From Seed to Certification – Challenges, Opportunities, and Considerations in Propagating and Deploying Boreal Plants for Reclamation Purposes
Revegetation is not Easy!

Challenges

• The biggest challenge I see impacting success is not having an integrated plan in place

• A revegetation plan must coordinate the timing of various activities
Integration of Timing for Successful Revegetation
In a Perfect World:
The Trifecta for Successful Revegetation

1. A site that has been adequately treated to deal with site limiting factors:
   - Examples
     - Compaction
     - Competition
     - Excessive soil moisture
In a Perfect World: 
The Trifecta for Successful Revegetation

2. Good quality plants or propagules are available at the proper time
In a Perfect World: The Trifecta for Successful Revegetation

3. Capable contractors are available to carry out treatments at the appropriate time
   – planning and prescriptions
   – planting
   – competition control
   – site preparation
   – monitoring
Considerations Around an Integrated Plan

- Species to deploy
- Availability of seed
- Nursery production time
- Site preparation
- Competition control
- Natural regeneration and planting
- Monitoring
Species Selection

- The species you chose must be ecologically suitable to the site it is being deployed on.
- The seed source must be adapted to the geographical area of deployment.
  - Follow provincial seedzones.
Availability of Seed

• When ordering seedlings there is often a good supply available of spruce and pine seed.
• Other tree species and shrubs have limited or no supply available so collections often have to be mounted and this has to be considered in your timing.
## Seed Collection Dates of Some Common Reclamation Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Latin Name</th>
<th>Seed Collection Dates</th>
<th>Seed Stratification Requirement (days)</th>
<th>Plant Growing Time Required prior to Harvest (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>white spruce</td>
<td>Picea glauca</td>
<td>August 15 - September 15</td>
<td>21</td>
<td>170</td>
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<tr>
<td>black spruce</td>
<td>Picea mariana</td>
<td>September 10 - December 1</td>
<td>21</td>
<td>170</td>
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<tr>
<td>lodgepole pine</td>
<td>Pinus contorta</td>
<td>anytime</td>
<td>14</td>
<td>150</td>
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<tr>
<td>jack pine</td>
<td>Pinus banksiana</td>
<td>anytime</td>
<td>14</td>
<td>150</td>
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<tr>
<td>tamarack</td>
<td>Larix laricina</td>
<td>August 15 - September 15</td>
<td>21</td>
<td>170</td>
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<tr>
<td>aspen</td>
<td>Populus tremuloides</td>
<td>May 15 - May 31</td>
<td>0</td>
<td>100</td>
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<tr>
<td>balsam poplar</td>
<td>Populus balsamifera</td>
<td>May 15 - May 31</td>
<td>0</td>
<td>120</td>
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<tr>
<td>white birch</td>
<td>Betula papyrifera</td>
<td>August 1 - September 15</td>
<td>60</td>
<td>120</td>
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<tr>
<td>willow</td>
<td>Salix Spp.</td>
<td>cuttings December 1 - March 31</td>
<td>0</td>
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<tr>
<td>green alder</td>
<td>Alnus viridis</td>
<td>September 15 - October 15</td>
<td>60</td>
<td>100</td>
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<tr>
<td>red oiser dogwood</td>
<td>Cornus sericea</td>
<td>September 1 - September 30</td>
<td>120</td>
<td>90</td>
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<tr>
<td>wild rose</td>
<td>Rosa acicularis</td>
<td>September 1 - February 28</td>
<td>120</td>
<td>100</td>
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<tr>
<td>saskatoon</td>
<td>Amelanchier alnufolia</td>
<td>July 1 - August 15</td>
<td>120</td>
<td>120</td>
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<tr>
<td>buffalobery</td>
<td>Shepherdia canadensis</td>
<td>September 1 - September 30</td>
<td>90</td>
<td>180</td>
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<tr>
<td>raspberry</td>
<td>Rubus idaeus</td>
<td>July 1 - August 30</td>
<td>90</td>
<td>100</td>
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<tr>
<td>Labrador tea</td>
<td>Ledum groenlandicum</td>
<td>September 1 - September 30</td>
<td>0</td>
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<td>chokecherry</td>
<td>Prunus virginiana</td>
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<tr>
<td>pin cherry</td>
<td>Prunus pensylvanica</td>
<td>August 1 - August 30</td>
<td>120</td>
<td>180</td>
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<tr>
<td>low bush cranberry</td>
<td>Viburnum edule</td>
<td>August 1 - September 30</td>
<td>180</td>
<td>170</td>
<td></td>
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</tbody>
</table>
Nursery Production Time

• Different species have different production timelines
  – Willow can be produced quickly
  – Low bush cranberry takes some time

• Seedlings must be planted when they are physiologically ready
# Seedling Ordering and Planting Guideline Chart

<table>
<thead>
<tr>
<th>Stock Type</th>
<th>YEAR 0</th>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
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<tbody>
<tr>
<td></td>
<td>October</td>
<td>November</td>
<td>December</td>
<td>January</td>
</tr>
<tr>
<td>spring 1+0 overwinter</td>
<td>Red</td>
<td>Blue</td>
<td>Green</td>
<td>Blue</td>
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<tr>
<td>summer 1+0 hotlift</td>
<td>Blue</td>
<td>Green</td>
<td>Yellow</td>
<td>Green</td>
</tr>
<tr>
<td>fall 1+0 hotlift</td>
<td>Green</td>
<td>Yellow</td>
<td>Blue</td>
<td>Green</td>
</tr>
<tr>
<td>early summer 2+0 hotlift</td>
<td>Blue</td>
<td>Red</td>
<td>Blue</td>
<td>Green</td>
</tr>
<tr>
<td>P+1 bareroot overwinter</td>
<td>Red</td>
<td>Blue</td>
<td>Green</td>
<td>Blue</td>
</tr>
</tbody>
</table>

Legend:
- **ORDER**
- **STRATIFY SEED**
- **SOW**
- **GROW**
- **COLD STORAGE OR DORMANT**
- **PLANT**
Site Preparation

- Site limiting factors impacting seedling survival and establishment must be dealt with prior to revegetation
Site Preparation for Compaction
Competition Control

• Aggressive vegetation competition is a huge impediment to successful survival and establishment of native plants

• Herbicides and mechanical site preparation should occur prior to seedling deployment
Competition Control
Natural Regeneration

• Natural regeneration considerations
  – Acceptable seedbed
  – Availability of onsite propagules
Planting

• In the absence of onsite propagules planting is the only effective way to revegetate a site

• Planting usually allows for quicker establishment of target vegetation
Native Shrub Propagation

• Most merchantable tree species like spruce and pine can be reliably produced
• Some shrub species can be more challenging to produce
Some Challenges with Shrub Propagation

- Poor availability of seed
- Quicker decline in viability of seed compared to conifers
  - Shorter storage shelf life
- Some shrub seed stores poorly and only germinates well when fresh
- Erratic germination rates
- Some species have long and complicated stratification periods in order to break seed dormancy
Considerations and Opportunities When Using Shrubs

• Have flexibility around a suite of shrub species that may be deployed
  – Mixes
  – Substitutions

• Longer periods of time required to produce some species so more planning is required
Summary

• Must have an integrated revegetation plan where timing of treatments is coordinated
• Make sure site limiting factors are dealt with
• Don’t forget about availability of propagules (mostly seed) and timing to collect if necessary
• Be aware of some of the challenges around deploying shrubs
Integration of Timing for Successful Revegetation