Plan for Coordinating Science

Phase II

Science Coordination Group Meeting

November 2, 2005

Plan for Coordinating Science

- **System-wide Indicators for Restoration**
- **Needs, Gaps, and Actions**
- **Quality Assurance**
- **Tracking Progress**
- **Information Sharing**
- **Phase I & II Next Steps**

System-wide Indicators

- Definition
  - A suite of indicators that collectively provides the Task Force with a measure of the success of attaining strategic plan restoration goals for the natural and built systems
- Timeline
  - Recommended 2006 list to the Task Force – JAN 06
  - Task Force Comments due – JAN 06
  - Public Comment – FEB 06
  - Independent Scientific Review – FEB / MAR 06
  - SCG final review – MAR / APR 06
  - Final recommendations to Task Force – APR 06

Potential Suite of System-wide Indicators

Drafting for 2006 Report

- ✓ Periphyton-Epiphyton
- ✓ Fish & Macroinvertebrates
- ✓ Big Wading Birds
  - ✓ (Spoonbill, Woodstork, White Ibis)
- ✓ Eastern Oysters
- ✓ Juvenile Pink Shrimp
- ✓ Florida Bay Algal Blooms
- ✓ Florida Bay Submerged Aquatic Veg.
- ✓ Lake Okeechobee Littoral Zone
- ✓ American Alligator
- ✓ American Crocodile

Potential Development for 2006 Report

- ✓ Invasive Exotic Plants
- ✓ Water Supply
- ✓ Salinity Intrusion in the Biscayne Aquifer

Under Consideration – Not Ready for 2006

- ✓ Flood Protection & Aquifer Water Levels
- ✓ Per Capital Water Use
- ✓ Water Re-use
- ✓ Changes in Land Use
- ✓ Vegetation Pattern-Mosaic
- ✓ Contaminants

System-wide Indicators

- Ten technically complete peer-reviewed indicators recommended by the SCG
- Expected to be ready for 2006 biennial report
  - Periphyton-Epiphyton
  - Fish & Macroinvertebrates
  - Big Wading Birds (Spoonbill, Woodstork, White Ibis)
  - Eastern Oysters
  - Juvenile Pink Shrimp
  - Florida Bay Algal Blooms
  - Florida Bay Submerged Aquatic Vegetation
  - Lake Okeechobee Littoral Zone
  - American Alligator
  - American Crocodile

System-wide Indicators

- 3 indicators are still under consideration & development by the SCG
- These <u>may</u> be ready for inclusion in the 2006 biennial report
  - Invasive Exotic Plants
  - Water Supply
  - Salinity intrusion in the Biscayne Aquifer

System-wide Indicators

- Six indicators are still under discussion or early development
- These probably will not be ready for inclusion in the 2006 biennial report
  - Flood Protection & Aquifer Water Levels
  - Per Capita Use of Water
  - Water Reuse
  - Changes in Land Use
  - Vegetation Patterns/Mosaic (including uplands & wetlands)
  - Contaminants (2-3 years from completed indicator development)

Built System Indicators – Under Development

- Two indicators approved by SCG for development
  - Water Supply
  - Salinity intrusion in the Biscayne Aquifer
- Will be finalized by January SCG meeting

Indicator 1: Water Volume: the relationship between *new* freshwater captured and how it is distributed among the built and natural systems

- Adapted from the RECOVER interim target
- This indicator measures the supply of *new* freshwater captured for potential distribution and compares it to freshwater demand from both the built and natural systems
- The amount of *new* freshwater volume captured (acre feet) will be compared to demand, which is defined by policy decisions of how water is allocated among the built and natural systems
  - The key driver of built system demand is population growth

Indicator 1: Water Volume: the relationship between *new* freshwater captured and how it is distributed among the built and natural systems (cont.)

- The collective determination of how much *new* freshwater is captured over time and how it is allocated among the built and natural systems will indicate compatibility. For compatibility to be achieved:
  - The amount of *new* freshwater captured must meet stated targets
  - *New* freshwater captured must be distributed appropriately among the built and natural systems
- RECOVER's interim targets for *new* water captured are 1,084,000 acre-feet in 2010 and 1,871,000 acre-feet by the end of CERP implementation (in 2050)

Indicator 2: Salinity intrusion in the Biscayne Aquifer

- Adapted from the RECOVER interim targets that protect coastal aquifers from saltwater intrusion
- This indicator measures the salt intrusion line or salinity levels in coastal aquifers.
- There is a system of monitoring chloride levels in coastal aquifers and the Subgroup is assessing whether this measurement is suitable for this indicator.

Indicator 2: Salinity intrusion in the Biscayne Aquifer (cont.)

- If no measure of salinity is deemed suitable, the Subgroup may also consider canal water levels maintained by SFWMD as a “surrogate” indicator for coastal aquifer salinity levels. If canal water levels decrease despite SFWMD’s efforts to maintain appropriate levels, this would indicate increased likelihood of saltwater intrusion in coastal aquifers, suggesting increased incompatibility.
- Regardless of the system of measurement selected by the Subgroup for this indicator, increased salinity would indicate increased incompatibility while decreased salinity would indicate increased compatibility. No change in salinity levels would indicate no change in current compatibility.

Built System Indicators – Tentative

- Four are under consideration and would require additional development
  - Per Capita Use of Water
  - Water Reuse
  - Flood Protection & Aquifer Water Levels
  - Changes in Land Use

Tentative Indicator 3: Per Capita Use of Water

- Adapted from the Southwest Florida Feasibility Study (SWFFS)
- This indicator measures freshwater supply in the context of its demand by the built system. It measures the amount of total freshwater used and normalizes that amount by the population to derive a consistently measurable indicator expressed in terms of “per capita”
- Increases in per capita water use would indicate increased incompatibility because the amount of freshwater used in the built system would be increasing at a faster rate than the population. Decreases in per capita water use would indicate increases in compatibility, suggesting successful water conservation and management

Tentative Indicator 4: Wastewater Reuse

- This indicator resulted from Subgroup discussion
- It focuses on the concept that reuse of wastewater before it is discharged back to sea or lost from the system through deep injection wells mitigates demand for *new* freshwater, and therefore increases compatibility
- The Subgroup is considering different options on how to best describe this indicator. Options discussed so far include:
  - Land area with access to reused (reclaimed) wastewater
  - Per capita use of reused (reclaimed) wastewater
  - Percent water supply reused (reclaimed) wastewater
  - Volume increase in reused (reclaimed) wastewater

Tentative Indicator 5: Aquifer Water Levels and Flood Protection

- To be discussed at Built System Indicator Subgroup Meeting

Tentative Indicator 6: Change in Land Use/Impervious Surface by Land Use Type

- To be discussed at Built System Indicator Subgroup Meeting

Next Steps

- Finalize Water Supply and Salinity of Biscayne Aquifer indicators by January SCG meeting.
- Address four tentative indicators based on SCG guidance provided at today's meeting
  - Subgroup to continue developing the tentative Built System Indicators?
  - Indicators linked specifically to restoration projects or generally to goals?
  - Subgroup to conduct subsequent meetings to further define them.
  - Additional work may be required beyond the January SCG meeting to finalize the tentative Built System Indicators

Ecological Indicators

- Template created and indicator drafting requested

Indicator	Source	Lead	Status
Periphyton-Epiphyton	RECOVER	Evelyn Gaiser	Accepted
Fish & Macroinvertebrates	RECOVER	Joel Trexler	DONE
Big Wading Birds (Woodstork, White Ibis)	RECOVER	John Odgen	Requested
Big Wading Birds (Roseate Spoonbill)	RECOVER	Jerry Lorenz	Requested
Eastern Oysters	RECOVER	Patti Sime	Requested
Juvenile Pink Shrimp	RECOVER	Joan Browder	Requested
Florida Bay Algal Blooms	RECOVER	Peter Ortner	Requested
Florida Bay Submerged Aquatic Vegetation	RECOVER	Peter Ortner	Requested
Lake Okeechobee Littoral Zone	RECOVER	Matt Harwell	Requested
American Alligator	RECOVER	Ken Rice	Accepted
American Crocodile	RECOVER	Frank Mazotti	Accepted
Invasive Exotic Plants	Other	Bob Doren	Accepted

Ecological Indicator Next Steps

- Complete first draft of ecological indicators by November 14
- SCG and Sub-team review products by early December
- Prepare for and conduct ISR January

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Need

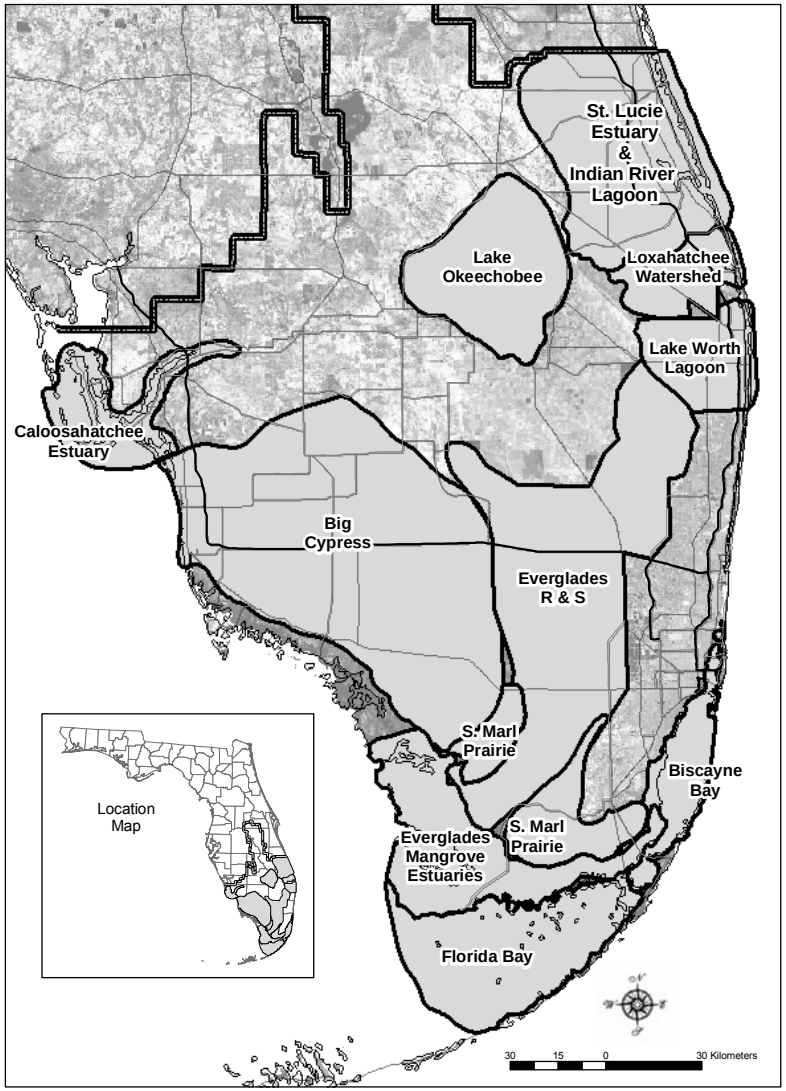
- A process or phenomenon that must be rigorously understood to make sound ecosystem restoration decisions and support ecosystem restoration success
  - Example:
    - To understand and predict the effects of water management, restoration of Keys' tidal passes (i.e., Flagler's Railway [Keys' Fill]), local development, and agricultural practices on Florida Bays
      - ✓ Salinity
      - ✓ Water Quality (e.g., light, nutrient availability)
      - ✓ Seagrass communities, associated nurseries (e.g., pink shrimp), and higher trophic functions (e.g., forage base for fish-eating birds)

Gap

- When there is not a full understanding of a process or phenomenon or an effort is not in place to achieve that understanding in a timely manner to address ecosystem restoration needs
  - Examples:
    - Fully implementing critical elements within the FBAMS Science Plan and its evaluation of current restoration plans and alternative plans (e.g., DON availability, mudbank evolution, and improved bathymetry)
    - Fully implementing and sustaining the CERP MAP for the Southern Estuaries. The USACE and the SFWMD fund part but not all of the CERP MAP. Task Force coordination and agency actions are required to fully implement and sustain RECOVER/MAP
    - Sustaining critical elements within the FBAMS Science Program and completion of the FB/FKFS water quality model in accordance with the Feasibility Study Project Schedule to provide timely recommendations to upstream CERP projects

Action

- A step taken that is the most effective way to address a gap
  - Example:
    - Review FB/FKFS model progress, implementation of the CERP MAP for the Southern Estuaries, and the FBAMS Strategic Science Plan



Conceptual Ecological Models by CERP MAP Modules

Northern Estuaries

- Caloosahatchee Estuary
- Lake Worth Lagoon
- St. Lucie Estuary & Indian River Lagoon
- Loxahatchee Watershed

Southern Estuaries

- Biscayne Bay
- Everglades Mangrove Estuaries

Greater Everglades Wetlands

- Everglades Ridge and Slough
- Southern Marl Prairies
- Big Cypress Regional Ecosystem

Lake Okeechobee

Total System

Phase II Approach for Need, Gap, and Action Identification

- Identifying Needs
  - Major hypothesis clusters from CERP's Monitoring and Assessment Plan (MAP) Regional Modules were reviewed by CEM sub-teams to identify critical science needs for the remaining South Florida CEMs
- Identifying Gaps
  - Each CEM sub-team evaluated their science initiatives with respect to each identified need to ascertain any gaps in scientific understanding for their region.
- Identifying Actions
  - Each CEM sub-team recommended actions that they considered the most effective way to fill the gaps identified for their MAP Module.

Phase II Approach for Need, Gap, and Action Identification

- Two Workshops Held on August 16 - 17 and September 15
  - Draft science needs with associated gaps and actions were identified for all MAP Modules:

Module	Needs	Gaps	Actions
Northern Estuaries	10	21	12
Southern Estuaries	4	13	3
Greater Everglades	9	13	9
Lake Okeechobee	5	10	4
Total System	4	4	5
TOTAL	32	61	31

  - Because of the overlapping nature of some needs identified (e.g., multiple hydrological or water quality needs for a region), needs are being reviewed for consolidation into major overarching needs for each Module

Consolidation of Science Needs

- Example of Needs Identified for the Northern Estuaries
  - To understand and evaluate the spatial extent of submerged aquatic vegetation (SAV) in the Northern Estuaries (NE)
  - To understand and predict the extent of SAV beds as related to suitable substrate (assessment of both suitable and non-suitable substrate for SAV)
  - To understand and predict the relationship between fish populations (fauna) and bottom types (i.e., sediment types, vegetation, oysters, etc.) in the NE
  - To understand and predict how changes in oyster reefs affect the associated floral and faunal communities inhabiting and surrounding them

- Consolidated Need
  - To understand and characterize the spatial distribution, conditions, and ecological relationships among Northern Estuaries:
    - submerged substrates
    - SAV
    - associated benthos
    - oysters
    - fish

Next Steps

- Consolidating needs, gaps, and actions
  - Anticipate consolidation complete for CEM sub-team review by November 14
    - Sub-team will receive consolidated and unconsolidated for review.
  - Anticipate consolidated needs, gaps, and actions to be reported at January SCG meeting
    - Consolidated and unconsolidated versions will be provided
- PCS needs, gaps, actions CEM summaries (for Plan)
  - Anticipate beginning after approval of needs, gaps, and actions by SCG
  - Anticipate draft text for SCG review one month after SCG approval of consolidated needs, gaps, and actions

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Ensuring Quality Science

- Why quality science needed
- Definitions
- Needs, gaps, and actions
- Next steps

Why the Task Force Needs Quality Science

- The quality of science products developed by the Task Force – whether new work or synthetic work of others – and its ability to effectively coordinate is controlled at three separate levels
  - Science institution (e.g., member agency or contractor)
  - Task Force (e.g., SCG and other scientists)
  - Third-party reviewers (e.g., ISR panels, science advisory boards, GAO)
- No evidence that the current process of ensuring quality of science used by the Task Force is broken
- Improved application, documentation, transparency, and communication of agency quality systems will:
  - Improve defensibility of results
  - Speed understanding of conflicting scientific interpretations
  - Reduce uncertainty of coordination decisions

Definitions

- Peer Review
  - A system whereby research is scrutinized by independent experts (peers)
  - Serves both technical function (i.e., ensuring that the science is sound) and subjective function (e.g., promoting science that is interesting, important, or groundbreaking) [Source: http://www.parliament.uk/post/pn182.pdf]
  - Numerous institutions and agencies have policies and procedures for conducting peer reviews, including:
    - All scientific journals
    - U.S. EPA [e.g., Science Policy Council Peer Review Handbook, December 2000, EPA 100-B-00-001, http://www.epa.gov/osa/spc/pdfs/prhandbk.pdf]
    - OMB [e.g., Final Information Quality Bulletin for Peer Review, December 2004, http://www.whitehouse.gov/omb/memoranda/fy2005/m05-03.pdf]

Definitions (cont.)

- Independent Science Review (ISR)
  - Relatively recent term, closely related to peer review in concept and practice
  - Usually refers to the *review of policy issues and decisions involving natural resource management and conservation.* Whereas, the classical definition of peer review (and the Task Force's use of this term) is the technical review of results from individual mechanistic or reductionist science projects
  - ISR concepts and practices are described in legislation and by numerous public and private institutions, including:
    - Section 610(j) of WRDA 2000, which requires the establishment of an ISR panel to review CERP's progress toward achieving the natural system restoration goals
    - National Research Council, *Strengthening Peer Review in Federal Agencies That Support Education Research*, 2004
    - U.S. Senate hearings (e.g., Independent Peer Review of Products that Support Agency Decision-Making, 5 March 2003, http://www.house.gov/transportation/water/03-05-03/03-05-03memo.html)
    - Society for Conservation Biology (Conserv. Biol. 12:268-270), which discusses application of IRSs for "…complex environmental issues [that] demand scientifically appropriate and politically acceptable solutions" [Source: http://www.eicc.bio.usyd.edu.au/news/?nov98.html#natural%20resource%20management]

Definitions (cont.)

- Synthesis of Science
  - *Translation* of research findings from different studies (that may cross multiple spatial, temporal, or topical parameters) to a common scale or interpretation
- Integration of Science
  - *Coordination* of separate but related (e.g., topical, regional) science studies or hypotheses for the purposes of improving the science efficiency of the studies (i.e., makes the whole greater than the sum of the parts)

Needs for Ensuring Quality Science

- Ensure that Task Force science products are of sufficient quality
- Task Force needs to assist agencies ensure that their data, research, models, monitoring, science applications, and reports are of sufficient quality to be scientifically defensible. Quality is assured through:
  - Implementation of a quality system (e.g., through a Quality Assurance Unit, QAU)
  - Standardization, review, and implementation of methods and experimental protocols by appropriately trained individuals
  - Rigorous data management and data sharing procedures
  - Peer reviews of results
- Task Force needs integrated and synthesized science information to understand differing interpretations and to coordinate restoration

Gaps for Ensuring Quality Science

- Task Force does not have an established system or process to assure quality of its science products
- There is uncertainty about:
  - Whether agencies have established quality systems or data management/sharing procedures
  - What they are composed of
  - How they are applied
- Task Force has no established processes or criteria for obtaining meta analyses or synthesis of science information

Actions for Ensuring Quality Science

- Task Force should develop or identify tools or a system to conduct independent reviews of its science products
- For agencies <u>with</u> established, transparent quality systems and data management/sharing procedures, the agencies should be encouraged to review their systems relative to their coordination and support of South Florida ecosystem restoration needs, Task Force goals, and RECOVER activities
- For agencies <u>without</u> established quality systems or data management/sharing procedures, the agencies should be encouraged to develop systems that support the defensibility of their science work and the needs of South Florida ecosystem restoration
- Task Force needs to develop tools, processes, or a system for meta analysis and synthesis of science information

Need 1. Task Force needs to ensure that its science products are of sufficient quality

- Action: Task Force should develop or identify tools or a system to conduct independent reviews of its science products
  - Develop a general statement of agreement among Task Force agencies regarding the value and importance of an established quality system with independent reviews for science products
    - Example statement developed by Information Sharing Subgroup: *"Data should be made as widely and freely available as possible while safeguarding the privacy of participants, and protecting confidential and proprietary data."*
  - After evaluating existing tools and systems for conducting reviews, develop a consistent, transparent system that includes criteria for independent reviews, work-plan templates for reviewers, and a method (e.g., task-order contract) for executing timely, value-added reviews
    - Apply lessons learned from the ISR of the *Phase I PCS,* ISR of *RECOVER Interim Goals and Targets Report*, and the upcoming ISRs of the ecological and built-system indicators

Need 2. Task Force needs to help agencies ensure that their data, research, models, monitoring, science applications, and reports are of sufficient quality to be scientifically defensible

- **Action:** For agencies with established, transparent quality systems and data management/ sharing procedures, the agencies should be encouraged to review their systems relative to their coordination and support of South Florida ecosystem restoration needs, Task Force goals, and RECOVER activities
  - Task Force will support agencies by providing examples and sources of quality assurance (QA) and quality control (QC) information to Task Force members, including:
    - RECOVER's quality system
    - Data management and data sharing procedures
    - Federal guidance (e.g., EPA)
    - Association and industry guidance (e.g., American Society for Quality)

Need 2. Task Force needs to help agencies ensure that their data, research, models, monitoring, science applications, and reports are of sufficient quality to be scientifically defensible (cont.)

- **Action:** For agencies <u>without</u> established quality systems or data management/sharing procedures, the agencies should be encouraged to develop systems that support the defensibility of their science work and the needs of South Florida ecosystem restoration
  - Task Force will support agencies by providing examples and sources of quality assurance (QA) and quality control (QC) information to Task Force members, including:
    - RECOVER's quality system
    - Data management and data sharing procedures
    - Federal guidance (e.g., EPA)
    - Association and industry guidance (e.g., American Society for Quality)

Need 3. Task Force needs integrated and synthesized science information to understand differing interpretations, and to make coordination decisions

- **Action:** Task Force needs to develop tools, processes, or a system for meta analysis and synthesis of science information
  - Options include:
    - Standing panel of experts to integrate information or evaluate technical disagreements
    - Criteria or triggers for involving external advisory bodies (e.g., National Research Council, EPA Science Advisory Board) or convening of special-topic workshops and conferences
    - Open task-order contracts with consultants and institutions that specialize in meta analyses, synthesis of science, and science product development and application, and the review of such products

Next Steps

- Address SCG's response to the proposed actions
- Develop draft Task Force quality system policies and procedures
- Evaluate upcoming ISR lessons learned

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Review of PCS Needs, Gaps, and Actions for Tracking Progress

- **Needs**
  - Track progress to ensure that gaps are being addressed in a timely manner and status is being reported to the Task Force
  - Periodically review science needs and gaps, review the method for identifying needs and gaps to incorporate improvements, and update the Plan for Coordinating Science to incorporate lessons learned and indicate the progress of filling gaps
- **Gaps and Actions**
  - Develop processes for tracking the progress of filling gaps
  - Develop processes for periodically reviewing science needs and gaps, reviewing the method for identifying needs and gaps to incorporate improvements, and updating the Plan

Tracking Progress of Filling Gaps

- Purpose
  - Monitoring the progress of action completion to support annual briefings to the Task Force
  - Support the Biennial Report
- Method
  - Basic tool (e.g., spreadsheet or Gantt chart)
  - More sophisticated tool
    - Database with detailed information on projects
    - Interactive capability (by SCG members or member agencies)
      - ✓Can be incorporated in proposed information sharing tool
- Need
  - SCG input on desired content and access to tracking information

Periodically Review Needs, Gaps, Actions; Incorporate Improvements; and Update the Plan

- Purpose
  - Reevaluate the approach for identifying need gaps and actions to incorporate improvements
  - Reassess needs and gaps
  - Update the Plan to incorporate lessons learned
- Method
  - Ensure process identified in Phase I adequately covers the approach and update as necessary for Phase II
    - Brief the Task Force on action status once per year
    - Conduct biennial review of the Plan
      - ✓Reassess needs, gaps, and action approach and results
      - ✓Evaluate success of the plan in addressing gaps

Next Steps

- Address SCG input on task tracking information content and access
- Update Phase I Task Tracking section

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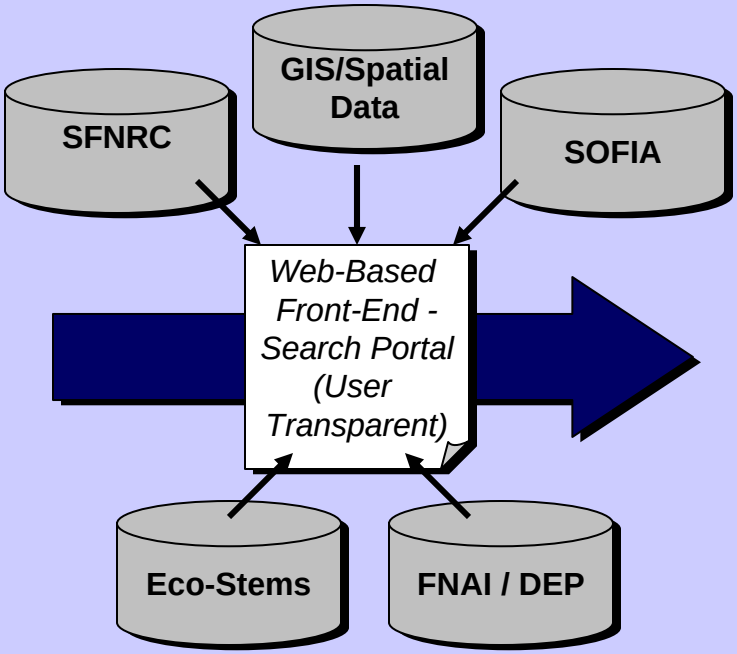
Potential Web-based Search Tool

Possible Information Components

- Project Information
  - Title and Abstract
  - PI Name and Contact Info
  - Amount of Funding / Duration
- Final Project Reports
- Publication / Research Products
- Summarized/Reported Data
- SFERTF Calendar Input
  - Conferences
  - Symposia
  - Workshops
  - Other Related SF Restoration Projects
- Special Reports
- Management Information / Analysis
- Agency Reports and Plans
- Other Restoration Programs in SF

Information Sharing Diagram



Possible Outputs

- Monthly/Quarterly SCG Newsletter
- SCG Calendar
- PI / Project Info
- Ad-Hoc Reports
- Bi-Annual TF Report
- Five-Year Report to Congress
- SF Environmental Report (SFWMD)
- Progress tracking

Exploration Process

	October / November	*November / December*	*December/January*
	Conduct IT/ System Interviews	**Develop Information Sharing Portal Requirements**	**Present and Review High-Level Portal Requirements**
Objectives	*To develop a baseline understanding of South Florida IT systems related to restoration*	*To determine the basic and longer term system requirements to implement an information sharing portal*	*To present basic and more advanced potential portal characteristics and determine a course for moving forward*
Key Activities	▸ Determine Interviewees ▸ Develop Interview Guide ▸ Schedule and Conduct Interviews	▸ Determine high-level requirements for basic information sharing portal, including rough cost ▸ Determine high-level requirements for additional advanced functionality, including rough cost ▸ Identify a demonstration portal	▸ SCG presentation of information sharing portal options ▸ SCG demonstration of information sharing tool
Outputs	▸ Baseline of Current Task Force IT Systems related to Information Sharing	▸ Basic and advanced information sharing portal requirements ▸ Information sharing demonstration	▸ SCG recommendation to the Task Force regarding Information Sharing

Next Steps

- Continue to conduct relevant interviews and analyze interview data for Task Force systems baseline (November)
- Determine high-level requirements and cost estimate for Information Sharing portal (December)
- Prepare Information Sharing Tool Demo for SCG (January meeting)

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Phase I Actions

Topic	Action	Lead	Milestone	Status
General	Complete Phase II of PCS	SCG	9/06	On Track
Florida Bay	Review FB/FKFS, implementation of MAP for Southern Estuaries, and the FBAMS Science Plan	Task Force	12/04	
Total System	Review current status of CIWQFS and implementation in CERP MAP	Task Force	12/04	
	Work with implementing org to address necessary improvements in the NSM	SCG	9/05	
Science Applications	Design approach for developing system-wide indicators and endpoints	SCG	12/04	Complete
	Implement approach, develop indicators and endpoints, sufficient to evaluate overall restoration success	SCG	12/05	4/06
	Develop fully-vetted CEM for the Florida Keys	SCG	9/05	Part of new action