

Long-term Cheatgrass (*Bromus tectorum*) Seedling Reduction with Indaziflam in Sagebrush-Grassland Plant Communities in Sublette County, WY US

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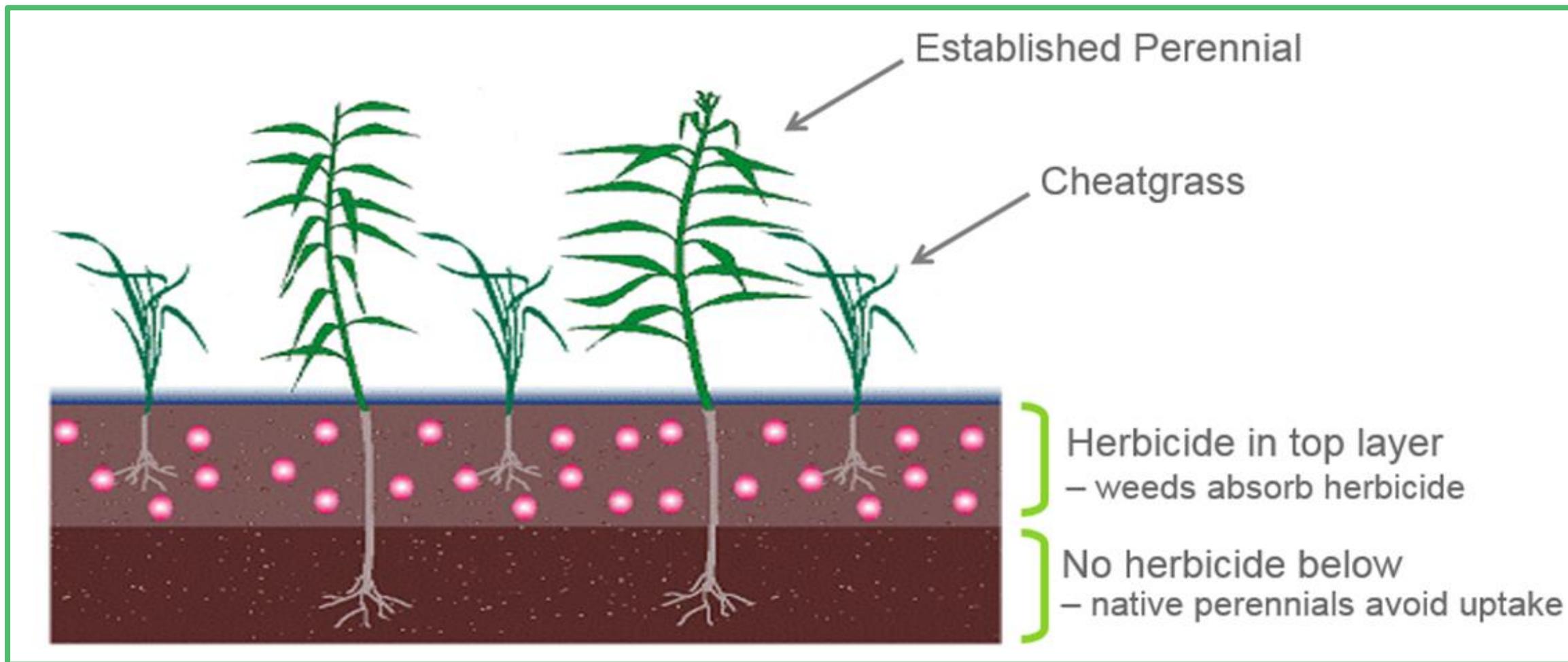
Agenda

- **Background**
- **Project Overview**
- **Results**
 - **Cheatgrass cover and density**
 - **Plant community total and native species richness**
- **Conclusions and Future Directions**

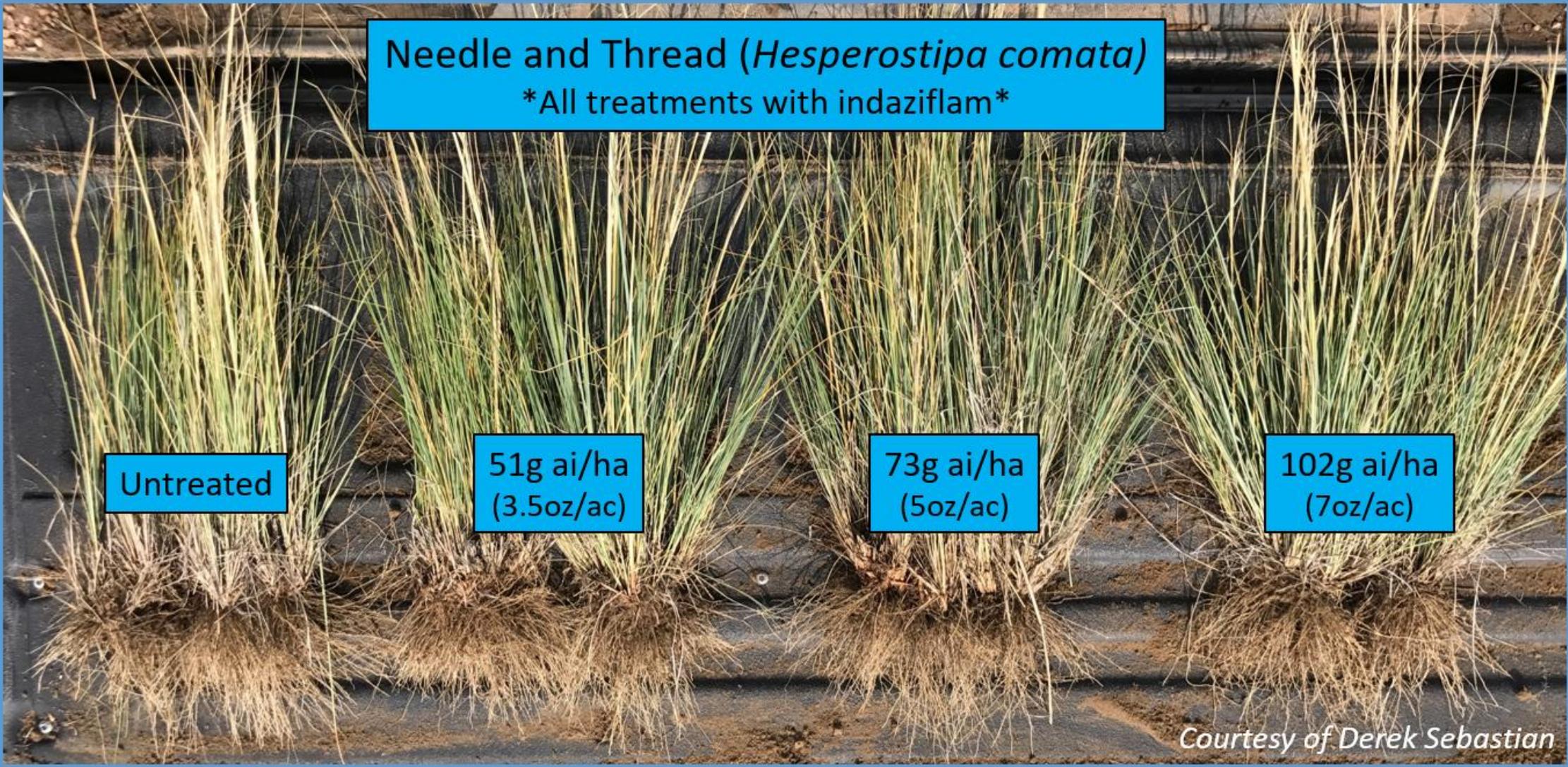




EsplAnade™ 200 SC



Courtesy of Bayer VM



Needle and Thread (*Hesperostipa comata*)
All treatments with indaziflam

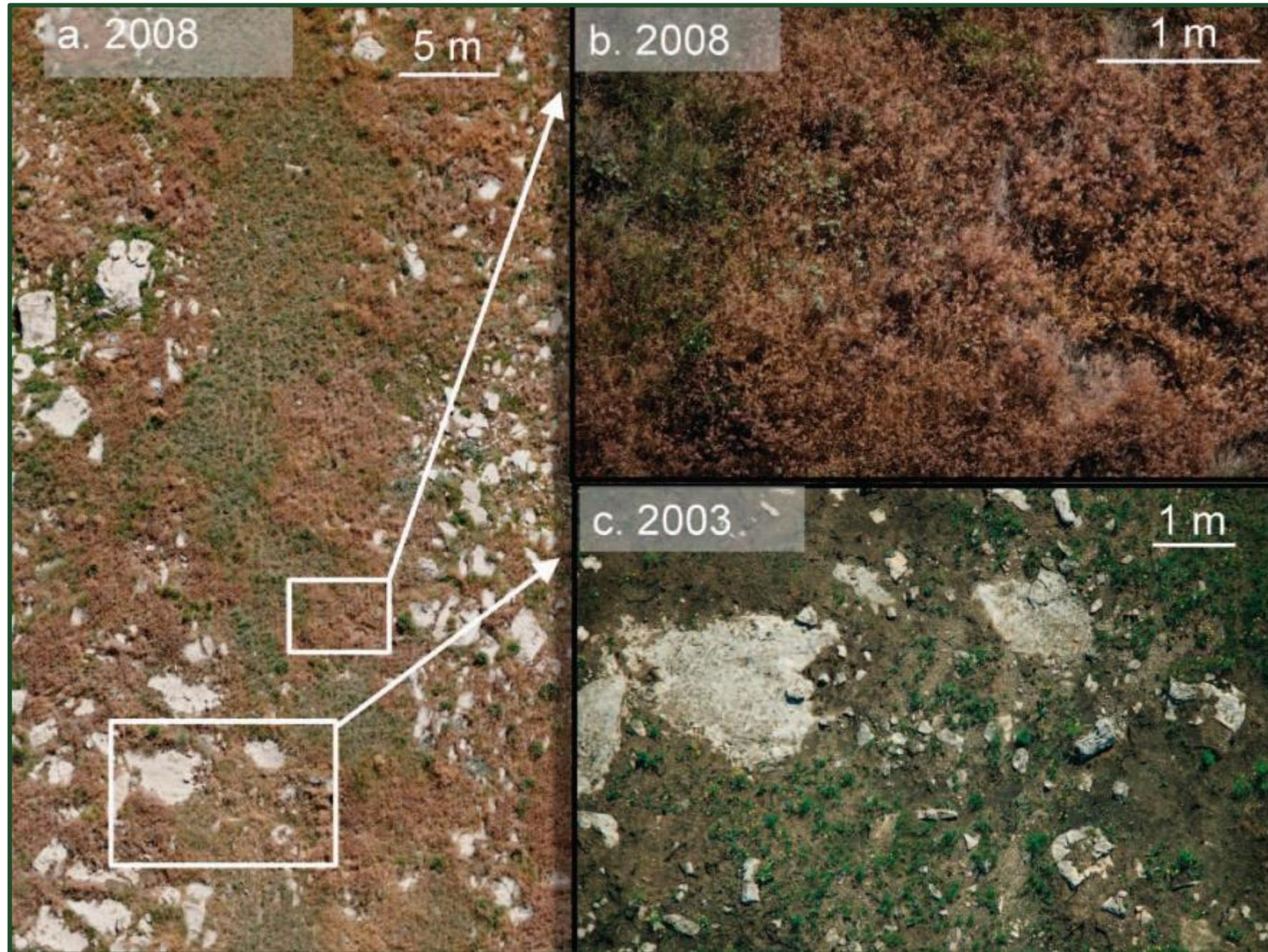
Untreated

51g ai/ha
(3.5oz/ac)

73g ai/ha
(5oz/ac)

102g ai/ha
(7oz/ac)

Courtesy of Derek Sebastian



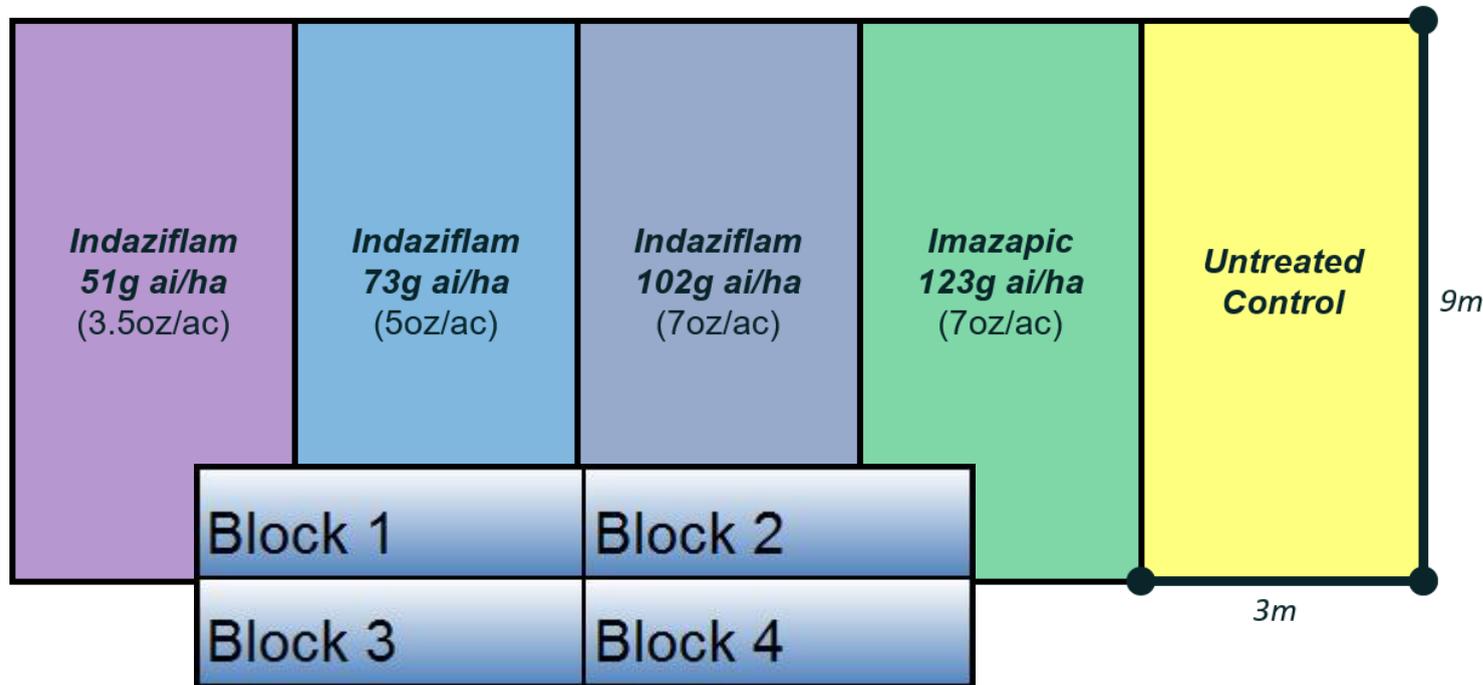
From Meador, Cox, and Booth 2012

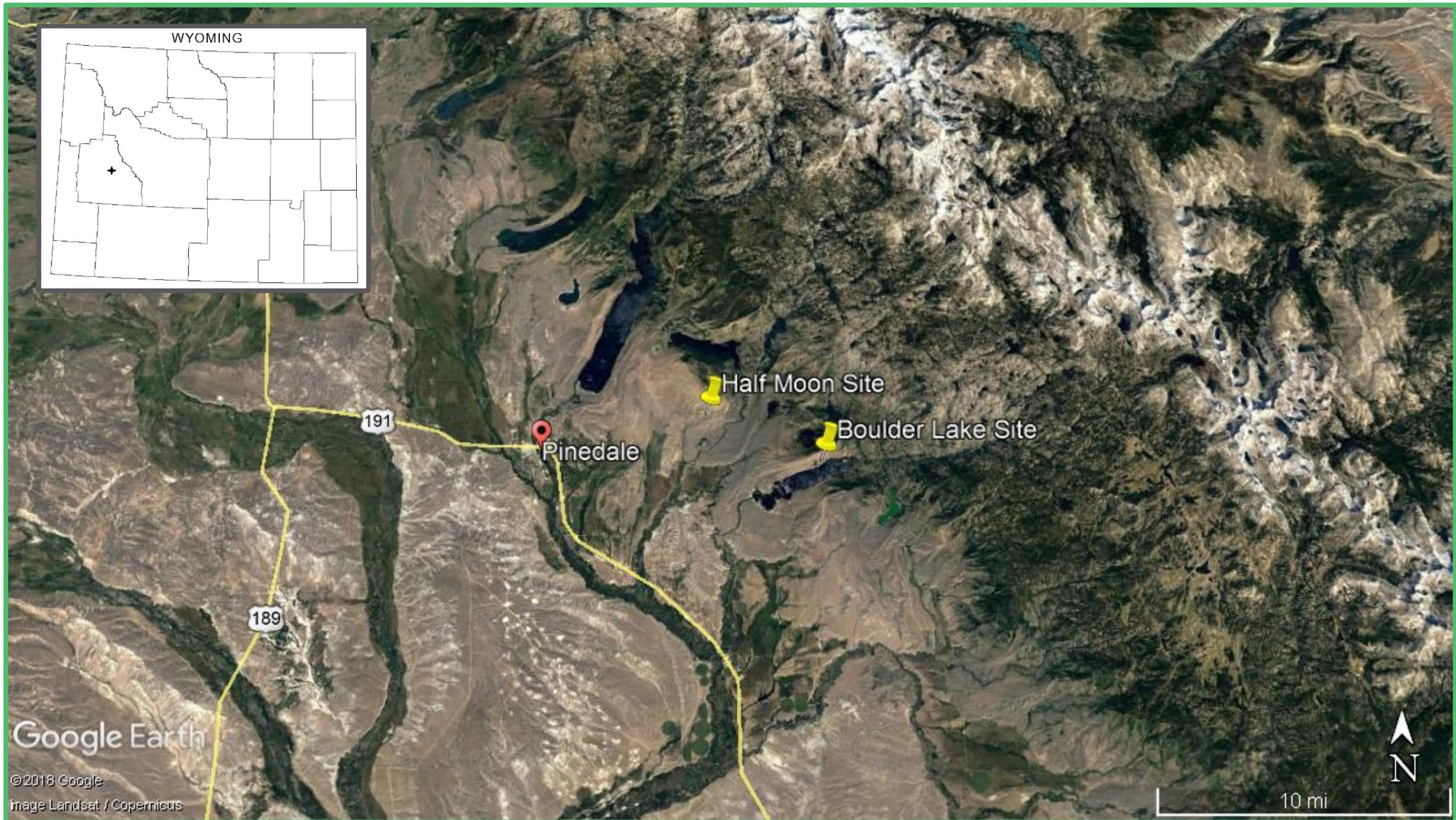
***Cheatgrass Seedling Reduction for
the Restoration of Native
Sagebrush-Grassland Plant
Communities***



Objective 1: Identify an effective long-term, ground applied herbicide treatment to selectively reduce invasive annual grass abundance while minimizing harm to established native plants.

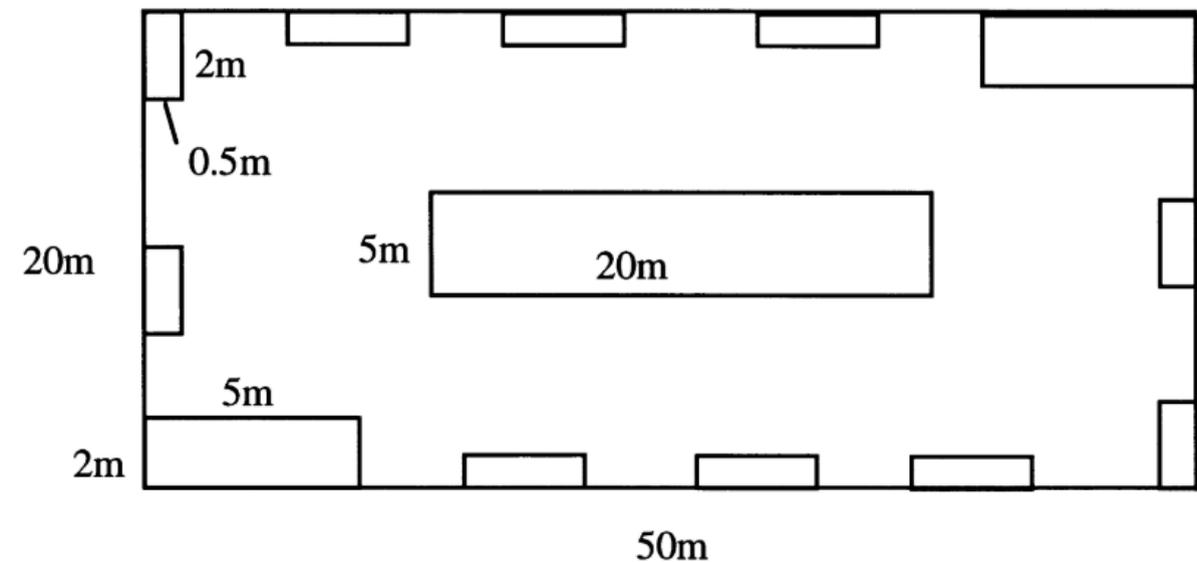
- Four randomized repetitions of herbicide treatments and untreated controls at two different sites (Boulder and Half Moon)
- Herbicide treatments include: Esplanade® (Bayer) at 51, 73 and 102g ai/ha, and Plateau® (BASF) at 123g ai/ha
- Canopy cover and cheatgrass density sampled using five randomly located Extended Daubenmire frames (0.5 meters) per plot





Objective 2: Determine the effectiveness of aerial applications of 73 g ai/ha of indaziflam to selectively reduce invasive annual grass abundance while maintaining or increasing the abundance of established native plants.

- 4 two-hectare aerial treatments and controls at Boulder Lake site
- Helicopter application of Esplanade® at 73 g ai/ha Sampled in the same manner as small plots and with Modified-Whittaker multiscale vegetation plots
- All treatments (small and aerial plots) applied fall 2016 and sampled 2017-2019

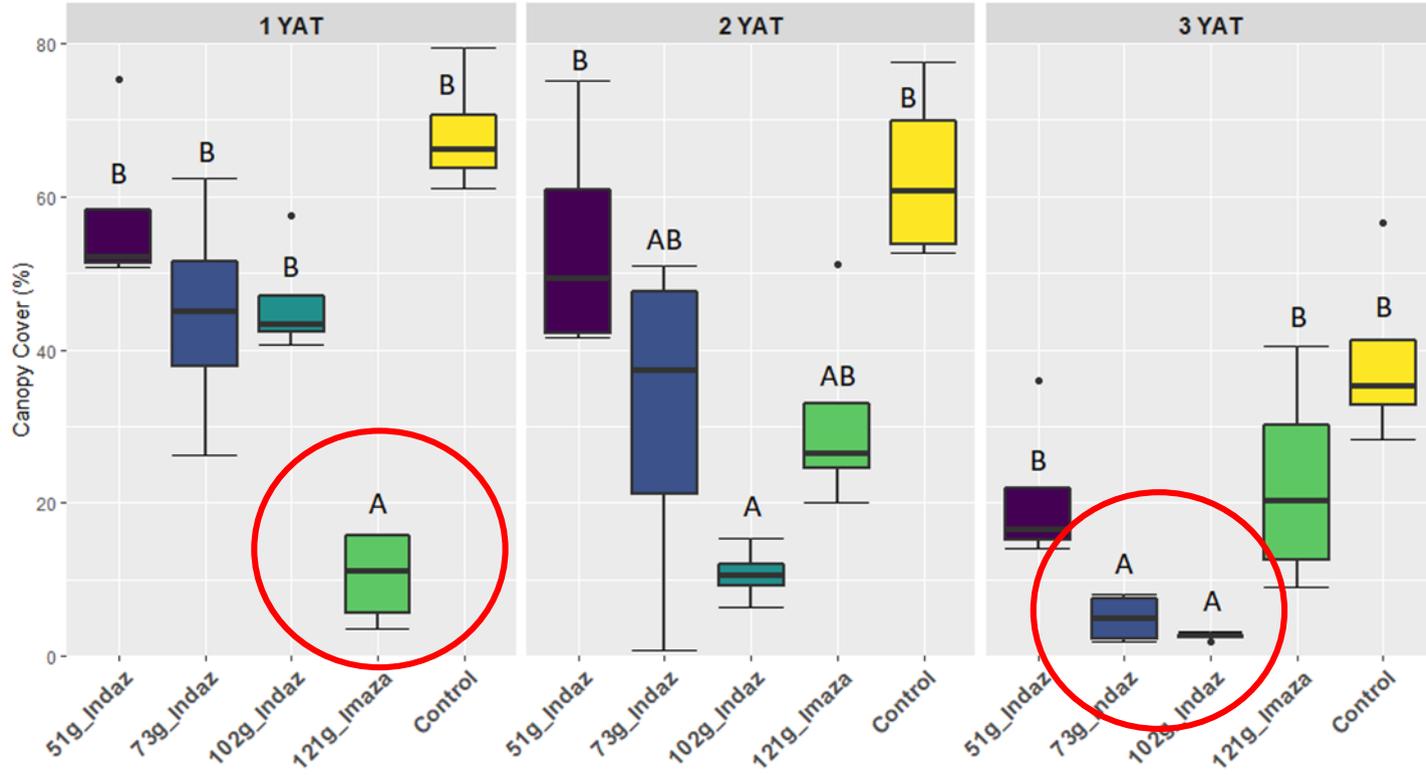


From Stohlgren et al. 1997



Boulder Lake - Downy Brome Cover

Data from small plots (4 replicates), significance refers to within year ANOVA with post-hoc pairwise Tukey HSD

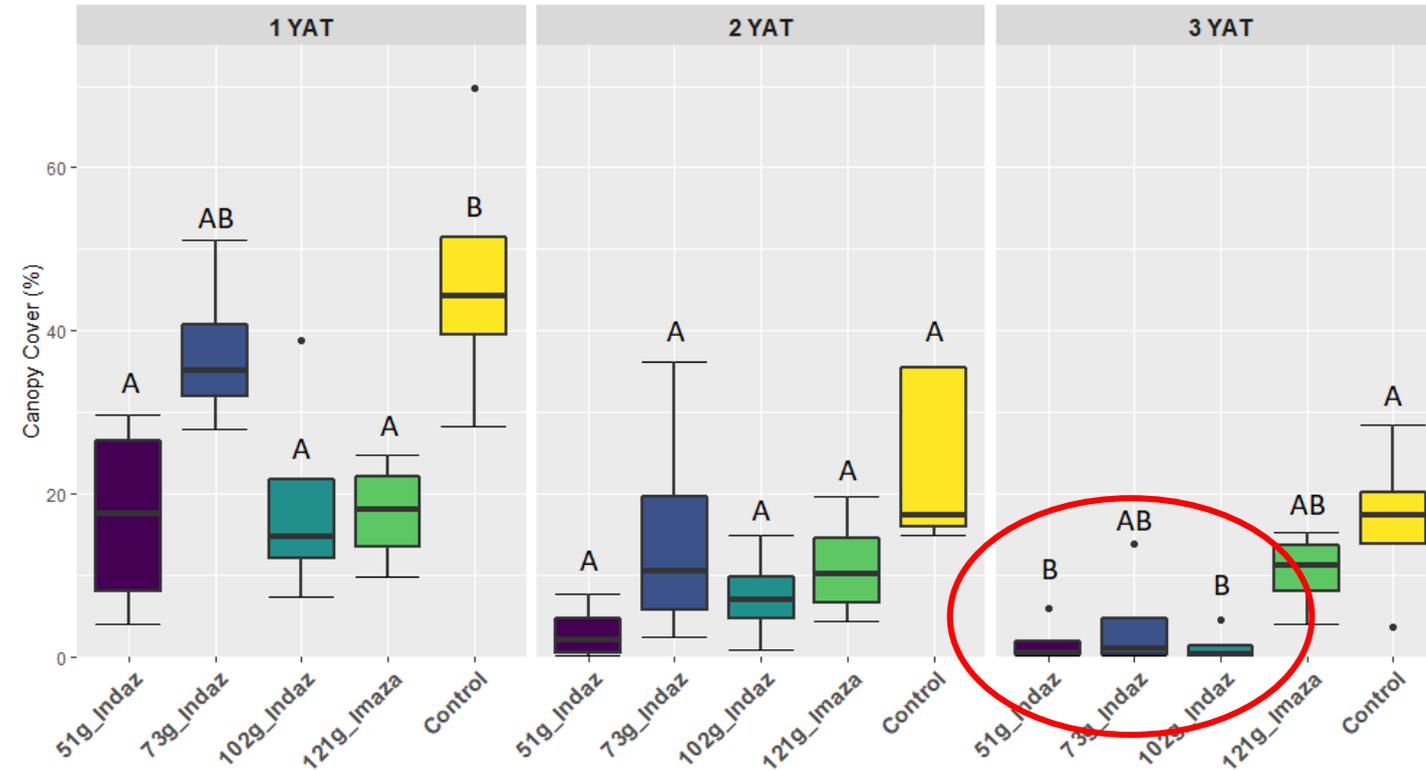


Only Esplanade treatments remain significant 3 YAT

Plateau outperformed Esplanade 1 YAT at Boulder Lake

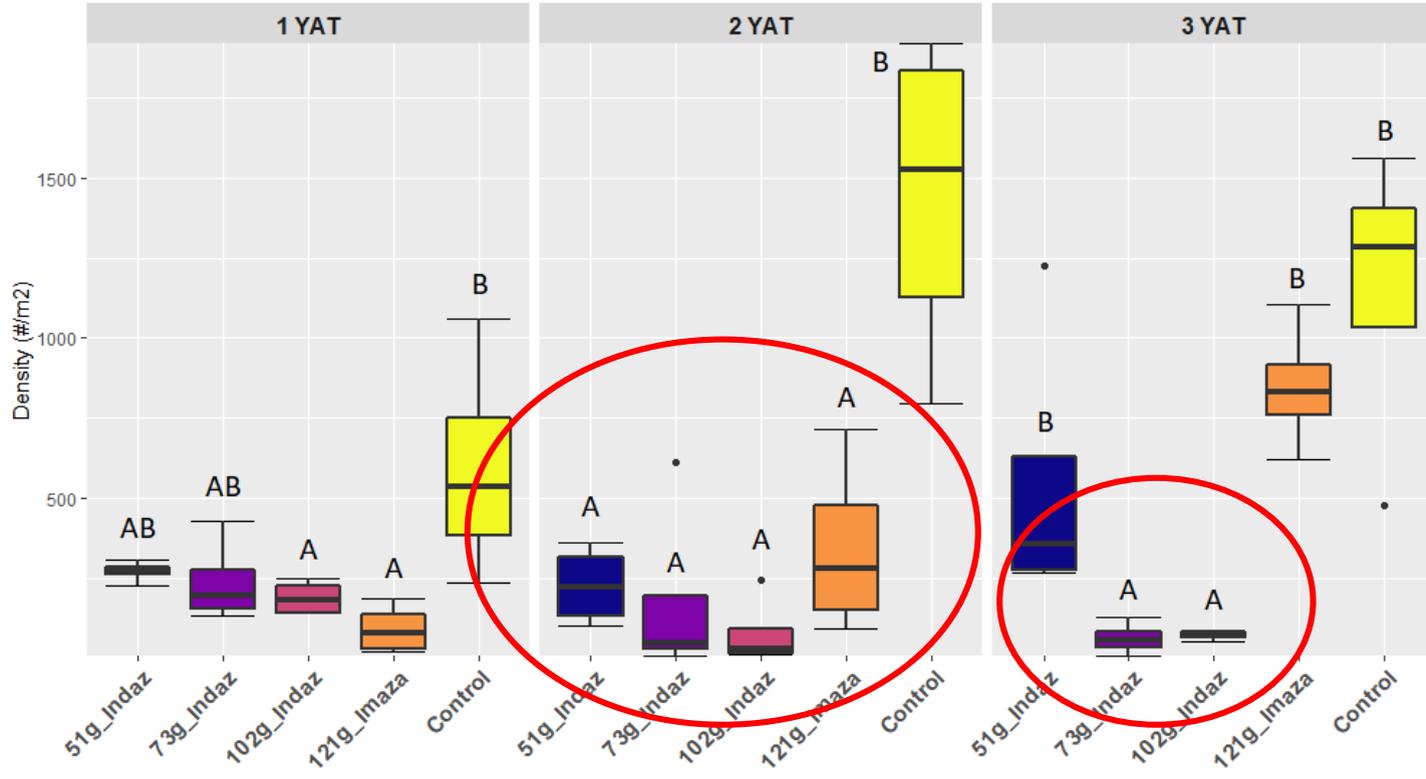
Half Moon - Downy Brome Cover

Data from small plots (4 replicates), significance refers to within year ANOVA with post-hoc pairwise Tukey HSD



Boulder Lake - Downy Brome Density

Data from small plots (4 replicates), significance refers to within year ANOVA with post-hoc pairwise Tukey HSD

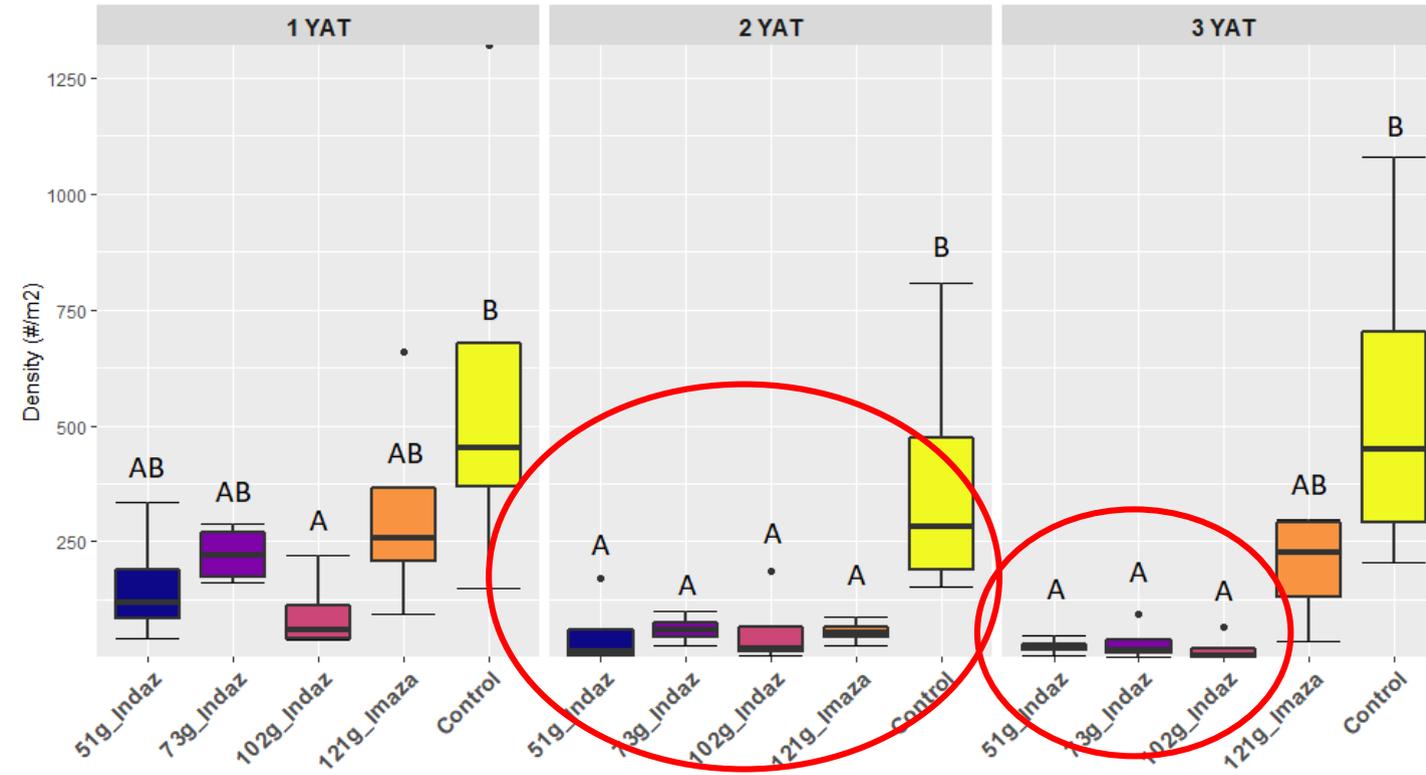


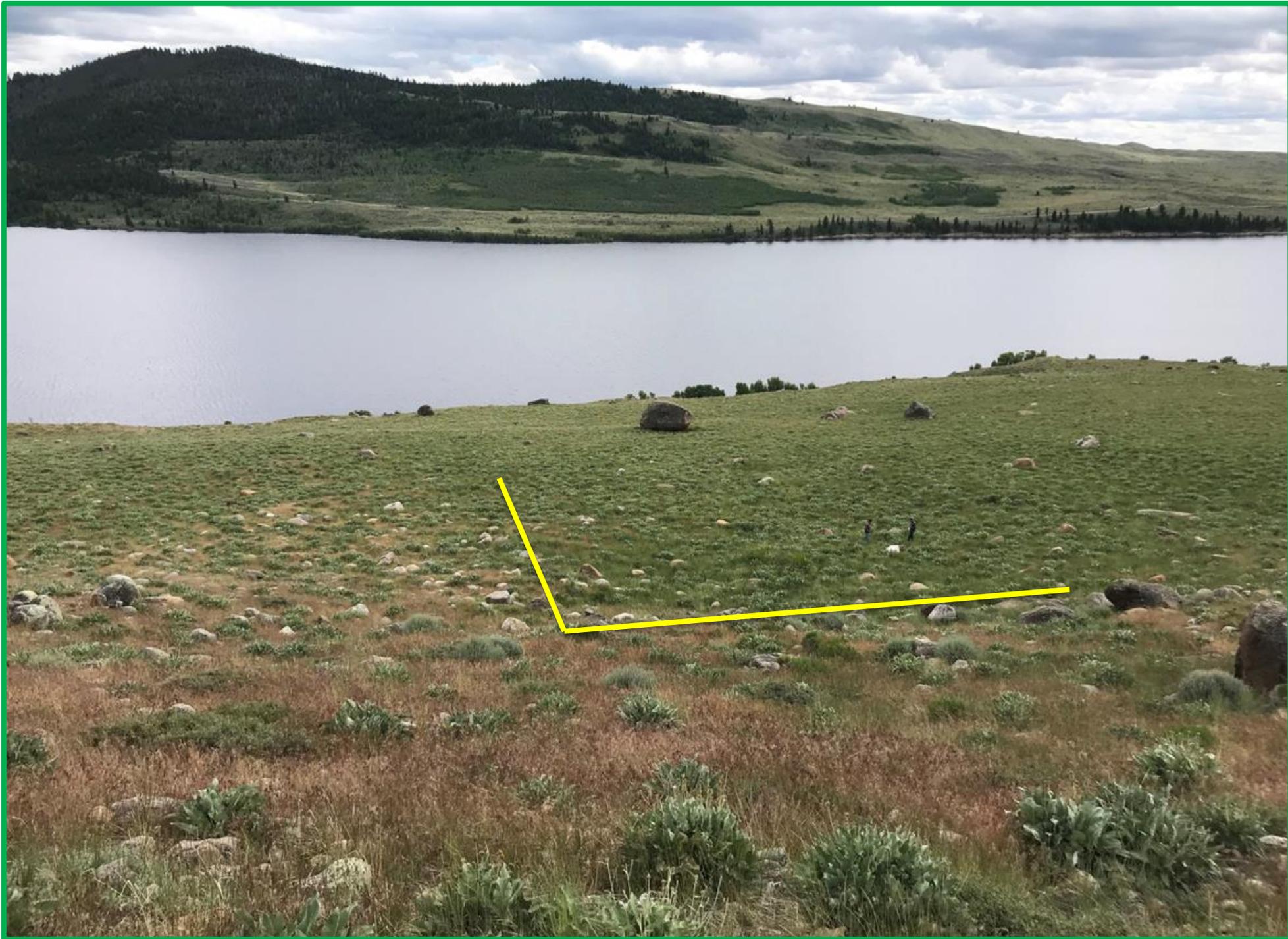
Only Esplanade treatments remain significant 3 YAT

All treatments result in significant density reductions 2 YAT

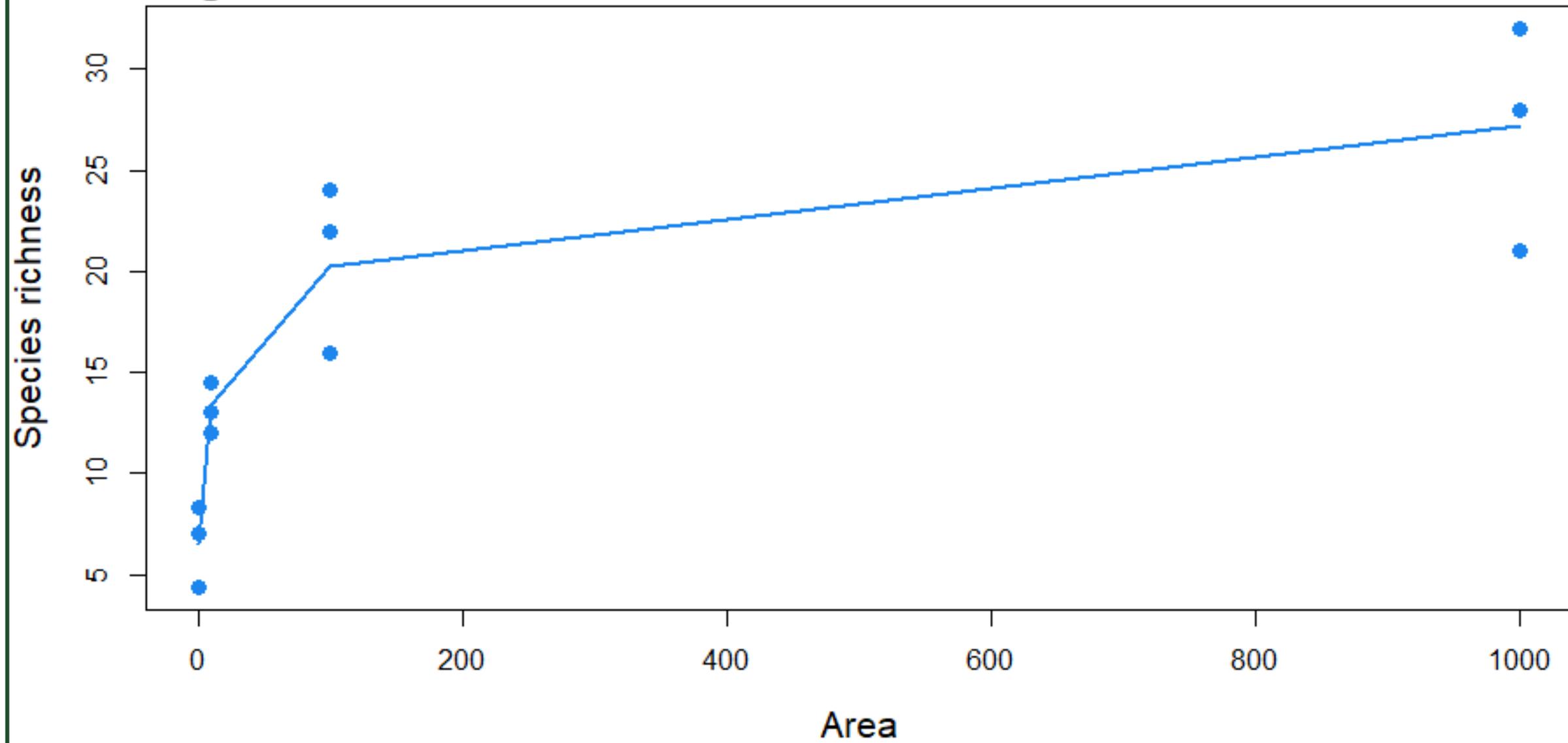
Half Moon - Downy Brome Density

Data from small plots (4 replicates), significance refers to within year ANOVA with post-hoc pairwise Tukey HSD



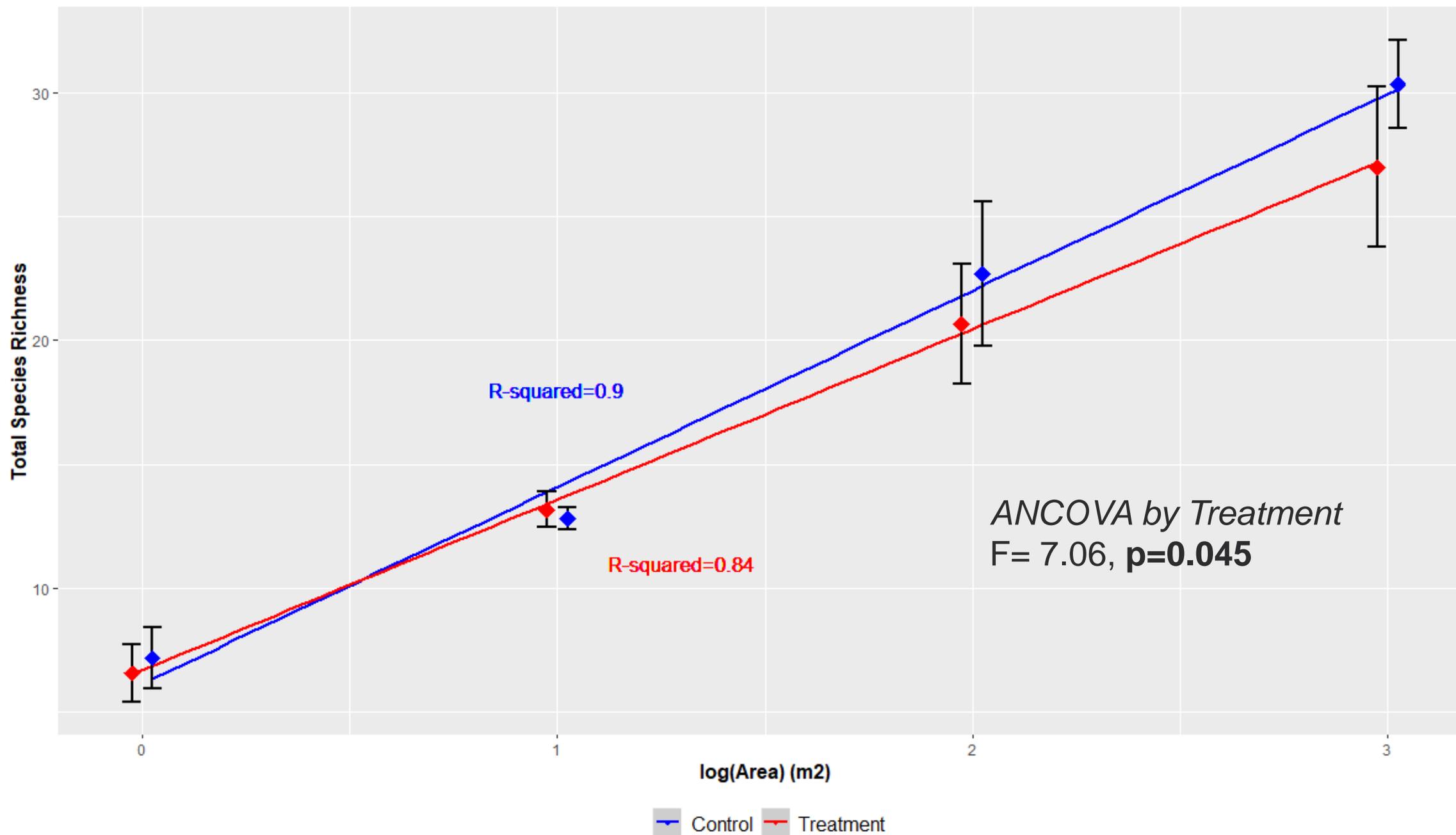


Logarithmic



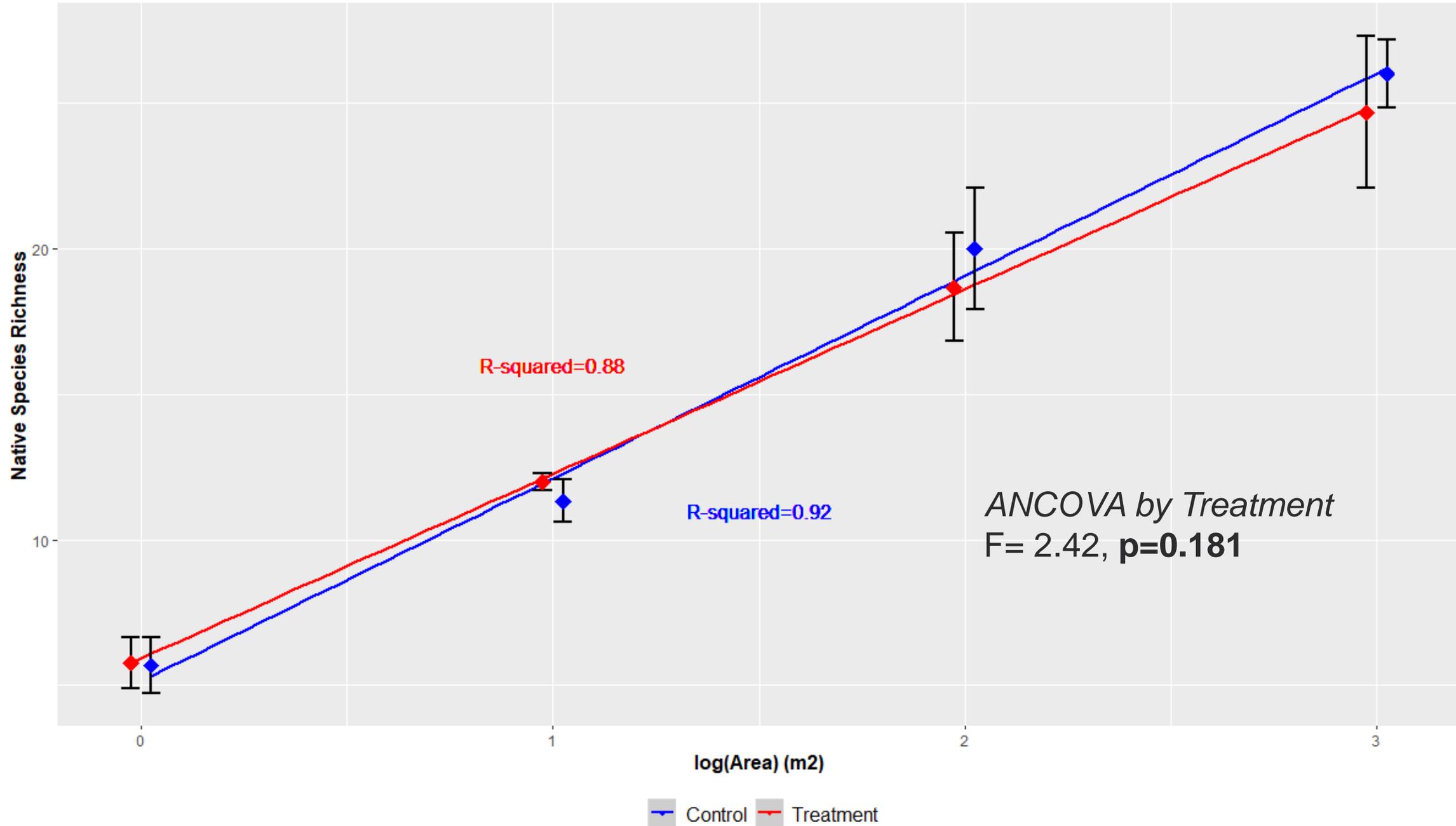
Boulder Lake Total Species-Accumulation Models

Treatment=indaziflam 73g ai/ha applied aerially Sept 2016, points represent actual richness (+/- 1 SE), lines represent fitted logarithmic models ($S=c+z*\log(\text{Area})$)

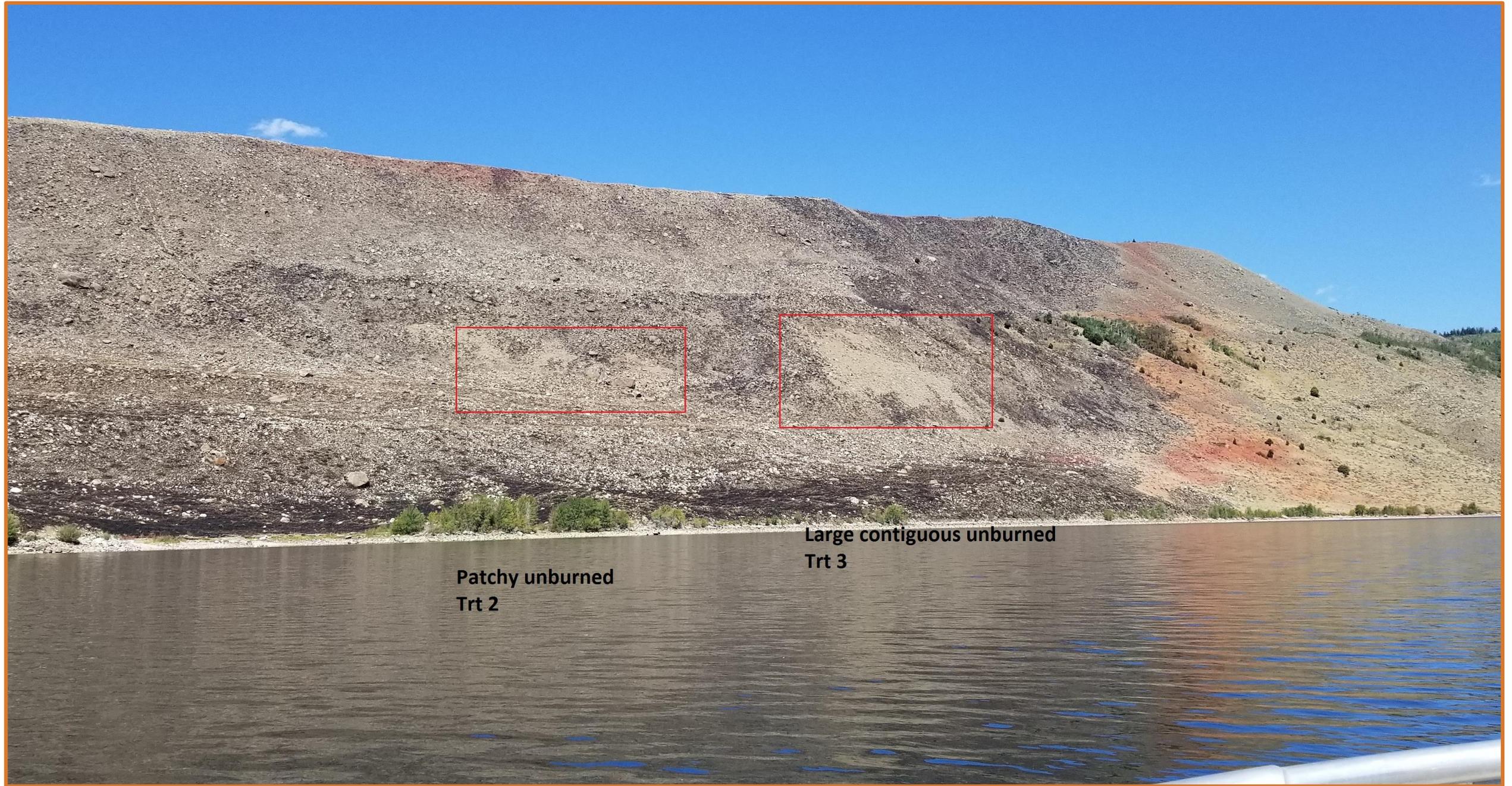


Boulder Lake Native Species-Accumulation Models

Treatment=indaziflam 73g ai/ha applied aerially Sept 2016, points represent actual richness (+/- 1 SE), lines represent fitted logarithmic models ($S=c+z*\log(\text{Area})$)

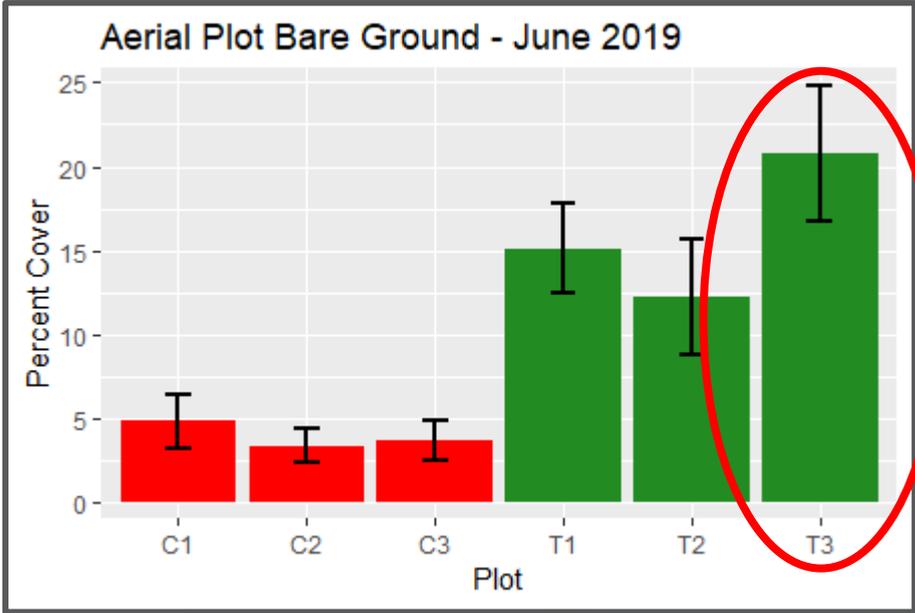






Patchy unburned
Trt 2

Large contiguous unburned
Trt 3





Photos taken in Boulder Lake aerial treatment and control plots 3 YAT and approximately 6 weeks prior to wildfire

Tentative Conclusions and next steps...

Tentative conclusions...

- Imazapic and indaziflam are comparable up to 2 years after treatment in terms of reducing cheatgrass cover and density, and in some cases imazapic outperforms indaziflam in the first year following treatment;
- Three years after treatment, reductions remain significant only in indaziflam treatments (especially the 5 and 7oz/ac rates);
- Aerial treatment reduced total plant species richness in the at Boulder Lake, but not native species richness three years after treatment;
- Aerial treatment appears to have influenced fire behavior 3 years after treatment, possibly by increasing bare ground.

Next steps...

- Possible retreatment this summer and continued sampling out to 5 YAT
- New treatments in the burned area
- Seed bank study



Questions?

Thank you

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