

# **Ecosystem Restoration and Unexpected Outcomes**



# Order of Presentation

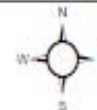
- Pilot trial conducted as part of University of Victoria Restoration of Natural Systems Program
- Site description and historic background
- Restoration Target
- Methodology
- Observations
- Outcomes
- Managing for Invasives

# Purpose of Study

- Do rooted plugs of *Salix spp.* and *Populus balsamifera* have a higher survival rate when planted with compost as a soil amendment, than rooted plugs planted without treatment?



## TRIAL PLOTS



● Pine Tree

○ Study Area



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Aerial Imagery (2006) obtained from Yukon Geomatics.

NAD 83 UTM Zone 8N



1:10,000 (when printed on 11 x 17 inch paper)

# History of Range Road Dumpsite

1940-1945	Used as disposal site for American and Canadian Forces during WWII
1945	Abandoned when American Forces demobilized
1950-1975	Used as municipal landfill by City of Whitehorse
Early 1990's	Some reclamation work and capping done by DIAND
1997	CoW hosts annual Yukon River clean-up
2004	Justin Munro solicits support from MP Larry Bagnell and community
2005	Official clean-up project initiated; Ta'an Kwach'an project involving EDI

# Preparation of Site



# Capping Material and Organics



# Coarse Woody Debris



# Restoration Target and Goals

- *Salix spp.* and *Populus balsamifera* dominated landscape similar to adjacent reference ecosystem and over time, will advance to late succession *Picea glauca* dominated forest
- Want to jump start vegetative cover to match, or eventually match the surrounding natural landscape



# Method

- Two 10m x 10m plots were delineated and staked
- Planting density of 1 rooted plug/2 m<sup>2</sup>
- One plot untreated, one plot treated with locally sourced compost

# Method and Treatment

- One half litre compost used for each rooted plug; half worked into hole and half used to top dress after plug was planted
- Untreated rooted plugs planted same as treated plugs minus the compost
- Treated and untreated plots were watered immediately after plugs were planted

# Site Conditions at planting time



# June 2010

Untreated

Treated



# September 2010

Untreated

Treated



# August 2011

Untreated

Treated



**July 2010**



# August 2011

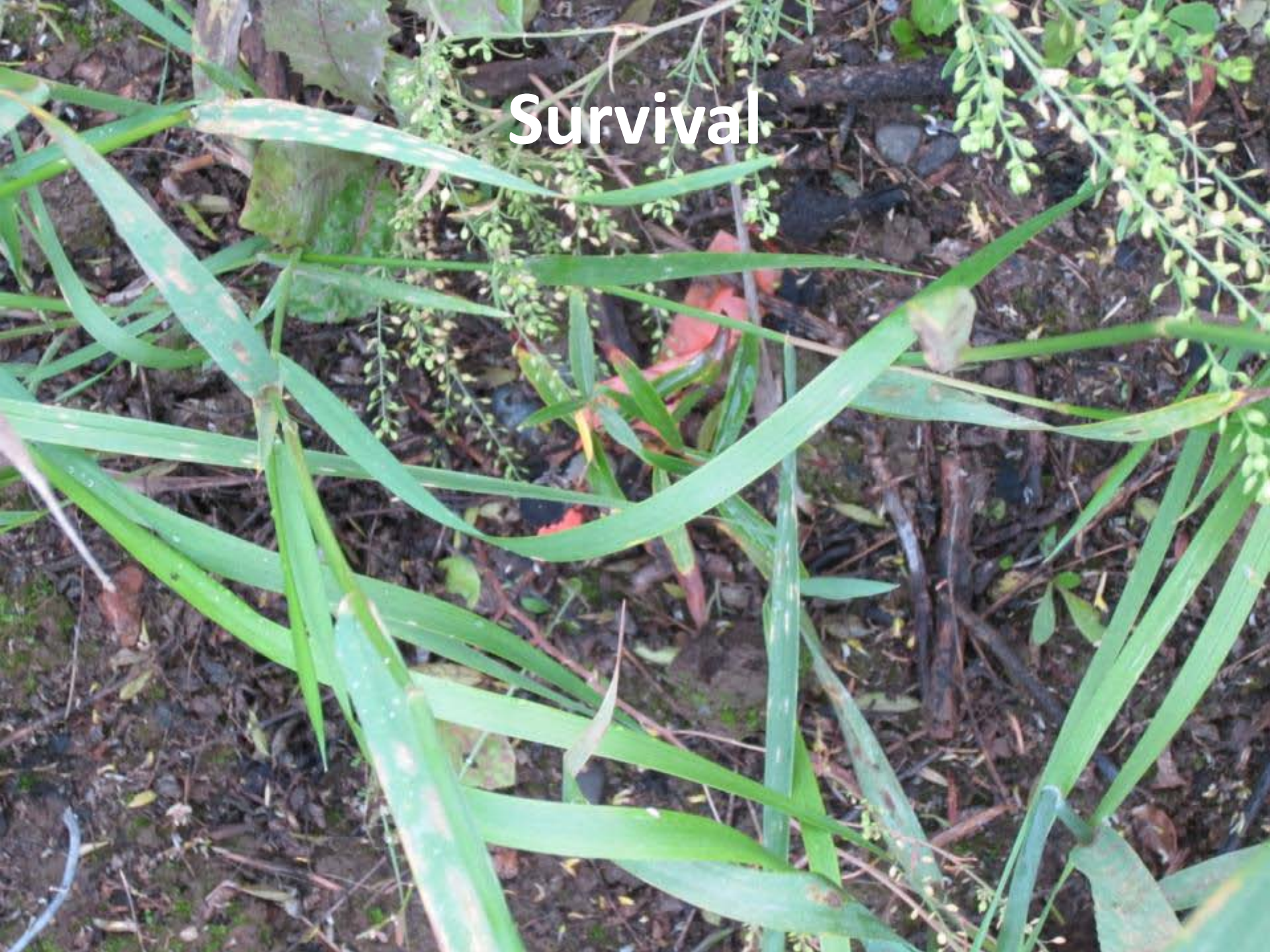


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# Rooted Plug Survival



Survival



Survival



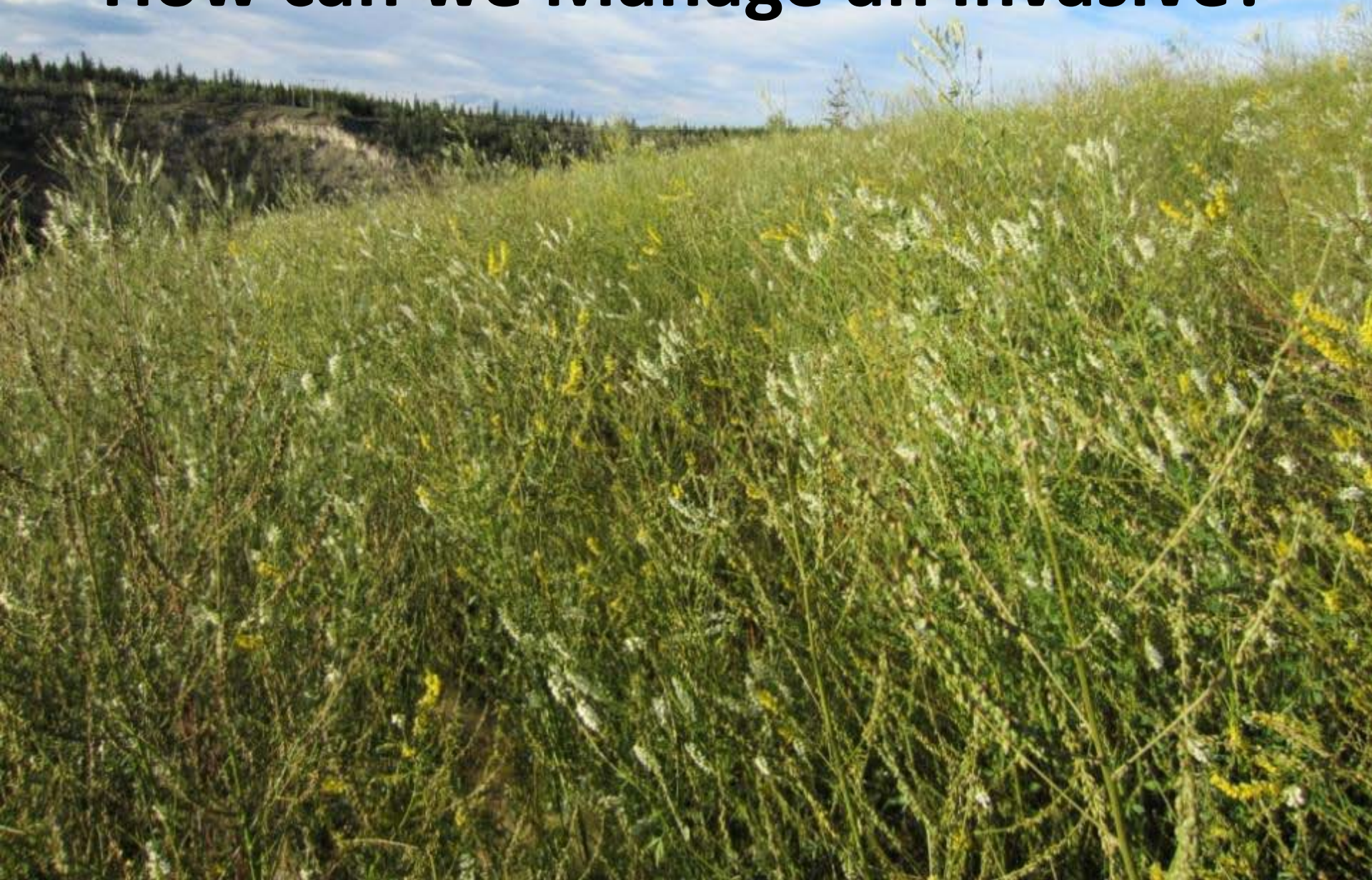
# Monitoring Success

<b>Trials</b>	<b>Number of Trees Planted</b>	<b>Number of Trees Found</b>	<b>Alive</b>	<b>Dead</b>	<b>%Survival</b>
Untreated	50	28	6	22	12%
Treated	50	31	8	23	16%

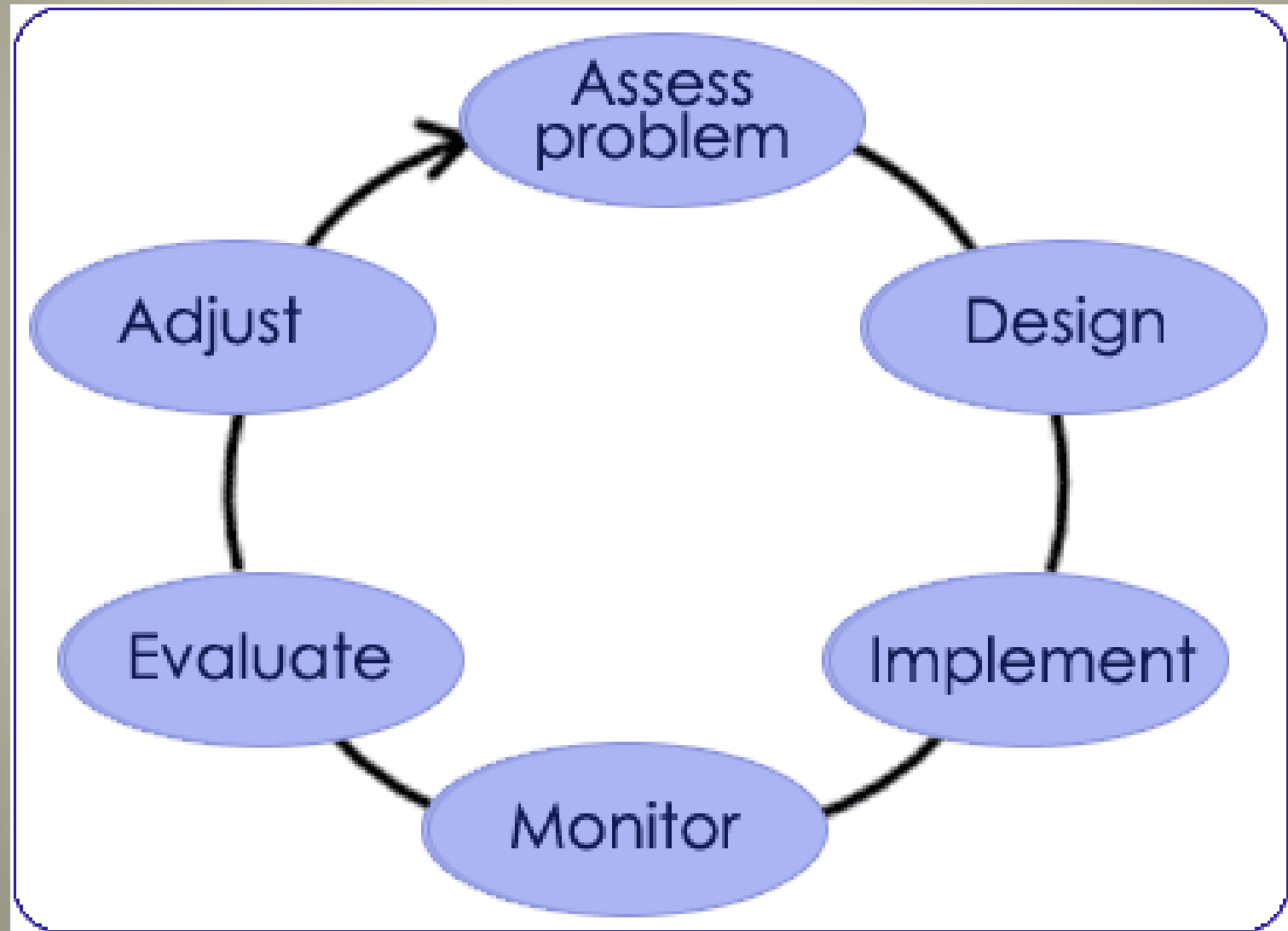
# Conclusion

- How much of an impact did the weeds have on survival of rooted plugs?
- Did the treatment work, or not?
- Suspect invasive species confounded data
- New study needed to see if it was the invasives
- Duplicate trial; control weeds

# How can we Manage an Invasive?



# Adaptive Management Framework



# Assess- Autecology of Sweet Clover

- Biennial forb, quick growing
- Shade intolerant
- Grows well on calcareous and alkaline soils and does not like acidic soils
- Fixes nitrogen; produces large amounts of biomass
- Vulnerable mid- late summer when energy reserves are low; after this time, energy is allocated to rapid root growth

# Design and Implement

- Collect soil data
- Create soil condition that will favour native reclamation species but not sweet clover
- Add soil nutrients
- Shade cover – Environmental resource patches will create mosaic on the landscape
- Sow faster growing competitor or companion plant

## Fire

- Prescribed annual burns show some success

# Monitor

Short Term:

- Delineate plots to record tree survival

Long term monitoring (20yr)

- Evaluate management plan – is succession advancing or is it arrested?

# Evaluate and Adjust as Required



# Plan Ahead

- Incorporate an invasive species management plan into future restoration projects
- Ensure all material is weed-free (seeds to soil)

# Good News

- A recent Alaskan study on invasive sweet suggests two species of native legumes have a high-tolerance to sweet clover competition
- Ongoing monitoring and management will ensure trees survive and over time will create forest canopy

# References

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# Thank you

