



Plug Project – Exploring Alternative Revegetation Strategies In Southern Alberta

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Agenda

- Introduction
- Revegetation Challenges
- Plug Project Trials
- Moving Forward in 2022
- Questions

Topic: What Salix has found to be a good criteria for a sites success when using plugs as a revegetation method



Salix Resource Management Ltd.

- Environmental Consulting Company
- Based in Sundre, Alberta
- Founded in 2002
- 'Cradle to Grave' Environmental Services
- Large focus on reclaiming Gas Projects in Southern Alberta



Reclamation in Southern Alberta

- High temperatures and low precipitation
- Solonchic and Regosolic soils predominate
- Dry Mixed-Grass Prairie ecotype
- Poor germination rates

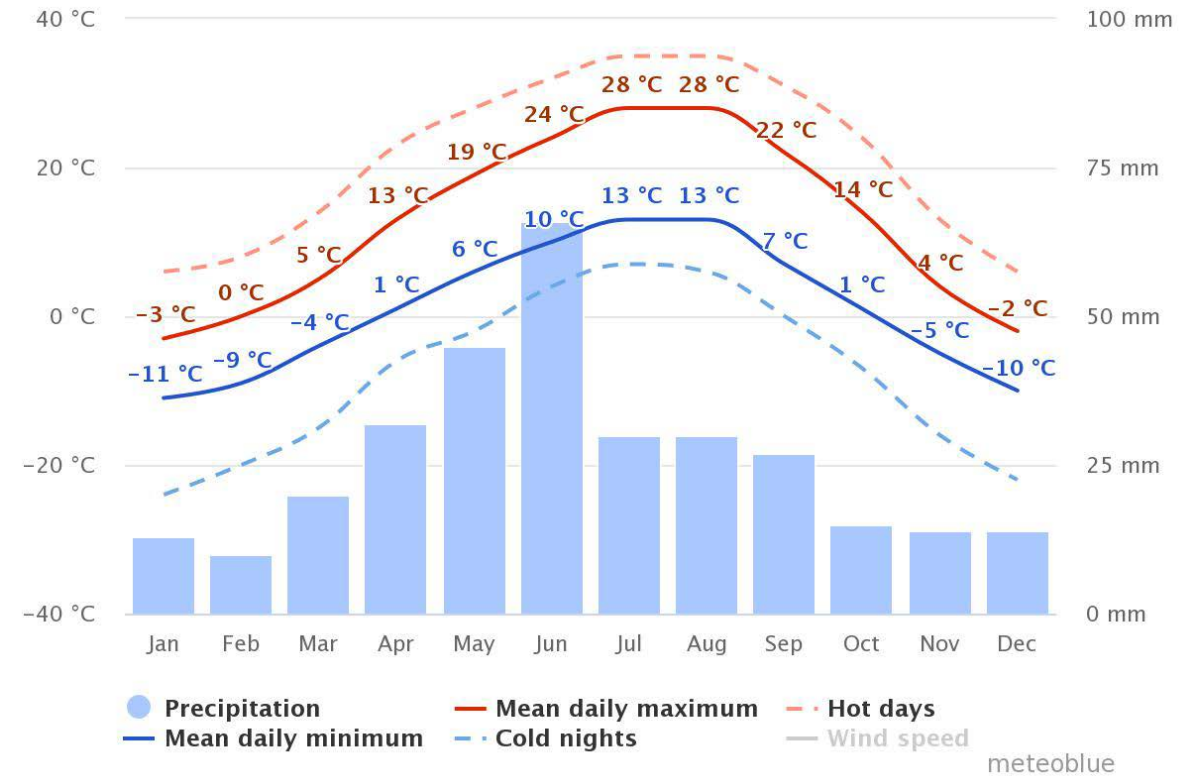


Figure 1: 30 Year Average Precipitation and Temperature in Jenner, AB.

Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/jenner_canada_5986225

The Plug Project Idea

- Combat germination issues by planting live plants
- Add in grown plants as 'mothers' to increase seed production on sparse areas of site
- Help to add native plant diversification
- Attempt to cover newly soil filled areas with grass plugs to start soil processes and revegetate sites 'quicker'
 - Planting mature plants vs waiting for a plant to mature



Plugs

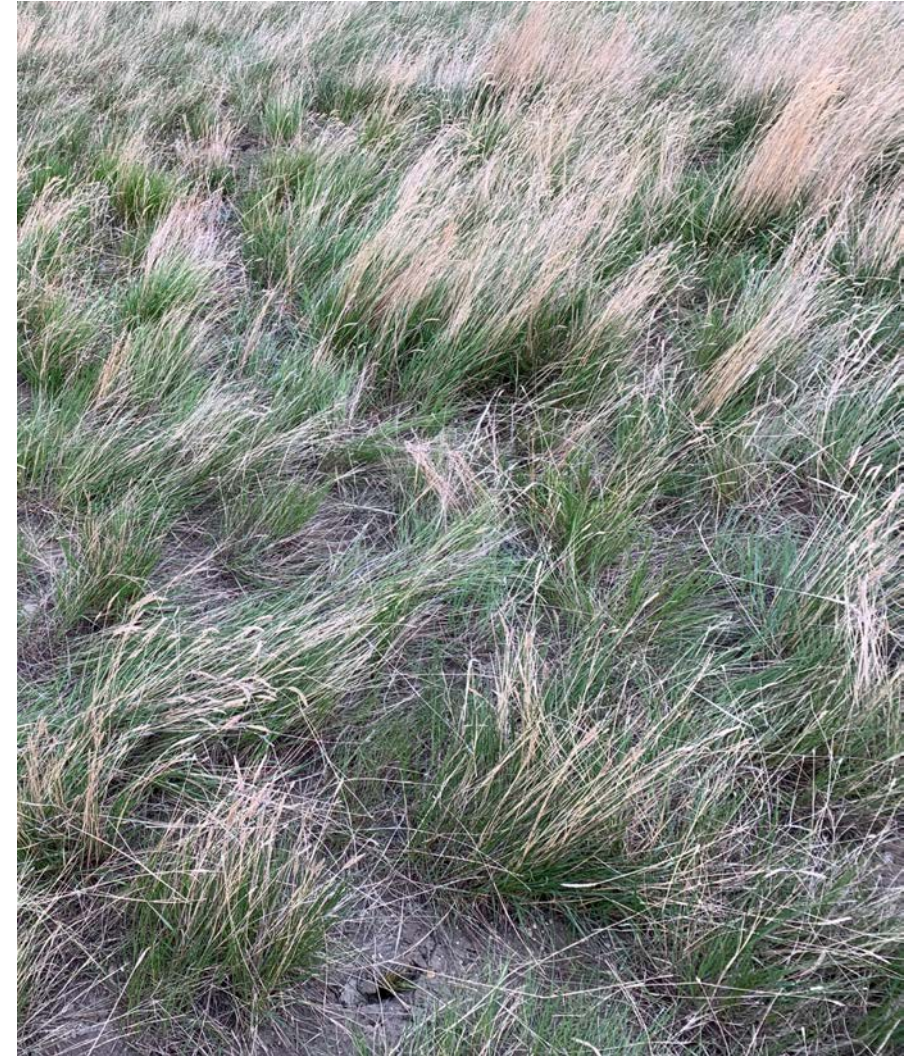
- Grass plugs are developed root and shoot systems grown in a greenhouse environment
- Tools include: a tree planting shovel, hip bags, and a good hat



Source: <https://www.agreforestation.ca/tree-planting.html>

Initial Site Criteria

- A smaller area to fill in onsite
- Sites located on Native Prairie
- Close in proximity to other sites
- Addressed one of our general issues
 - Newly filled with soil
 - Crested Wheatgrass dominates onsite and not offsite
 - Not enough comparable native vegetation cover onsite



Trials

- Trial 1:
 - Revegetation technique: how best to plant the plugs – closer together (grouped)? Further apart (ungrouped)?
 - Selected sites with more bare ground
- Trial 2:
 - If adding vegetation litter (ie. Grass) affects plug success
 - General litter amounts for Southern Alberta from the Range Health Assessment Guide: 250lb/ac
 - Selected sites with lots of litter available, generally those less used by cattle (ie. No dugout nearby)
- Trial 3:
 - How plugs would compete on sites dominated by Crested Wheatgrass
- Planted 3000 plugs over 51 sites



2018 © Peter M. Dziuk

Source: <https://www.minnesotawildflowers.info/grass-sedge-rush/needle-and-thread-grass>

The Planting Plan

- Planted 60% Needle and Thread (*Stipa comata*), 20% Blue Grama Grass (*Bouteloua gracilis*), and 20% Junegrass (*Koeleria macrantha*) in a 8 plugs/m² density
- Used previous site visit comments to estimate number of plugs required
- Example: Comment says “Sparsely vegetated in a 2x3m area”
 - $2\text{m} \times 3\text{m} = 6\text{m}^2$
 - $8\text{ Plugs/m}^2 \times 6\text{m}^2 = 48\text{ plugs}$ at a 3:1:1 ratio
- Adjust numbers as required
- Planted mainly on a community pasture where cattle were delayed from grazing until June



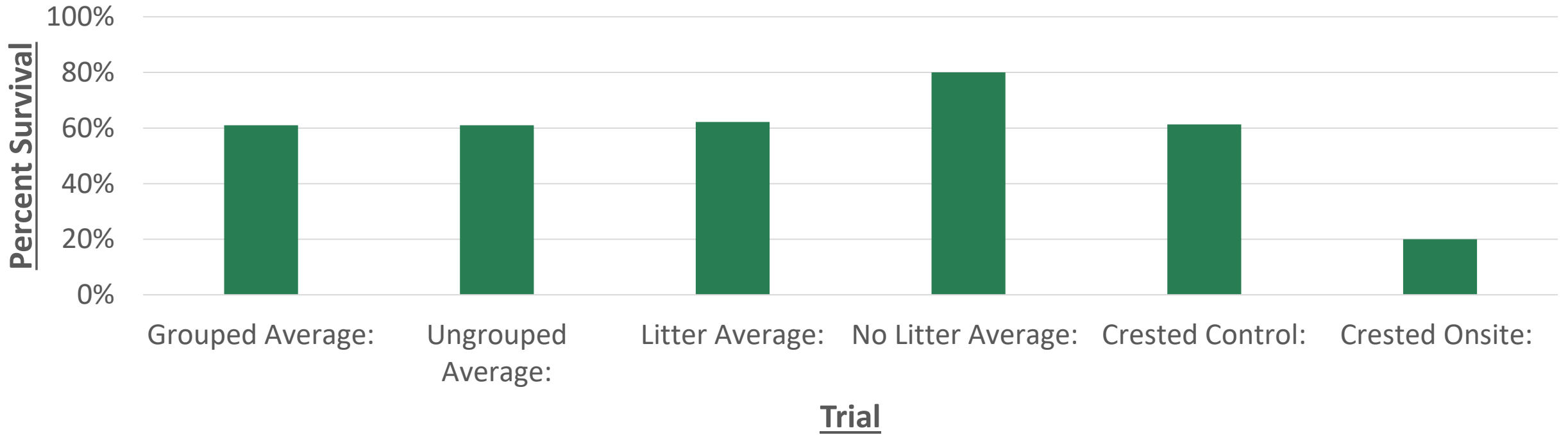
How We Measured Success

- Most difficult part
- Took lots of pictures in the Spring and revisited the sites in the Fall
- Tried plastic rings on the plants



2020 Results

Plug Survival



- Total of 51 sites planted, 8 passed the 2020 DSA process

2020 Observations



- Junegrass (*Koeleria macrantha*) was the grass species observed to survive best
- The sites that had fresh soil fill – almost all the plugs died
- Sites that were mainly crested wheatgrass had poor survival



Challenges

- Time available between other projects
- Wildlife
- Estimating number of plugs required – always have extra sites



Moving on in 2021

- Reduced number of grass species and chose heartier, disturbance tolerant species
 - Junegrass (*Koeleria macrantha*) and Western Wheatgrass (*Agropyron smithii*)
- Mostly chose sites that were not freshly filled, had some minor cover on them, did not have crested wheatgrass, and were close in proximity to other sites
- Still kept some experimental sites
- Used pinfinder to exact well center to photograph before and after to determine success
- Attempted to use Coyote Urine granules to deter cattle
- Expanded project to cover 114 sites with 12, 000 plugs



Before



After



Fall Follow up: 6% plug survival

Before



After



Fall Follow up: 50% plug survival

Challenges

- Timing with other field season projects
- People Management and Consistency
- Unpredictable weather
- Livestock
- Wildlife



Continuing in 2022

- Continuing with Junegrass (*Koeleria macrantha*) and Western Wheatgrass (*Agropyron smithii*)
- Salix now comments in their updates on sites that would be good for plugs
- Trimming the plugs before planting



Why Continue

- We have seen some success
- An addition to the revegetation strategies for Southern Alberta
- Unpredictable weather
- Two years was not enough time



Summary

- 2020: The design
- 2021: Refined and adjusted
- 2022: Continuing forward
 - Adding new experiments such as spraying high density Crested Wheatgrass before planting
 - Trimming the plugs before planting

What Salix has found to be a good criteria for a sites success when using plugs as a revegetation method:

Sites with no Crested Wheatgrass, some vegetation established, and are not in high cattle use areas



Thank You





References

- Adams, B.W. et al. (2016). *Rangeland Health Assessment Guide for Grassland, Forest, and Tame Pasture*. AEP, Rangeland Resource Stewardship Section.