An Overview on Research and Studies on Diversifying Crested Wheatgrass Seedings

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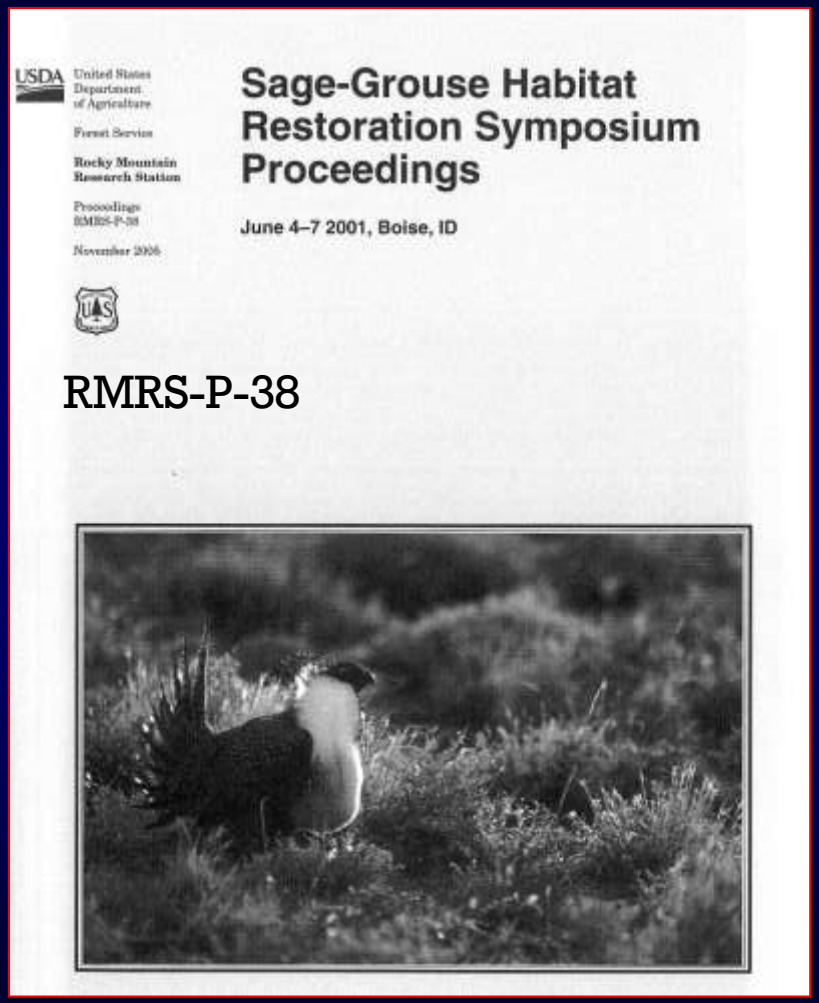
GREAT BASIN
Restoration Initiative

Topics

- Evolution from conversion to Crested WG to seeding diversification?
- Why is crested wheatgrass diversification difficult?
- How can it be accomplished?

Reference



USDA United States Department of Agriculture

Forest Service

Rocky Mountain Research Station

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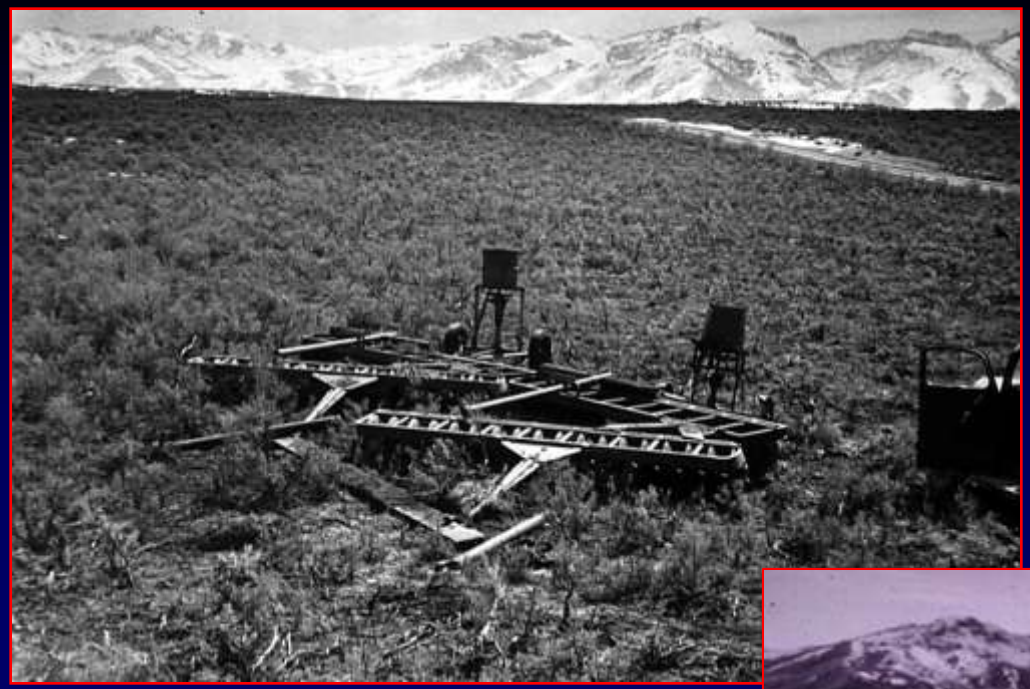
Strategies to Enhance Plant Structure and Diversity in Crested Wheatgrass Seedings

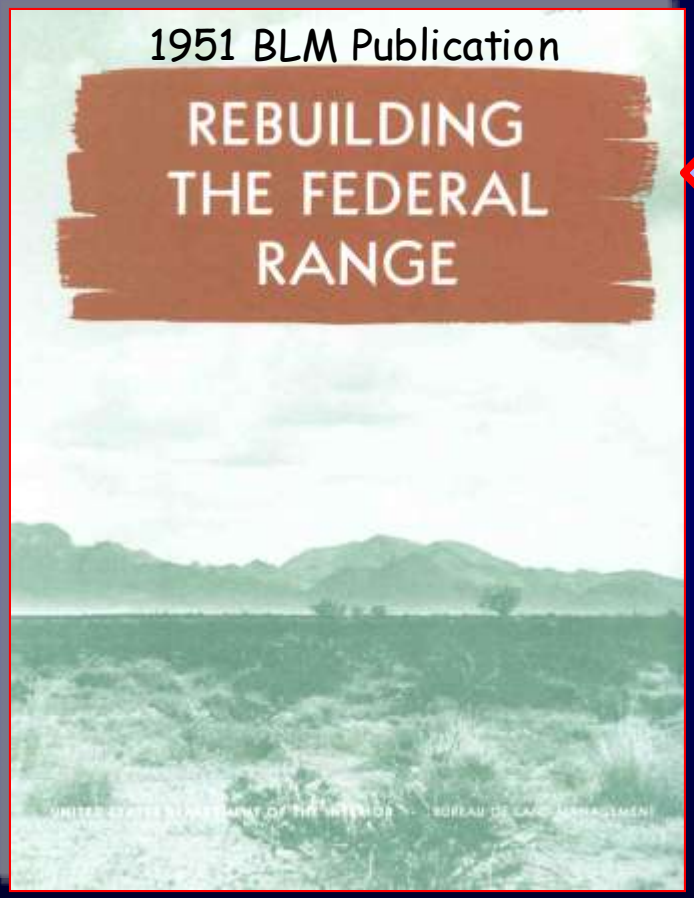
Mike Pellant
Cindy R. Lysne

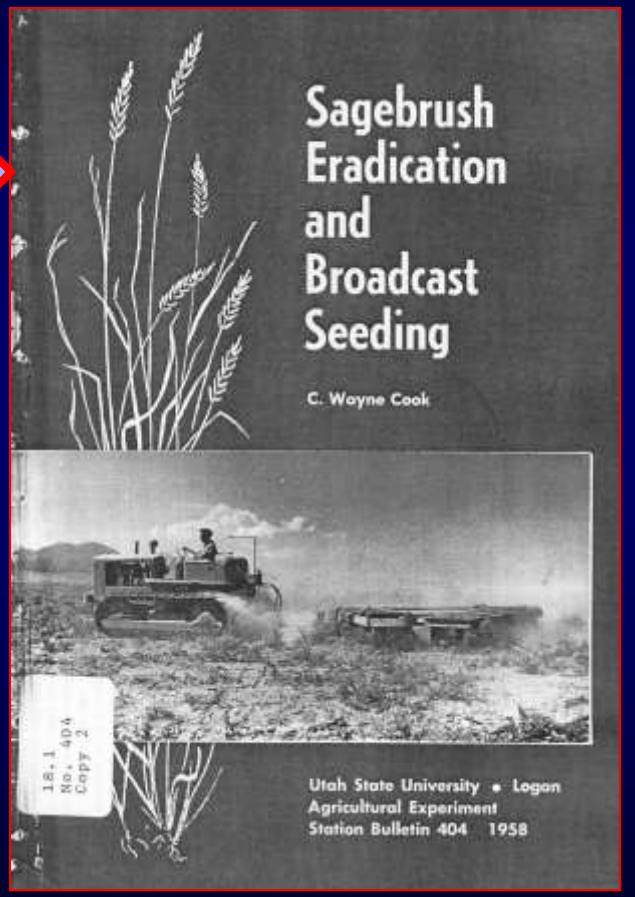


1940's-50's- Sagebrush was abundant and grass was scarce

Research Met Land Management Agency Needs

1951 BLM Publication

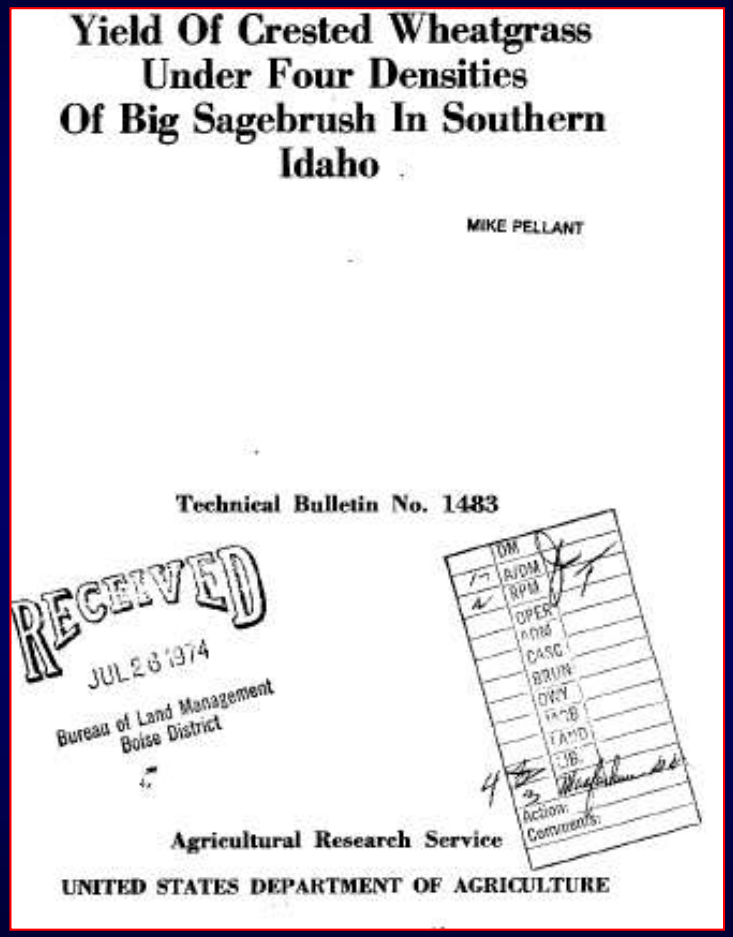




Halogeton Control Act of 1952

Early use of biological control of a poisonous rangeland weed

Sagebrush Reinvasion



Yield Of Crested Wheatgrass Under Four Densities Of Big Sagebrush In Southern Idaho

MIKE PELLANT

Technical Bulletin No. 1483

Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

"Where domestic livestock or wildlife do not need sagebrush for feed or cover, or where it is not needed for erosion control, **all the brush should be killed**."

Sagebrush Reinvasion

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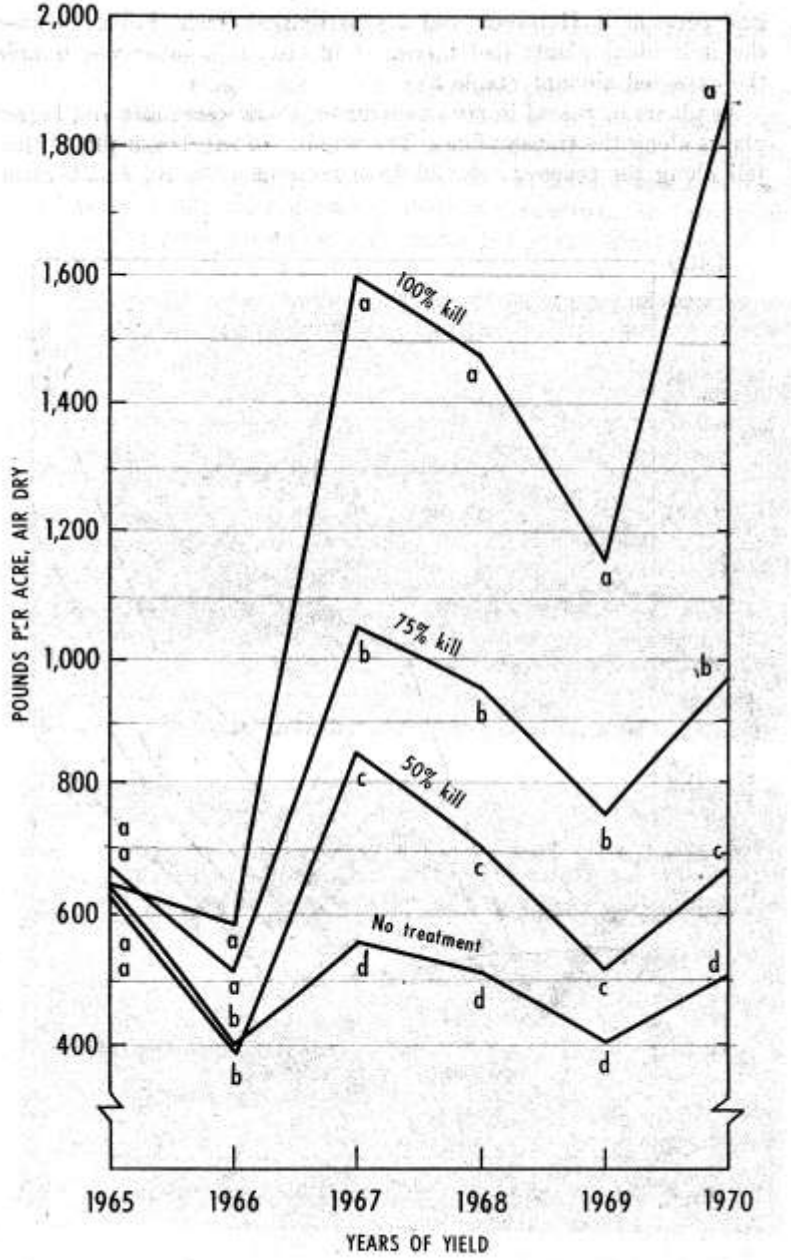
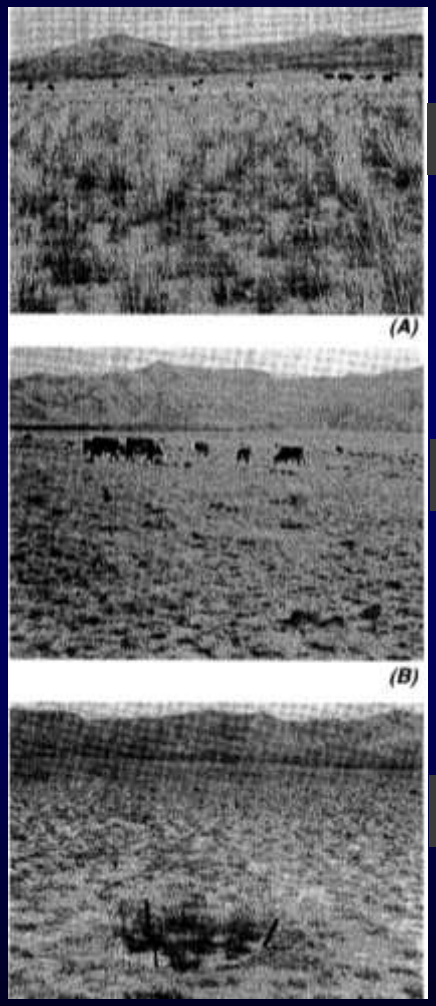


FIGURE 6.—Yields of crested wheatgrass under 4 degrees of sagebrush control at Holbrook, 1965–70. Within each year, any 2 points with the same letter are not significantly different at the 5-percent level.

Sagebrush Retreatment

Improved Crested WG Management



Light Use

Mod. Use

Heavy Use

Everyone was Happy…

…for a while!

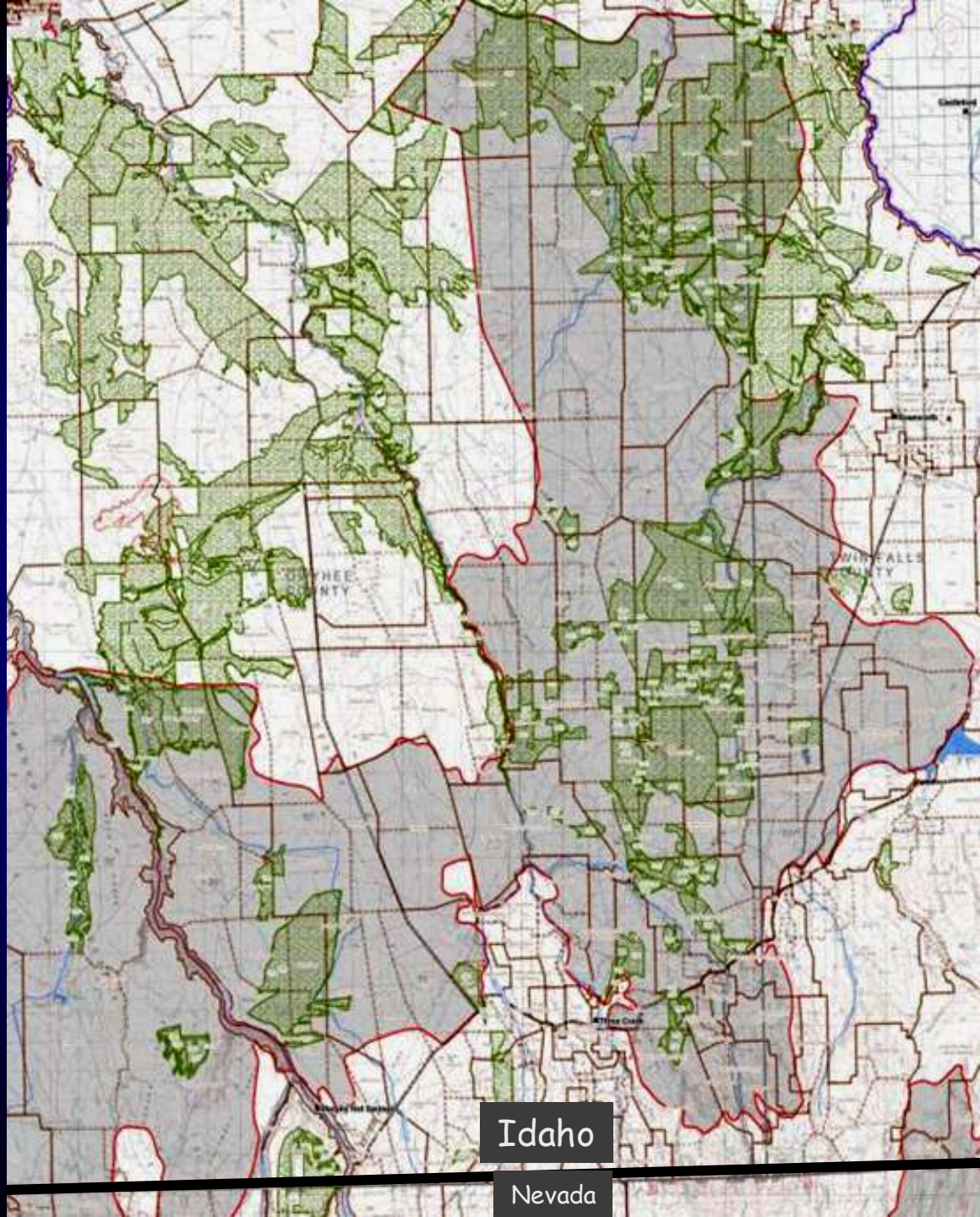
1970's-- Wildfires increase and environmental laws enacted:

- National Environmental Policy Act
- Threatened and Endangered Species Act
- Executive Orders

Seedings are Extensive in Areas with a High Fire Frequency

2009 Murphy Complex Wildfire

Seedings



Why improve diversity in **selected** crested wheatgrass seedings?

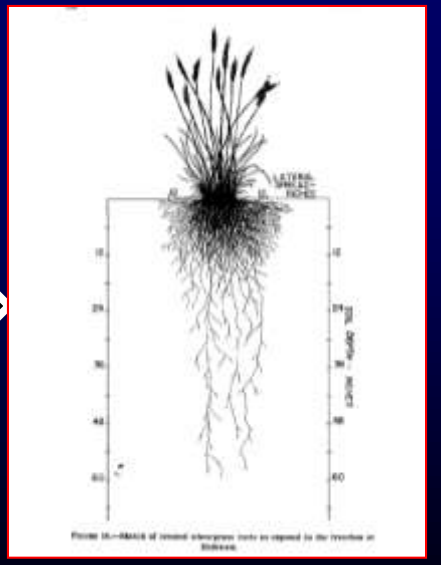
- To improve wildlife habitat
- Increase opportunities for livestock use (shrubs = protein content in winter)
- Promote long-term stability (reduce opportunity for disease or system crash)
- Better use of water/resources in soil profile
- Improve rangeland health

Topics

- Evolution from conversion to Crested WG to seeding diversification?
- Why is crested wheatgrass diversification difficult?
- What has been done?

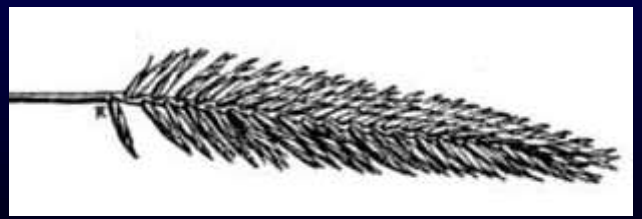
Crested Wheatgrass is resilient in the face of various management actions, climate, and natural disturbances

Drought

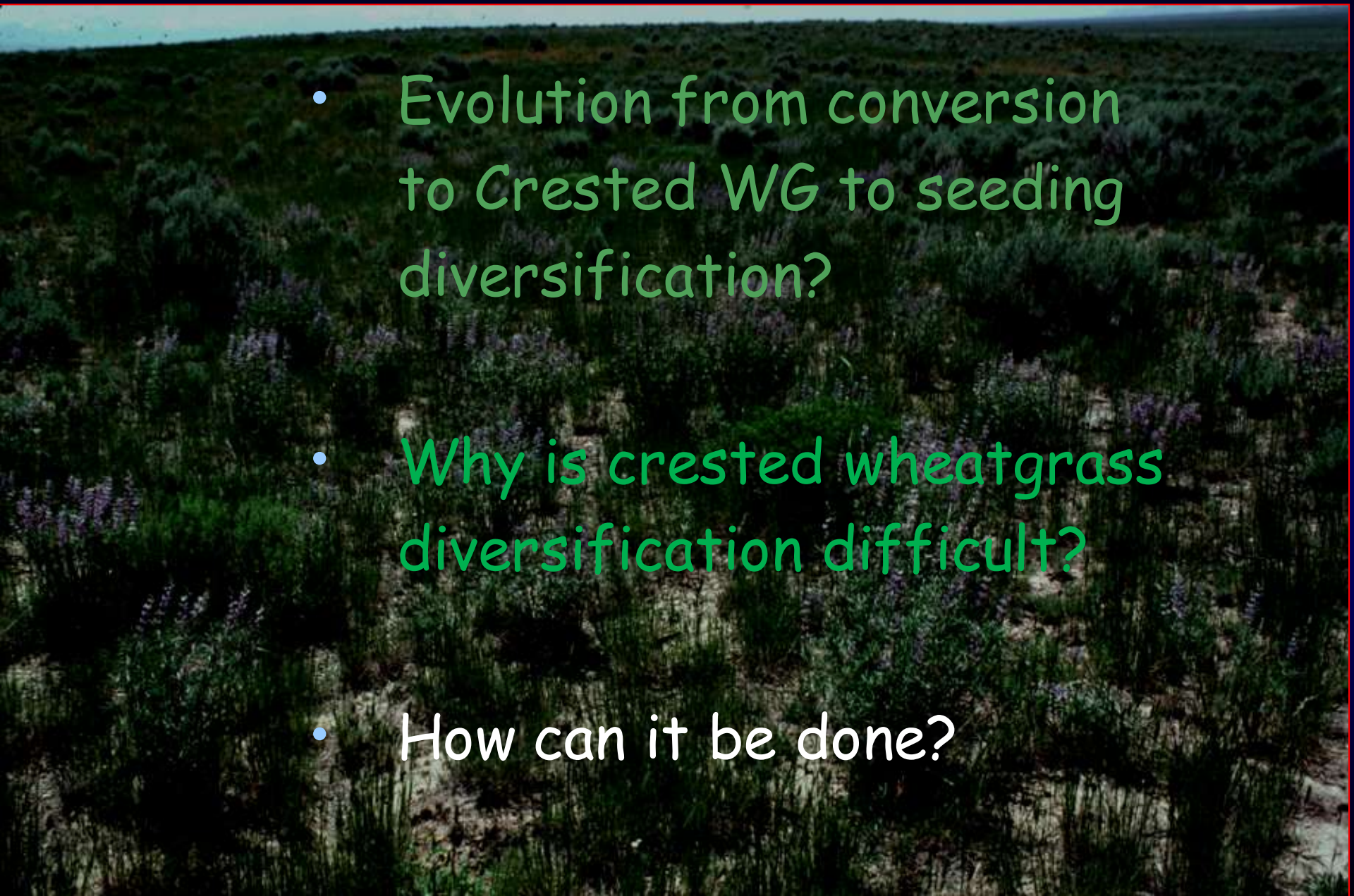


Other Competitive Characteristics

- Crested WG seed production: 1,772 (wet year) to 1,037 (dry year) seeds/m^2 (Pyke 1990).
- Seed retains viability for 1-2 years and up to 20 years in a lab (Ackigoz and Knowles 1983).
- Very competitive for resources in early stages of growth.
- Can be invasive in more mesic environments.



Topics



- Evolution from conversion to Crested WG to seeding diversification?
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Increasing Diversity in Crested Wheatgrass Seedings

1. Reduce Crested Wheatgrass Competition
   - ✓ Fire
   - ✓ Grazing
   - ✓ Herbicide
   - ✓ Mechanical
   - ✓ Combination(s)

2. Introduce desired plants

Evaluate the Potential for Increases in Invasive Species When Selecting Treatments

Use of Fire to Reduce Crested Wheatgrass Competition

- May be difficult to burn
- Fire reduces vigor but rarely causes mortality
- Effectiveness is limited using fire alone, however fire may improve the effectiveness of herbicide or grazing treatments.

Use of Livestock to Reduce Crested Wheatgrass Competition

Numerous studies on management effects of livestock grazing on sagebrush reinvasion of crested wheatgrass seedings.

How can we use this science "in reverse" to reestablish sagebrush and other species in crested wheatgrass seedings?

Grazing management can be used to promote sagebrush establishment

Livestock grazing reduces crested wg root reserves and reduces plant vigor

Livestock trampling reduces crested wg seedlings in interspaces

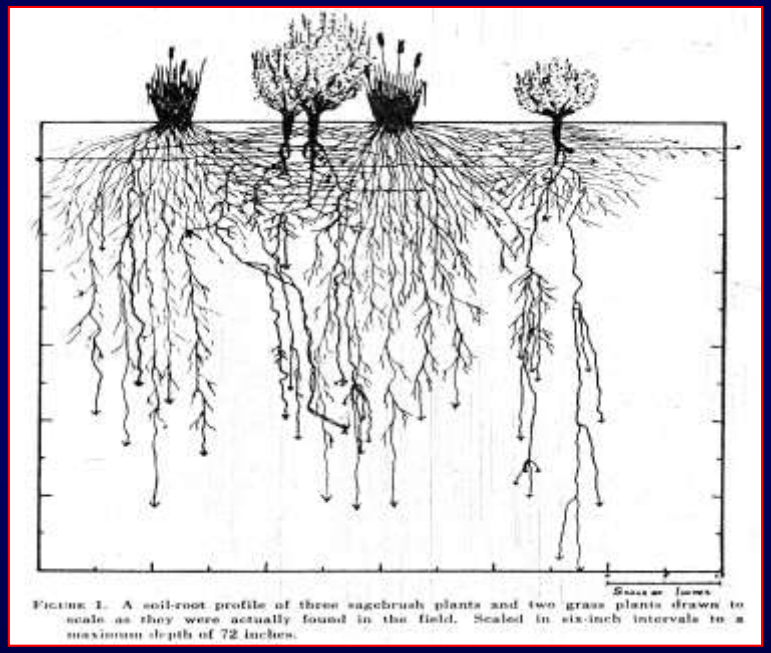


FIGURE 1. A soil-root profile of three sagebrush plants and two grass plants drawn to scale as they were actually found in the field. Scaled in six-inch intervals to a maximum depth of 72 inches.

One option to increase sagebrush density in crested wheatgrass seedings:

Heavy use in the Spring during drought periods

Using Livestock to Increase Sagebrush in Crested Wheatgrass Seedings

Frischknecht (1978) – 90% of sagebrush seedlings were within 27 ft of parent plant

Use of Herbicides to Reduce Crested Wheatgrass Competition

Roundup ULTRAMAX

Complete Directions for Use

1.0 INGREDIENTS

2.0 IMPORTANT PHONE NUMBERS

3.0 PRECAUTIONARY STATEMENTS

3.1 Hazards to Humans and Domestic Animals

CAUTION

3.2 Environmental Hazards

3.3 Physical or Chemical Hazards

DIRECTIONS FOR USE

Glyphosate

Use of Herbicides to Reduce Crested Wheatgrass Competition

Glyphosate

- Differential effect on different species of crested wheatgrass
- May take multiple applications per year and several years of retreatment for good control
- Seedbank is maintained due to increased seed production from surviving plants
- Burning prior to Glyphosate application improves kill

Use of Mechanical Equipment to Reduce Crested Wheatgrass

Disk Plow

Van Epps & McKell (1977)- Can successfully establish other species if 3 rows of crested wg removed

Mechanical Equipment to Reduce Crested Wheatgrass

Pipe harrow

Disk Chain

Mowing to Reduce Competition

- High cost per unit area
- Why not use livestock?
- Multiple clippings during the growing season to a one inch stubble height can reduce vigor and seed production.

Seed Distribution After SUCCESSFUL Crested Wheatgrass Control

Equipment to Reduce Competition and Plant: Seedlings

Seed

Risk of Enhancing Diversity?

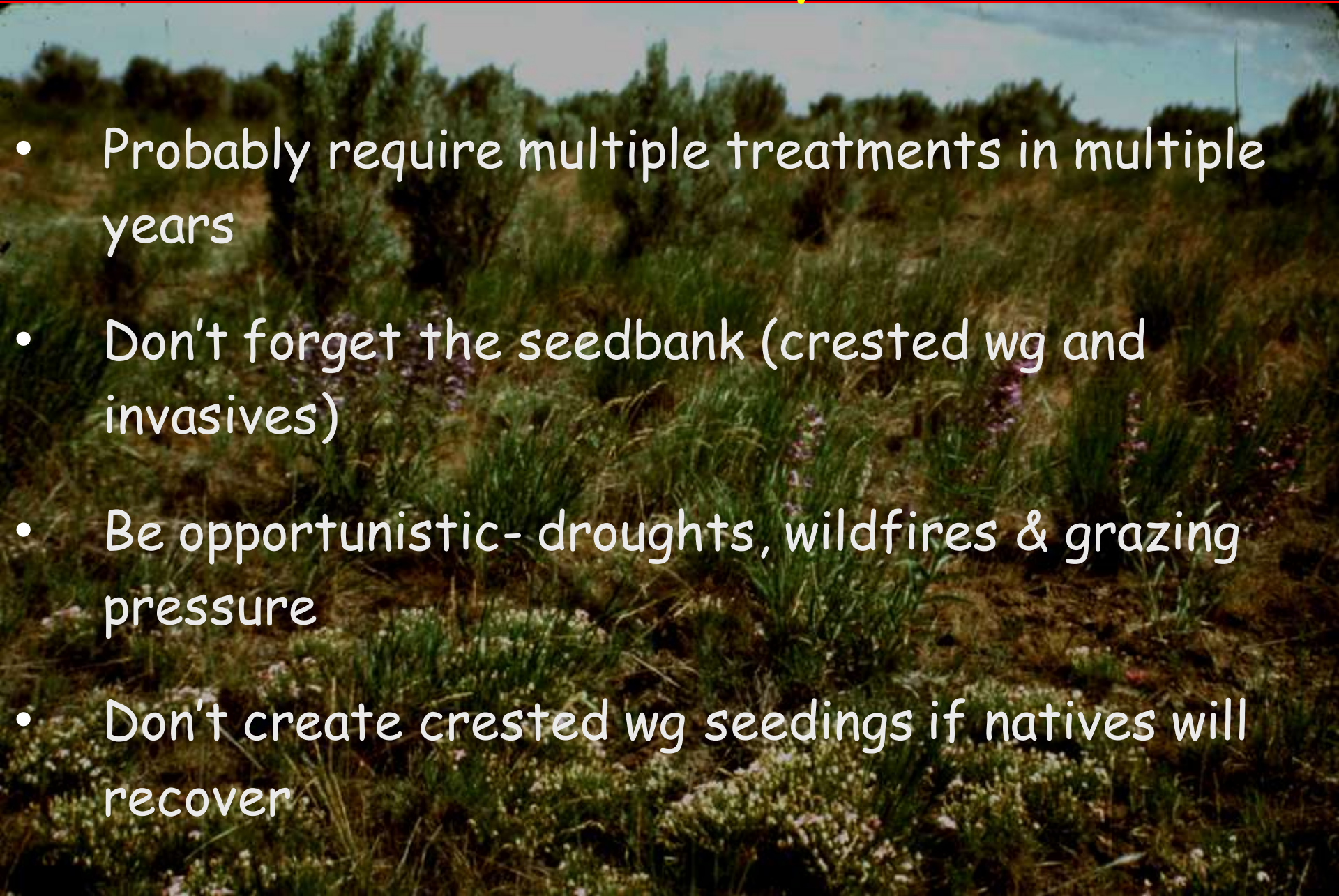
Southern Idaho Fire Rehab Project

Seeded to Crested WG's @6 lbs/ac.

Not seeded to Crested WG- native grass recovery

Both areas were aerial seeded with sagebrush at two pound/acre (bulk)

Summary



- Probably require multiple treatments in multiple years
- Don't forget the seedbank (crested wg and invasives)
- Be opportunistic- droughts, wildfires & grazing pressure
- Don't create crested wg seedings if natives will recover