Integrating grazing and herbicide treatments

Joe DiTomaso, UC Davis

What is IPM? From UC IPM

Integrated Pest Management is an **ecosystem-based strategy** that focuses on long-term **prevention** of pests or their damage through a **combination of techniques**. Pest control materials are selected and applied in a manner that **minimizes risks** to humans, non-target organisms, and the environment.

Integrated Weed Management Approaches

- Mechanical
    - Tillage
    - Heavy equipment
- Cultural
    - Grazing
    - Water management
    - Prescribed burning
    - Plant competitive
- Biological
    - Insects
    - Pathogens
- Chemical
    - Herbicides

Integrated Weed Management Approaches

- Mechanical
  - Tillage
  - Heavy equipment
- Cultural
  - Grazing
  - Water management
  - Prescribed burning
  - Plant competitive
- Biological
  - Insects
  - Pathogens
- Chemical
  - Herbicides

Strategies for integrating grazing and herbicides

- Direct combination where both techniques are both used to control the invasive population

Field estimates of translocation for perennial species

"Late spring or early summer mowing or herbicide application, followed by hard, monthly grazing, gave extremely good Canada thistle control."

Mitchell, R. B. and R. J. Abernethy, 1993. Integrated management of Californian thistle in pasture. Proc. New Zealand Weed Pest Control Conf. 46:278-281.
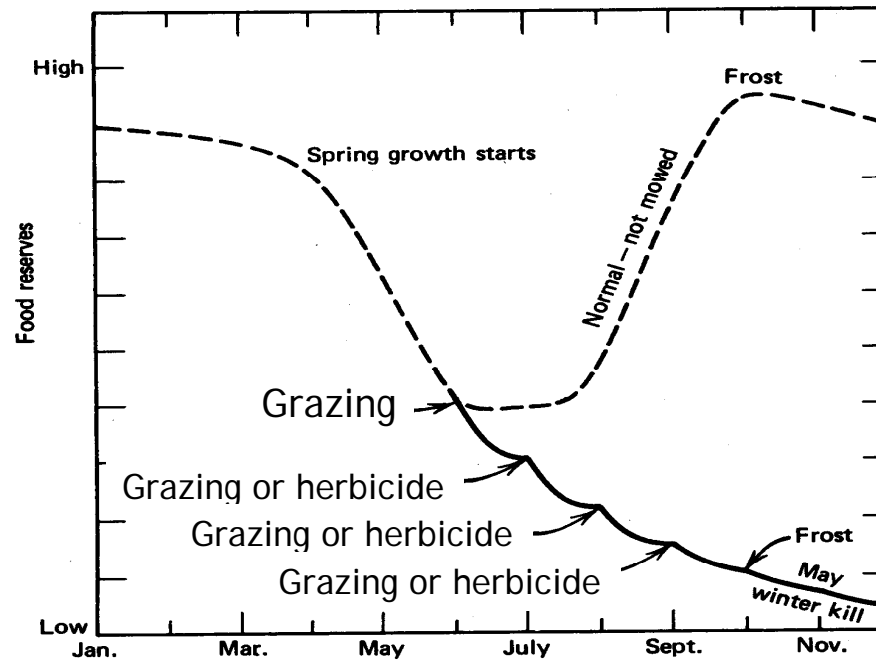
Figure 3-3. Food reserves of a perennial unmowed plant compared with reserves of a repeatedly mowed plant.

From *Weed Science Principles and Practices.*
Ashton & Monaco 1982

Use of grazing and herbicides for direct control of invasives

- Rod Lym, North Dakota State University, found grazing with sheep or angora goats combined with fall-applied picloram plus 2,4-D reduced leafy spurge density more rapidly than either method alone.

    - Grazing until mid-August, herbicide applied mid-Sept, 30 days after grazing ceased

- Tom Whitson at University of Wyoming, showed that glyphosate provided selective control of downy brome on rangeland when combined with intensive grazing.

    - Herbicide application following by intensive cattle grazing 30 days later

Strategies for integrating grazing and herbicides

- Direct combination where both techniques are both used to control the invasive population
- Grazing early in the season increases vulnerability of invasive plant to subsequent herbicide treatment
  - Exposes more surface area, reducing density and increasing exposure
  - Improves control of recovering plants that have younger tissues

Medusahead
(*Taeniatherum caput-medusae*)

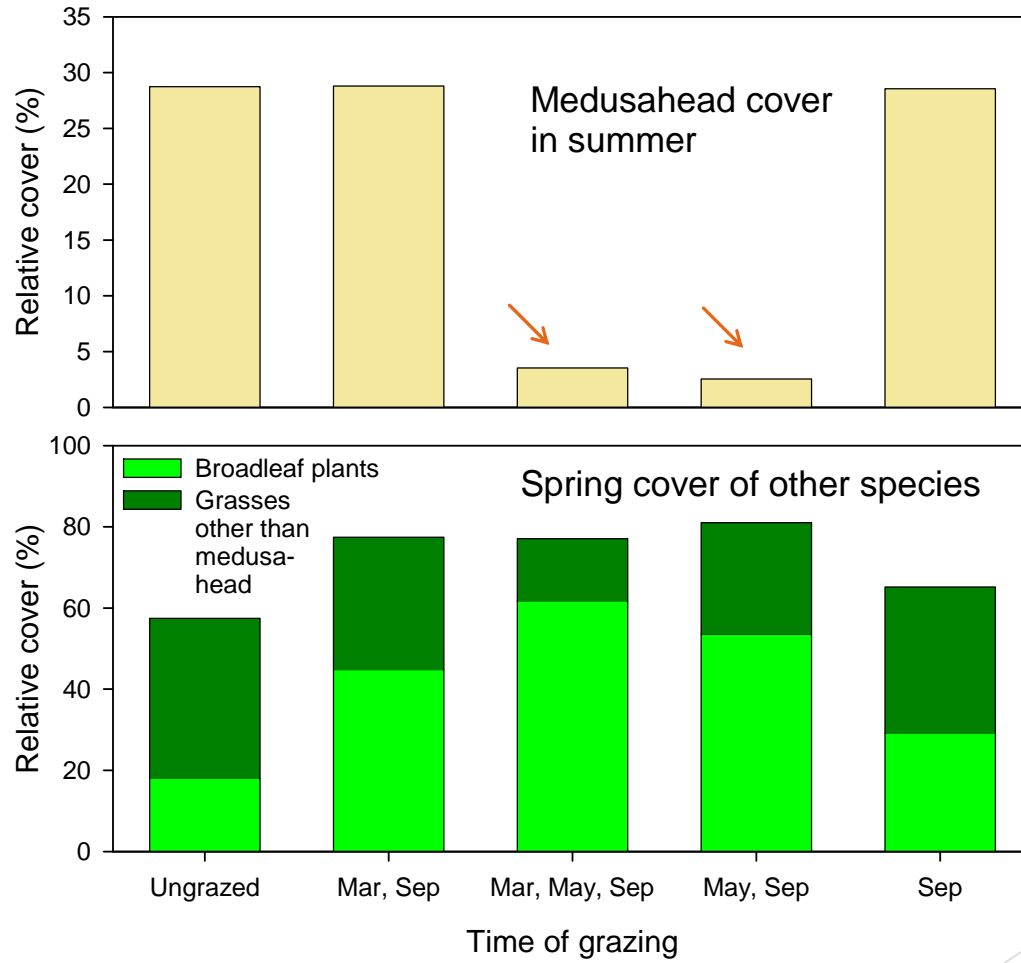# Barb goatgrass
(*Aegilops triuncialis*)

Late April or early May grazing

Control of medusahead with grazing, Yolo County

Strategies for integrating grazing and herbicides

- Direct combination where both techniques are both used to control the invasive population
- Grazing early in the season increases vulnerability of invasive plant to subsequent herbicide treatment
  - Exposes more surface area, reducing density and increasing exposure
  - Improves control of recovering plants that have younger tissues
- Proper grazing after herbicide/revegetation program can maintain dominant desirable vegetation, which can resist invasive or re-invasion
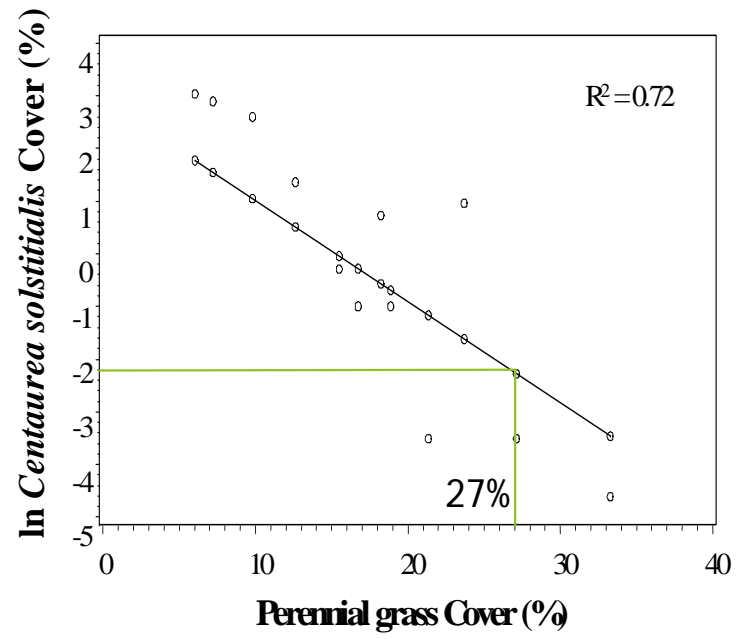
Vegetative cover for barb goatgrass

Vegetation type	% Vegetative cover or index value					
	Unburned			Burn		
	1997	1998	1999	1997	1998	1999
Grasses						
barb goatgrass	45	62	63	55	54	0
native perennials	0	0	1	1	9	10
total grasses	127	156	152	116	173	68
Forbs						
introduced	3	37	14	4	15	8
total	8	46	21	10	26	11
Total native plant species	6	13	10	7	19	13

Pre-burn

Three years after the burn there was still 85% control (only 5% cover) in the plots that burned twice.

DiTomaso et al. 2001. Cal. Ag. 55, 47.

Burning increased the native perennial grass *Hordeum brachyantherum* by 13-fold while controlling barb goatgrass (*Aegilops truncialis*)

Strategies for integrating grazing and herbicides

- Direct combination where both techniques are both used to control the invasive population
- Grazing early in the season increases vulnerability of invasive plant to subsequent herbicide treatment
  - Exposes more surface area, reducing density and increasing exposure
  - Improves control of recovering plants that have younger tissues
- Proper grazing after herbicide/revegetation program can maintain dominant desirable vegetation, which can resist invasive or re-invasion
- Herbicide treatment late in the season can suppress seed production and provide some late-season forage. Subsequent grazing can remove thatch

Medusahead control with low rates of glyphosate
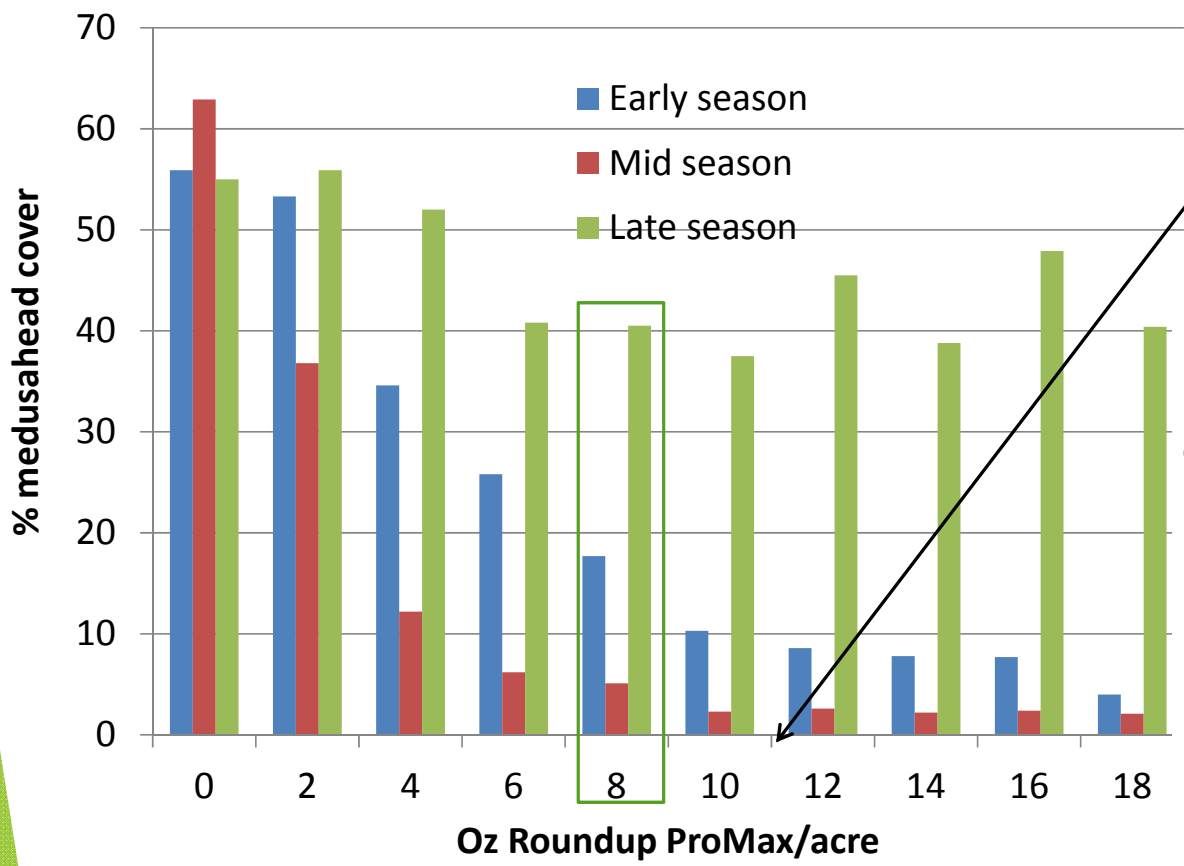
Label states: "To control or suppress medusahead, apply 11 oz/ac at the 3-leaf stage"
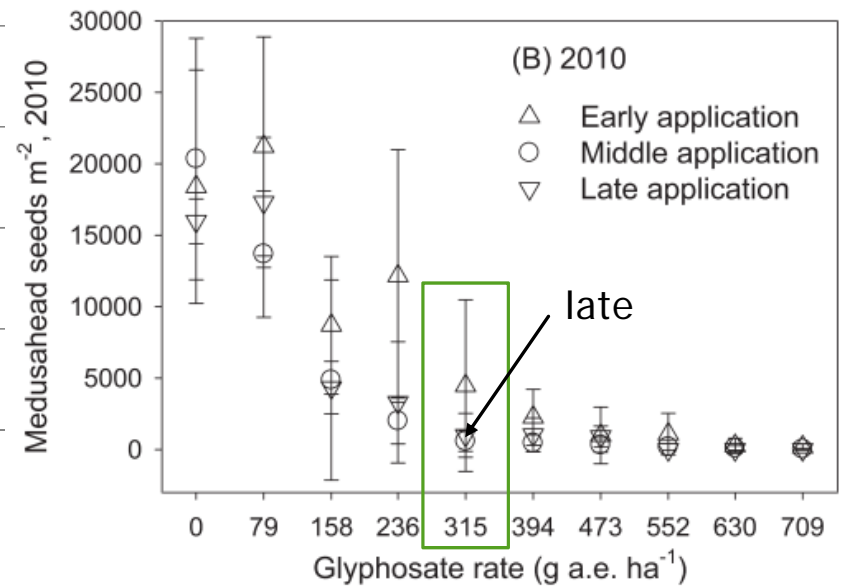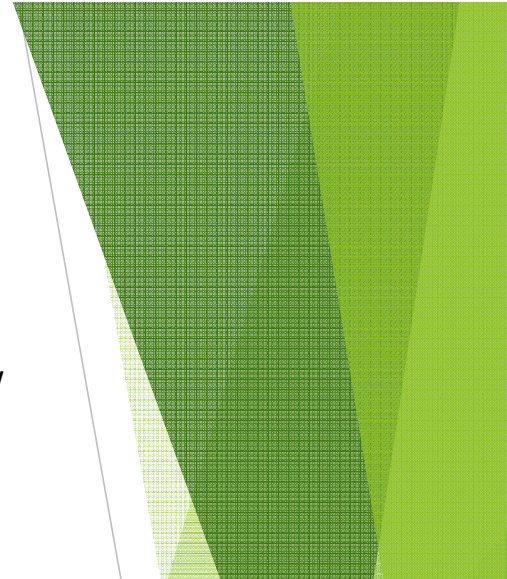
Benefits: 1) lower cost, 2) safer on sagebrush, 3) provides late-season forage

Great Basin sagebrush steppe trial
Late season (early seedhead) medusahead treatment
with low rate of glyphosate vs. plot treated with a
low rate at tillering stage (mid-season).

A bit of a different twist

▶ Combining grazing management with herbicides has been used in the Australian spray-graze technique.

▶ Weeds sprayed with low rates of phenoxy herbicide to make them more palatable, and then grazed heavily.

▶ Carter, E. D. 1990. The role of grazing animals in weed control. Proc. Aust. Weeds Conf. 9:239-242.

Strategies for integrating grazing and herbicides

- Direct combination where both techniques are both used to control the invasive population
- Grazing early in the season increases vulnerability of invasive plant to subsequent herbicide treatment
  - Exposes more surface area, reducing density and increasing exposure
  - Improves control of recovering plants that have younger tissues
- Proper grazing after herbicide/revegetation program can maintain dominant desirable vegetation, which can resist invasive or re-invasion
- Herbicide treatment late in the season can suppress seed production and provide some late-season forage. Subsequent grazing can remove thatch
- Early season grazing or trampling can manage top growth, reduce seed production, and expose bare ground prepping soil for revegetation program
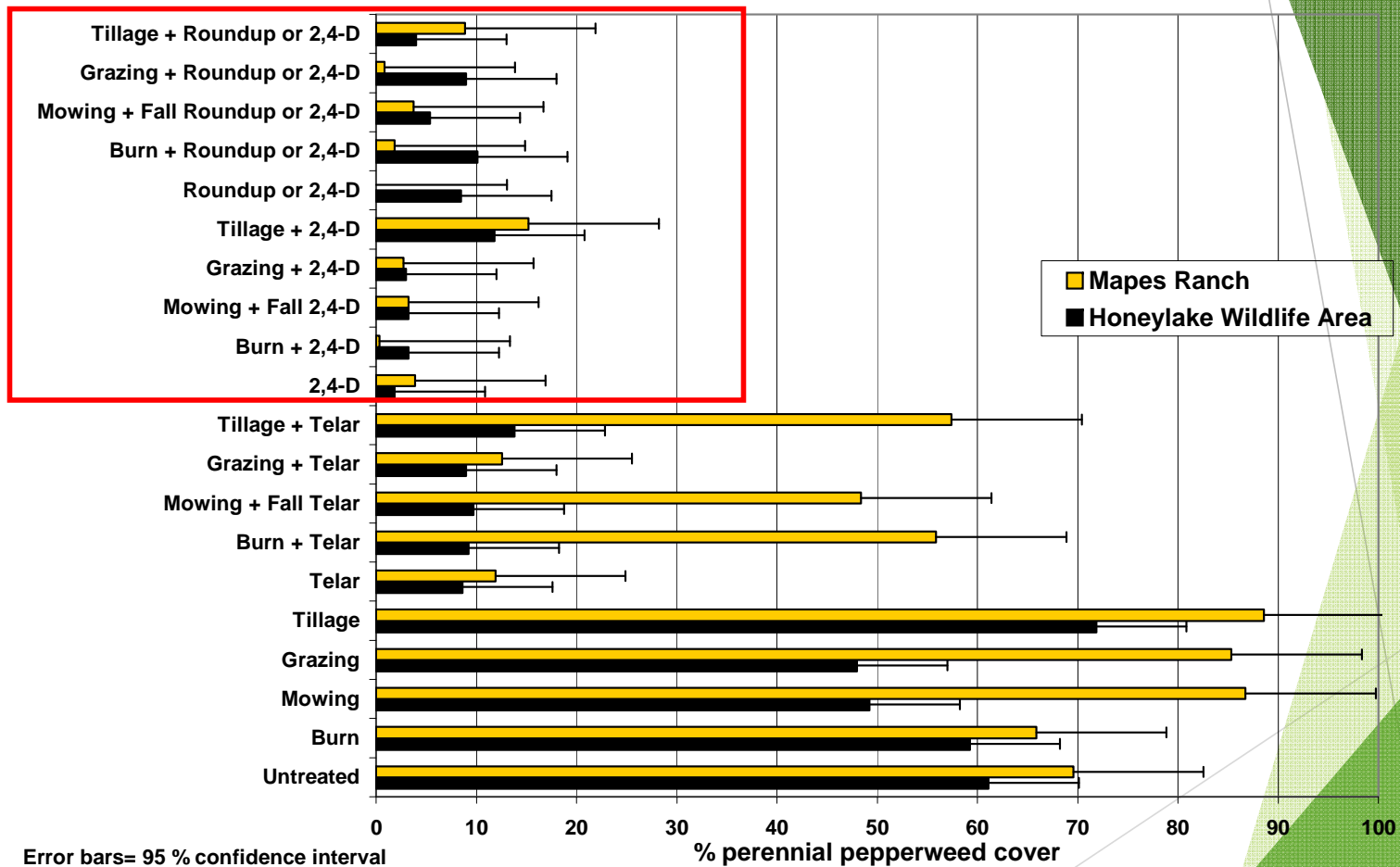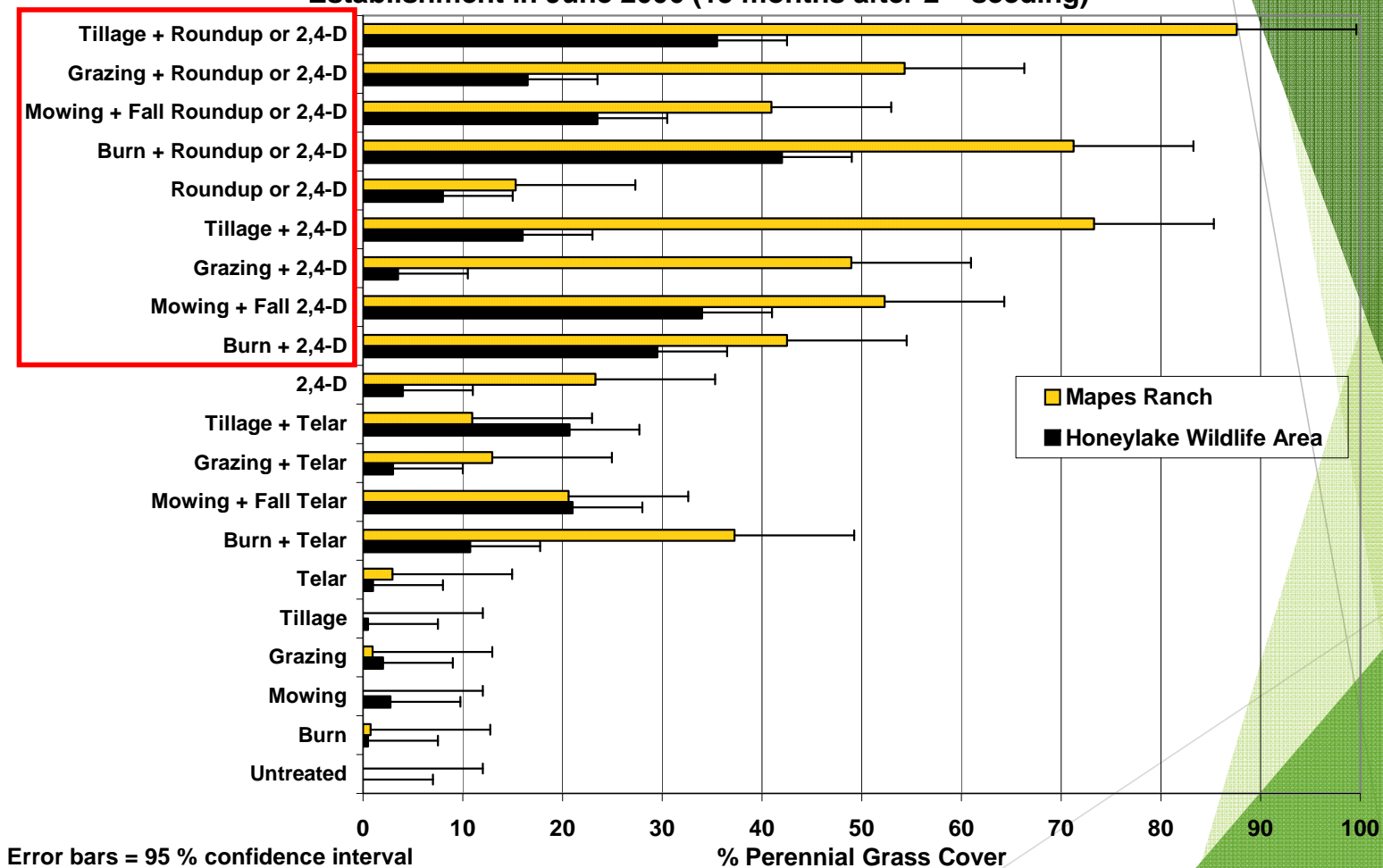
Lepidium latifolium (perennial pepperweed)

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

Wilson, Boelk, Kyser, and DiTomaso. Invasive Plant Science and Management 1, 17

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

Error bars = 95 % confidence interval

% Perennial Grass Cover

Wilson, Boelk, Kyser, and DiTomaso. Invasive Plant Science and Management 1, 17

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

While the combination of grazing and herbicides in an IPM program is not commonly used, there are opportunities to utilize both practices for more effective invasive plant management and increased ecosystem services.

Thank you and questions!