



# Adaptive Management: From CALFED to the Co-Equal Goals

Plenary Presentation, February 3, 2021

Adaptive Management Forum

Presented by: Michael Healey

Professor Emeritus, University of British Columbia

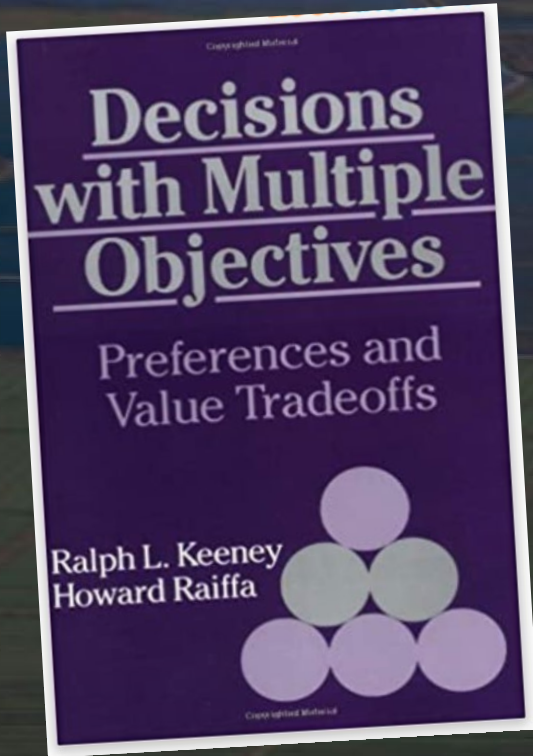


# Outline of Presentation

- Origins of Adaptive Management
  - Using decision theory and systems theory to make better management decisions.
  - Hollings' vision of Adaptive Management
- Adaptive Management in Major US Environmental Programs
- Adaptive Management in CALFED
  - Strategic Planning Team
  - Obstacles to AM implementation
  - AM Examples under CALFED
- AM and the Blue Ribbon Task Force/Delta Plan
- What has been gained from Adaptive Management

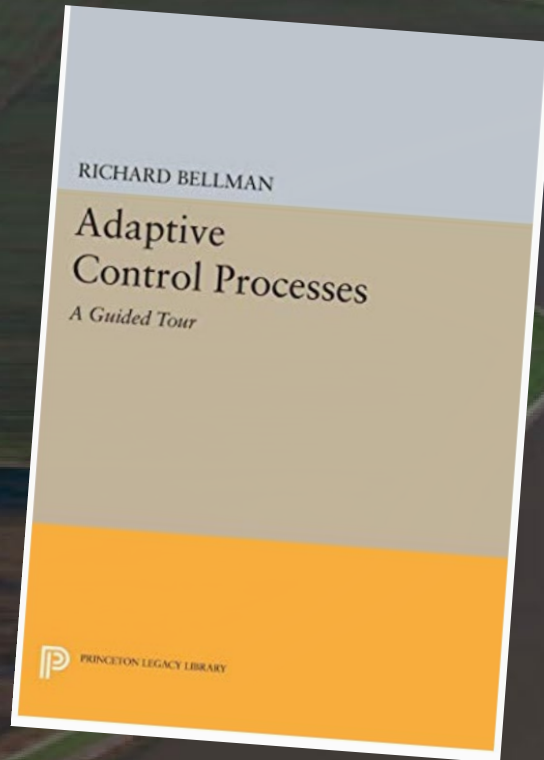


# Foundations of Adaptive Management

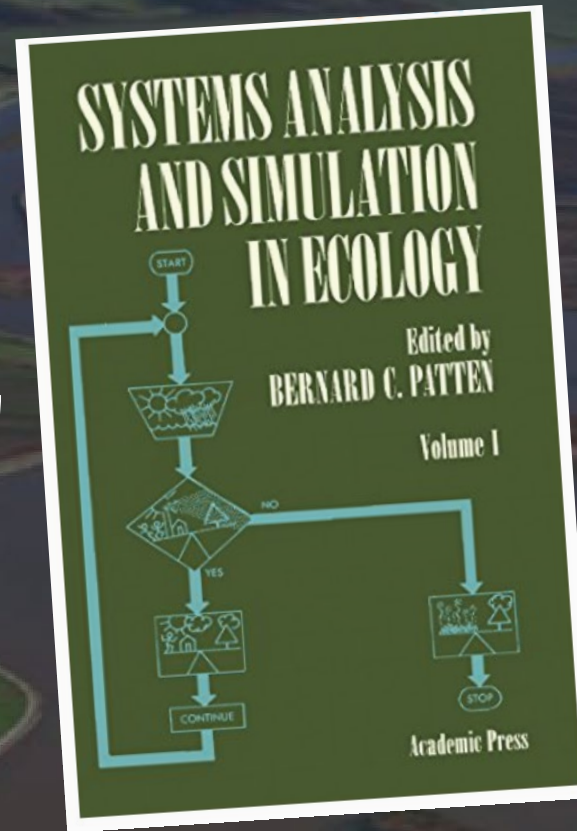


Complex Adaptive Systems, Optimal Control Theory

Statistical Decision Theory, Decisions Under Uncertainty, Structured Approach To Decisions



Dynamic Programming, Systems Analysis



A New Generation of Professionals Wanted to Use These Tools To Improve Management Decisions

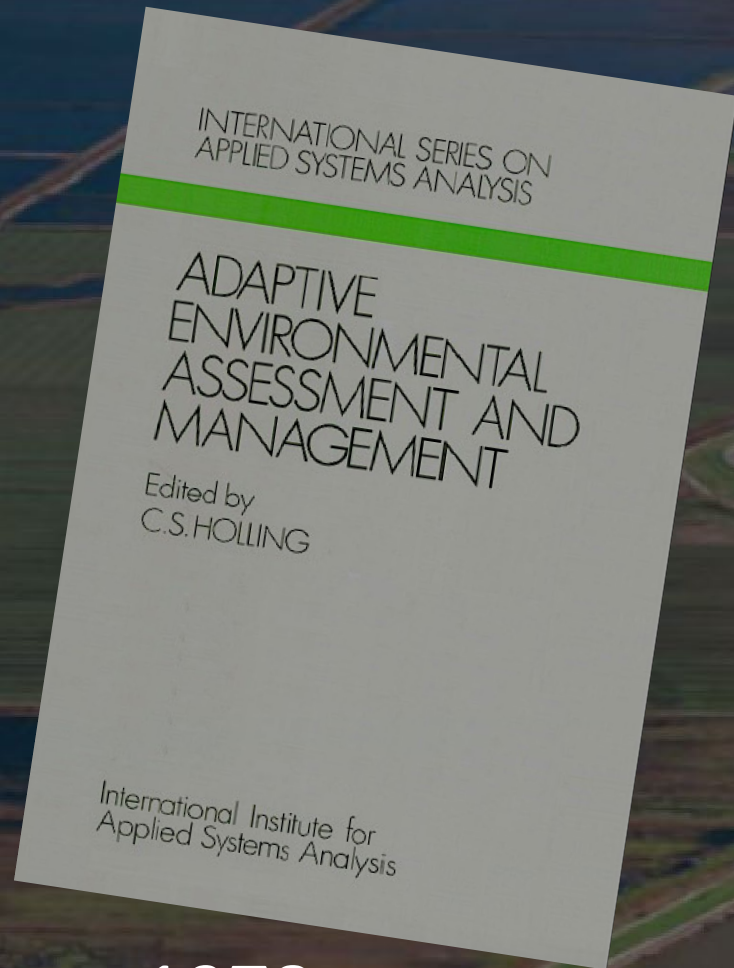


# Foundational Texts for AM

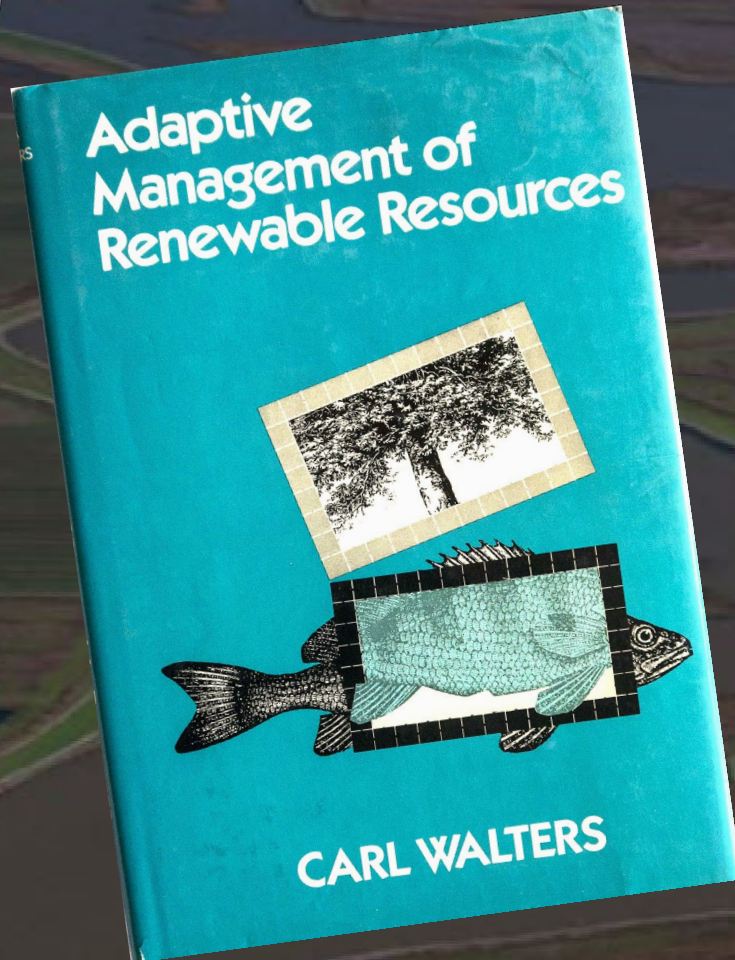
1986



Case Studies



1978





# Holling's Vision of Adaptive Management

1. Decision makers engage with AM team to scope problem.
2. AM team convenes workshop with decision makers, specialists, and effected citizens to clarify problem, available information, uncertainties, and management options.
- 3. During workshop, AM team drafts initial version of the system model**
4. AM team works with specialists (scientists, economists, sociologists) to clarify policy options and model.
5. AM team convenes a second workshop to share preliminary results and make further adjustments to the model.



# Holling's Vision of Adaptive Management

- 6. After Workshop 2, AM team updates model and policy options, uses model to test policy outcomes, reports to decision makers.**
7. Decision makers choose preferred policies. AM team with implementing agencies designs implementation and monitoring.
8. Agencies implement their aspects of the program with coordination by AM team.
9. AM team and agency staff use monitoring data to evaluate effects of program, report to decision makers, recommend program modification.





# Adaptive Management in the US

Many Large Scale Environmental Projects Were Started in the 1980s-1990s

All Were Charged with Employing AM

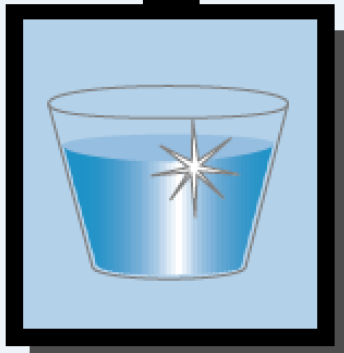
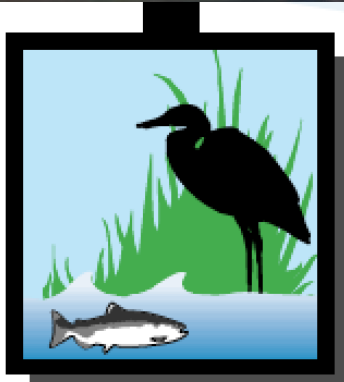
- Columbia River, Salmon Restoration, Initiated 1984, ongoing
  - Missouri River Habitat Mitigation, Authorized 1986, ongoing
  - Kissimmee River Restoration, Authorized 1992, ongoing
  - Colorado River, Glenn Canyon AMP, Initiated 1995, ongoing
  - California, CALFED -> Delta Reform Act, Initiated 1994, ongoing
- Others, Upper Mississippi, Everglades, Coastal Louisiana, etc.



# Antecedents of CALFED Bay Delta Program

1. Water management in California always contentious. Environmental consequences secondary until:
2. 1992, Central Valley Project Improvement Act – Anadromous Fish Restoration Program
3. 1994 Bay Delta Accord: Government agencies, water users, environmental groups agree on approach to water and environmental management
4. 1994 CALFED: a coordinating agency to carry forward the goals of the Bay Delta Accord using Adaptive Management





CALFED  
BAY-DELTA  
PROGRAM

# Ecosystem Restoration Program Plan Strategic Plan for Ecosystem Restoration

July 2000

## Strategic Planning Core Team:

Michael Healey, University of British Columbia  
Wim Kimmerer, San Francisco State University  
Matt Kondolf, University of California, Berkeley  
Peter Moyle, University of California, Davis  
Roderick Meade, R.J. Meade Consulting, La  
Jolla  
Robert Twiss, University of California, Berkeley



# Adaptive Management Flow Chart Adapted From Strategic Plan

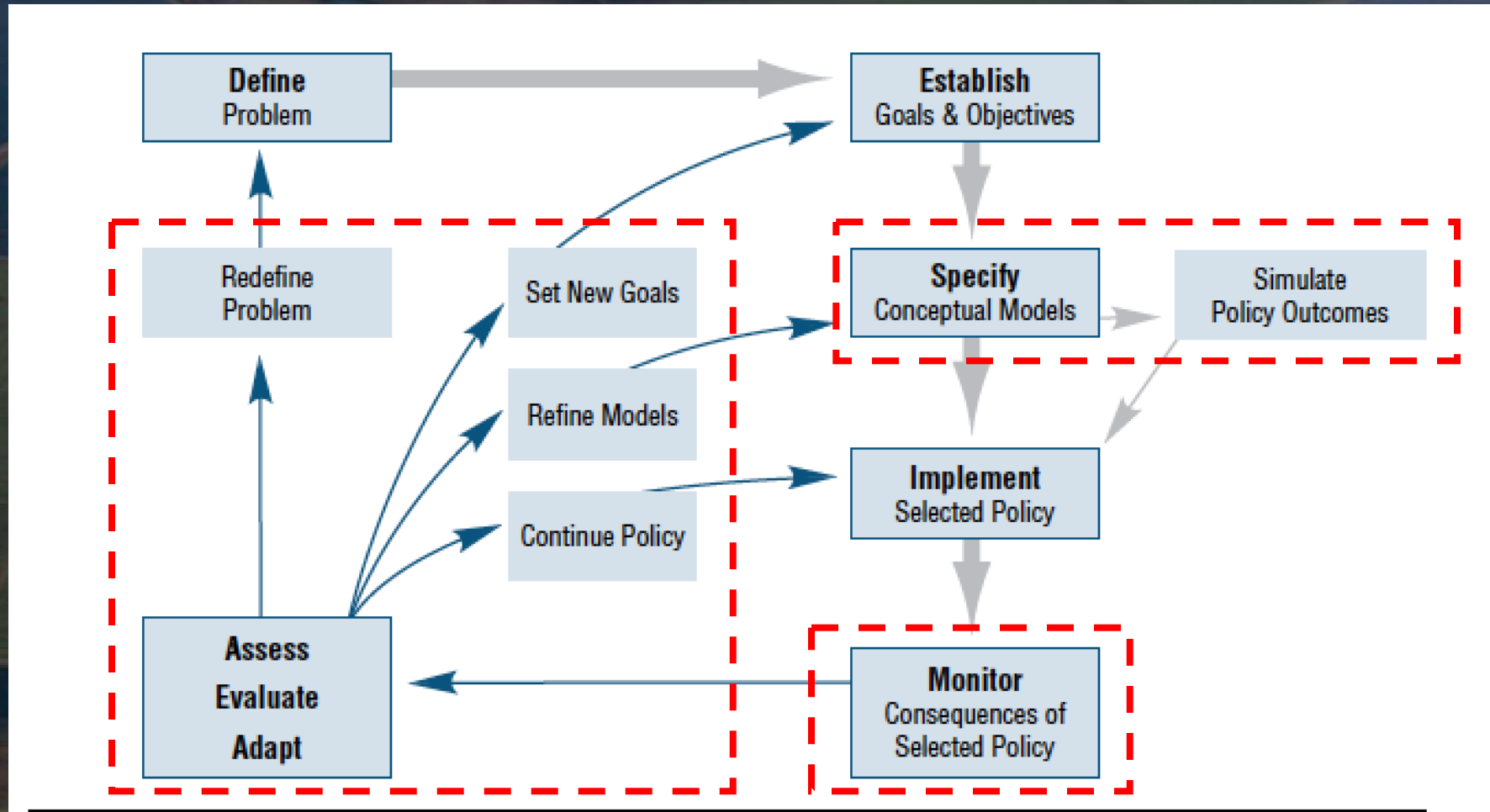


Figure 8.2. Conceptual model of the adaptive management cycle. (Source: Adapted from Ecosystem Restoration Program 2000)



# Obstacles to Implementing Adaptive Management

1. No Agency experience
2. No local expertise trained in AM
3. Elements of AM (Collaborative approach to problem definition; Numerical models to game policy outcomes; Using management to generate information; Monitoring to assess management.) were foreign to agency staff and decision makers.



# Obstacles to Implementing Adaptive Management

4. Common definition of AM, “Learning while doing”, allowed Agencies to believe that there was nothing new in AM
5. Agency tendency to redefine new approach as what it already does
6. Funding could not be used for monitoring.
7. CALFED had a lot of money that had to be spent quickly.  
There was no time to inform, train, build consensus over AM.



# Adaptive Management Projects from CALFED Early Days

1. Clear Creek – Flow and habitat restoration for Chinook
2. Battle Creek – Flow and habitat restoration for Chinook and rationalization of Coleman hatchery
3. Merced River – Flow and habitat restoration for Chinook
4. Dutch Slough – Wetland restoration in the Delta
5. Vernalis Adaptive Management Program – Effects of flow and Old River Barrier on San Joaquin smolt survival
6. McCormick-Williamson Tract, Liberty Island, Others - Wetland restoration in the Delta

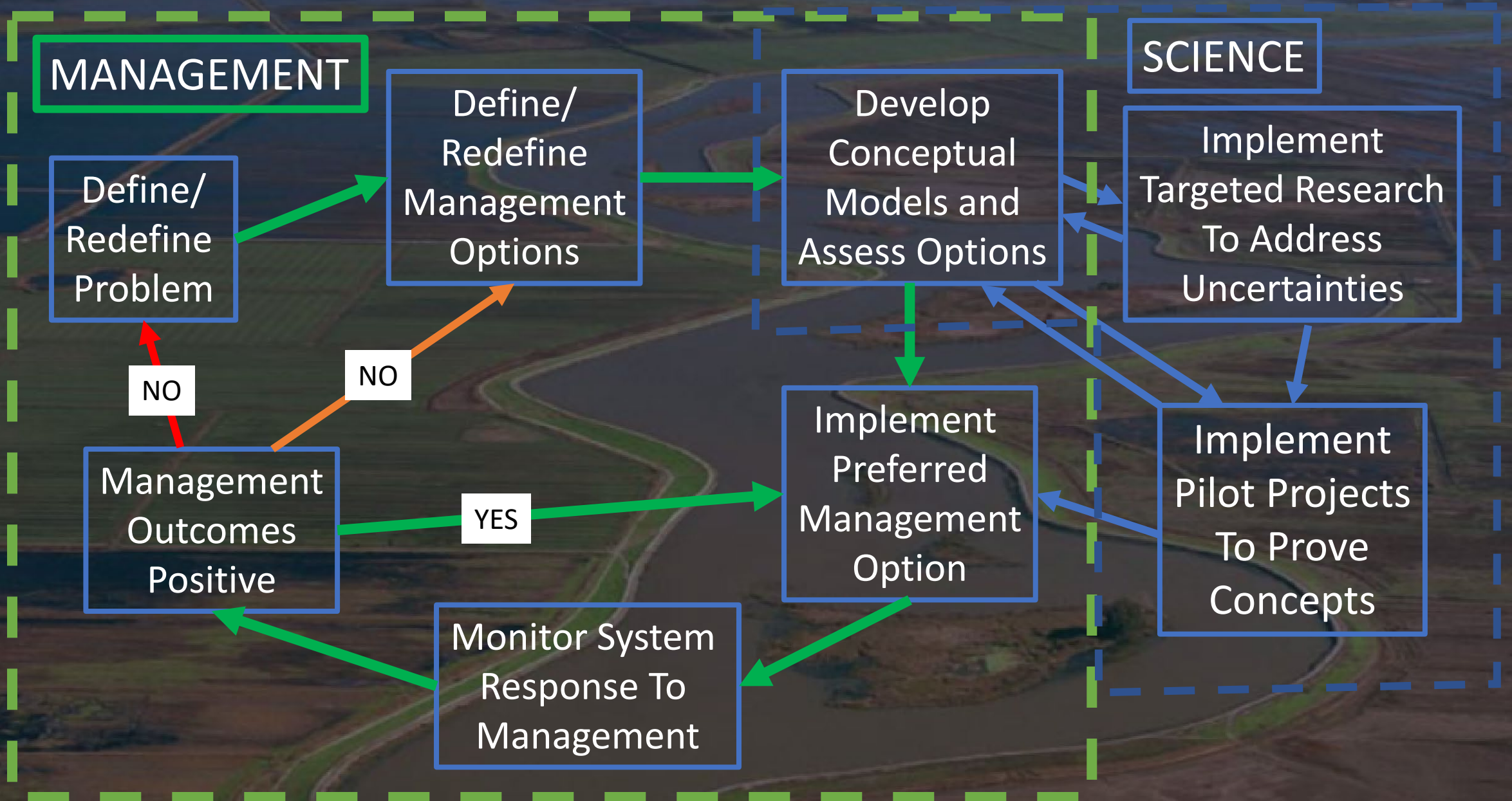


# Adaptive Management Projects from CALFED

- Many never got past the planning stage
- Some were only loosely connected with AM
- Some followed the script quite well (Clear Creek)
- The problems of implementing AM in CALFED carried over into the early days of the Stewardship Council.
- In confronting the difficulties of implementing AM, CALFED began to develop its own version of AM.



# Adaptive Management – CALFED Version





# The Blue Ribbon Task Force and the Delta Plan

- Blue Ribbon Task Force established in 2007 to develop a new Vision for the Delta
- A healthy Delta ecosystem and a reliable water supply as “co-equal goals”. The Delta as a place where people lived, worked, and played an essential context for the co-equal goals.
- Recommendations in the Vision were codified in the 2009 Delta Reform Act. The Act specifically required that AM be the management framework.

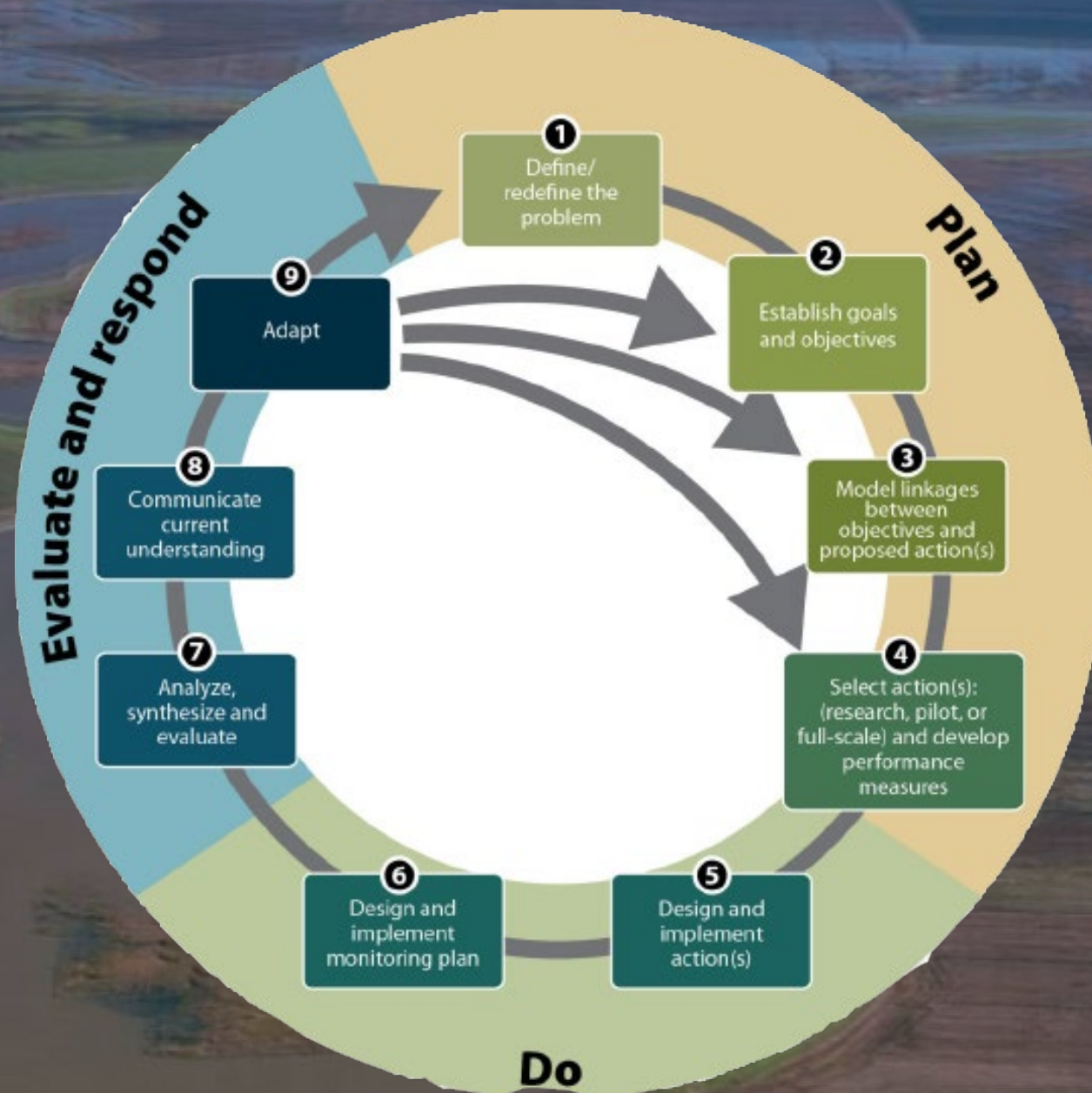


# The Delta Plan 2013

Lays out how AM will inform water and environmental management in the Delta

The AM Cycle in the Delta Plan virtually the same as in the 2000 ERP Strategic Plan

Neither Holling's nor Walters' book is referenced





# What Are The Expected Products of AM?

1. Clear specification of the problem, management options, and expected outcomes
2. A (numerical) model that allows managers to explore the consequences of management interventions
3. Improved understanding of how the system functions and responds to management intervention
4. A more collaborative understanding of the system among scientists, managers, decision-makers, and the public
5. A way of using monitoring to update management (learning while doing)
6. More effective management



# CONCLUSIONS

1. AM provides a structured, rational framework for theory and practice of resource management
2. Despite its attractiveness in theory, few management agencies have incorporated AM into their standard procedures
3. By law, AM is to be the organizing framework for ecosystem management and restoration in the Delta
4. During the time that I was involved in the Delta (1995-2009), many elements of AM were incorporated into environmental management
5. Whether this has improved environmental management in the Bay/Delta remains a subject of debate



An aerial photograph of a large, winding reservoir or lake. The water is a dark, muted blue-grey color. The reservoir is surrounded by a mix of green and brown agricultural fields, some of which are divided into rectangular plots. The overall scene is a rural landscape. The text "Thank You" is overlaid in the center in a white, cursive font.

*Thank You*