



Photo: Jacey Bell



Long-term efficacy of glyphosate for smooth brome control in native prairie

By Jessica Slopek

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Current Status of Native Prairie

- Estimated that roughly 26.6% of mixed grass prairie and less than 5% of fescue prairie remain in Saskatchewan (Thorpe and Godwin, 2009 and Grilz and Romo, 1994)
- Invasive species, including invasive forage grasses, pose a threat to native prairie diversity
- Control methods for invasive species are needed to maintain the health and functioning of grassland ecosystems

Smooth Brome (*Bromus inermis* Leyss.)

- Initially introduced to Canada as a tame forage grass
- Aggressive below-and-above-ground competitor
 - Extensive underground root system
 - Prolific seed producer
- Species of national concern and a serious invader of grasslands (Haber, 1996)



Herbicide Usage

- Glyphosate (N-(Phosphonomethyl)glycine) is commonly used for grassland management
- Rapid translocation through plant tissue, low mobility in soil, low toxicity for wildlife
- Broad-spectrum, non-target

Objectives

1. Assess the long-term effectiveness of spot-spraying glyphosate as a control method for smooth brome control in native prairie
2. Evaluate subsequent recovery of native prairie plant species at Kernan Prairie



Study Site



Current Management Strategies

- Occasional controlled burns
- Annual light grazing since 2009



Photo: Amanda Guy

Experimental Design

- Between 1999 and 2000, 40 patches of smooth brome were selected and monitored for 17 years
- Selected patches were 6-8m in diameter and percent cover was estimated to be between 85-95%
- Smooth brome patches were spot sprayed with a 10% glyphosate solution

Data Collection

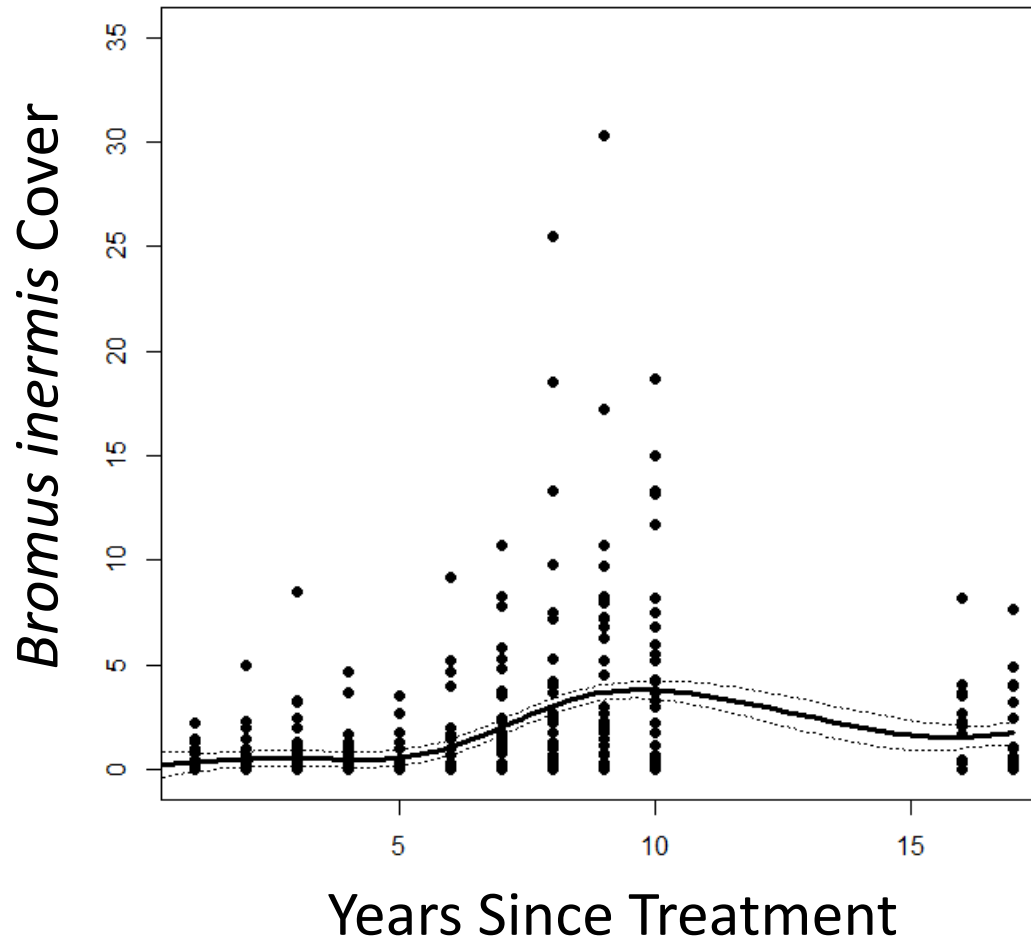
- Three permanent parallel transects were placed across each patch
- A 20x50cm quadrat was placed at 1m intervals to assess species composition



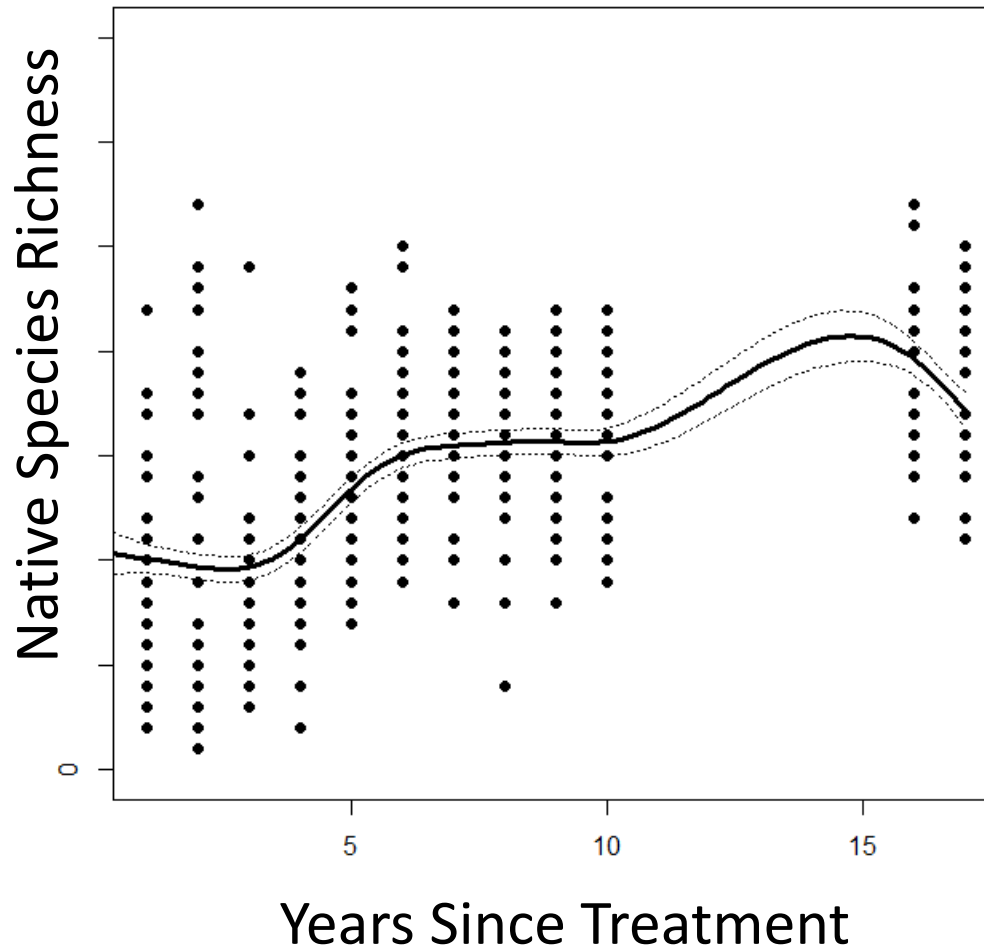
Data Analysis

- R statistical package was used to examine how plant abundance and plant community structure changed with time post glyphosate treatment
- Models were fit using the generalized additive model (GAM) function in the mgvc library of R (Wood, 2006)

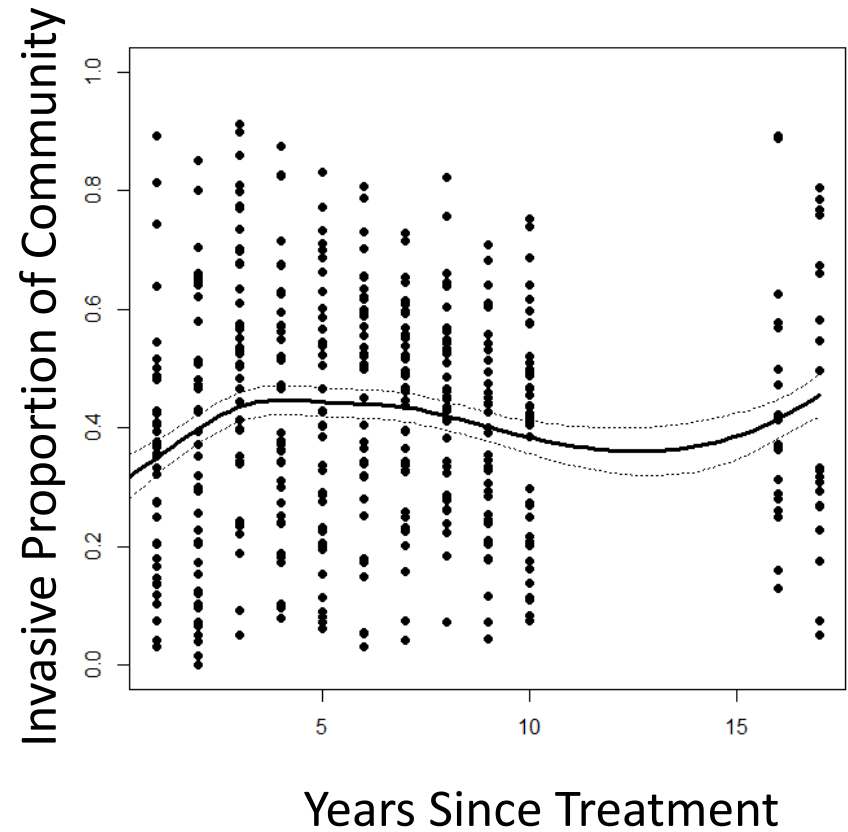
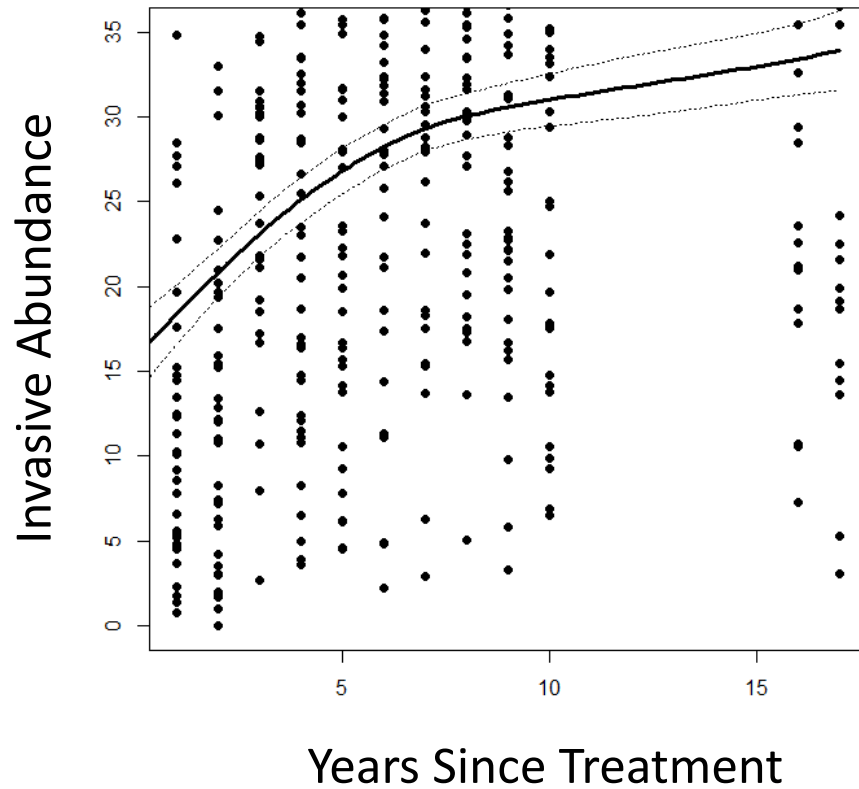
Results: Smooth Brome



Results: Native Species Richness



Results: Invasive Abundance and Invasive Proportion of Community

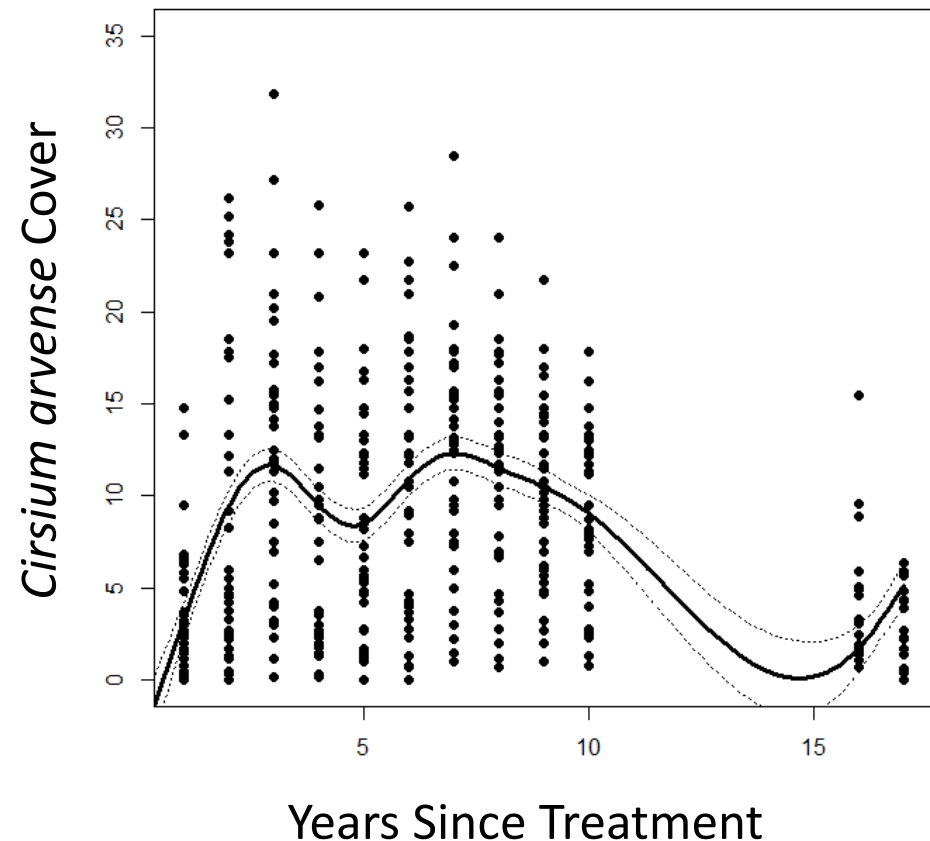


Results: Invasive Species of Concern



http://www.saskwildflower.ca/nat_Cirsium%20arvense.html

Canada Thistle

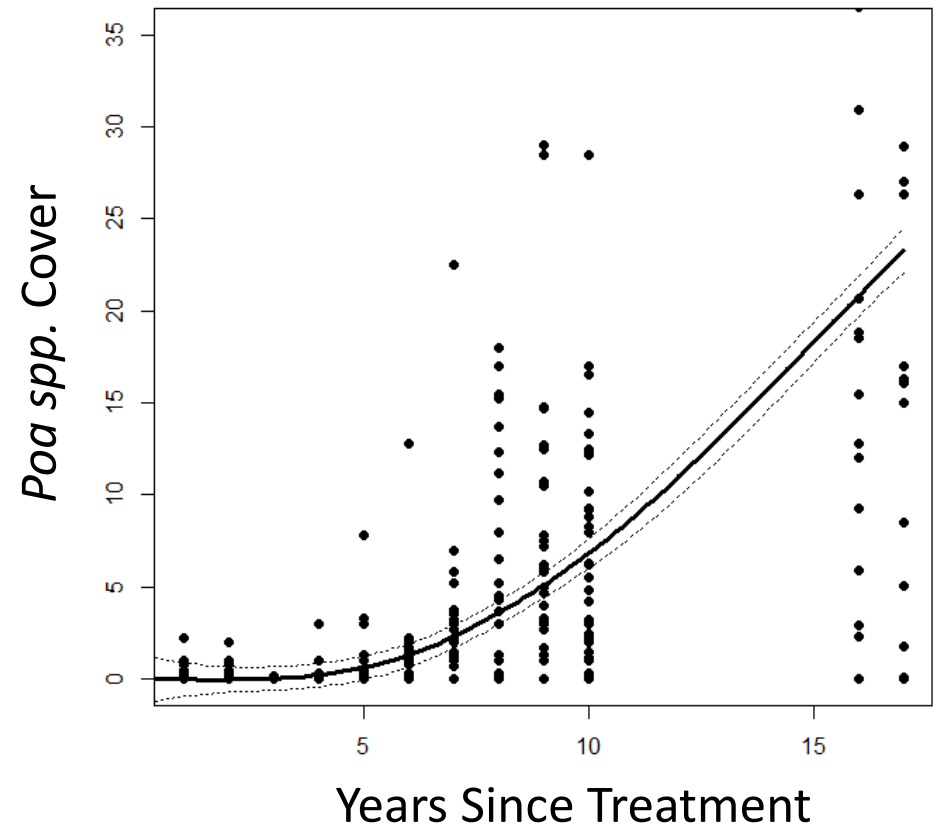


Results: Invasive Species of Concern

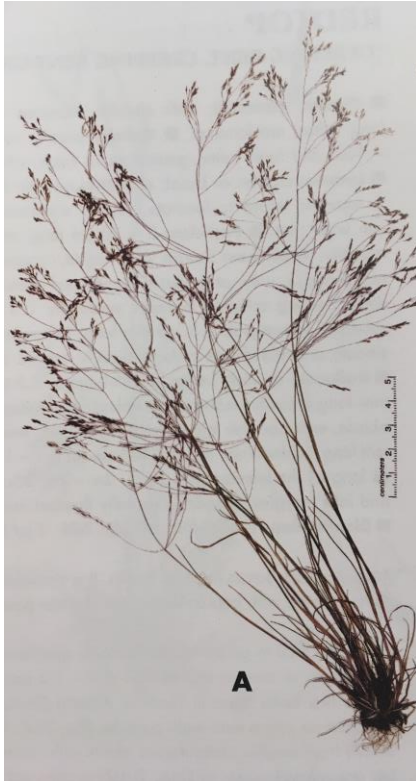


(Leighton and Harms, 2014)

Kentucky Bluegrass

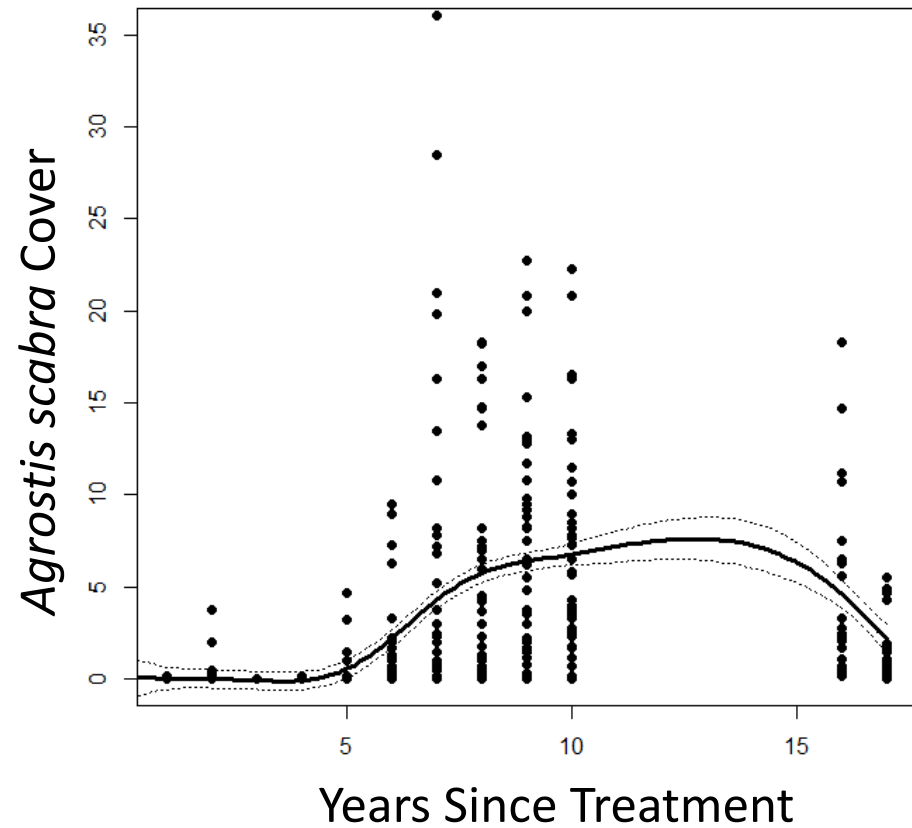


Results: Native Species of Concern



(Leighton and Harms, 2014)

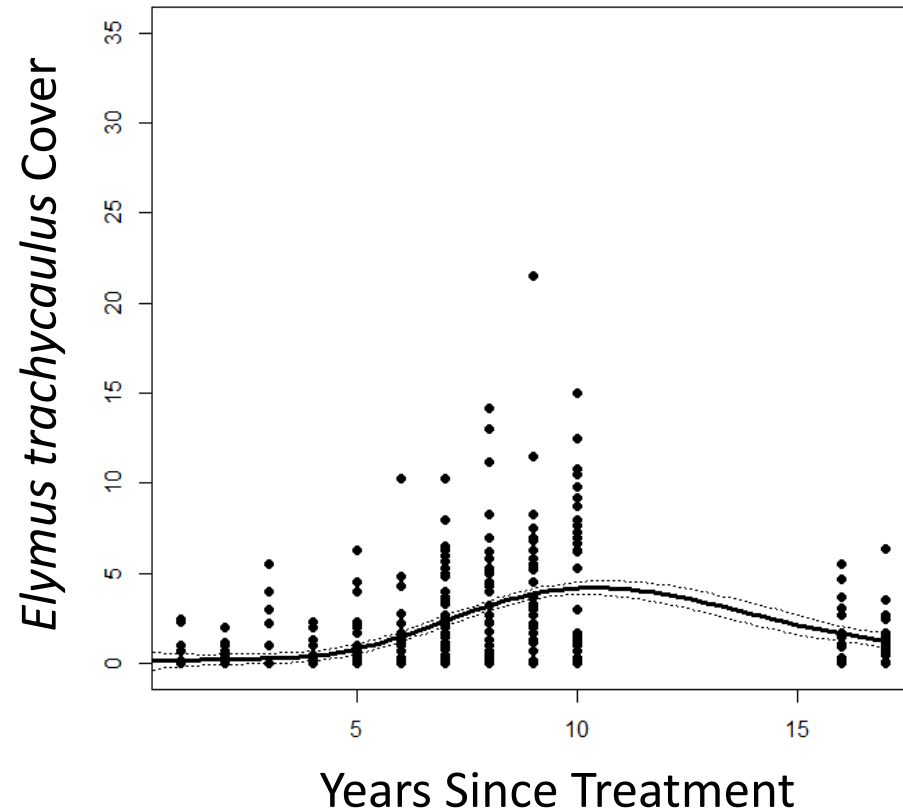
Rough Bent-grass



Results: Native Species of Concern



(Leighton and Harms, 2014)



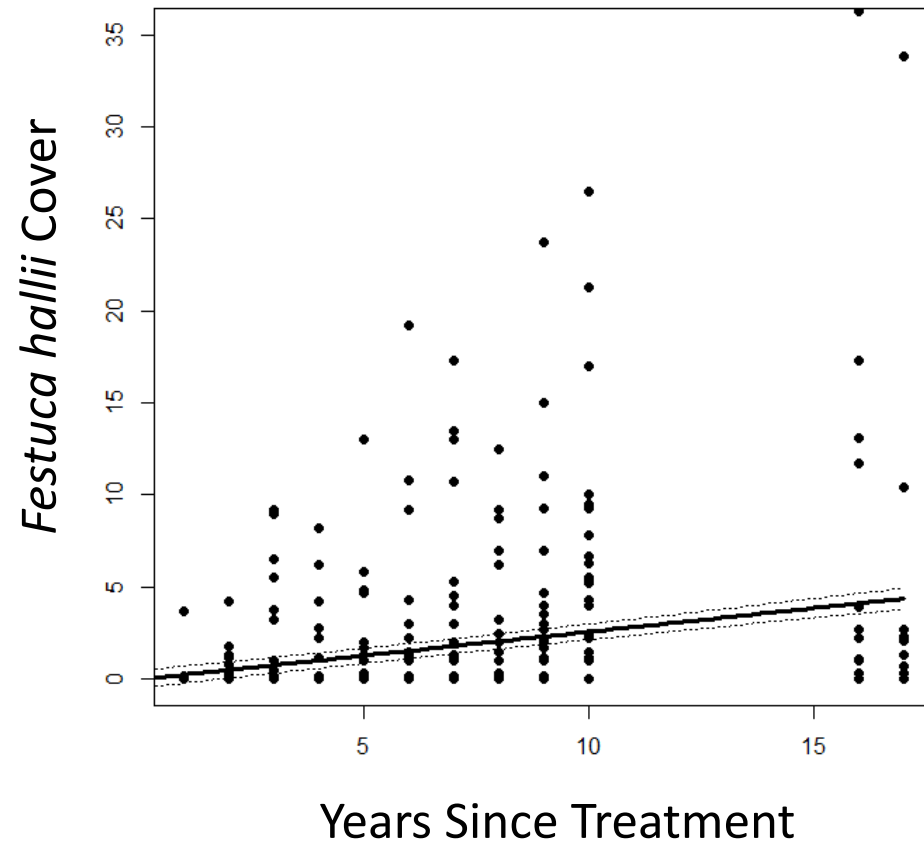
Slender Wheatgrass

Results: Native Species of Concern



(Leighton and Harms, 2014)

Plains Rough Fescue



Conclusions

1. Spot application of glyphosate is an effective control method for reducing smooth brome in native prairie
2. Short – medium time scale community recovery occurred
3. Long-term native prairie recovery may depend on external factors such as invasive species



Recommendations for Management

- Continuous follow-up monitoring should take place
- An increase in the abundance of smooth brome following initial treatment should be addressed with subsequent suppression treatments (Grilz and Romo, 1995)



Photo: Amanda Guy

References

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Questions?



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