Adaptive Management: Structure, Process, and Examples

West Coast Forum 2013:
Adaptive Management Strategies

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Outline of the presentation

- Provide a context for adaptive management
- Discuss the elements and processes of adaptive management
- Give an example of AM implementation
- Offer a few closing remarks

Adaptive Management Background

- Used in resource management since at least the 1950s
- Given formal expression by Hollings (1978) Walters (1986), and Lee (1993)
- Described in considerable detail in more recent documents

Adaptive Management Defined

Learning through management, and adapting based on what is learned

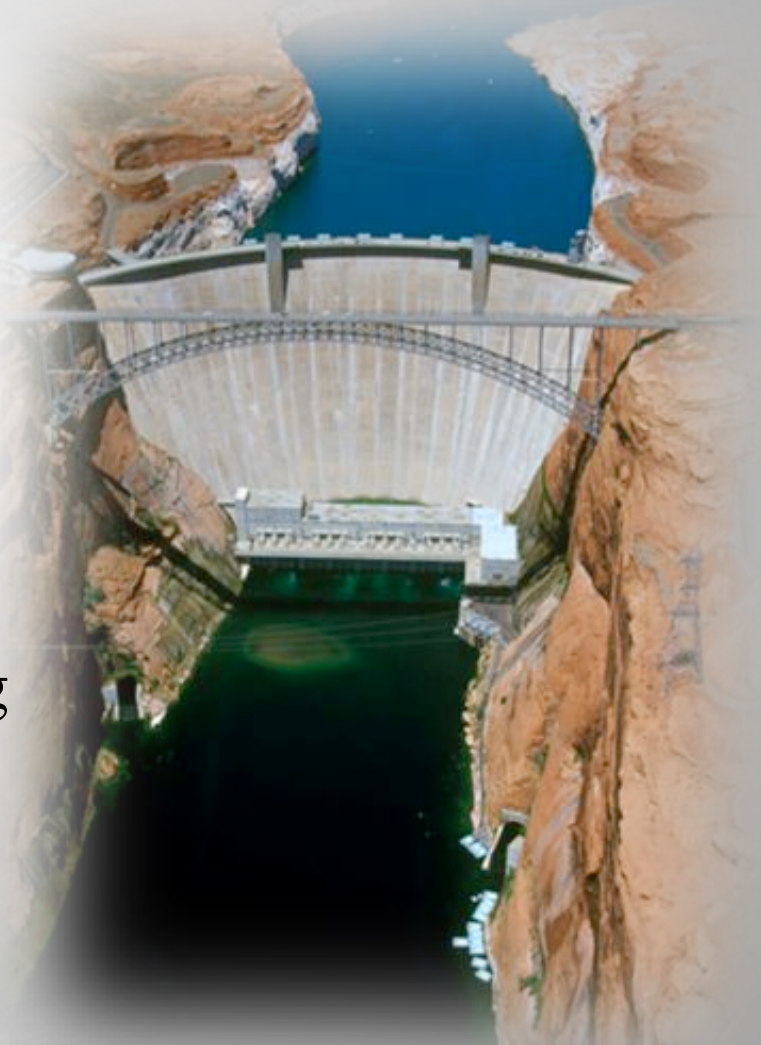
- Learning: the accretion of understanding through time
- Adaptation: the adjustment of management through time based on what's learned
- General goal: reducing uncertainty and improving management

Example 1: Management of waterfowl hunting

- Uncertainty about
  - impacts of hunting on population survival rate
  - impacts of hunting on reproduction rate
  - impacts of hunting on behavioral adjustment of waterfowl
- Uncertainty limits manager's ability to implement informed hunting programs

Example 2: Management of water releases from a reservoir

- Uncertainty about
  - extremes in water levels
  - alteration of downstream aquatic and riparian vegetation
  - fish survival
  - interspecific competition
- Uncertainty limits ability to achieve stakeholder agreement on the timing and amount of water to be released



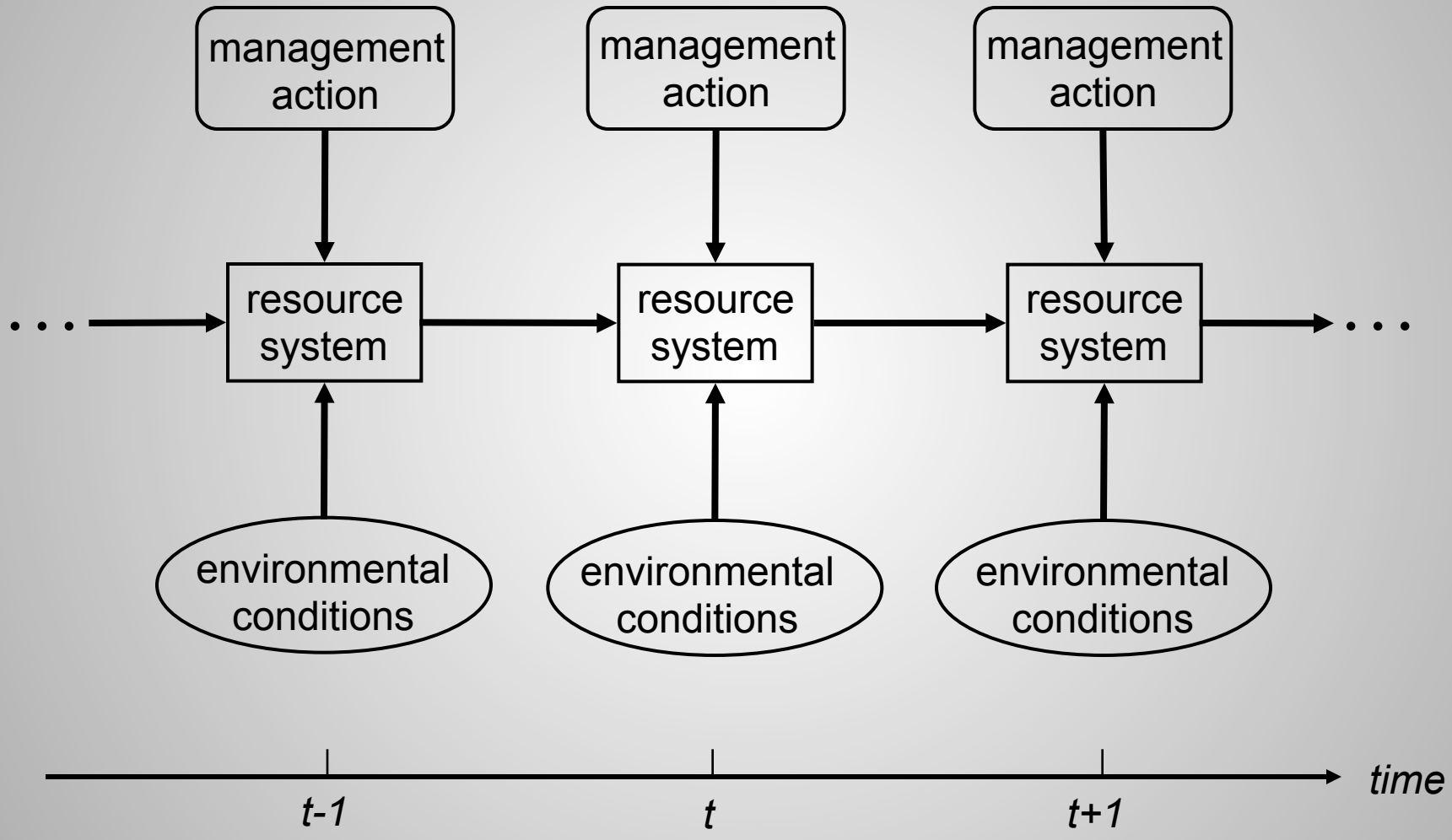
Example 3: Management of grazing on rangelands

- Uncertainty about vegetation responses to grazing in terms of
  - future vegetation productivity
  - susceptibility to invasive plants
  - plant community succession
- Uncertainty limits ability to design smart and acceptable grazing strategies

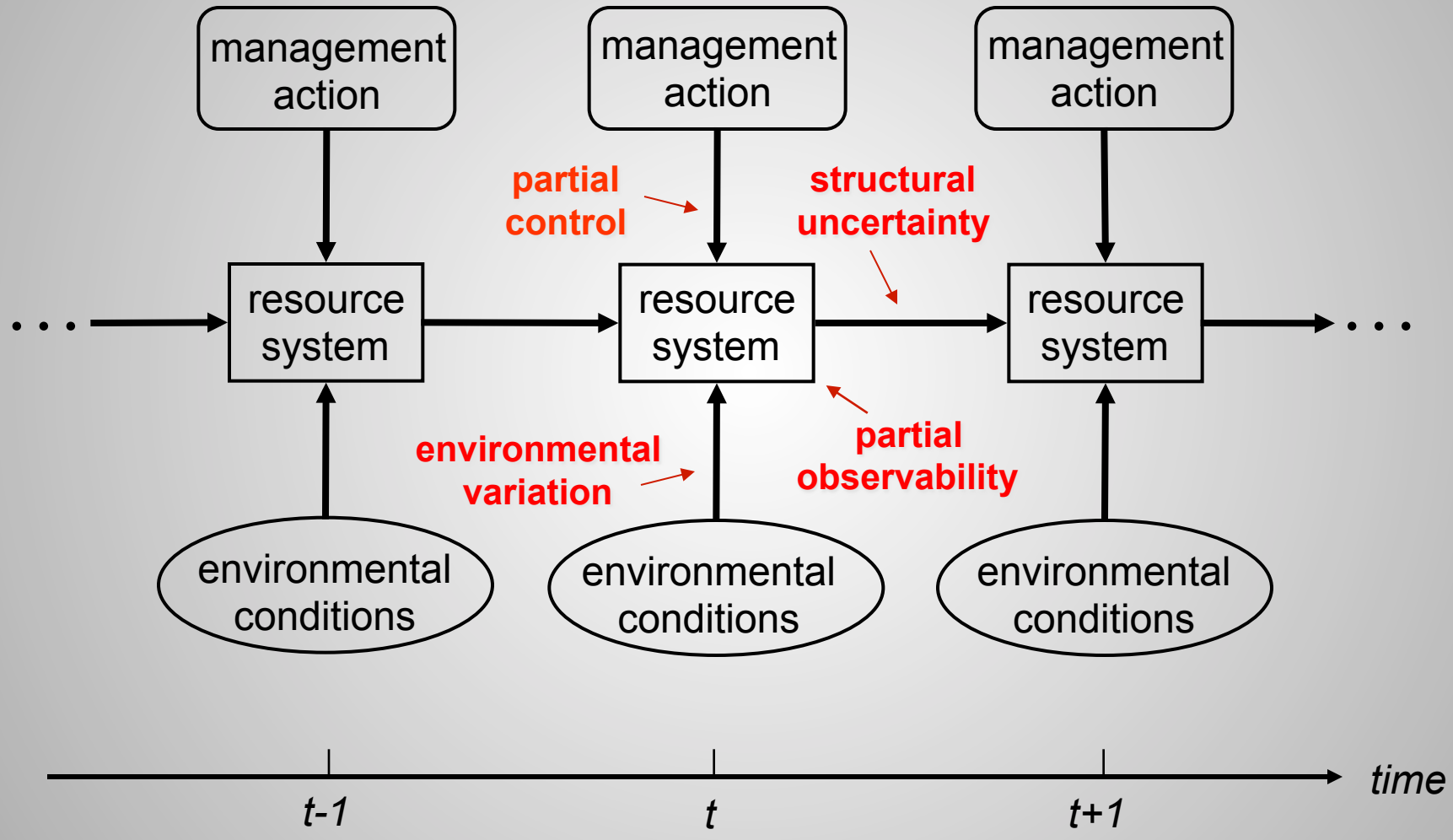
Commonalities in the examples

- Actions have future consequences for the natural resource system
- Those consequences are not fully understood, i.e., are uncertain
- The lack of understanding gets in the way of making smart decisions
- Decisions have to be made anyway

Resource Situation



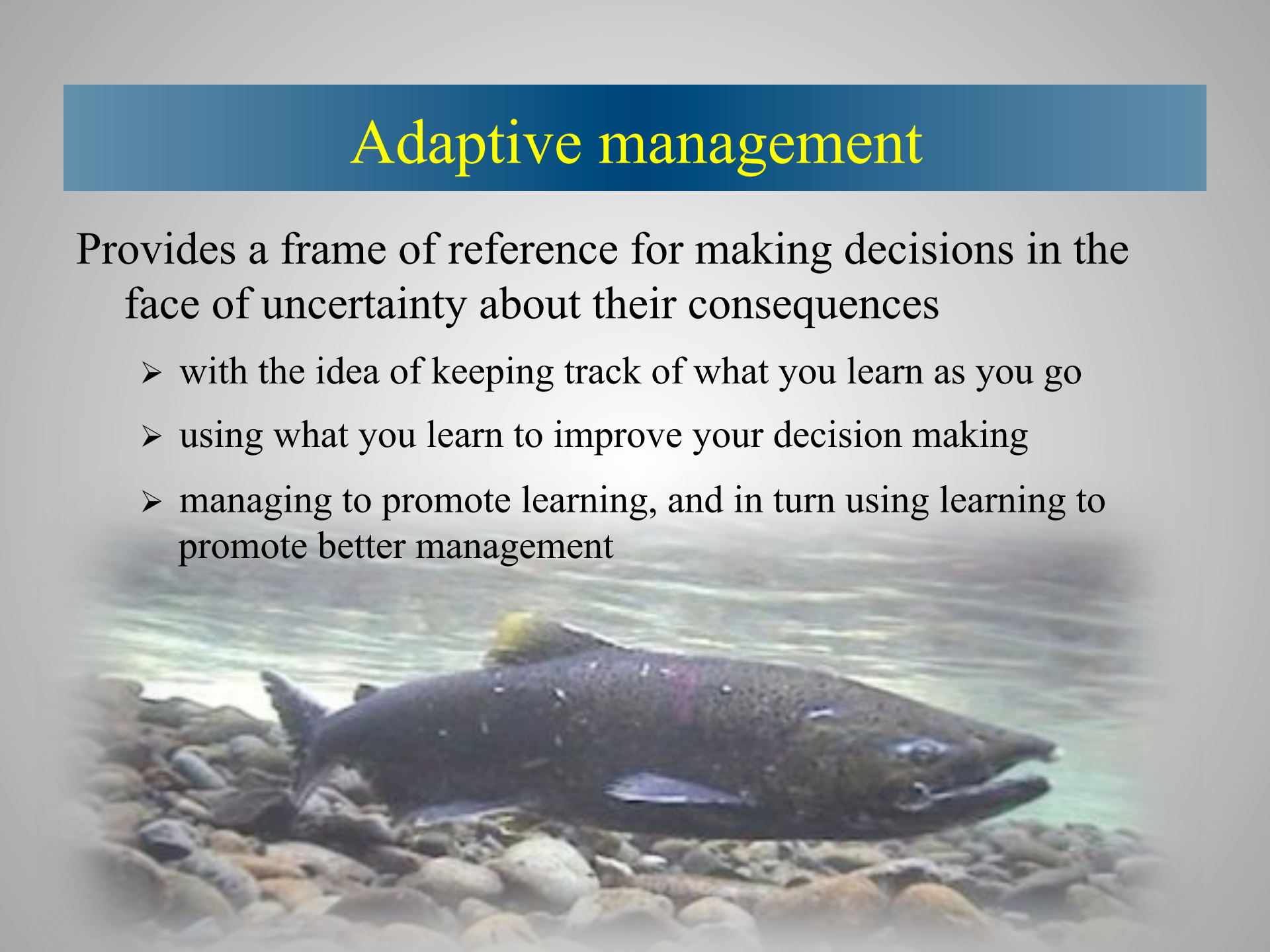
Resource Situation



Adaptive management

Provides a frame of reference for making decisions in the face of uncertainty about their consequences

- with the idea of keeping track of what you learn as you go
- using what you learn to improve your decision making
- managing to promote learning, and in turn using learning to promote better management

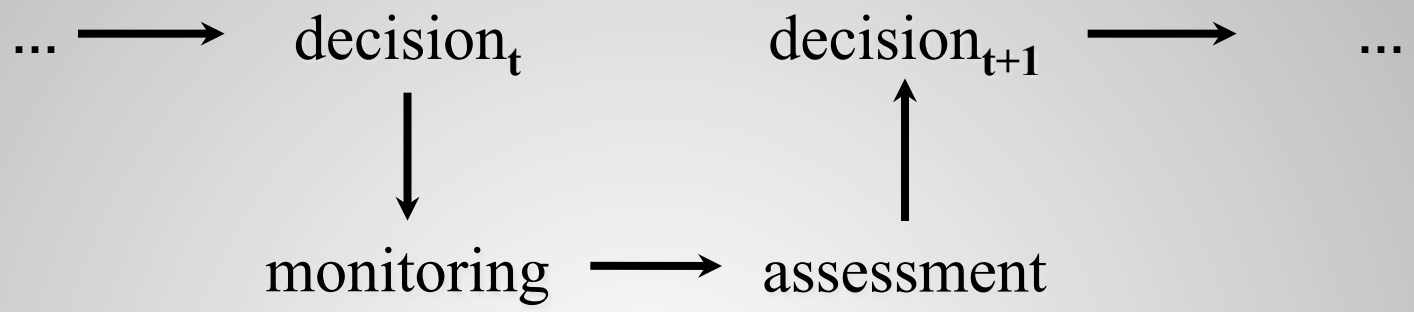


Key set-up elements of AM

- Stakeholder involvement
- Management objectives
- Alternative management actions
- Predictions of the consequences of potential management actions
- Monitoring protocols, plans, capacity

These elements are folded into the iterative learning process of decision making, monitoring, and assessment

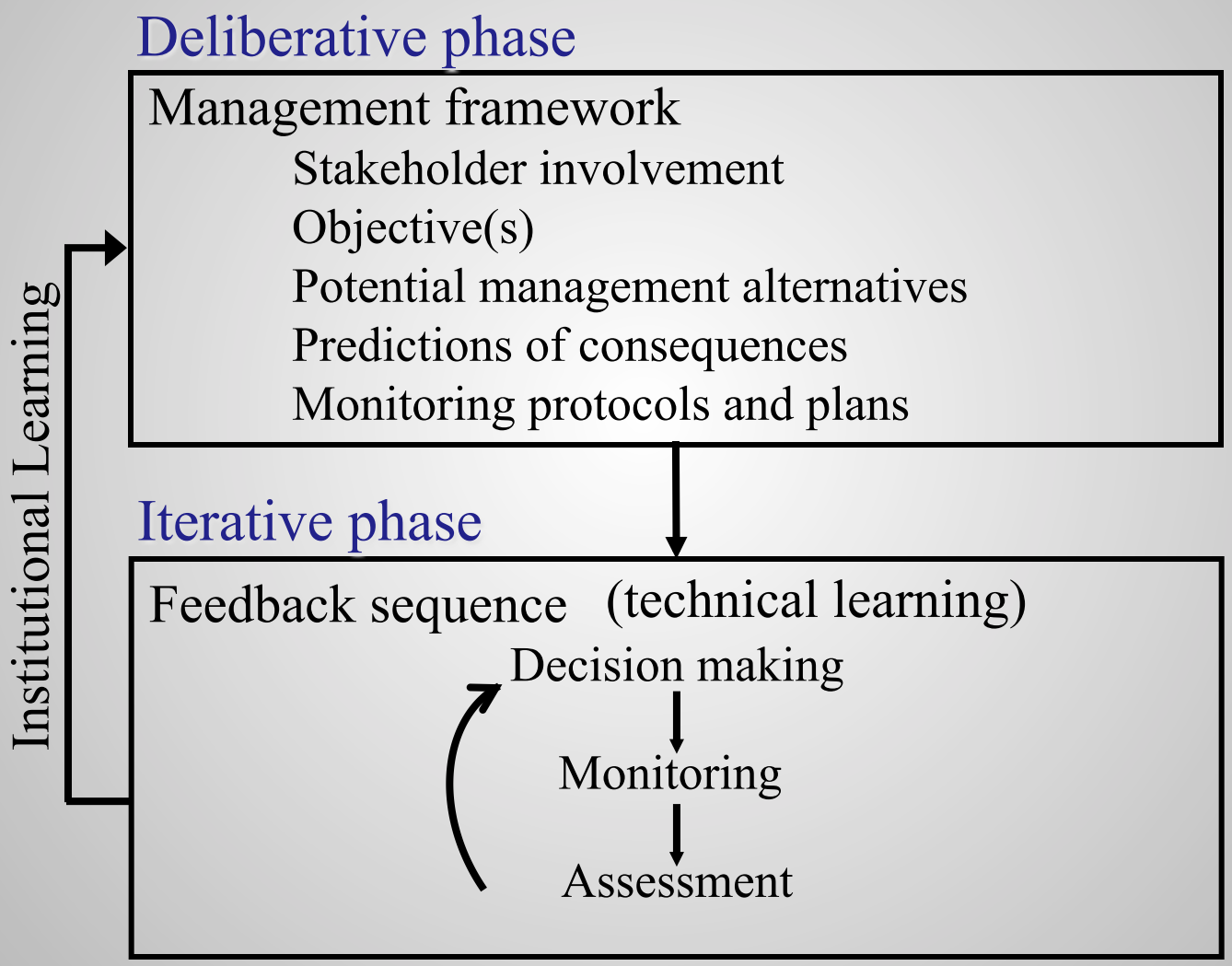
Iterative decision making process



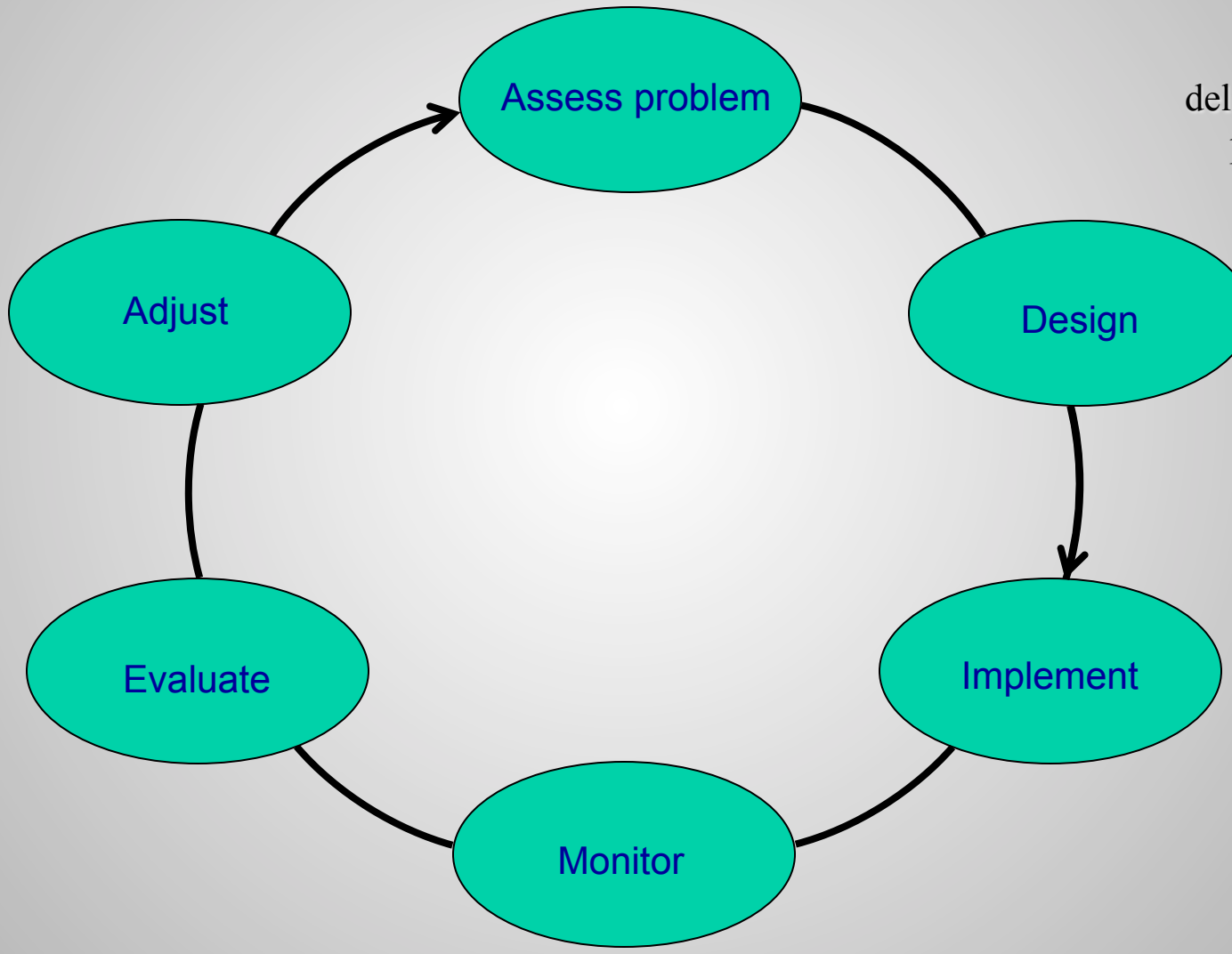
- Decisions are guided by management objectives at each time
- Monitoring is used to track system responses to management action
- Monitoring data are combined with previously collected information to produce improved understanding
- Decisions are adjusted in the next time period based on that improved understanding

Two key outcomes: 1) improved understanding, and 2) improved management based on that understanding

AM process in two phases

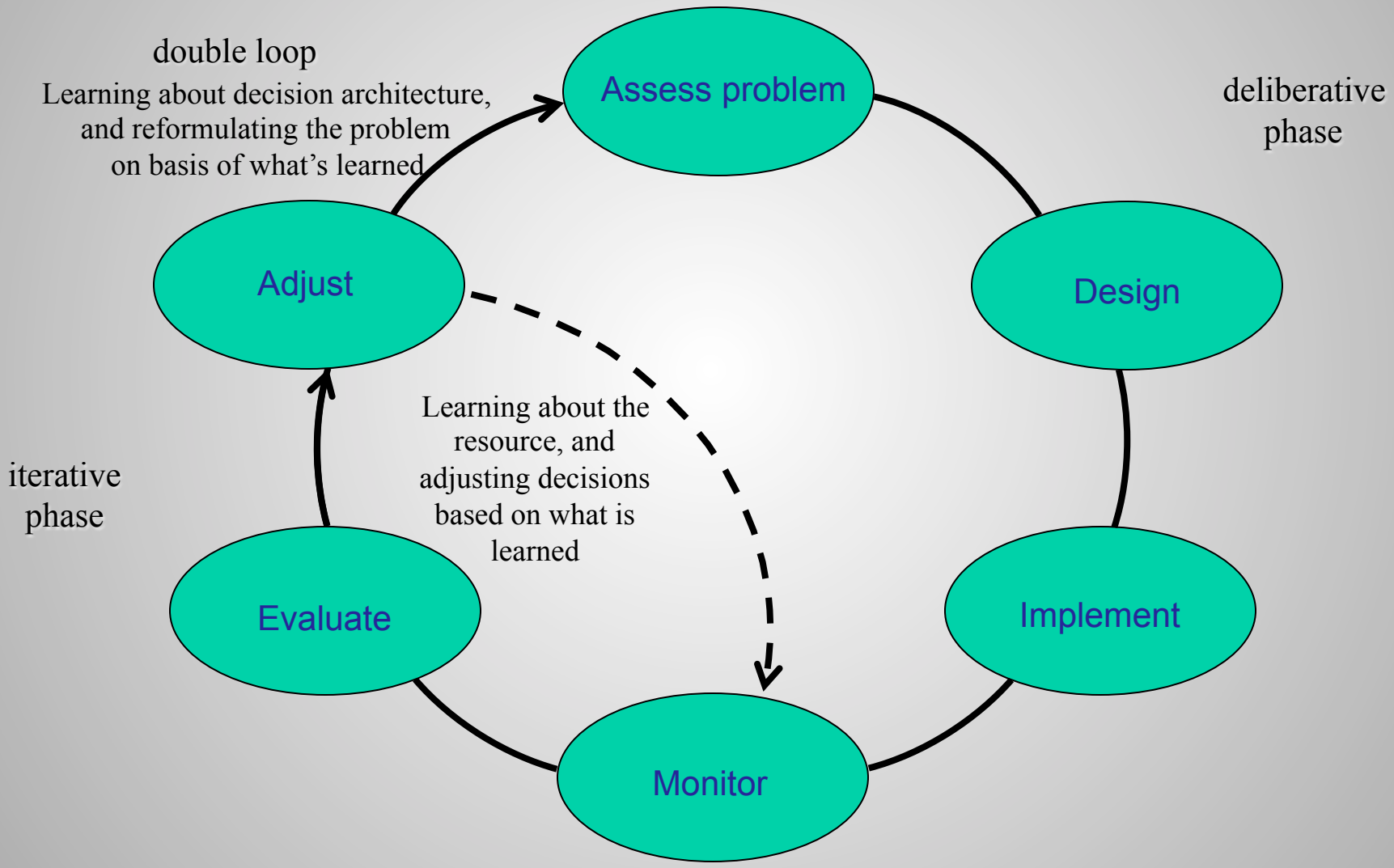


Adaptive management cycle



deliberative phase

Adaptive management cycle

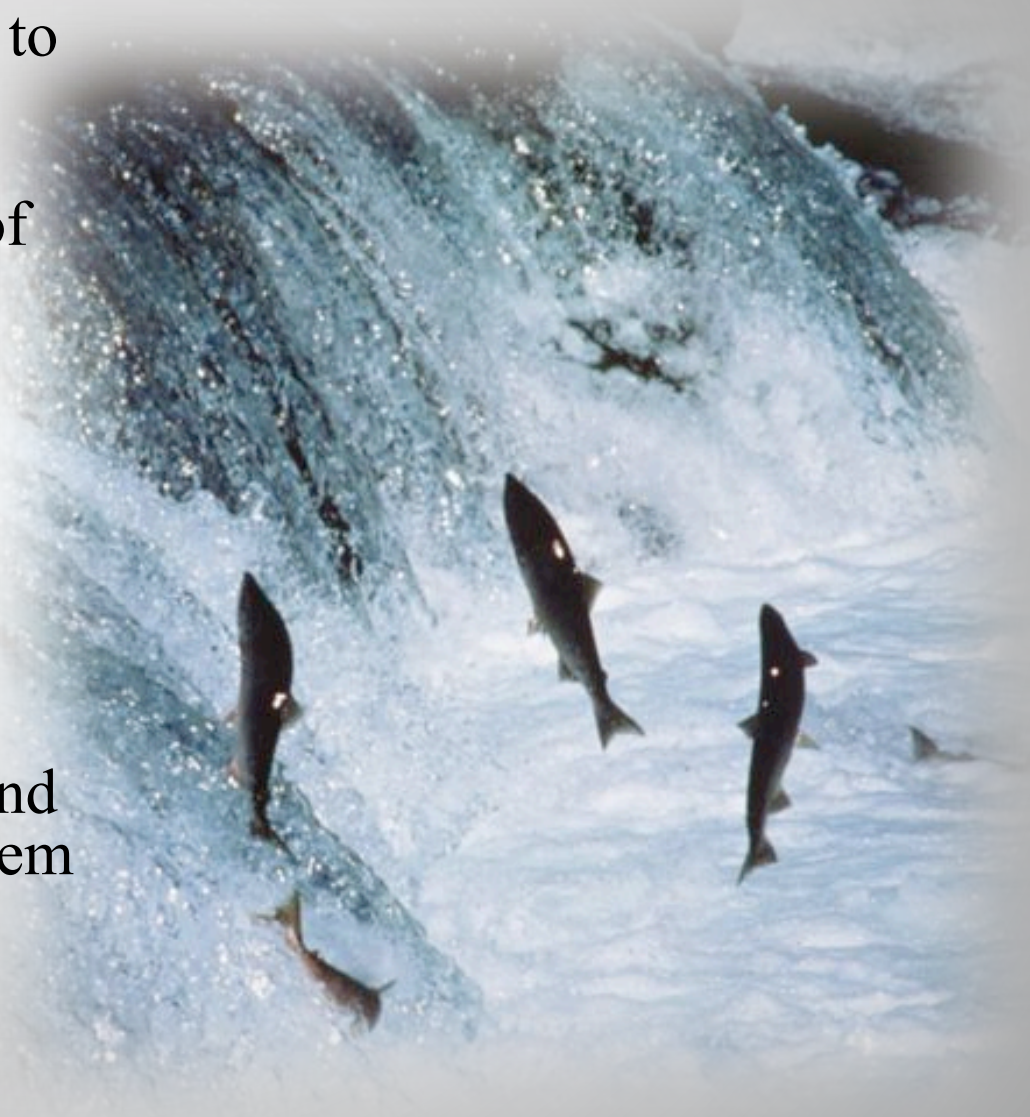


Different approaches to AM

There are different approaches to adaptive management, e.g.:

- sequential implementation of management alternatives
- parallel implementation of management alternatives
- Combinations of the two

They all feature an integrated, recurrent decision process and competing views of the system



Example – red knots

- Long distance migrants – 20,000 miles each year
- Arrive in Delaware Bay each spring in poor condition
- Replenish energy by feeding on horseshoe crab eggs
- Horseshoe crabs also used as bait in commercial fisheries
- Declines in red knot abundance over the last decade
- Contentiousness between fishing and conservation interests

Example – red knots

- Advisory group established that includes stakeholder interests in both crab fishing and bird conservation
- Agreed to a compromise objective of maximizing horseshoe crab harvest while sustaining the red knots
- Identified a range of alternative crab harvest actions
- Identified 3 competing models of horseshoe crabs and red knots
  - different views about horseshoe crab – red knot interactions
  - different predicted responses to crab harvest pressure
- Agreed to monitoring of crab and red knot abundance

Example – red knots

- Monitoring of population conditions occurs each spring
- Learning about the impact of harvest occurs each year, via a comparison of predicted vs observed population conditions
- Decisions about the allowable level of horseshoe crab harvest are updated each year on basis of
  - population status of horseshoe crabs and red knots in the spring
  - updated understanding of crab – red knot interactions and responses to crab harvest
- This adaptive process now is used to set annual crab harvest regulations by the Atlantic States Marine Fisheries Commission

Challenges with adaptive management

- Resistance to the acknowledgment of uncertainty
- Belief that everything important is already known
- Mistaken belief that AM is already being used
- Risk aversion by decision makers and managers
- Focus on management in the short term (myopia)
- Resistance to meaningful stakeholder involvement
- Resistance to focused and effective monitoring
- Lack of an effective decision making structure
- Belief that AM is too expensive compared to alternatives

Closing comments

- Momentum is growing for adaptive, learning-based management of natural resources
- Pre-adaptations of many programs for an adaptive approach
- Collaborative and technical thrusts in adaptive management
- Challenges of actually doing adaptive management