



Re-establishing Diverse Plant Communities

**Wyoming Sage-grouse Habitat
Restoration Conference 2015**

March 24, 2015



What is Diversity
Why Might Diversity Be Important
Keys to Diversity
Important Considerations



What is Diversity

The quality or condition of being different

- the number and variety of species (plants) at a location
- species richness - total number of species present
- species evenness – distribution of individuals among species
- diversity indices – richness weighted by evenness
- diversity in life forms (grasses, forbs, shrubs), life histories (long or short-lived), morphology/growth types (mat forming, erect), genes
- generally diversity increases from arctic to tropics, high to low altitudes, high to low stress
- we are currently in the UN-designated decade of biodiversity

Why Might Diversity Be Important

Not just because it's required on reclaim

Importance is not well understood, but often correlated with:

- Site-stability
- Later seral stages climax/historic reference
- Productivity

Increased Ecosystem Services

- provisioning (suggested increase in primary production [forage])
- regulating (erosion control, nutrient cycling, carbon capture)
- cultural (aesthetics, recreation)

Habitat reclamation efforts require the re-establishment of a diverse assemblage of pre-disturbance species/life forms to facilitate re-establishment of native fauna (habitat function)

Keys to Establishing Diversity

Pre-disturbance vegetation composition is the strongest determinant of what species will persist in reclaim, ultimately influencing diversity

Degree and size of disturbance will influence restoration efforts (consider invasion/re-establishment of species from adjacent areas)

Succession (time) is necessary to increase diversity

Restoring species richness with those plants originally present will be much more difficult than restoring species with similar functionality

Keys to Establishing Diversity

Minimize disturbance size/maximize edge

- possibly leaving small pockets of undisturbed habitat within larger disturbance blocks (topsoil pile edges, belts adjacent to roads/pipelines)

Keep adjacent areas undisturbed

Maximize diversity in seed mix (grasses, forbs, shrubs, subspecies)

Consider:

- planting forb/shrub islands
- altering seed row widths/species planted in rows
- use variable seed planting depths (seeder, seed bed surface, mulch crimping)
- direct haul top soiling for capturing propagules
- planting selected species a year or 2 in advance (staggered seedings)
- use of species that attract animals that are seed dispersers or pollinators

Important Considerations

Maximizing diversity may reduce overall productivity (e.g., grasses vs. forbs)

Early dominance by grasses may limit successful establishment of some seeded species and re-colonization by natives from adjacent areas (suggests importance of grazing to reduce grass competition)

Reclaim may have similar dominant species but will likely lack rare species

Inability to acquire seeds of commonly occurring native species (forbs) let alone site-specific genotypes

Consider seed survival issues (herbivory [ravens, small mammals]; germination timing [young plant freezing])

Fertilization, particularly N, will promote productivity of a few species, but will likely be detrimental to species richness (best to have reclamation site fertility match the natural fertility condition)

2014/07/26

Important Considerations

Non-persistent invasive species (natives and non-natives) may impart reclamation benefits and promote diversity in the long term (grazer avoidance, wildlife attractants)

Invasive species and some species in mixes can alter nutrient cycling

Weed occurrence/dominance can alter reclamation site diversity through competition

Weed control efforts (herbicides) can adversely affect survival of seeded and invading native species

Questions

