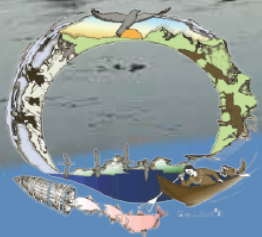


Active forest management as a means for climate change adaptation in the boreal forest

**Approaches to Adapting to Alaska's Rapidly Warming Climate
February 23-25, 2022**

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Forestry Director**



Tanana
Chiefs
Conference

Outline...

- Presentation started from a request to discuss the planting of exotic tree species in Alaska in response to climate change. We'll discuss that, but...
- Will focus on the somewhat broader questions of some forest management practices and active management in response to climate change.
- Resisting by Taking Action...

What is “Active Management”?

- Prescribed actions to manipulate vegetation to enhance some “value”; improve forest conditions or productivity, increase resiliency, recover from or prepare for some catastrophe or disturbance, etc.
 - Timber
 - Wildlife Habitat
 - Water
 - Recreation
 - Reduce risk: Hazardous fuels mitigation
- In the case of Forestry, this manipulation focuses on trees.
- In response to climate change, the goals can be things like maintenance of ecosystem resilience and diversity.
- Use of silvicultural methods and forest management practices:
 - Timber harvesting
 - Prescribed fire
 - Timber stand improvement; thinning, pruning, weed control
 - Reforestation – planting, seeding, tree improvement programs

Forest Management Options for Climate Change

- Do nothing (deny)
- Silvicultural measures to promote resiliency (resist)
- Select and breed for adaptive traits within species/populations
- Promote natural migration and gene flow
- Gradually change species and seed sources for reforestation or restoration in anticipation of warming or in response to problems (assisted migration)

The Boreal Forest:

- Limited number of native tree species. Commercial interest focused on one species (white spruce)
- But – great variety of site conditions
- Very dynamic – driven by disturbance, especially fire.
- Climate change, a disturbance factor in and of itself, also affects other “standard” disturbances like fire.
- Permafrost and its effect on soil moisture and temperature has great effect on species growth and distribution; also greatly vulnerable to climate change effects.
- In terms of the whole landscape, very little in terms of current active management.

Traditional Forestry

- Assumption is that local trees are best adapted to local conditions.
- Even when using artificial regeneration methods (planting, direct seeding), it has been preferred that seed source used is local. Seed Zone maps provide guidelines. (Alden, 1991)

In the context of climate change, this may not be adequate or appropriate.



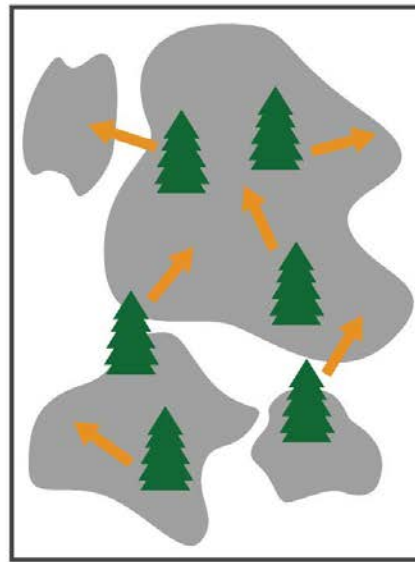
Reforestation as a Climate Change Adaptation Technique:

- Goal: To use a seed source that is genetically adapted to future climate conditions.
- Moving genetic material from one location to another, or “Assisted Migration”
- Trying to use the inherent genetic variability already present in tree species.

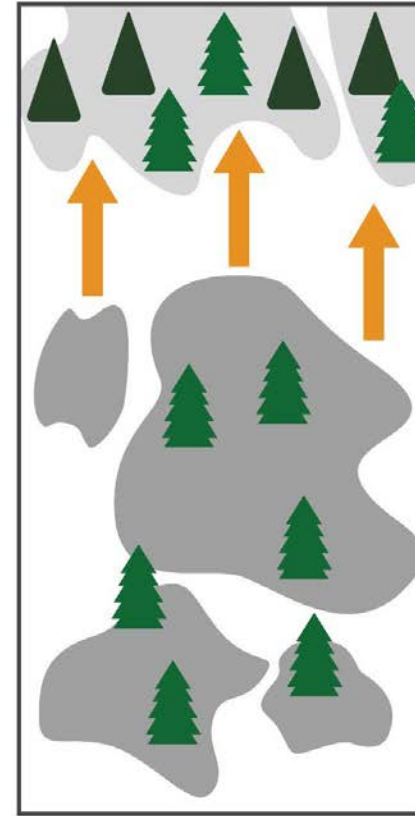
Assisted Migration

Assisted Migration can take several forms.

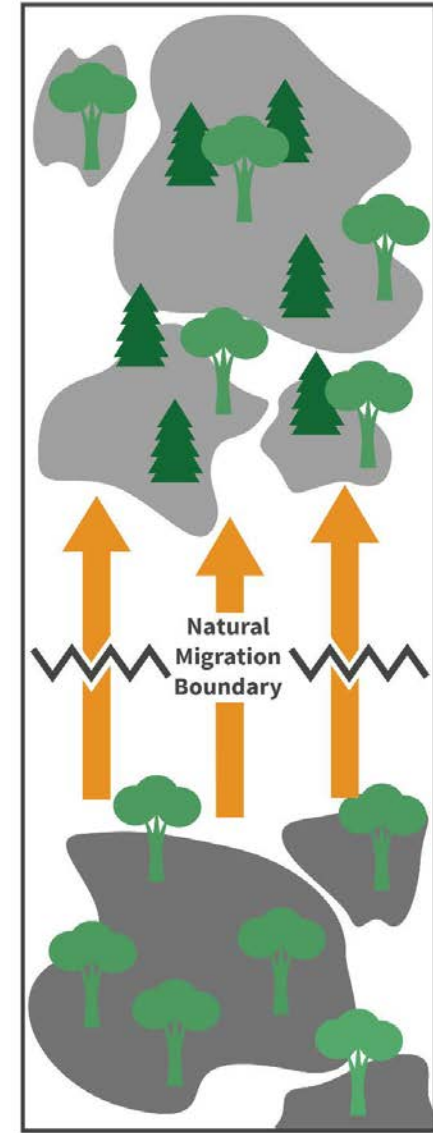
- Assisted population migration, local
- Assisted range expansion
- Assisted species migration



Assisted Population Migration



Assisted Range Expansion

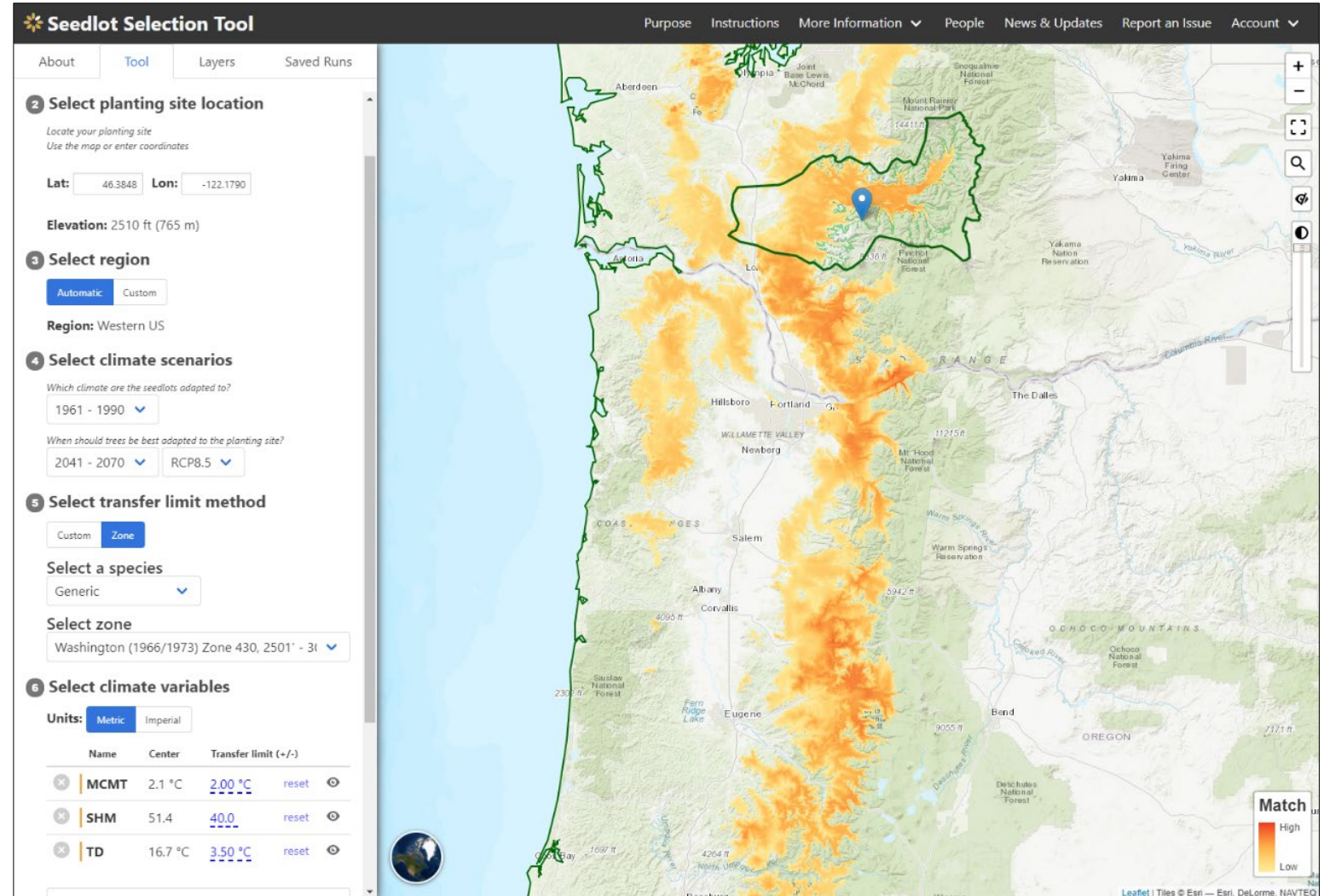


Assisted Species Migration

Assisted Migration – an interesting tool: Seedlot Selection Tool

From Brad St. Clair,
USDA Forest Service
PNW Research Station

<https://seedlotselectiontool.org/sst/>



Assisted Migration: Non-native trees

- NOT a new idea.
- Usually thought of in terms of increasing the options of commercial tree species.
- In Alaska, most commonly tried in the past with lodgepole pine and Siberian larch.
- Probably the most research on this in Alaska done by John Alden in southcentral and southern interior Alaska, with numerous trials.
- Some operational outplantings on State land.



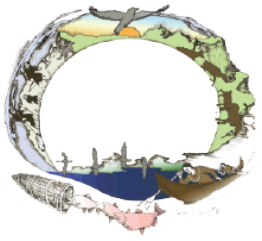
Non-native tree species: possible risks

With any non-native species, there is the risk of it becoming naturalized and displacing native species and disrupting ecosystems. Alaska example: Chokecherry (*Prunus*).



And, the act of introducing non-native species also presents the risk of introducing invasive insects pests and diseases.

Thank You!



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