

Scaling issues in effective adaptive management: theory and examples of practice

Theory



Defining adaptive management



Institutions as key impediment



Birth of an adaptive management system

Practice



Stand-scale practice-oriented research



Landscape-scale prescription comparisons



Regional learning



Why is it important to define adaptive management precisely?

If adaptive management means something different to everyone, perhaps it doesn't mean anything to anybody?

George Stankey

Key elements

*From: Adaptive management of forest ecosystems: did some rubber hit the road? Bormann et al. 2007. **BioScience***



AM needs to be implemented in a systematic, planned way;



Explores alternative ways to meet management objectives;



Implements more than one alternative, to speed learning;



Monitors to learn which alternative best meets the management objectives;

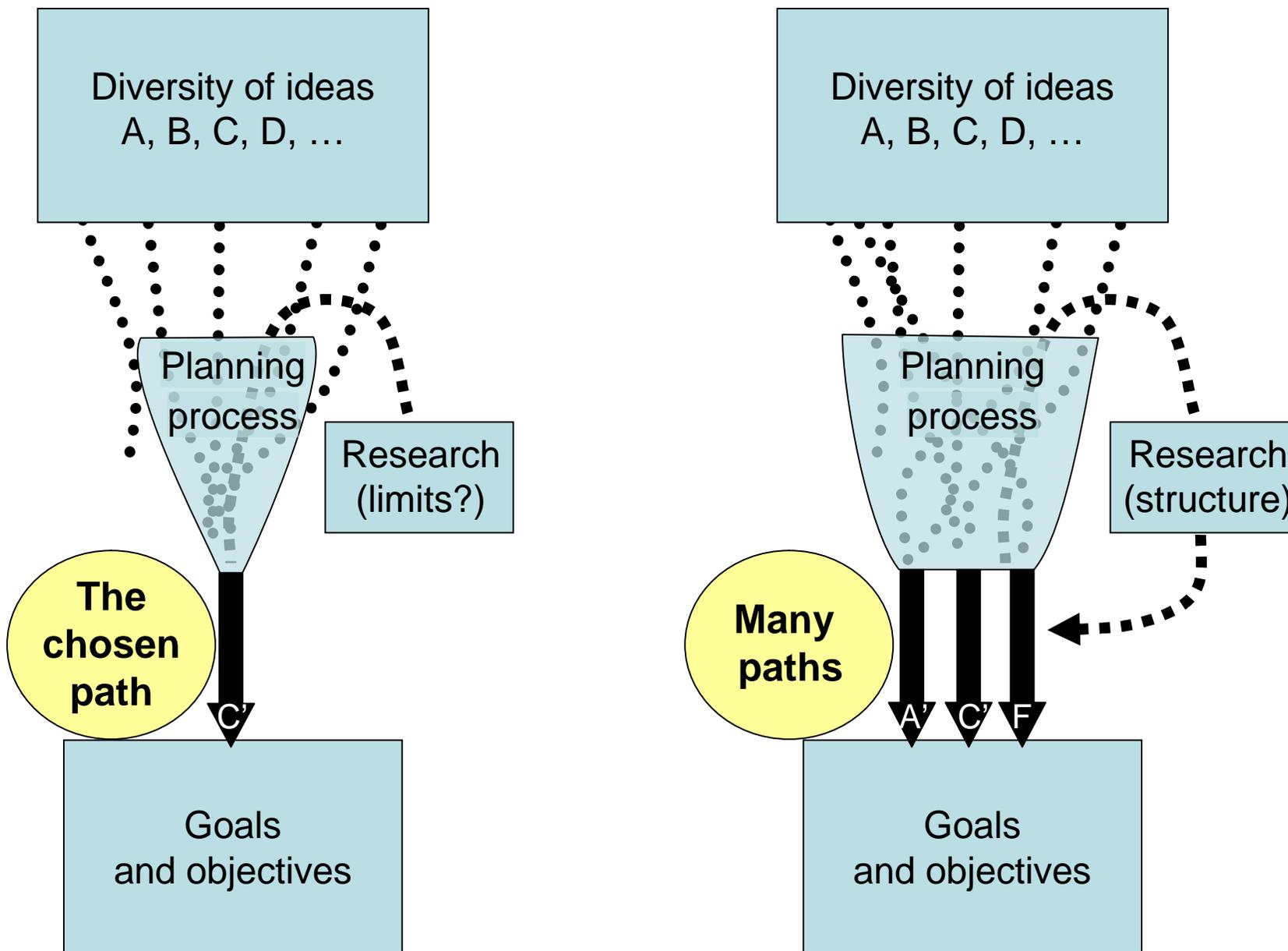


Uses results to update knowledge and adjust management actions; and



AM is not research

Available adaptive management models



Passive adaptive management

Active adaptive management



Institutions as key impediment

Why adaptive management areas did not meet expectations?

*From: Adaptive management: rhetoric or reality?
Stankey et al. 2003. J Forestry):*



Built-in regulatory constraints;



Lack of Agency leadership;



Increasing workloads, declining budgets;



Lack of institutional processes; and



**Lack of learning structures to increase
the value of monitoring.**

Regional adaptive management framework (adopted)



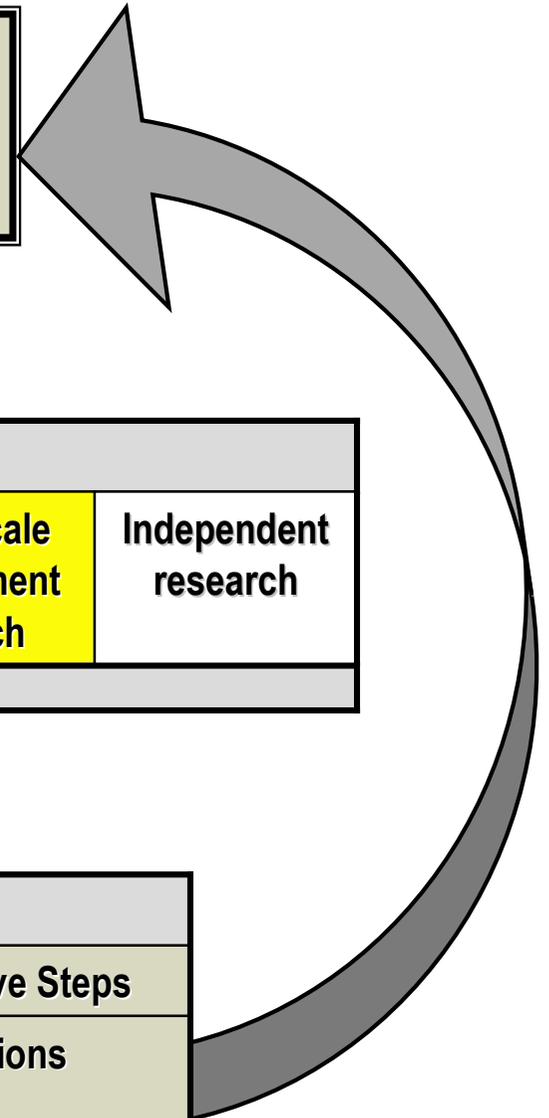
**Priority Questions
and Conceptual and Decision Models**

Learning Modes				
Activity Databases	Regional goal monitoring	Landscape-scale management studies	Stand-scale management research	Independent research

FRAMEWORK ISSUES

- Balancing investments among modes; and
- Balancing investments in learning (15%?) and doing (85%?)

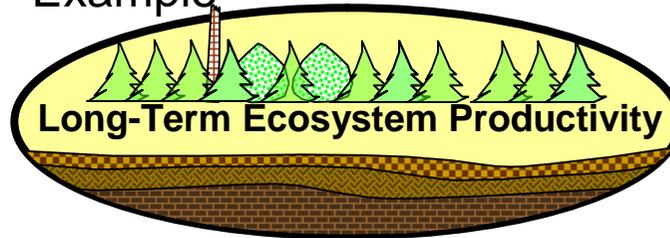
Evaluation	
Refinement of conceptual model and application of decision framework	Interpretive Steps
	Decisions



Learning mode: Stand-scale management research



Example



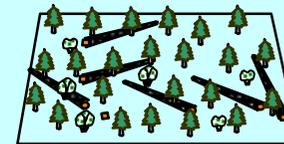
What are the effects of:

-  Intense Douglas-fir culture,
-  Pioneer plants,
-  Thinning to promote lateral species, and
-  Adding woody debris,

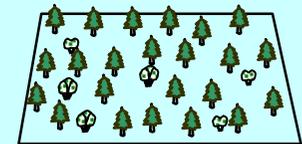
Priority question:
(1989)

on long-term soil productivity and biodiversity?

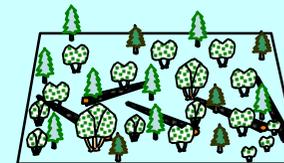
Treatments



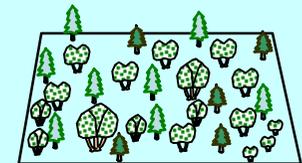
Doug-fir hi-wood



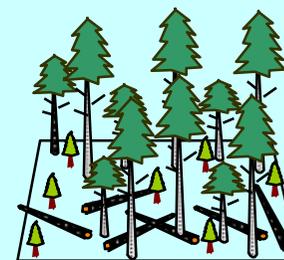
Doug-fir lo-wood



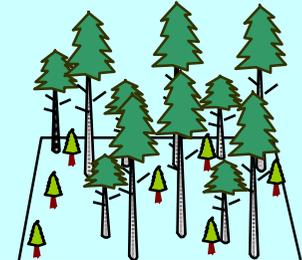
Pioneer hi-wood



Pioneer lo-wood



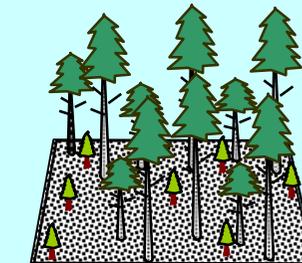
Mature, thinned, hi-wood



Mature, thinned, lo- wood



Control, no action



Mature, thinned, underburned

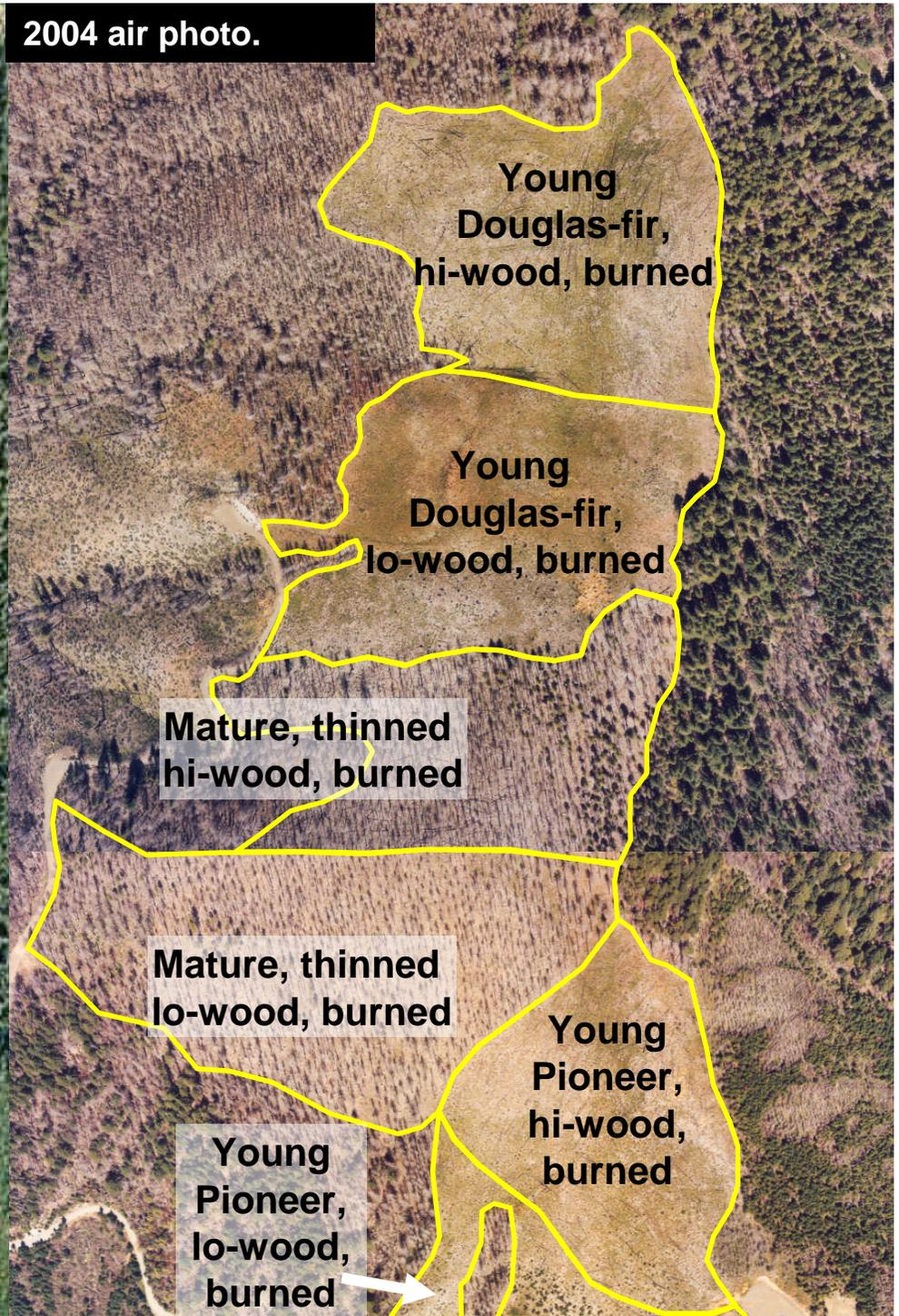
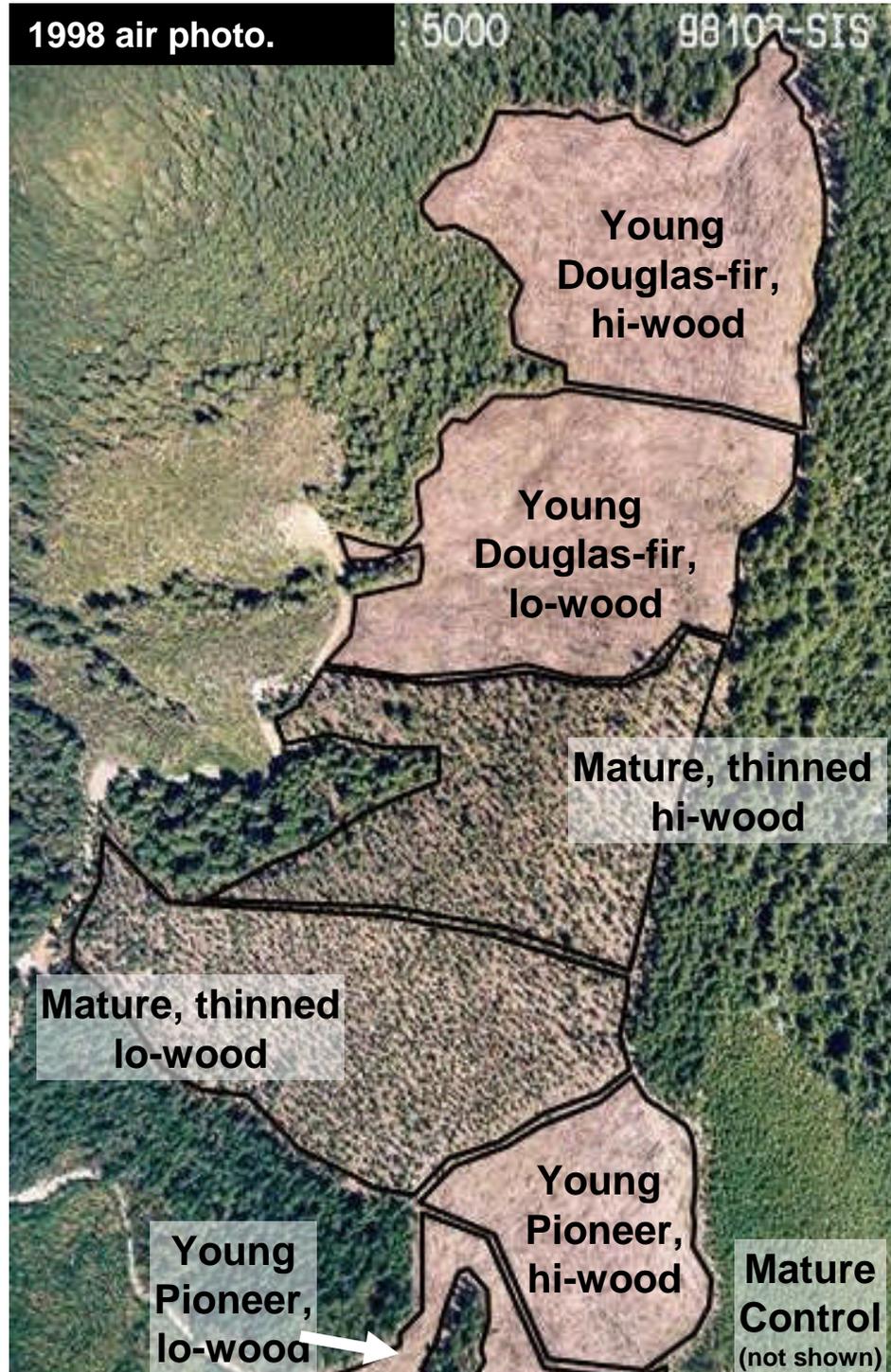
Funded mostly by research

1998 air photo.

5000

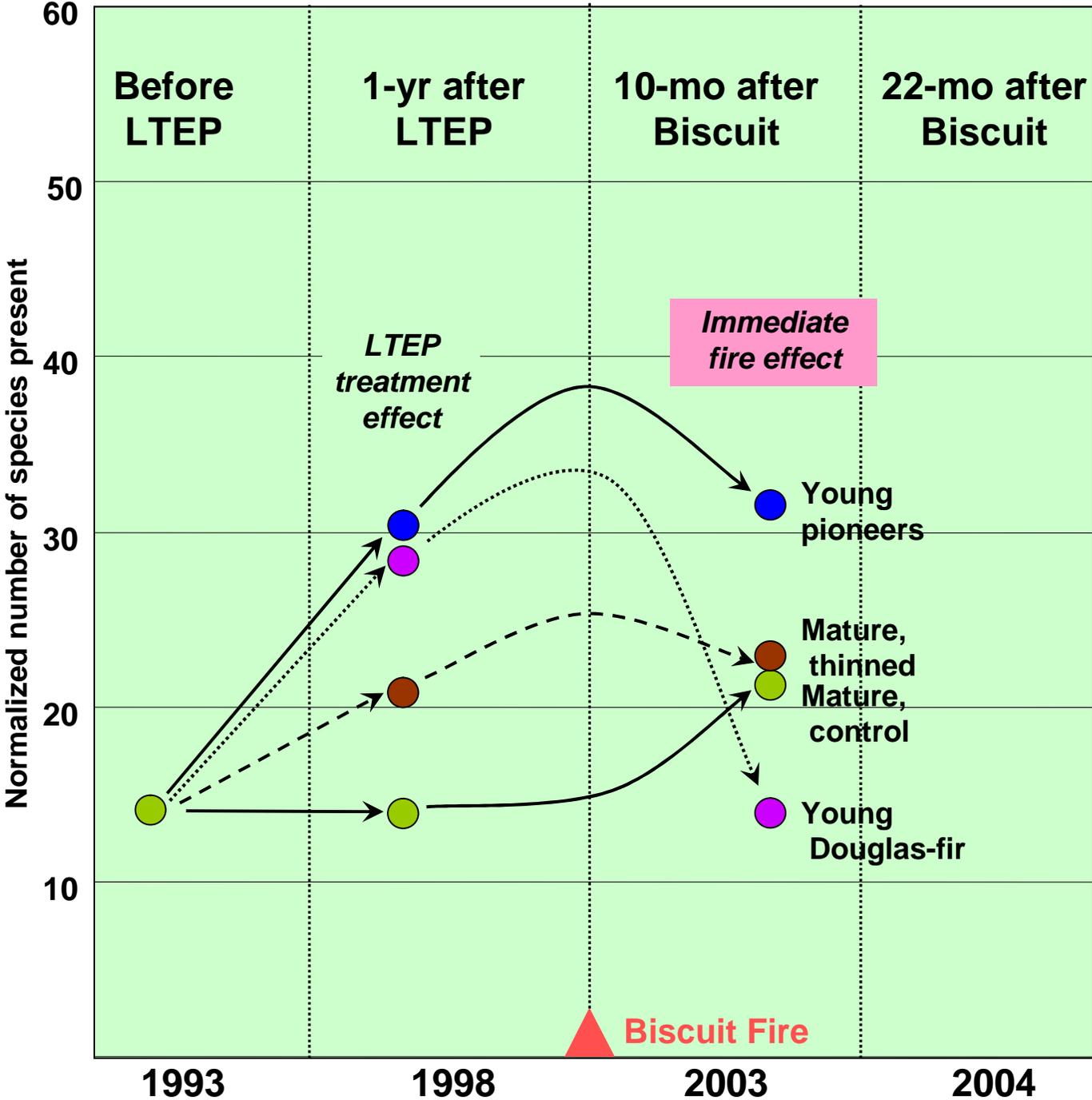
98103-SIS

2004 air photo.



Changes in numbers of understory species

Fire effects mostly swamped by LTEP effects



Learning mode: Landscape-scale management studies



Priority question:

How do alternative approaches to managing LSRs burned in wildfire compare?



Example: Biscuit Fire Landscape Experiment (appendix A in Biscuit EIS)

Three management strategies are compared:



A: Salvage and replant

Salvage, plant Douglas-fir, and tend fuels and vegetation without fire



B: Natural recovery

No salvage or vegetation treatment with fuel breaks on perimeter



C: Underburning focus

Salvage, plant fire-resistant vegetation, and tend fuels with frequent fire



Biscuit-fire management experiment

Design

✿ Four blocks with 3 similar areas each;

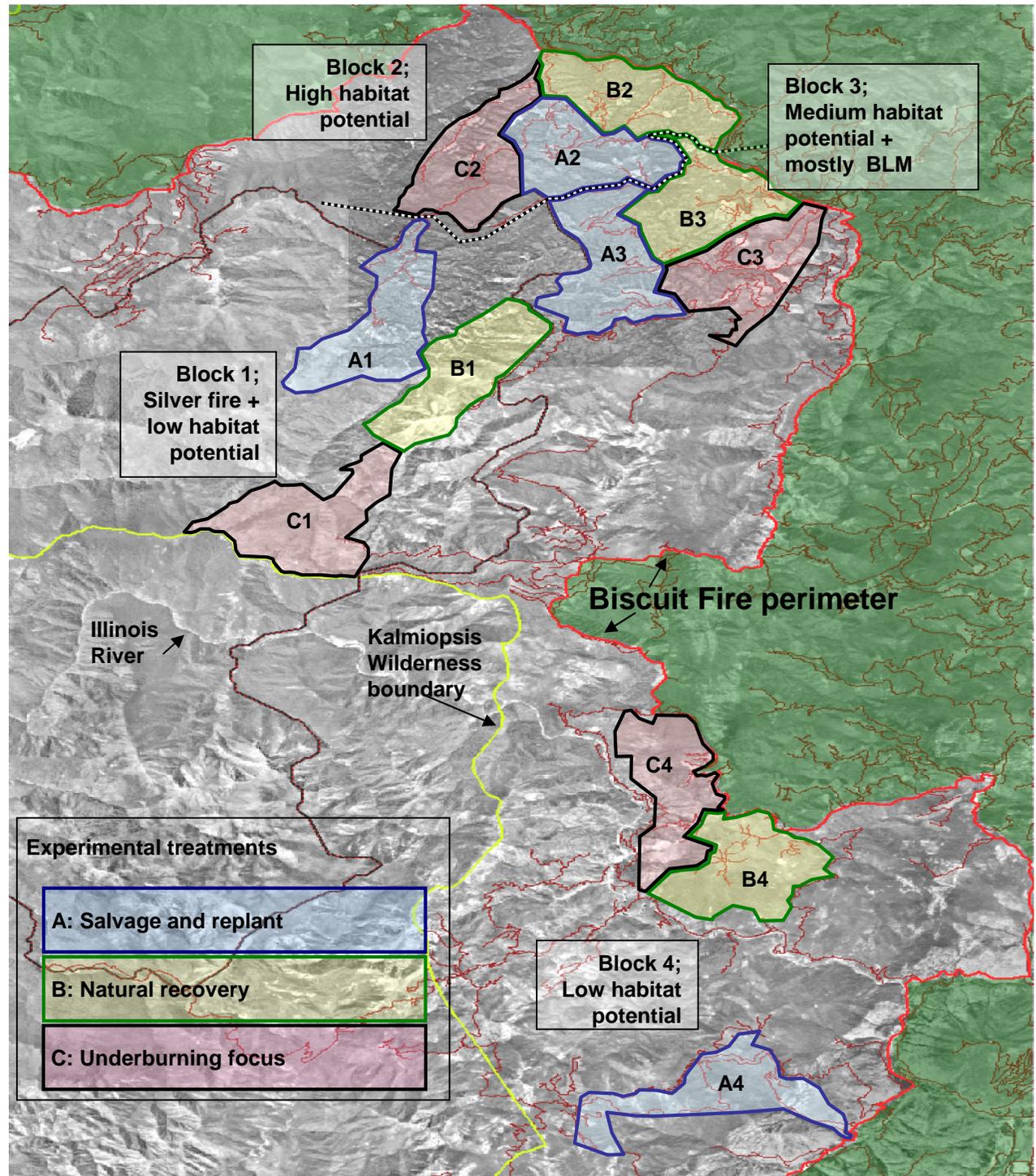
✿ Three treatments (strategies)

✿ Randomly assigned

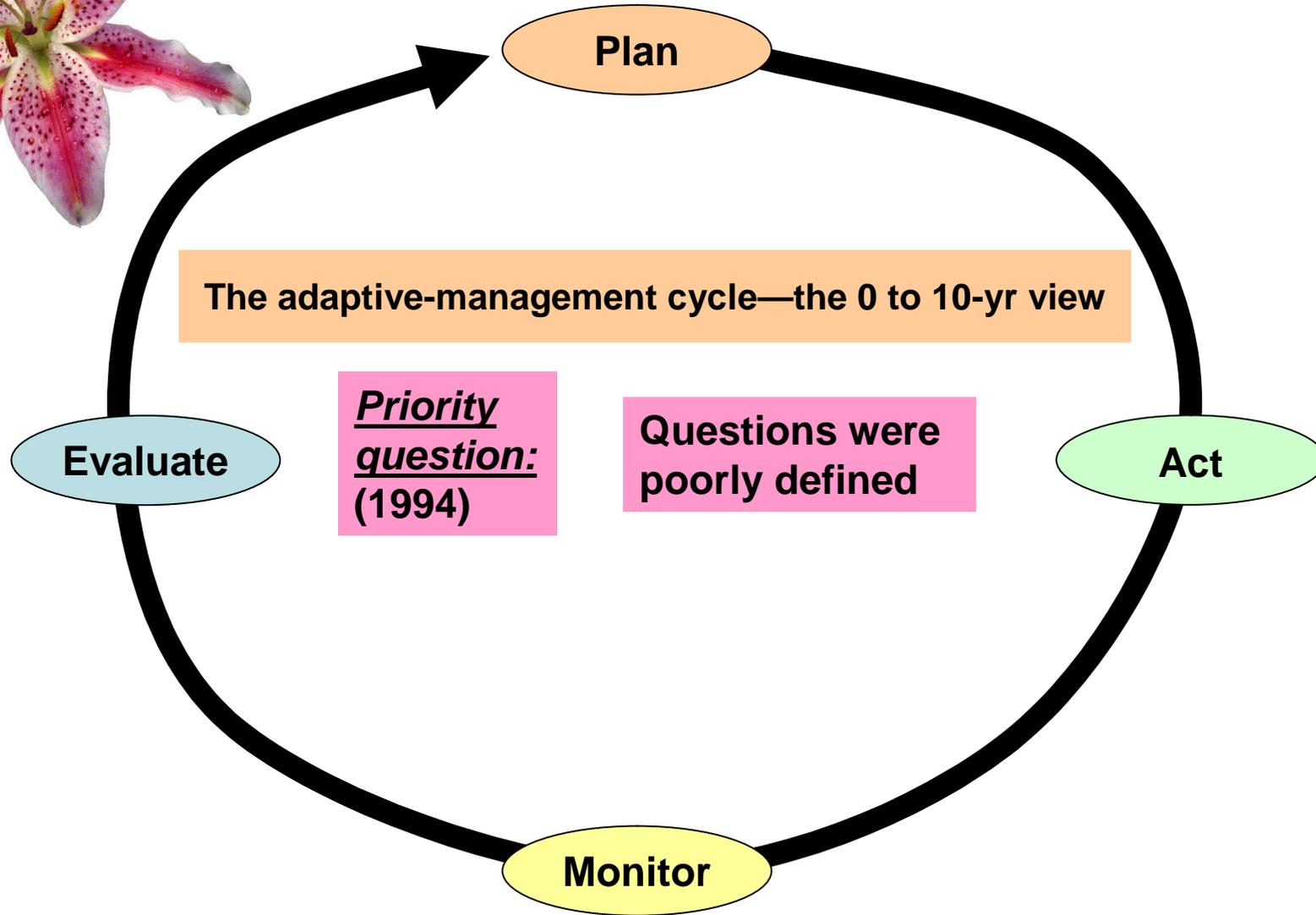
✿ Limited to burned late-successional Reserves

✿ Acres
Areas: 3,000
Blocks: 9,000
Study: 36,000

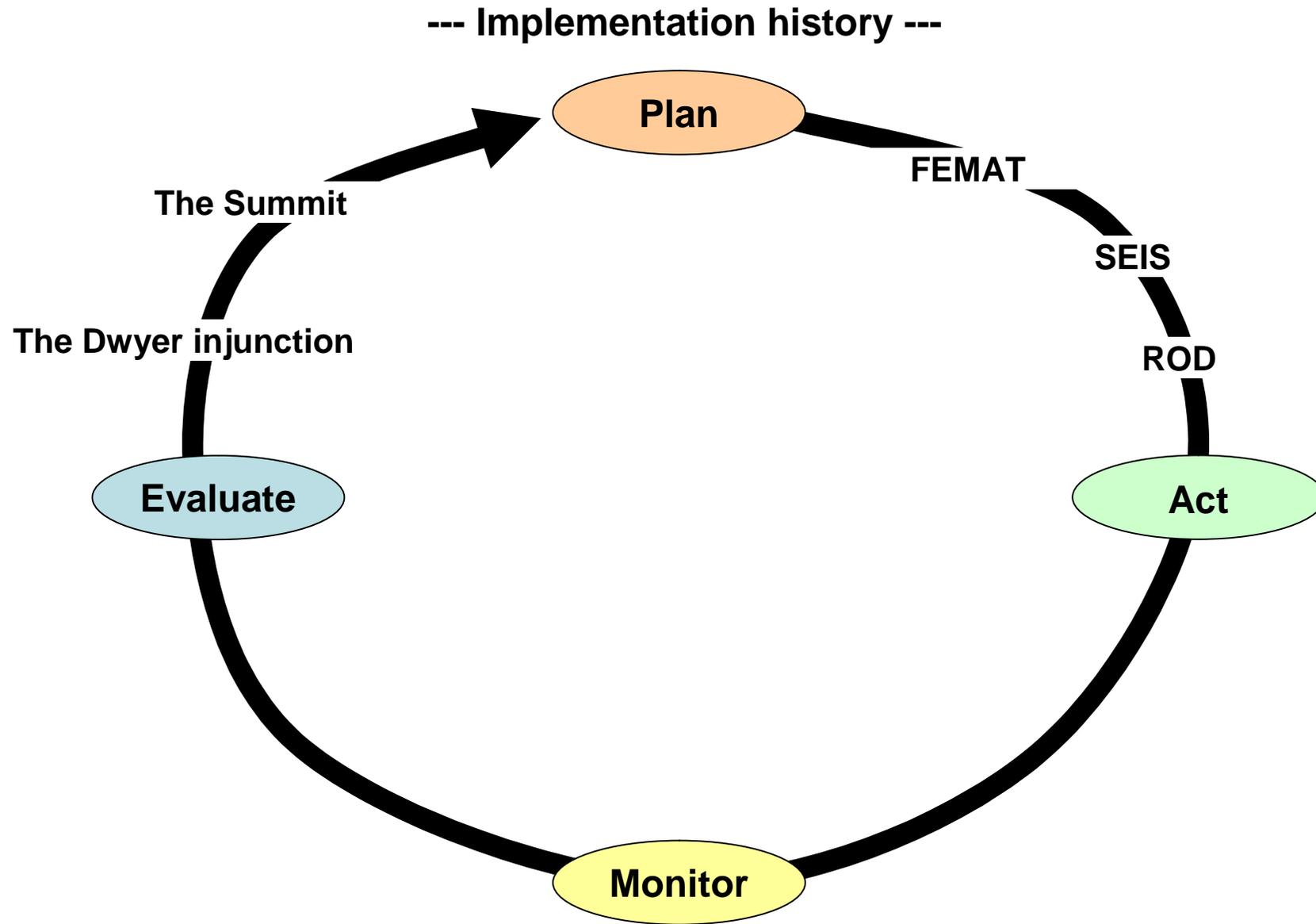
Funding: RO, receipts



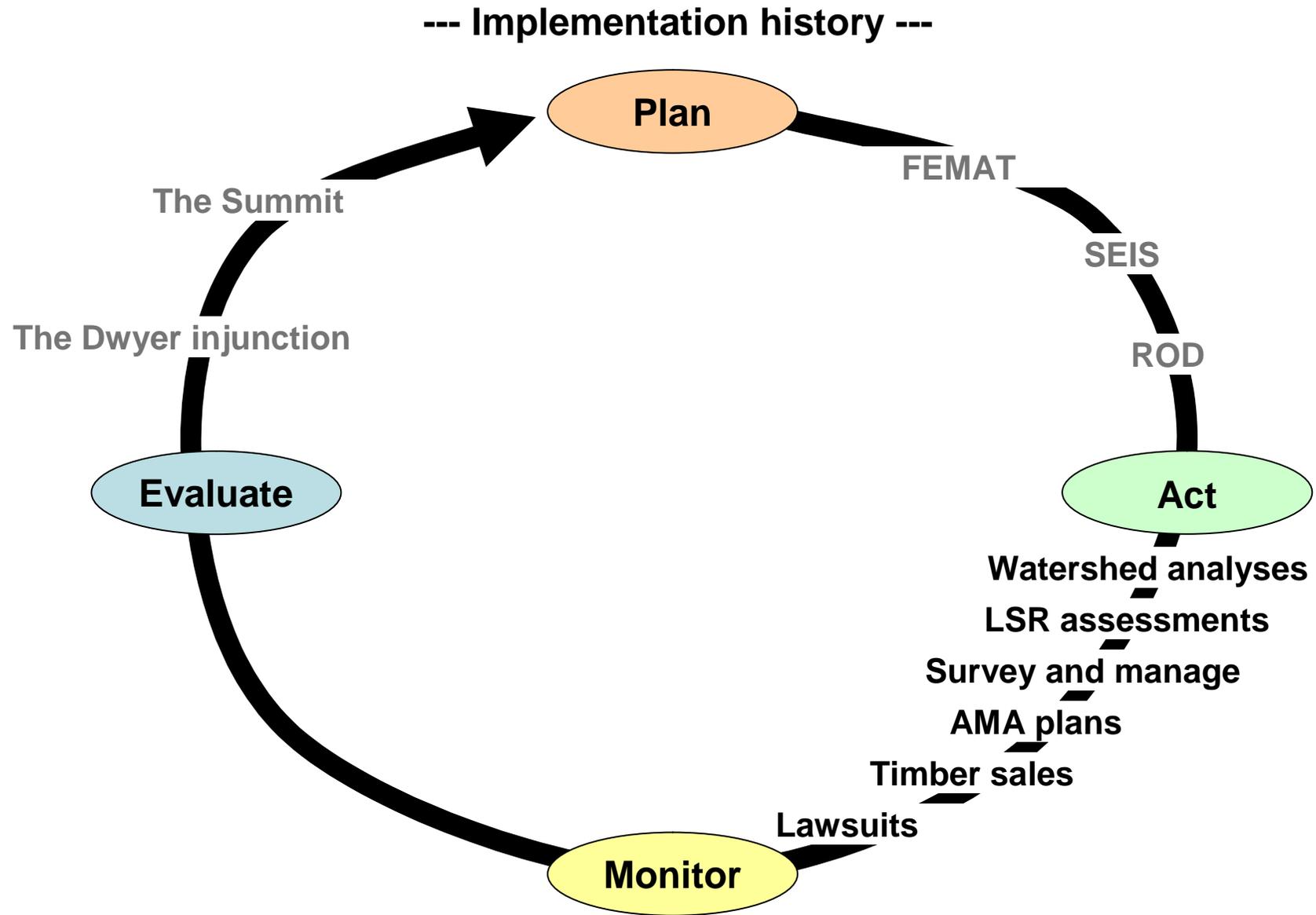
Learning mode: Regional goal monitoring



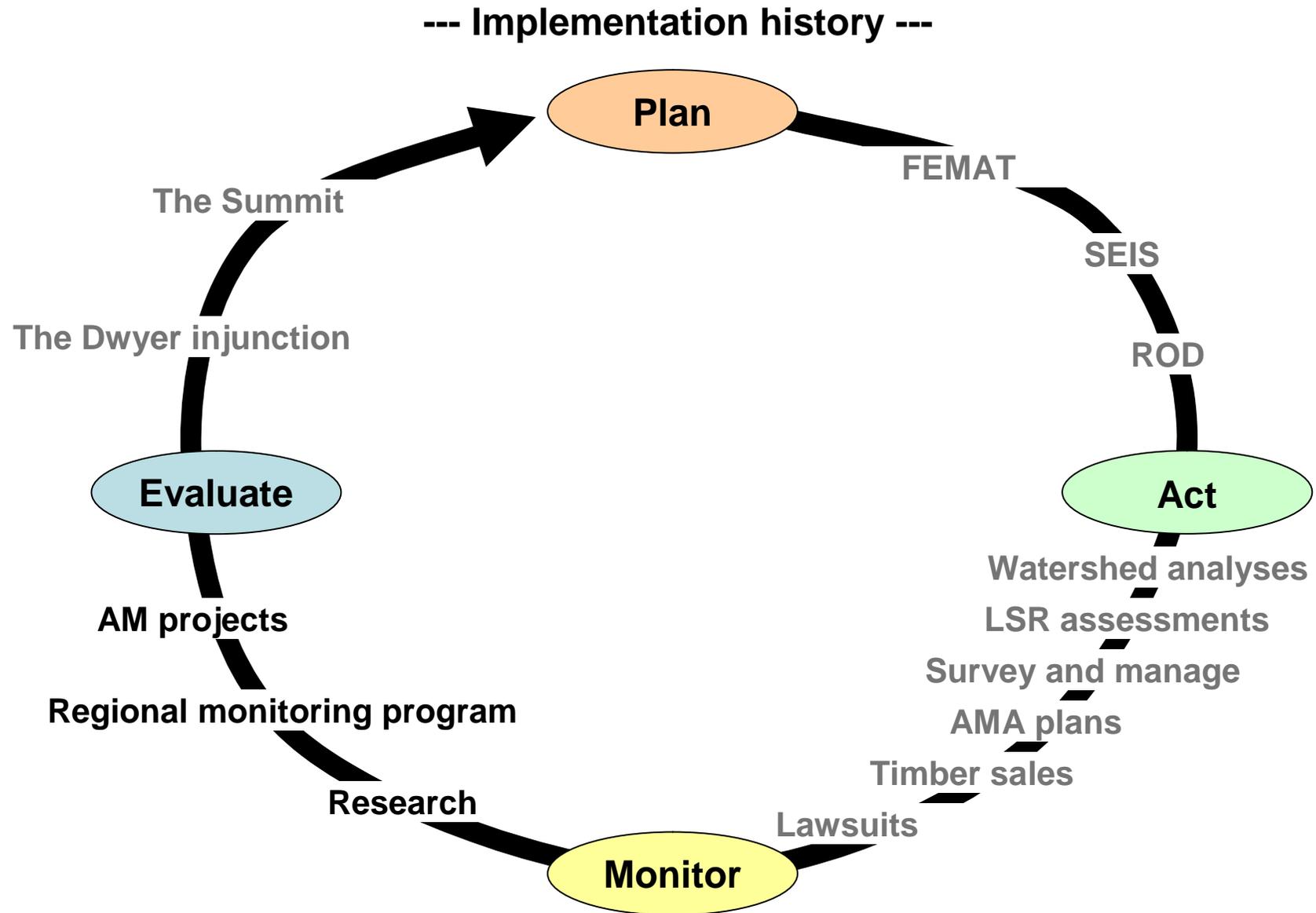
The adaptive-management cycle—concepts versus implementation



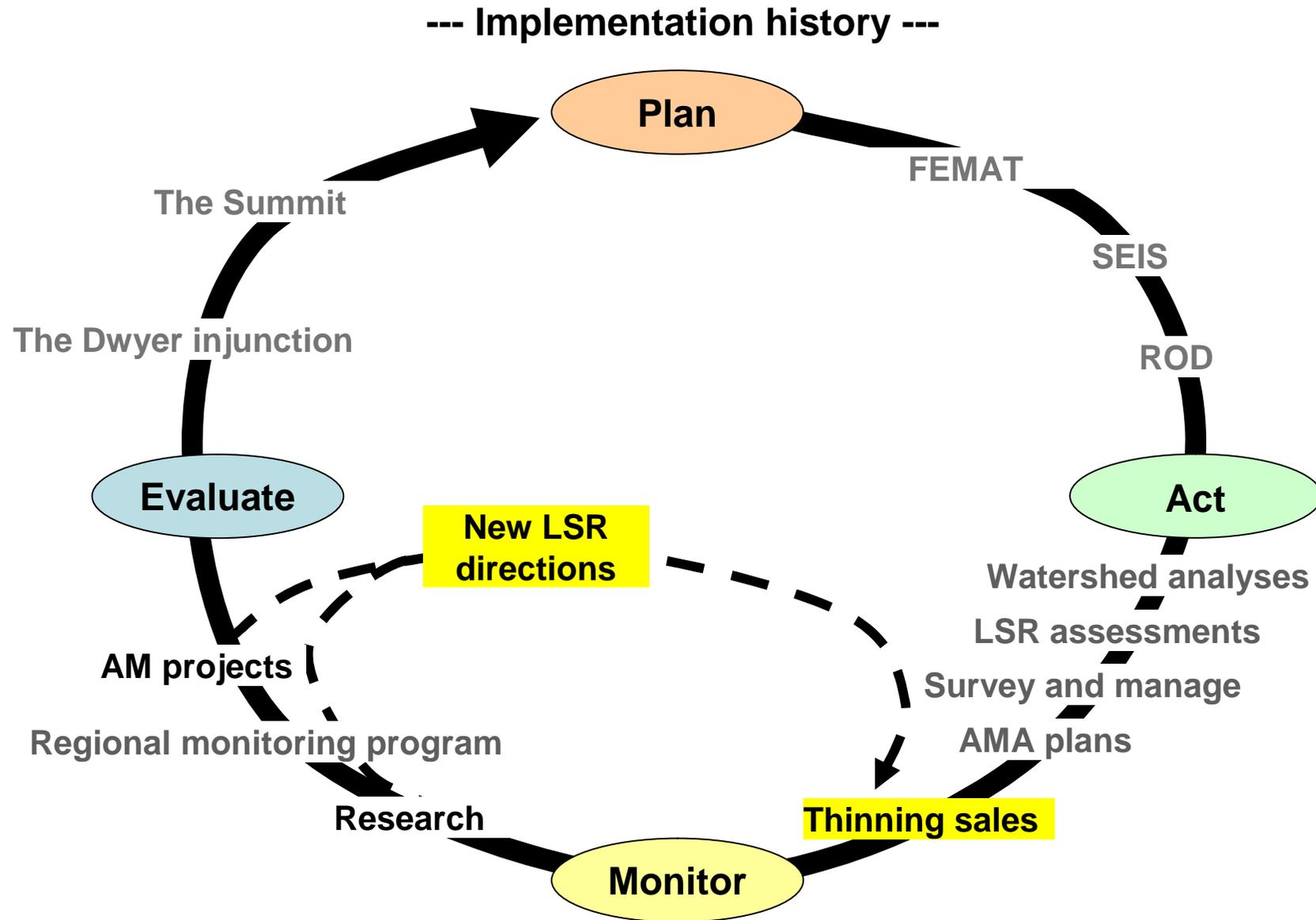
The adaptive-management cycle—concepts versus implementation



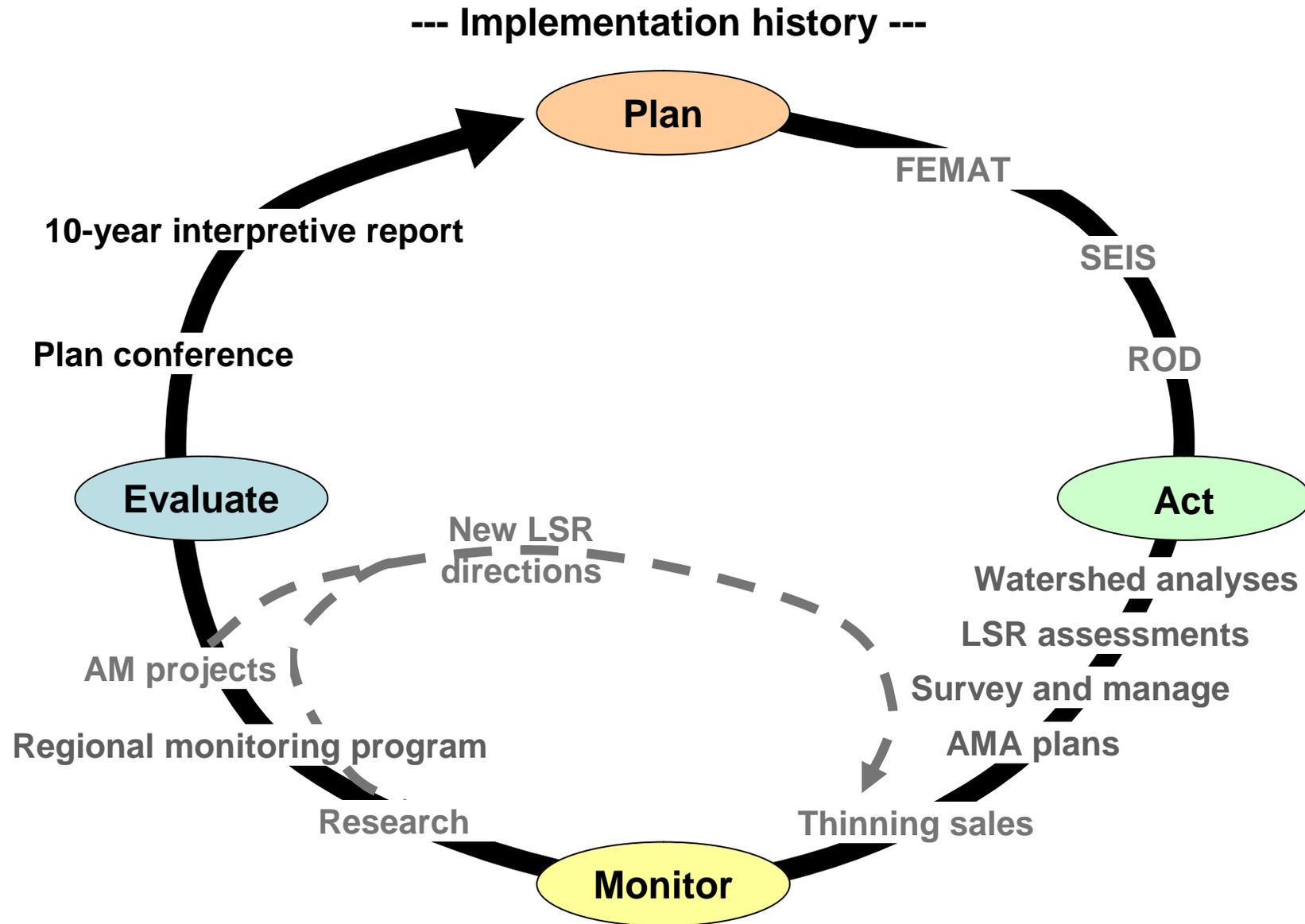
The adaptive-management cycle—concepts versus implementation



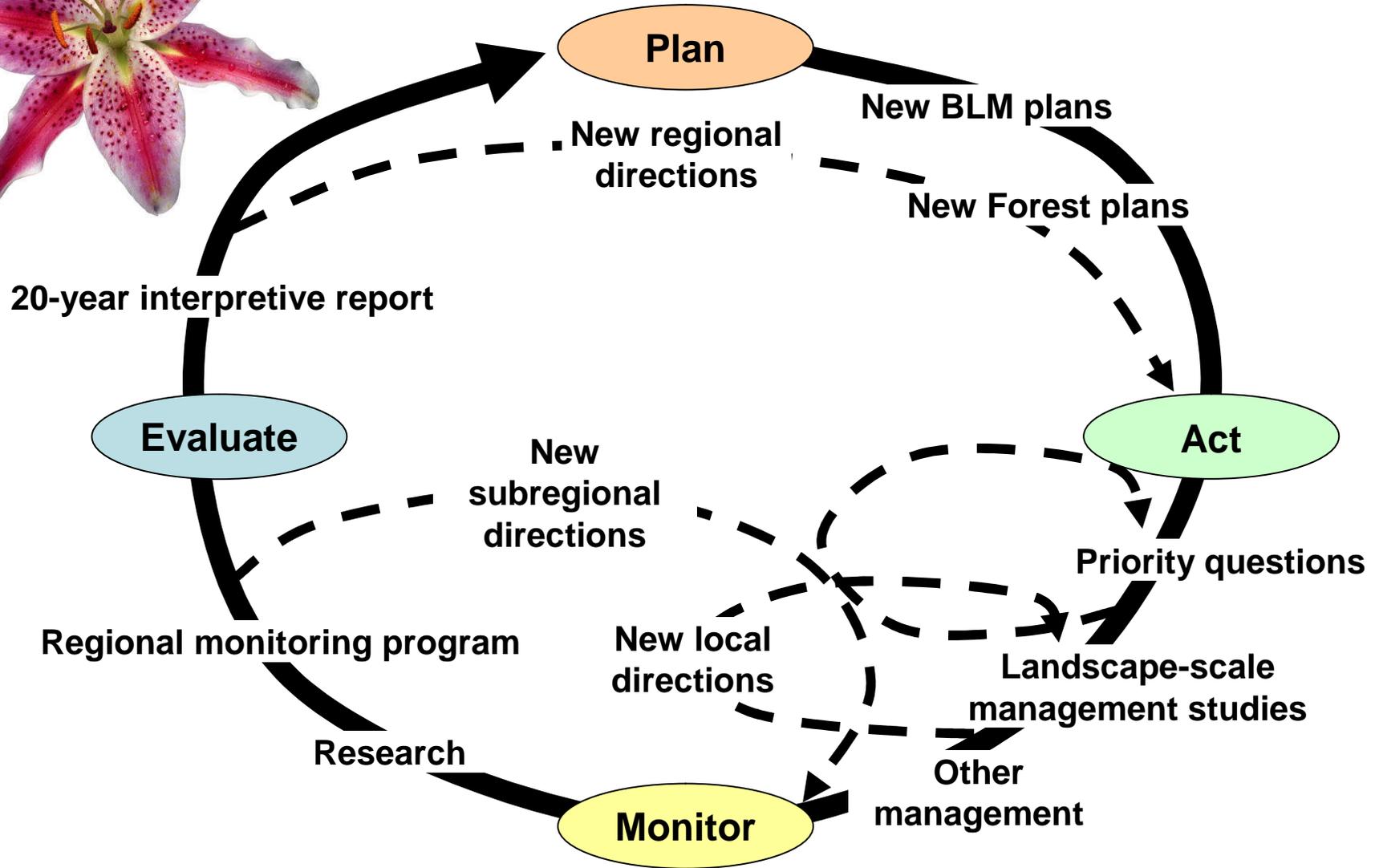
The adaptive-management cycle—concepts versus implementation



The adaptive-management cycle—concepts versus implementation



The adaptive-management cycle—the 10 to 20-yr view



Parting Thoughts



**Focus on important AND controversial questions
(small steps were ineffective)**



**Implement an adaptive management system that:
Focuses on priority questions;
Applies learning modes appropriate to the question;
Promotes multi-scale learning loops.**

Defining adaptive management



*From: Adaptive management of forest ecosystems: did some rubber hit the road? Bormann et al. 2007. **BioScience***

Adaptive management is ... a **systematic and iterative ... a planned approach** to reliably learn how to improve policies or management practices over time in the face of uncertainty.

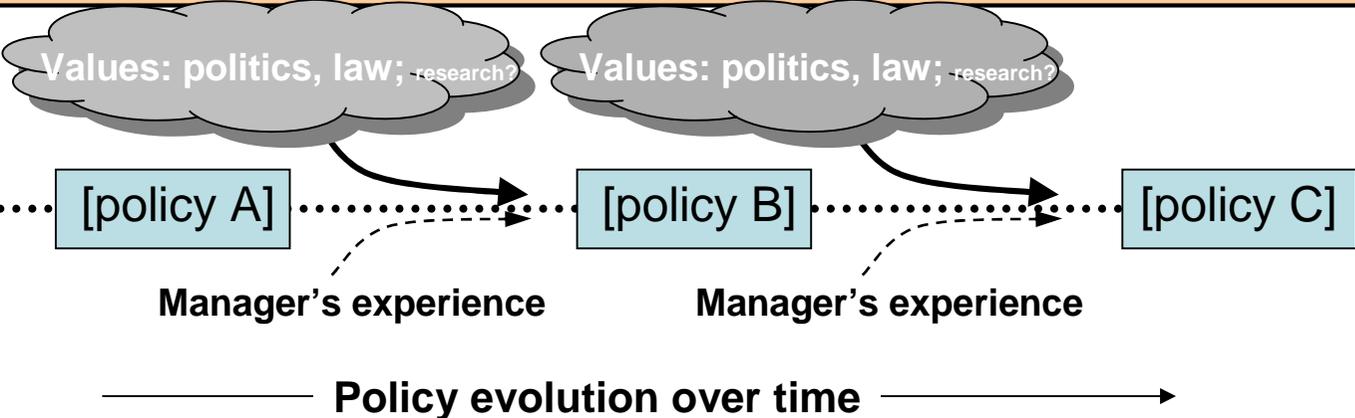
Adaptive management **requires exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on what is known, implementing one—or if possible, more than one**—of these alternatives, monitoring to learn which alternative best meets the management objectives, and then using results to update knowledge and adjust management actions.

Adaptive management is not an end in itself, but a means to more effective decisions and enhanced benefits; thus, its true measure is in how well it helps meet environmental, social, and economic goals, adds to scientific knowledge, and reduces tensions among stakeholders.

Available adaptive management models

Reactive
(poorly
adaptive)
management

Forces:
External
Internal



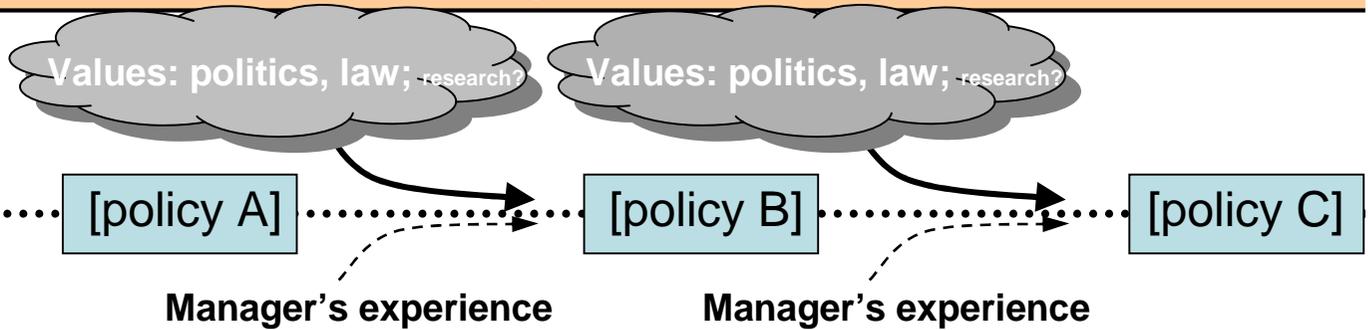
Passive
adaptive
management

Active
adaptive
management

Available adaptive management models

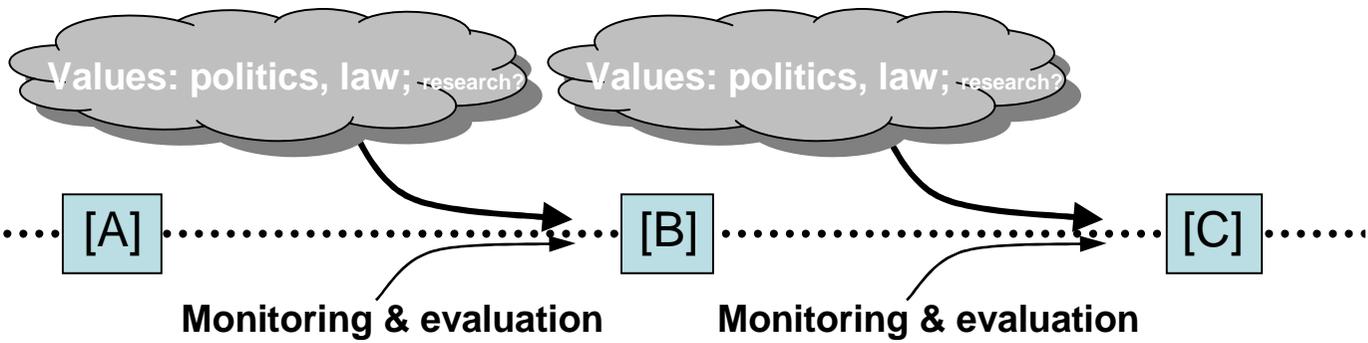
Reactive
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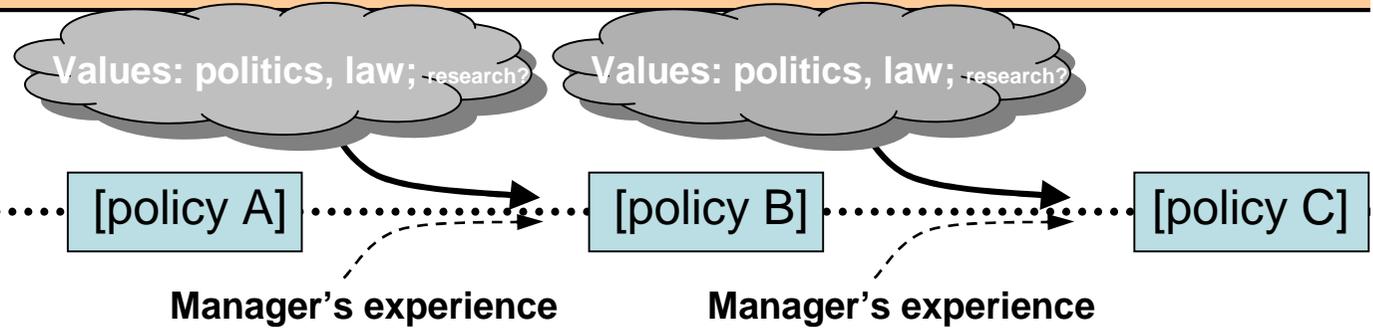
————— Policy evolution over time —————>

Active
adaptive
management

Available adaptive management models

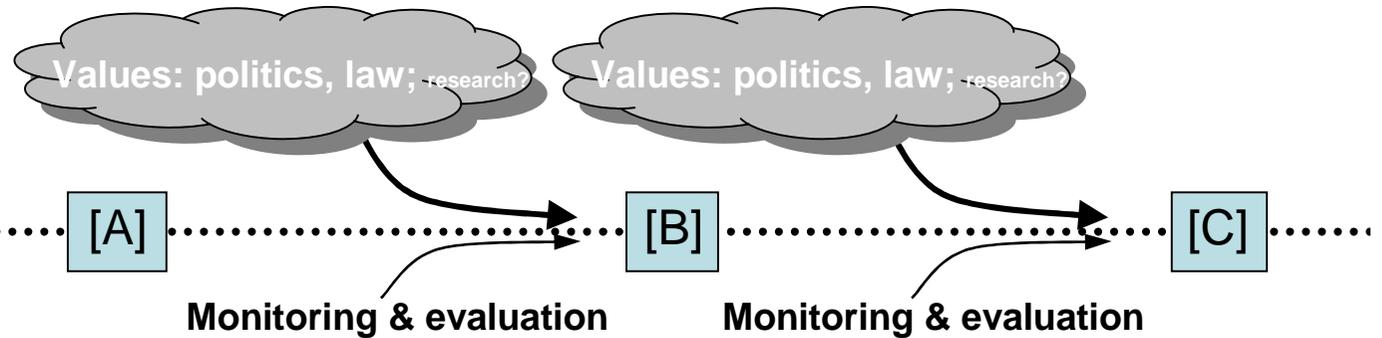
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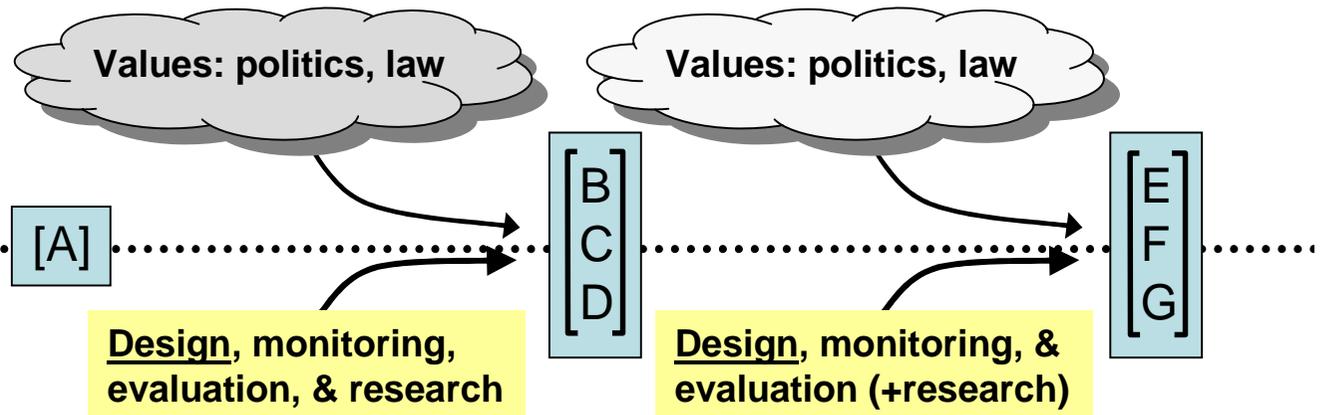
Passive
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————— Policy evolution over time —————>