

# Returning Succession to Downy Brome Dominated Rangelands: Roadblocks to Perennial Grass Establishment



Dan Harmon, Charlie D. Clements, and James A. Young  
 USDA, Agricultural Research Service  
 Great Basin Rangelands Research Unit  
 920 Valley Rd Reno, Nevada 89512  
 Daniel.Harmon@ars.usda.gov

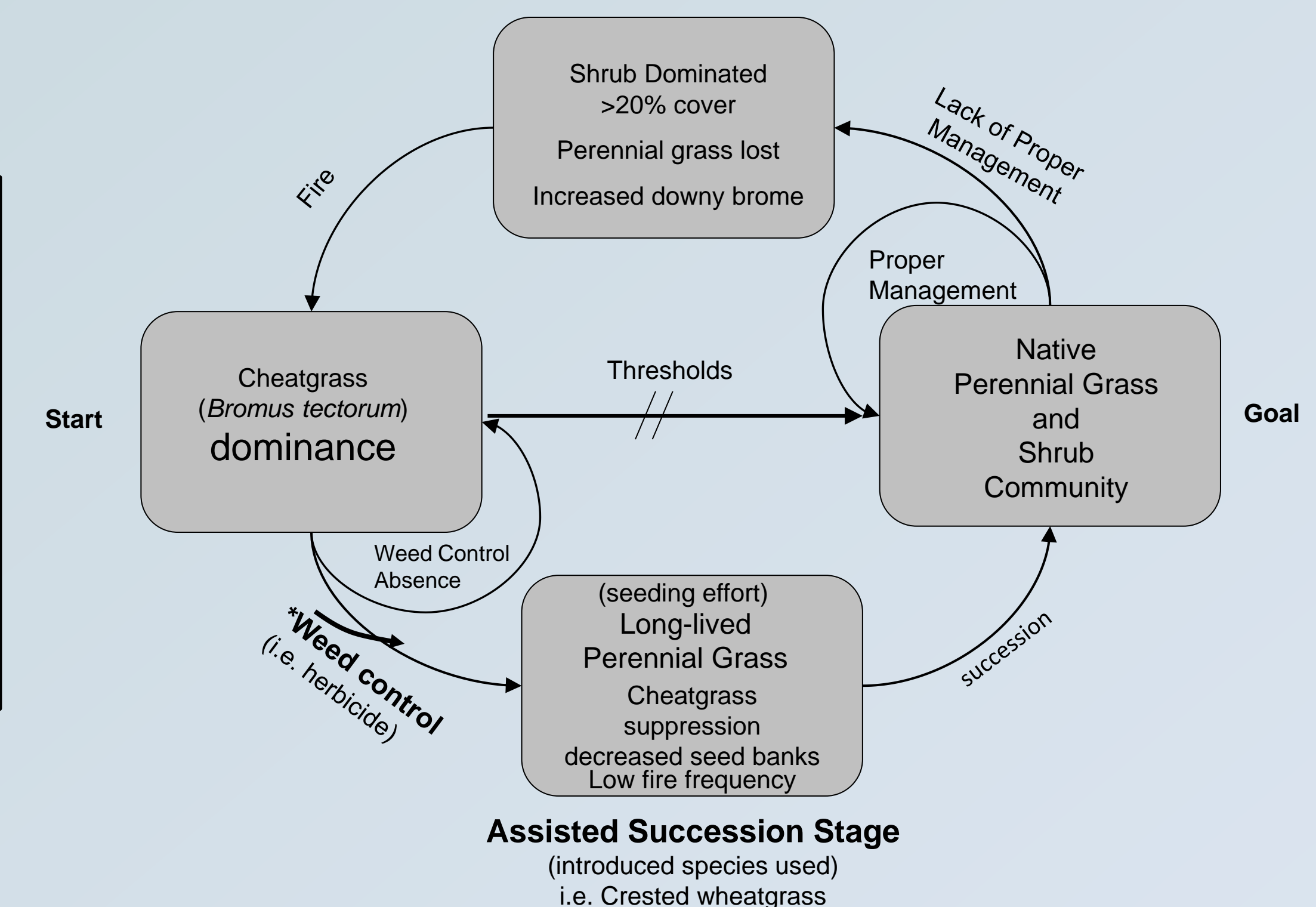
The most common cause of successional retrogression in the Great Basin is wildfires fueled by downy brome. Downy brome invasion has reduced fire intervals from an estimated 60-100 years to 5-10 years.

*Establishment of a long-lived perennial grass is the best method to suppress downy brome and reduce wildfire disturbance to assist succession.*

## Results

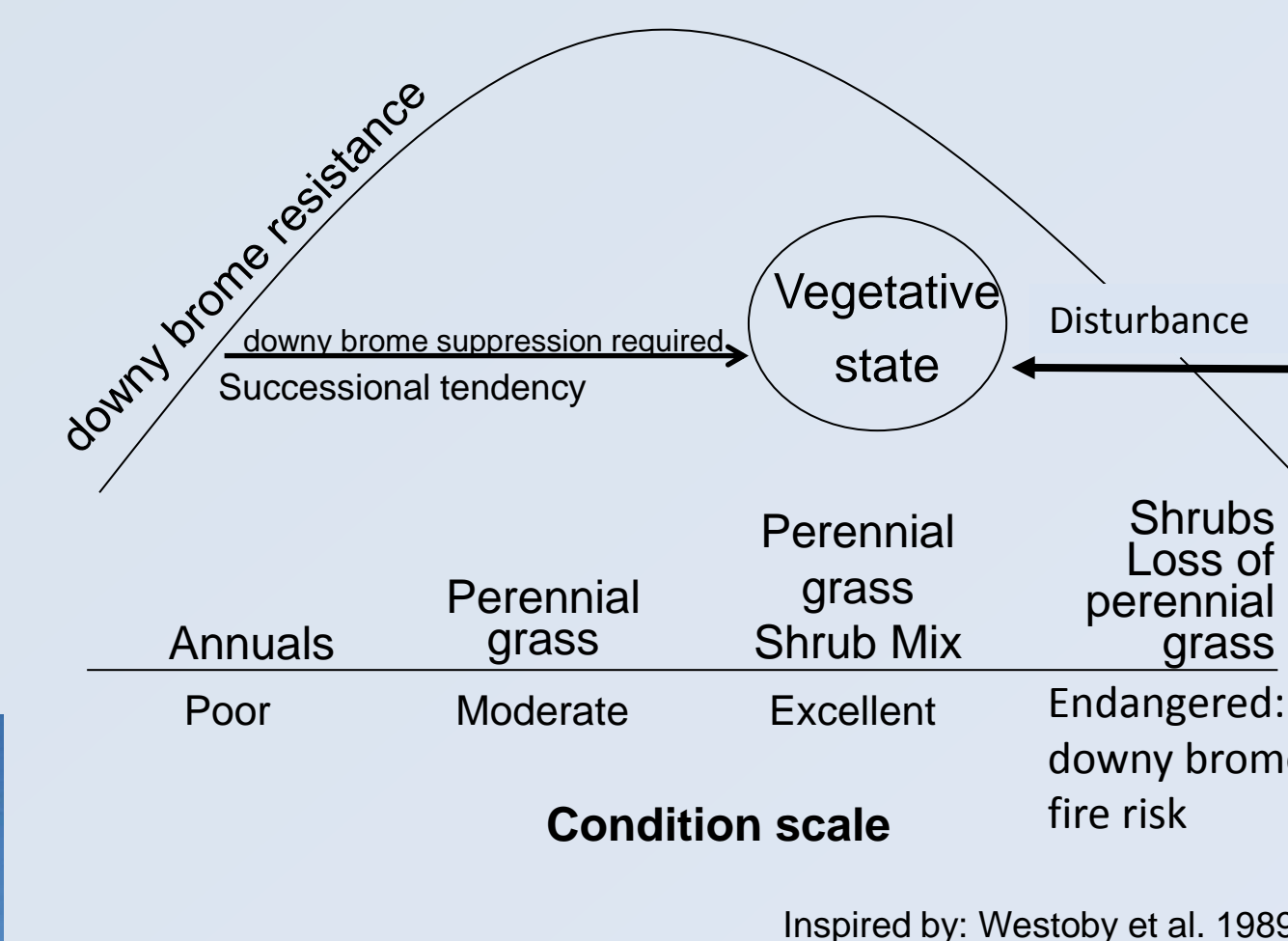
July seedling survival significantly increased comparing the introduced seed mix to native seed mix (introduced=34.6 seedlings/m<sup>2</sup>, native=4.3 seedlings/m<sup>2</sup>) (**Figure 1**). An increased seeding depth improved first year seedling survival (26.5 seedlings/m<sup>2</sup> vs. 12.4 seedlings/m<sup>2</sup>).

**At the seedling phase, perennial grasses only compete to survive. Perennial grass seedlings do not out compete downy brome. Only mature perennial grasses can compete for resources an adequate amount to suppress downy brome.**



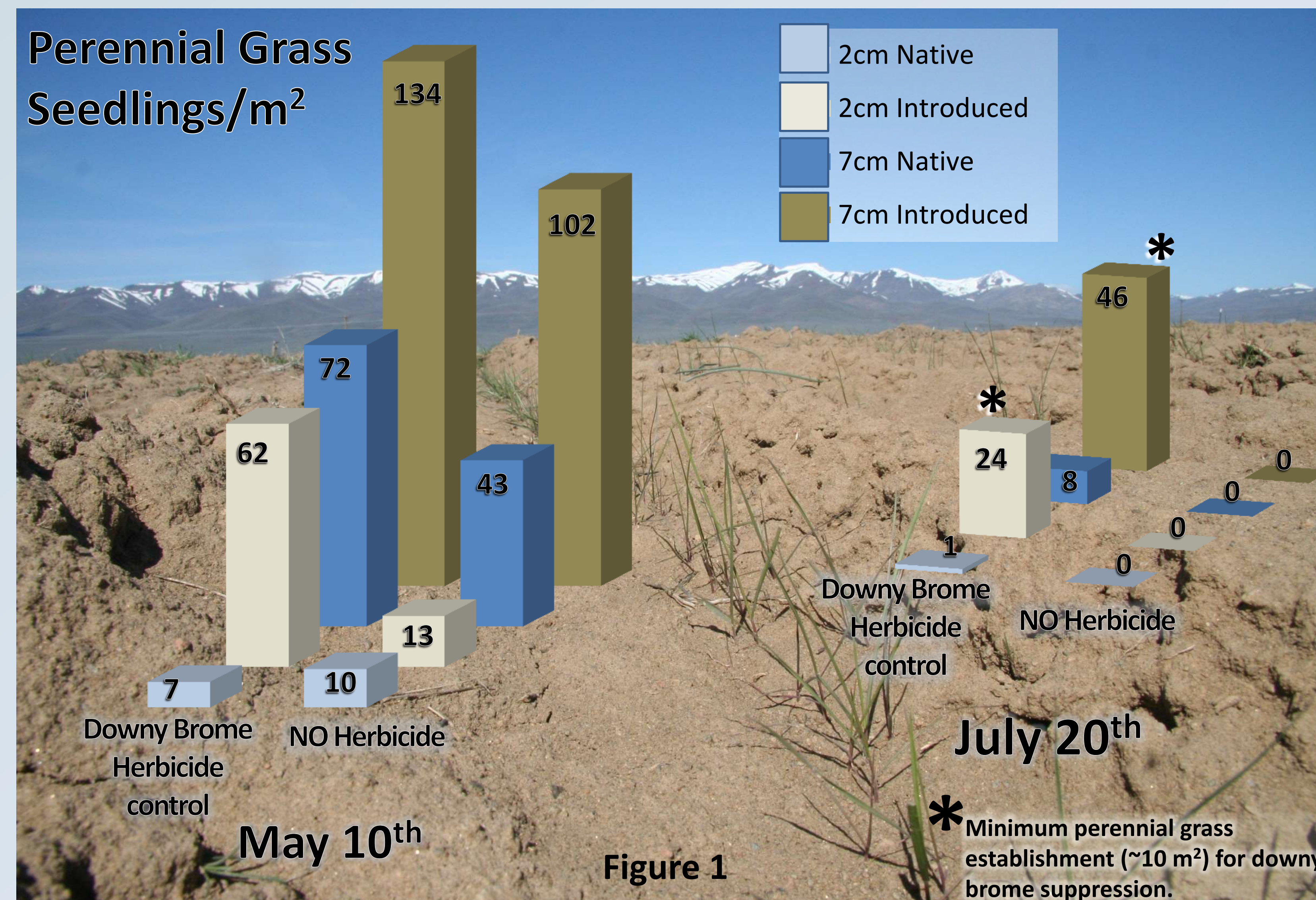
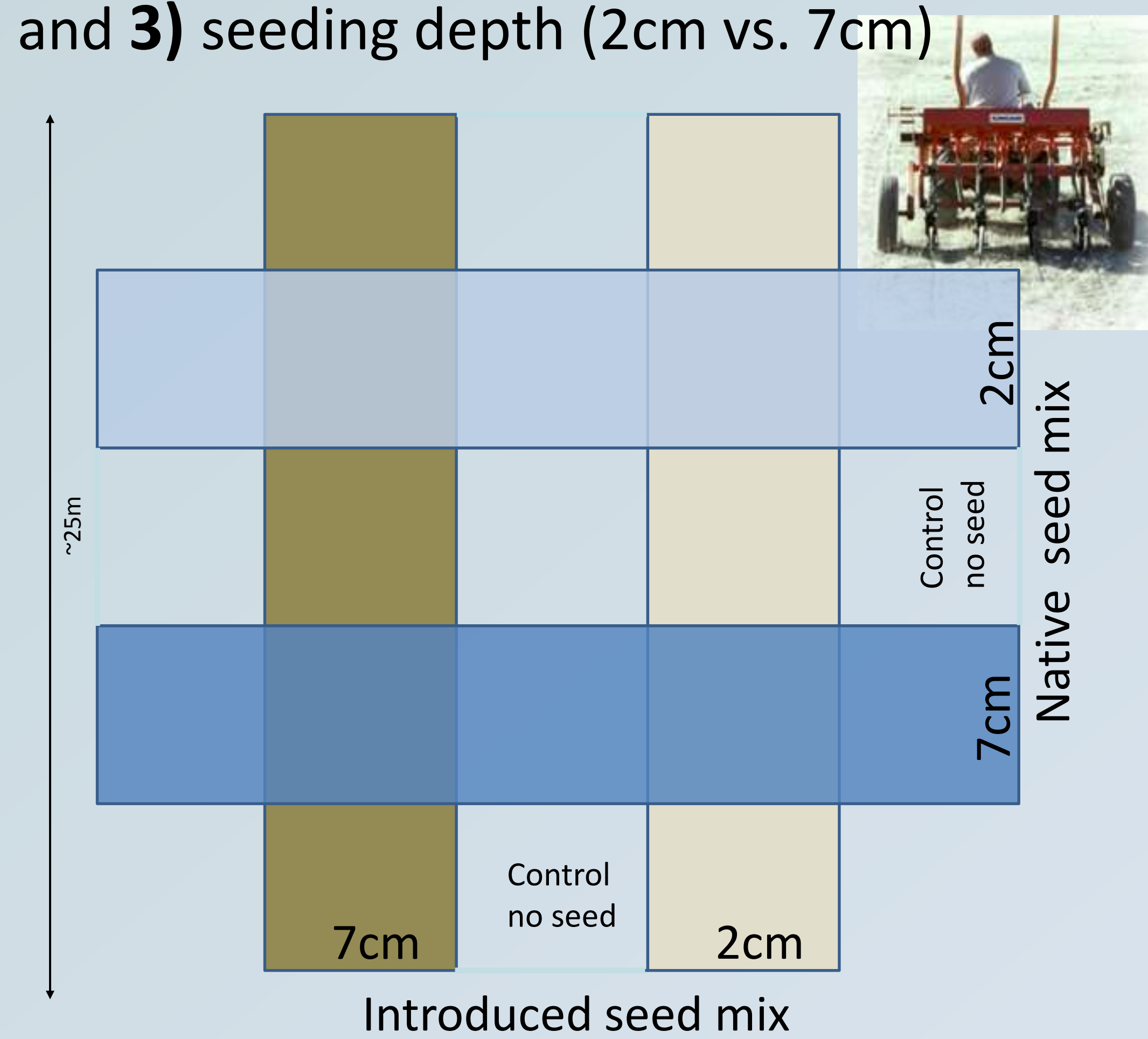
## Discussion

Complete seedling die-off occurred by July if downy brome was not controlled (**Figure 1**). Most alarmingly, even with downy brome control, the native grass seed mix established very poorly (1-8 seedlings m<sup>2</sup>). In order for long term downy brome suppression to occur a minimum density (~10 plant/m<sup>2</sup>) of long-lived perennial grass must be established. Lower densities will permit downy brome to continue increased fire disturbance and halt succession.



Reports of successful perennial grass establishment fall below 20 percent. We hypothesize that downy brome resource competition, seed species choice and seeding depth are contributing to the failure rate.

In a plot level seeding experiment we tested three treatments: **1)** downy brome herbicide control (Glyphosate 5%) **2)** seeded species (native vs. introduced mix) and **3)** seeding depth (2cm vs. 7cm)



Our results find that downy brome control is paramount to perennial grass establishment and that appropriate species selection and seeding depth can increase success.

\*Plot replicated on downy brome herbicide control area and NO control area.  
 Introduced mix [Hycrest' (*Agropyron cristatum*) and Siberian wheatgrass (*A. fragile*)]  
 Native mix [Squirrel tail (*Elymus elymoides*), Bluebunch wheatgrass (*Pseudoroegneria spicata*),  
 Indian ricegrass (*Achnatherum hymenoides*), Sherman big bluegrass (*Poa secunda*)]  
 Herbicide – 1 time application November Glyphosate 5%  
 High seeding rate used (~50 seeds/ft, 10+lbs/acre)

\*Minimum perennial grass establishment (~10 m<sup>2</sup>) for downy brome suppression.