

Weeds and Seeds and Fire, Oh My! Weed Management Lessons from Montana

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The Next 15 Minutes

- **Managing the seed bank**
- **Revegetation following wildfire**
- **Long-term outcomes of revegetation**



MANAGING THE SEED BANK

Ventenata (Ventenata dubia)

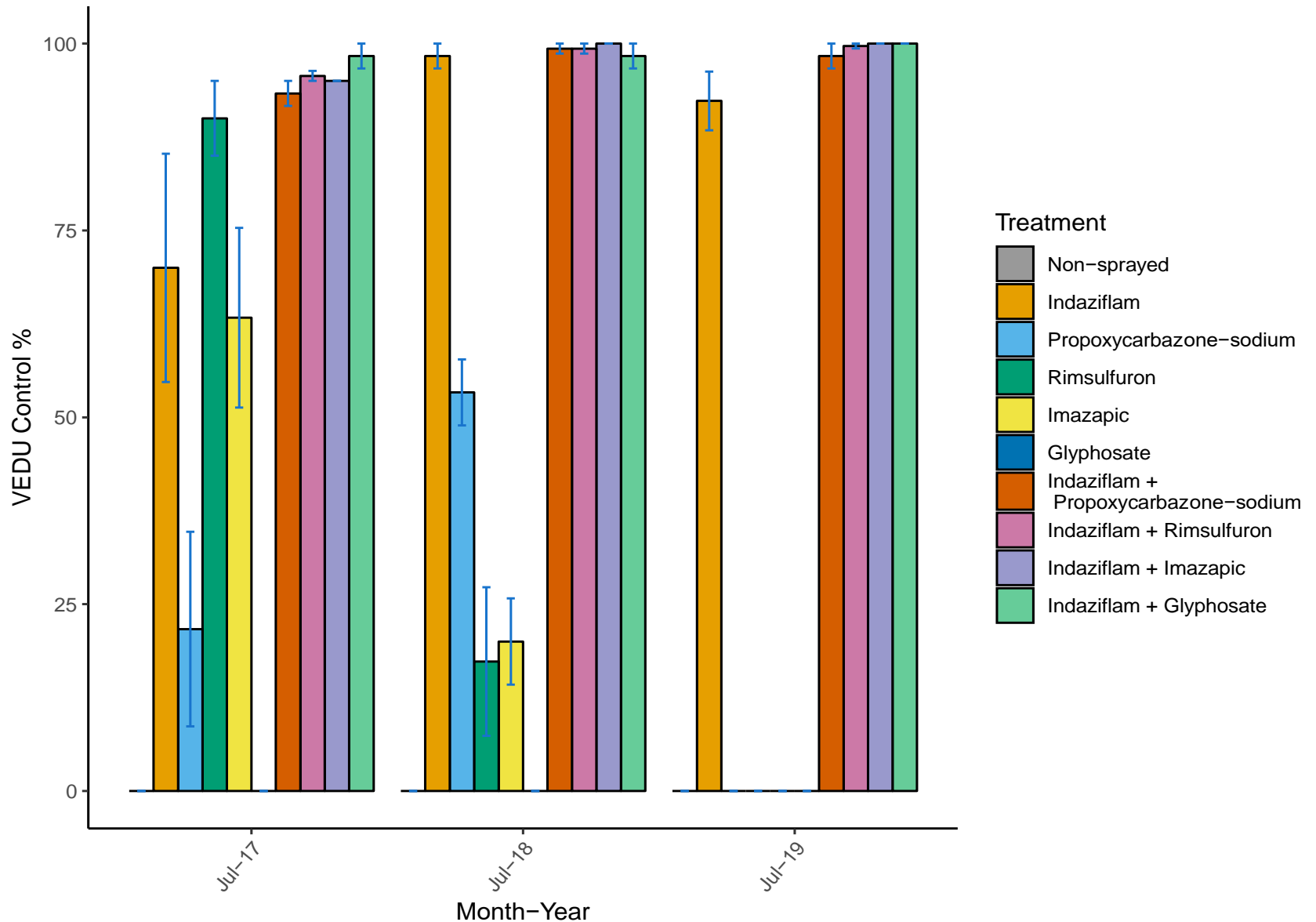
- Annual grass
- Rapidly spreading across Montana
- Herbicide options
- Short-lived seeds (<4 years)

Ventenata Herbicide Trial

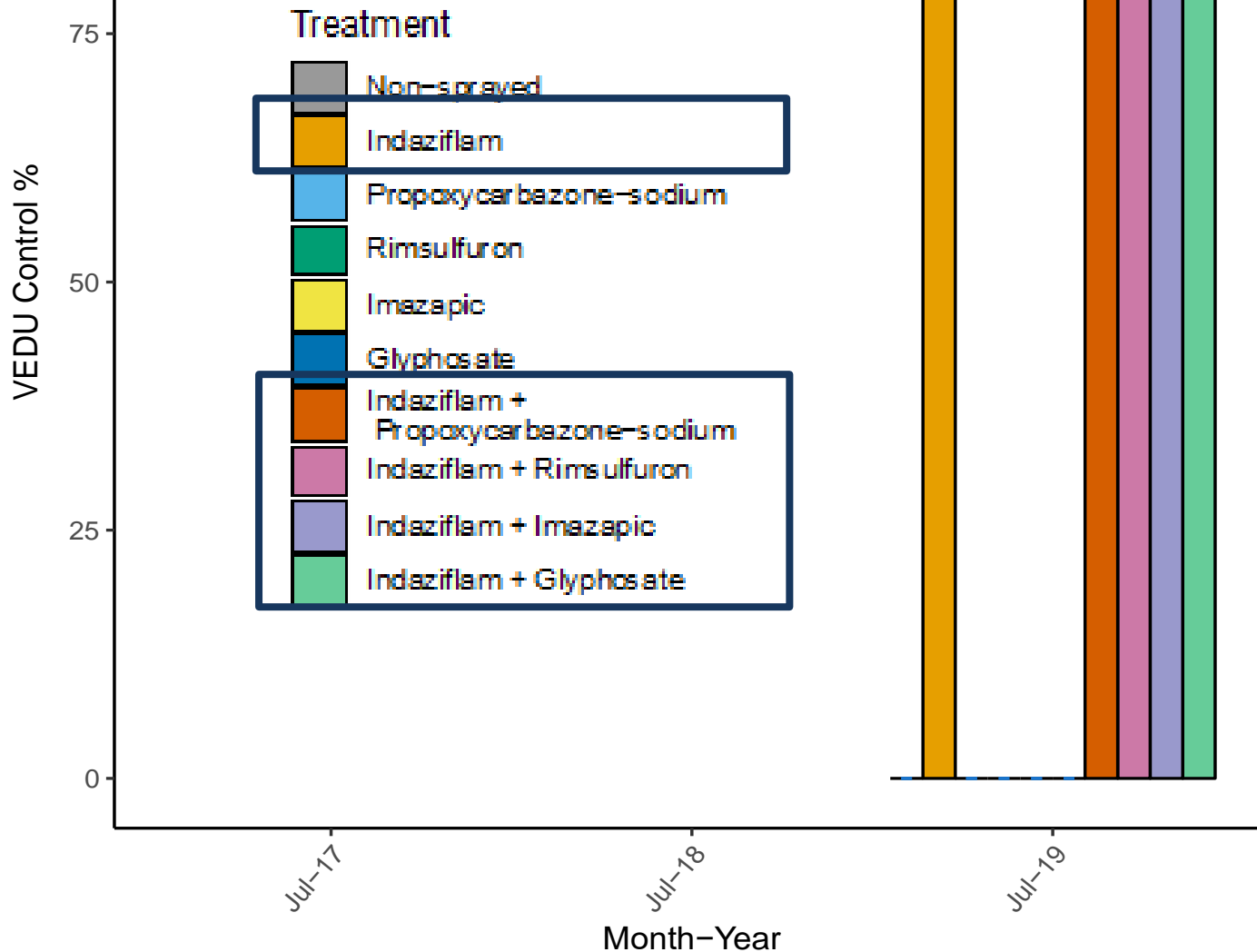
5 Years Running

- Treatments
 - Indaziflam (Esplanade, 7 oz)
 - Imazapic (Plateau, 7 oz)
 - Rimsulfuron (Matrix, 4 oz)
 - Propoxycarbazone (Lambient, 1.2 oz)
 - Glyphosate (12 oz)
 - Indaziflam + other 4 herbicides
- Sprayed November 2016

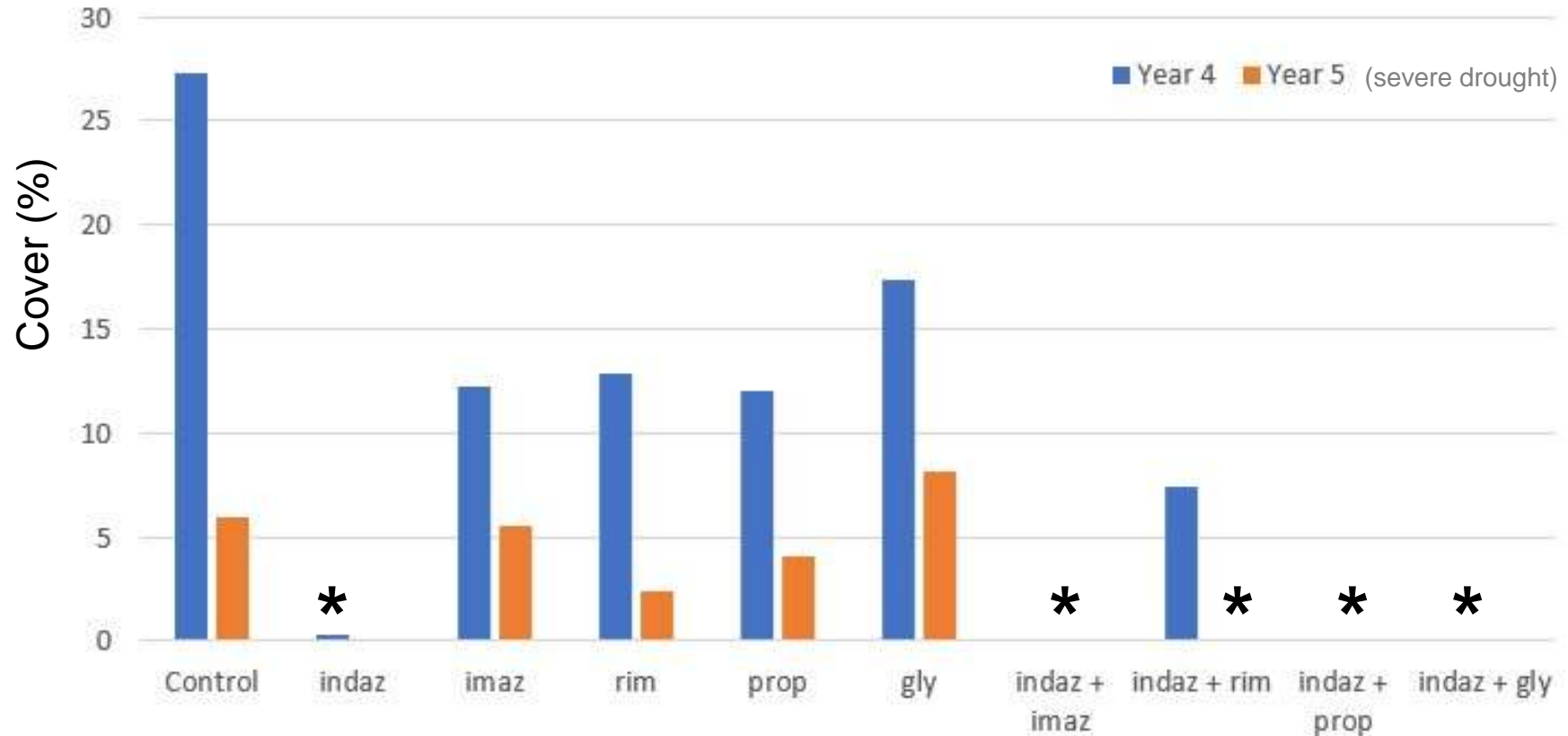
Ventenata Control over Three Years



Year 3—Indaziflam still controlling ventenata



Ventenata Cover, Years 4 and 5



Mangold et al, unpublished data

Seed Bank Assay

Are there any seeds left?

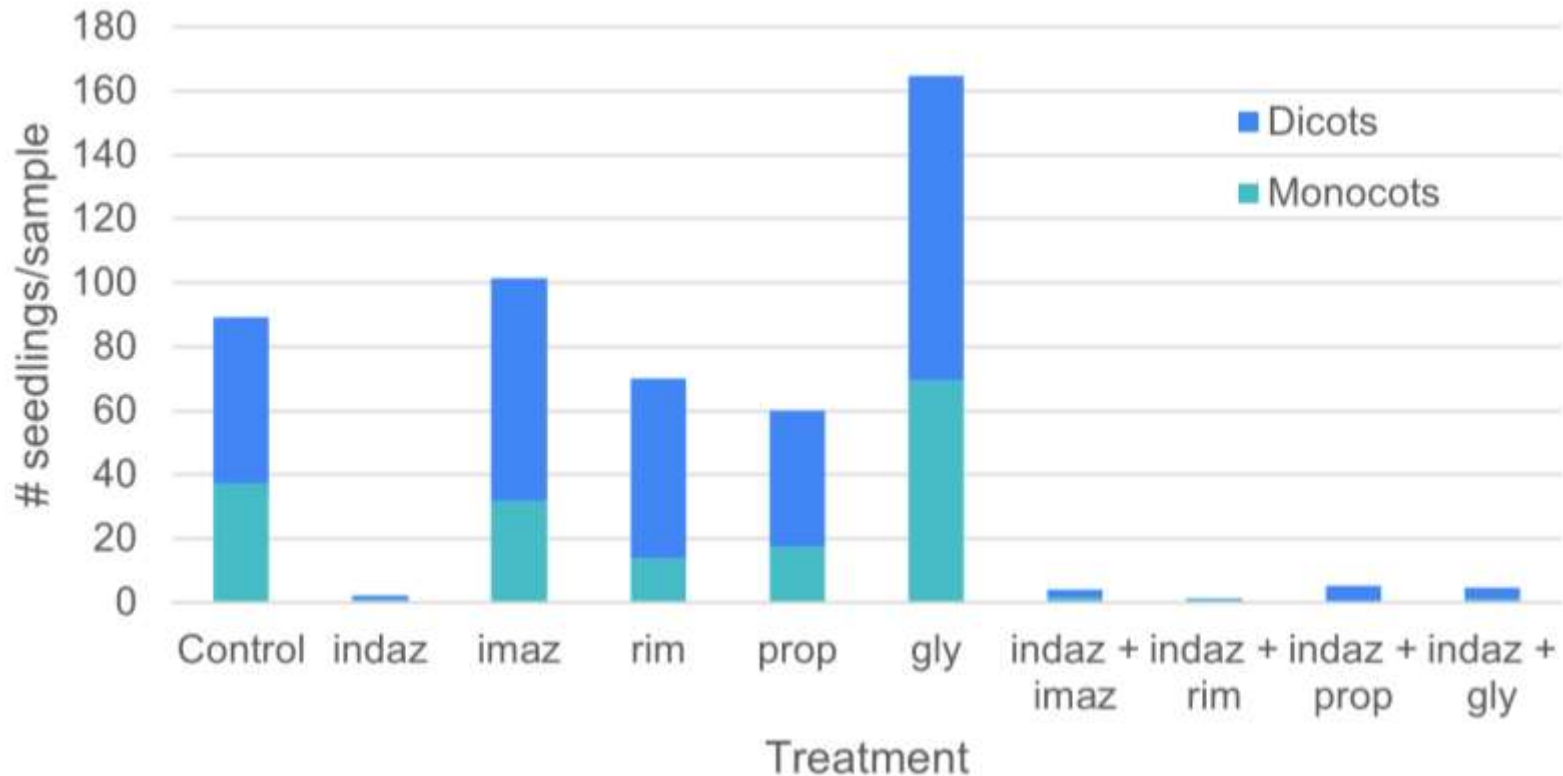


Collected seed bank
samples August 2021



Grew in greenhouse
fall/winter 2021

Emerged Seedlings

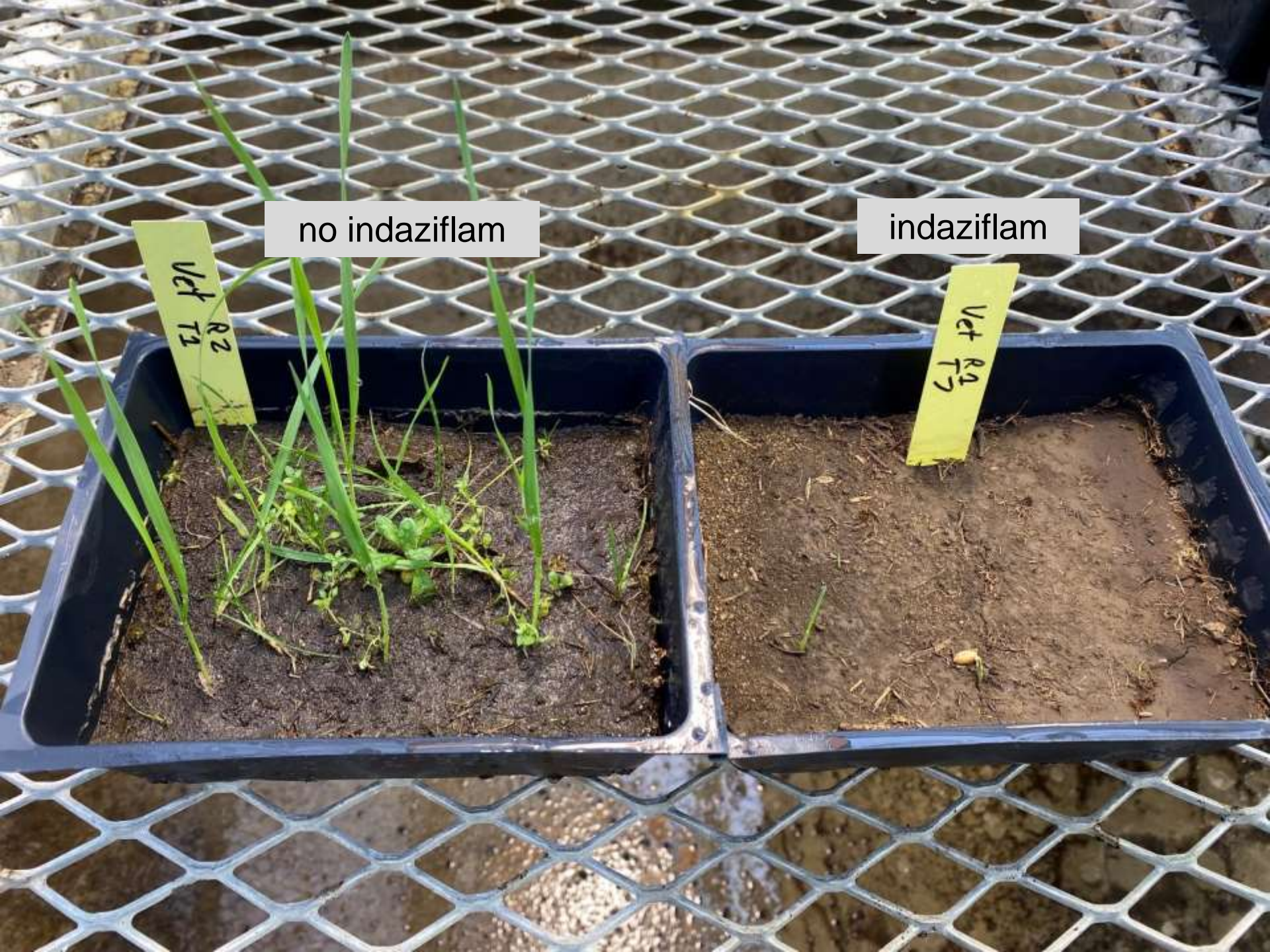


no indaziflam

indaziflam

Vet R2
T2

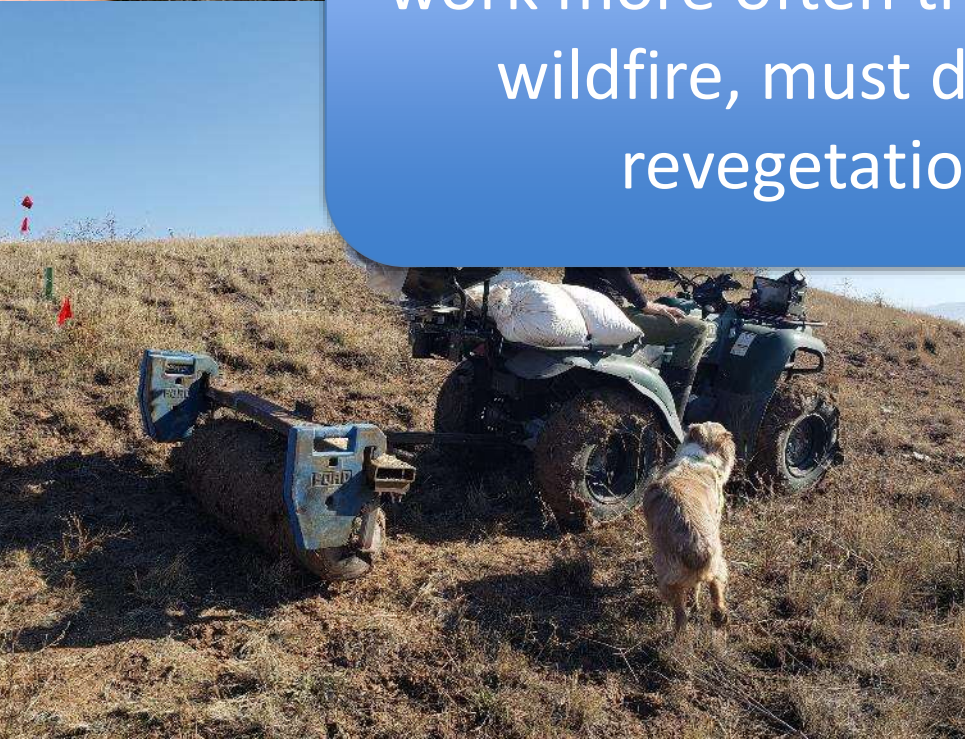
Vet R2
T2



REVEGETATION FOLLOWING WILDFIRE



Revegetation is expensive and it *doesn't* work more often than it *does* work. After wildfire, must determine whether revegetation is necessary.

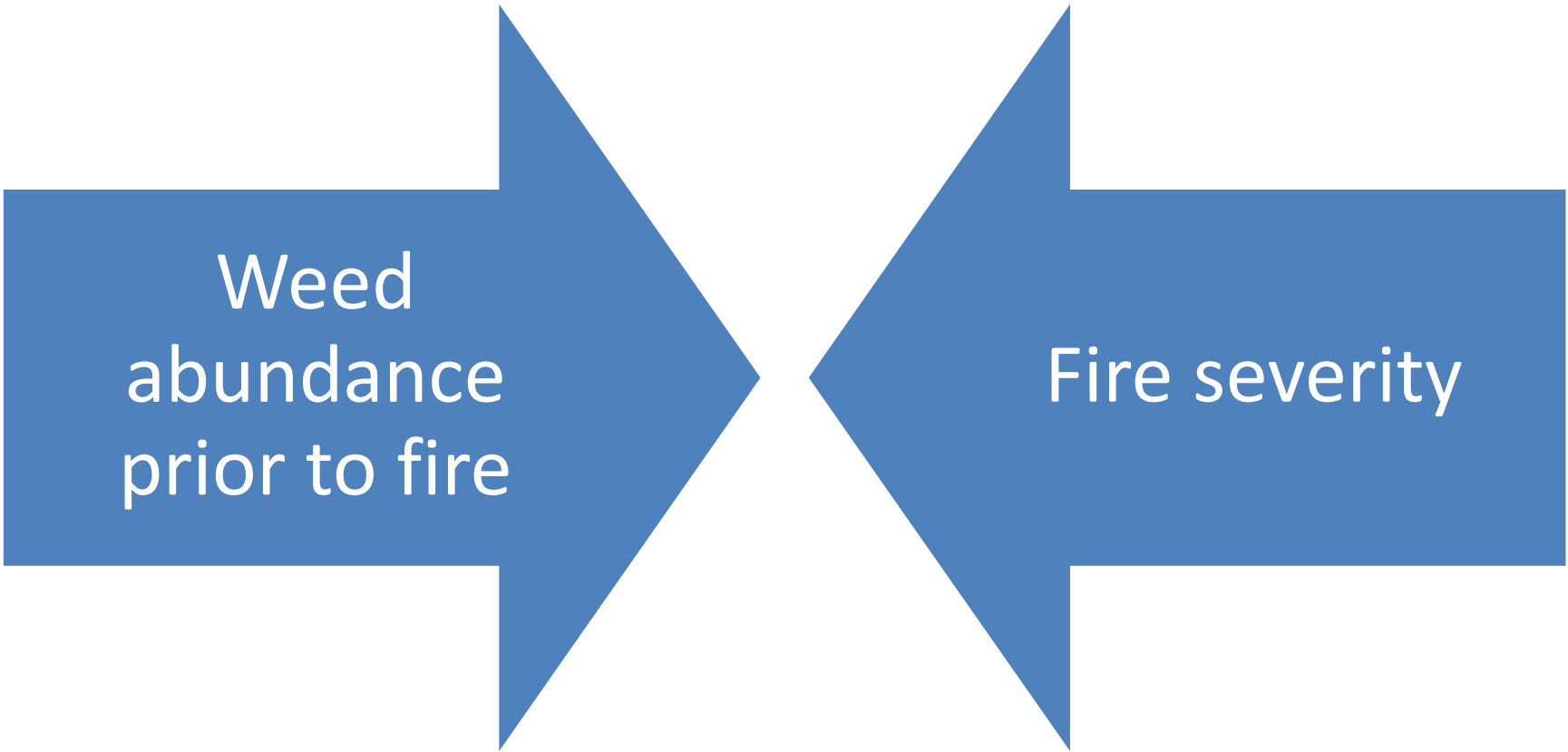


Is Revegetation Necessary?

“To seed, or not to seed, that is the question”

Is Revegetation Necessary?

“To seed, or not to seed, that is the question”








The diagram consists of two large, blue, stylized arrows pointing towards each other, forming a central diamond shape. The left arrow points right and contains the text 'Weed abundance prior to fire'. The right arrow points left and contains the text 'Fire severity'.

Weed
abundance
prior to fire

Fire severity

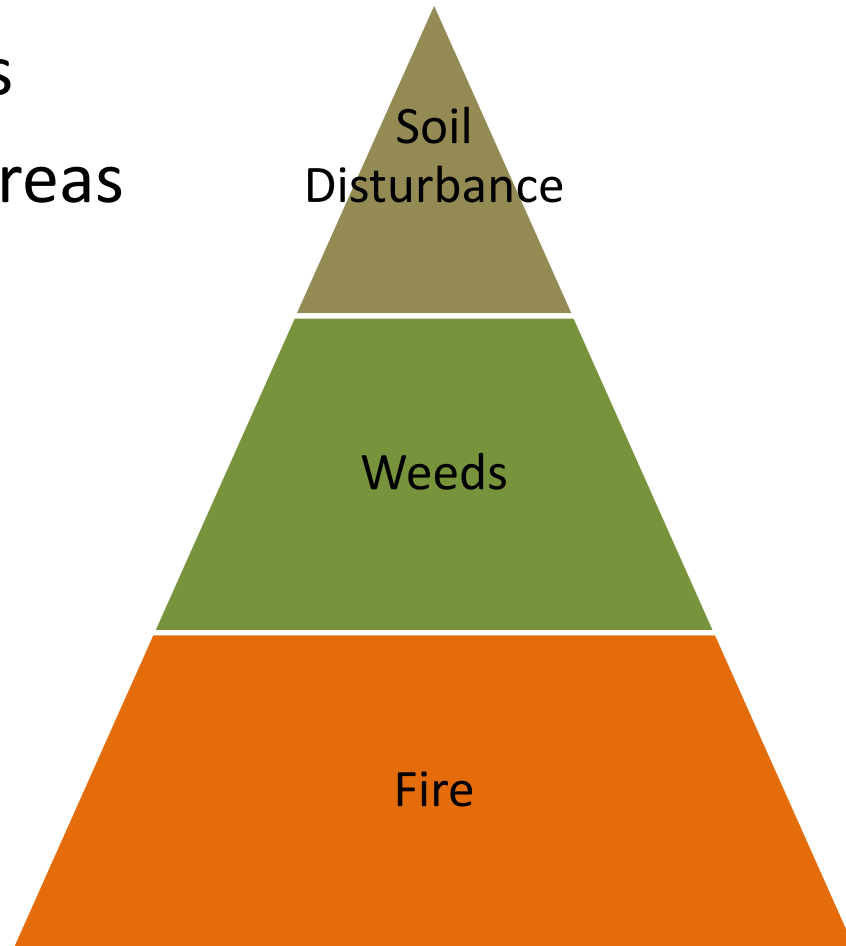
Is revegetation necessary?

Degree of Weed Cover	Burn Severity		
	Low	Medium	High
Absent to low (up to 20%)	Revegetation not necessary; natural recovery within 1-2 years	Natural recovery in 2-5 years	Natural recovery possible; monitor for plant survival and revegetate if necessary 
Moderate (20-80%)	Natural recovery within 1-2 years with weed management	Natural recovery in 2-5 years likely with weed management	Natural recovery limited; revegetation likely needed 
High (over 80%)	Natural recovery within 1-2 years, but intense weed management needed; revegetation likely needed 	Natural recovery possible, but intense weed management needed; revegetation likely needed 	Revegetation and intense weed management needed 

Davis and Mangold (2019) Managing weeds after wildfire. Montana State University Extension, pub # EB023, <https://store.msuextension.org/publications/AgandNaturalResources/EB0230.pdf>

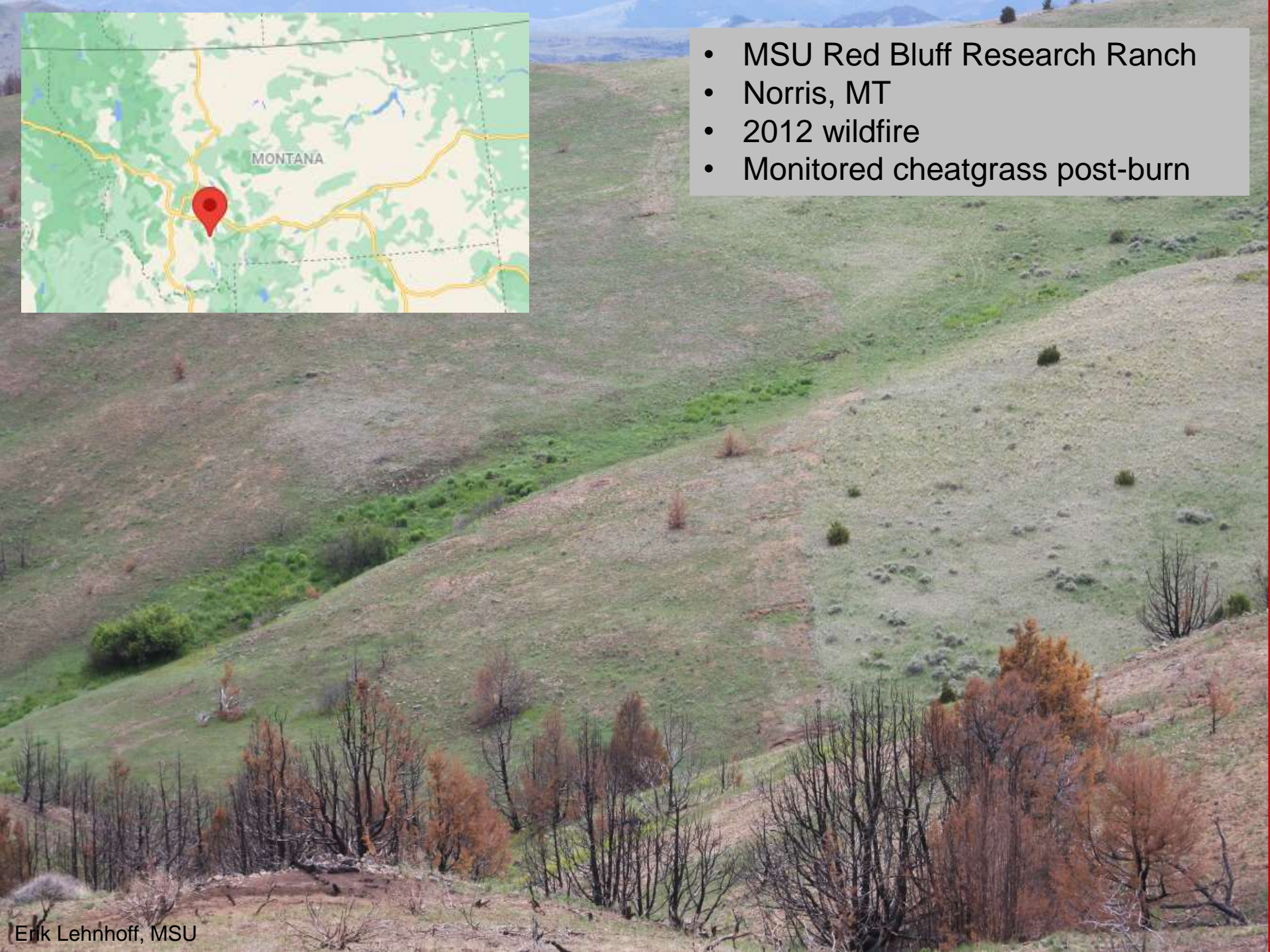
High Priority Areas

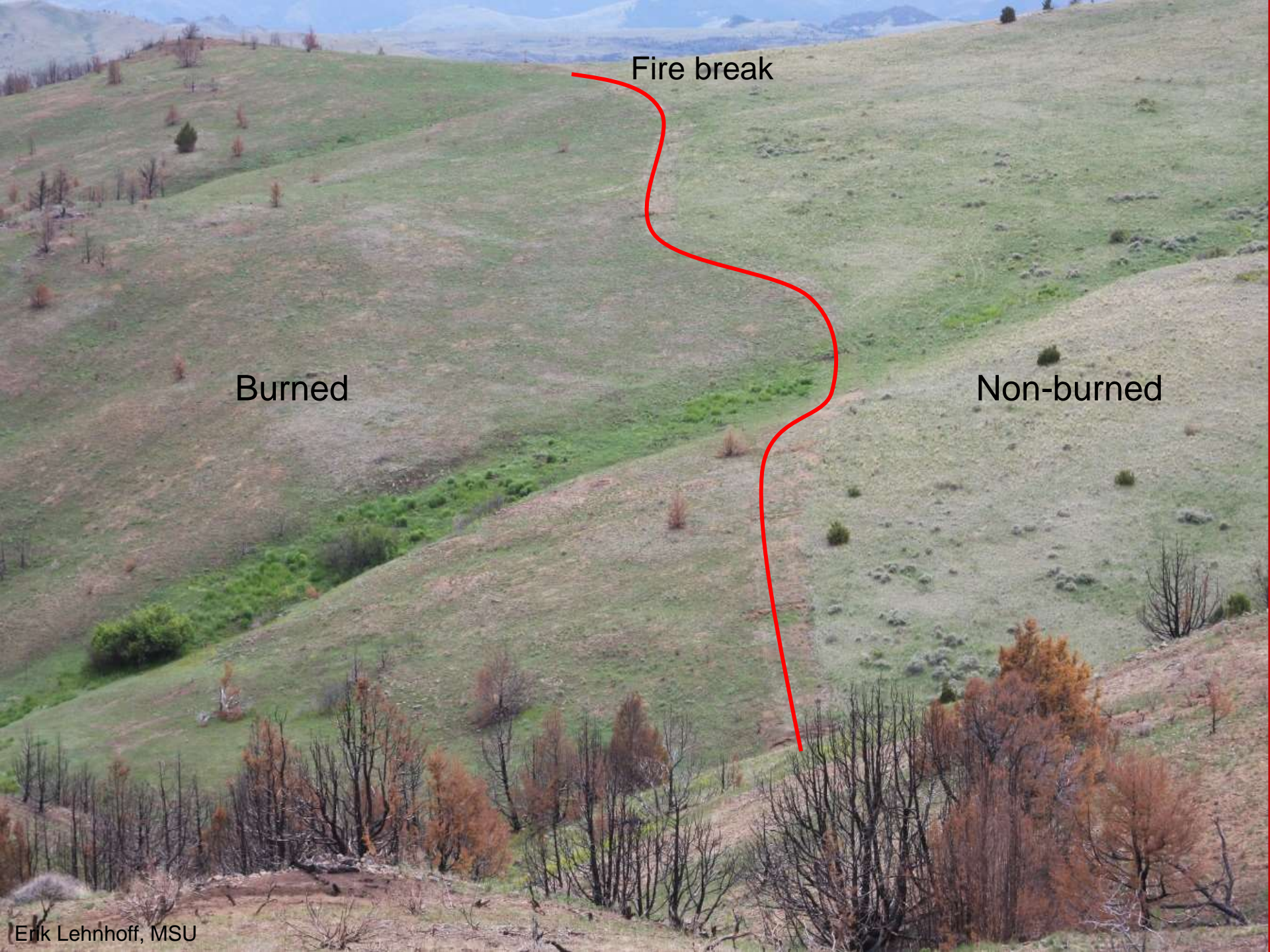
- Fuel breaks/fire lines
- Equipment staging areas





- MSU Red Bluff Research Ranch
- Norris, MT
- 2012 wildfire
- Monitored cheatgrass post-burn



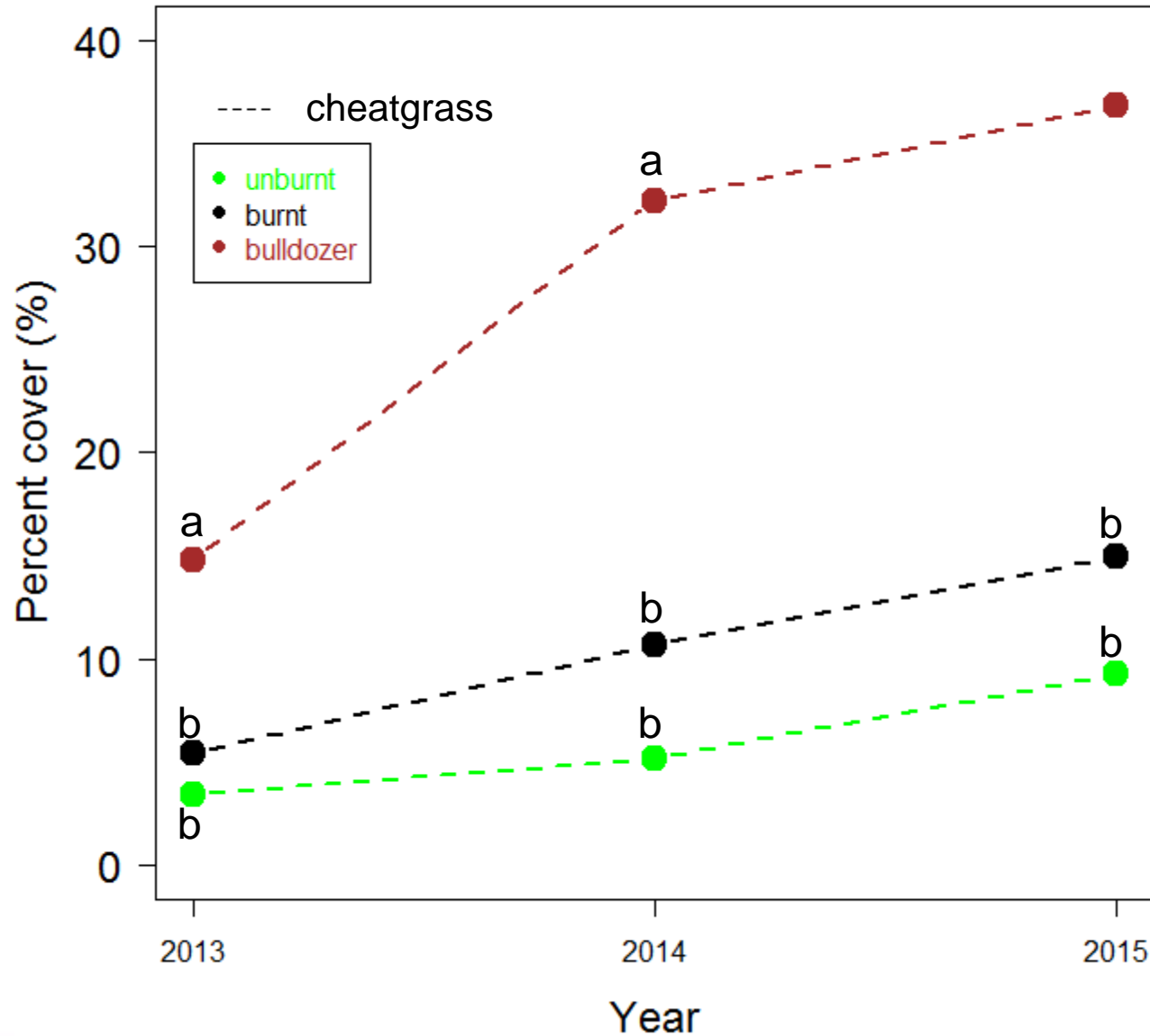


Fire break

Burned

Non-burned

Cheatgrass Cover 1-3 Years Post-Fire





Focus Efforts Here First

- Locations
 - Fuel breaks/fire lines
 - Equipment staging areas
- Actions:
 - Monitor
 - Treat weeds (herbicides, targeted grazing, other)
 - Revegetate

LONG-TERM OUTCOMES OF REVEGETATION

Long-Term Outcomes of Revegetation

- Re-sampled 3 published seeding studies 15 years after seeding
- Wildlife management areas in southwestern Montana
- Invaded by spotted knapweed

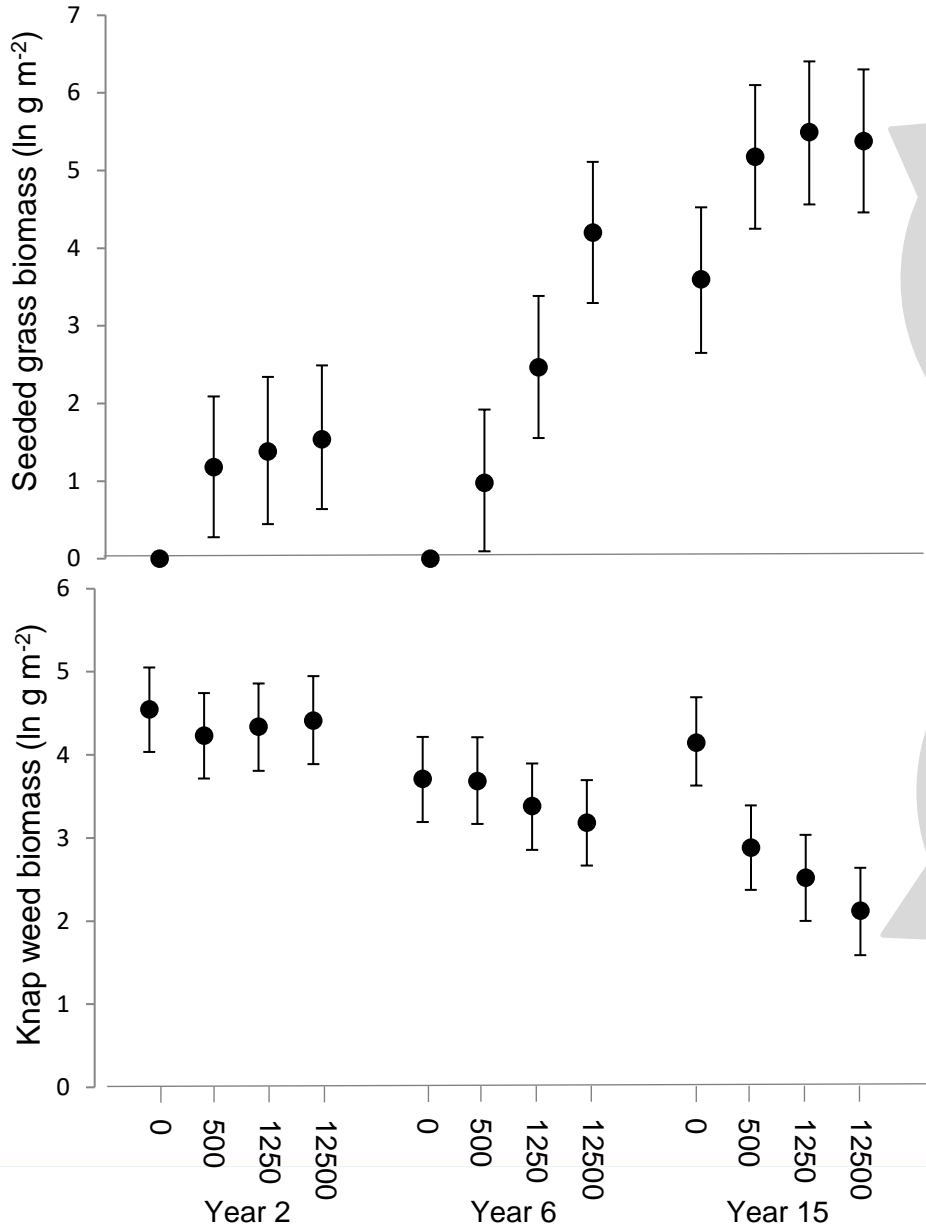


Seeded Grass Reduced Invader



Non-seeded

Seeded



Seeded grass biomass increased from ~26 lb/A in Year 2 to 1760 lb/A in Year 15

Highest seeding rate decreased spotted knapweed biomass by ~86%

Leafy Spurge-Invaded Rangeland

- Southwestern Montana
- Integrated herbicide and seeding
- Sampled 3 and 14 years post-treatment

Seeded grasses increased over time, especially bluebunch wheatgrass



Short term



Long term

Leafy spurge declined over time, regardless of treatments



Seeding grasses, especially bluebunch wheatgrass, reduced “secondary invaders” (cheatgrass, Japanese brome, bulbous bluegrass, Canada bluegrass, spotted knapweed, western salsify)

Rinella et al. 2020. Seeding causes long-term increases in grass forage production in invaded rangelands. *Range Ecol. Manage.* 73:329-333.



Thank you! Questions?
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Ventenata infestation in southeastern Montana