

Adaptive Management Overview & Orientation

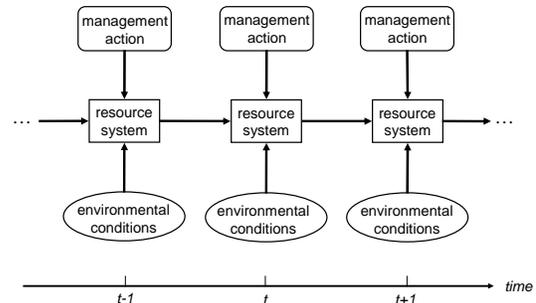
Slides used during the
May 24, 2007 broadcast

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?

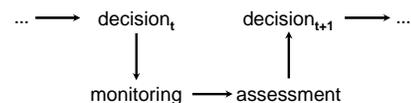
- When decision making is iterative through time
- When management is being limited by incomplete understanding of the resource system
- When clear and understandable objectives can be identified
- When uncertainty about management impacts can be described explicitly
- When monitoring is in place or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

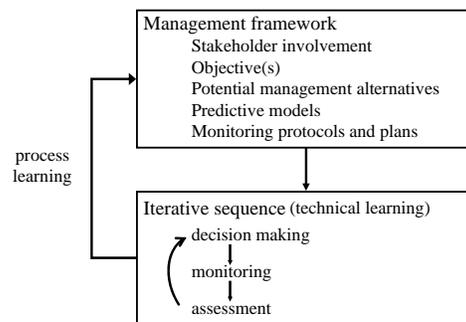
Uncertainty in Adaptive Management

- 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

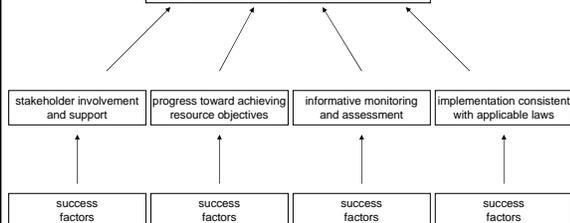
Example: Sport Hunting of Waterfowl in North America

- 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



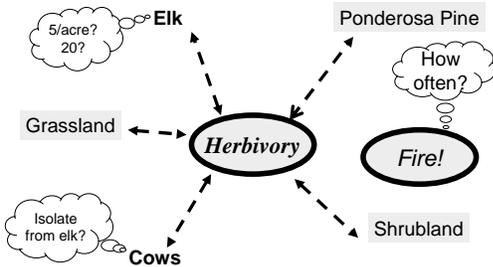
adaptive management success



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



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

SET - UP PHASE

Step 1: Stakeholders as Partners



Adaptive Management Operational Steps

Step 2: Develop Objectives

- Specific
- Measurable
- Achievable
- Results - Orientated
- Time - Fixed

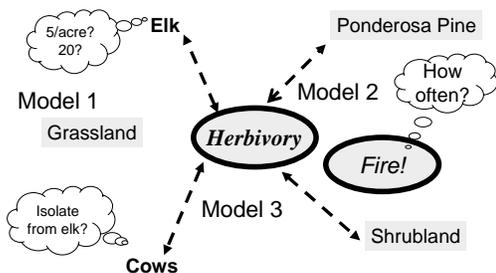
Adaptive Management Operational Steps

Step 3:
Develop
Alternatives

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

Adaptive Management Operational Steps

Step 4: Develop Models



Adaptive Management Operational Steps

Step 4: Develop Models

Model 1 Elk Herbivory

H₀ Unmanaged elk population numbers will have no effect on vegetation types

Model 2 Ungulate Interactions

H₀ There are no interactive effects between livestock and native ungulates

Model 3 Fire Effects

H₀ 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?

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Step 2 - Objectives

Are objectives explicit and measurable?

Are objectives achievable and sustainable?

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Step 3 - Management Actions

Has a range of potential management actions been developed?

Does scale of alternatives match that of anticipated effects?

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Step 4 - Models

Enough baseline information?

Are questions involved expressed as one or more testable models?

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Step 5 - Monitoring Plans

Commitments in place to sustain a program?

Information available within timeframes that allow for adaptive decision making?

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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?

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Step 7 - Follow-up Monitoring

Is monitoring conducted on a timely basis?

Are monitoring data available?

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Step 8 - Assessment

Anticipated effects of actions seen,
or ecological surprises?

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

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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

*Critical NEPA
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

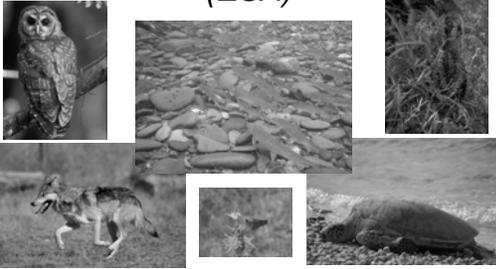
- Active and early integration of NEPA can reduce potential delays by streamlining subsequent environmental review

Benefits in a NEPA Process

- 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*