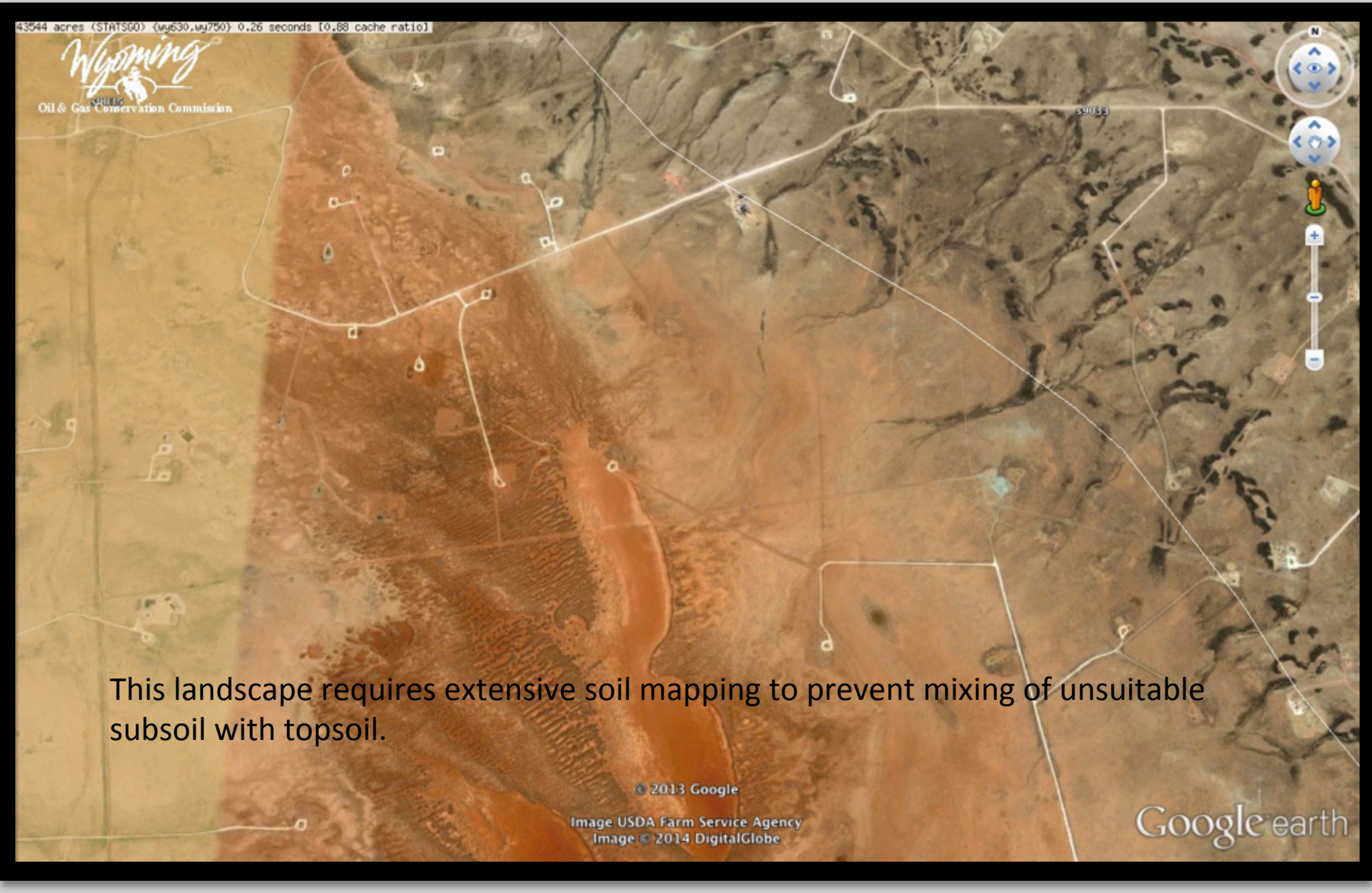
Planting Methods and Sage Grouse Habitat

Calvin Strom Research Scientist
Wyoming Reclamation and Restoration Center

Wyoming Reclamation and Restoration Center

Soil variability across the landscape. Different plants favor different soil types and depths



This landscape requires extensive soil mapping to prevent mixing of unsuitable subsoil with topsoil.


When re-contouring these islands should be reconstructed. Plant shrubs on higher ground to take advantage of prevailing winds to disperse seed. These islands should be mapped and stripped separate from the saltbush community to prevent elevation of EC which restricts sagebrush establishment
03/06/2014

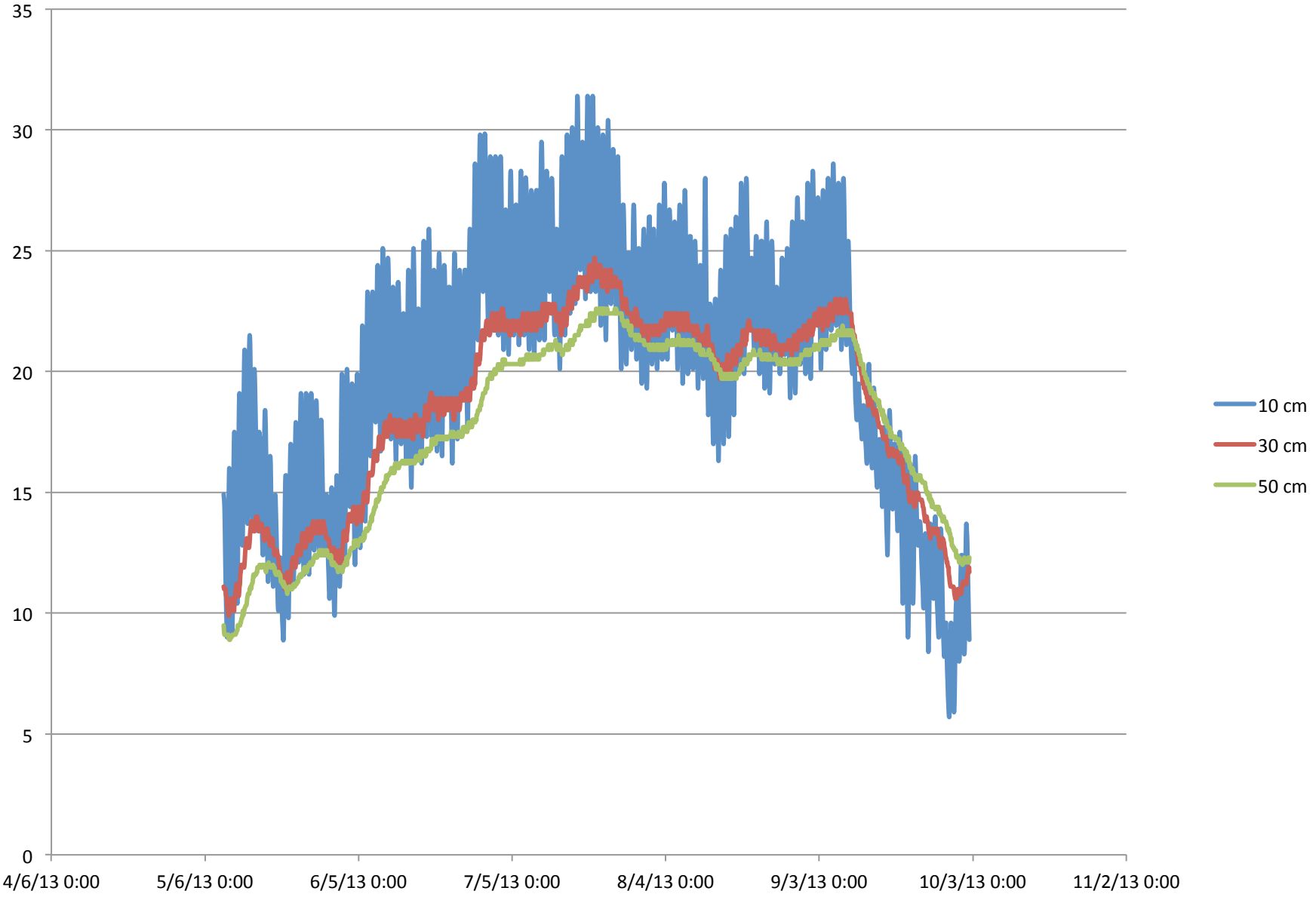

Inventory:1 Composition: existing species & abundance. 2. Structure vertical. 3. Pattern horizontal 4. Heterogeneity plants, soil litter. 5. Function ecological processes. 6. Vegetation dynamics
03/06/2014


03/06/2014


Stripping no more than 10 cm maintains native seed bank stripping to 30cm
reduces seedbank threefold, Leaving trash in topsoil pile

Major Disturbance transforms the landscape .. It alters soil chemical and physical properties, depth across the site, mixes subsoil with topsoil. Recreates a homogenized topsoil at a uniform depth. Most of the variables influencing restoration success are related to texture and nutrient content.
Research has demonstrated that most ecosystems contain variable depths of topsoil, and certain plants occur in certain areas. Topsoil depth effects plant community composition and diversity.
Lawrence et al (1967) soil exposed from retreating glaciers have characteristics that make it difficult for plants to establish. Pioneer species that establish moderate the harsh attributes and add organic soil over the hardpan, and reduce wind effects it is then that spruce seedlings appear. Research in Australia recommends ripping to 80 cm after topsoil is re-spread and does not reduce seedling recruitment-----
Meeting Notes (3/17/14 13:49) -----

Mid July . soil temperature in SW Wyoming measured 89.6 at 10cm, 77 @ 30cm and 71.6 at 50cm




Leaving woody debris on surface creates micro-climes.


Plant annual cover crop, which reduces surface soil temperature & evaporation rate.
Provides shade for seedlings, and reduces herbivory.


Rocky mountain bee plant trapping snow on seeded site, increases soil moisture, reduces wind and water erosion

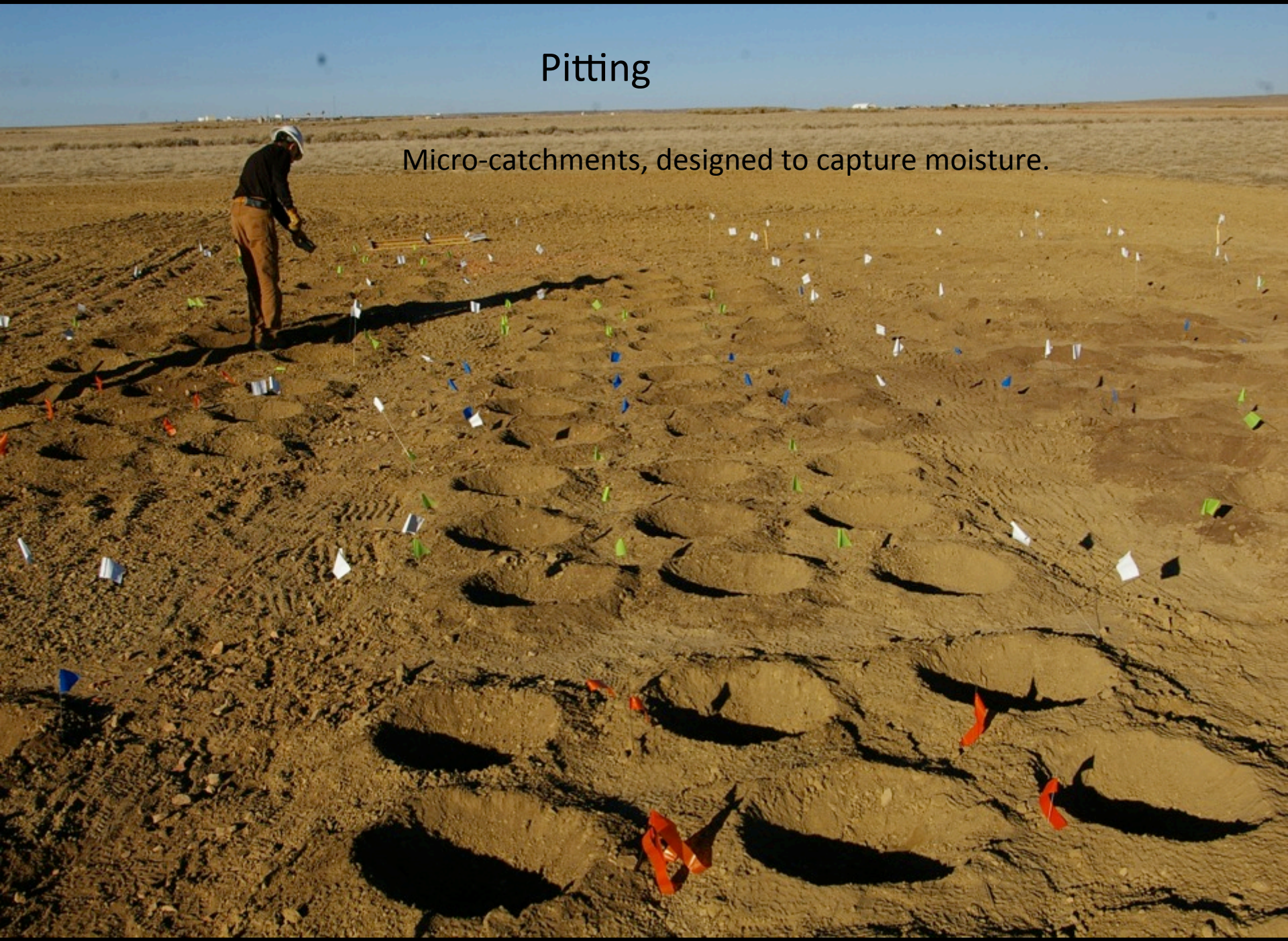
4 foot high snow fence is ineffective snow piles to height of fence and approximately fifty feet wide leaving bare ground beyond. Fence height should be no higher than the tallest shrub that was present on the site and strategically placed to provide snow cover across the site.


Note no shrubs no snow, burned site

Drill seeding. Timing is October good time for dormant seeding. Seeds germinated in December and seedlings did not emerge until March and were subject to freeze thaw and moisture levels as low as summer drought. This research demonstrates that seed emergence is the bottleneck, not germination
Can we design seed mixes to over come this bottleneck? Or change seeding dates?

Seeding

Pitting



Micro-catchments, designed to capture moisture.

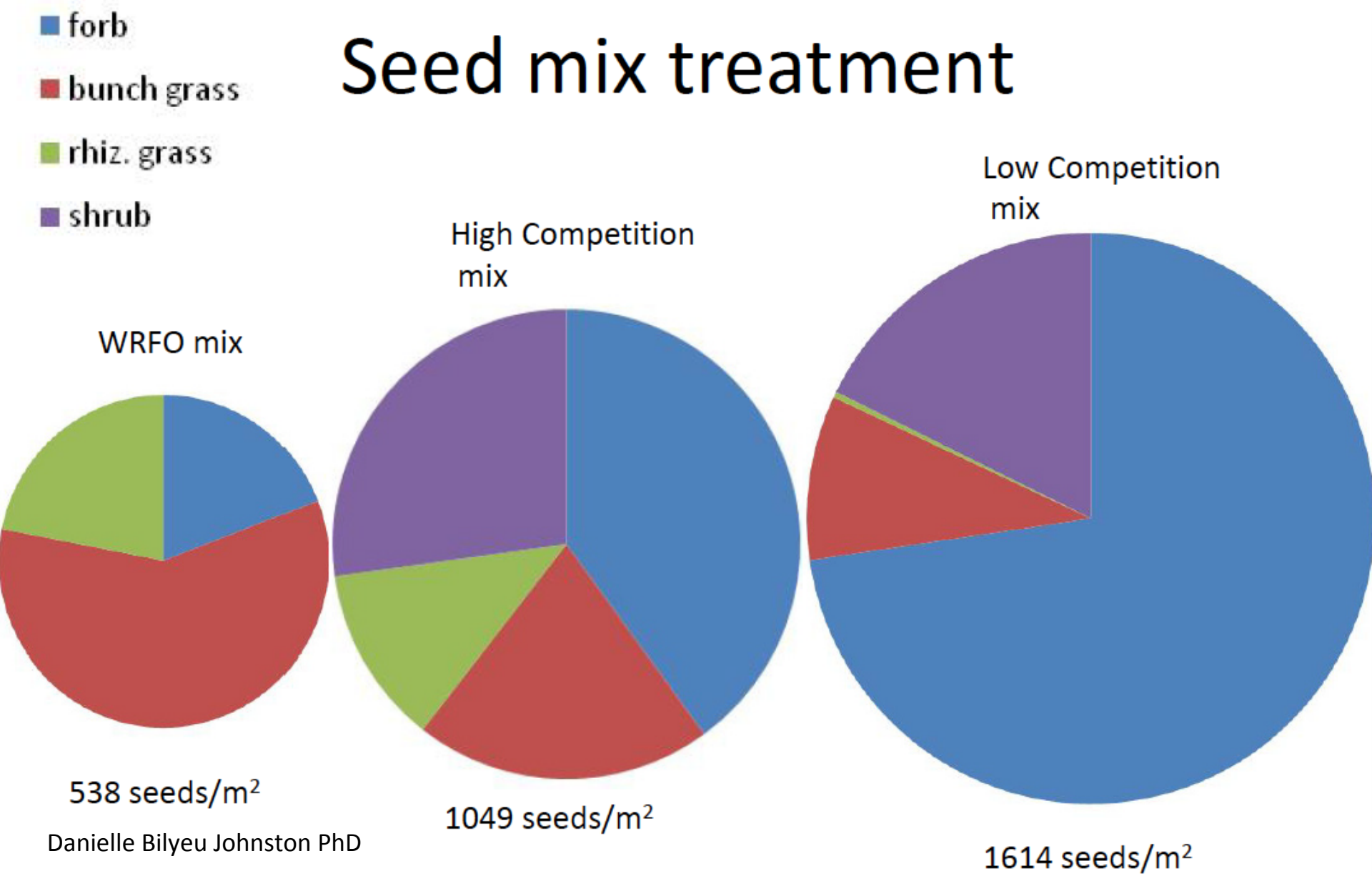

Illustration of micro-catchments intercepting snow.


Note the smooth surface in the background

Diamond imprinter used on this site. Soil was too dry to make stable imprints. Note flat surface, increases wind erosion. Need woody debris or artificial shrub silhouettes to slow wind and create micro-climes and deposition of wind blown soil and traps snow increasing spring moisture.


Surface treatment
Creation of a rough surface and leaving woody debris on the surface

Seed mix treatment



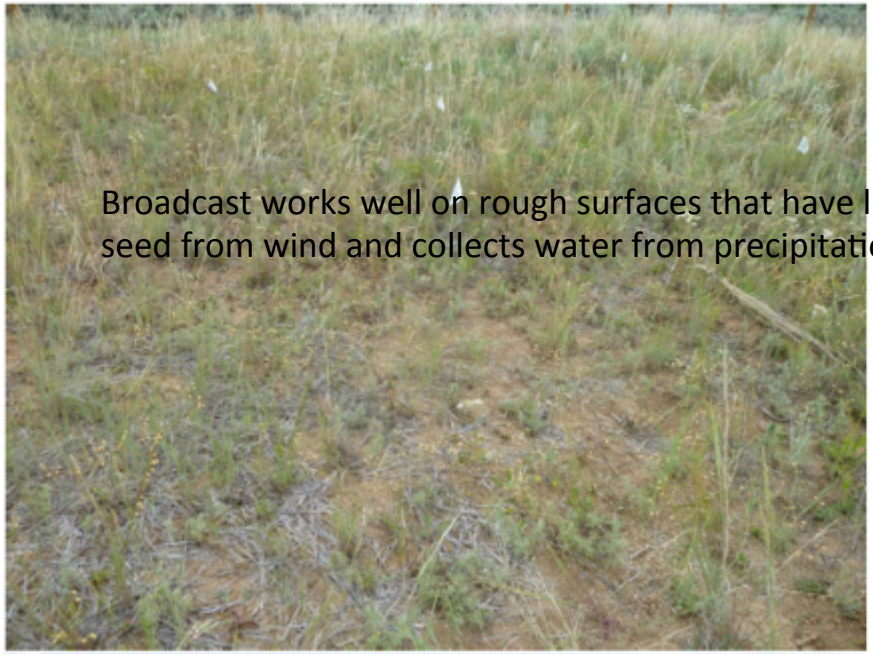
Danielle Bilyeu Johnston PhD

Research has that seeding high rates of perennial grasses, may slow or inhibit shrub establishment. Seed mixes need to be designed to reduce competition to allow shrub establishment.
Removing or reducing rhizomatous wheatgrasses?

2011 photos

Flat

Rough



Broadcast works well on rough surfaces that have litter cracks, and crevices which protect the seed from wind and collects water from precipitation events

Photos by Danielle Bilyeu Johnston PhD
Colorado Parks and Wildlife

Planting Container Shrubs

Plant seedlings to same depth as they are in the container, the root collar should at the soil surface not be covered. Bare root seedlings it is harder to differentiate the location of root collar, crews should be trained to identify the root collar. When planting bare root stock care should be taken to not to expose roots to elements, research has shown that as little as ten minutes on a clear warm day can harm or kill them. Keep the roots protected. It is also recommended to spread loose dry soil and litter around the base.

Questions

References

- James, J. J., Svejcar, T., Rinella, M. 2011. Demographic Processes limiting seedling recruitment in arid grassland restoration. Journal of Applied Ecology, 48, pp. 9611-969.
- James, J. J., , Rinella, M., Svejcar, T. 2012. Grass Seedling Demography and Sagebrush Steppe Restoration. Rangeland Ecology 65 pp. 409-417
- Paschke, M, W., Topper, k., Brobst, R, B., Redente, E, F. 2005. Long-term Effects of Biosolids on Revegetation of Disturbed Sagebrush Steppe in Northwestern Colorado. Restoration Ecology, 13, 3, pp. 545-551
- Boyd, C, S., Svejar, T, J. 2011. The influence of plant removal on succession in Wyoming big sagebrush. Journal of Arid Environments, 75, pp. 734-741.
- Boyd, C, S., Davies, K, W. 2012. Spatial Variability in Cost and Success of Revegetation in a Wyoming big Sagebrush Community. Environmental Management, 50, pp. 441-450.
- Chambers, J. 2000. Seed Movements and Seedling Fates in Disturbed Sagebrush Steppe Ecosystems: Implications for Restoration. Ecological Applications, 10 (5) pp. 1400-1413.
- Hoezle, T, B., Jonas, J, L., Paschke, M,W. 2012. Twenty-five years of sagebrush steppe plant community development following seed addition. Journal of Applied Ecology, 49, pp. 911-918.
- Davies, K, W., Boyd, C, S., Nafus, A, M. 2013. Restoring the Sagebrush Component in Crested Wheatgrass-dominated Communities. Rangeland Ecology and Management, 66, pp. 472-478.
- McAdoo, J. K., Boyd, C, S., Sheley, R, L. 2013. Site, Competition, and Plant Stock influence Transplant Success of Wyoming Big Sagebrush. Rangeland Ecology and Management, 66, pp. 305-312.
- Oil Sands BMP's http://environment.gov.ab.ca/info/posting.asp?assetid=8431&categoryid=4
- Johnston, D. Restoring Energy Fields for Wildlife. 2012 Colorado Parks and Wildlife.