



# Approaches and Tools for Science-Decision Maker Collaboration and Actionable Science

*Patricia Gorman*

*South Florida Water Management District*

*NCER April 20, 2016*



[sfwmd.gov](http://sfwmd.gov)



# Panel Members

- April Patterson, USACOE, Everglades
- Jennifer Pratt Miles, Meridian Institute
- Craig Fischenich, ERDC Environmental Laboratory, Missouri River Recovery Program
- Jerry Kenny, Headwaters Corp., Platte River Recovery Program



# Panel Format

- Introduction to the subject matter
- Panel member self introductions
- Q & A's to stimulate an interactive dialog amongst panelists and audience
- Closing Summary



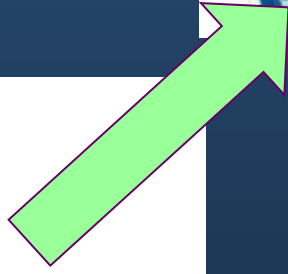
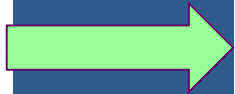
# Panel Focus

- Approaches, tools, and structures for scientist and decision maker collaboration
- Co-producing actionable science
- Barriers to and benefits of collaboration in large scale environmental restoration programs



# Scientists and Decision Makers Working Together

- Actionable science can be produced if scientists and decision makers spend more time co-defining the problem and identifying how the information will be used.
- Co-production is critical for tackling complex societal problems. Decision makers can explain the type of decisions including the legal, political, social, and fiscal constraints.





# **Sustained Collaboration Produces Actionable Science**

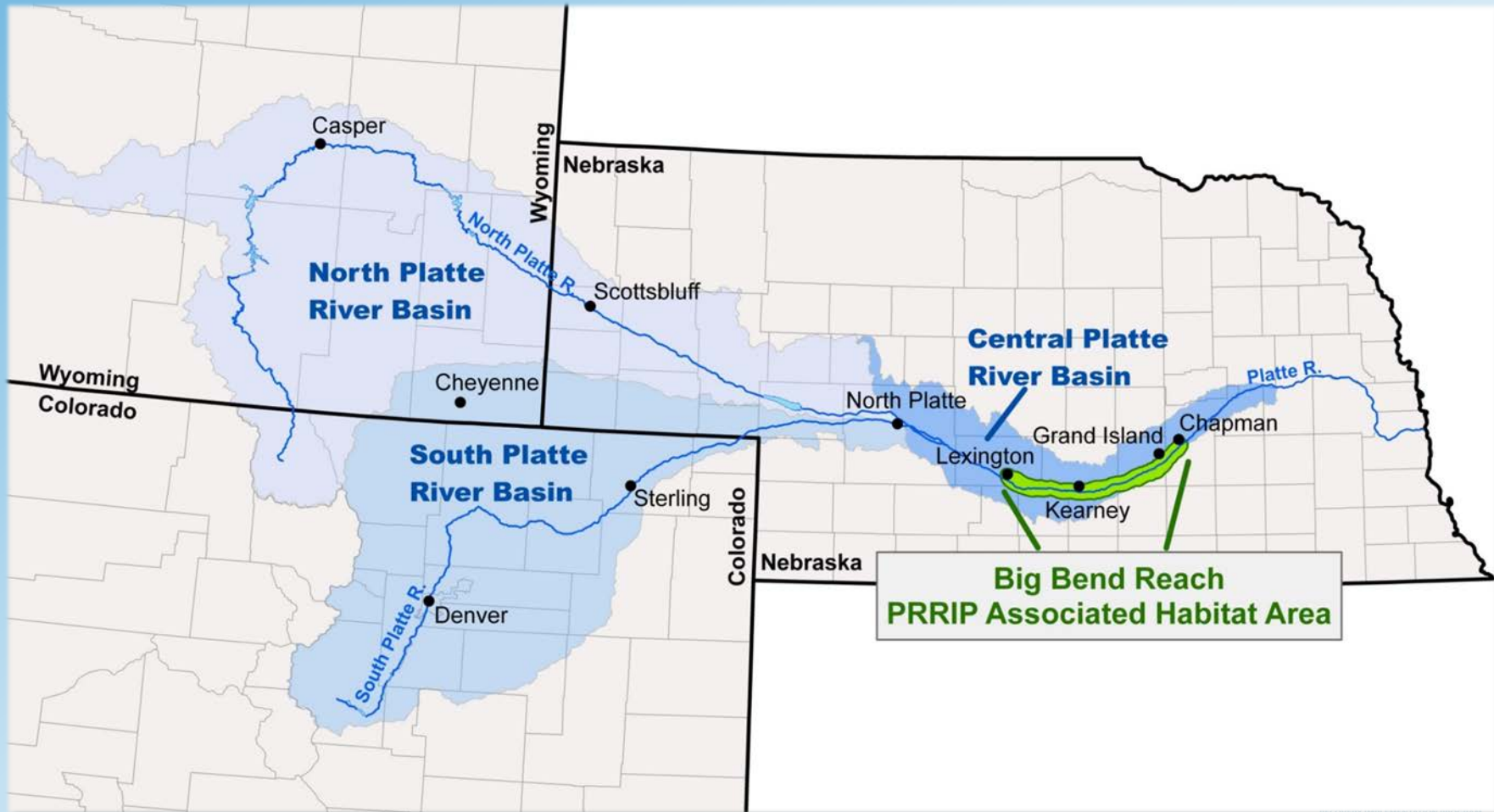
- **Sustained collaboration is needed not only to specify the research goals, but also to plan how the science will be used.**
- **To identify the most useful formats to interject scientific understanding and uncertainty into specific decisions over the entire length of a program.**



# Platte River



# Platte River Basin



# Target Species on the Platte River





Meridian Institute

Connecting People to Solve Problems

# Jennifer Pratt Miles

## Senior Mediator

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**WCA-3A**

**DPM  
Flow-  
way**

**2.5  
miles**

**Canal Backfill**

**Levee Removal**

**WCA-3B**



Meridian Institute  
Connecting People to Solve Problems

**Fred Sklar, South Florida Water  
Management District**

# CAMNet

Collaborative Adaptive Management Network



- Stakeholders, managers, and scientists collaborating.
- Management goals and objectives are clearly stated.
- Conceptual model of the system is developed.
- Key uncertainties/questions are articulated.
- Alternative management strategies are identified.
- Monitoring results are compared to objectives.
- System in place to adjust management based on learning.
- Learning is communicated among stakeholders.



Meridian Institute

Connecting People to Solve Problems

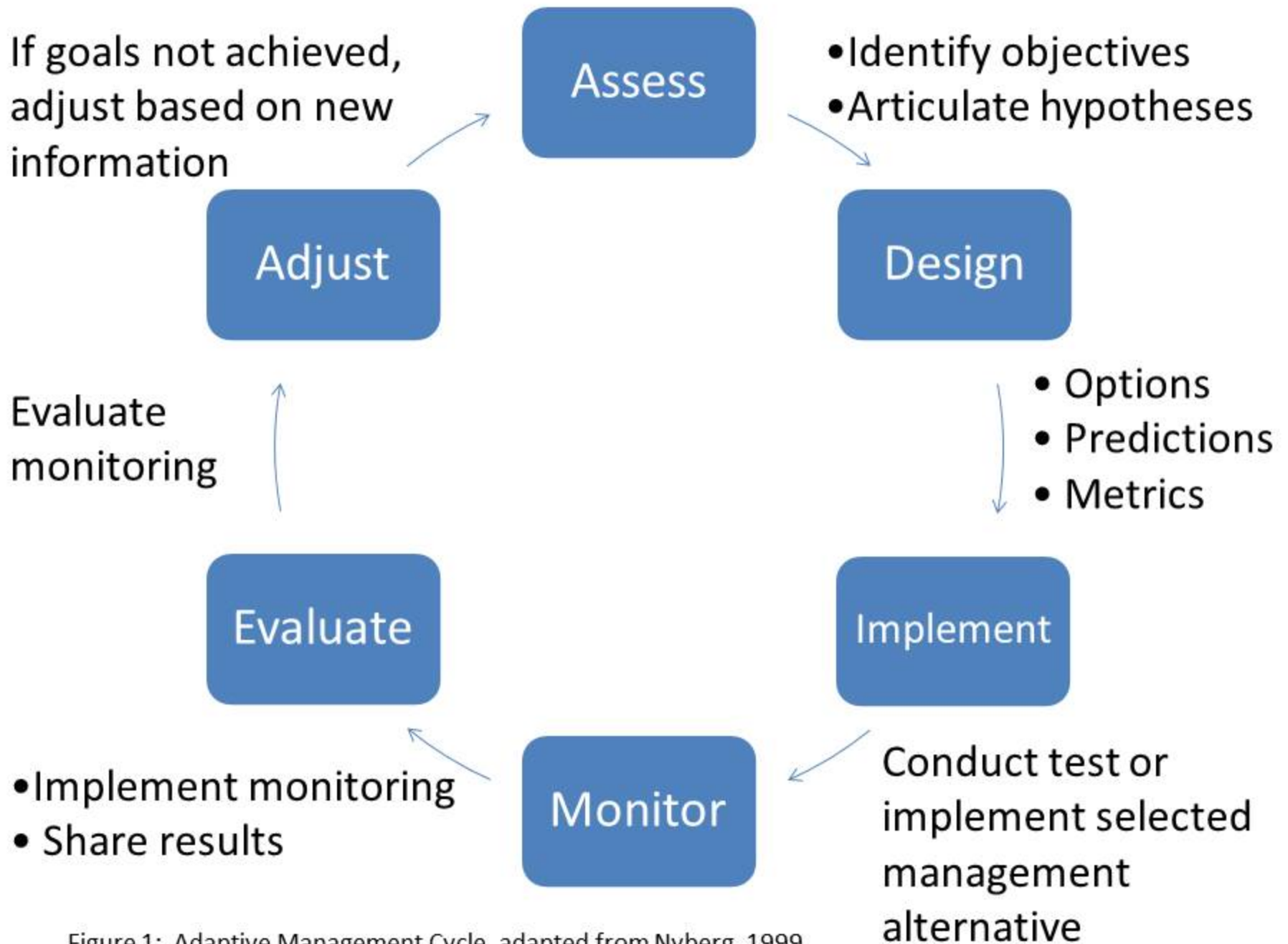


Figure 1: Adaptive Management Cycle, adapted from Nyberg, 1999.

## Panel: Approaches and Tools for Scientist-Decision Maker Collaboration and Actionable Science

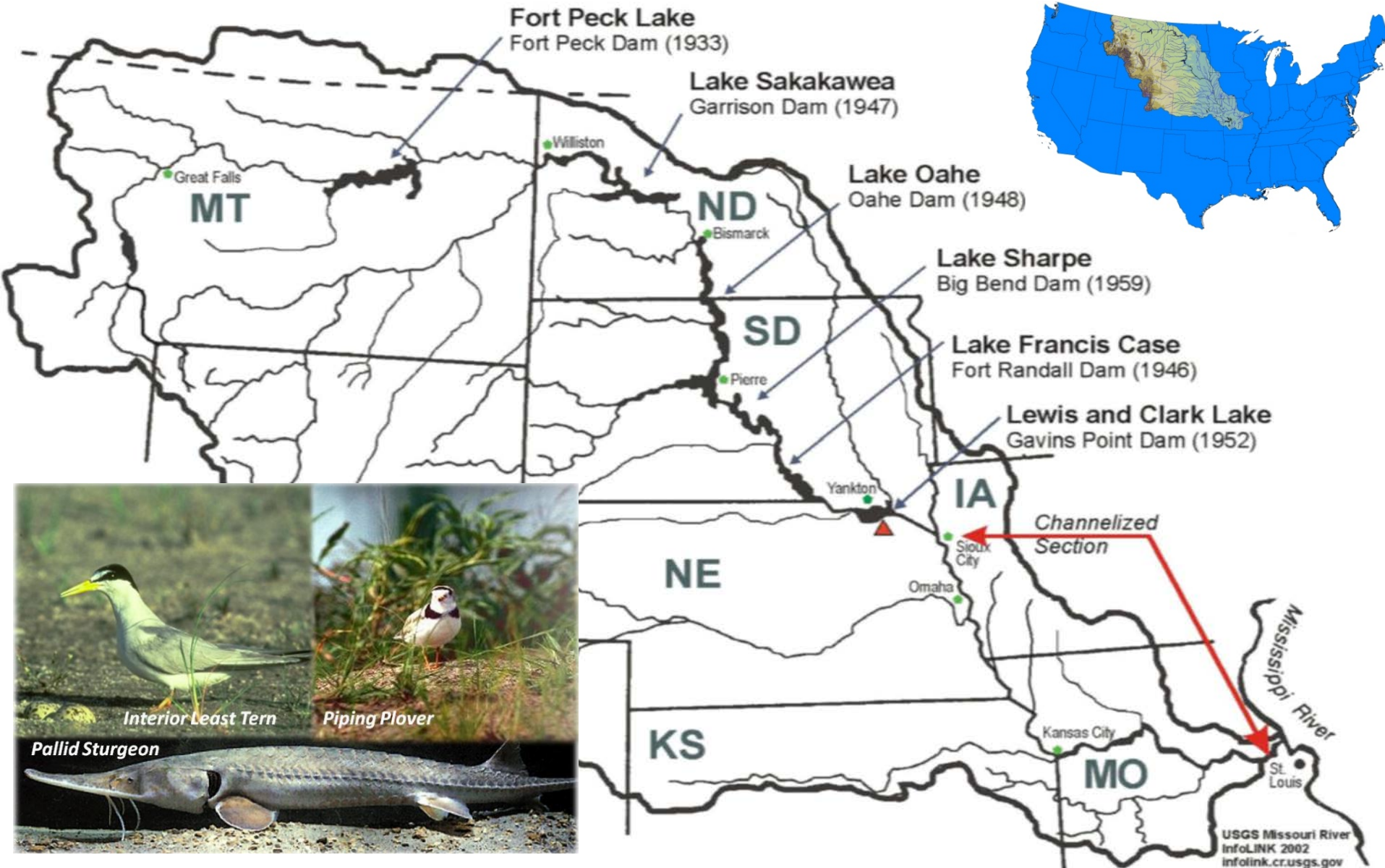
# The Missouri River Recovery Program: A Framework for Addressing Threatened and Endangered Species Challenges

Dr. Craig Fischenich  
ERDC Environmental Laboratory

NCER  
April 20, 2016  
Coral Springs, FL



# Missouri River System





# Missouri River Recovery Program

## The EMERGENT SANDBAR HABITAT PROGRAM



- Mechanically building and maintaining sandbars
- Clearing existing sandbars of vegetation

Missouri River Recovery Implementation Committee (MRRIC) established in 2007 WRDA to make recommendations to ASA(CW)

Independent Science Advisory Panel (ISAP) 2011 review of program

MRRP makeover 2013-2016

New ROD 2017

## The SHALLOW WATER HABITAT PROGRAM



- Creating 20 - 30 acres per mile of new shallow water habitat by 2020
- Widening river channel
- Restoring chutes and side channels

*“The Corps should embrace an adaptive management process that allows efficient modification/implementation of management actions in response to new information and to changing environmental conditions to benefit the species . . .” (USFWS 2000)*

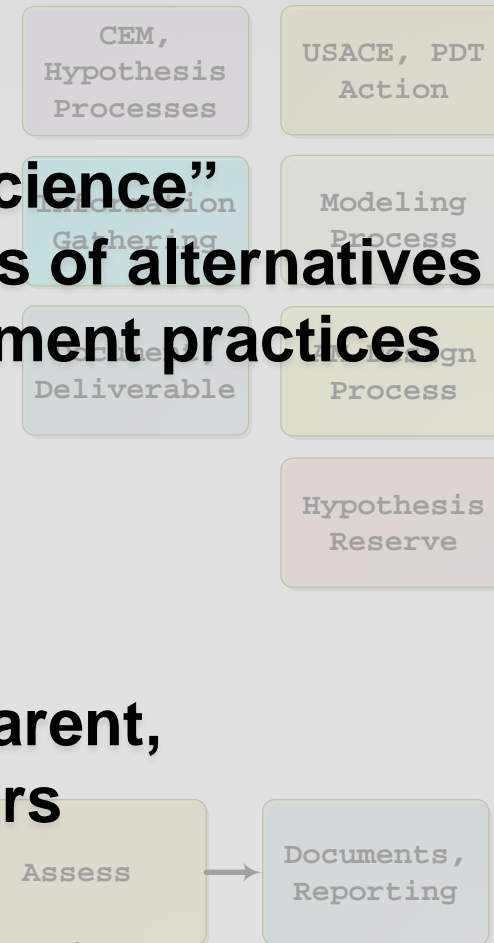
# Framework Overview

## Framework components in three parts:

- Identification of the “best available science”
- Quantification of effects and tradeoffs of alternatives
- Use of progressive adaptive management practices
  - Research and hypothesis testing
  - Targets and decision criteria
  - Governance structure/process

The framework is implemented in a transparent, collaborative environment with stakeholders

### Key



Learning

# RECOVER: Providing Sound Science to Drive Decision Making in the Comprehensive Everglades Restoration Program

April Patterson, Project Manager

National Conference on Ecosystem Restoration

April 20, 2016

*Trusted Partners Delivering Value,  
Today and Tomorrow*





# Comprehensive Everglades Restoration Plan (CERP)



BUILDING STRONG

## Restoration will:

- Improve the health of over 2.4 million acres of the south Florida ecosystem, including Everglades National Park – **Greater Everglades**
- Improve the health of **Lake Okeechobee**
- Significantly reduce damaging freshwater releases to the **Northern Estuaries**
- Improve water deliveries to Florida and Biscayne bays, **Southern Coastal Systems**
- Improve water quality
- Enhance water supply and maintain flood





# RECOVER



BUILDING STRONG

- The science behind the Comprehensive Everglades Restoration Plan (CERP)
- Provides system-wide science perspective for planning and implementation of CERP projects
- REstoration COordination and VERification
- Conducts system-wide monitoring and assessment
- Responsible for Adaptive Management Plans, Interim Goals and Targets, System Status Reports and the 5 year Report to Congress





# RECOVER Organization



BUILDING STRONG



# Question ?

**How do you define  
actionable science and  
what are some strategies  
for producing it?**

# Actionable Science

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Data, analyses, projections, or tools that can support decisions regarding management. It is ideally co-produced by scientists and decision makers and creates rigorous and accessible products to meet the needs of stakeholders.

Adapted from the Advisory Committee on  
Climate Change & Natural Resource Science  
(ACCCNRS)





# Actionable Science Principles

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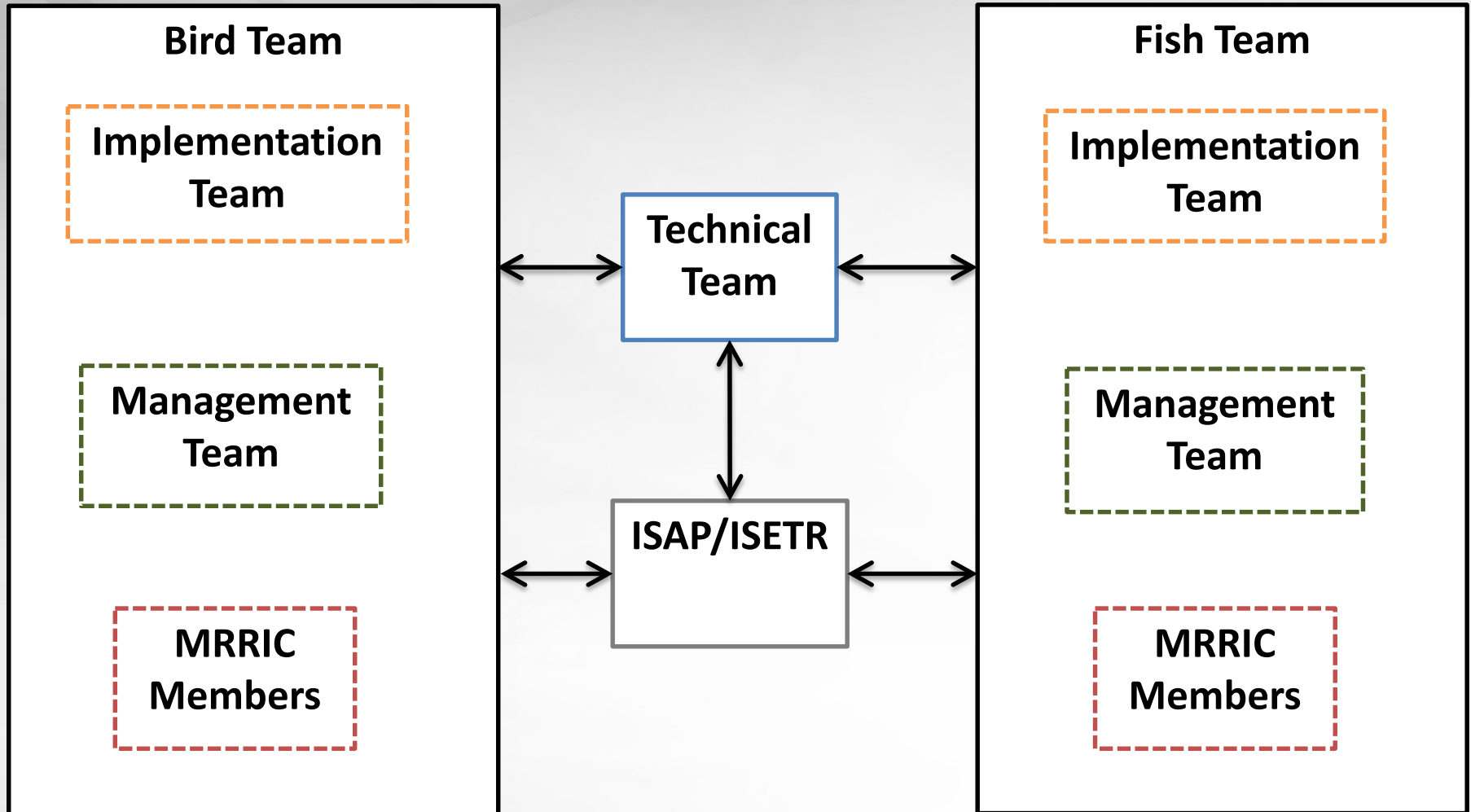
- 1. Most reliably co-produced by scientists and decision makers/managers.**
- 2. Start with a decision that needs to be made.**
- 3. Give priority to processes and outcomes in addition to products.**
- 4. Build connections.**
- 5. Evaluate - Was the science used?**



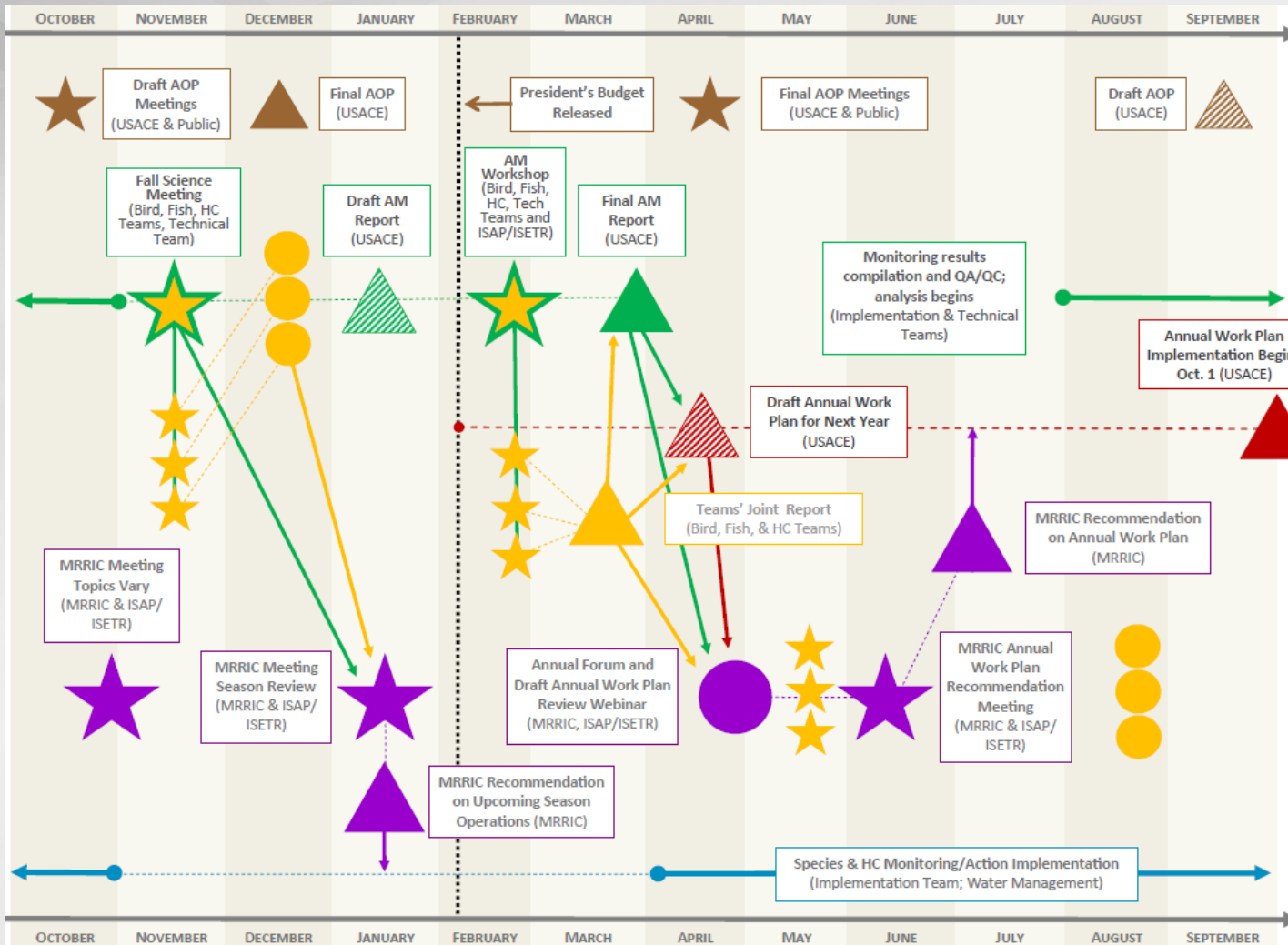
# Question ?

**What structures/processes do you have in place to facilitate communication and collaboration between scientists and decision makers/managers (e.g. what does collaboration look like)?**

# Governance Structure: Working Level



# Communication and collaboration among scientists, managers and stakeholders



## MISSOURI RIVER ADAPTIVE MANAGEMENT ANNUAL GOVERNANCE ACTIVITIES PROCESS MAPS

These process maps depict the proposed governance activities to be undertaken annually by the U.S. Army Corps of Engineers (USACE), the U.S. Fish and Wildlife Service (USFWS), and the Missouri River Recovery Implementation Committee (MRRIC) in the implementation of Adaptive Management (AM) for recovery of the endangered piping plover and pallid sturgeon in the Missouri River. These process maps reflect the governance recommendations developed by the MRRIC Adaptive Management Ad Hoc Group for consideration by MRRIC in June 2016.

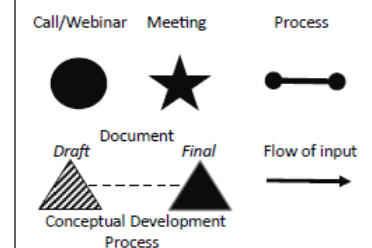
**Map 1.** The map on this page shows all the activities for any given year.

**Map 2.** The map on page two shows the same process, highlighting the sequence of Adaptive Management steps to be taken for each year's monitoring data over the following two fiscal years/three calendar years.

### Color Coding

- Brown = Annual Operating Plan Process
- Green = Monitoring Results Reporting
- Gold = Bird, Fish, and HC Team Activities
- Red = Annual Work Plan Process
- Purple = MRRIC Activities
- Blue = Monitoring, Research, and Implementation

### Key



# Structure for Implementation

- **Governance Committee**
  - States, DOI, water users, environmental groups
  - Policy and Direction
- **Independent Implementation**
  - Executive Director and EDO staff – independent contractor
  - Honest Broker
- **Land, Water, Technical Advisory Committees**
  - Representatives of stakeholders
- **Independent Science**
  - Independent Science Advisory Committee
  - Independent Peer Review
  - Independent third party contractor develops candidates



# Communication in the Science Sphere

- **Effective Communication is essential**
  - **Amongst stakeholders within a committee**
  - **Amongst Advisory Committees**
  - **Between Advisory Committees and Governance Committee**
- **Science informs decisions, Governance Committee makes the decisions**
  - **Communication of science findings to assist decision makers is critical**
  - **Science is means for reducing uncertainties**
  - **Many considerations factor into decisions**



# Question ?

**What tools and techniques do you use to convey information between scientists and managers?**

# What tools/techniques do you use to convey information between scientists and managers?

## Effects Analysis:

- ▶ Establish the best available data and science
- ▶ Develop and use conceptual and numerical models
- ▶ Identify critical uncertainties and formulate associated hypotheses

## AM Plan Development:

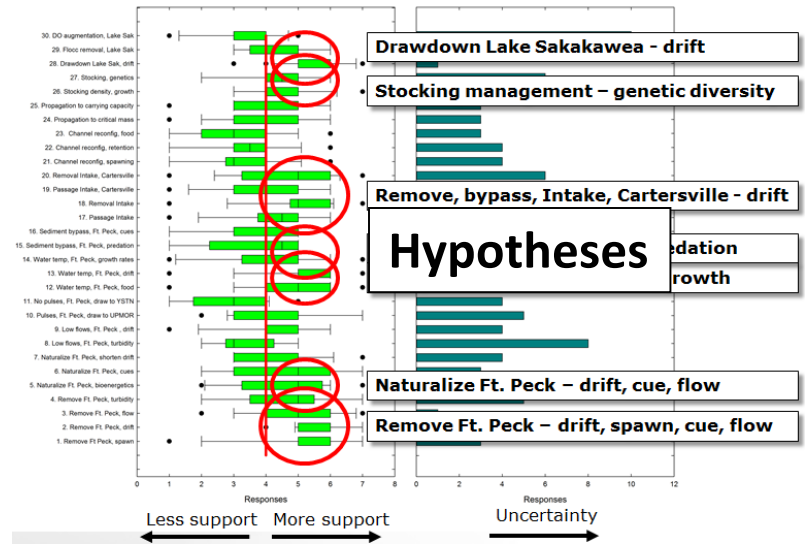
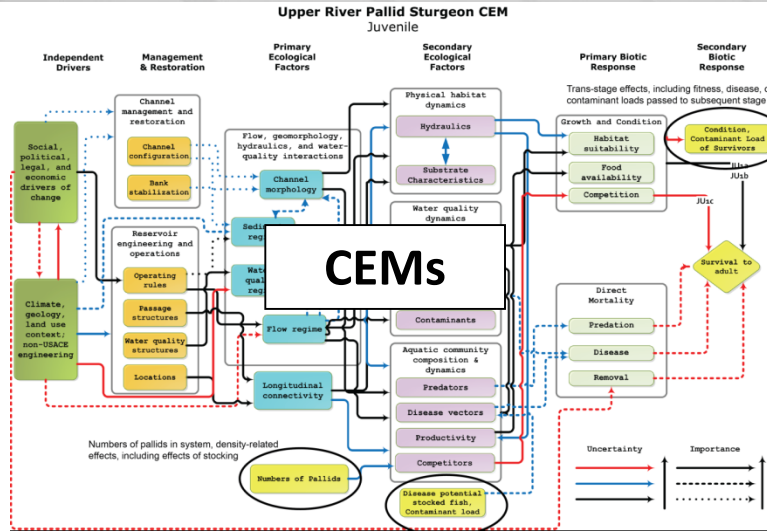
- ▶ Metrics, targets, decision criteria, decision trees, contingency plans...
- ▶ Create websites/tools for open access to information

## AM Plan Implementation:

- ▶ Periodic monitoring and assessment reports
- ▶ Science and adaptive management meetings
- ▶ Utilize independent science panels and review processes



# Science Foundation



**Table 4. Summary of time limits for level 3 implementation and scope of actions.**

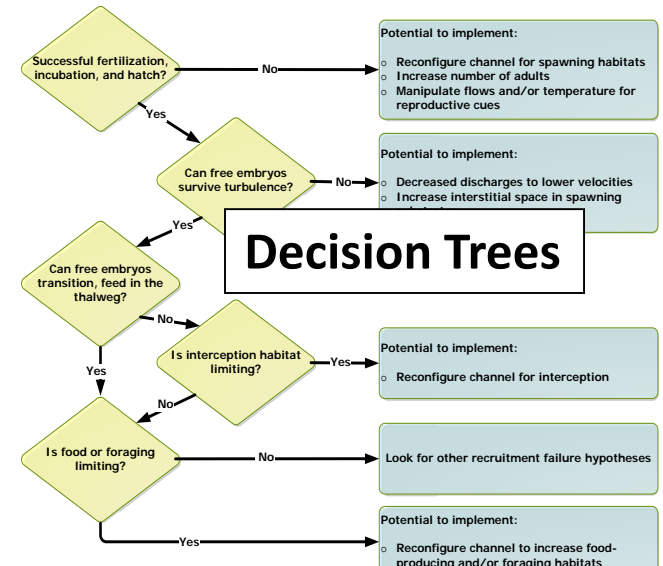
Action Category	Time Limit*	Minimum Scope	Maximum Scope
Population augmentation	Immediate	Current avg. stocking rate	Variable over time
IRC habitat development	2 years	Add 260K ac-d/yr	Add 500k ac-day/yr
Spawning habitat	2 years*	3 spawning sites	See decision tree**
Spawning cue flows			to be 1 in 3 years minimum and maximum be developed and informed by population models and impact assessments***

## Targets & Decision Criteria

\* Anticipated as Level 2 pilot projects focused on developing and evaluating high-quality spawning habitat.

\*\* Spawning habitat implementation will be guided by the decision tree and associated decision criteria as described in the section below on spawning habitat.

\*\*\* Pallid population modeling will be used to set minimum spawning flow needs; bird impacts and status may inform decisions regarding spawning cue flows below Gavins Point Dam in any particular year.





# Critical Uncertainties

PRRIP Big Question	2014 Assessment	Basis for assessment
<b>Implementation – Program Management Actions and Habitat</b>		
1. Will implementation of SDHF produce suitable tern and plover riverine nesting habitat on an annual or near-annual basis?		Peer-reviewed Program synthesis concludes that SDHF will not produce suitable nesting sandbars.
2. Will implementation of SDHF produce and/or maintain suitable whooping crane riverine roosting habitat on an annual or near-annual basis?		Trending negative; Program synthesis chapters now in development will be discussed with the TAC and ISAC and peer reviewed in 2015; those synthesis chapters and published manuscripts related to the Program's vegetation and lateral erosion research will likely support a "two thumbs down" assessment in the 2015 State of the Platte Report.
3. Is sediment augmentation necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?		Trending positive; certainty about the sediment deficit; uncertainty about the role of that deficit in habitat creation and maintenance.
4. Are mechanical channel alterations (channel widening and flow consolidation) necessary for the creation and/or maintenance of suitable riverine tern, plover, and whooping crane habitat?		Trending positive; planform management manuscript now in development will be published and will likely support a "two thumbs up" assessment in the 2015 State of the Platte Report.
<b>Effectiveness – Habitat and Target Species Response</b>		
5. Do whooping cranes select suitable riverine roosting habitat in proportions equal to its availability?		A definitive assessment is expected by 2017 once peer review of data analyses (monitoring, telemetry, stopover study data, habitat availability assessments, IGERT research) is complete.
6. Does availability of suitable nesting habitat limit tern and plover use and reproductive success on the central Platte River?		Trending positive; three documents now in development will be peer reviewed and/or published and will likely support a "two thumbs up" assessment in the 2015 State of the Platte Report.
7. Are both suitable in-channel and off-channel nesting habitats required to maintain central Platte River tern and plover populations?		Trending negative; three documents now in development will be peer reviewed and/or published and will likely support a "two thumbs down" assessment in the 2015 State of the Platte Report.
8. Does forage availability limit tern and plover productivity on the central Platte River?		Trending negative; synthesis document related to tern forage (fish) will be peer reviewed that, in combination with the results of the Foraging Habits Study, will likely support a "two thumbs down" assessment in the 2015 State of the Platte Report.
9. Do Program flow management actions in the central Platte River avoid adverse impacts to pallid sturgeon in the lower Platte River?		Peer-reviewed Program stage change study concludes Program flow management actions will avoid adverse impacts.
<b>Larger Scale Issues – Application of Learning</b>		
10. Do Program management actions in the central Platte River contribute to least tern, piping plover, and whooping crane recovery?		By definition, implementation of the Program contributes to recovery of the target species. A definitive answer for this question can only be obtained by a broader analysis of the contribution of the central Platte to range-wide recovery.
11. What uncertainties exist at the end of the First Increment, and how might the Program address those uncertainties?		This question is a "parking lot" for uncertainties that could be addressed through adaptive management in an extended First Increment or new Second Increment.

**Table 2.** 2014 Big Questions table.

# Question ?

**What challenges have you faced in your efforts to collaborate with or facilitate collaboration between scientists and decision makers? How did you overcome them?**

**How does  
it work?**

**How  
much does  
it cost?**



# Question ?

**What benefits have you seen from scientist-decision maker collaboration (e.g. how has it helped accomplish goals/save money/change how the program is executed)?**

# Question ?

**What factors do you think are most influential in enabling/inhibiting collaboration between scientists and managers in your program?**



# Communicating to Managers



BUILDING STRONG

- Sync timeline of restoration with ecosystem response reporting and planning
- Inform management about the value of investments in monitoring, modeling, and planning tools.
- Engage in planning for new projects
- Collaborate among interagency teams to communicate a unified message

# Question ?

**What specific things about your science programs' organizational structure assist with governance challenges? What do you see as the biggest impediments to effective science governance?**



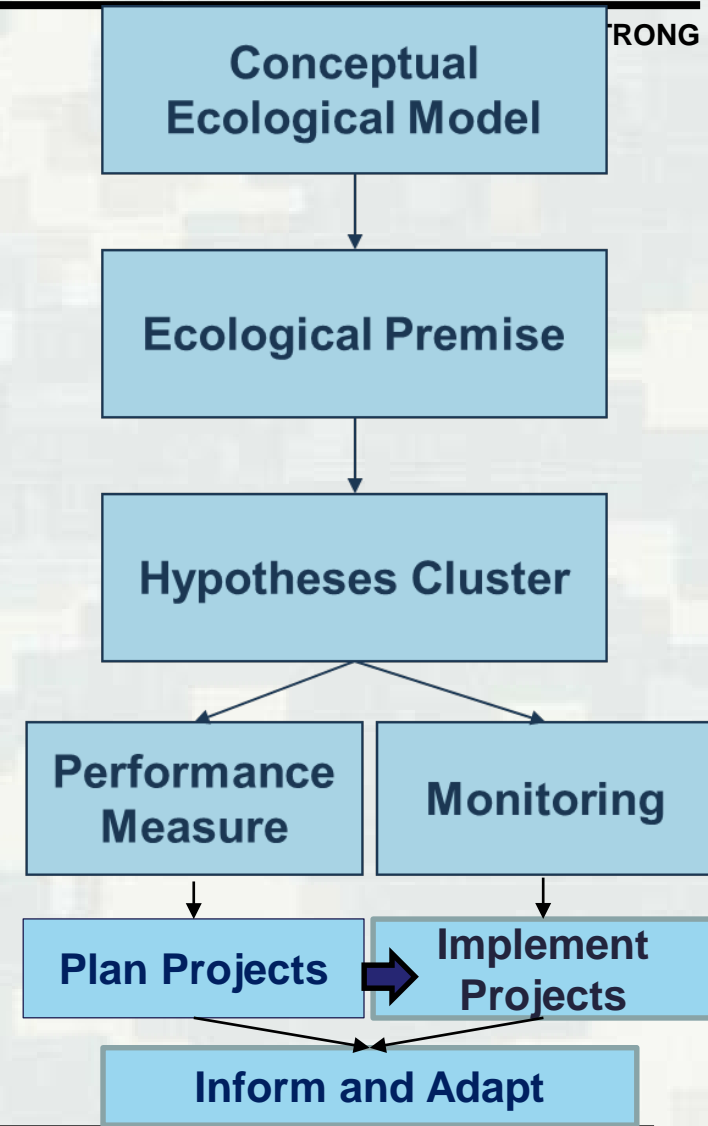


# Science Framework



TRONG

- The Monitoring and Assessment Plan (MAP)
  - ▶ Organized around Conceptual Ecological Models (CEM's)
  - ▶ Hypothesis Clusters
  - ▶ Indicator Species
  - ▶ Performance Measures
- Interim Goals and Interim Targets
- Adaptive Management





***Closing  
Comments  
and Thank  
you!***