

The Role of Monitoring in Adaptive Management: Improving Small Wetland Restorations



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Slide 1

Main points

- Adaptive management can be used to evaluate conservation outcomes on both private and public lands.
 - Case example: How can we improve the quality of small wetland restorations, most of which occur on private lands?
- Monitoring under an adaptive management leads to defensible monitoring partnerships.
 - Protocols can be designed to be simple enough for volunteers or temporary staff to implement.
 - Monitoring data can be designed to be useful at multiple geographic scales.



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Main points

Why should land managers consider adaptive management?

- Focus on objectives and outcomes
- Reduces uncertainty through management
- Transparent decisions
- Framework for robust monitoring partnerships



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Why should land managers consider adaptive management?

Management in the face of uncertainty

Adaptive management is “..management in the face of uncertainty, with a focus on its reduction..”

Williams & Johnson 1995



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Management in the face of uncertainty

Adaptive Management: 4 requirements



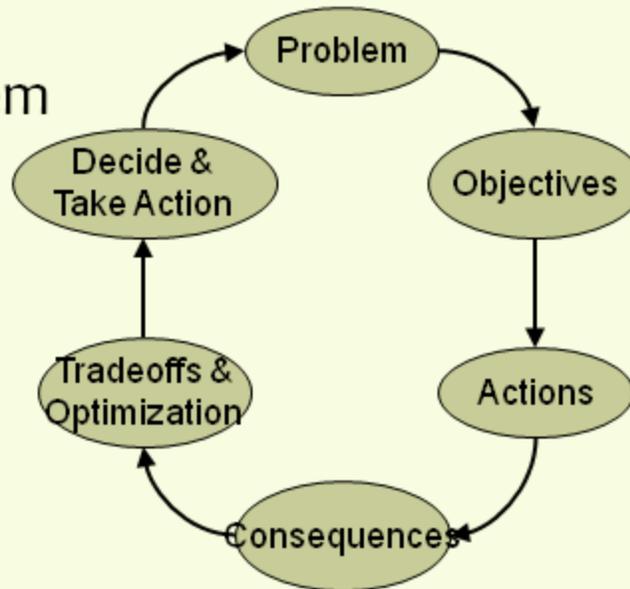
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Adaptive Management: 4 requirements

Steps in the Structured Process

- PROACT
- Defining the Problem
- Objectives
- Alternatives
- Consequences (models)
- Trade-offs and optimization



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Steps in the Structured Process

Defining the Problem

Geographic and temporal scope, who is the decision-maker?

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Defining the Problem

Restoring Small Wetlands in Minnesota



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Restoring Small Wetlands in Minnesota

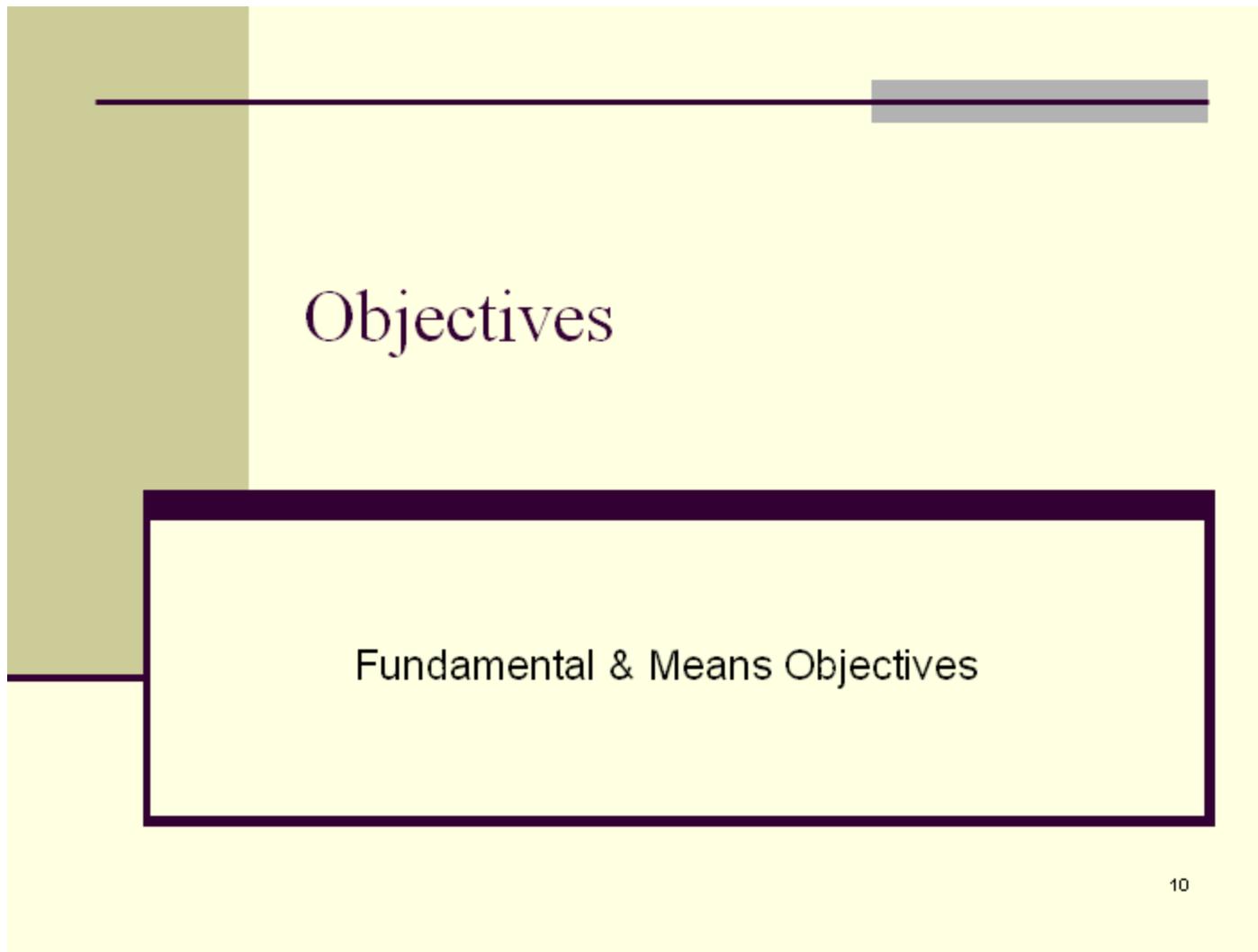
Define the Problem

- The USFWS Partners for Fish and Wildlife Program restores > 100 small wetland basins, on private land (wetland easements), in Minnesota annually. Managers want to identify the best techniques for restoration.
- USDA NRCS also restores wetlands.

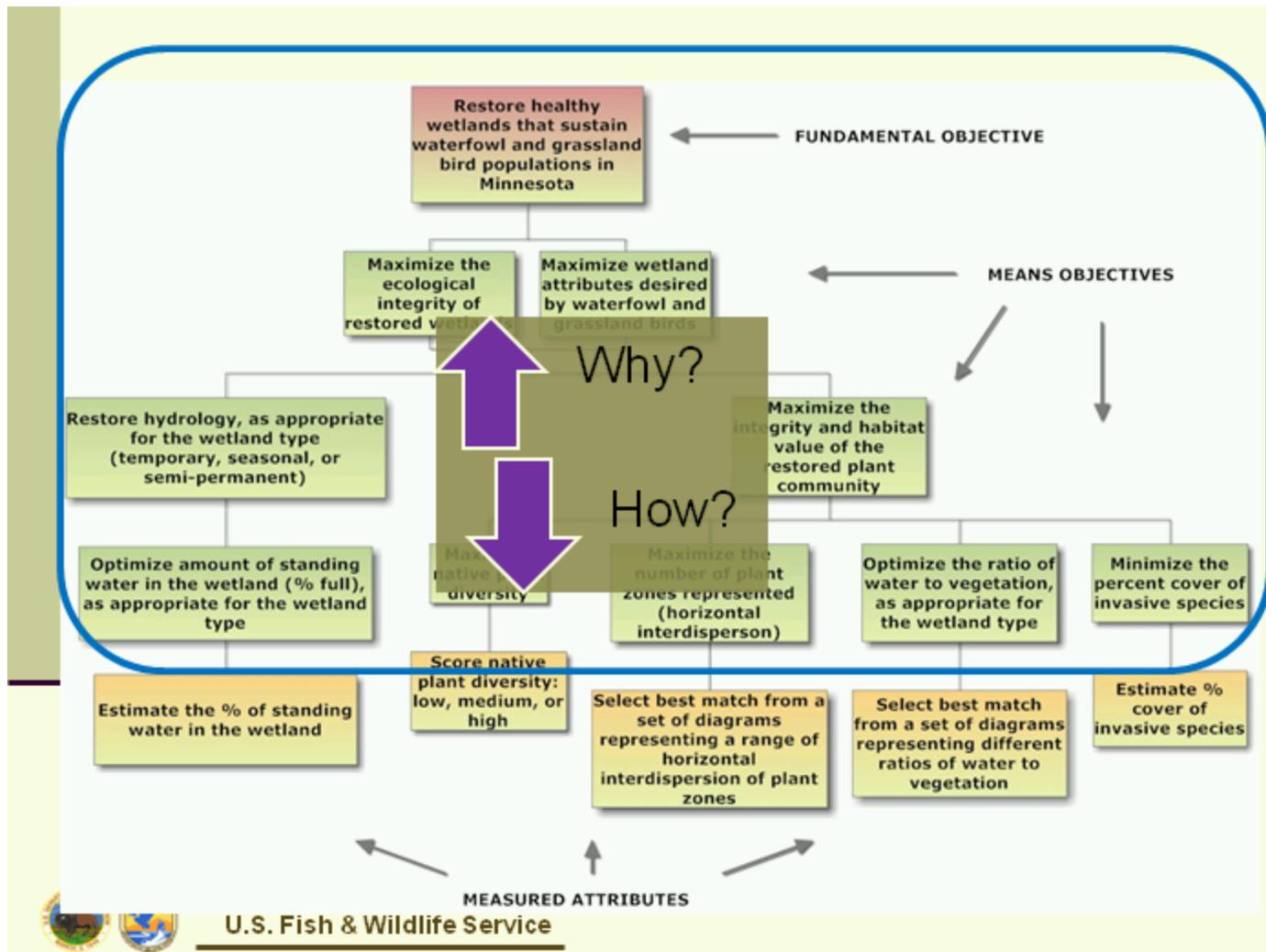


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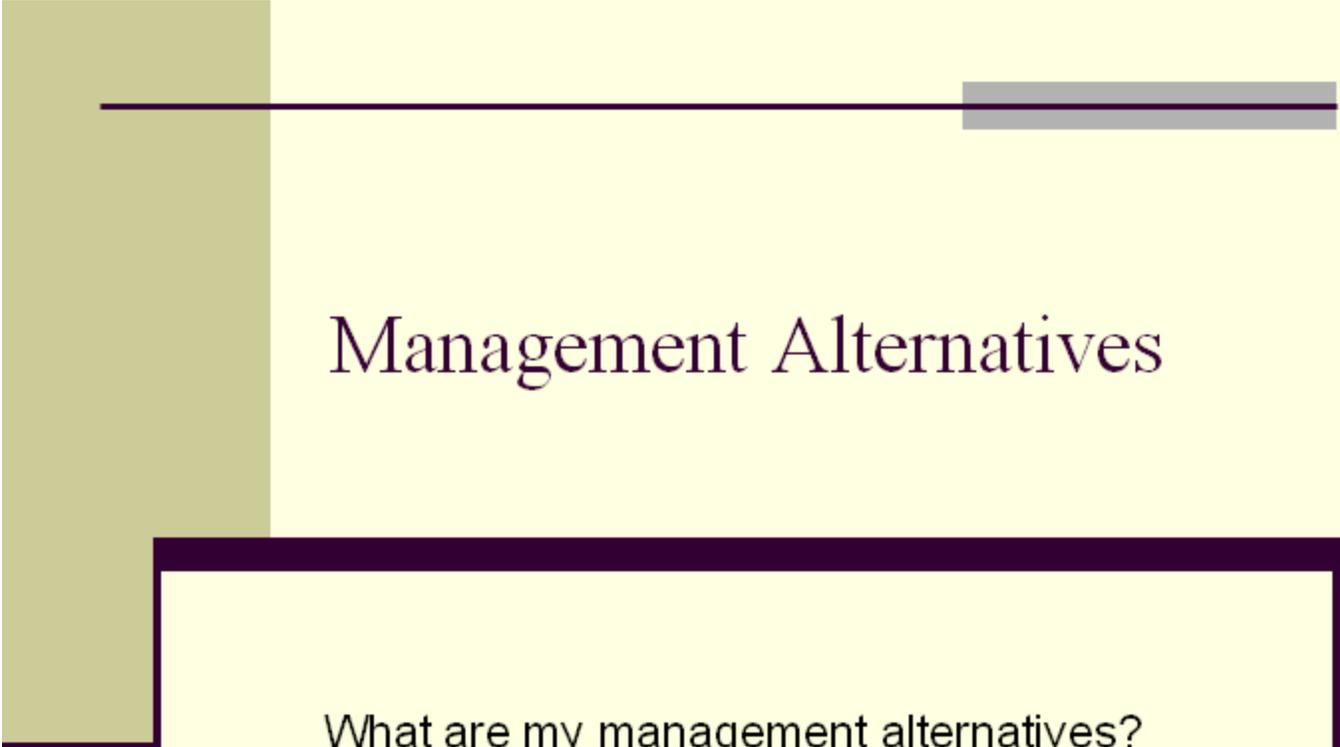
Define the Problem



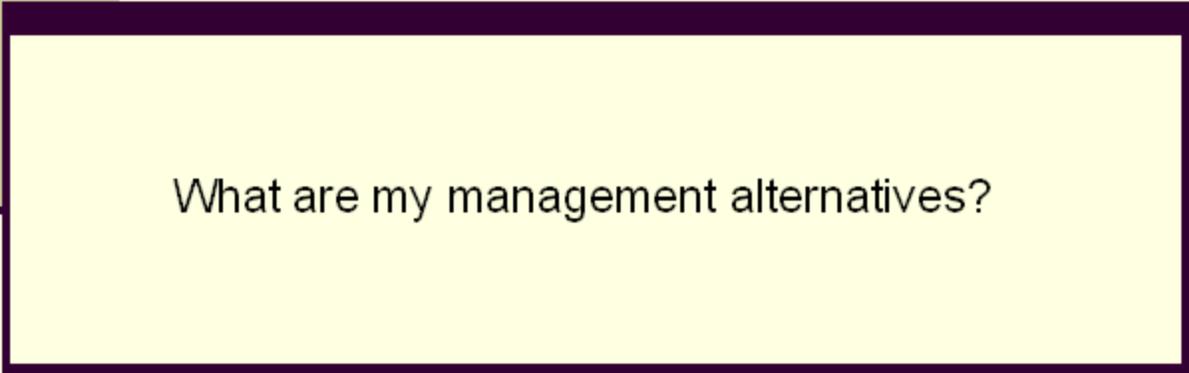
Objectives



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Management Alternatives



What are my management alternatives?

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Management Alternatives

Management Alternatives

Restore
Hydrology



Restore Hydrology
+
Excavate Sediment



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Management Alternatives

Pre-assessment



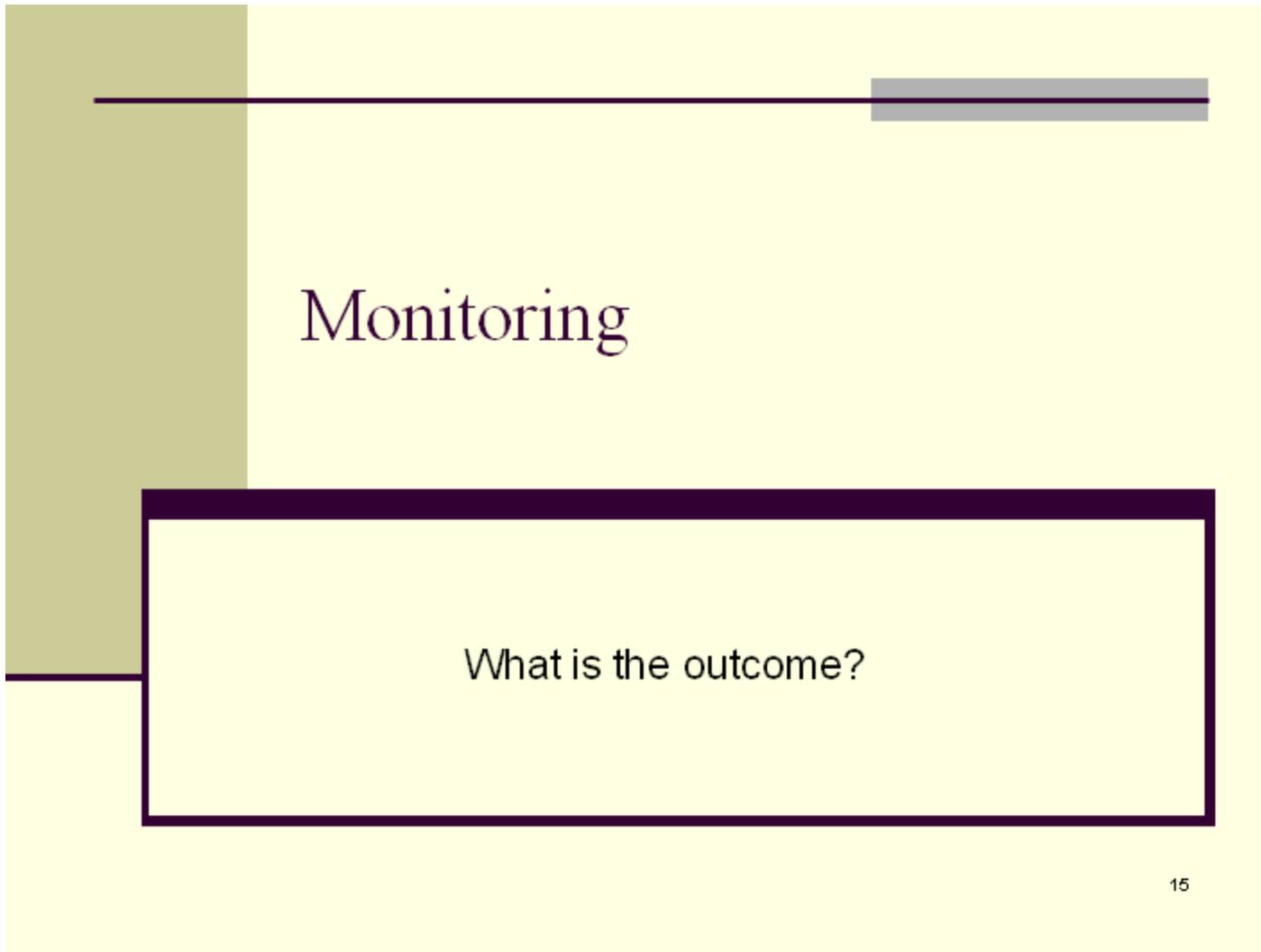
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Pre-assessment



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Monitoring

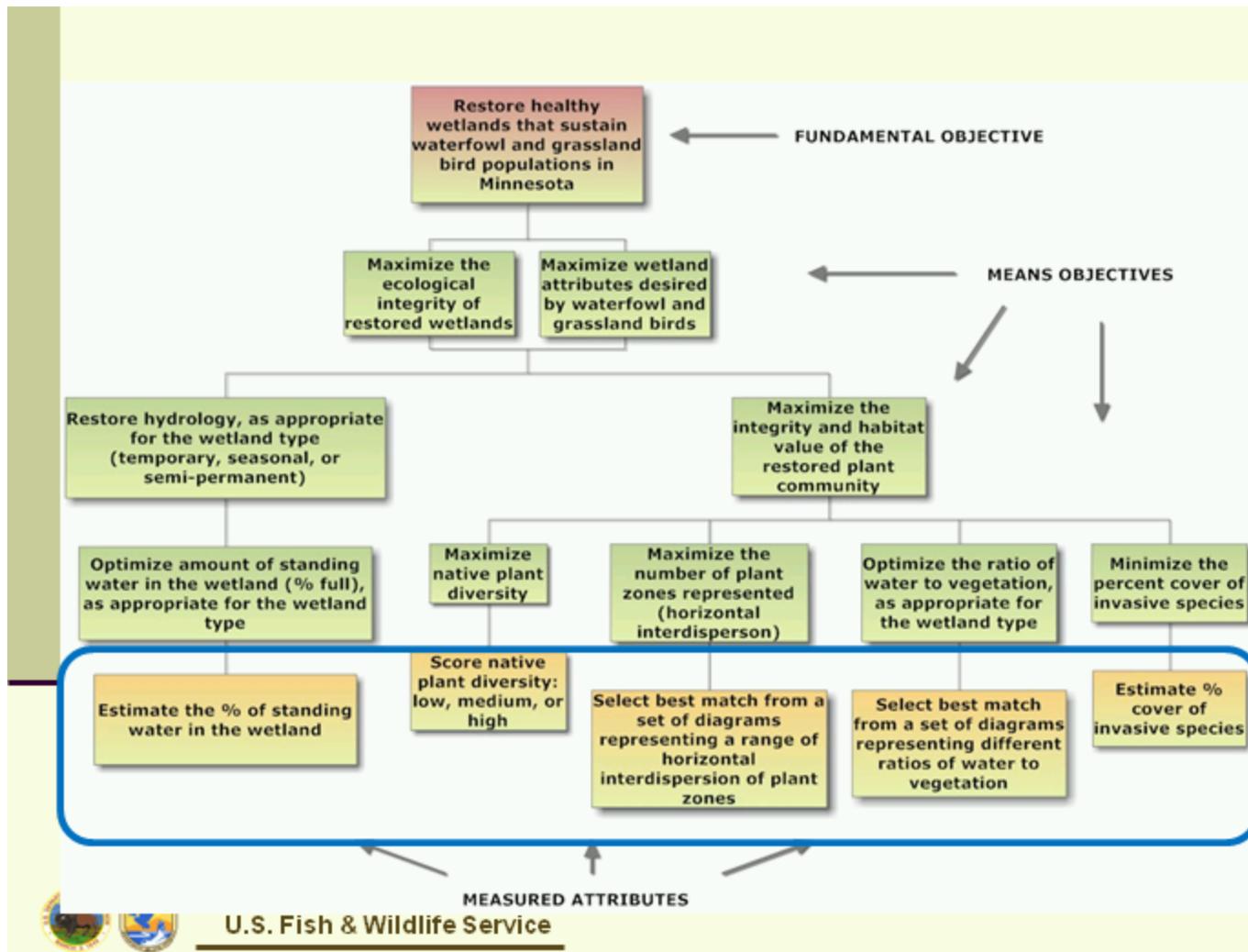
Monitoring



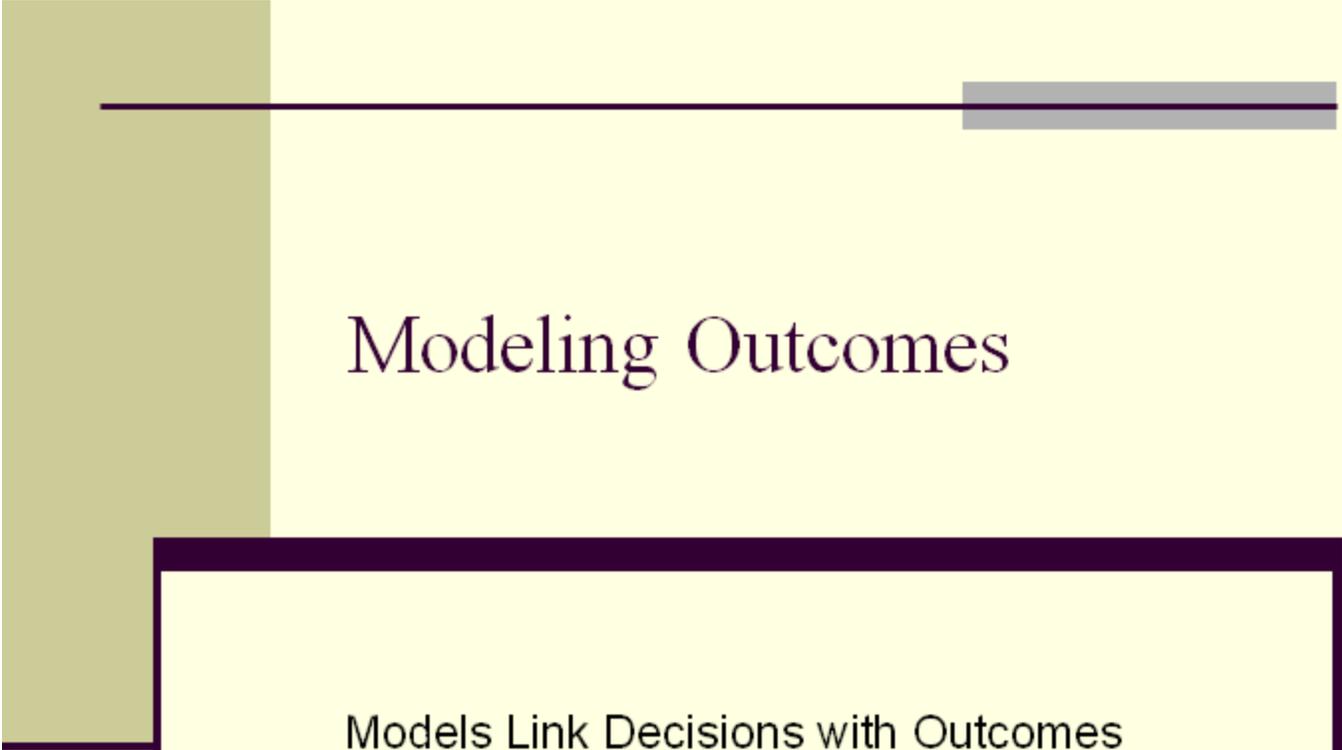
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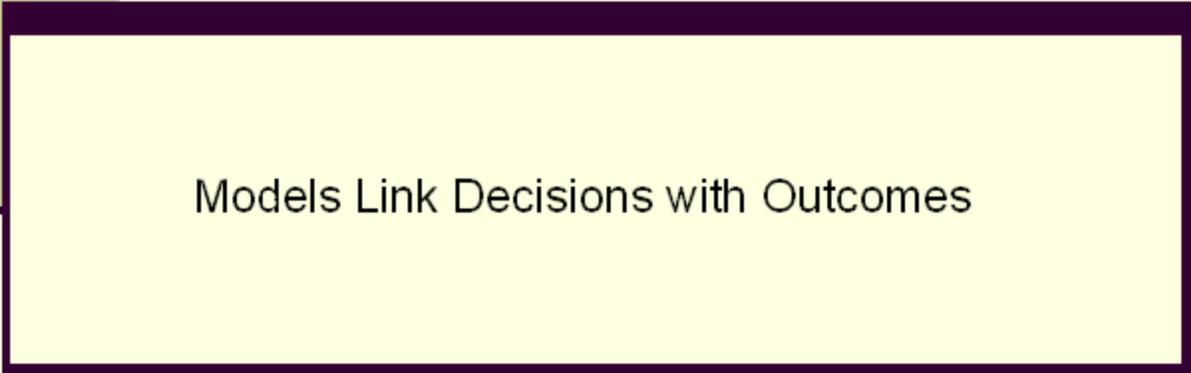
Monitoring



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Modeling Outcomes



Models Link Decisions with Outcomes

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Modeling Outcomes

The Role of Modeling

- Models link decisions with outcomes
- Models make predictions about outcomes
- There are many types of models!
- The model is tailored to the decision context



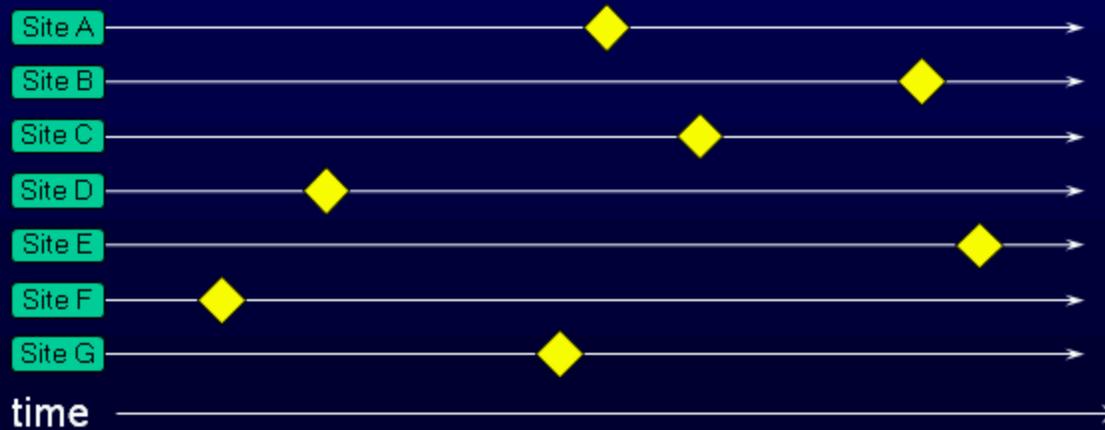
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The Role of Modeling

Making a *sequential* decision

- Situation 2:
Series of replicated, one-time decisions
Examples: Dam removals, wetland restorations



Making a sequential decision

Adaptive Management combines modeling, prediction, and monitoring

- “By *monitoring* the system’s *reaction* to management and *comparing* the result *against* the *predictions of* each of the *competing models*, we can discern over the long run which of the candidate models produces better predictions and then favor that model in future decisions.”

■ Kendall 2001



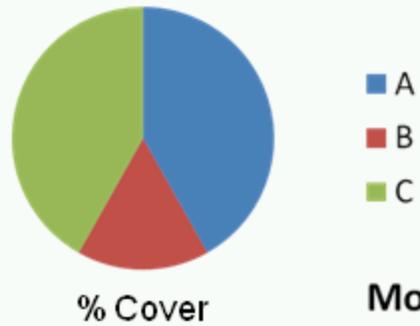
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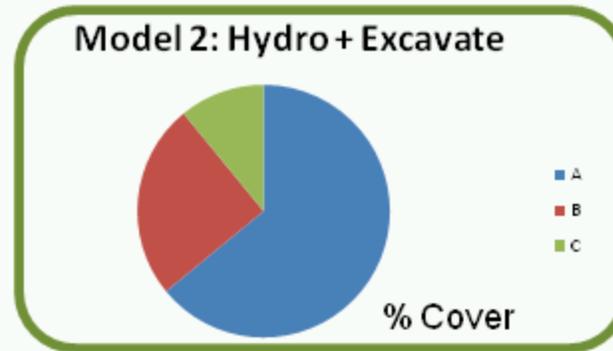
Adaptive Management combines modeling, prediction, and monitoring

Models Predict Outcomes

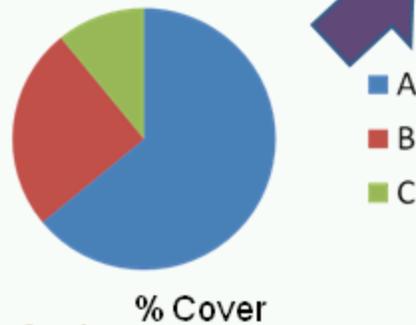
Model 1: Hydrology



Model 2: Hydro + Excavate



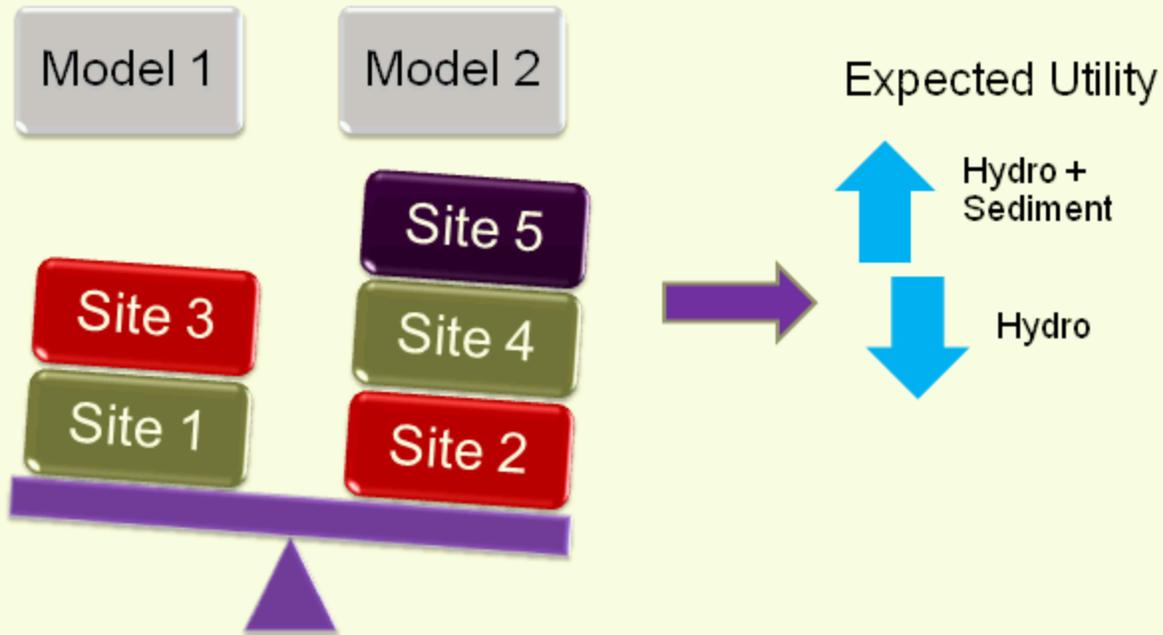
Monitoring Data



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Models Predict Outcomes

Model Weights Change as Evidence Builds



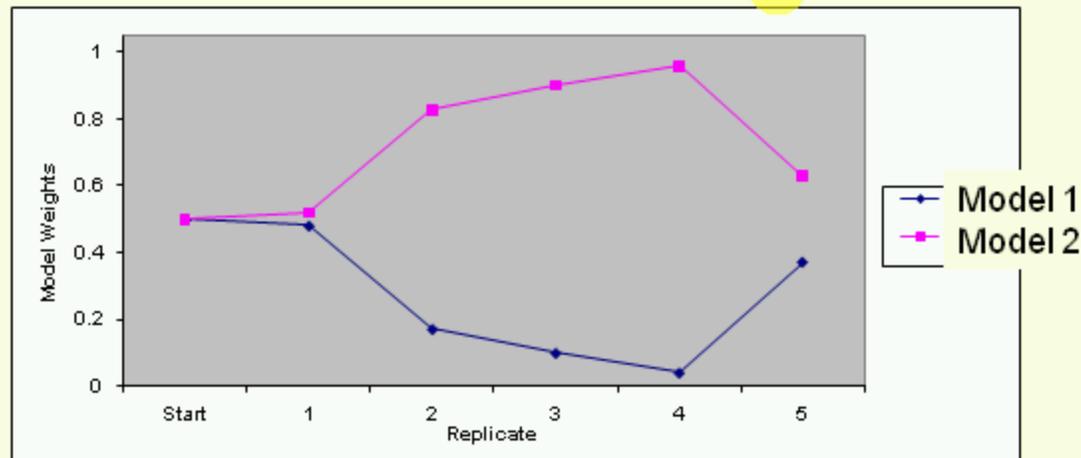
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Model Weights Change as Evidence Builds

Updating the Models

- When to measure outcomes of a wetland restoration?
- When is it 'complete'?
- Models updated at years 4 & 8 post-restoration



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Updating the Models

Summary

When Should We Invest in Adaptive Management?

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Summary

When Should We Invest in Adaptive Management?

- High risks if 'wrong' decision is made.
- High costs associated with management.
- Strong controversy, public interest in the decision.
- Need to explain, defend decisions (transparency).
- Evaluate assumptions associated with common management practices.
- Strong need for cooperative learning to improve management and document outcomes.



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When Should We Invest in Adaptive Management?

Adaptive Management Leads to Defensible Monitoring Partnerships

- US Fish & Wildlife Service
 - Partners for Fish and Wildlife Program, MN
 - Wetland Management Districts
 - Private Landowners
- USDA Natural Resources Conservation Service

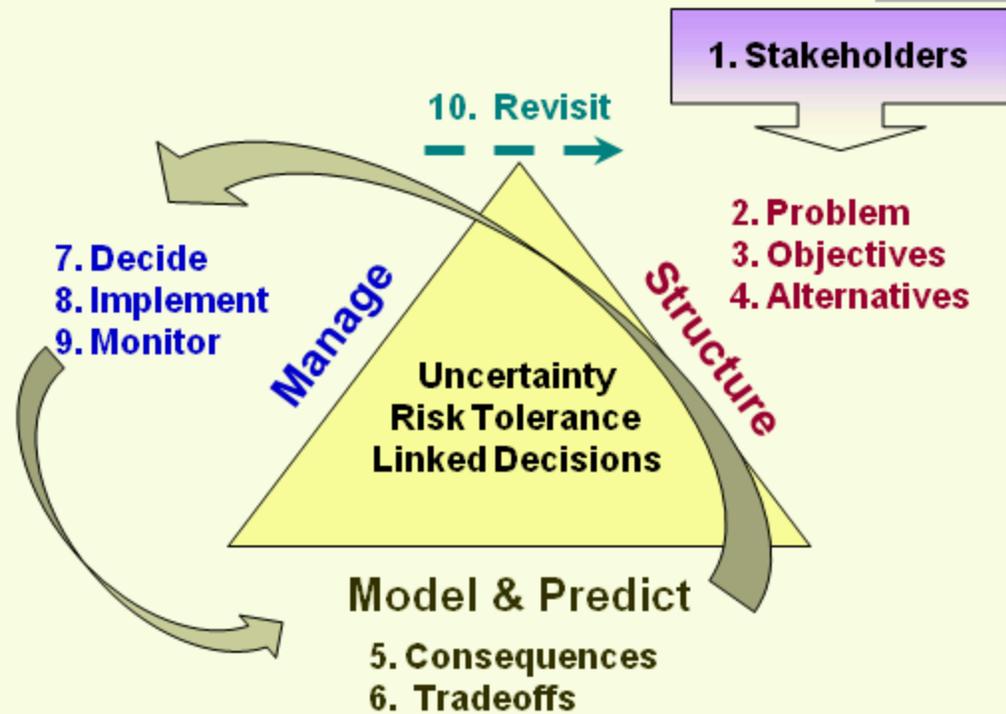


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Adaptive Management Leads to Defensible Monitoring Partnerships

Adaptive Management Process



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Graphics by Melinda Knutson²⁸

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Main points

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Acknowledgements

The End



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The End

Resources

- FWS National Conservation Training Center offers a series of courses
 - Principles of Modeling
 - Structured Decision Making Course
 - Structured Decision Making Workshop
 - Adaptive Management
 - Monitoring
- USGS has expertise at Patuxent WRC, Northern Prairie WRC, UMESC, GA Coop Unit, several other Coop Units interested

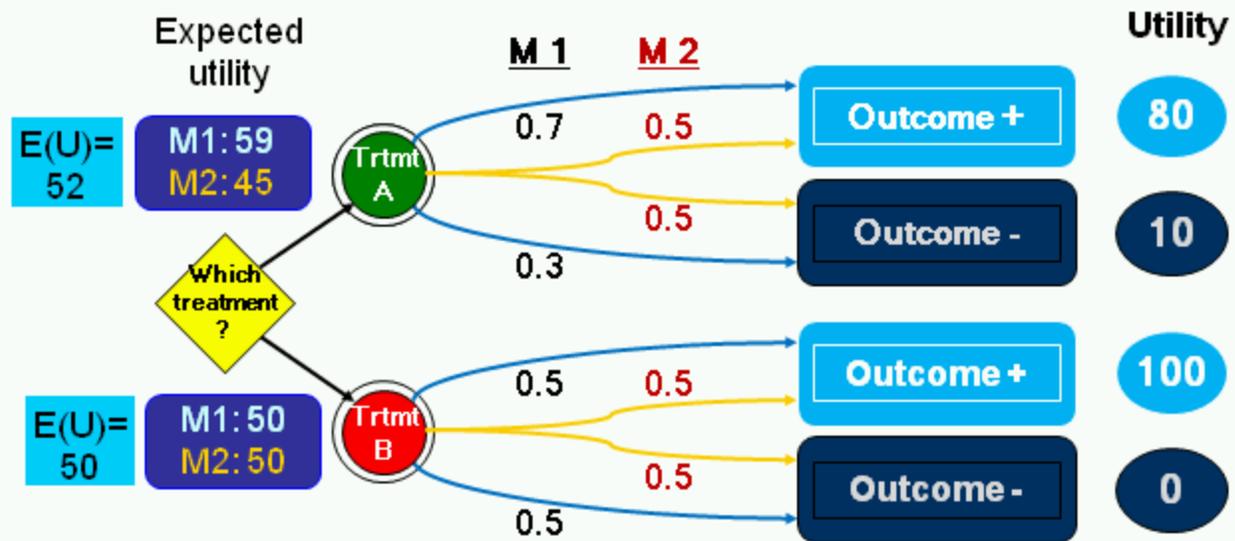


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Resources

Decision Tree:
Expected utility (value) guides management



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Decision Tree: Expected utility (value) guides management

Separate Models for Wetland Types



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Separate Models for Wetland Types