The Practical Use of Intermountain Native Annuals and Assisted Succession

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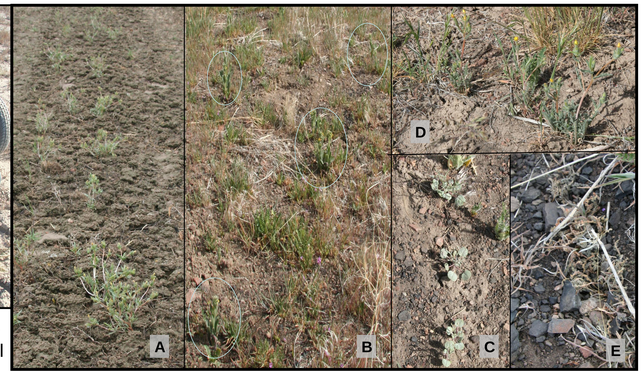
(1) Establishment Potential

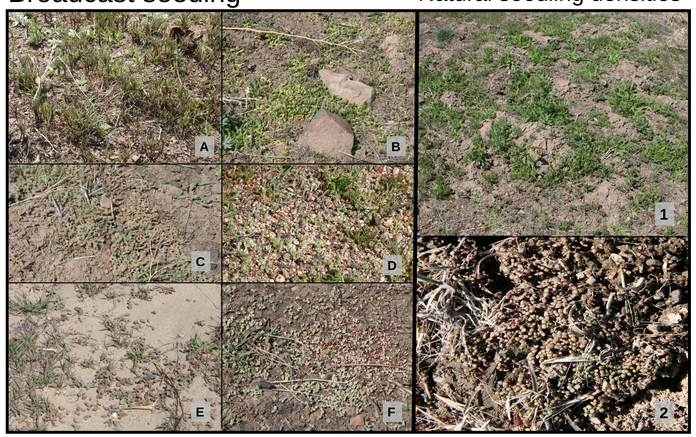
Drill Seeding

Using a traditional seeding rate (≤ 30 seeds /ft) with a no-till drill provided very little establishment.



Antelope Valley site: (**A**) White-stemmed stick-leaf (*Mentzelia albicaulis*), Empire site: (**B**) Fiddleneck (*Amsinkia tessellata*), (**C**) Birds nest Buckwheat (*Eriogonum nidularium*),(**D**) White-stemmed stick-leaf flowering, (**E**) White-stemmed stick-leaf desiccated before flowering

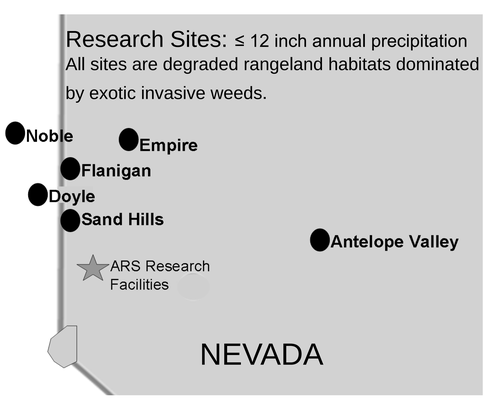
Broadcast seeding

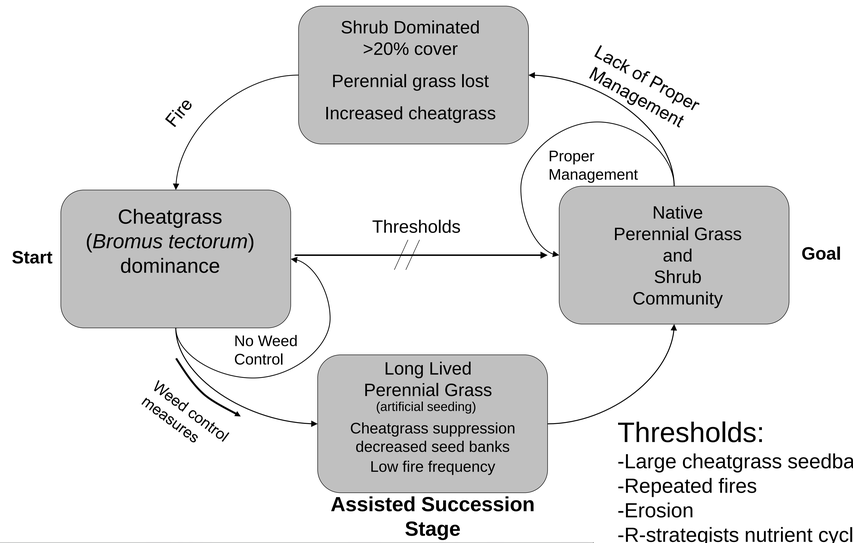


Broadcast: (**A**) Desert pin cushion (*Chenactis stevoides*), (**B**) Fiddleneck, (**C**) White-stemmed stick-leaf, (**D**) Cushion Cryptanth (*Cryptantha circumscissa*), (**E**) Booth's evening primrose (*Camasonnia boothii*), (**F**) Bailey's buckwheat (*Eriogonum baileyii*). Natural: (**1**) Fiddleneck (*Amsinkia tessellata*) (**2**) Bailey's buckwheat

Broadcast seedling establishment closer resembles a natural density, however the likelihood of seeding at such a high rate (100+ seeds/ft) on a large scale seems improbable.

Natural seedling densities





What role do Intermountain Native annuals have in an assisted succession management strategy?

(2) Persistence

In 2007 we seeded 14 native annuals, six species established the first year, with only two species persisting on the site four years later.

Fiddleneck (*Amsinkia tessellata*) Bailey's buckwheat (*Eriogonum baileyii*)

Traditional Succession

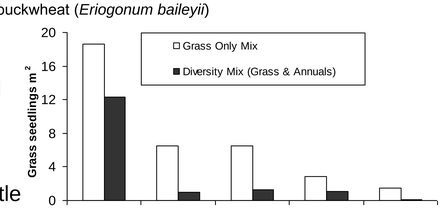
Each successive assemblage of plants modifies the site potential to allow the establishment of following assemblages.

What does a native annual dominated community lead to?

What is the time frame of native annual domination that facilitates the establishment of a higher succesional plant group?

Facilitation

We found a negative effect of adding annuals with a perennial grass seeding. Possible explanations could be (1) the increased calibration difficulty and seed flow through the drill, (2) possible attraction of seed predators to native annual seeds or (3) competition for water. The higher potential micro-ecosystem created by annual litter or remnant dead plants (eg:Russian thistle *Salsola paulsenii*) is a benefit to cheatgrass more than any desirable range plant making facilitation very limited.



Average number of grass seedlings for Perennial grass seed mix and a Diversity mix (grass and annuals). Harmon, D.N., Clements, C.D. 2010. Revegetation Potential of Great Basin Native Annuals and Perennial Grasses: Does Facilitation Occur? [abstract]. Society for Range Management. 63:64.

Thresholds:

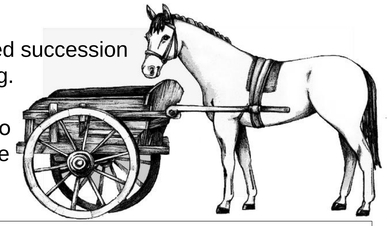
-Large cheatgrass seedbanks
-Repeated fires
-Erosion
-R-strategists nutrient cycling
-No Native seed banks/source

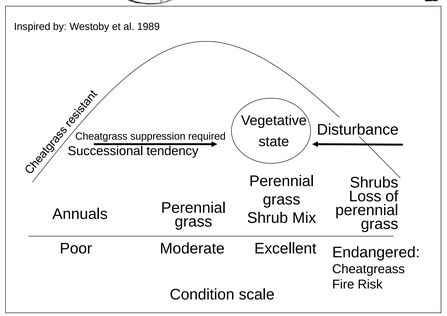
Discussion

Assisted succession is a sensible management practice that recognizes the value of introduced perennial grasses as a tool to improve the establishment or natural recruitment of native species and allow progression along a successional gradient.

Intermountain native annuals have limitations: To maintain a population, they have to compete with cheatgrass every year at the seedling stage, when cheatgrass dominates. They also have a heavy seed rain that is difficult to mimic with artificial seeding. For succession to occur they must decrease cheatgrass densities and seed banks in order to decrease fire frequencies.

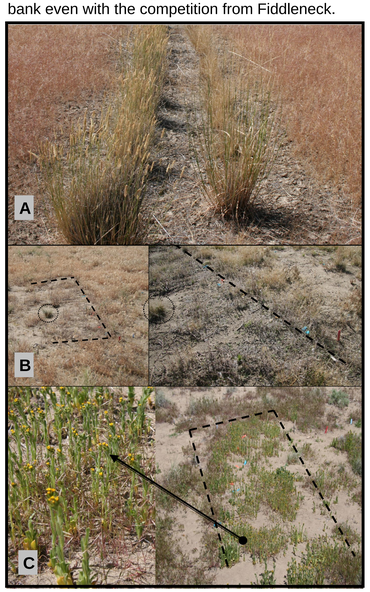
We have yet to observe assisted succession with native annual artificial seeding. We will continue practical "on the ground" long term field research to better understand the role of native annuals in a now exotic annual dominated ecosystem.



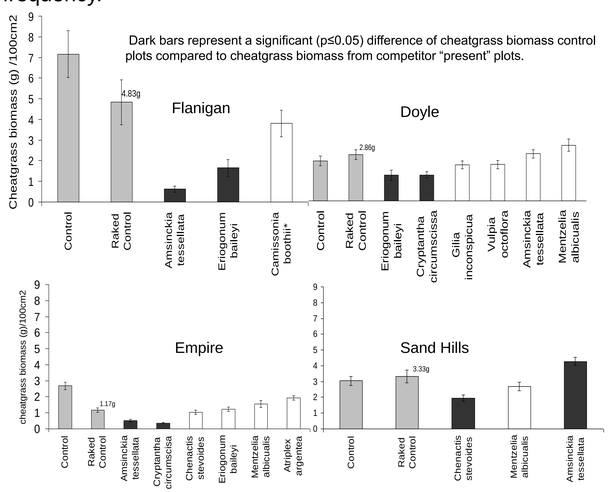


(3) Cheatgrass Suppression

(**A**) *Agropyron desertorum* and *Poa secunda* suppressing cheatgrass (**B**) Affect of Fiddleneck presence on cheatgrass biomass and litter, (**C**) Cheatgrass producing seed to maintain a seed bank even with the competition from Fiddleneck.



Cheatgrass suppression occurs ***after*** the establishment of a mature perennial grass ***not*** during the seedling stage of the perennial. This makes it difficult to determine the long term effects of native annuals on cheatgrass seedbanks and fire frequency.



Harmon, D.N., Clements, C.D. 2011. Cheatgrass Biomass and Competition: Is a greenhouse fight a fair fight? [abstract]. Society for Range Management.