Revegetation: Seeding Essentials for Reclaiming Disturbed Lands

Rachel Mealor
Extension Range Specialist
Department of Renewable Resources
Where we are headed

• Designing a seed mix
• Seedbed preparation
• Using the best planting methods
Revegetation

• Challenging
  – Low/variable precip., thin soils, steep slopes, cold and windy climate

• Choose adapted varieties native to site
Designing a reclamation seed mix

• Reclamation Objective
  – Reestablishing diverse native plant community of grasses, forbs, and shrubs
  – Inventory pre-disturbance plant community for setting reclamation objectives and designing seed mix
Designing a reclamation seed mix

- Assess pre-disturbance plant community
  - Determine elevation, annual precipitation, timing of precipitation, growing season length, existing veg., soil depth and texture, and land form characteristics
  - Inventory helps determine ecological site
- ESD is an excellent tool to help in designing an appropriate seed mix for your site
Ecological Site Description

• **Ecological site** = kind of land with:
  
  – specific physical characteristics (soil, topography, climate)
  
  – which differs from other kinds of land in its ability to produce
  
  – distinctive kinds and amounts of vegetation

• In other words, a kind of land with similar natural potential
Ecological sites vary in kind and amount of vegetation.
An ecological site description, developed for Wyoming by the NRCS, is a reliable tool for planning site-specific seed mixes.

- [http://uwyo.edu/WRRC](http://uwyo.edu/WRRC)
  - “Reclamation Information”
Anyone may view reports of approved Ecological Site Descriptions. To view the various reports select a State or MLRA or both and Submit. From the subsequent list, select the ESD you wish to view.

Major Land Resource Areas (MLRA) are a portion of the spatial framework utilized by the Natural Resources Conservation Service in the planning, design, implementation, and evaluation of natural resource management activities. MLRA boundaries reflect nearly homogenous areas of landuse, elevation, topography, climate, water resources, potential vegetation, and soils.

If you need assistance in locating the MLRA, click on the MLRA Explorer link below. The MLRA Explorer is an interactive map-based application of USDA Agriculture Handbook 296. With the tools in this application, you can:
(1) search for your MLRA by entering your State and County,
(2) search for LRRs and MLRAs using a variety of geographical and textual queries.

For questions about this database as a whole, contact:
An ecological site description, can also be found using the web soil survey


• Click on the large Green START button
Web Soil Survey
### Sheridan County Area, Wyoming

<table>
<thead>
<tr>
<th>Map unit symbol and soil name</th>
<th>Ecological site</th>
<th>Total dry-weight production</th>
<th>Characteristic vegetation</th>
<th>Rangeland composition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Favorable year</td>
<td>Normal year</td>
<td>Unfavorable year</td>
</tr>
<tr>
<td>154—Haverdah very fine sandy loam, 0 to 3 percent slopes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haverdah</td>
<td>Lowland 10-14” Northern Plains Precip</td>
<td>3,000</td>
<td>2,300</td>
<td>1,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needle and thread 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slender wheatgrass 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Western wheatgrass 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>155—Haverdah loam, moist, 0 to 3 percent slopes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haverdah, moist</td>
<td>Lowland (15-19 Np)</td>
<td>3,000</td>
<td>2,500</td>
<td>2,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Western wheatgrass 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slender wheatgrass 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needle and thread 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clarkelen</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Drasnak</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Frex, flooded soils</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Gravel bars</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Drasnak</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
Manage and promote what we want or where we want to go.
Long-term success in restoring a species to a given site is dependent upon obtaining plant materials adapted to the site.
Working to design an appropriate seed mix
Selecting your seed mix depends on objectives, characteristics of disturbed area and seed preference and availability.
To assure genetic integrity of seeds there are standards that must be adhered to in order to sell the product as certified seed.

- Not all seeds for sale are certified
- Bags of certified seeds are marked with colored tags
- **Certified tags should have data on genetic identity of seeds, purity and germination**
- Noncertified seeds’ label includes purity and germination data alone
- Genetics to match ecological site!
- Excellent idea to purchase *Certified or Source Identified* (unless from reputable seller)
Two approaches to germplasm development: manipulated track & natural track
Unevaluated germplasm identified to species and location of the wild growing parents (exclusive to the natural track)

**SOURCE IDENTIFIED SEED**

<table>
<thead>
<tr>
<th>Species Name</th>
<th>Sporobolus heterolepis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Name</td>
<td>Prairie Dropseed</td>
</tr>
<tr>
<td>Germplasm ID, Gen.</td>
<td>G3/5</td>
</tr>
<tr>
<td>G3 State, County, Elev.</td>
<td>WI, Dane, 800 ft.</td>
</tr>
<tr>
<td>G0 State, Region, Elev.</td>
<td>WI, Southwest, 790 ft.</td>
</tr>
<tr>
<td>G0 Indigenous?</td>
<td>Yes</td>
</tr>
<tr>
<td>Natural-Track?</td>
<td>Yes</td>
</tr>
<tr>
<td>Lot:</td>
<td>2999-SPOHET-3-SE; 03346</td>
</tr>
</tbody>
</table>

MEMBER OF ASSOCIATION OF OFFICIAL SEED CERTIFYING AGENCIES
Variety/cultivar release if eligibility requirements are satisfied
Purchase and evaluate seed choices based on PLS (pure live seed)
PLS is the product of the purity (percentage of the lot by weight that consists of the crop seed) and percentage germination as performed by an official germination test.

Example:

A 50-pound bag of seed with 90% purity and 90% germination has a PLS percentage of 81 (0.9 x 0.9 = 0.81), and amounts to 40.5 pounds of PLS (50 x 0.81 = 40.5)
Proper seeding rates

• Dependent on type and size of seeds, seeding techniques, soil type, and moisture
• Total of 8-16 lbs./ac for seeding native grass and forb mixture (Monsen and Stevens 2004)
  – Higher for difficult low productive sites and when broadcast seeding
• 20 pure-live-seeds/ft$^2$ for most species and doubling rate for broadcast and difficult sites (NRCS recommendations)
Proper seedbed preparation results when seedbed is free of competition from established weeds, allows for infiltration of moisture (yet does not puddle), and is firm below seeding depth (Monsen and Stevens 2004).
Proper Seedbed Preparation

• No clods more than 2 inches in diameter where a 170 lb. person leaves footprints no deeper than ½ inch (NRCS recommendation)

• Utilize correct tillage implements

• Works best at soil moisture content of about 10-15% (when a weak ball can be formed from soil 2-3 in. below surface)
Ideal Seedbed

• Firm below seeding depth
• Free of large clods and smooth
• No clodding or puddling
• Free from live resident plant competition
• Free of seed from competitive species

Valentine 1989
Lastly: using the best planting methods
Best Planting Methods

• Time planting to optimize moisture
  – Dormant seeding, October 15 and April 15 most effective (soil temp. less than 40 degrees at 2 in. depth)
  – Spring, summer or early fall can be successful, but a much bigger risk than dormant seeding
Best Planting Methods

• Planting equipment
  – Seed drill
    • Fairly flat, smooth seedbed, relatively large seeds
    • On contour and perpendicular to prevailing winds
  – Broadcast seeders
    • Steep slopes or rough terrain, fluffy, uneven or trashy seed and very small-seeded species
  – Hydromulch and hydroseeders
    • Disperse with water or additives (fertilizer); areas with problematic access; not suggested except where other alternatives impossible
Match equipment with seed size, calibrate to **proper depth** of seeding and **seeding rate** for each plant species.

- Most grasses and some forbs – relatively large seeds (higher seeding rates, relatively few seeds per pound, and deeper depths)
- Many shrubs and forbs – small seeds
- Higher rate is recommended for broadcast seeding
There are many aspects to seeding success, some of which we have no control.
So much information, so little time.
The Wyoming Reclamation and Restoration Center (WRRC) is an interdisciplinary program housed within the College of Agriculture and works closely with the School of Energy Resources. Our mission is to:

- Train students to facilitate land reclamation and restoration projects based on applied and theoretical ecological principals
- Provide tools and training for the implementation of sustainable land management practices and ecological restoration.
Questions/Comments ???

Please feel free to contact me anytime
phone: 307-766-4139
rdmealor@uwyo.edu