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

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NATIONAL NATIVE SEED CONFERENCE
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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


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)

Number of seeding treatments entered into the Colorado Plateau Restoration Outcomes Database (CPROD) by source and year.
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.
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

Number of seeds used

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of seeds (billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native forb</td>
<td>20</td>
</tr>
<tr>
<td>Native grass</td>
<td>1,400</td>
</tr>
<tr>
<td>Non-native forb</td>
<td>100</td>
</tr>
<tr>
<td>Non-native grass</td>
<td>50</td>
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</tbody>
</table>

Cost of seeds used

<table>
<thead>
<tr>
<th>Type</th>
<th>Total amount spent (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native forb</td>
<td>1</td>
</tr>
<tr>
<td>Native grass</td>
<td>9</td>
</tr>
<tr>
<td>Non-native forb</td>
<td>5</td>
</tr>
<tr>
<td>Non-native grass</td>
<td>1</td>
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</tbody>
</table>
DEMAND VOLUME & VALUE

Number of seeds used

Cost of seeds used

Number of seeds (billions)

Native Forb  Native Grass  Non-native forb  Non-native grass

Total Amount Spent (millions)

Native Forb  Native Grass  Non-native forb  Non-native grass
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)
Lifeform significantly explains variation in success.
SEEDING OUTCOMES - SPECIES

- Species significantly explains variation in success.

Seeding success by species - forbs

Seeding success by species - grasses
Source significantly explained variation in success.

<table>
<thead>
<tr>
<th>Species</th>
<th>Release</th>
<th># treatments</th>
<th>% present</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Elymus lanceolatus</em></td>
<td>Sodar</td>
<td>6</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>Critana</td>
<td>11</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>Bannock</td>
<td>15</td>
<td>67%</td>
</tr>
</tbody>
</table>

Post-seeding presence of *Elymus lanceolatus*

![nrcresearch.nrcs.usda.gov](https://nrcresearch.nrcs.usda.gov)
SOURCE USE OVER TIME

**Use of *Elymus lanceolatus* cultivars**

- Bannock
- Critana
- Sodar
- Schwendimar

**Average annual precipitation at sites**

**Elymus lanceolatus** average price paid

- not specified
- Bannock
- Critana
- Schwendimar
- Sodar

NO DATA
NEED MORE DATA!
EXPERIMENTAL SEEDING TRIAL NEAR GRAND JUNCTION, CO
NEW WINNING SPECIES
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)
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
- Seed providers: Ken Holsinger, Jim Garner, Robby Henes, Sheila Williams
- Experimental seed trial site support: Nikki Grant-Hoffman and Anna Lincoln (BLM GJFO), Hau Truong and Zach Lundeen (Bonderman Field Station at Rio Mesa)
- Support: Bureau of Land Management Plant Conservation Program

QUESTIONS?

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