



Photo by Cami Dixon



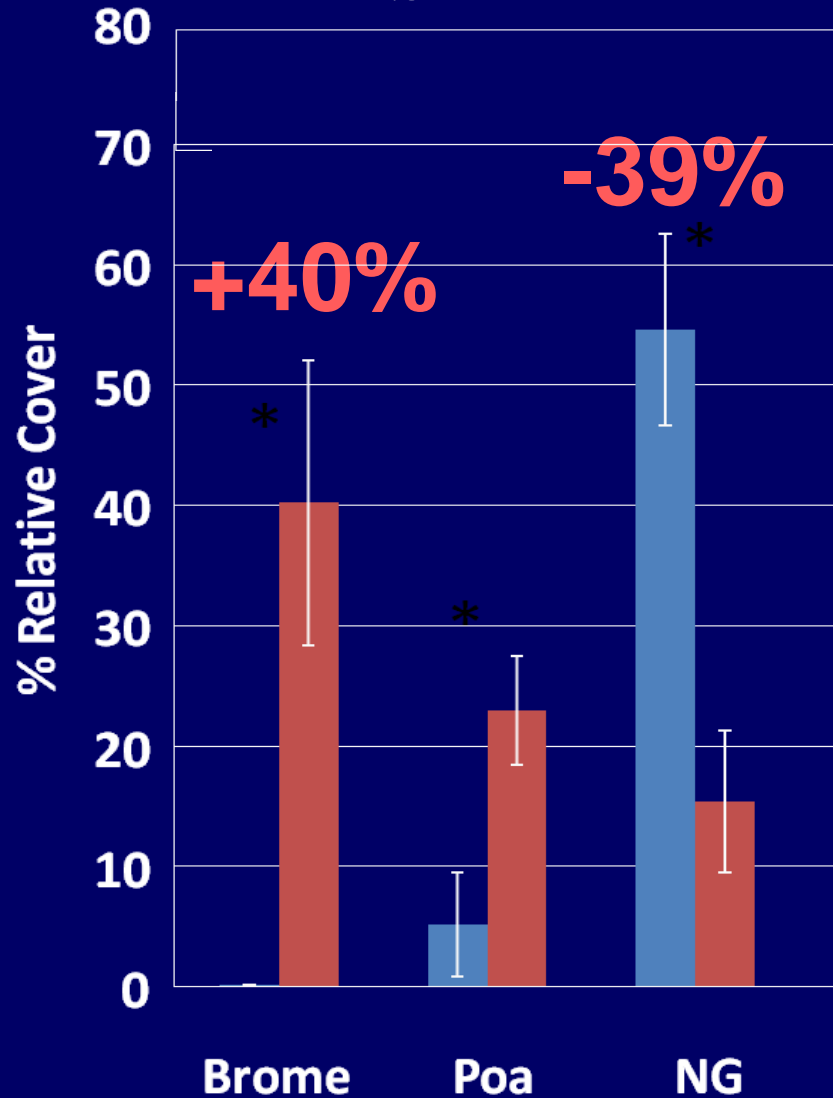
Photo by Bill Witt



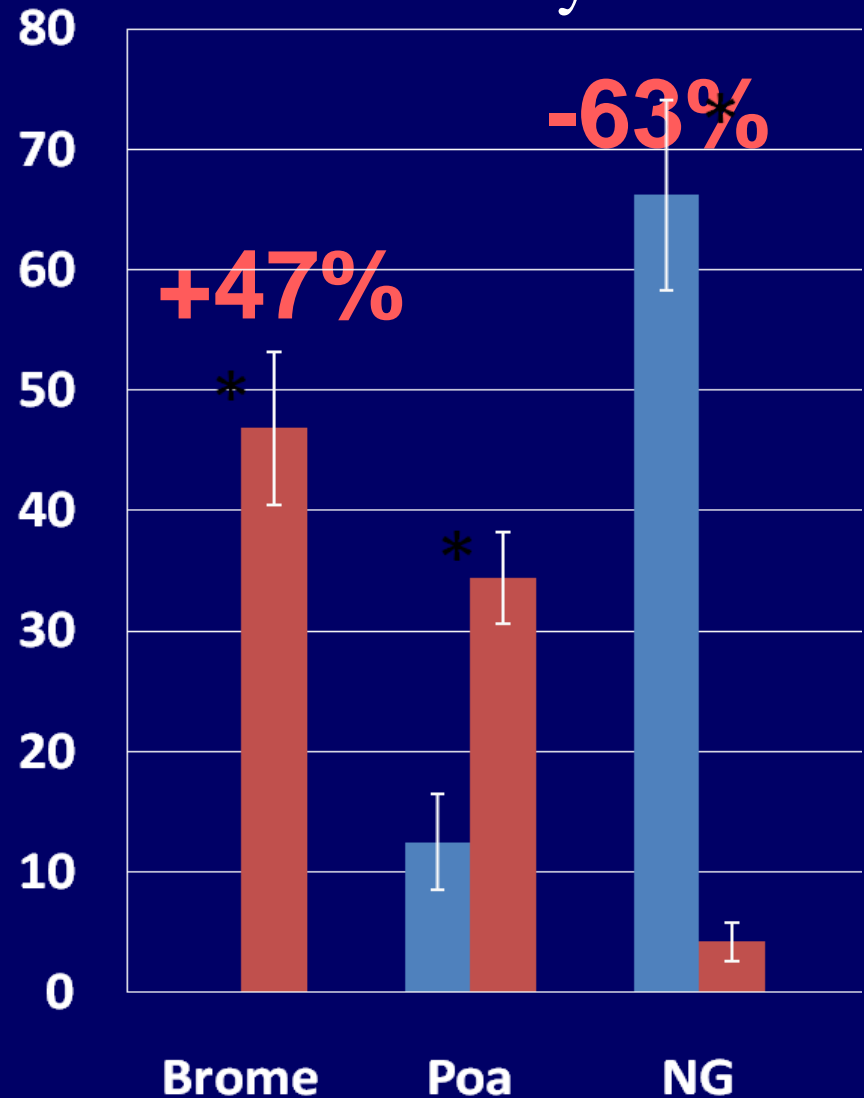
Photo by Sara Vacek

Knife River Indian Villages, North Dakota

Sands



Loamy



■ 1984 ■ 2007



Native Prairie Adaptive Management Team

A landscape photograph of a prairie with a lake at sunset. The sky is a mix of pink, orange, and blue, with scattered clouds. The lake is calm, reflecting the sky. The foreground is a field of tall, dry grass. In the distance, there are rolling hills and a single dark tree on the right.

USFWS

Science Team: Kim Bousquet, Pauline Drobney,
Vanessa Fields, Bridgette Flanders-Wanner, Todd Grant,
Sara Vacek

Project Coordinator: Cami Dixon

Database: Jen Zorn, Justin Dupey

All Refuge Cooperators

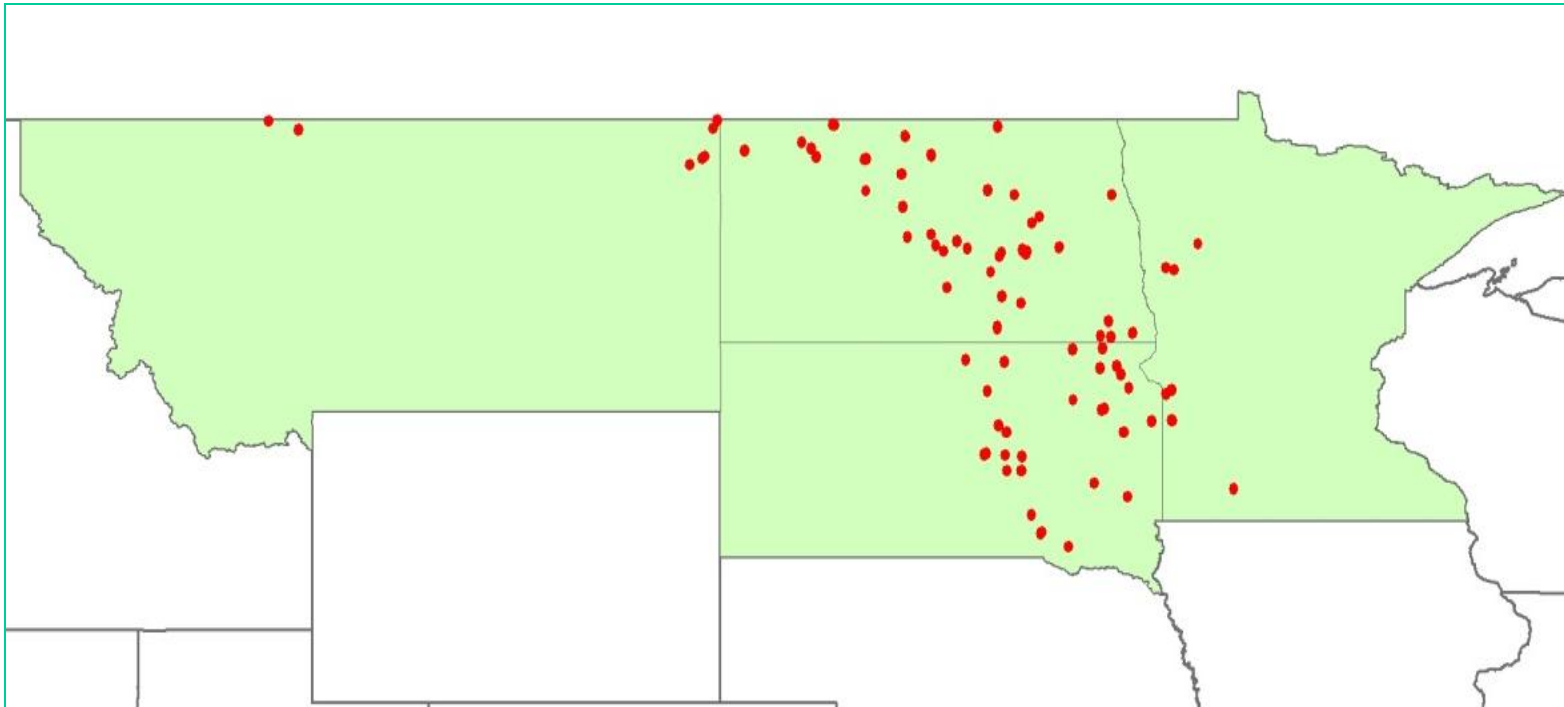
USGS

Terry Shaffer, Clint Moore, Jill Gannon



Native Prairie Adaptive Management Project

- Prairie Pothole Region
- Four states: SD, ND, MN, MT
- Mixed-grass and tallgrass
- 19 USFWS stations
- 120 management units
- 114,950 data points



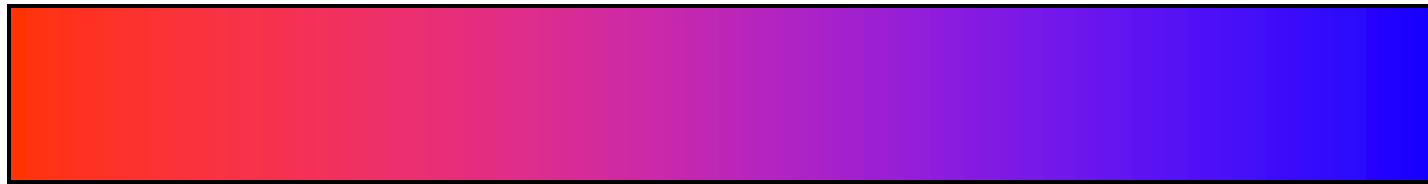


Adaptive Management

Learning valued to the extent that it improves management

Research

Management



Focus on *learning*

Focus on *outcomes*
(*trial & error*)

Adaptive Management

Focus on outcomes, on a
path illuminated by learning





The Problem

- Brome and Kentucky Bluegrass are replacing native sod (remnant prairie) at an alarming rate
- Management against invasive species
Introduction of a surrogate for natural processes that shaped historic prairies
- Success has been poor to inconsistent
 - Uncertainties about biological response to management
 - Absence of systematic evaluation of management effects
 - No coordination of efforts
 - Inadequate monitoring, record-keeping



What do we want to do?

Objective:

- Increase native vegetation
- Minimal cost

(Note: project is not focused on structure)

What management choices can we try?

Alternatives:

❖ Burn

❖ Graze

❖ Combo

❖ Rest

What will happen when we apply management?

Use best available information and best judgement to come up with expected consequences of management actions.

We don't know everything, but we can develop our model and test our ideas.



Adaptive Management – What is it?

A Form of Structured Decision Making or Decision Analysis

Require a:

- **management objective** – what do we want?
- set of **alternative** management **actions** – choices!
- A **prediction of the consequences** –what will happen?





Full System State Structure

Vegetation State Structure

		<u>Dominant Invasive</u>			
		SB	SB KB	KB	OT
<u>Native Cover</u>	60 – 100%	1	2	3	4
	45 – 60%	5	6	7	8
	30 – 45%	9	10	11	12
	0 – 30%	13	14	15	16

Defoliation State Structure

		<u>Defoliation Level</u>		
		Low	Med	High
<u>Years Since Defoliation</u>	5+	1		
	2 – 4	2	3	4
	1	5	6	7





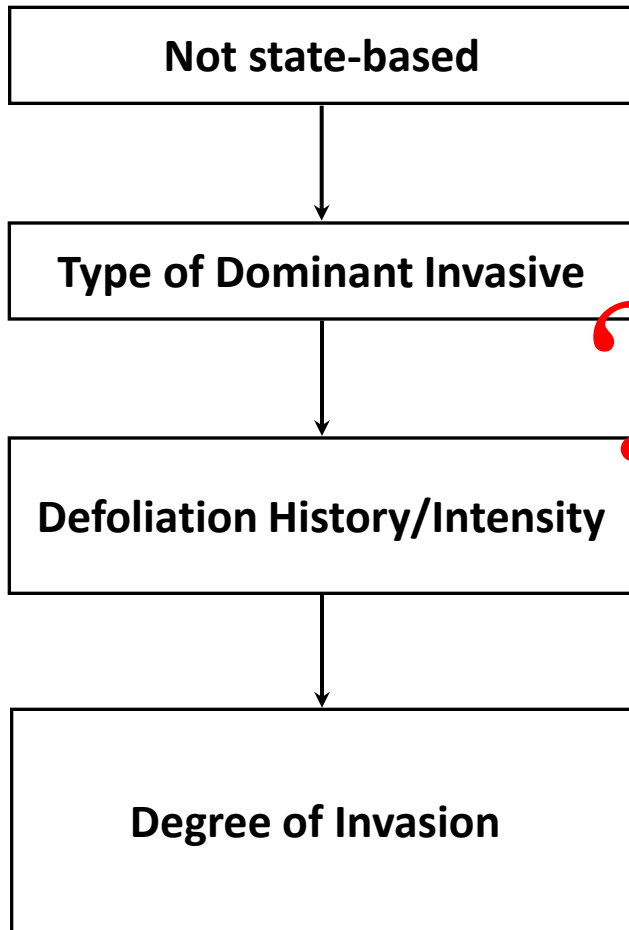
Adaptive Management

Some of our ideas (alternatives) get greater weight than others because we believe some will work better.





Alternative Model Set



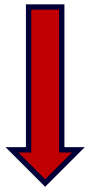
- ❑ All management is equally effective and better than rest *regardless* of system state (i.e. vegetation and defoliate state ignored)
- ❑ Management effectiveness is different depending on which invasive species is dominant
- ❑ History of frequent defoliation creates momentum: active management is more effective; rest doesn't work as well
- ❑ Management effectiveness declines as the degree of invasion increases: at high levels, active management is equivalent to rest





Adaptive Management How it Works

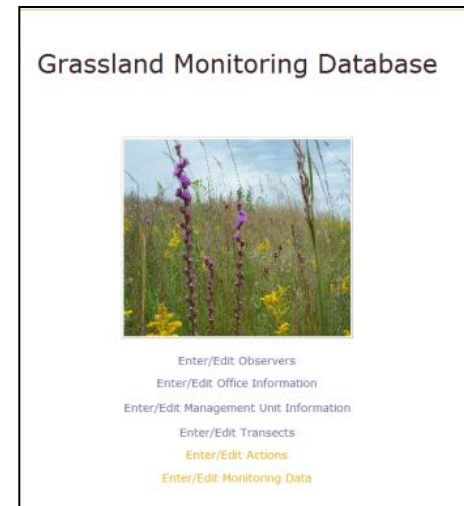
Management



Standardized monitoring



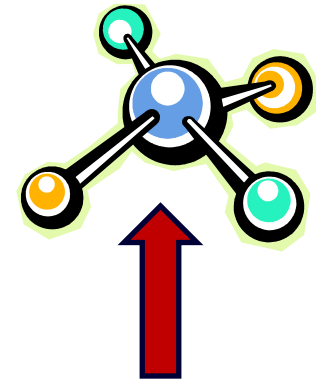
Database



Management
Recommendations



Model





U.S. Fish & Wildlife Service

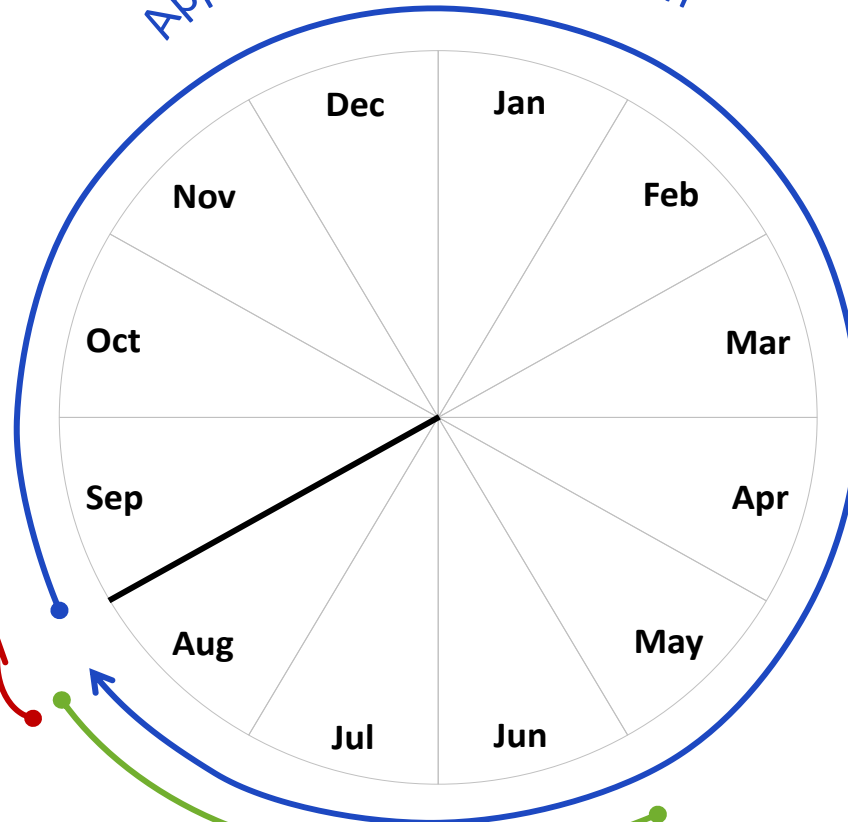
Native Prairie Adaptive Management Project Annual Cycle



Process Data &
Decision Guidance

*Data Entry
Complete
Aug 25

Apply Management Action



Monitor &
Enter Data





Partial Controllability

- What we do is not always what the model recommends because some things are beyond our control
 - Unfavorable conditions, lack of resources, etc
- An irreducible form of uncertainty that we must explicitly take into account in the decision framework





Native Prairie Adaptive Management Project

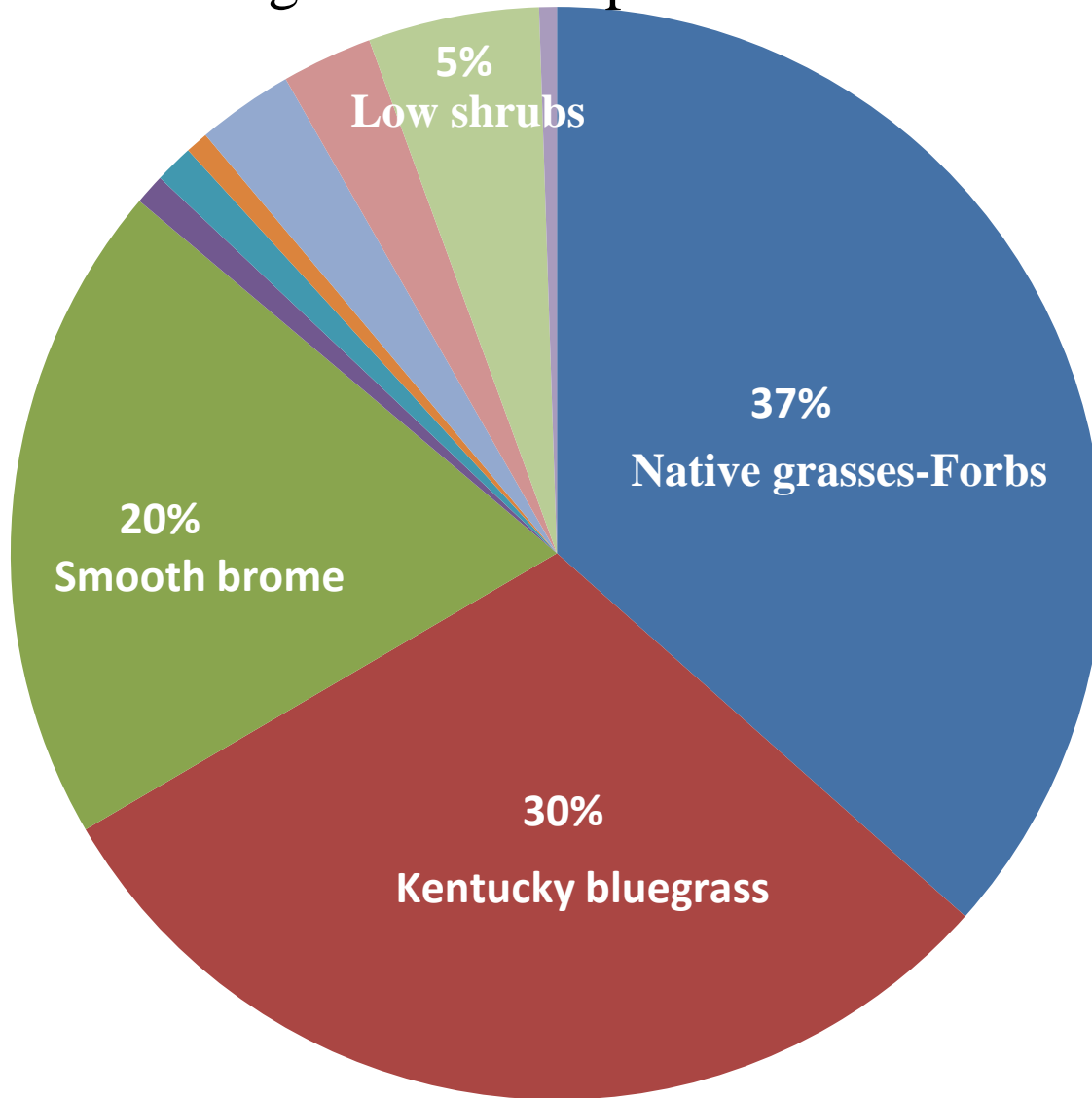
Management Recommendations

Org	Unit	Year	Mgmt Restriction	2012 Recommended Management Action
ARROWWOOD NWR	G14 Pasture 1	2011	None	Burn
ARROWWOOD NWR	G14 Pasture 2	2011	None	Rest
ARROWWOOD NWR	G26 Paddock 1	2011	None	Graze
ARROWWOOD NWR	G26 Paddock 2	2011	None	Burn/Graze



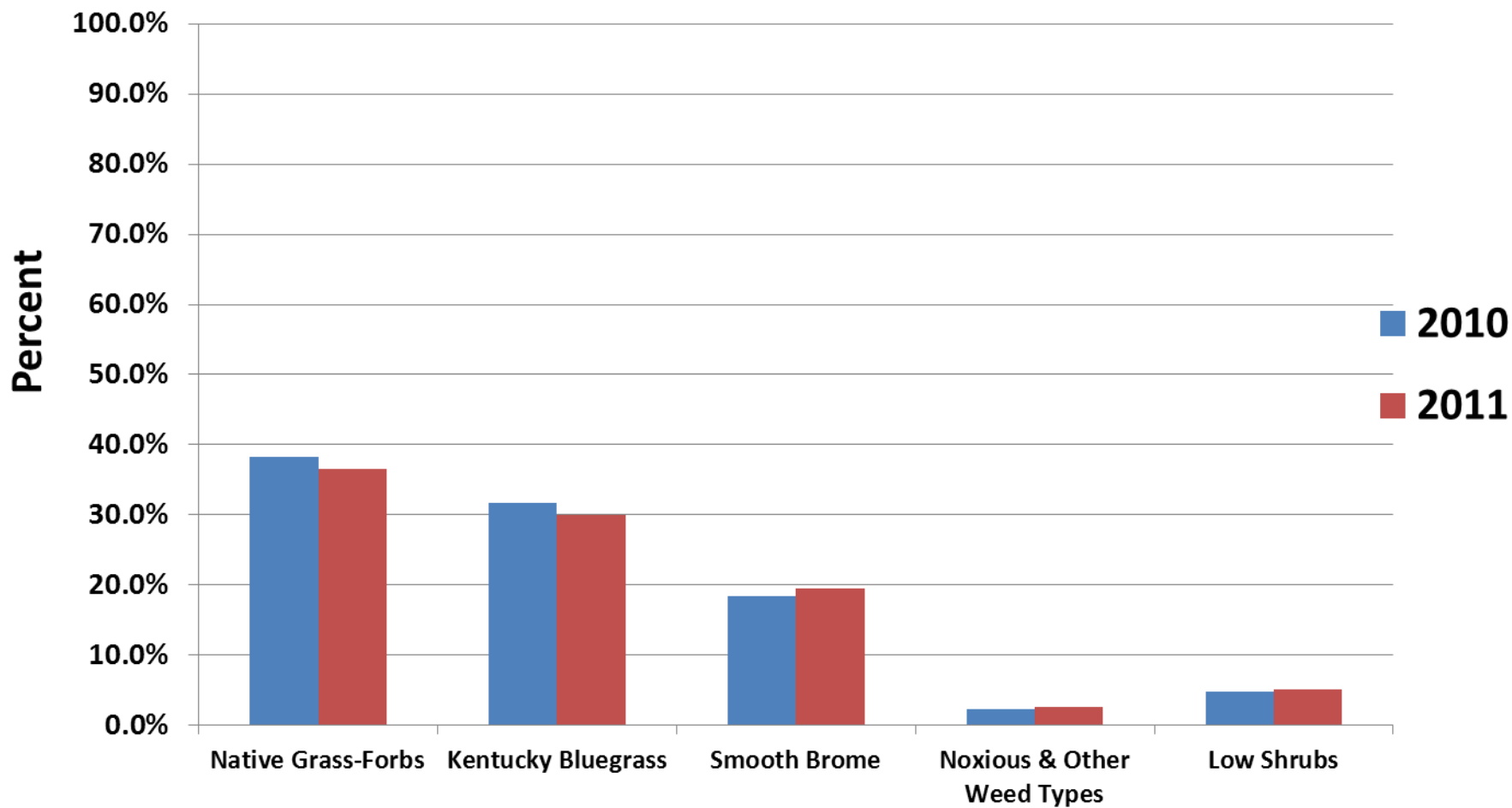


Native Prairie Adaptive Management Project Vegetation Composition 2011





NPAM Vegetative Composition - 2010-2011





The Future of NPAM

- FWS assumed operational control in 2012 and continues implementing annual iterative cycle
 - Cooperators
 - Manage, Monitor, Enter Data
 - Project and Database Coordinators
 - Update model weights and decision policy
 - Provide recommended management actions
 - Overall guidance to cooperators as needed
- USGS involvement as part of an Advisory Team
- Expanded partner involvement





Questions & Discussion

