Weed and grazing management in pipeline reclamations

Dr. Erin K. Espeland
Pest Management Research Unit
USDA-ARS NPARL
Sidney MT

USDA United States Department Of Agriculture
Agricultural Research Service

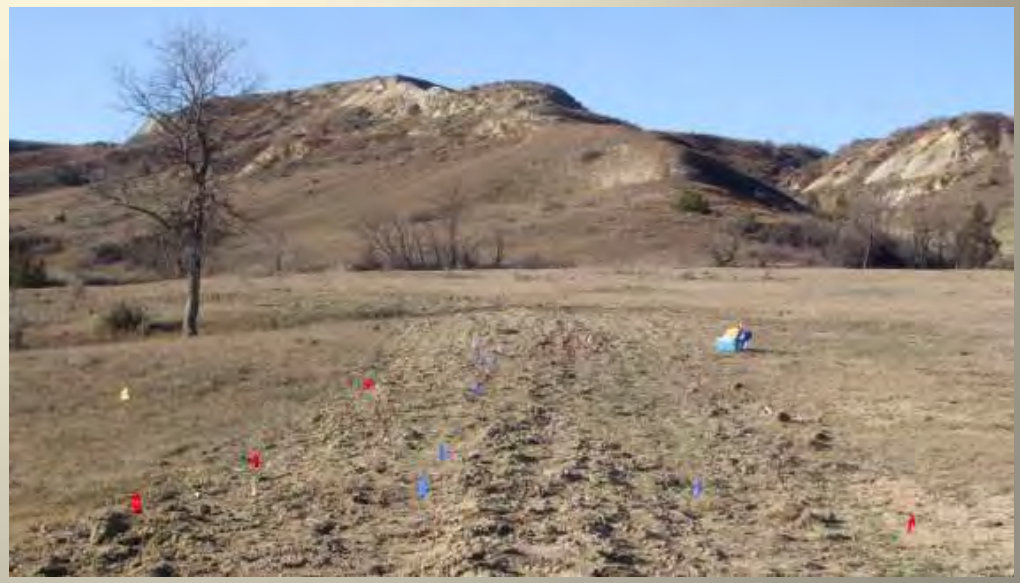
Research and application

- What do I do as a Research Ecologist for ARS
- Conduct original research
- Synthesize available research for end users
- This talk
  - Brief account of my applicable research
  - Grazing management
  - Preventing weed encroachment

Water pipeline western ND

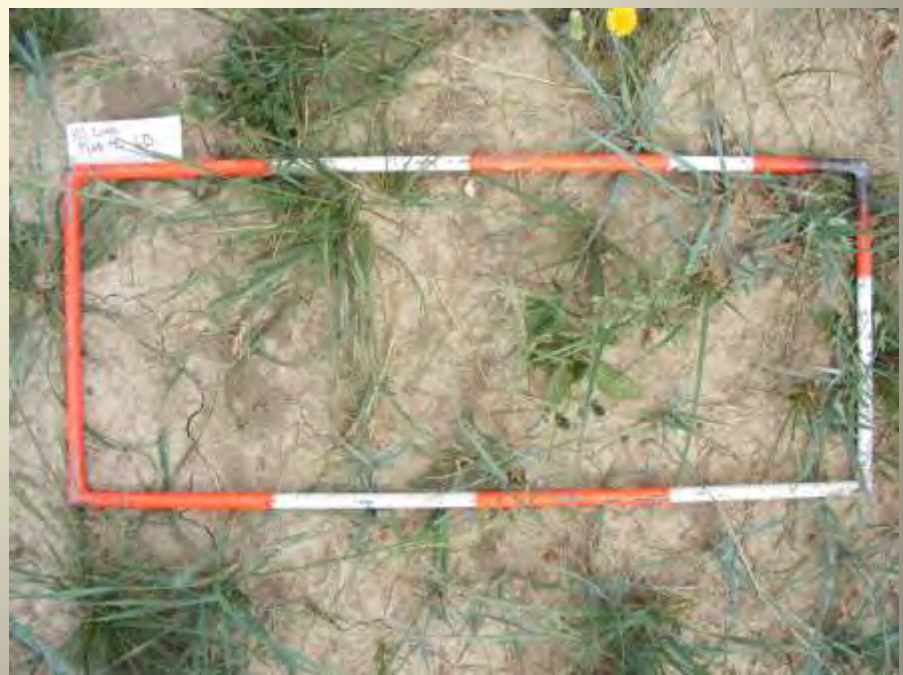
- Summer 2008 pipeline installed
- May 2009 seeded

- Western wheatgrass
- Slender wheatgrass
- Green needlegrass
- Sideoats grama
- Common oat
- Millet



Season/mode of growth important

- Western wheatgrass (rhizomatous, cool season)
- Slender wheatgrass (bunchgrass, cool season)
- Green needlegrass (bunchgrass, cool season)
- Sideoats grama (bunchgrass, warm season)
- Common oat (early)
- Millet (early)



Do annuals reduce perennial performance?

- Annual grasses outcompete perennials
  - Great Basin
  - CA
- Invasives
- But…?
- Common oat
- Millet

Plant competition and annual spread

- Competition is a mainstay in plant ecology
- Occurs within restoration?
- Will annuals spread

beyond the pipeline

and persist as

weeds?

Benefits of annuals

- Surface soil stabilization
- Forage

The site

- Large ranch near Elkhorn Unit of TRNP
- East of Trotters ND
- West of river
- Continuous grazing
- No grazer exclusion
- Pipeline impact
  - ~1% of available pasture

Experiments

- Do annuals inhibit germination and early growth of perennials?
- Does removing annuals improve perennial growth?

Annuals did not impede perennial growth/germination

- annuals only problematic in well-watered pots in farmland soils
- Not in well-watered pots with pipeline soils
- Not at farm, in grassland, or in pipeline

What is going on with pipeline soil?

Farm

High in Nitrogen

High in Phosphorous

Pipeline

High in Na (sodium)

High in Sulfur

Soil type gradient: stress to no-stress

Farm

High in Nitrogen

High in Phosphorous

Grassland

Variable among 3 locations

Lower in Na and S

Pipeline

High in Na (sodium)

High in Sulfur

EXPERIMENT SUMMARY

- High variability led to no negative effect of annuals under field conditions
  - Slight positive
- Stressful soil in pipeline meant competition was not important

Need for further research

- Can reclamation seedings be grazed right away?
- What are the effects of
  - Rainfall year
  - Utilization rate
  - Reclamation size vs. pasture size
  - Reclamation species vs. natural
  - Planting mix
- In this case, seeding = success without grazing interruption

Grazing and seeding

- Very few people include grazers when seeding
- 2-3 years grazing exclusion required by some agencies
- Almost all research on grazing in

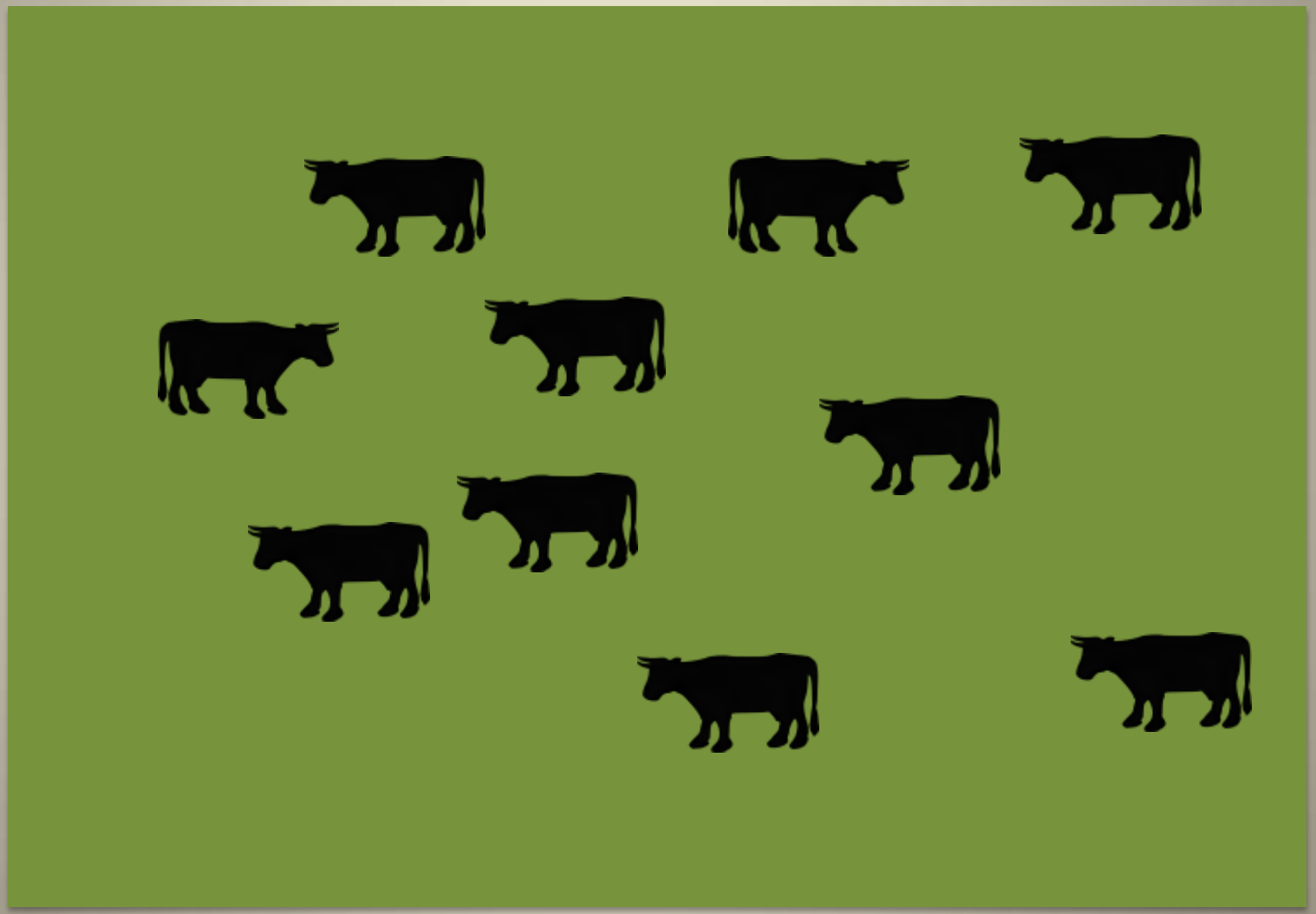
reclamation excludes grazers

at least 2 years

Change grazing = change vegetation

- Some species increase when grazed
- Some species decrease when grazed
- Timing is important
  - Continuous
  - Rotational
    - Season
- Grazing often suppresses weeds
- Expect pasture to change when grazing program changes

Cows love pipelines!



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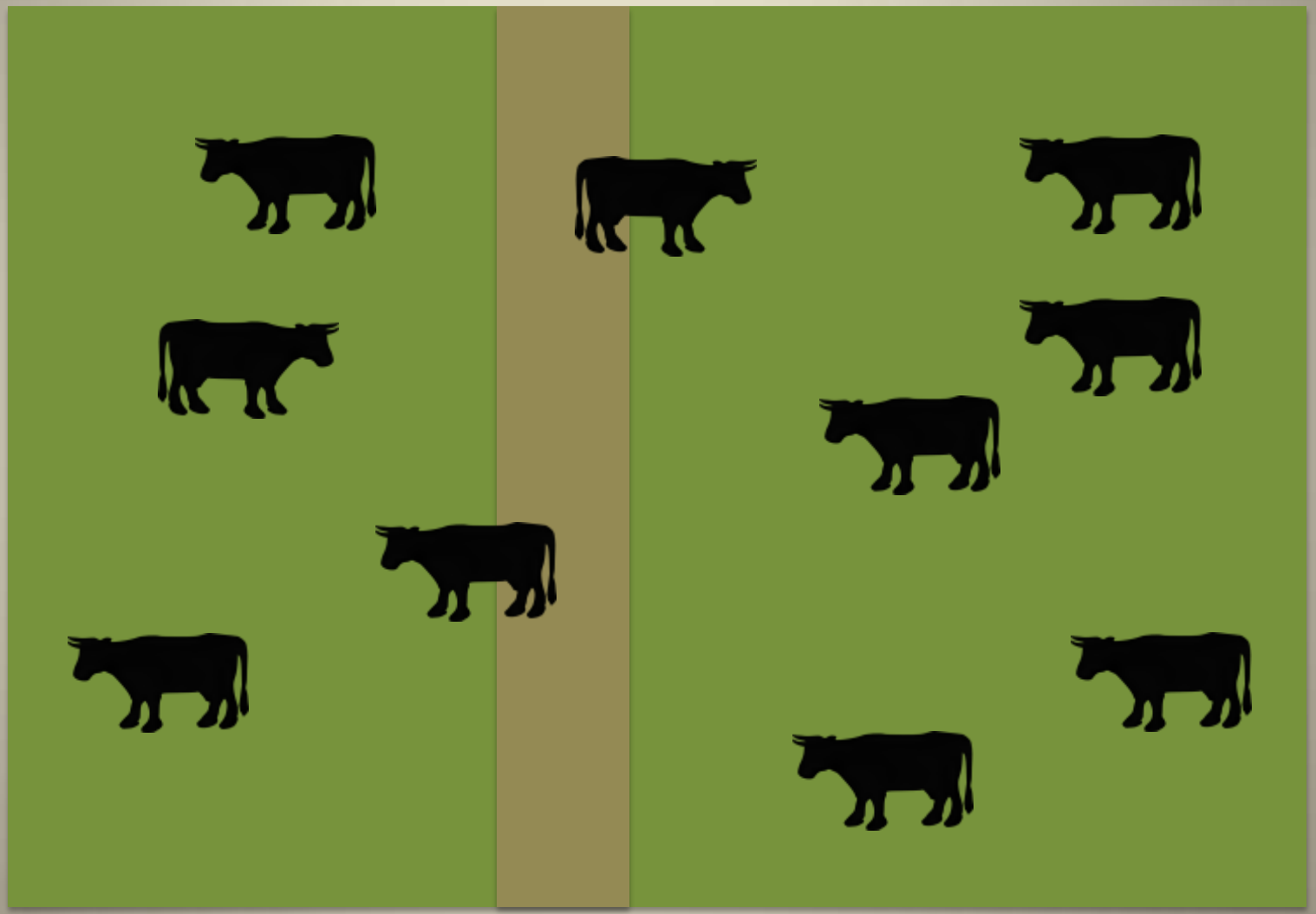

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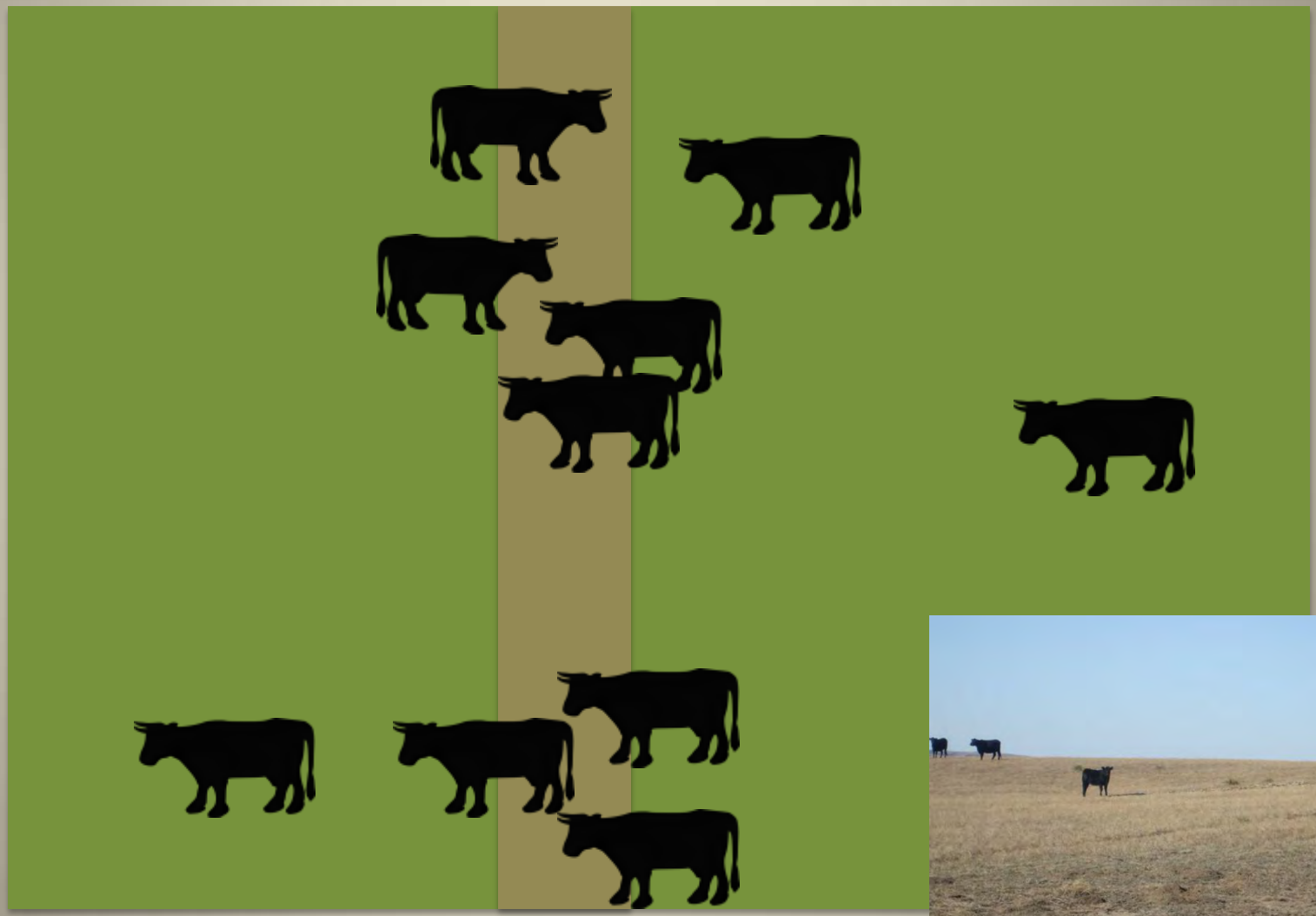
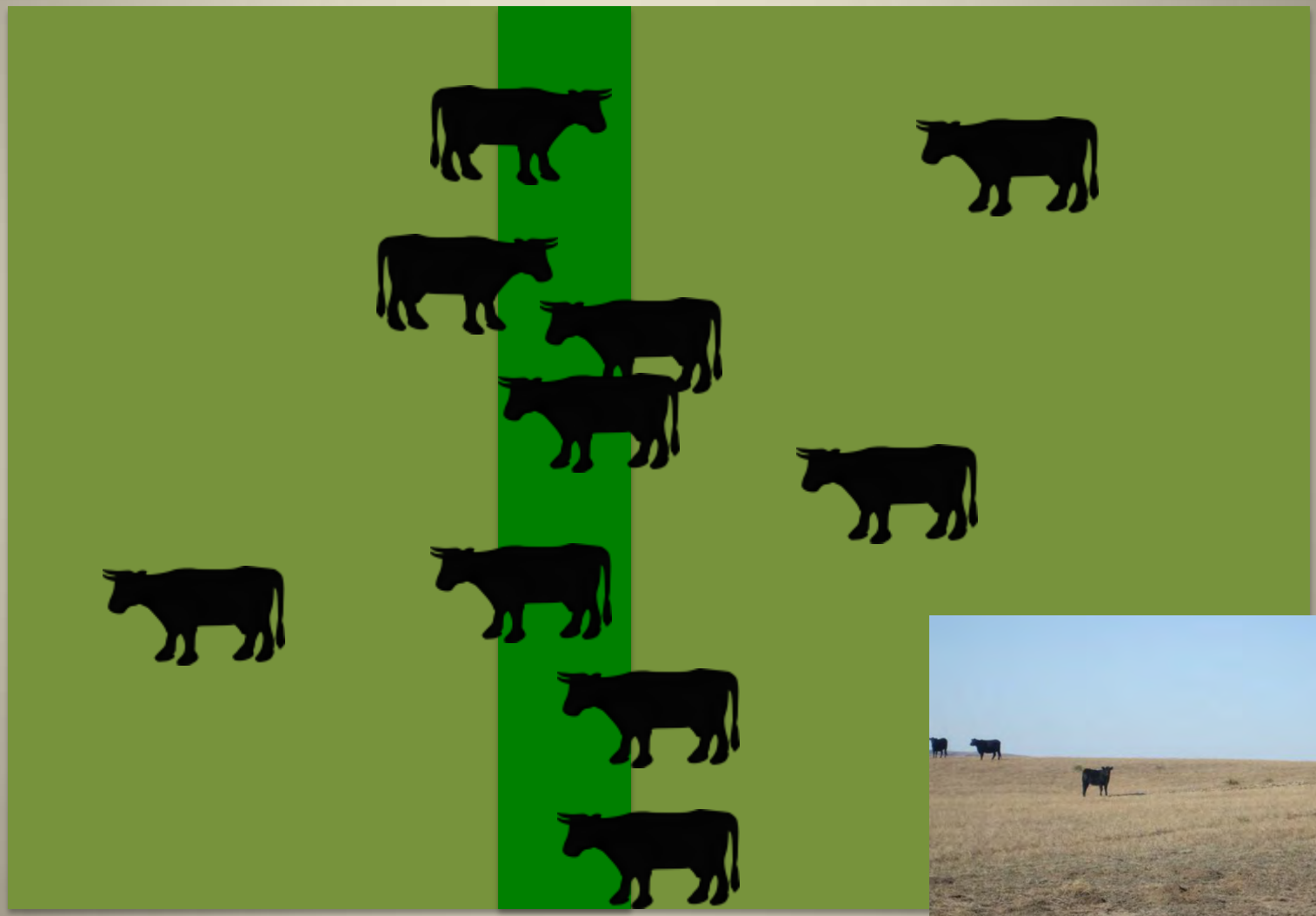


This will change pasture use



Weed Management

- Pre-reclamation assessment
- Construction and reclamation best practices
- Seeding mix choice is important

Pre-reclamation weed management

- Present weeds will likely spread
  - Construction
  - Reclamation
- Be aware how changes in grazing may increase some weeds
- More people in an area means more weeds
  - Monitoring!

Construction and Reclamation Hygiene prevents weeds

- Clean before moving to new site
- Prevent moving weeds from one location to another
  - Machinery
    - KNOW IT!
  - People
    - culture

Best Practices, cont.

- Use certified weed seed free material

Plan for weed control

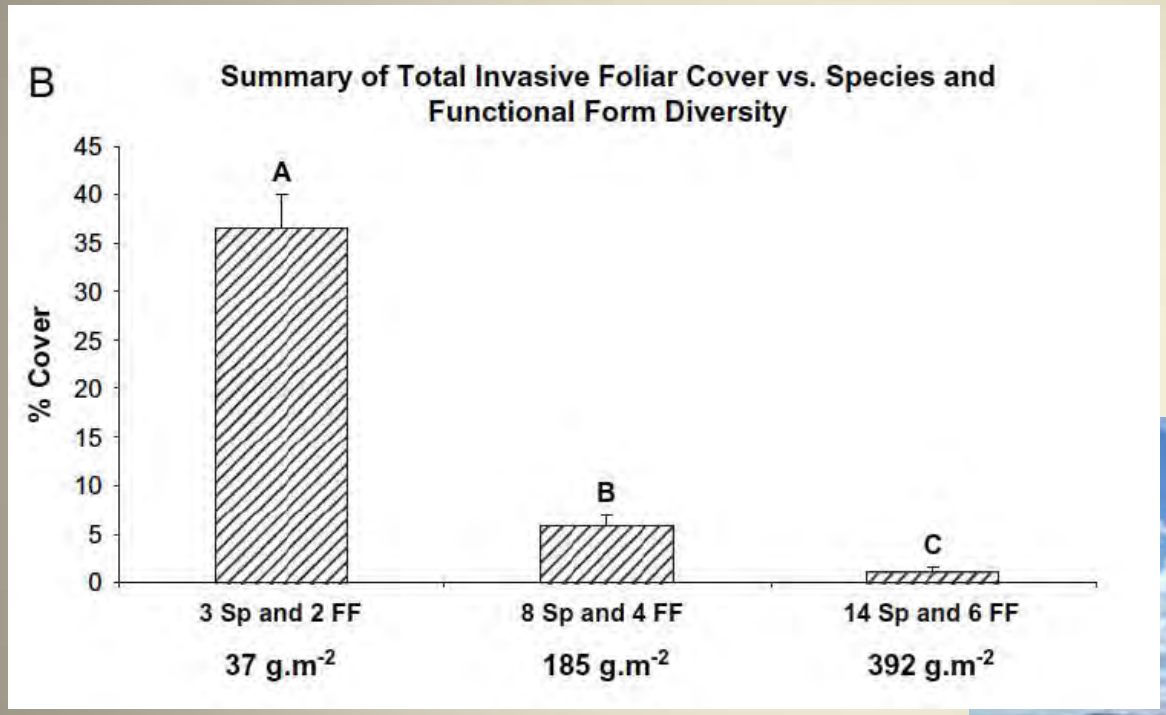
- Understand that “weed” has legal and extra-legal definitions
- Legal requirement to control noxious weeds
  - State
  - County

Leafy spurge
Noxious weed in MT and ND

Perennial pepperweed
Cat 2 in MT, not in ND

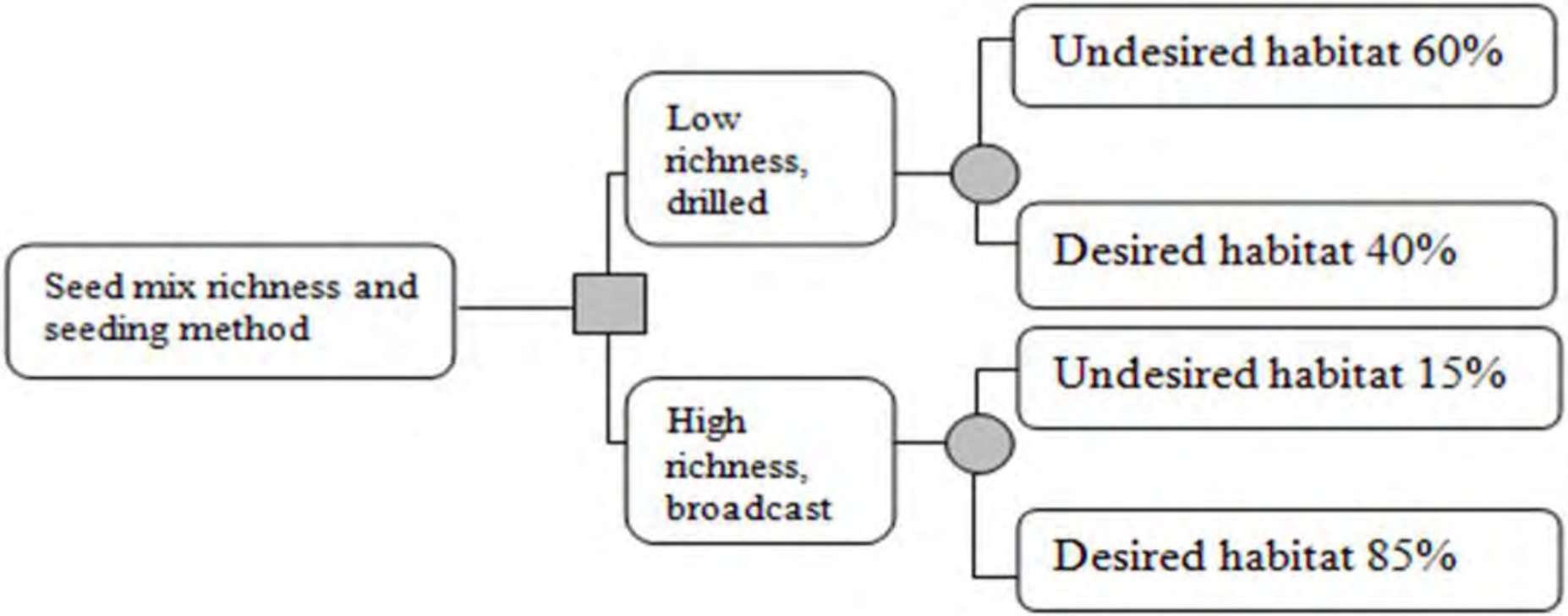
Crested wheatgrass??

Diverse planting mix = less weeds



From Bondini et al. Ecological Restoration 2007

Diverse is more expensive up front but may save costs later



Norland, unpublished data

In Closing

- Conservative practice to ensure seeding establishment is to exclude grazing for at least two years
  - We need more research on this!
- Plan for weeds
  - Presence
  - potential
- Plan for change

Thanks!

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