Evaluating use of assisted population migration during reforestation for climate adaptation

Rob Slesak, Research Forester (PNW Research Station)

And many, many others

USDA Climate Hubs
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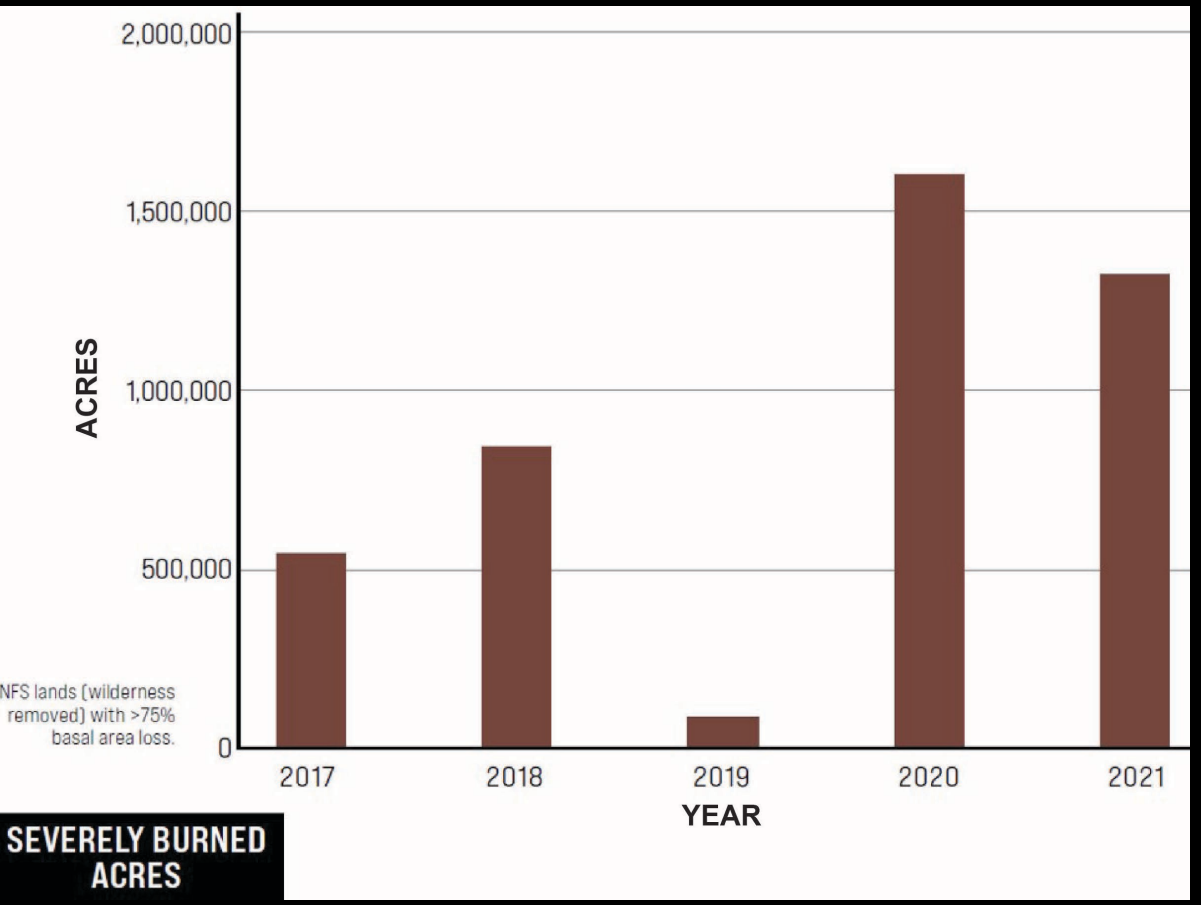
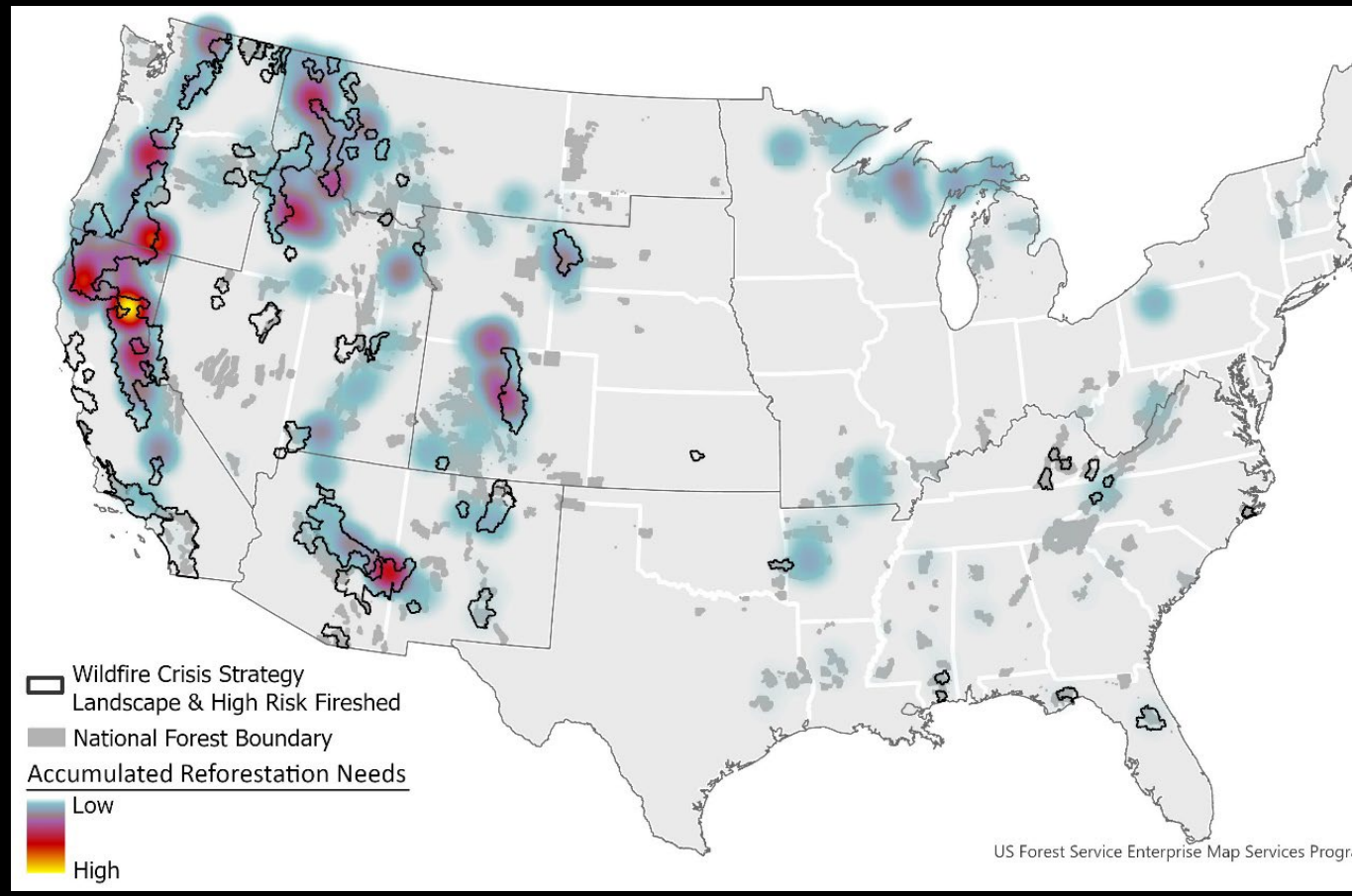
WWETAC
Western Wildland Environmental Threat Assessment Center

American Forests™

Reforestation needs are at a critical level



Source: NFS Reforestation Strategy



Source: Olivia Fraser, WO Reforestation team

Achieving reforestation success

Two components:

1. Short term establishment
- Immediate threats to survival and growth

2. Long-term resilience
- Future-adapted species and genotypes

What should I plant and how should I plant it?

In general, trees are adapted to the climate where they are found

Adaptation issue: identify where that climate will exist in the future

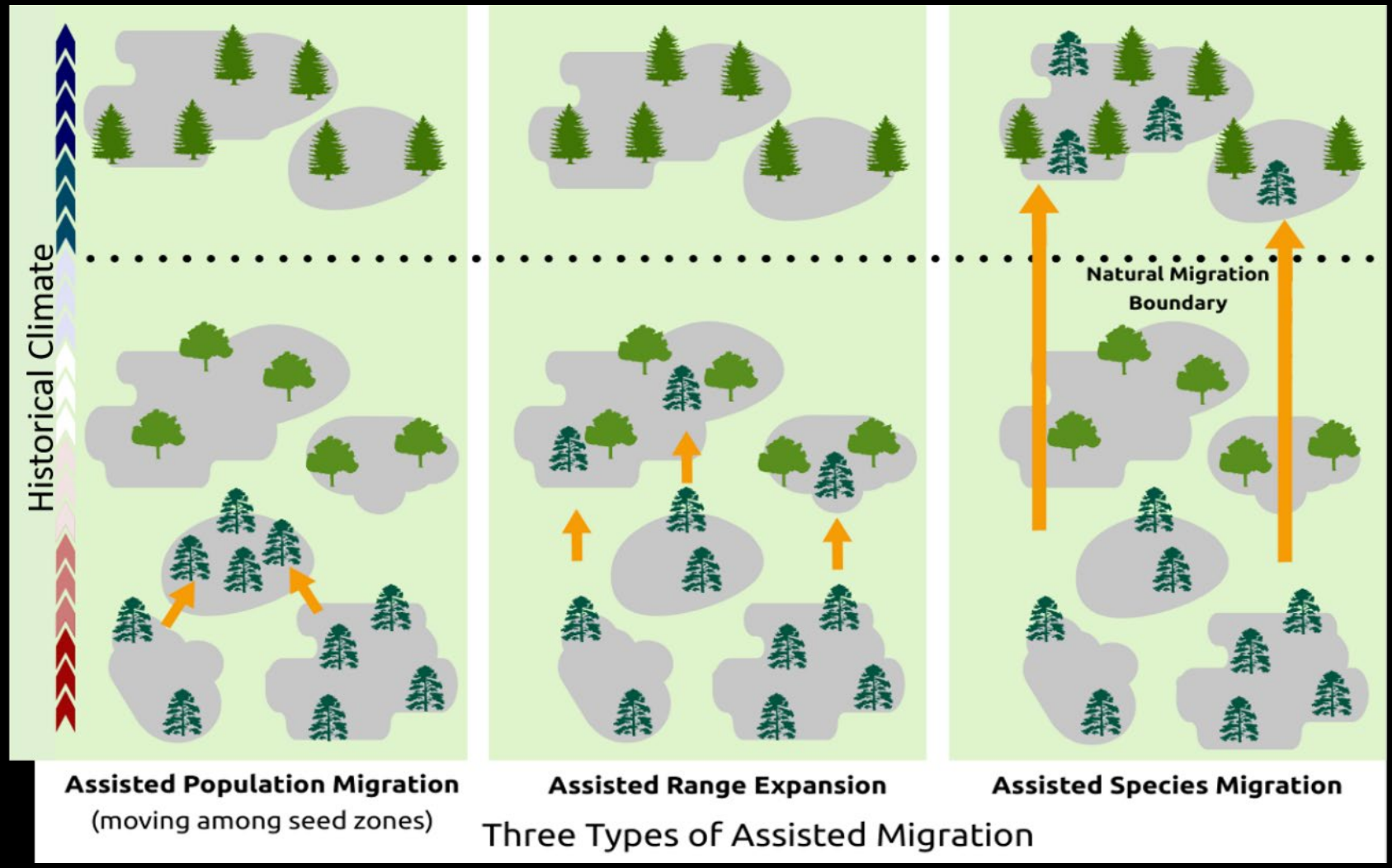
Greg O'Neil

Assisted migration

Population migration – movement of seed sources to new locations within an existing range

Range expansion – movement of populations just outside their range

Species migration – movement outside the range, farther than naturally possible



Challenges to operational implementation

- Knowing on how far is too far to move in climate space
- Getting the trees to survive until climate change aligns with their population climate niche
- Hesitation at doing something new (uncertainty)
- Barriers – logistical, policy, and administrative

Establishment practices are an important aspect

Practices to increase the likelihood of survival

Much existing research, but novel applications are needed

What practices are needed for reforestation using APM?

Experimental Network for Assisted Migration and Establishment Silviculture (ENAMES)

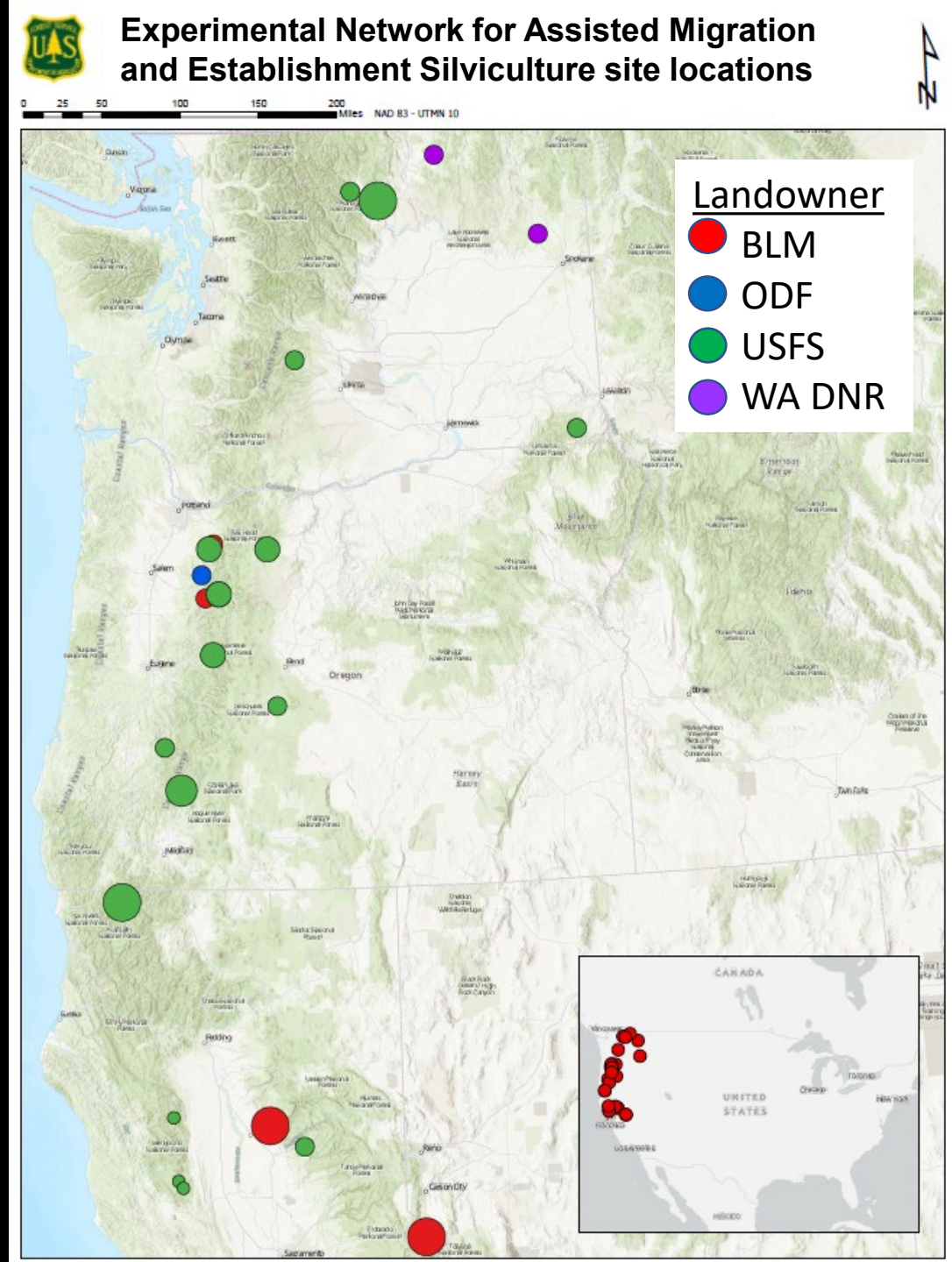
Overarching objective: provide information on what seed sources to plant and the establishment practices needed for reforestation success

- Multidisciplinary
- Multiownership
- Coproduction with practitioners

Designed to be directly relevant to operational application

Overview

- 30+ sites (CA, OR, WA)
- All ownerships
- Any setting of interest (salvage, underplant, etc)
- Any tree species of interest
- Fully replicated at each site



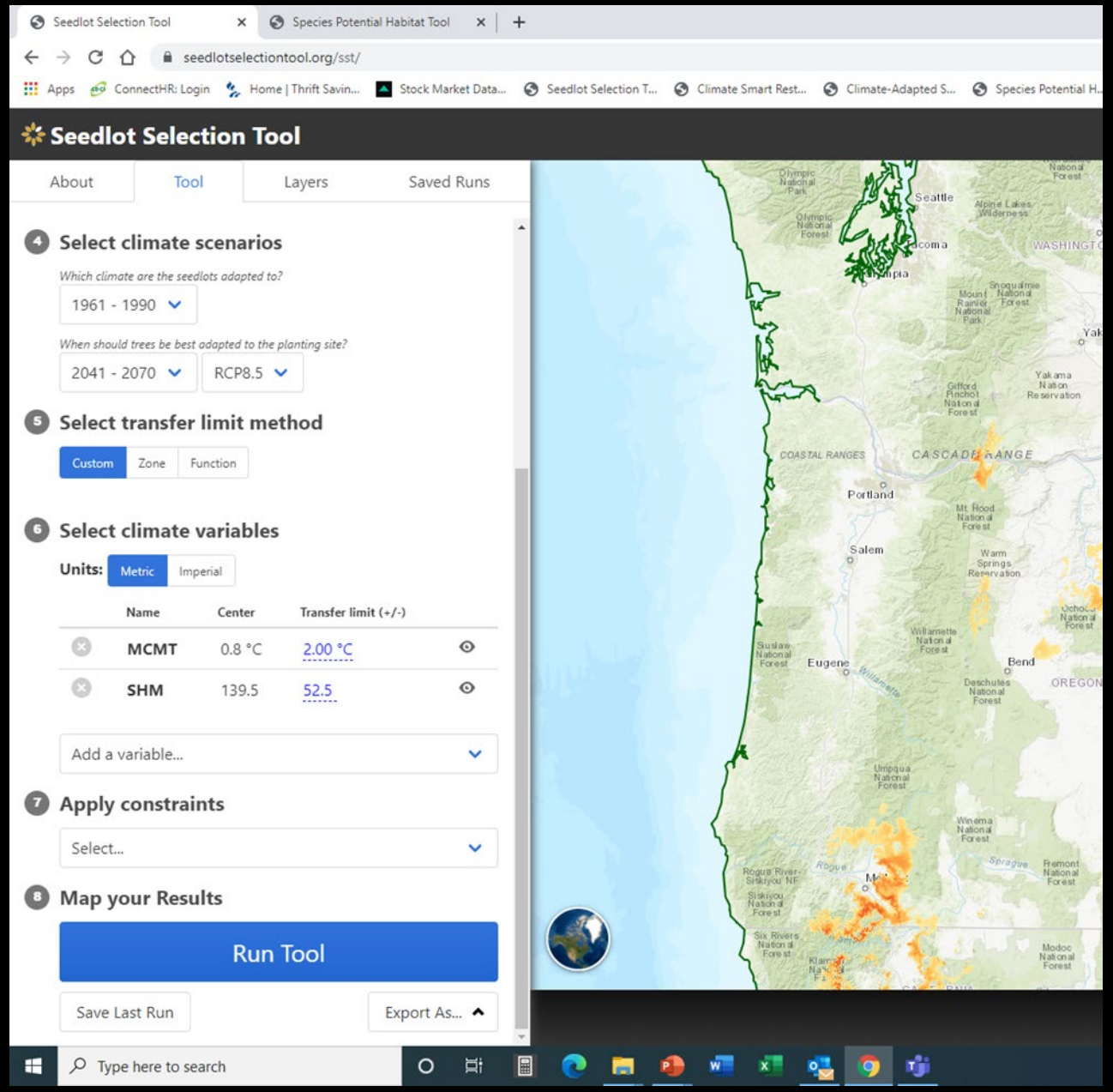
Experimental design: Assisted migration

Common treatments across sites

Seedlot selection tool to ID seed sources
https://seedlotselectiontool.org/sst/

Four climate-associated genotypes

- Historic climate / seed zone
- Current climate (+1 ℃)
- Mid century climate (+2 ℃)
- End of century (+4 ℃)



Experimental design: Silviculture practices

- Variable treatments that reflect differences in management intensity

- Partners determined which treatments to test at a given site
  - relevant to their objectives
  - specific information need

- Practices to date:
  - stock type
  - competition control
  - planting density






Science Engagement

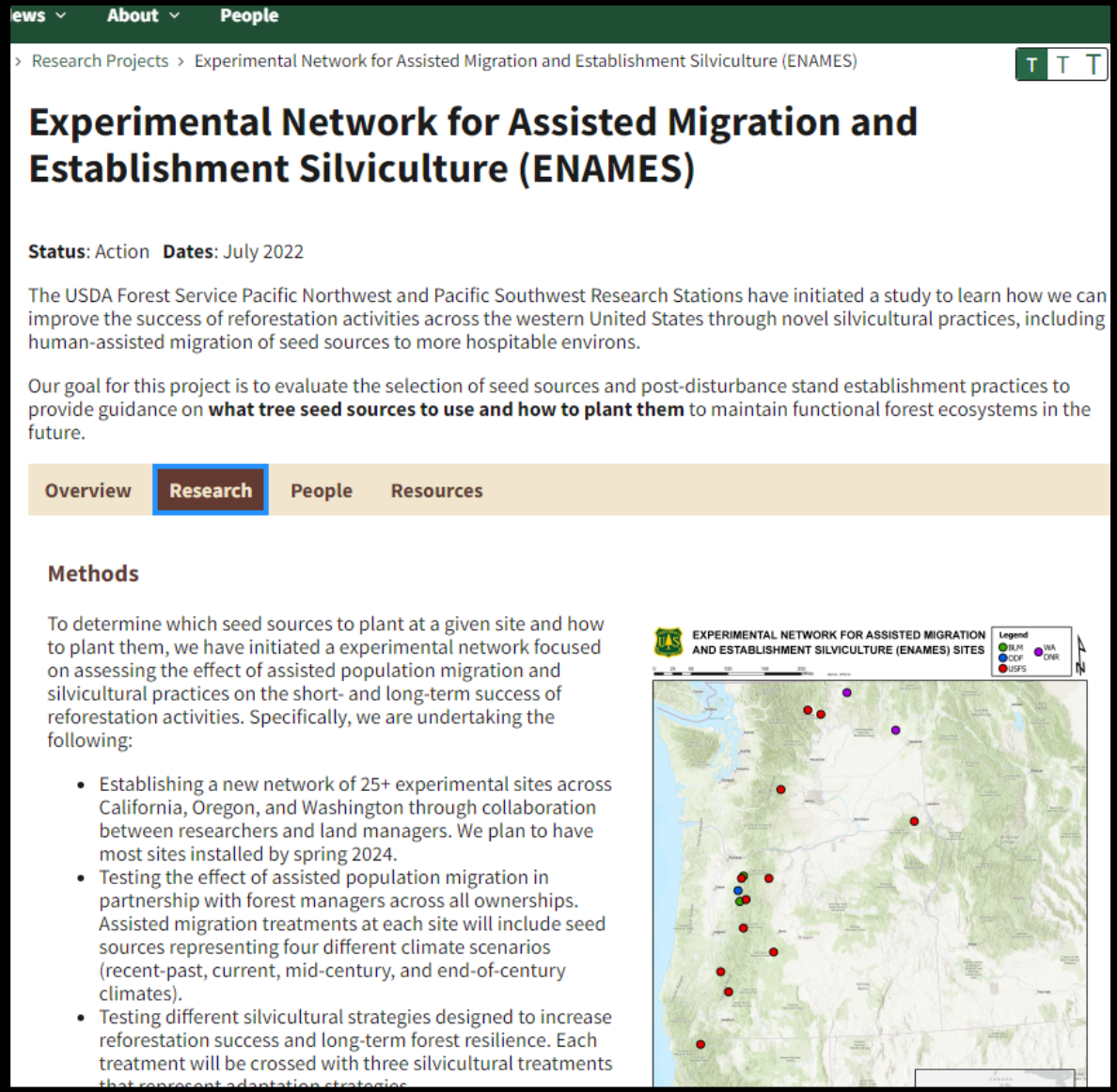
Engagement with stakeholders and the public is a core objective

Website interface attached to database

- Data uploading / storage
- Data summarization / visualization

Content features

- Assisted migration overview
- Reforestation case studies
- Topical briefs / summaries
- Site story maps



https://www.fs.usda.gov/research/pnw/projects/enames#research

Outcomes

Removing barriers to operational use of APM during reforestation

- Recommendations on climate transfer distances for each species
- Recommendations on establishment practices needed for APM success
- Easily accessible /intuitive website for dissemination of network findings and information to assist managers in decision-making

Questions?

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McKenzie District, Willamette NF. March 24, 2023
Photo by Scott Kolpak