Moving towards coordinated reforestation: Reflections from the 2025 Reforestation Summit

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Introduction

On January 15, 2025, American Forests and Planscape convened the 2025 Reforestation Summit at the Google.org offices in San Francisco, California, U.S. This collaborative event combined American Forests' decades-long experience in post-fire reforestation planning and implementation with Planscape's innovative, community-driven forest restoration planning platform. The objective of the summit was to initiate the development of an integrated reforestation tool(s) to support an end-to-end pipeline approach to post-fire reforestation. The summit brought together more than ninety leading scientists—both in-person and virtually—from across the United States to advance the state of reforestation science and practice (Figure 1). We first provide a brief summary of the 2025 Reforestation Summit, then describe the decision support tools (DSTs) that were discussed at the summit, and lastly discuss the next steps and challenges for building out an integrated reforestation tool(s).

The Reforestation Summit

American Forests and Planscape organized the 2025 Reforestation Summit to strengthen a national community of practice focused on post-wildfire reforestation planning, fostering collaboration, knowledge exchange about technical information transfer between land management and current science (Olsen et al. 2024), and critical appraisal to spur methodological innovation. We assessed and synthesized the current state of scientific understanding in post-fire reforestation planning and implementation with over 20 leading experts giving oral presentations for their current research (these presentations were recorded and are accessible via the Planscape website). Next, we discussed key gaps in knowledge and research critical to advancing reforestation strategies and implementation plans. Finally, we discussed how to merge state-of-the-field reforestation science with practitioner needs to create an integrated reforestation tool(s), including strategies for sustainable funding and scalability.

The next section highlights key DSTs currently used in the Western U.S. to guide reforestation planning (Table 1). These tools are designed for use by land managers today and will also help shape the development of new, open-source, end-to-end reforestation tool(s) for the continental U.S. (CONUS).

Figure 1. A breakout group that focused on how to incorporate recent scientific findings and decision support tools into an end-to-end reforestation tool.

Decision support tools for reforestation planning

Identifying the appropriate DSTs for a specific reforestation planning context can be challenging for land managers. Existing reforestation DSTs currently are not integrated under a single digital platform, creating challenges for understanding the relevance of individual DSTs for specific contexts, and for integrating DSTs to support a broad suite of reforestation planning for all steps of the reforestation pipeline (Fargione et al. 2021; Dobrowski et al. 2024). One of the main goals for the summit was to discuss how key DSTs could be integrated to offer users a streamlined workflow—from seed source identification through outplanting and monitoring. We focus here on currently available DSTs and their relevance for key themes in reforestation including genetics and assisted gene flow, the relationship between drought and increased fire hazards, the wildland-urban interface, building climate resilience, and seedling survival. The list below contains those tools discussed at the summit, and is not an exhaustive list of all post-fire planning and reforestation tools in use in the U.S.

- Climate-Adapted Seed Tool (CAST)

CAST supports climate-adapted seed selection by matching seed sources with anticipated climates at planting sites. The tool uses models built with common-garden and forest-inventory data to estimate carbon sequestration, timber production, relative productivity, and survival (Stewart et al. 2024; Aitken & Bemmels 2015).

- Land Treatment Exploration Tool (LTET)

Co-produced by the U.S. Geological Survey (USGS) and Bureau of Land Management (BLM), the LTET is a publicly available tool designed to assist resource managers with restoration and rehabilitation planning (Pilliod et al. 2018; Pilliod et al. 2023). The primary audience for the tool are stewards working in rangelands in the western U.S., though many data layers have wall-to-wall coverage across the western U.S. Dozens of treatment, ecological, and climatical data sources are provided and a subset are automatically summarized. The LTET also taps into a wealth of information from legacy land treatments implemented by the BLM, and users can learn from past actions to make informed future plans. The dynamic, site-specific Site Characterization and Seasonal Ecological Drought Reports support resource managers to create ecologically appropriate treatment plans.

- Postfire Conifer Reforestation Planning Tool (PostCRPT)

PostCRPT models the probability of natural conifer regeneration following wildfire and assists in identifying areas where active reforestation may be required for forest to return. It integrates postfire regeneration and seed production datasets with maps of estimated fire severity, post-fire seed production and dispersal, and other environmental variables (Stewart et al. 2021).

- Postfire Reforestation Success Estimation Tool (PReSET)

PReSET predicts postfire reforestation outcomes in Sierra Nevada mixed-conifer forests, aiding decision-making around resource allocation (Sorenson et al. 2025).

- Southern Rockies Reforestation Tool (SRRT)

SRRT is a Google Earth Engine (Gorelick et al. 2017) application that helps to identify potential sites for planting of *Pinus ponderosa* and *Pseudotsuga menziesii* in the Southern Rocky Mountains. It develops fire severity maps within a selected area and overlays them with predictions of natural tree regeneration (Rodman et al. 2020). Prioritization is based on (1) the availability of nearby seed sources and (2) environmental suitability, with optional criteria for slopes and road access (Rodman et al. 2022).

- RegenMapper

RegenMapper predicts postfire recruitment probabilities and climate suitability for six key conifer species across the western U.S. It integrates wildfire perimeters, fire severity (MTBS or user uploaded), climatic water deficit (TOPOFIRE; Holden et al. 2019), potential soil surface temperature (Holden et al. 2024), and seedling survival datasets (Davis et al. 2023; Holden et al. 2022).

- Seed Source Scouting Tool (3ST)

This tool ranks the seed zone/elevation bands of a tree species' range into various categories of risk and nursery priority, to help identify where to allocate cone crop scouting prior to seed collection (Thorne et al. 2025).

Together, these tools represent a diverse and rapidly evolving ecosystem of DSTs. Their integration would aim to improve usability, consistency, and effectiveness in post-fire reforestation planning, starting in the western U.S.

Table 1. List of decision support tools (DST) discussed at the 2025 Reforestation Summit.

DST	Extent	Species/Plant Communities
Climate Adaptation Seed Tool	CA, OR, WA, ID, & NV	ABCO, ABMA, PICO, PIJE, PIPO, PSME
Postfire Conifer Reforestation Planning Tool	CA, OR	Multiple Ecological Classifications
Postfire Reforestation Success Estimation Tool	CA	Yellow Pine and Mixed-Conifer Forests
Southern Rockies Reforestation Tool	CO, NM, WY	PIPO, PSME
RegenMapper	Western USA	PIPO, PSME, LAOC, PIEN, PICO, ABLA, ABGR
Land Treatment Exploration Tool	Western USA	Multiple Ecological Classifications
Seed Source Scouting Tool	CA	PIPO, PSME

*Species abbreviations: ABCO: *Abies concolor*; ABGR: *Abies grandis*; ABLA: *Abies lasiocarpa*; ABMA: *Abies magnifica*; LAOC: *Larix occidentalis*; PIEN: *Picea engelmannii*; PICO: *Pinus contorta*; PIJE: *Pinus jeffreyi*; PIPO: *Pinus ponderosa*; PSME: *Pseudotsuga menziesii*.

Challenges ahead

The effectiveness of DSTs depends not only on their technical capabilities but also on long-term maintenance, accessibility, and user engagement. Successful deployment of these tools requires sustained collaboration across multiple domains. During the summit, tool stewardship, interoperability, and long-term support emerged as central challenges because reforestation tools need continued maintenance and development to address potential reforestation areas as burn scars are mapped and made publicly available, while maintaining a collaborative approach to adjusting methodology as further advancements in the reforestation community emerge. The use of R packages where individual research labs could update and/or integrate functionality could be a useful collaborative approach. In addition, building trust among public agency specialists, land managers, and local stakeholders is essential.

Establishing DST credibility and improving user uptake requires trust in tool accuracy and field relevance through co-development, pilot testing, and transparent documentation. Increasing trust and buy-in must include a multi-pronged approach to field validation performance for different ecosystems and landowners. This approach involves integrating remotely-sensed and *in-situ* data streams for incorporating near-real time conditions into planning, collaborating with regional experts, practitioners, researchers, and partners to confirm that model predictions align with ecological realities. Climate change, particularly drought, has nearly doubled expected forest fire area (Abatzoglou and Williams 2016). This changing environment means plants suitable for reforestation today under current conditions may not survive future conditions. Therefore, seed selections must target both current and expected future environments (Aitken and Bemmels 2015). Marginal areas where success is projected to be low may consider alternative species more suitable for prevalent and projected environmental conditions (Bothwell et al. 2021). Since fire severity is increasing with climate change, managers may also consider selecting more fire-tolerant genotypes within a species (e.g., Hernandez et al. 2022) and/or more fire-tolerant species (Pellegrini et al. 2017). Furthermore, since the majority of forest fires are initiated by humans in the western U.S. (Balch et al. 2017), fire risks associated with human presence may inform reforestation strategies to minimize future exposure and/or susceptibility to anthropogenic ignitions. Integrating data from field surveys, including mobile-based data collection platforms, can help refine planning models and provide regional specificity that can be validated through test plantings that compare actual performance against predicted performance. These types of adaptive tools in both the management and evolutionary sense provide important flexibility that enables reforestation tools to be applied across a broad range of complex, post-disturbance landscapes.

Finally, maintaining cloud-based, open-access platforms is costly and logistically complex. Long-term support structures—potentially involving public-private partnerships—will be essential to ensure the longevity and equitable access of reforestation tool(s).

Next steps

A Reforestation Steering Committee will be assembled by American Forests to assess what DST developments—such as addressing additional steps in the reforestation process, integration between existing tools and data sources, and decision support frameworks that account for multiple competing priorities—have the greatest promise for improving reforestation outcomes. This effort is critical because, while DSTs highlighted during the summit represent considerable progress in planning for reforestation projects, several critical gaps remain for integrated end-to-end reforestation planning. One is a lack of integration across planning strategies. DSTs often address isolated components of the reforestation process—such as seed sourcing or site selection—but few offer seamless transitions between these stages. The development of a unified platform, or integrations between tools focused on different steps in the reforestation process, would be useful to support coherent, actionable workflows from planning through implementation and evaluation. Additionally, models need to address regional, species-specific, and other scale-related constraints, because model inference is constrained to the geography, forest types, and/or species on which the models were trained. Scaling these approaches to encompass the diversity of ecosystems across CONUS will require extensive model development and adaptation and will require expansion of base data representing various forest and woodland types. A malleable user experience with widespread accessibility for all users will help progress broader adoption by practitioners and land managers. Therefore, the reforestation tool(s) must be intuitive, well-documented, thoroughly validated, and accompanied by clear guidance materials. Usability testing, training workshops, and technical support will be essential to lowering barriers to entry. Scalable funding and institutional support from organizations outside of American Forests and Planscape will be necessary to secure stable, long-term funding to continue the maintenance and development of the reforestation tool(s).

Building durable partnerships across public agencies, research institutions, and the private sector is critical to ensure continuity and innovation to address the growing reforestation need in our forests.

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