Recipes for Restoration
Context of Climate and Landscape in Western Canada

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SER-WC, AGM, Sep 21, 2019
Restoration
Analogies

Recipes
Restoration Best Practice Concepts
(adapted from SER 2016)

1. Natural reference ecosystem and an understanding of succession and natural variation are the basis

2. Goals and objectives are developed only after a site description

3. Reliable achievement of success means assisting natural recovery by supplementing only where impaired

4. Seeks the highest and best-effort progression toward full recovery of the ecosystem

5. Draws on all relevant knowledge for successful outcomes

6. Underpinned by early, genuine, and active engagement with all stakeholders for successful outcomes
Hydro-seeding
Hydro-seeding

Excellent resources exist.

But not everyone is using these resources.
Hydro-seeding Wrecks
Hydro-seeding Wrecks

Ideally, perennials establish under cover crop

Often the infill desired just doesn’t happen
Hydro-seeding Wrecks
# Roadside Seed-mix Standards (B.C.)
(adapted from Ministry of Transportation & Industry, & FLNRORD)

<table>
<thead>
<tr>
<th>Coastal BC</th>
<th>Interior BC</th>
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<tbody>
<tr>
<td><strong>Fall Rye</strong></td>
<td><strong>Fall Rye</strong></td>
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<tr>
<td>Annual Rye</td>
<td>Perennial Rye</td>
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<tr>
<td>Perennial Rye</td>
<td>Intermediate Wheat</td>
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<td>Intermediate Wheat</td>
<td>Slender Wheat</td>
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<tr>
<td>Creeping Red Fescue</td>
<td>Crested Wheat</td>
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<td>Hard Fescue</td>
<td>Creeping Red Fescue</td>
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<tr>
<td>Timothy</td>
<td>Sheep Fescue</td>
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<td>Orchard Grass</td>
<td>Orchard Grass</td>
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<tr>
<td>Smooth Bromegrass</td>
<td>Canada Bluegrass</td>
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<tr>
<td>Redtop</td>
<td>White Clover</td>
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<tr>
<td>Alsike Clover</td>
<td>Alfalfa</td>
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<tr>
<td>White Clover</td>
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<td>Red Clover</td>
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<td>Red Clover</td>
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<tr>
<td>Birdsfoot Trefoil</td>
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<tr>
<td>Alfalfa</td>
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Cover Crops

Cover Crops (green manure)

Companion Crops

Nurse Crops (facilitation)
Annual Cover Crops (Companion Crops)

Barley (*Hordeum vulgare*)

Oats (*Avena sativa*)

Fall Rye (*Secale cereale*)
Nurse Crops


• Facilitation rare in nature, usually shrubs or small trees “facilitate” herbs, cacti, and woody plants, with tradeoffs.

• Early-emerging herbs “inhibit” late emerging herbs (competition).

• Abiotic structures (rocks, coarse woody debris) better “safe sites”

Nurse Crops in Dry Environments


- Cover crops more often fail to suppress weeds, and succeed in suppressing desired perennials.
- Cover crop competition strong enough to suppress annual weeds, also suppresses desired perennials.


- Oat cover crop on North Dakota coal mine = neutral effect on perennial grass establishment.
Environmental Gradients

Vancouver  Kelowna  Saskatoon
Environmental Gradients

Vancouver

Kelowna

Saskatoon

Steep Slopes
Young Parent Material
Coarse Textured

Steep Slopes
Young Parent Material
Coarse Textured

Gently Undulating Slopes
Old Parent Material
Fine Textured
Seeding Windows

Spring seed perennials
Fall seed “winter cover crop”

Spring seed perennials (risky)
Fall seed perennials (dormant)
Fall seed “winter cover crop”

Spring seed perennials
Fall seed perennials (dormant)
Successional outcomes – Goals & objectives
Use natural references

Supplement where impaired
Questions/Recommendations

1. In the dry interior of BC, should revegetation expertise be coming from the wet coast or the dry great plains?
   a) Similar to coast: steep slopes, coarse soils, winter wet
   b) Similar to great plains: prolonged drought, grassland end-point

2. In the dry interior of BC, what is the relative benefit of seeding a perennial mix? with:
   a) Better site preparation to provide a good seedbed
   b) Annual “fall rye” cover crop as a “nurse” crop for winter erosion
   c) Placement of physical amendments (mulch, rock, CWD) for safe sites

3. Hydro-seeding can cost 10 to 100X that of broadcast seeding, and cost of one failed hydro-seeding operation could pay for 10 to 100 broadcast seeding operations. How are risks of failures assessed and managed?
   a) Better to “make it green” fast for client satisfaction and contract closure?
   b) Better to repeat broadcast seeding for 10 years in different seasons to obtain a mix of establishment dates and infill?