

# Reforestation: trees for the future

The Experimental Network  
for Assisted Migration and  
Establishment Silviculture (ENAMES)



## The toll on forests is increasing

Conditions are changing in forests at an unprecedented rate. Climate change, drought, and high-severity wildfire are killing trees and threatening forests in many parts of the western United States. There is currently a 4-million-acre backlog of formally forested lands in need of replanting, and the pressure to start reversing this trend is building. The Biden administration announced plans to replant trees on millions of acres through provisions in the Bipartisan Infrastructure Law, which directs the USDA Forest Service to plant 1.2 billion trees in the next decade.

## Better information will improve replanting success

However, the very conditions that created this urgency could hinder replanting efforts if seedlings can't survive after planting and thrive into adulthood because of climate change. In other words, rapid changes in climate could be outpacing the rate of natural plant adaptation and migration. Previous

research and experience have given us the knowledge needed to start taking action, but there is still uncertainty about what seedlings to plant and how to plant them so that they survive increasingly harsh conditions following planting. With better data and information, we can greatly increase the success of reforestation efforts and improve long-term resilience of forests to changing conditions.

## The Experimental Network for Assisted Migration and Establishment Silviculture (ENAMES)

To maximize the effectiveness of replanting efforts, the USDA Forest Service Pacific Northwest and Pacific Southwest Research Stations are initiating a new study focused on assisted population migration and silviculture. Assisted population migration refers to the movement of seed sources or populations of a particular species from their existing location to new, currently cooler locations within their habitat range.

← These Douglas-fir seedlings will be planted as part of a reforestation effort at the site of the 2020 Santiam Fire on the Willamette National Forest. USDA Forest Service photo by Rich Cronn.

Our goal is to match the seed source to the future climate of the planting site, without moving it so far that trees suffer cold damage in the near term. We are evaluating silvicultural practices to determine which will increase short-term seedling survival and promote a forest structure that is resilient to a changing climate. These practices, applied at the time of planting, include things like planting larger seedlings than typical, reducing competition from other vegetation, and reducing planting density so that more resources are available to fewer trees.

## Building a network to enhance knowledge

To address questions about which seed sources to plant at a given site and how to plant them, ENAMES is being implemented on a range of forest ownerships across the western United States. Specifically, we are undertaking the following:

- Establishing a new network of 20 experimental sites across California, Oregon, and Washington through collaboration between researchers and land managers. We plan to have most sites installed by spring 2024.
- Testing the effect of assisted population migration in partnership with forest managers across all ownerships. Assisted migration treatments at each site will include seed sources representing four different climate scenarios (recent-past, current, mid-century, and end-of-century climates).
- Testing different silvicultural strategies designed to increase reforestation success and long-term forest resilience. Silvicultural treatments are determined through a collaborative process with partners, and then crossed with each assisted migration treatment to represent a gradient of adaptation strategies.

**“We absolutely need this information about seed sources and climate change because more and more we are going to run into trouble with seed sources not working any longer.”**

*—Pacific Northwest land manager*

Plans are underway to replant this site on the Willamette National Forest, which was burned by wildfire. USDA Forest Service photo by Jessica Wright.



## The mutual benefits of partnership

In the interest of covering a wide range of conditions and management objectives, the study team is partnering with forest landowners and managers across all ownerships. We want to ensure that the practices we are testing are relevant to operational management, aligned with forest landowner objectives, and commensurate with the resources available to achieve them. The design of the study is applicable to a wide range of tree species, site and post-disturbance conditions, and ownerships.



## Making connections and sharing information

The 20 experimental network sites will serve as a foundation for assisted population migration research across the region and nationally for many years to come. Over time, the network will provide information on the practices best suited for reforestation under changing conditions. We plan to develop a system to share readily accessible data and data visualization tools to promote information sharing.

The partnership between managers and researchers is a core tenet of the entire project. The purpose in developing this approach is to increase the efficiency, utility, and visibility of research efforts related to assisted population migration and stand establishment practices. Our vision is for the network to serve as a nexus that will bring together researchers, land managers, and policy makers to exchange ideas and information that can help guide the implementation of findings and support adaptive management into the future.

← A tree seedling planted as part of a reforestation effort on the Plumas National Forest. USDA Forest Service photo by Jessica Wright.

The ENAMES project spans from southern California to northern Washington and includes all ownerships—at a much larger scale than has ever been attempted for such studies.



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JANUARY 2023

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