Persistence of Invasive Species Over Time in Prairie Reconstructions

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Jennifer Larson
- Polistes Foundation
Acknowledgments

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Objectives

• How pervasive are exotic species over time in reconstructed prairies?
  – Is this a function of planting methods or seed mix richness?
• Are some exotic species more persistent than others?
  – Is this a function of the composition of the planted species?
Primary questions

• What do we really need to worry about?
• What will take care of itself over time?
Treatments: Planted in 2005

Methods
• Dormant-season broadcast
• Growing-season broadcast
• Growing-season drill

Seed mixes
• Extra-high diversity (57 spp) Iowa only
• High diversity (34 spp)
• Medium diversity (20 spp)
• Low diversity (10 spp)

Planting method and seed mix treatments were fully crossed in a completely randomized design with 12 replicates on each of 6 fields in Minnesota and 3 fields in Iowa.

We planted 420 seeds/m².

Between 2010 and 2015 one field (Meadows) was partly converted to a wetland restoration so was removed from the study.
Guild proportions in seed mixes

- Warm-season (C₄) grasses: 50% (13% in extra-high)
  - *Big bluestem, little bluestem, side-oats grama…*
- Cool-season (C₃) grasses: 20% (5% in extra-high)
  - *Canada wildrye, green needlegrass…*
- Perennial forbs: 20% (68% in extra-high)
  - *Sunflower, beebalm, milkweed…*
- Legumes: 10% (13% in extra-high)
  - *Purple prairie clover, roundhead lespedeza…*
Exotic species cover as a function of planting method

Minnesota

Iowa (low, medium & high only)

DB = dormant season broadcast, GB = growing season broadcast, GD = growing season drilled
Exotic cover

- Dormant broadcast typically had least exotic cover in Minnesota plots, but all the same 2010-15
- Growing-season drill typically had least in Iowa plots, persisting through 2010-15
Trends in extent of noxious or problematic species

Minnesota

Iowa (low, medium, high only)

Larson et al. 2017 Restoration Ecology
Poa and Bromus

• Clear change in rate of spread for Poa in Minnesota in 2006-2007, Bromus in 2010
• Steady increases in Iowa
### Cover of *Cirsium arvense* (MN)

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<tr>
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![Graph showing cover of *Cirsium arvense* (MN)](image-url)
## Cover of *Poa pratensis* (MN)

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![Graph showing cover of *Poa pratensis* over years with significant interaction effect highlighted]
## Effect of the seed mix on exotic cover, Iowa sites

Drobney et al., submitted.

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Exotic species cover as a function of seed mix richness: Iowa

Drobney et al., submitted.
Trends in cover of noxious/problematic species by seed mix richness: Iowa

Drobney et al., submitted.
Take-home Messages

• Exotic forbs tended to peak early, then decline
  – More so in higher diversity plantings

• Cool-season exotic grasses show no evidence of decline
  – May be useful to look at what happened at inflection points on the graph (weather, management actions, etc.)
It’s not just *what* you know
It’s not just *what* you know

It’s *when* you know it!
Thank you!

Questions? dlarson@usgs.gov