale Ecosystem Restoration Programs

Defining the Problem

- Artificial separation of planning/engineering and science
- Formal USACE planning process and lifecycle
  - Challenge of integrating science
- No “how-to” book for ecosystem restoration
- Ecosystems are complex
- No longer a static endpoint
  - Ecological functionality vs. construction complete

Traditional Implementation

Typical Civil Works Project Lifecycle



6-Step Planning Process

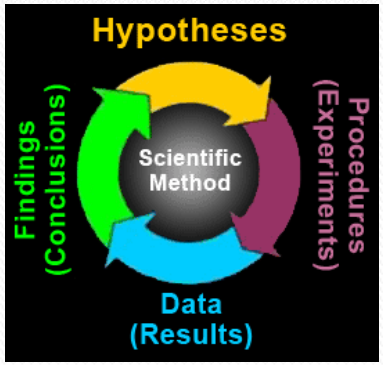
Project design

Construction

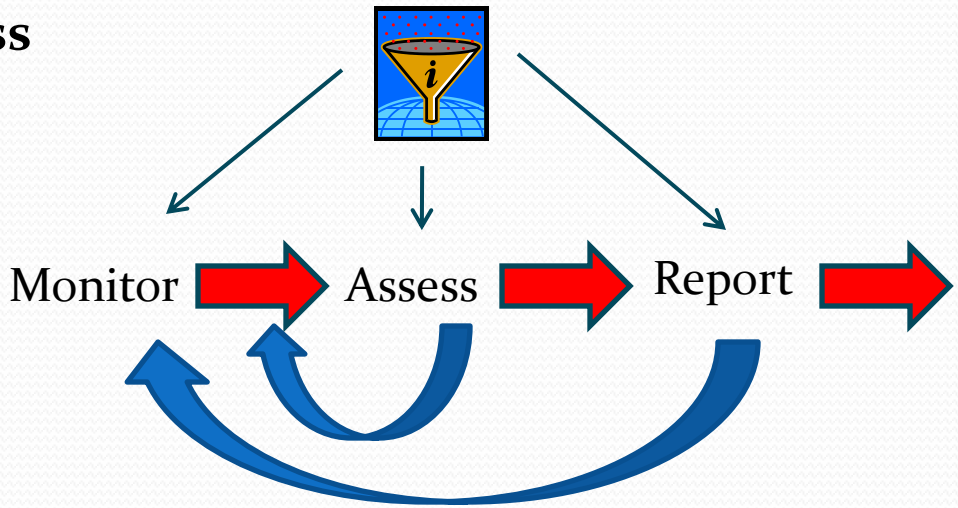
Project Complete

Changing the Way We Think…

Scientific Process

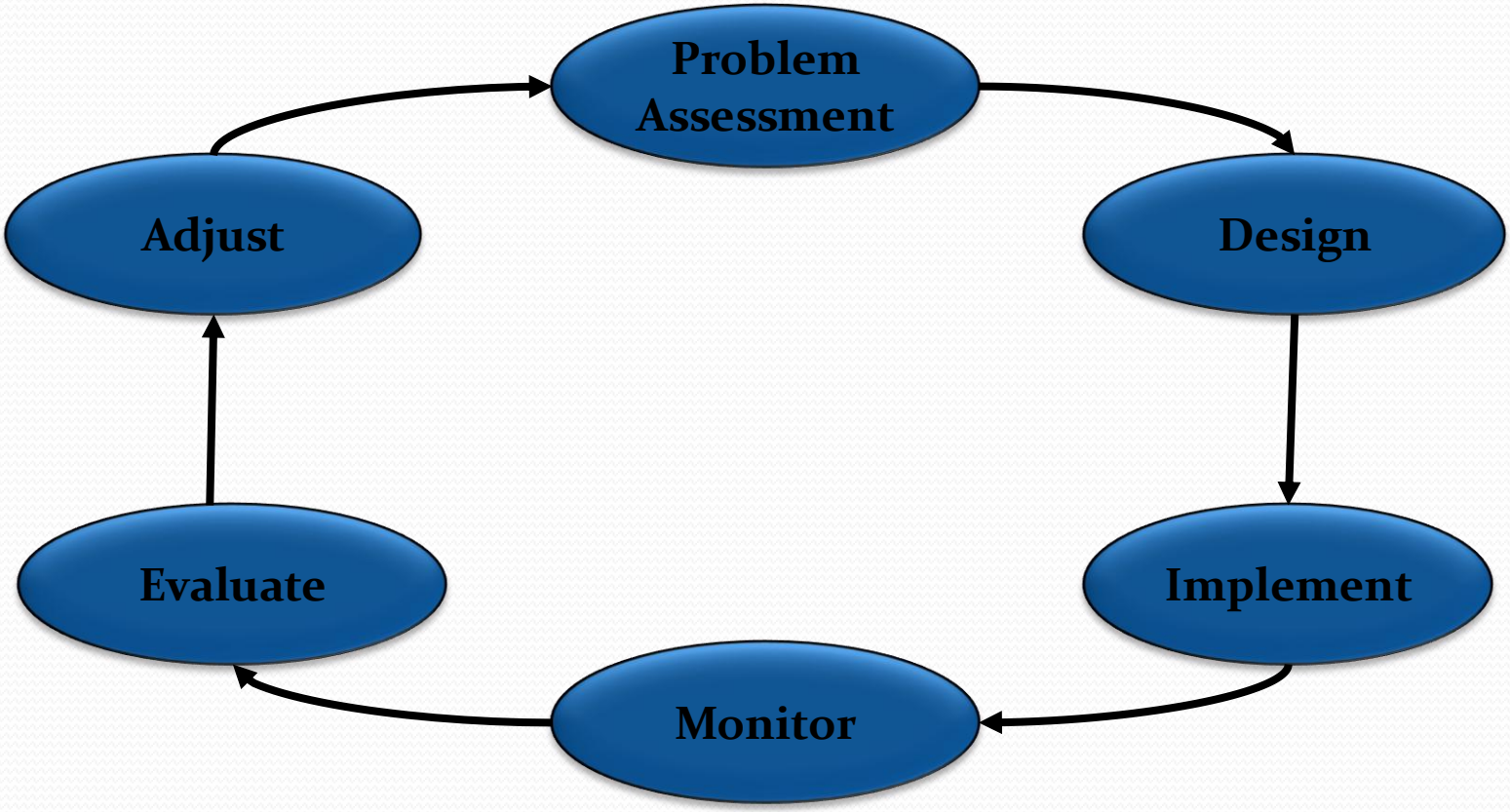


New scientific/technical information



Ecological Response

Adaptive Management



Example: Reservoir Design

- Water storage key component of Everglades restoration
- Traditional approach to reservoir design – functional and safe
- Case example
  - Unanticipated consequences to wildlife
  - Need for better integration of science and planning/design
  - Importance of monitoring for ecological response

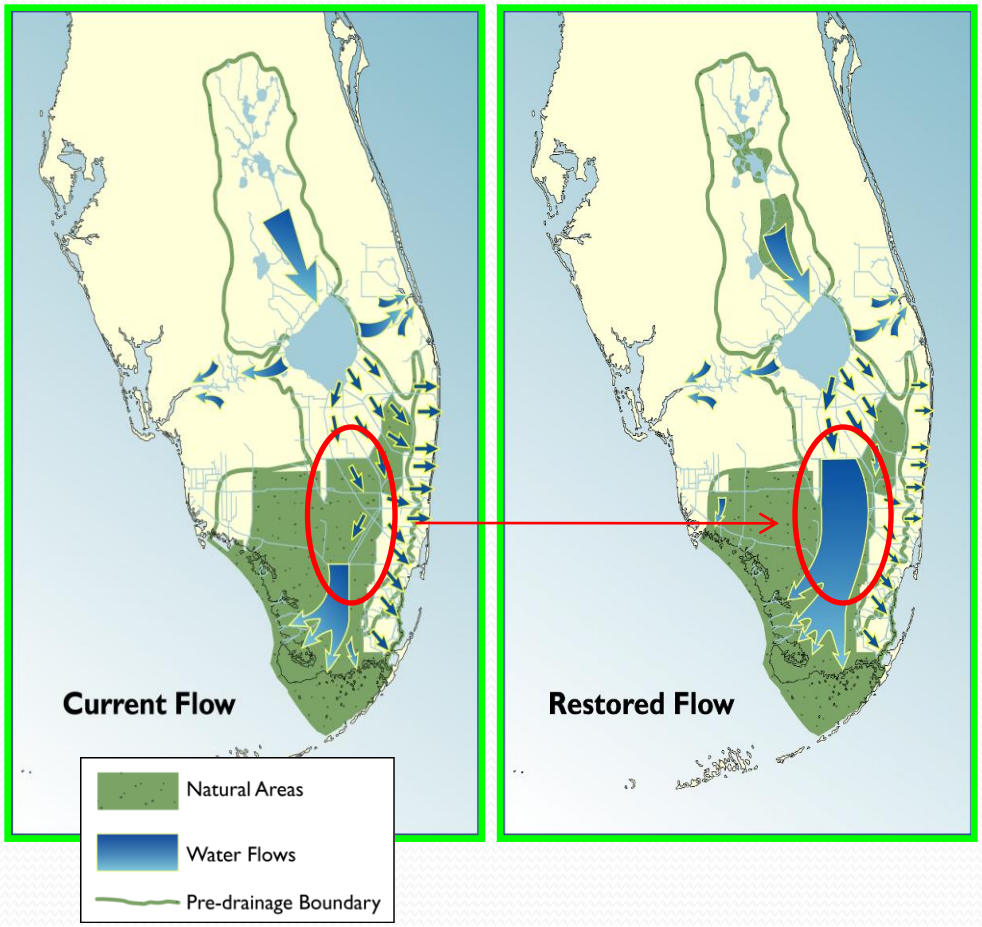
Trapped Turtles

Potential Solutions

- Planning
- Design & Construction
- Operations & Maintenance

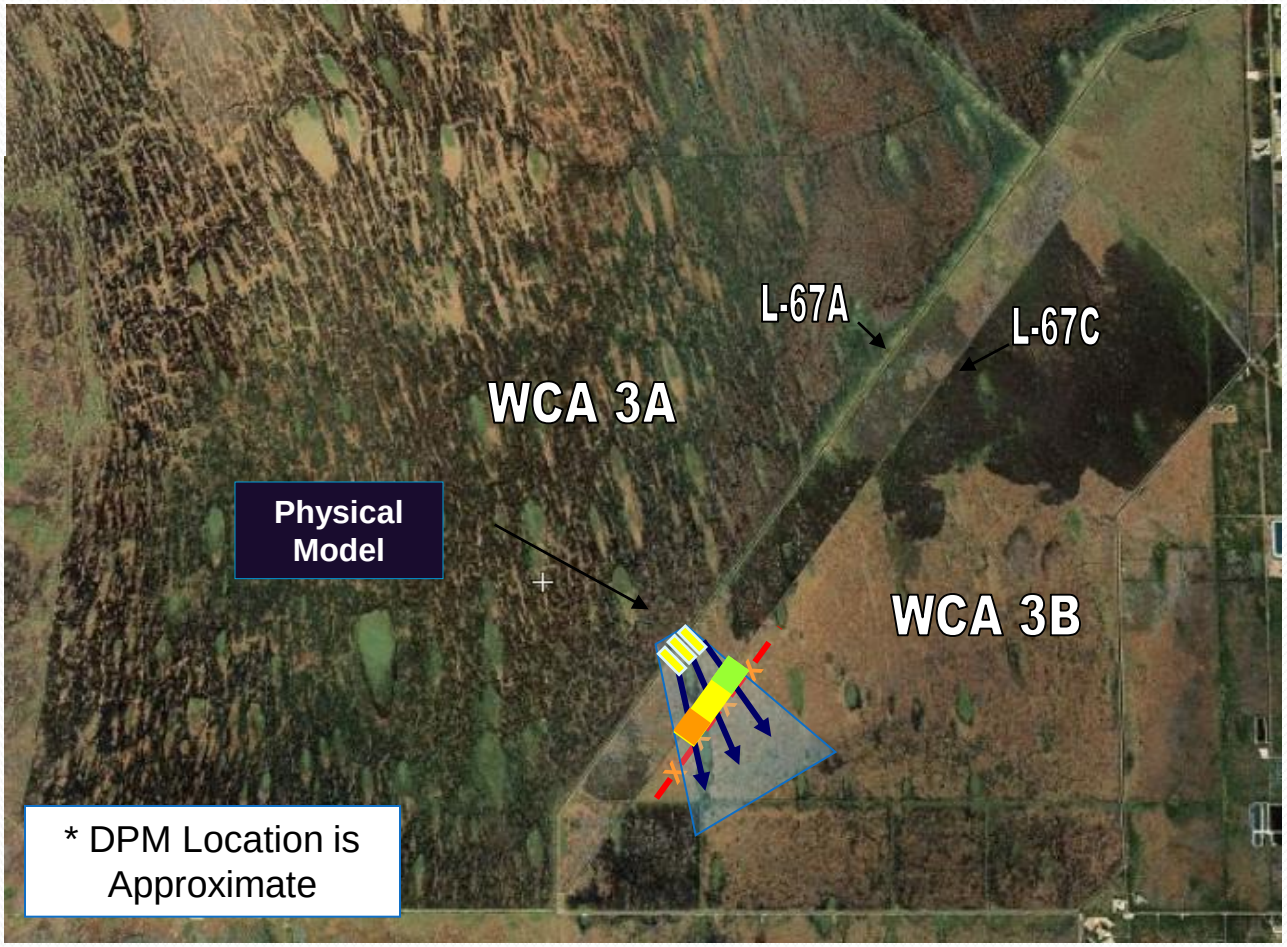
- Both formally implemented solutions as well as proposed methods for bridging the gap.

Integrating Science & Planning



- Decomp Project – integration of science in project planning
  - Scientific input to the team
  - Physical Model

Decomp Physical Model



Temporary Gated Culverts

No Backfill

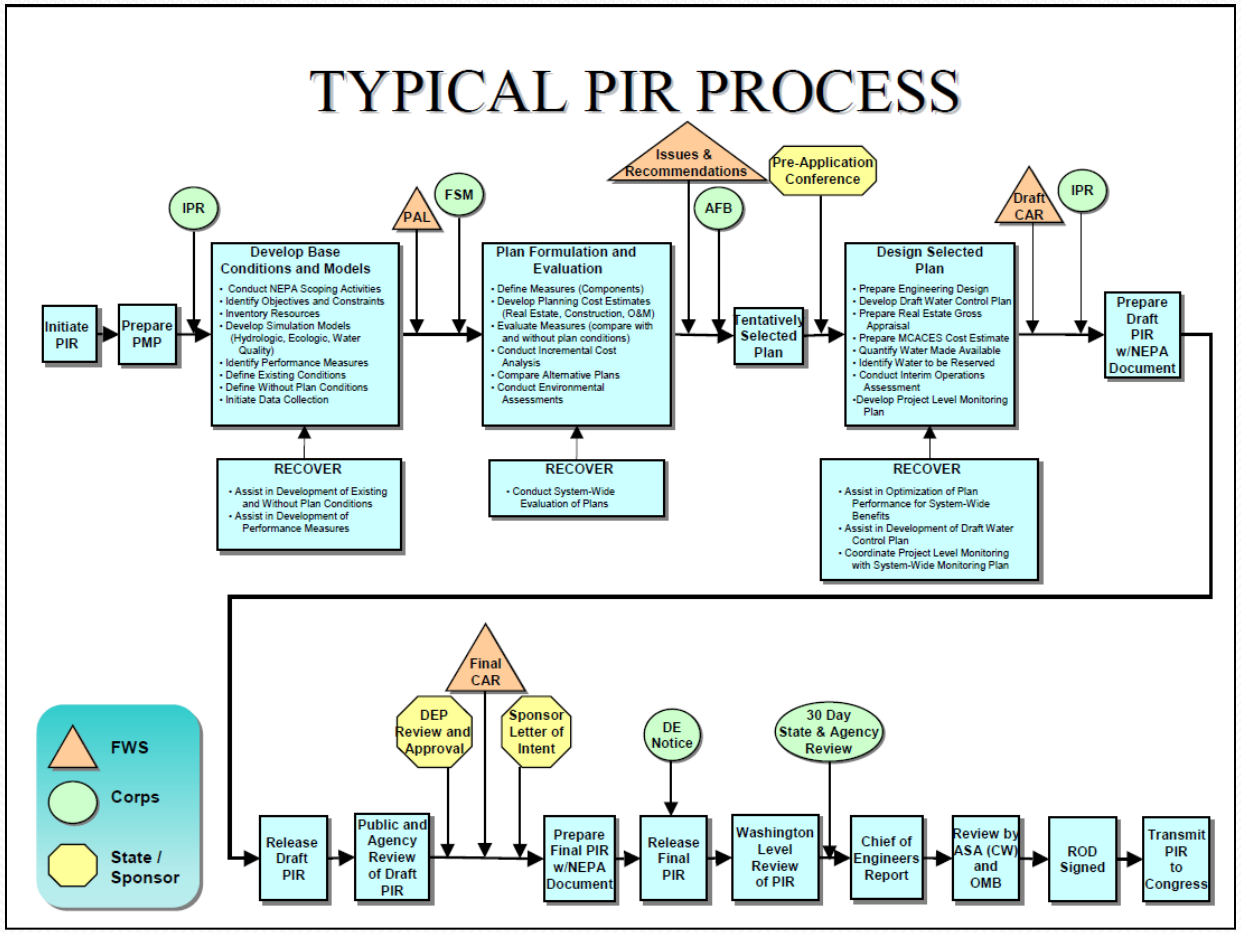
Partial Backfill

Complete Backfill

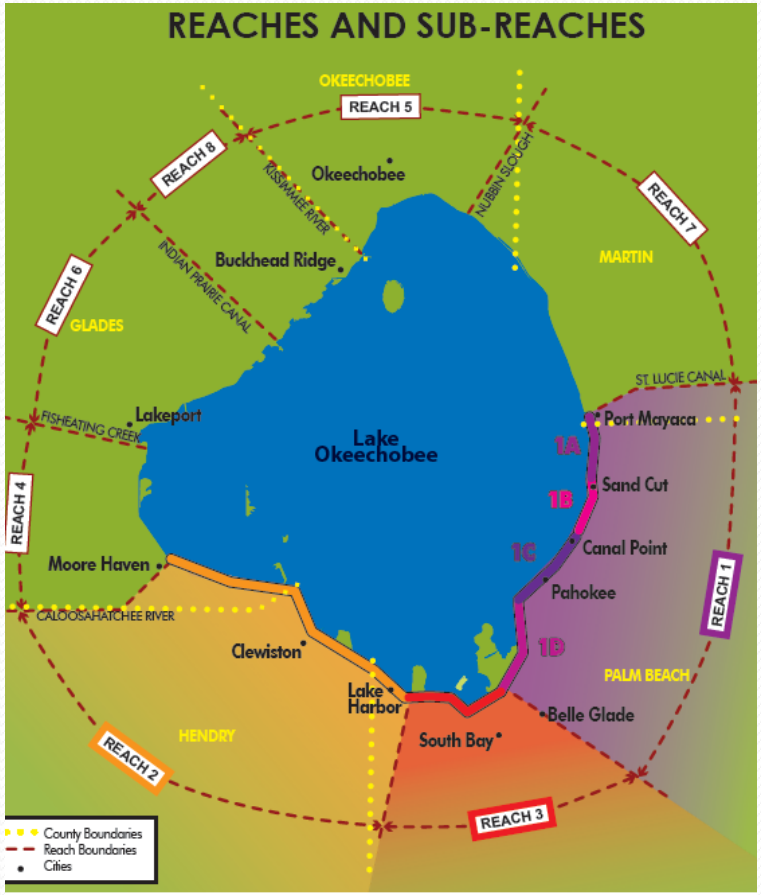
Sheetflow

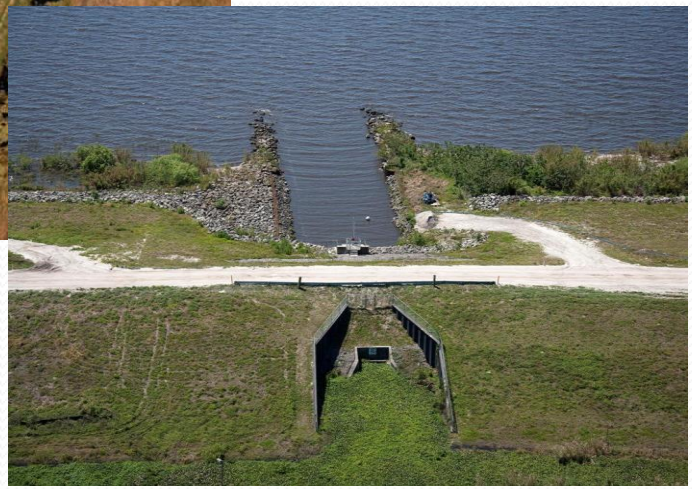
Levee Degrade

PIR Template

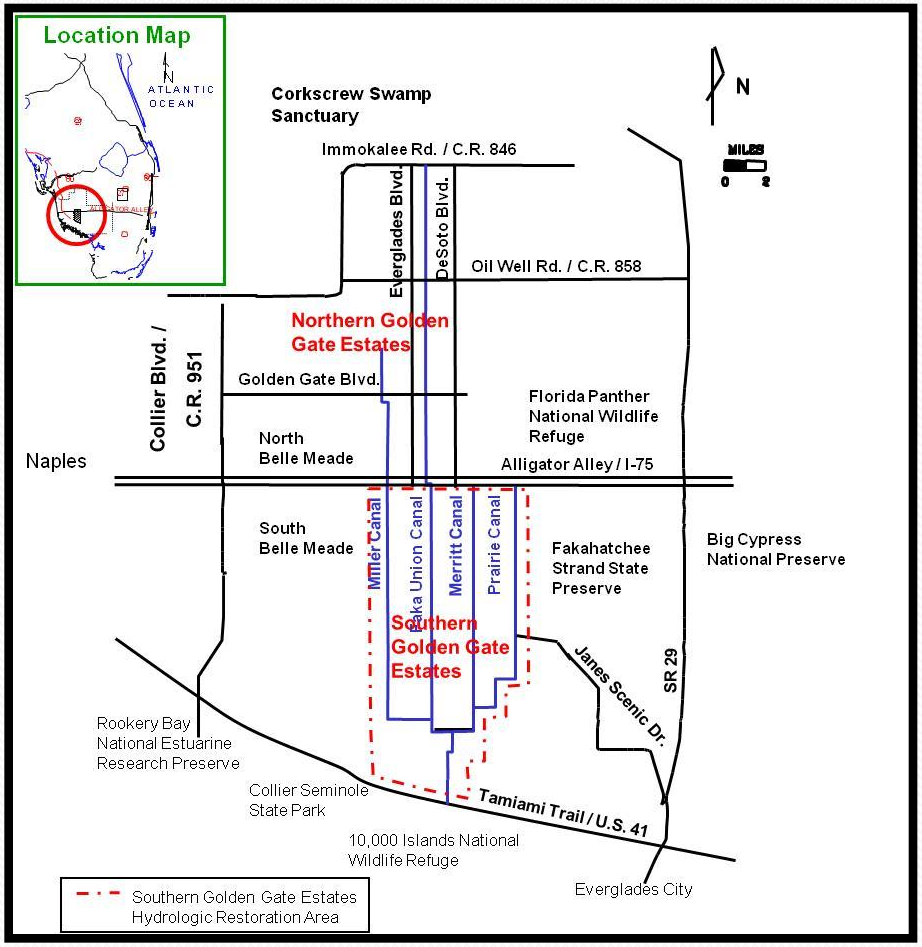


Design & Construction
Rehabilitating Herbert Hoover Dike





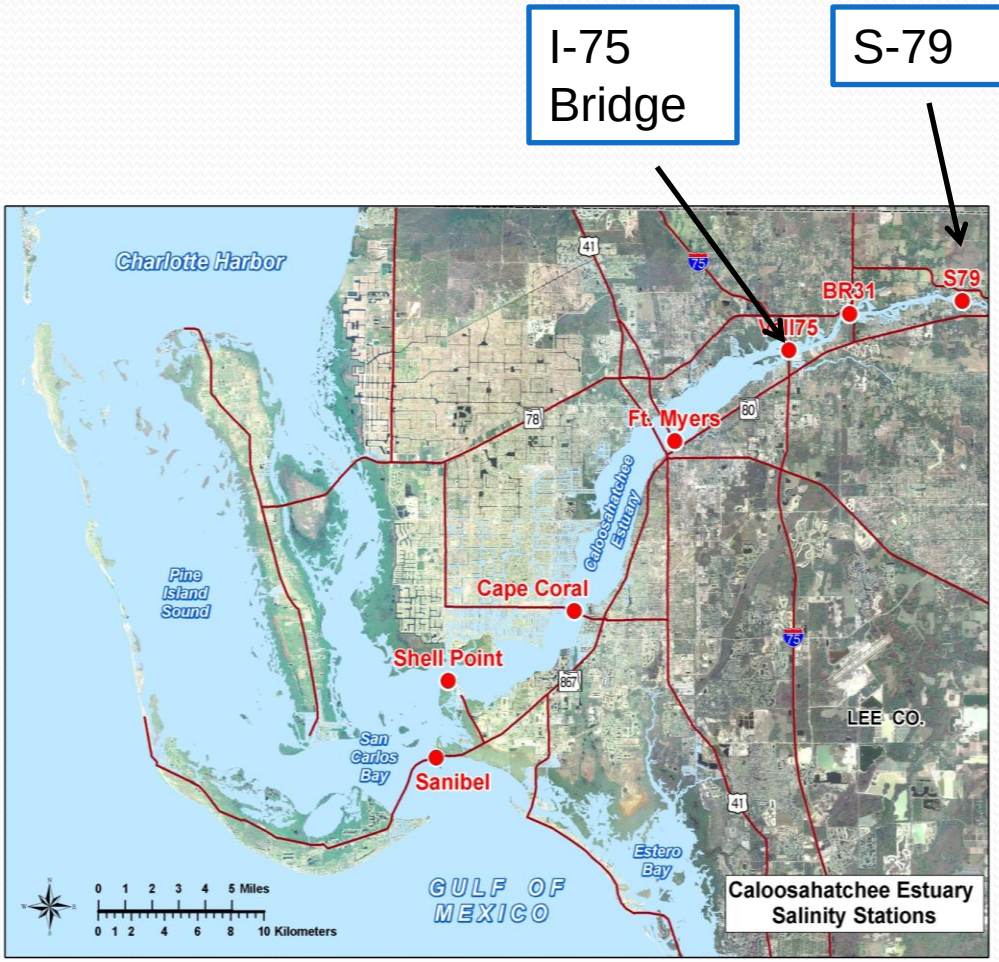
Picayune Strand Restoration Project



Operation and Maintenance

- Ecologists/biologists involvement in SFWMD weekly operations meetings

Caloosahatchee Estuary



Weekly Average Salinity (psu)		
Sampling Site	**Surface**	**Bottom**
S-79 (Franklin Locks)	**3.9** (4.9)	**3.9** (5.2)
BR31	**4.0** (5.4)	**4.9** (7.4)
Val I75	**3.6** (5.5)	**7.3** (10.9)
Ft. Myers Yacht Basin	**11.2** (16.1)	**12.2** (17.4)
Cape Coral	**17.4** (23.7)	**18.9** (24.8)
Shell Point	**28.3** (32.6)	**29.5** (33.1)
Sanibel	**33.6** (35.1)	**33.9** (35.5)

Lessons Learned

- Reinforce the importance of monitoring to assess ecological response
- Integrate scientists as members of the project team throughout the project lifecycle
- Incorporate science into existing processes
- Ensure flexibility in design and operations so that information can be used to make adjustments
- Utilize lessons learned from one project to inform others

Questions?

- Website: www.atkinsglobal.com/northamerica
- Eliza Hines (eliza.hines@atkinsglobal.com)
- Rebecca Burns (rebecca.burns@atkinsglobal.com)