



Reforestation Strategy for the Tree Mortality Task Force

Submitted by the Forest Health and Resilience Working Group of
The Governor's Tree Mortality Task Force
June 2018

The Forest Health and Resilience Working Group of the Governor's Tree Mortality Task Force was charged with development of a reforestation strategy to address the unprecedented deforestation caused by bark beetles in the Sierra Nevada mountains. To this end, the Working Group has developed a set of actions that the partner entities of the Tree Mortality Task Force can implement that will result in informing, assisting, encouraging, and completing reforestation projects on private, nonindustrial forestlands in California.

The target beneficiary for this strategy is private, non-industrial forestland owners in California impacted by high levels of tree mortality, particularly in the central and southern Sierra Nevada. The expected outcome is to improve the availability of reforestation and restoration resources for this same audience.

This strategy provides information on post mortality site evaluation and monitoring, basic concepts of site preparation, reforestation, and maintenance of young plantations. It also provides links to resources, including public financial and technical assistance programs. Finally, it promotes cooperation and communication between agencies, universities, businesses, landowners and other cooperators.

Evaluation and Monitoring

Tree mortality from drought and bark beetles is not distributed evenly across time or space. Using mortality patterns to inform reforestation solutions will enable us to target those forested landscapes most likely to require active intervention. By identifying private, non-industrial forestlands in areas of greatest mortality we can 1) focus outreach efforts to those landowners most likely to need information, assistance, or incentives; and 2) make the best use of limited funding to achieve future forest health goals.

- The Fire and Resource Assessment Program (FRAP) conducts an annual analysis of tree mortality trends on private, non-industrial forestlands to:
 - Identify total private, non-industrial acreage likely to require reforestation within each heavily impacted seed zone and elevation band to inform speculative sowing orders.
 - Guide public financial and technical assistance efforts (i.e. CFIP, EQIP, CCI, etc.) into areas of highest potential need and success.
 - Use modeling to 1) determine areas most likely to experience type conversions from mixed-conifer forest to shrub and oak/grass/woodland types without active reforestation efforts; and 2) inform landowners regarding the general locations where successful reforestation will be most challenging.

Reforestation Resources

Historic declines in both the availability of seedlings and reforestation assistance for landowners, has limited the number of private, non-industrial forestlands that are being reforested after disturbance events such as drought, bark beetle, or wildfire. Making resources available to the public is critical to increasing the amount of reforestation work being completed.

This part of our strategy focusses on increasing seed and cone collection and the development of climate based seed zone guidelines. The objective is to not only redefine how seeds are distributed across the landscape, but to also increase and diversify where seeds, currently in storage, can be deployed to assist reforestation in critical mortality areas.

- Increase availability of zone-specific conifer seedlings
 - Open CAL FIRE L.A. Moran Reforestation Center nursery to full operating capacity with state of the art growing facilities to accommodate growing at least 300,000 conifer seedlings per year.
 - Nursery will focus on making conifer seedlings available to small forestland owners in areas where tree mortality from insect, disease, or wildfire have significantly impacted forest stands.
 - Nursery will focus on small-scale sowing orders and species not readily available from commercial nurseries.
 - Additional sowing orders will continue to be made in partnership with the El Dorado Resource Conservation District and USFS Region 5 conifer nursery in Placerville for species and volumes not available from the CAL FIRE L.A. Moran facility.
 - Establish yearly speculation sowing orders and make seedlings available to tree mortality and fire impacted areas.

- Increase cone and seed collection efforts in mortality affected seed zones.
 - Increase the amount of survey and follow up review for cone maturity and amounts in the mortality areas.
 - Utilize CAL FIRE Forestry Assistance program staff to increase contacts with landowners in tree mortality areas to increase awareness and gain access to private properties for cone collection.
 - Increase communication with industrial landowners, USFS, other forest land owners, and commercial forest nurseries to increase CAL FIRE's ability to collect cones when they are ripe.

- Review seed bank storage and processing activities and implement changes to bring continuity between USFS R5, CAL FIRE and commercial forest nursery operations.
 - Convene a group of seed experts across California, including researchers, forestry managers, climate experts and USFS/CAL FIRE seed bank staff to explore processing, storage, and dispersion of seeds.
 - Increase cooperation between USFS, CALFIRE and private seed banks to increase capacity for collection and storage of conifer seeds.

- Revise and improve seed zone seed transfer guidelines.
 - Convene working group focused on updating seed zone mapping in California.
 - Encourage and support climate-based seed zone research.
 - Develop climate-based seed transfer guidelines and a GIS-based seed lot selection tool for California.
 - Integrate information needs to support seed zone seed transfer guidelines into cone collection, storage, and processing activities with the goals of increasing transferability of existing seed resources and promoting wider potential collection areas for genotypes under threat.

Reforestation and Forest Management Education

A significant element of this Reforestation Strategy lies in providing education to forest landowners. One of the most compelling requests we have received in the Forestry Assistance Program is landowners asking "IF" they should replant their trees and how to manage what is left following the mortality event. The Tree Mortality Task Force realizes that we need to make a concerted effort to rewrite and revise existing educational documents as well as develop new educational tools focused on forest management under a new and changing climate. The following actions will be taken to help landowners address this challenge.

- Provide climate-based forest management and recovery information on the concepts of resilience, resistance and transition with emphasis on active, informed management.
 - Develop an informational report geared towards private landowners who wish to steer the management of their forestlands towards active engagement with climate change predictions. Management actions and prescriptions will focus on active and informed stewardship of the forest towards a predicted or potential shift in ecosystem growing conditions. Changes in species composition, density management, completing vegetation, harvest regimes, wildfire management, wildlife habitat, landscape-level diversity and resilience to these changes is encouraged. The report will offer specific options and prescriptions for landowners relative to their spatial location in a given landscape.
 - Supplement management information with a site assessment tool that can be used by landowners to identify not only their long-term goals, but a course of action related to climate-based forest management based on the site-specific conditions on their property.
 - Focus prescriptions on the three principles of adaptive silviculture for climate change:
 1. Promote relatively unchanged conditions over time if management goals and site conditions allow.
 2. Allow some change in current conditions, however encourage eventual return to originally identified target conditions.
 3. Facilitate and encourage adaptive responses to changing and predicted conditions.

- Create a Reforestation Guide directed at forestland owners implementing reforestation projects.
 - Include the topics of implementation details of seed selection, seedling ordering, species selection site preparation, planting, number and arrangement of seedlings per acre, protection, vegetation management and follow up actions to promote successful reforestation projects.
 - Encourage reforestation needs on private lands.
 - Provide information on species diversity, recovery and type change, integration with stocking standards and the need for continuation of forest cover to prevent the loss of forestlands across the state.
 - Document needs to stress the importance of private forestlands in relation to forest health and fire safety across the forested landscape.

- Provide planning tools and other resources to landowners wishing to conduct reforestation projects on their own.
 - Provide technical assistance, guidance and directed education, written and in person, on cultural practices needed for successful reforestation and regeneration.
 - Provide landowners with funding for reforestation and development of Forest Management Plans (CFIP, EQIP, CCI grants).
 - Complete a Reforestation Manual for California that includes all aspects of reforestation planning and implementation at all scales.
 - Complete a Reforestation Needs Assessment for California.

- Provide the following resources for managers available on organizational websites, in written form and through cost share programs, grants and workshops:
 - Forestland Site Assessment Tool
 - Plant and seed materials resources (nurseries, NRCS PMC, etc.)
 - Forest management plan framework and link to currently available resources
 - Forest pest and pathogen resources
 - BMPs, Fact sheets and UC Cooperative Extension resources
 - Adaptive Silviculture for Climate Change practices guide.

- Develop educational resources including:
 - Forestland Steward Newsletter articles focused on recovery and management.
 - Consolidation of online tools and resources for landowners
 - Social media posts of information and events
 - The existing Reforestation Story Map focusing on where and how the mortality event occurred, what actions can be taken and how to implement reforestation (see: <http://calfire-forestry.maps.arcgis.com/apps/MapJournal/index.html?appid=3457736fb0dd45f98d41ab4030ebf048>)
 - Press releases when opportunities arise
 - SAF Forestry Helpline
 - Master Gardeners Helpline
 - Reforestation workshops across the tree mortality region
 - California Firewood Taskforce outreach and education campaign “Buy It Where You Burn It” to educate the public about the risks of moving invasive species via firewood.
 - The updated Reforestation Guide for California- this will be a short summary handout or trifold document that will capture the elements of implementing a reforestation project from planning to follow up actions. Includes updated graphics and resource links.

Cooperation and Communication

A key Management Objective of the Tree Mortality Task Force is to facilitate cooperation and communication between state, federal, and local governments and nonprofit organizations to address the vast concerns of communities within the tree mortality regions. It is critical to the success of our endeavors that we continue to collaborate to achieve our goals.

- Continue and encourage active cooperation and communication between entities engaged in forest land management across public and private landscapes.
 - CAL FIRE and others should promote coordination of resources to plan program functions, operations and to share resources.
 - Forest Health and Resilience Working Group and other regional land manager collaborative efforts

- Entities providing resources and assistance to the Reforestation Strategy include:

<ul style="list-style-type: none"> ○ CAL FIRE ○ Natural Resource Conservation Service ○ Resource Conservation Districts ○ Pacific Gas and Electric ○ Caltrans ○ California Conservation Corps ○ Affected Counties ○ Forest Landowners of California ○ University of California Cooperative Extension ○ Society of American Foresters ○ Sierra Pacific Industries ○ California Forestry Association ○ Sierra Nevada Conservancy ○ National Park Service ○ CA Board of Forestry and Fire Protection 	<ul style="list-style-type: none"> ○ Cal EPA ○ Center for Biological Diversity ○ CA Natural Resources Agency ○ CA Council of Land Trusts ○ Sierra Forest Legacy ○ CA State Parks and Recreation ○ The Nature Conservancy ○ California Department of Fish and Wildlife ○ California Department of Food and Agriculture ○ American Forest Foundation ○ One Tree Planted ○ Pacific Forest Trust ○ USFS PSW Research Station ○ USDA Climate Hub
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Accomplishments to date (June 2018)

- 2017- established speculative sowing order of 87,000 seedlings including sugar pine, ponderosa pine and giant sequoia. Seed zones for these trees were selected based on the relative amount of mortality within the 10 high hazard counties affected by the mortality event. These trees were distributed to affected counties as requested. One Tree Planted funded the entire cost of this order which made the trees free of charge.
- 2018- Established a speculative sowing order for 50,000 seedlings consisting mostly of ponderosa pine and 10,000 Douglas-fir. These trees were selected from the mortality affected seed ones and the Douglas-fir were selected to support reforestation efforts in Sonoma and Napa counties. Some of these trees are being grown at the L.A. Moran Nursery.
- Seed Zone group has visited both USFS and CAL FIRE seed banks to review procedures. Comparisons across cone collection data and storage procedures were made and recommendations for coordinating data collection and dissemination were received and accepted by both agencies. Meetings are ongoing between these groups to coordinate yearly cone collection. A Seed Zone Mapping group between the USFS and CAL FIRE has reviewed outside efforts related to climate-based seed transfer databases and tools, and the basis for the CA Seed Zones, including how they were developed, changed and how they could be improved. This group has decided to generate provisional seed transfer guidelines based on climate metrics and not just geographic zones. Efforts will continue to move towards creation of an online seed zone selection tool that combines inventory data with the CAL FIRE seed bank.
- Contract started with USFA Pacific Southwest Research Station and UC Davis for creation of climate based provisional seed transfer guidelines for California.
- Contract started with USDA Climate Hub to draft Adaptive Silviculture for Climate Change practices guide for forested areas impacted by drought and bark beetle mortality. Contract will focus on writing specific prescriptions for forest management based on resistance, resilience and transition of forest stands based on current and predicted climate stressors.
- Provided technical assistance, guidance and directed education in written and personal. formats on cultural practices needed for successful reforestation and regeneration.
- Provided landowners with funding for reforestation and development of Forest Management Plans (CFIP, EQIP, CCI grants).
- Completed a Reforestation Manual for California that includes all aspects of reforestation planning and implementation at all scales. (in peer review now)
- Completed a Reforestation Needs Assessment for CA.
- Completed Reforestation Story Map focusing on where and how the mortality event occurred, what actions can be taken and how to implement reforestation (see: <http://calfire-forestry.maps.arcgis.com/apps/MapJournal/index.html?appid=3457736fb0dd45f98d41ab4030ebf048>)
- Current activities underway or completed at the L.A. Moran Reforestation Center
 - Rebuilding existing greenhouses and glasshouse
 - Construction of new state of the art greenhouse
 - Construction of new cone shed
 - Custom built cone tumbler line and dewinger
 - Purchase of new equipment and supplies
 - Hiring of staff and contractors
 - General repair and upgrade of all facilities
 - Started first crop of trees growing on site since 2003. Includes 10,000 Douglas fir seedlings.