USING PAST SEEDING TREATMENTS TO INFORM FUTURE SOURCING IN THE COLORADO PLATEAU

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MANY THINGS INFLUENCE SEEDING OUTCOMES

- Management
  - Composition, diversity, and source of plant species used
  - Propagule type used, timing and method of application
  - Invasive species control
  - Use of prescribed disturbances (e.g., fire, grazing)
- Site-specific and temporal factors
  - Land use history
  - Composition of surrounding landscape
  - Weather

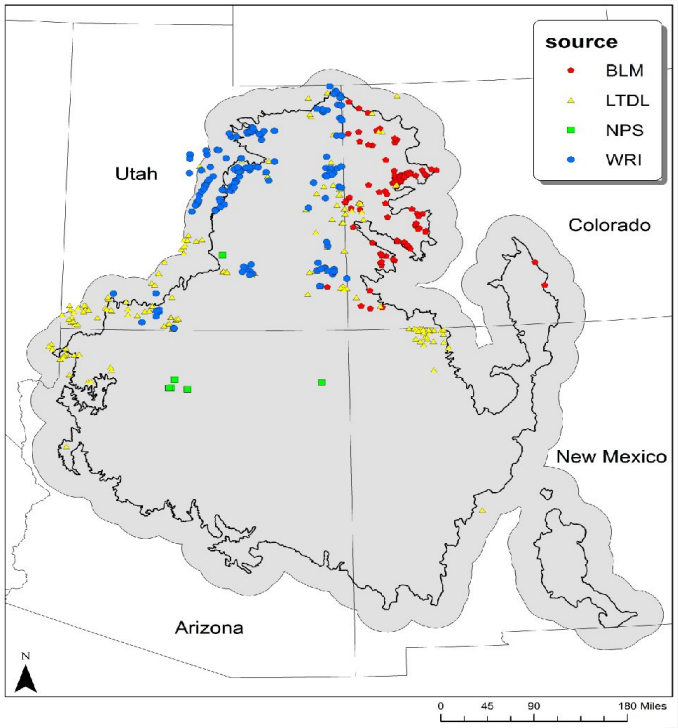
Knutson et al. 2014. Long-term effects of seeding after wildfire on vegetation in Great Basin shrubland ecosystems. Journal of Applied Ecology **51**:1414-1424.

Grman et al. 2013. Confronting contingency in restoration: management and site history determine outcomes of assembling prairies, but site characteristics and landscape context have little effect. Journal of Applied Ecology **50**:1234-1243.

COLORADO PLATEAU RESTORATION OUTCOMES DATABASE (CPROD)

Compile seeding treatment data (incl species & sources) & pre- and post-treatment monitoring data

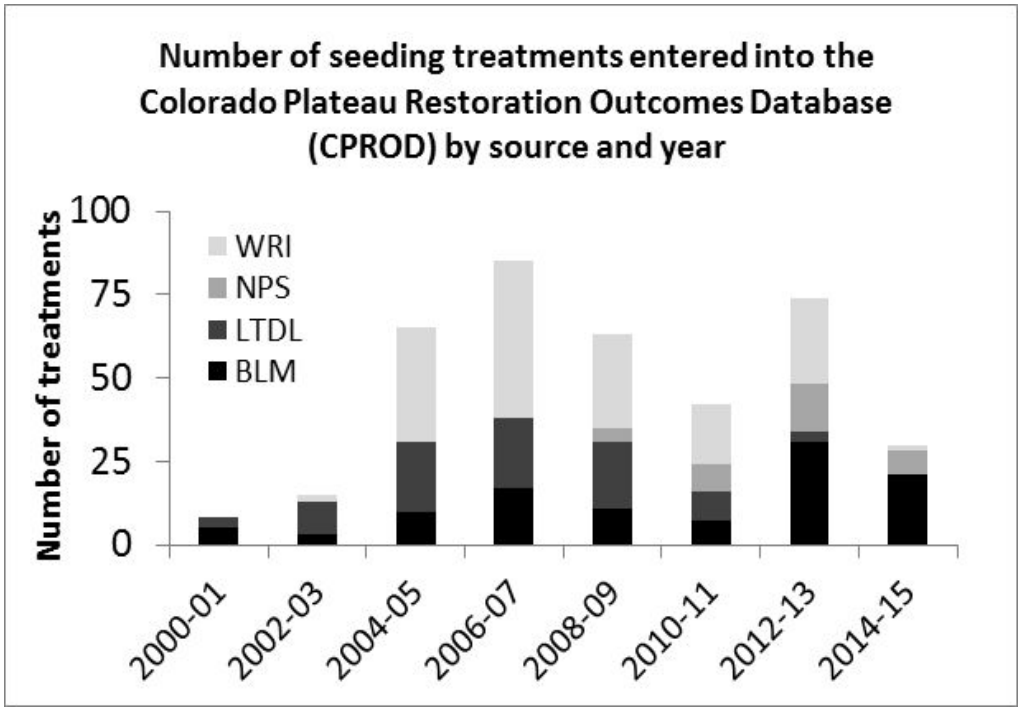
- WRI = Utah Watershed Restoration Initiative (WRI) incl monitoring data from Utah Division of Wildlife Resources Range Trend Project
- LTDL = USGS Land Treatment Digital Library
- NPS = National Park Service
- BLM = Bureau of Land Management field offices



669 seeding treatments applied between 2000 and 2015

88 well pad
190 post-fire
391 other

COLORADO PLATEAU RESTORATION OUTCOMES DATABASE (CPROD)

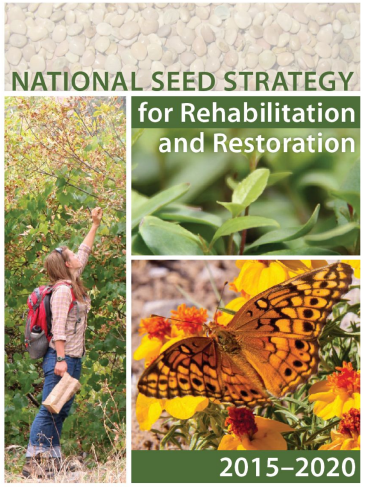


CONTRIBUTIONS TO THE SEED STRATEGY

Goal 1: Identify seed needs, and ensure the reliable availability of genetically appropriate seeds.

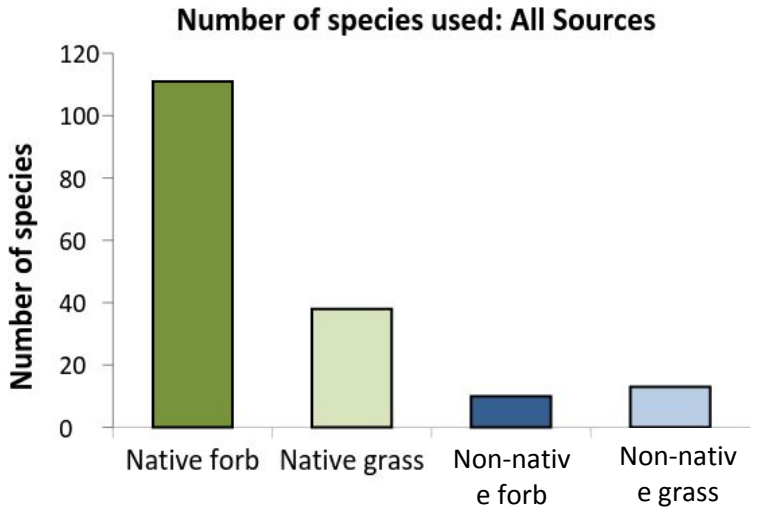
Objective 1.1: Assess the seed needs of federal agencies and the capacity of private and federal producers.

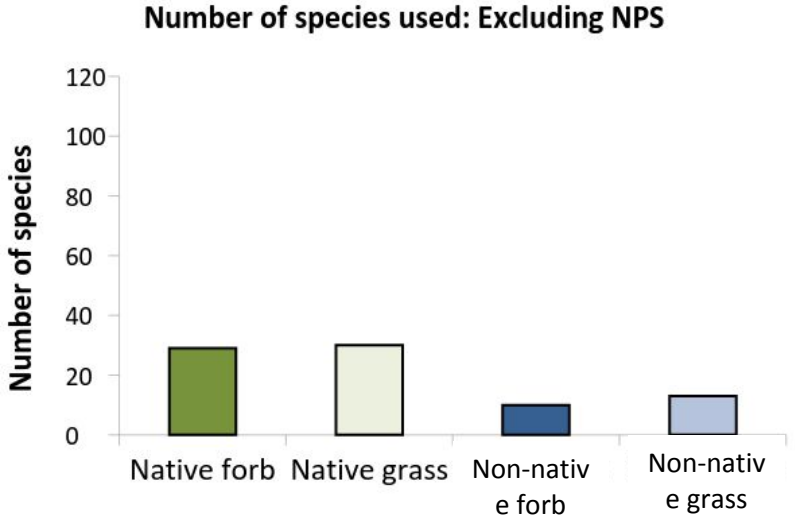
Action 1.1.1: *Conduct an assessment of seed needs for all Federal agencies and their offices that provide or use seed.*



SPECIES DEMAND

- More than 80% of treatments had species-level details

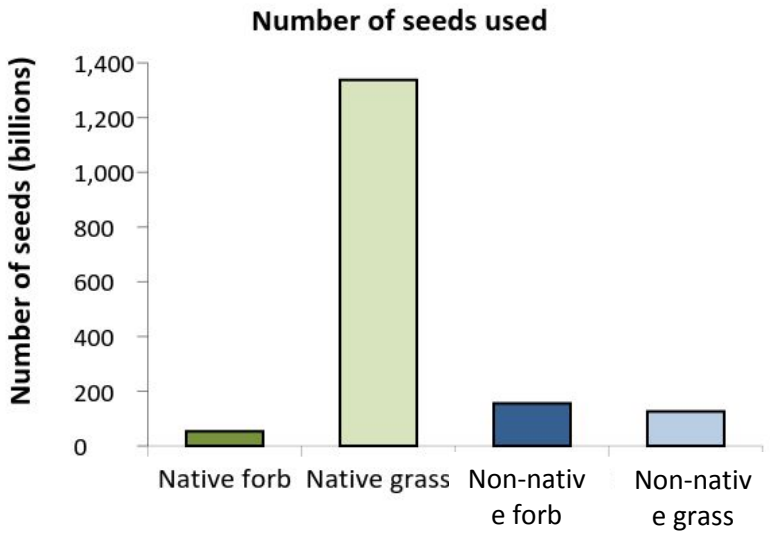




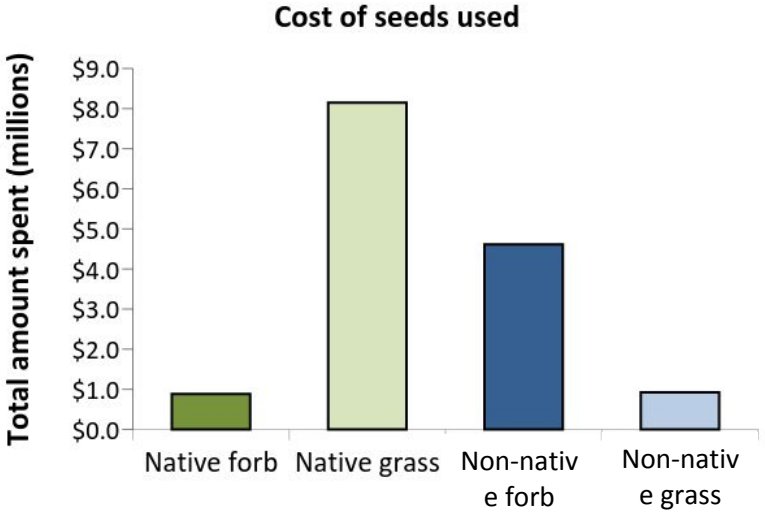
- 80 NPS seeding treatments had very different diversity and sourcing approaches
- Top species by seed number: *Sporobolus cryptandrus*
- Top species by # of treatments: *Achnatherum hymenoides*

DEMAND VOLUME & VALUE

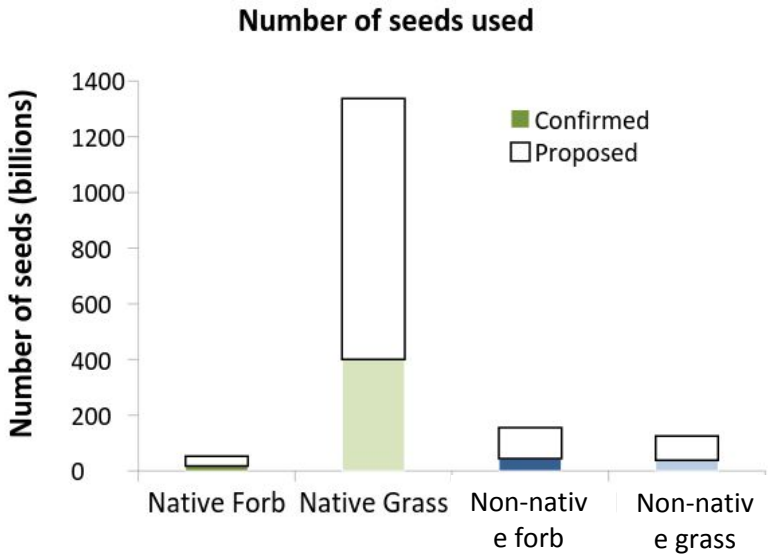
3.2 million pounds of seed (1.7 trillion seeds)

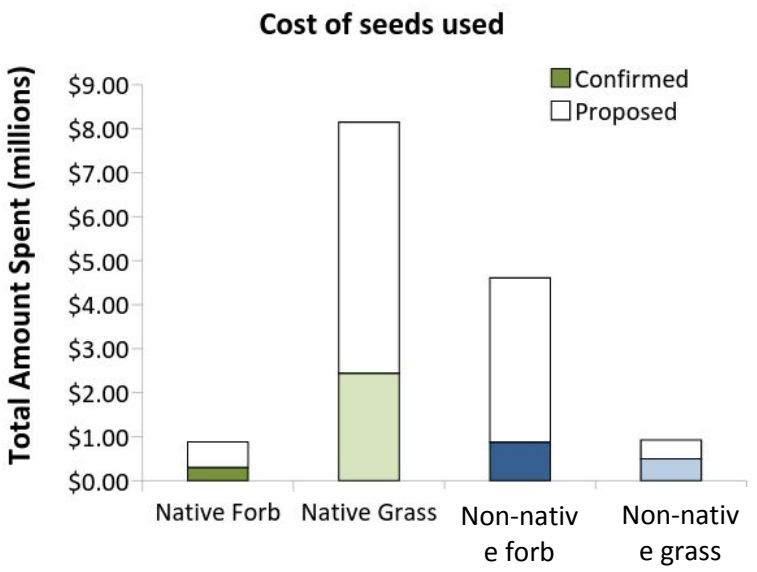


$14.6 million dollars



DEMAND VOLUME & VALUE



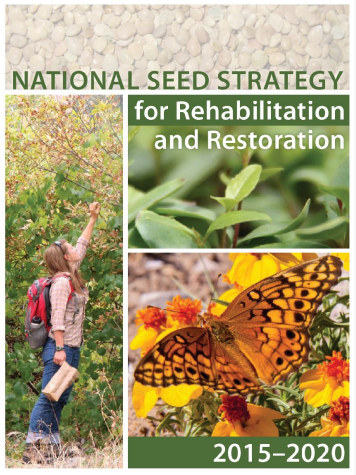


CONTRIBUTIONS TO THE SEED STRATEGY

Goal 2: Identify research needs and conduct research to provide genetically appropriate seed and to improve technology for native seed production and ecosystem restoration.

Objective 2.4: Develop or modify monitoring techniques, and investigate long-term restoration impacts and outcomes

Action 2.4.1: *Analyze new and existing methodologies to evaluate restoration outcomes.*

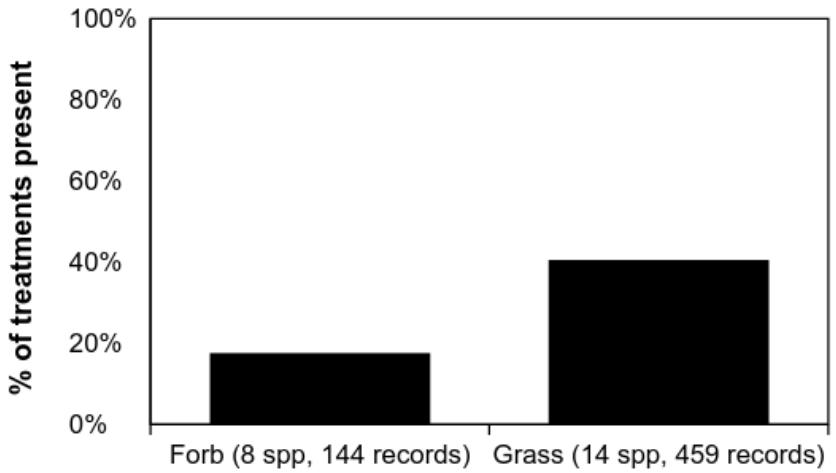


CONNECTING TREATMENTS TO OUTCOMES

- Complete data for 153 seeding treatments (23% of 669)
  - Pre-treatment monitoring data (or identified control) most often missing
- Many monitoring approaches, so success = present
  - Focus on **native species** used
  - Analyses to identify whether lifeform, species, or source significantly explains variation in success
- Ultimate (future) goal to tie species & source uses with broader outcomes (resistance to invasion, resilience after disturbance, etc)

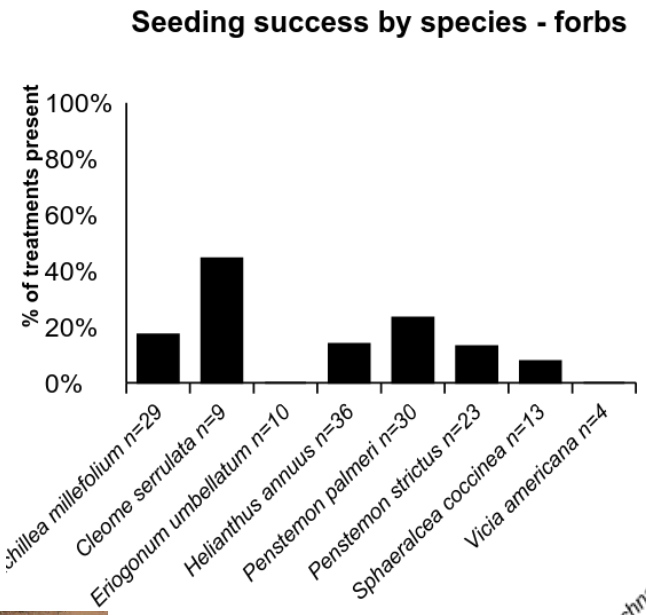
SEEDING OUTCOMES - LIFEFORM

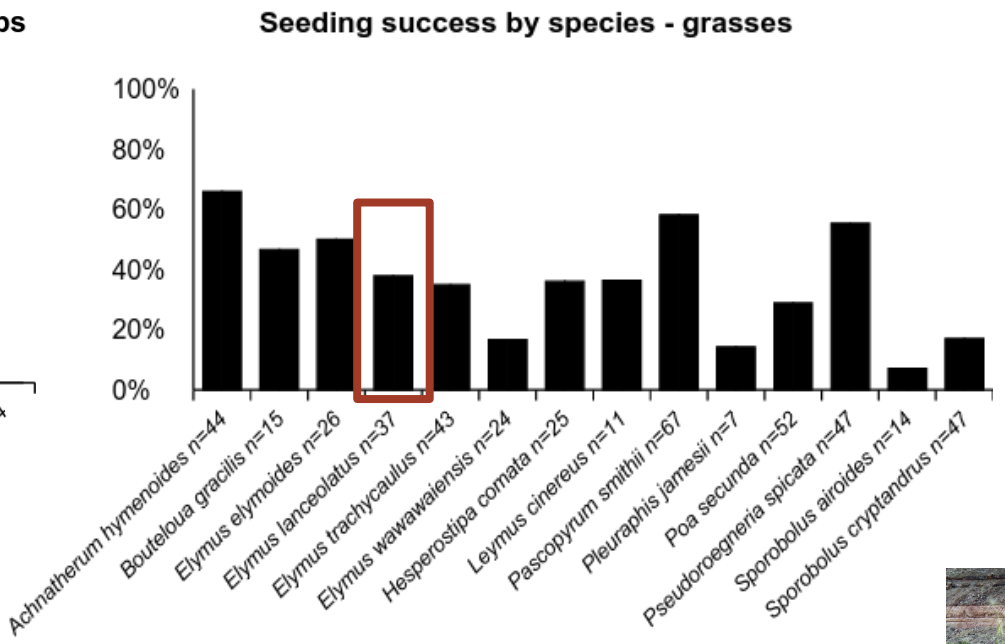
- Lifeform significantly explains variation in success.



SEEDING OUTCOMES - SPECIES

- Species significantly explains variation in success.

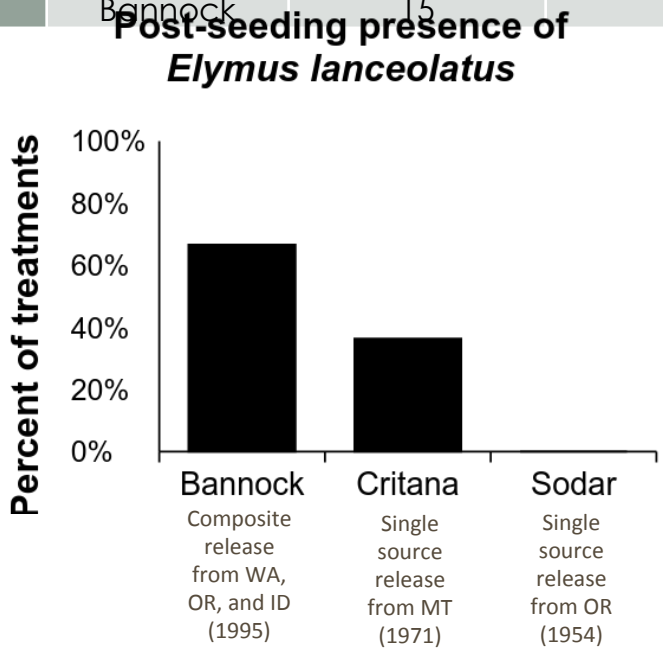




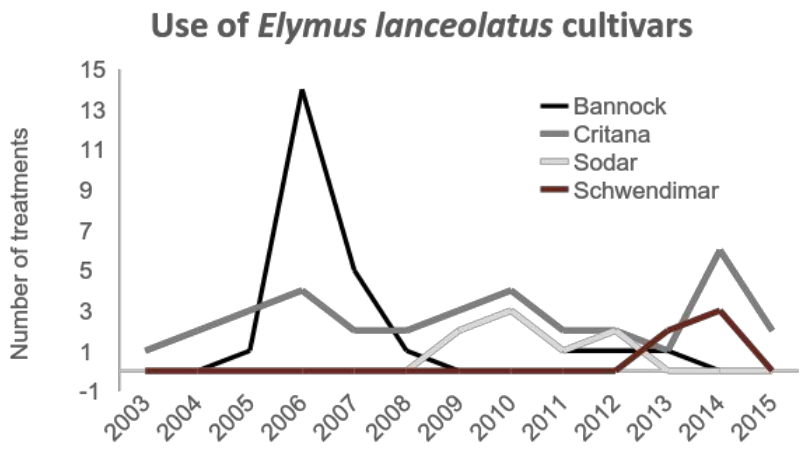
SEEDING OUTCOMES - SOURCE

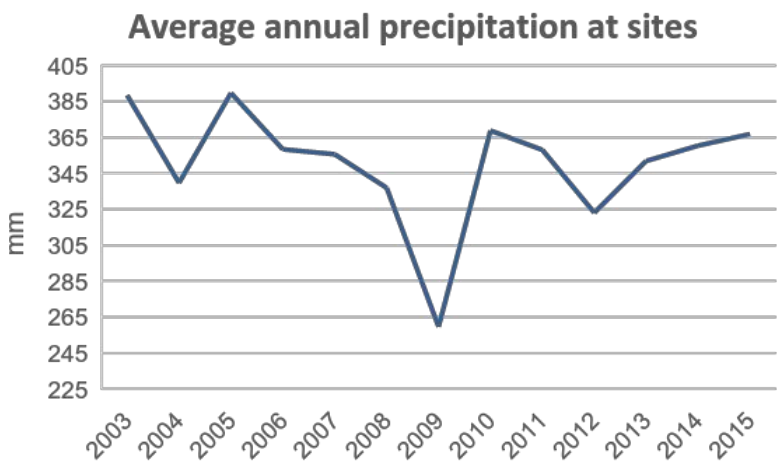
- Source significantly explained variation in success.

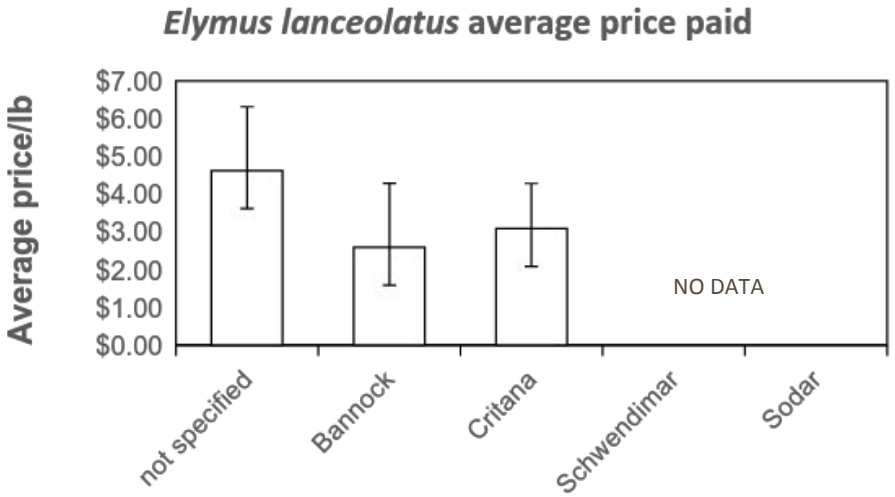
Species	Release	# treatments	% present
Elymus lanceolatus *$p < 0.005$	Sodar	6	0%
	Critana	11	36%
	Bannock	15	67%



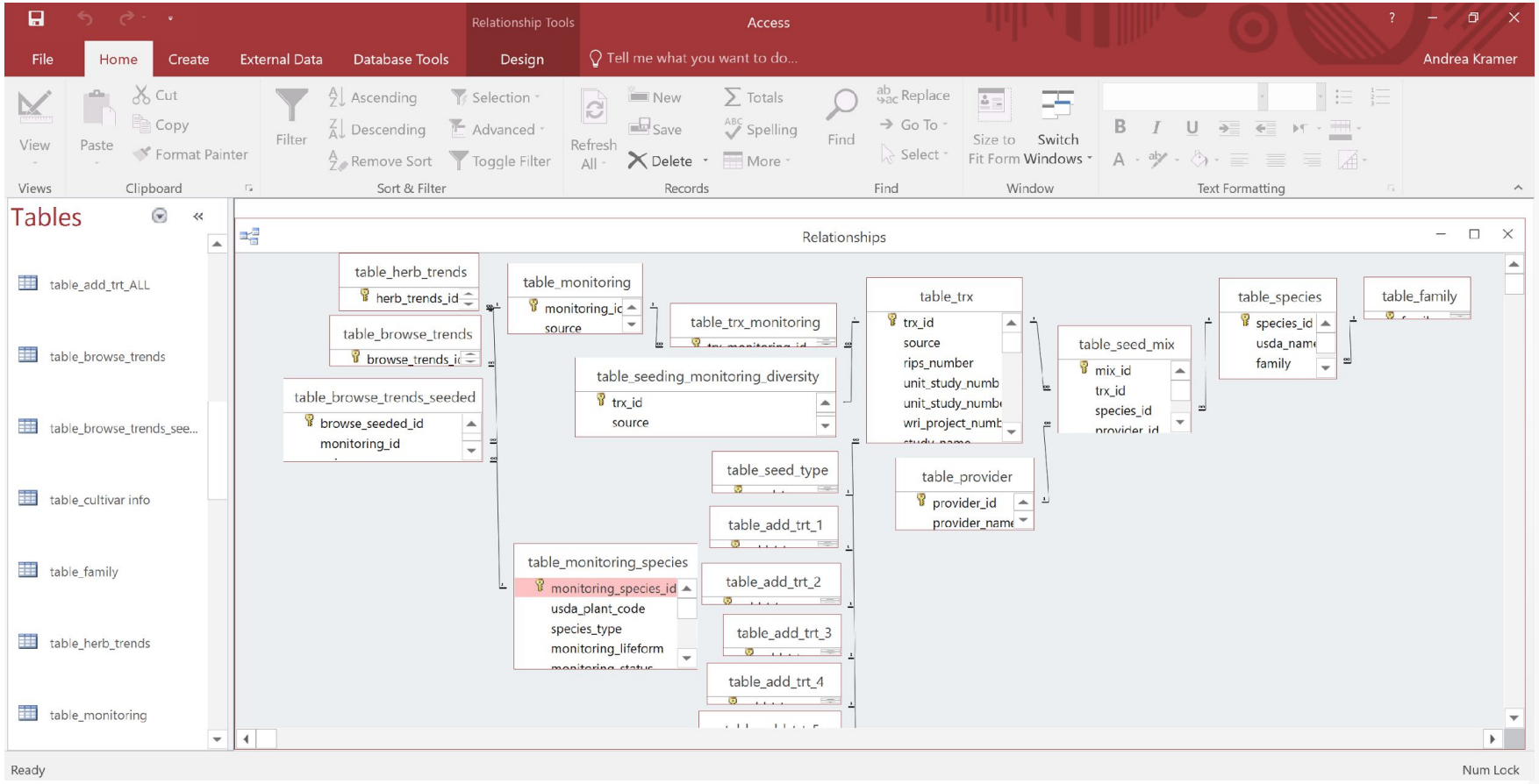
SOURCE USE OVER TIME







NEED MORE DATA!



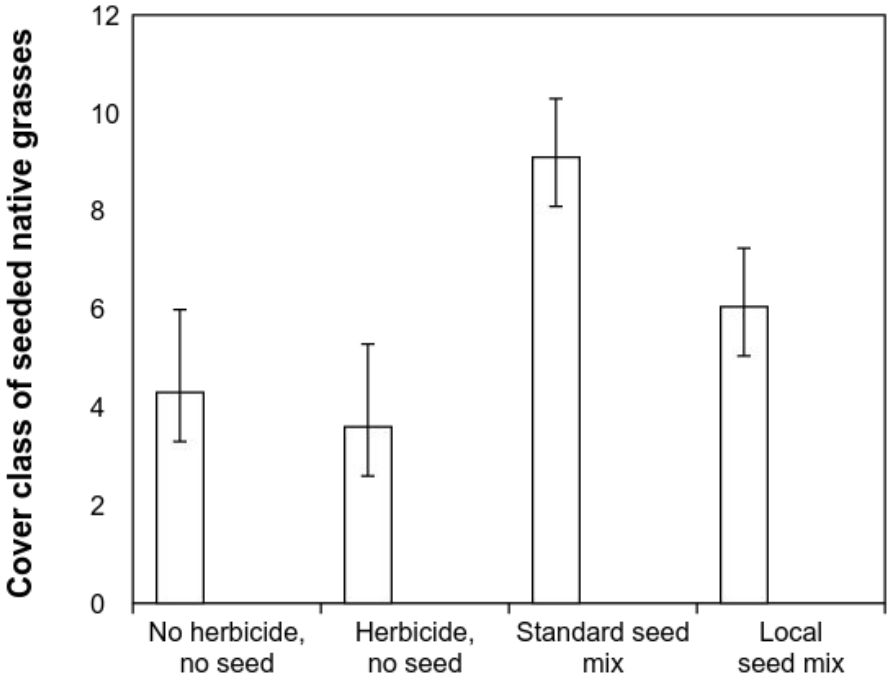
EXPERIMENTAL SEEDING TRIAL NEAR GRAND JUNCTION, CO

NEW WINNING SPECIES

EXPERIMENTAL SEEDING TRIAL NEAR MOAB, UT

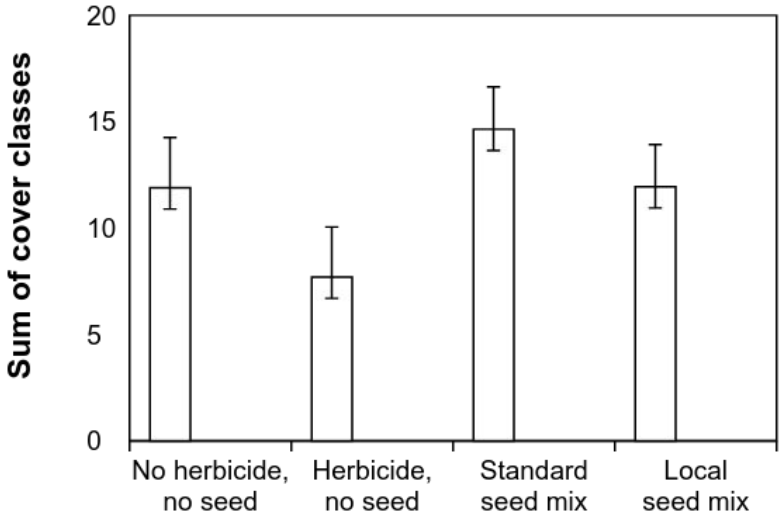
TREATMENT EFFECTS ON NATIVE (SEEDED) GRASS COVER

- If outcome = presence of seeded species, seeding significantly **increased** cover of seeded native grasses



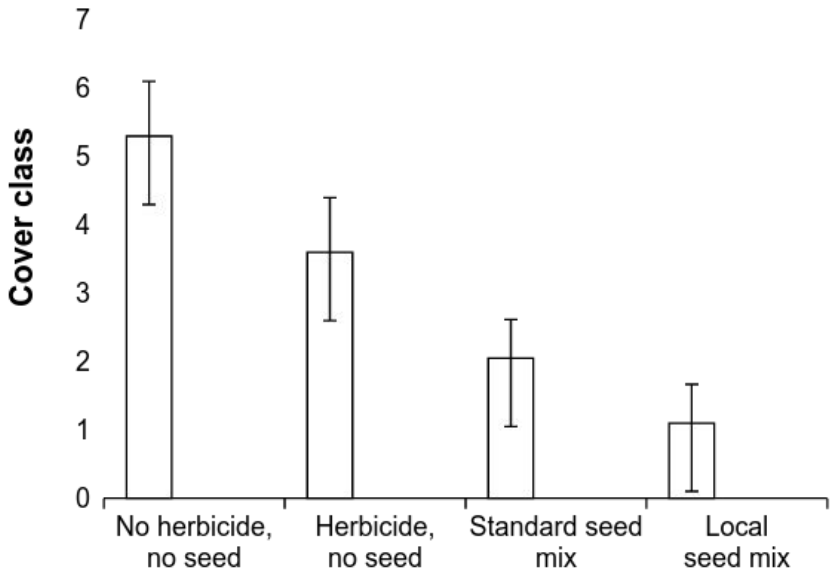
TREATMENT EFFECTS ON (TOTAL) NATIVE PLANT COVER

- If outcome = cover of all native species, herbiciding & seeding did not have a significant effect (herbicide killed forbs)



SEEDING EFFECTS ON KNAPWEED COVER

- If outcome = invasion resistance, seeding significantly **decreased** cover of Russian knapweed (*Acroptilon repens*) after 2 growing seasons.



CONCLUSIONS

- Value in compiling seeding treatments data
  - Past demand can help predict future need
- Assessing outcomes remains challenging but worthwhile
  - More data needed – how can we do this strategically?
- Be intentional about following new releases through use - especially in regions like the CP as new materials made available
  - Can help illustrate costs/benefits of different materials
- Capitalize on experimental seeding trials within larger treatments when possible
  - Collaborations, access to sites and seeds, and time

THANK YOU!

- Data collection and entry: Elizzabeth Kaufman
- Data locators/providers: Kevin Gunnell, Justin Welty, Judy Perkins, Nikki Grant-Hoffman, Dale Beckerman, Nate West, Ken Holsinger, Matt Dupire, Gabe Bissonette, James Ivory, Mark Paschke, Katie Sandbom, Adrienne Pilmanis, Sandra Borthwick, Laura Schrage
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QUESTIONS?

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CHICAGO BOTANIC GARDEN

The preceding presentation was delivered at the

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This and additional presentations available at http://nativeseed.info

NATIVE SEED NETWORK

Institute for Applied Ecology