

Integrated Management Strategies for Perennial Pepperweed

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Background


- Perennial pepperweed is becoming the #1 weed problem in much of Northeast California and Western Nevada
- Rapidly invades floodplains, wetlands, roadsides, and rangeland (especially following disturbance)
- Many infestations have formed large monoculture stands covering several acres



Management Obstacles

- Impenetrable thatch layer of senesced shoots
- Extensive creeping root system
- Sodic soils with less than 8 to 10 inches of yearly precipitation



A photograph of a dry, grassy field under a clear blue sky. The foreground is filled with sparse, dry, brownish grasses and some small, dark shrubs. In the middle ground, there is a fence line and several utility poles. The background shows rolling hills and mountains under a clear blue sky. A white thought bubble is overlaid on the right side of the image, containing the text "How productive is this site?".

How productive
is this site?

Management Questions?

- Combining burning, mowing, grazing, or tillage with herbicides and re-seeding
 - Can burning, mowing, grazing, or tillage effectively remove thatch and stimulate vegetation recovery?
 - Does burning, mowing, grazing, or tillage before treatment affect herbicide efficacy?
 - How does integrating control methods influence re-seeding success and long-term weed suppression?

Experiment Design

- Established at two sites in Lassen County in Fall 2002
- Both sites were monoculture stands of perennial pepperweed
- Split-split-plot design with 4 replications
 - 4 site preparation treatments
 - burning, tillage, grazing, mowing, control
 - 3 herbicide treatments
 - chlorsulfuron, glyphosate, 2,4-D, control
 - 1 re-vegetation treatment
 - Seed native perennial grass mix , control



Experiment Design

<u>Burn</u>	
glyphosate seed	glyphosate no-seed
2,4-D seed	2,4-D no-seed
untreated seed	untreated no-seed
chlorsulfuron seed	chlorsulfuron no-seed

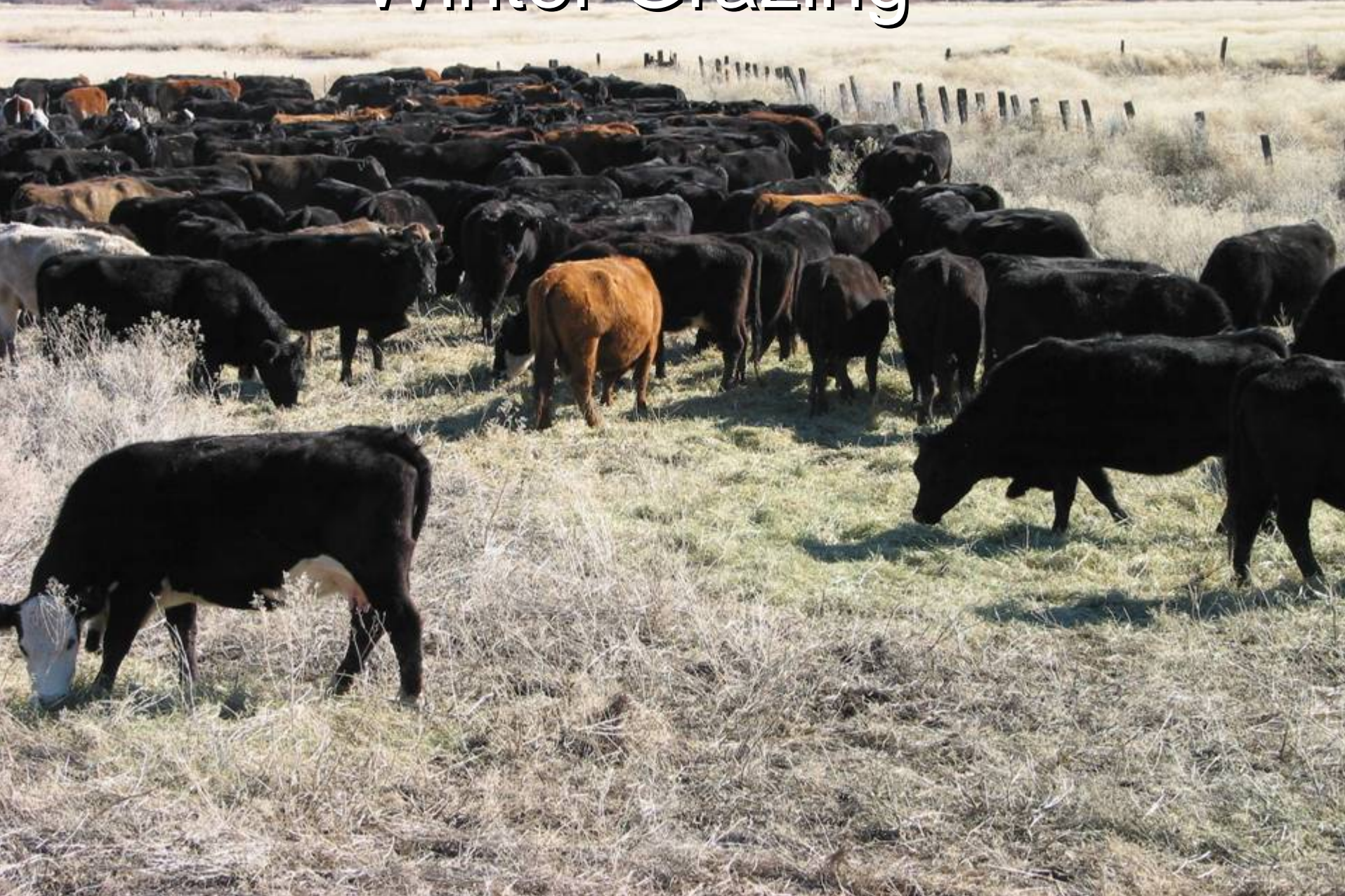
Winter Burning



Fall Disking



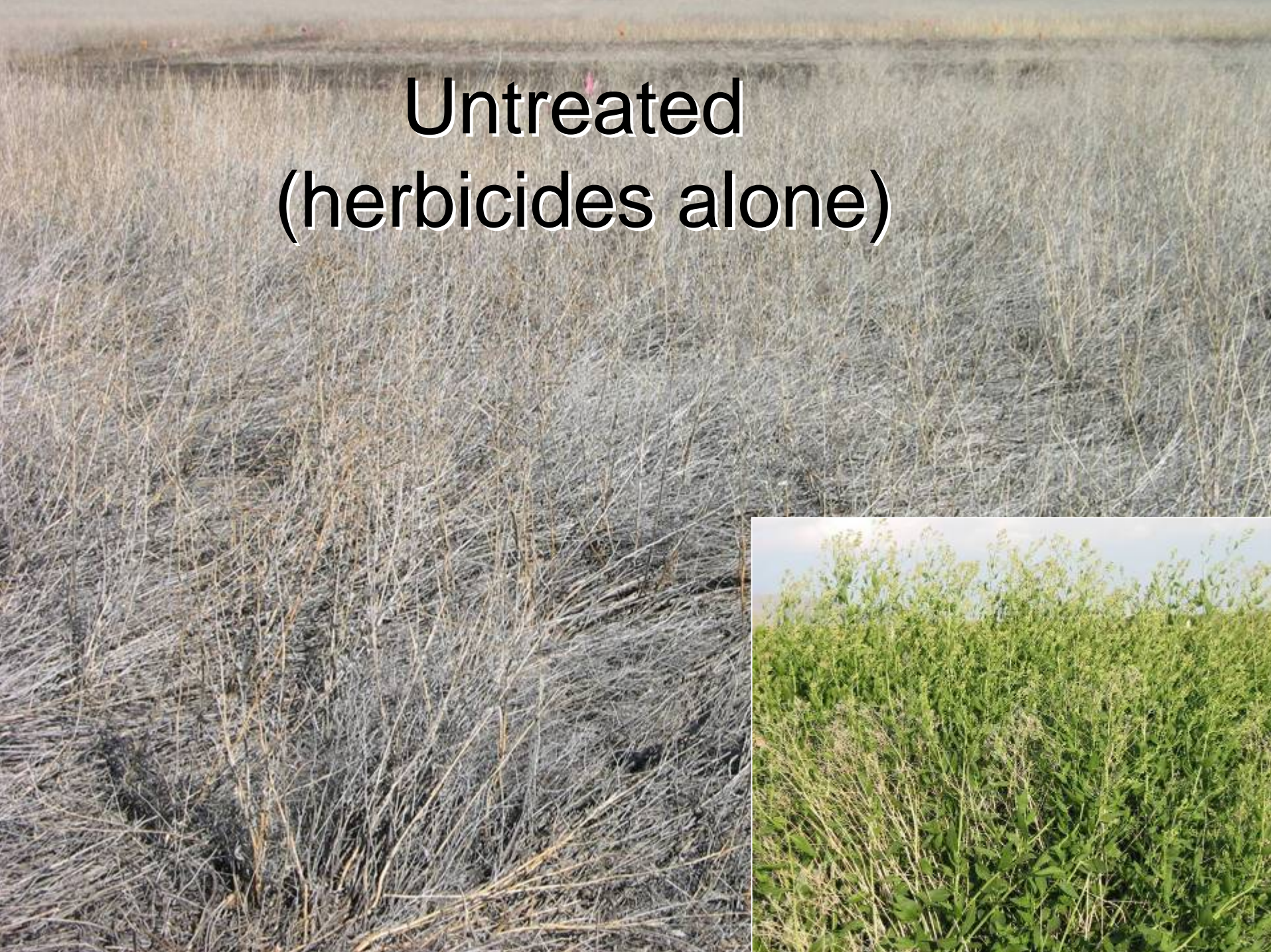
Winter Grazing



Spring Mowing at Flowering (fall re-growth)



Untreated
(herbicides alone)



1st Year Treatments

	<u>Mow</u>	<u>Burn</u>	<u>Disk</u>	<u>Graze</u>	<u>Untreated</u>
chlorsulfuron + NIS (Telar)	1.5 oz ai/A fall regrowth	1.5 oz ai/A flowerbud	1.5 oz ai/A flowerbud	1.5 oz ai/A flowerbud	1.5 oz ai/A flowerbud
glyphosate + NIS + AMS (Roundup)	3 lb ae/A fall regrowth	3 lb ae/A flowerbud	3 lb ae/A flowerbud	3 lb ae/A flowerbud	3 lb ae/A flowerbud
2,4-D ester + NIS (Weedone LV4)	2 lb ae/A fall regrowth	2 lb ae/A flowerbud	2 lb ae/A flowerbud	2 lb ae/A flowerbud	2 lb ae/A flowerbud
control	no herbicide	no herbicide	no herbicide	no herbicide	no herbicide

2nd Year Treatments

	<u>Mow</u> fall mow <i>drilled seed in March</i> spring mow	<u>Burn</u> fall mow <i>drilled seed in March</i>	<u>Disk</u> fall disk <i>drilled seed in March</i>	<u>Graze</u> winter graze <i>broadcast seed before grazing</i>	<u>Untreated</u> <i>broadcast seed in March</i>
chlor-sulfuron	0.75 oz/A fall regrowth	0.75 oz/A flowerbud	0.75 oz/A flowerbud	0.75 oz/A flowerbud	0.75 oz/A flowerbud
glyphosate 2,4-D 2 nd yr	1 lb/A fall regrowth	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud
2,4-D	1 lb/A fall regrowth	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud
control	no herbicide	no herbicide	no herbicide	no herbicide	no herbicide

3rd Year Treatments

	<u>Mow</u>	<u>Burn</u>	<u>Disk</u>	<u>Graze</u>	<u>Untreated</u>
	fall mow <i>drilled seed in March</i> spring mow	fall mow <i>drilled seed in March</i>	fall disk <i>drilled seed in March</i>	winter graze <i>broadcast seed before grazing</i>	<i>broadcast seed in March</i>
chlor- sulfuron	no herbicide	no herbicide	no herbicide	no herbicide	no herbicide
glyphosate 2,4-D 2 nd yr 2,4-D 3 rd yr	1 lb/A fall regrowth	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud
2,4-D	1 lb/A fall regrowth	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud	1 lb/A flowerbud
control	no herbicide	no herbicide	no herbicide	no herbicide	no herbicide

Native Perennial Grass Mix

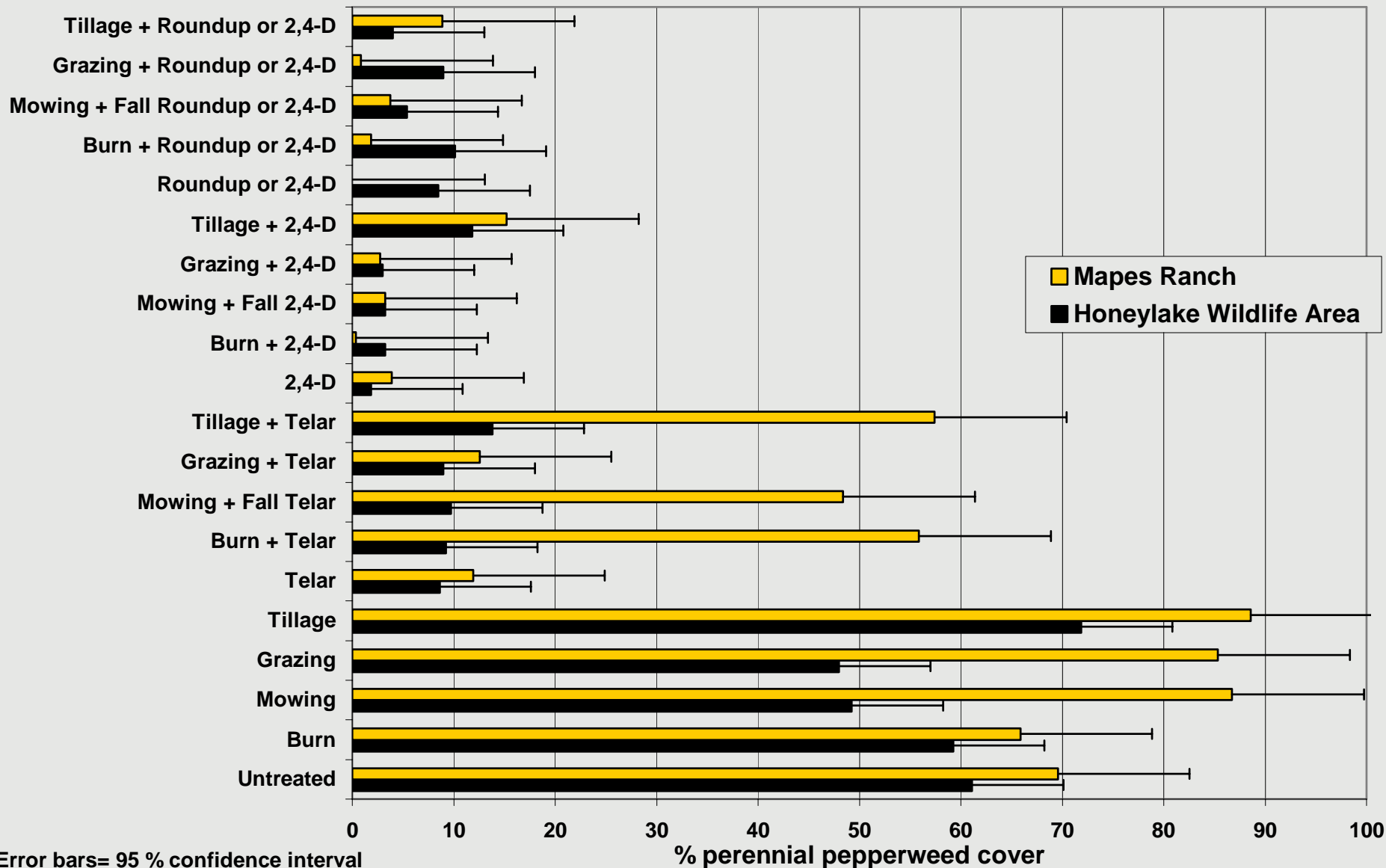
- 'Rosana' western wheatgrass (6 lb/A PLS)
- 'Shoshone' beardless wildrye (9 lb/A PLS)
- 'Magnar' basin wildrye (4 lb/A PLS)
- 'Revenue' slender wheatgrass (2 lb/A PLS)



Results



The Effect of Control Methods on Perennial Pepperweed Cover June 2006 (4 years after treatment initiation)



Burn



Disk



Mow



Graze

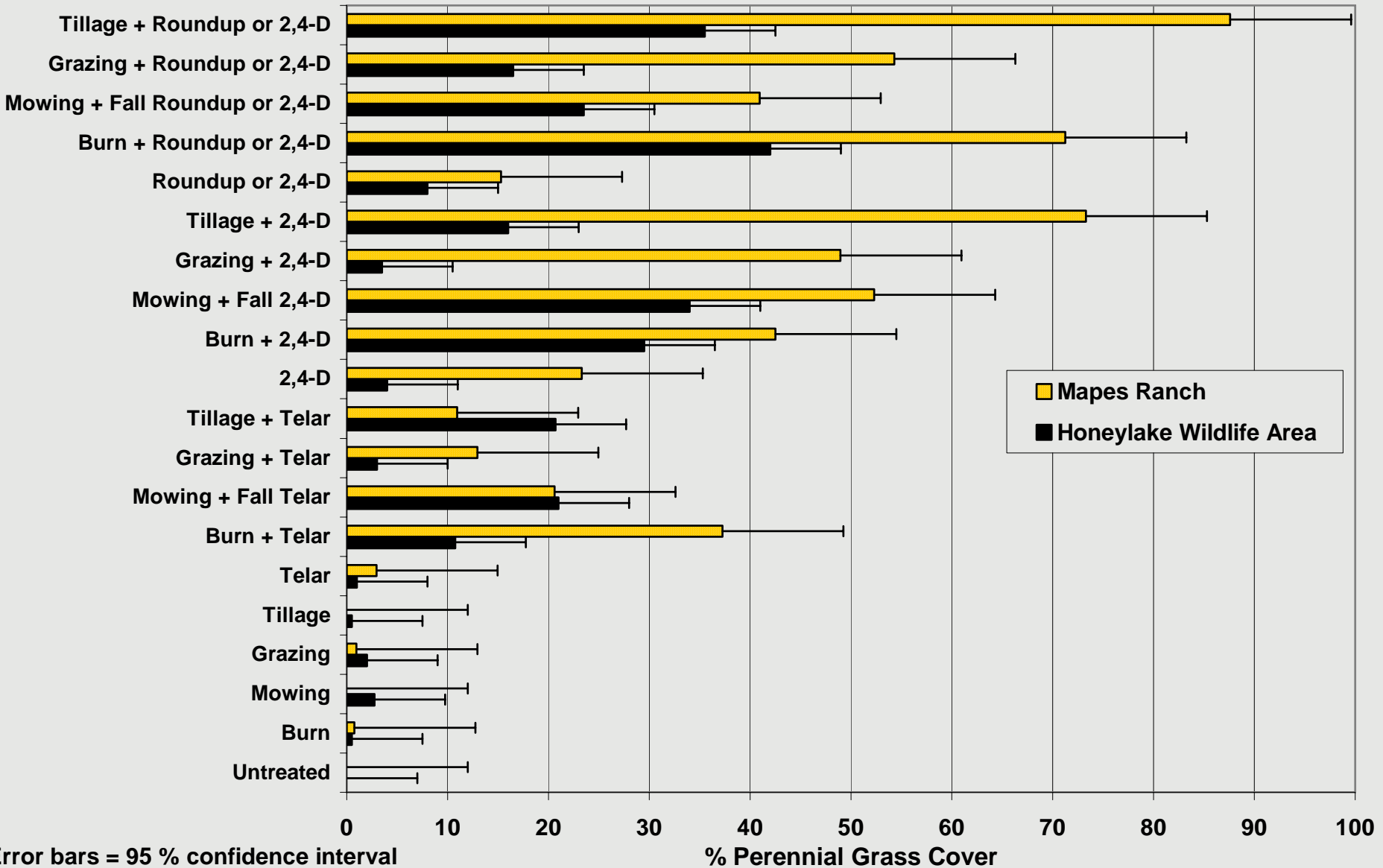




No Way!!



The Influence of Site Preparation Treatments and Herbicides on Perennial Grass Establishment in June 2006 (15 months after 2nd seeding)



■ Mapes Ranch
■ Honeylake Wildlife Area

Error bars = 95 % confidence interval

% Perennial Grass Cover



Chlorsulfuron Injury to Grass Seedlings

No Site Preparation or Reseeding

(3 years after treatment initiation)

untreated

chlorsulfuron



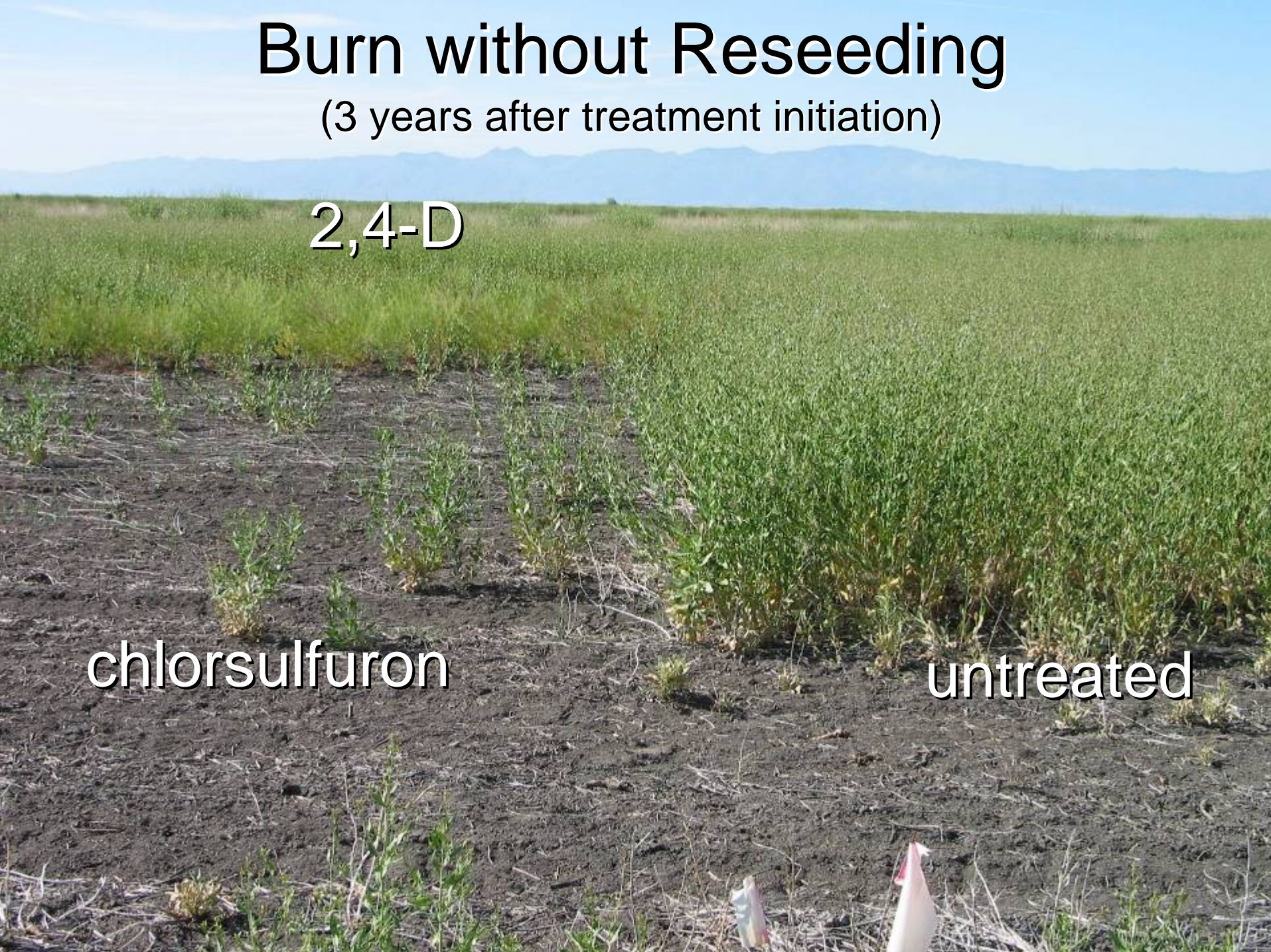
Burn without Reseeding

(3 years after treatment initiation)

2,4-D

chlorsulfuron

untreated



Mow + Glyphosate & 2,4-D + Reseeding

(3 years after treatment initiation)



Disk + Glyphosate & 2,4-D + Reseeding

(3 years after treatment initiation)



Burn + 2,4-D + Reseeding

(3 years after treatment initiation)



Burn + 2,4-D + Reseeding (4 years after treatment initiation)



Disk + Glyphosate & 2,4-D + Reseeding (4 years after treatment initiation)



Summary

- Burning or mowing + yearly herbicide applications provided the best combination of perennial pepperweed control and grass establishment
- Thatch removal, reseeding, and herbicide treatment before and after grass establishment were necessary for site restoration
- Maintenance herbicide treatments and multiple re-seedings need to be factored into management plans



Special Thanks

- UC Integrated Pest Management Program
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- Willis Dow

