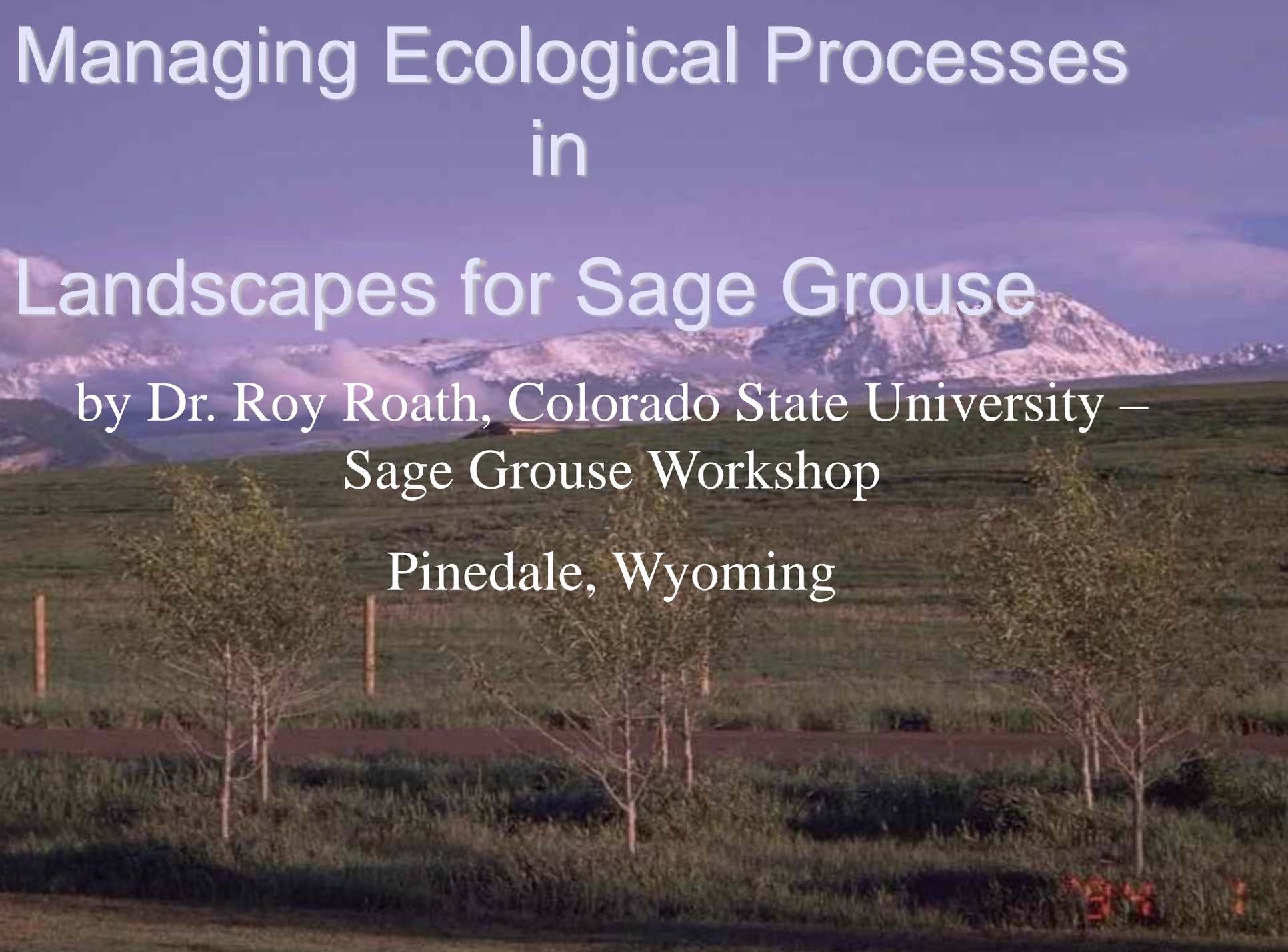


Managing Ecological Processes in

Landscapes for Sage Grouse

by Dr. Roy Roath, Colorado State University –
Sage Grouse Workshop

Pinedale, Wyoming



A landscape photograph showing a vast, open field of dry, brownish grass and shrubs. In the background, there are rolling hills and mountains under a clear blue sky. The foreground is filled with dense, low-lying vegetation, including several small, dark-colored bushes and clumps of tall grass. The overall scene is a natural, somewhat arid environment.

What is Process-Based Management?

Process-Based Management Is:

- Understanding Ecological Processes and Applying them to Produce Desired Outcomes
 - Water
 - Success
 - Nutrient Turnover
 - Colonization
 - Plant Performance
 - Animal Performance



Challenges of Process –Based Management

- Can't see the processes
- Must use deduction and indicators to determine what is happening
 - How can we tell?
 - Physical signs/indicators
 - For Example – Indicators of poor water process is evidence of overland flow, drier than expected rangeland areas, shorter green periods than expected
 - You Can't Tell Unless You Know the Land!



Management of Ecological Processes

- What does this mean?
 - Alter a targeted Ecological Process to provide the desired outcomes
 - For Example...Dr. Len Carpenter sampled sagebrush veg. communities in early 1970's
 - By the early 1990's these communities had declined in production,... Even though the stocking rate had been materially reduced
 - The communities are locked into place.. A stable state



Managing Ecological Processes cont.

- Management
 - Detective work and insights from research shows that... High seral communities have **high stored carbon and low nitrogen turnover rates**
 - Sage brush communities that have a dominant overstory of sage brush and little understory are likely late seral habitats
 - Late seral habitats are often great wintering habitats but are unlikely to meet the needs for chick rearing



Late Seral Steady States

- Late seral sage communities are very stable... but don't have much diversity, few forbs and often little herbaceous cover
- Nutrient availability is low and water is is dominated by the sage
- Productivity is low



Transitions

- Ecological process define the transitional processes between Plant Communities
- The rates and outcomes of the transitions is determined by how the management strategy influences the ecological process(s)
- In the previous example the movement in one transition is “controlled” by grazing strategy

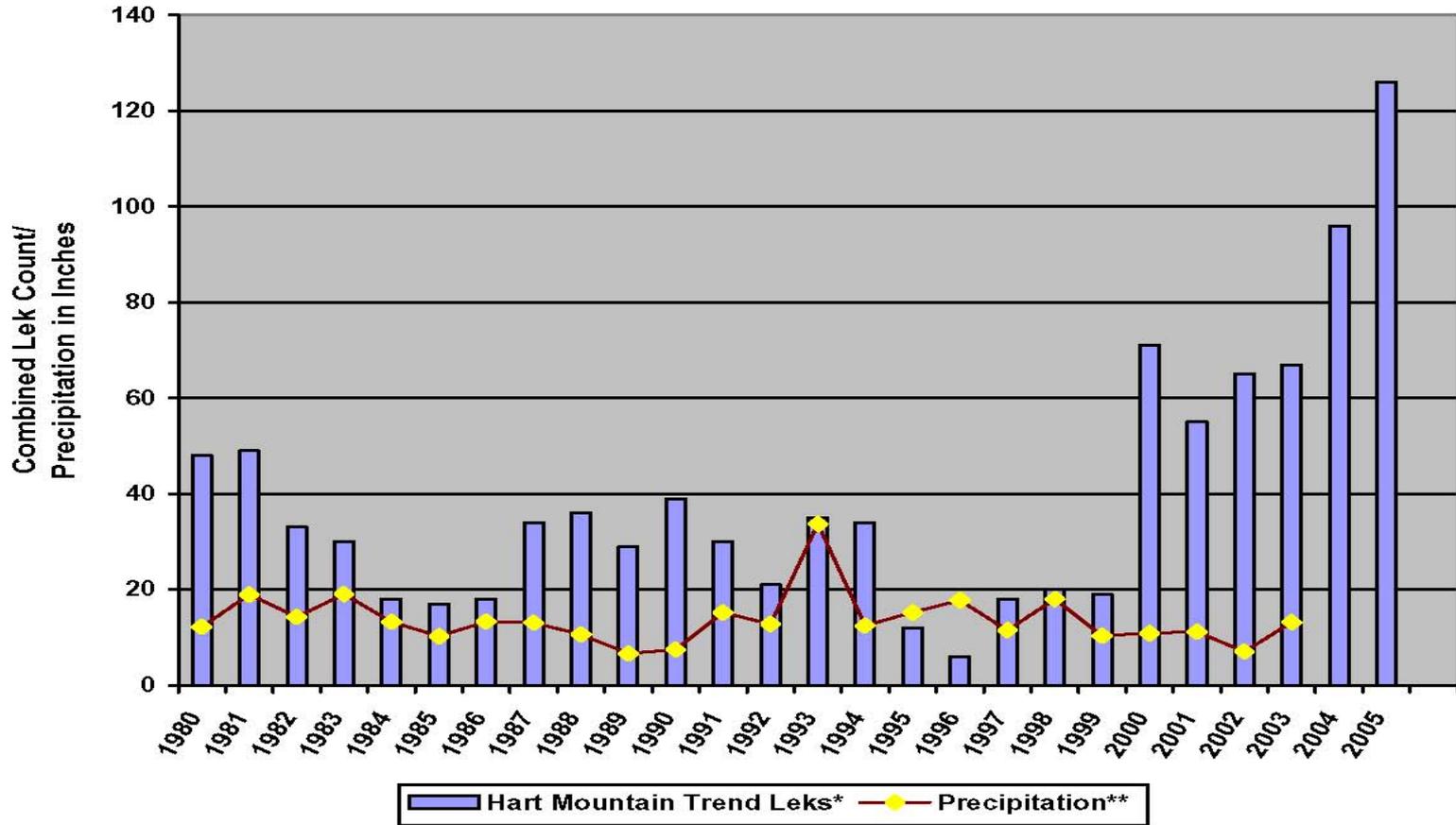


Importance In Considering Sage Grouse

- **Sage Grouse Recovery following Removal of Livestock**
- I would like to tell you about what happened to greater sage-grouse numbers when livestock grazing was ended on the Hart Mountain National Antelope Refuge in southeastern Oregon (while the two species of sage grouse are distinct species, their habitat needs are essentially identical). Sage grouse populations have significantly increased since livestock grazing ended on the refuge in 1990. While sage grouse numbers continued to decline nearly everywhere else in the West, monitored trend leks on Hart Mountain showed a 223% increase in grouse counted since 1990. The average count since 2000 is 156% higher (2.5 times) than the average count in the 1980's, when grazing was permitted on the refuge.
- *American Lands Alliance*



Hart Mountain National Antelope Refuge Sage Grouse/Precipitation • 1980-2005



Management Influences

- What Does Grazing Do?.... To Manage the Ecological Processes?
 - Changes Plant Performance
 - Alters Water Relations
 - Impacts Colonization?



Grouse Numbers

- Grouse number determined by lek counts
 - Have increased in managed areas with livestock grazing in Moffat County, Colorado & Sheridan County, Wyoming
 - What determines the change?
 - Better habitat!!!... To meet the needs of grouse during critical periods!



How Does Grazing Influence Grouse Habitat?

- Removes Vegetation
 - Good?
 - Bad?
- How much, when, & where are the determining factors
- Moist areas are critical
 - Maintain cover w/o too much
 - Forbs!



What Kind of Grazing?

- Rotationally/Seasonally grazed
 - Moderate use
 - Managed recovery
 - Spring use allow for more dependable recovery
 - Fall use to liquidate too much vegetation
 - Building water in the system
 - Managing for bugs



Range Sites/ESD

- All sites are not the same!!
- Nesting occurs on upland sites with moderate sage density and good understory w/ forbs
- Chick rearing depends on forbs
- Sites with more moisture grow more forbs



Management of Processes

- If We Wanted to Manage for Quality Sage Grouse Chick Rearing Habitat...?
 - In the Sagebrush Steppe of West Central Colorado... What would we do?
 - By understanding the process we can now more predictably “*Move*” a community toward the desired goal
 - The questions is.... “What is the goal?”



Physiological phase or state	Approximate dates	Relative requirement	Potentially limiting nutrient(s)	Portion of nutrients on offer greater than requirement ^a	Appropriate seral phase/state ^b	Portion of landscape of most important seral state/important descriptors	Spatial scale of importance	Total demand ^c
Spring Nesting	March – June	Mod. High	Protein Energy	High	Mid-late with some early seral openings for leks.	Mosaic of sagebrush (both big and low sage and/or age classes to provide this structure for nesting), openings (leks), forbs and insects for early brood rearing.	<100 acres (pop/individuals are in closer proximity for breeding)? <i>One study stated the most successful stands were large continuous stands often over 50 sections</i>	Mod.
Spring Early Brood Rearing	May – June	High	Protein Energy	Mod	Mid seral to upper-mid seral	Rangeland w/ rich forb and grass understory	<20 acres (pop/individuals are more spread out than breeding)?	High
Mid to Late Brood Rearing	July - Aug	High	Protein Energy	Rangeland low Meadow Mod.- High	Mid seral	Mesic sites with a high abundance of forbs adjacent to sagebrush cover	Preferably long narrow meadows w/cover interface	High
Fledging – Fall Staging	Sept-Oct	high	energy	Meadows-mod-good	Mid seral	Meadows w/ per. water supply moving to ridges w/ low /black sage	Large areas/ great ability to move	Mod.
Winter Habitat	Oct. – Feb.	Low	Energy	Low	Mid-late	Mosaic of sagebrush (must be big sage in order to be taller than snow cover), provides food and cover.	Hundreds of acres (birds migrate a large distance to meet feeding and cover requirements) <i>?I read a paper that quoted un</i>	Low-Mod



Indicators of Process

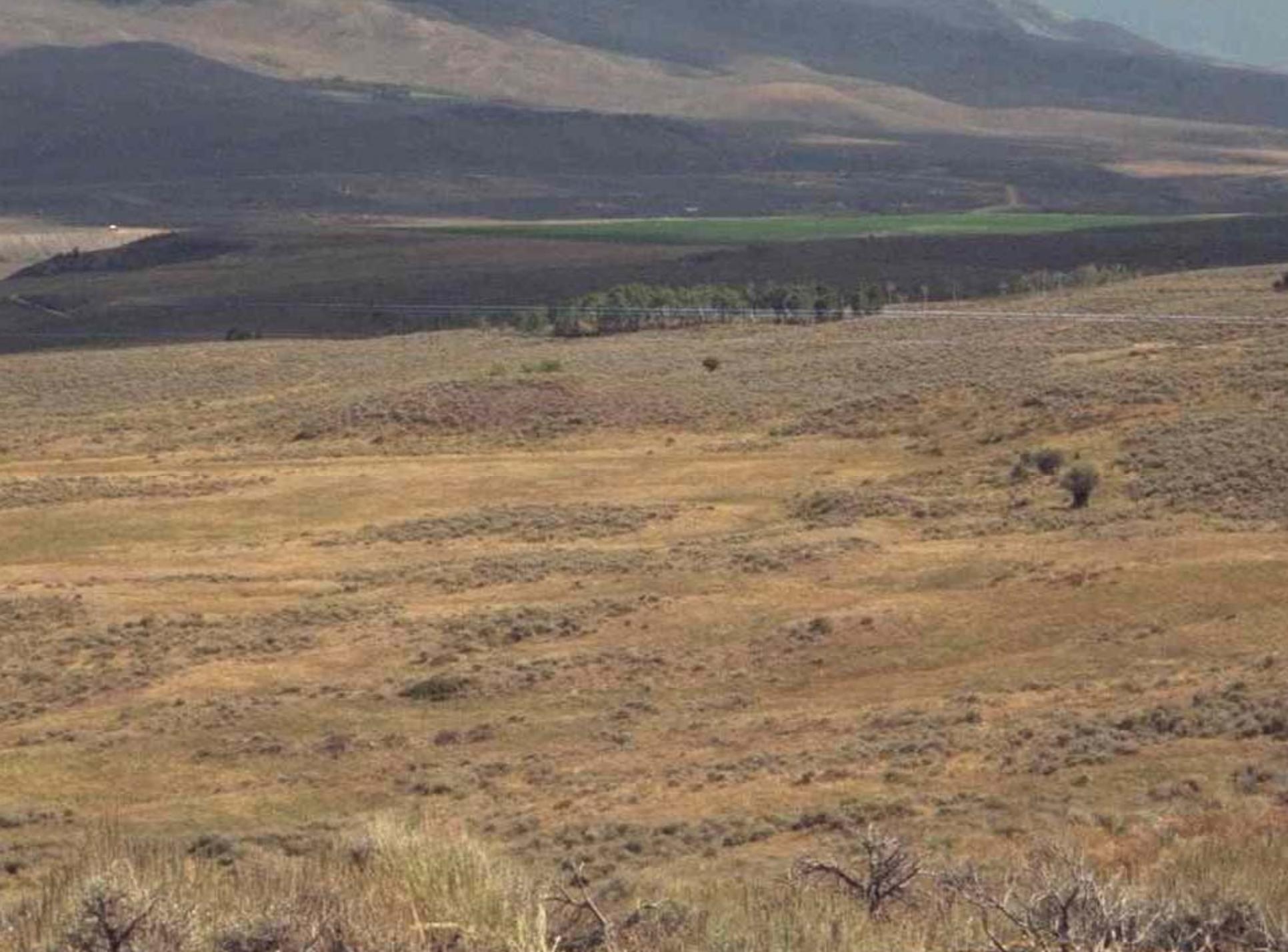
- The Current Habitat
 - Has High Stored Carbon & Low Rates of Nutrient Turnover – Excessive Canopy of Sagebrush
 - Has Low Water Availability to Understory Vegetation
 - Has Low Diversity/Forbs
- Desired Habitat
 - Has Less Stored Carbon & Greater Nutrient Turnover Rates
 - Has Far Greater Water Availability
 - Has Much More Diversity and Forb Component



What Should We Do?

- What Actions Would Modify Processes & Move the Current Community toward the Desired Community?
 - A) Do Nothing?
 - B) Fertilize?
 - C) Irrigate?
 - D) Burn?
 - E) B,C & D?







Managing Water as a Process

- Driven by Ground Cover and Structure
 - Relative Water Availability Modified by Who Get the Water
- How Effectively Do We Manage Water?
 - Dr. Jimmie Richardson- NDSU
 - Season-long Heavy Grazed Areas Capture < 20%
 - Rotationally Grazed w/ Moderate Levels of Use Capture up to 60%
 - In 12" annual Precip. 20% = 2.4" 60% represents an additional 4.8" of Water!



Water Process Influences

- Changes Nutrient Turnover Rates
- Changes Diversity
- Changes Plant Performance
- Changes Animal Performance
- Alters Succession
- **If You Can Manage Water?... Can You Manage the System?**



Building Bridges to Our Constituents

- To Effectively Work w/ Our Clientele.. We Must Be Able to Relate What We Do to What They Value
- Perhaps Water is a Great Bridge!



Riparian Function 1996



Riparian Function 2002



Conclusions

- If You Can Recognize and Use Process – Based Management
 - You Can More Reliably Achieve Your Management Goals
 - You have Much Greater Understanding of How the System is Operating
 - A the Frame of Reference of What Should be Expected is Far Greater



