

Adaptive Management Overview & Orientation

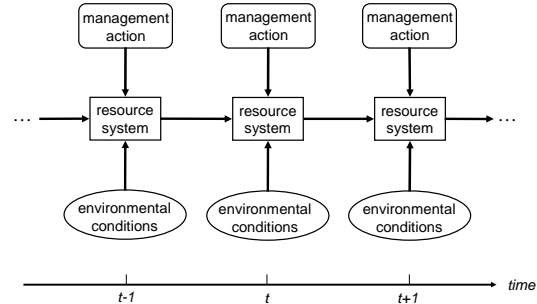
Slides used during the
May 24, 2007 broadcast

Revised May 23, 2007

Management situation

- Management actions are taken through time
- System behavior is influenced by management actions
- Resource system is influenced by changing environmental conditions
- There is uncertainty (or disagreement) about the expected impacts of management

Management situation



Management Situation

- Management occurs through time, so learning through management is possible
- The system being managed is subject to uncertainties and potential surprises
- The impacts of management are not completely understood
- Improved understanding has the potential to lead to better management

When should AM be Used?

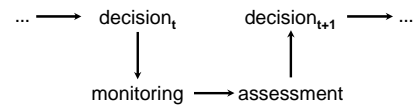
- When decision making is iterative through time
- When management is being limited by incomplete understanding of the resource system
- When clear and understandable objectives can be identified
- When uncertainty about management impacts can be described explicitly
- When monitoring is in place or can be put in place

Five key elements in the application of AM

- Stakeholder involvement
- Management objectives
- Management alternatives
- Predictions of the effects of potential management actions
- Monitoring protocols and plans

These elements are folded into structured process of decision making, monitoring, and assessment

Decision-making Process in AM



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

Two Key Outcomes

- Improved understanding over time
- Improved management over time based on that improved understanding

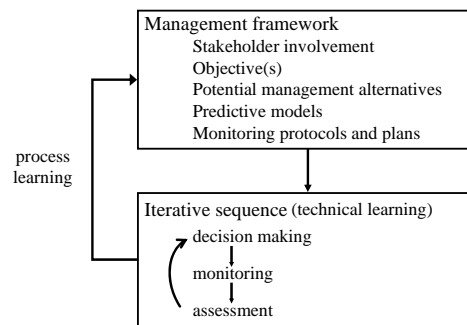
Uncertainty in Adaptive Management

- Within the body of theory and knowledge used to understand a resource is some uncertainty
 - About a particular biological or ecological process
 - About a vital rate that controls the process
 - About how a management action will affect that process or vital rate
- Uncertainty is expressed in terms of competing hypotheses about how the resource system works
 - With each hypothesis imbedded in a resource model
 - That can be used to predict responses to management
- Predicted responses in turn can be compared against monitoring data
- Results of these comparisons are used to learn about the resource system

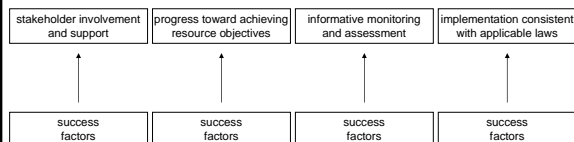
Example: Sport Hunting of Waterfowl in North America

- Regulations are set each summer for fall sport waterfowl hunting
- Monitoring occurs during the fall, winter and spring
 - Size of the harvest, population status, reproduction/recruitment, breeding habitat conditions
- Analysis of data on completion of the surveys
- Incorporation of what is learned when regulations are set again the next summer
- Sequence of regulations-setting, monitoring, assessment, and feedback is known as Adaptive Harvest Management

Adaptive Resource Management

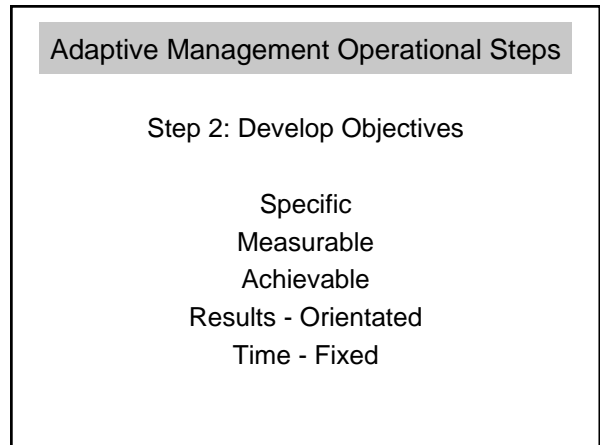
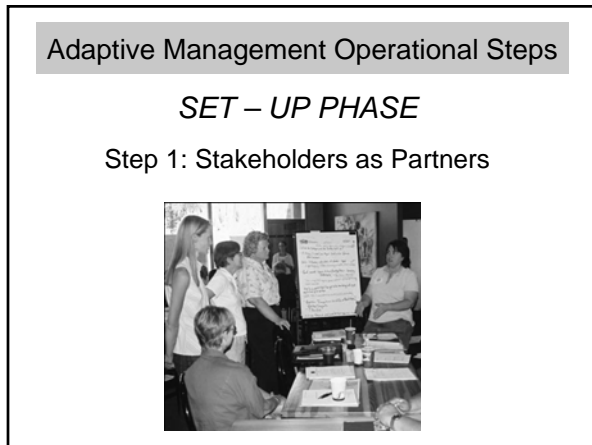
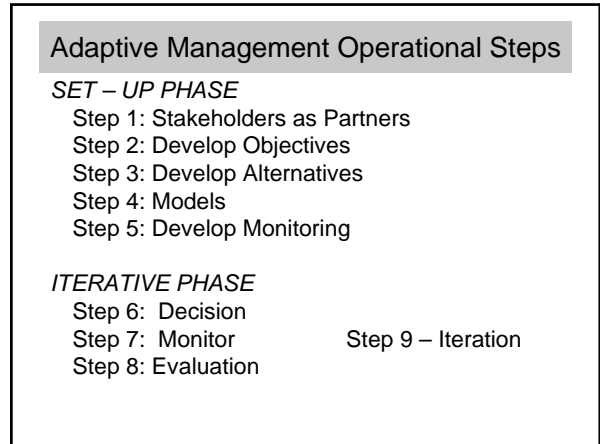
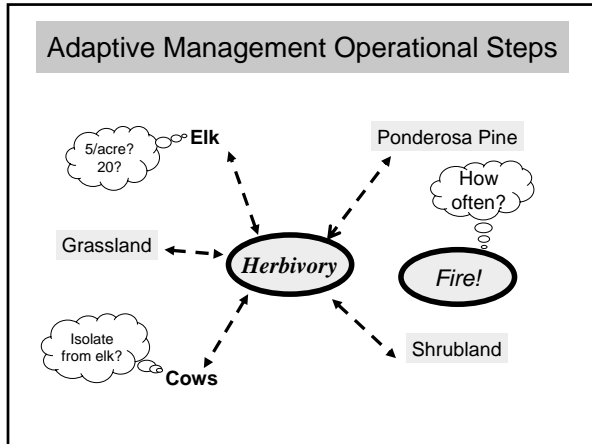


adaptive management success



Take-home points

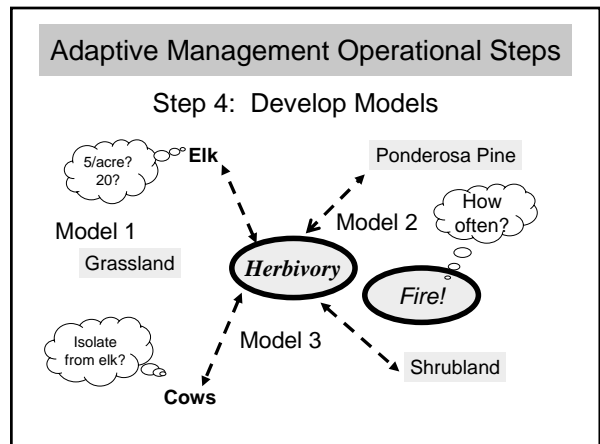
- AM is designed to be science-based and objective-driven
- AM is an open, collaborative process involving stakeholders
- AM applies when
 - Management is limited by incomplete understanding of impacts
 - Improved understanding can lead to better management
- AM is not a one-size-fits-all panacea
- AM holds promise for acquiring the understanding needed to improve resource management
- The payoff with AM is the gradual improvement in management through time
 - Which means that patience and commitment are required



Adaptive Management Operational Steps

Step 3:
Develop
Alternatives

Spatial Scale	Ecological Organization	Social	Vegetation	Temporal (Years)
National	Ecoregion	Continents	Biome	10 ⁵
Regional	Landscape	Nations	Formation	10 ⁴
Land management unit and immediately surrounding areas	Ecosystems/Communities	States	Series	
Watersheds within unit	Population/Species	Counties	Forest	10 ³
Sites/stands	Organisms/ Genes	Neighborhood	Tree	10 ²
		Home/Family	Shrub	10 ¹
		Person		



Adaptive Management Operational Steps

Step 4: Develop Models

Model 1 Elk Herbivory
 H_0 Unmanaged elk population numbers will have no effect on vegetation types

Model 2 Ungulate Interactions
 H_0 There are no interactive effects between livestock and native ungulates

Model 3 Fire Effects
 H_0 Winter prescribed burn effects will not differ from summer Rx burn effects

Adaptive Management Operational Steps

Step 5: Develop Monitoring

Evaluate progress

Determine resource status

Increase understanding of resource dynamics

Enhance models

Adaptive Management Operational Steps

ITERATIVE PHASE

Step 6: Decision

Design action

Fine tune monitoring protocols

Begin work

Adaptive Management Operational Steps

SET – UP PHASE

Step 1: Stakeholders as Partners

Step 2: Develop Objectives

Step 3: Develop Alternatives

Step 4: Models

Step 5: Develop Monitoring

ITERATIVE PHASE

Step 6: Decision

Step 7: Monitor

Step 8: Evaluation

Step 9 – Iteration

Adaptive Management Operational Steps

Step 9: Iteration

Check for 3 likely areas of disconnects:

Hypothesis

Monitoring assessment

Communication

Adaptive Management Operational Steps

Step 1: Stakeholders

Process to facilitate stakeholder participation?

Lines of communication?

Stakeholder commitment?

Adaptive Management Operational Steps

Step 2 - Objectives

Are objectives explicit and measurable?

Are objectives achievable and sustainable?

Adaptive Management Operational Steps

Step 3 - Management Actions

Has a range of potential management actions been developed?

Does scale of alternatives match that of anticipated effects?

Adaptive Management Operational Steps

Step 4 - Models

Enough baseline information?

Are questions involved expressed as one or more testable models?

Adaptive Management Operational Steps

Step 5 - Monitoring Plans

Commitments in place to sustain a program?

Information available within timeframes that allow for adaptive decision making?

Adaptive Management Operational Steps

Step 6 - Decision Making

Tradeoffs among objectives been considered and are they understood?

Is it clear how decisions will be made?

Stakeholders consulted before decisions made or changed?

Adaptive Management Operational Steps

Step 7 - Follow-up Monitoring

Is monitoring conducted on a timely basis?

Are monitoring data available?

Adaptive Management Operational Steps

Step 8 - Assessment

Anticipated effects of actions seen,
or ecological surprises?

Is it clear how results are to be understood
and interpreted – and communicated?

Adaptive Management Operational Steps

Step 9 - Iteration

Decisions frequently reviewed?

Alternatives revisited and/or modified
over time?

Legal Considerations

- Key Points*
- Must be in compliance with all legal obligations

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 - Not a replacement for environmental compliance

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- Must be in compliance with all legal obligations
 - Not a replacement for environmental compliance
 - Need to determine if the laws will allow for an adaptive management approach

- Have figure 1.1 here with the Assess, Design, and Adjust ovals colored



*Critical NEPA
Planning Components*

- Develop an adaptive management framework

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- Describe initial and subsequent actions to be taken based on monitoring results

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Planning Components*

- Develop an adaptive management framework
- Describe initial and subsequent actions to be taken based on monitoring results
- Assess the impacts of the initial actions, subsequent actions, and monitoring program.

Benefits in a NEPA Process

- Active and early integration of NEPA can reduce potential delays by streamlining subsequent environmental review

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- Active and early integration of NEPA can reduce potential delays by streamlining subsequent environmental review
- Promotes active and effective involvement of stakeholders through its public involvement requirements

*Federal Advisory
Committee Act
(FACA)*

*The Endangered
Species Act
(ESA)*



The Clean Water Act



*Other Federal Efforts in
Adaptive Management*