# Case Study: Native Prairie Adaptive Management in the USFWS Refuge System

# Introduction

## Case Study Module A

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Purpose of Case Study

- Demonstrate the components of an adaptive management framework through a real application
- Individual elements introduced throughout Case Study Modules A - E, in sync with the regular course modules that introduce each topic
- Illustrate how the components all integrate into a cohesive decision framework

Case Study – Outline

- Module A
  - Problem
  - Objective
  - Alternative Decisions or Actions
- Module B
  - Models
- Module C
  - Monitoring and Learning
- Module D
  - Dynamic Decision Making
- Module E
  - Seeing the Whole Picture

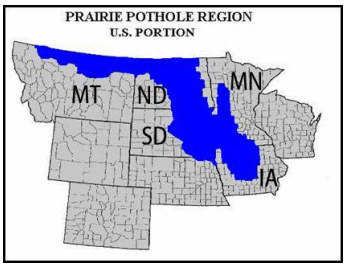
Outline for this Module

- Introduction to the Problem
- Native Prairie Adaptive Management
  - Framework Components
  - Decision makers and stakeholders
  - Organization and Roles
  - Area and scale of focus
  - Management Objective
  - Alternative Actions
  - Decision cycle – frequency and timing

Native Prairie in North America


- Widespread loss to agricultural conversion
  - Mixed-grass prairie reduced by >70%
  - Tallgrass prairie reduced by >85%
- In remainder, exclusion of historic disturbances
  - Grazing by native ungulates
  - Frequent fires

Native Prairie in the USFWS Refuge System - Prairie Pothole Region




- USFWS Refuge System is an important conservation reservoir of remaining native prairie
- Invasion by cool-season introduced grasses
  - Smooth Brome (*Bromus inermis*)
  - Kentucky bluegrass (*Poa pratensis*)

Native Prairie in the USFWS Refuge System

- "Brome Summit" 2006
- Dakota-wide inventory 2006 – 2008
  - 5 – 55% native grasses and forbs (NP)
  - 10 – 45% smooth brome (SB)
  - 10 – 45% Kentucky bluegrass (KB)
- 1984, 2007 site comparison
  - 39-63% reduced NP cover, replacement by SB and KB
- Conclusion
  - Invasion problem is bad and getting worse
  - USFWS Refuge System is accountable
    - NWRS mission statement ▪ NWRS Improvement Act of 1997
  - Need to act now

Native Prairie in the USFWS Refuge System

- Management against invasive species
  - Re-introduction of disturbance to mimic natural processes that historically shaped native vegetation communities

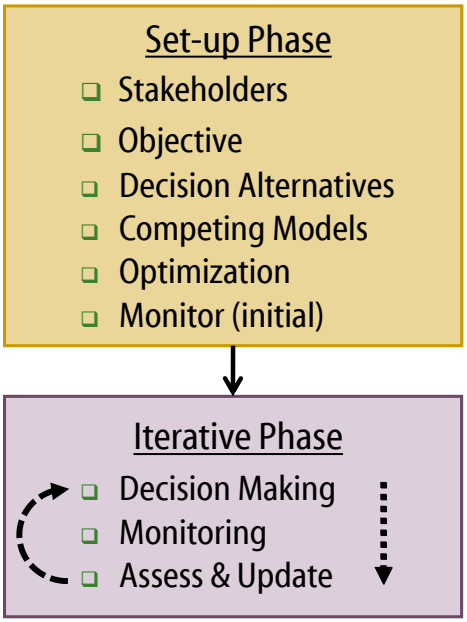
Native Prairie in the USFWS Refuge System (cont)

- Success has been poor to inconsistent
  - Uncertainties about biological response to management
  - Absence of systematic evaluation of management effects
  - Inadequate monitoring, record-keeping
  - No coordination of effort

A Coordinated, Adaptive Approach

- Joint effort by USGS and USFWS
- Develop adaptive decision support system (NPAM)
  - Coordinates local efforts
  - Assists in selecting management actions under uncertainty
  - Maximizes learning from management outcomes
  - Reduces uncertainty through time
  - Improves future decision making
- Operates at level of individual land unit and whole region
- Began in 2008…continues to present

NPAM Framework Components

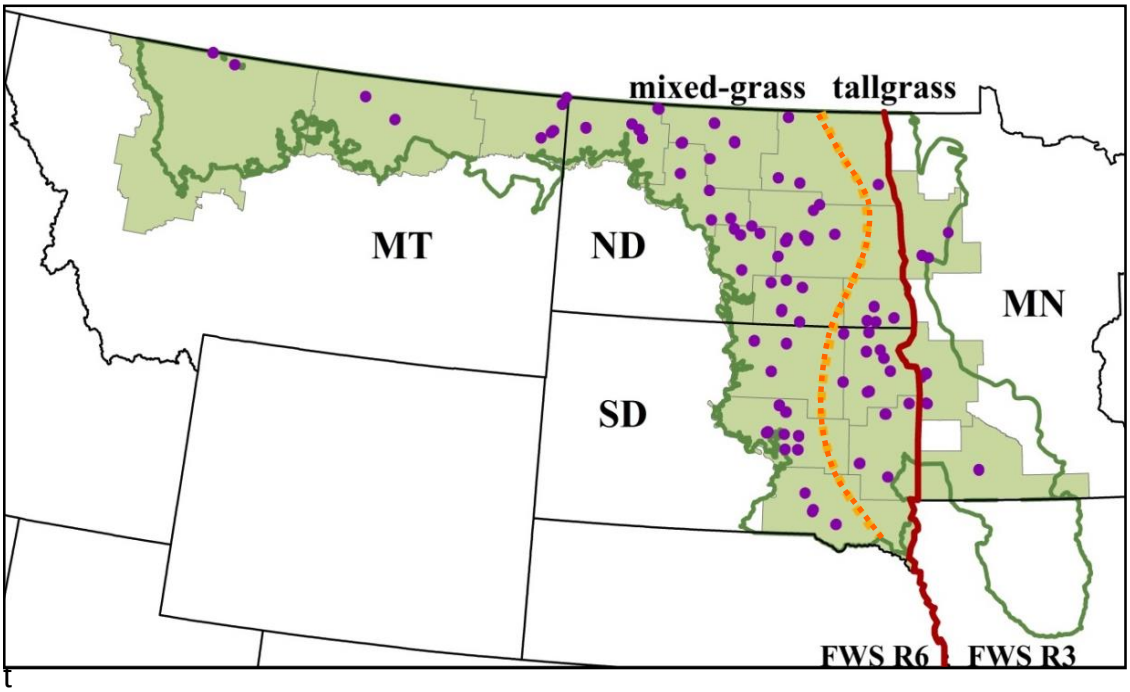


Decision Makers and Stakeholders

- USFWS National Wildlife Refuge System (NWRS)
  - Multiple decision makers under a single authority
- Decision makers
  - Individual managers of each refuge
  - Autonomy in interpreting goals and implementing management
- Stakeholders
  - Refuge managers, biologists, and project leaders
  - NWRS, regional offices and administrators, funding sources, outside researchers
  - Burn crew, grazing contractors, neighbors, users, public

USFWS Refuge System Cooperators

- Prairie Pothole Region
- Mixed-grass and tallgrass
- USFWS Refuge System, Regions 3 and 6
- 120 management units
  - 81 mixed-grass,39 tallgrass

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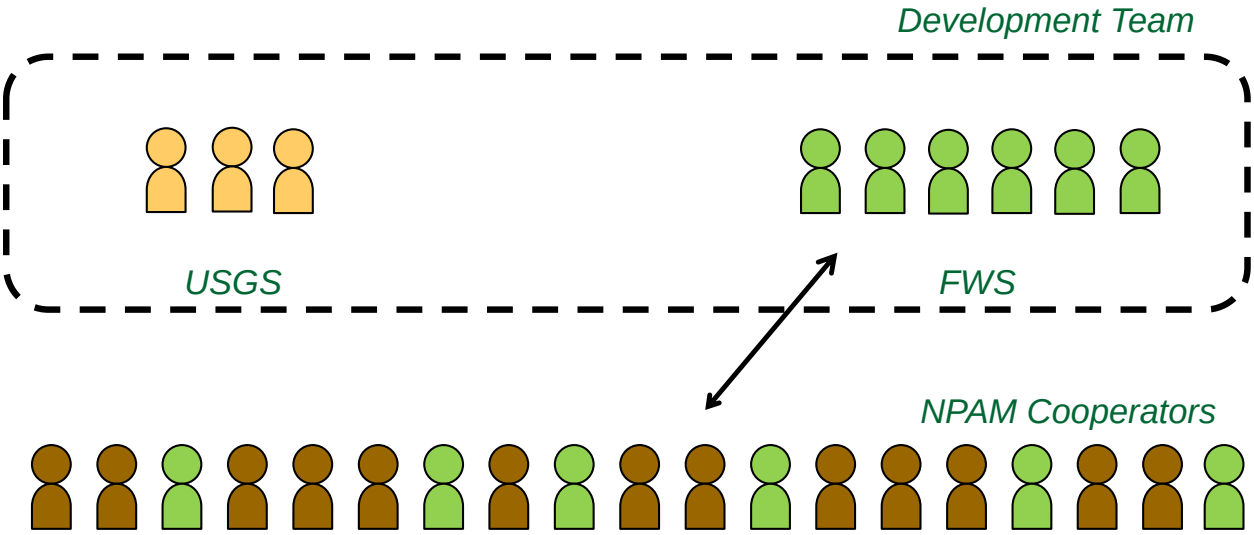
es: MN, ND, SD, MT

- 19 refuge stations

NPAM Organization and Coordination

- Framework Development Team
  - USGS researchers
  - Refuge biologists – core representatives of greater cooperator group




- Coordination and Communication
  - Annual face-to-face workshops and meetings
  - Web-Ex, conference calls, emails
  - Central repository (e.g., SharePoint)

Refuge Cooperator Contributions

- Elements of the decision framework
  - Desired outcomes
  - Feasible management actions
  - Expected response of system to management
  - Uncertainties
  - Monitoring capacity
- Land base
  - Spatial replicates for management actions
- Process sustenance
  - Vision, leadership, and energy

USGS Research Partner Contributions

- Expertise in:
  - Constructing adaptive decision framework
  - Elicitation of pertinent information
  - Decision structuring
  - Developing models that inform decision making
  - Designing monitoring that informs management
  - Linking management outcomes to learning
- Hold and facilitate meetings
- Document process

NPAM "Kick-Off"

- 2008 Cooperator Kick-Off Meeting
  - Consensus on the problem
  - Adaptive management, elements of a decision framework, organization of NPAM
  - Determined the following elements for NPAM
    - Scope – area of focus
    - Spatial scale
    - Management objective
    - Decision alternatives
    - Temporal scale
    - Uncertainties that make decision-making difficult
    - Monitoring needs and capacity

NPAM – Bounding the Problem

- The Resource Problem
  - Loss of native prairie to cool-season invasive grasses, smooth brome and Kentucky bluegrass
- Area of focus
  - Native sod on Refuge lands across the Prairie Pothole Region in USFWS Regions 3 and 6, where SB and KB are the main invasive species of concern.
- Spatial unit of focus
  - Management unit

NPAM – Management Objective

- Management Objective
  - Must be measurable
  - Must be capable of being predicted
  - Drives development of all other framework components

➢ *Increase the cover of native grasses and forbs while minimizing cost*

NPAM – Decision Alternatives

- Decision Alternatives
  - Small set of distinct actions
  - Ability to predict response
- Menu of management action alternatives
  - Rest
  - Graze
  - Burn
  - Burn / Graze

NPAM – Decision Cycle

- Management cycle
  - Decisions made on an annual basis
- Management year: 1 September – 31 August
  - Based on timing of management relative to monitoring and expected time-frame of response to management
    - Management actions – fall and spring
    - Monitoring – June to August, after management implemented
    - Measuring system response to action requires management year to include the fall and spring that precedes monitoring

NPAM – Decision Cycle

- Concept of linked decisions
  - Current decision influences future system state and therefore future decisions
  - Current decision may affect
    - Options for future decisions
    - Feasibility of future decisions
- More on this on topic in Case Study Module D – Dynamic Decision Making

NPAM – Management Problem

- Problem recast as a Decision Statement
    - Which is the best management action to implement each year to decrease cool-season invasive grass species and increase the cover of native grasses and forbs on each management unit, while minimizing cost?

Next Up…
Case Study Module B – Model Devlopment

Literature Cited

Gannon, J.J., T.L. Shaffer, C.T. Moore. 2013. Native Prairie Adaptive Management: A Multi Region Adaptive Approach to Invasive Plant Management on Fish and Wildlife Service Owned Native Prairies: U.S. Geological Survey Open File Report 2013-1279, 184 p. with appendixes, http://dx.doi.org/10.3133/ofr20131279

Grant, T.A., Flanders-Wanner, B., Shaffer, T.L., Murphy, R.K., and Knutsen, G.A. 2009. An emerging crisis across northern prairie refuges—Prevalence of invasive plants and a plan for adaptive management: Ecological Restoration, v. 27, p. 58–65.