Lake Tahoe Basin

FOREST ACTION PLAN

Protecting Communities
Restoring Landscapes

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THE FOREST ACTION PLAN (PLAN) CONTAINS three overarching strategies that support completing and maintaining all wildland-urban interface treatments, and implementing large-landscape restoration:

1. **Scale up to match the scale of the solution to the scale of the threat.**
   - Develop and Implement Landscape Scale Initiatives
   - Streamline Planning and Permitting
   - Create Powerline Resilience Corridors
2. **Build capacity for all phases of the forest landscape management cycle.**
   - Expand the Restoration Workforce
   - Adapt for Organizational Efficiency
   - Strategically Use Prescribed Fire
   - Increase Restoration Byproduct Utilization
3. **Leverage technology for rapid, large-scale, more efficient implementation.**
   - Launch the Technology Innovation Sprint
   - Improve Decision Making through Better Data Management
   - Enable Rapid Response through a Wildfire Camera Network

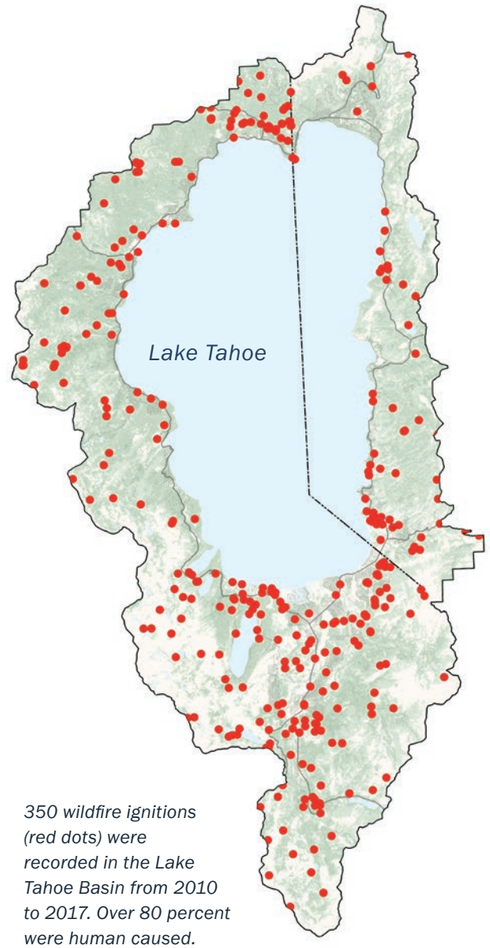
LAST YEAR BROKE RECORDS for the largest, deadliest, most destructive, and most expensive wildland fires. More acres burned in California and Nevada than in any other states. Climate change projections suggest that such levels of destruction could soon become commonplace.

Lake Tahoe straddles the border of California and Nevada, seemingly undisturbed by wildfire. But wildfire, drought, and a potential bark beetle epidemic threaten the communities of the Lake Tahoe Basin (Basin) and the treasured landscape that 24 million visitors enjoy every year.

Responding to the increasing threat to our forests, the partner organizations of the Tahoe Fire and Fuels Team (TFFT) developed this Plan to proactively minimize the growing risk. The Plan charts a path for collaboration across property boundaries to accelerate landscape restoration and community wildfire protection.

The Plan aligns with state and federal plans and mandates that call for increasing the pace and scale of forest management including Nevada's Cohesive Strategy Implementation Plan and Forest Action Plan, California Executive Orders B-52-18 and N-05-19, and USDA Forest Service Region 5's Ecological Restoration Leadership Intent.

LAKE TAHOE BASIN IGNITIONS 2010–2017



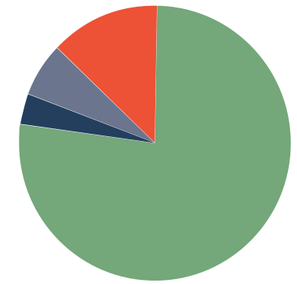
350 wildfire ignitions (red dots) were recorded in the Lake Tahoe Basin from 2010 to 2017. Over 80 percent were human caused.

The Plan implements the Forest Health focus area of the Basin's Environmental Improvement Program, the signature partnership to restore and protect Tahoe's natural resources.

The vitality and resilience of the Basin's natural landscape and human communities have long been inextricably linked. The Washoe Tribe of Nevada and California has a 10,000 year history of environmental stewardship in the Basin. The Washoe Tribe's unique knowledge and guardianship of the Basin and its plants and animals guide and support partner restoration activities.

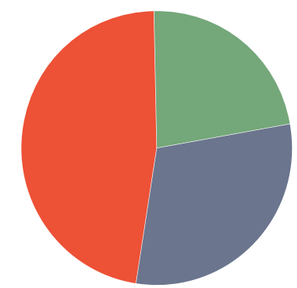
WILDLAND-URBAN INTERFACE TREATMENTS

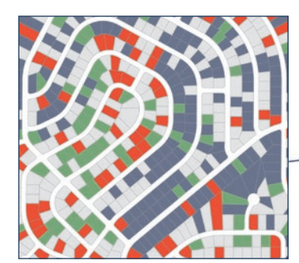
LAKE TAHOE BASIN LAND OWNERSHIP



USDA Forest Service	155,000 ac
State of Nevada	7,000 ac
State of California	13,500 ac
Private & Local Government	28,000 ac

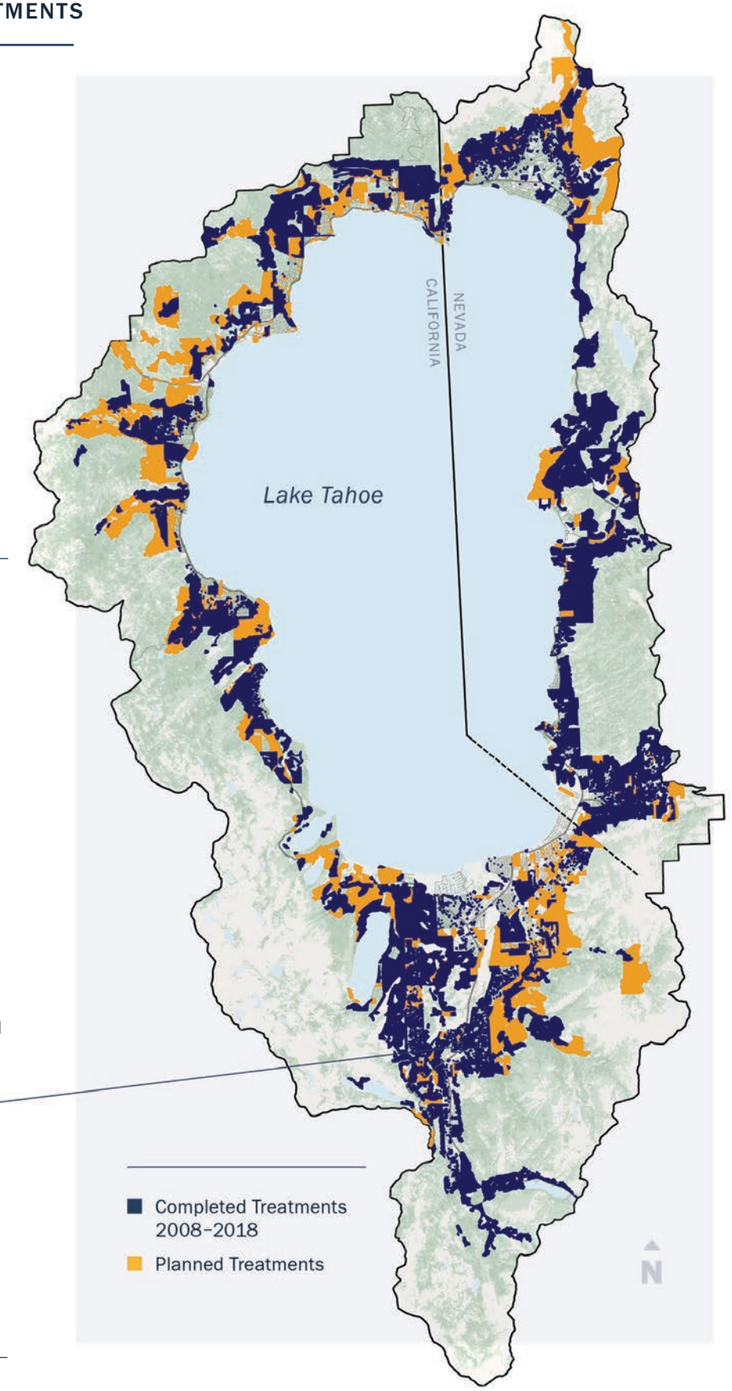
OWNERSHIP OF UNDEVELOPED RESIDENTIAL LOTS





Example Neighborhood

USDA Forest Service	3,000 lots
States of NV & CA	4,000 lots
Private & Local Government	6,300 lots



Within Basin neighborhoods over 13,000 small undeveloped lots are intermixed with homes, forming a dense patchwork. The USDA Forest Service, California Tahoe Conservancy, and Nevada Tahoe Resource Team have completed nearly 100 percent of initial treatments on these public lots to complement neighbors' defensible space. The TFFT is prioritizing continued maintenance and helping private landowners treat their lots.

FROM VULNERABILITY TO RESILIENCE

Over the next five years, the TFFT will **treat an additional 22,000 acres in the wildland-urban interface** (completing all initial treatments) and help residents and businesses **achieve nearly 100 percent compliance with defensible space requirements.**

On June 24, 2007, embers from an illegal and abandoned campfire ignited the most destructive fire in Tahoe s history. Stoked by strong winds and overgrown forests, the Angora Fire destroyed 254 homes and structures and burned 3,100 acres within hours. If another large fire occurs on a summer day, hundreds of thousands of visitors will overwhelm the Basin s limited evacuation routes.

The TFFT formed in 2008 with the twin aims of reducing fuels in the wildland urban interface (WUI) and preparing communities for wildfire. The partnership involves 21 federal, tribal, state, and local conservation, land management, and fire agencies, including the USDA Forest Service (USFS), California Department of Forestry and Fire Protection (CAL FIRE), Nevada Division of Forestry, and Tahoe Regional Planning Agency. Seven fire districts and the Tahoe Resource Conservation District lead the Tahoe Network of Fire Adapted Communities. They help prepare families and neighborhoods for evacuation, create defensible space, and make homes less vulnerable to fire embers.

The Lake Tahoe Basin Multi Jurisdictional Fuel Reduction and Wildfire Prevention Strategy guides the TFFT s work. Accordingly, TFFT partners have treated 57,000 acres in the WUI since 2008. These multiple benefit thinning and prescribed fire treatments connect to form continuous areas where fire behavior is reduced and forest health is improved.

Before 2004

The USDA Forest Service, California Tahoe Conservancy, and Nevada Tahoe Resource Team begin fuel reduction treatments on undeveloped public lots

California State Parks and North Lake Tahoe Fire District use prescribed fire to reduce fuels and improve forest health

2004

Basin fire districts complete Community Wildfire Protection Plans that identify priority actions to reduce hazards

2007

The Angora Fire burns in South Lake Tahoe and partners develop the Multi Jurisdictional Strategy

2008

The TFFT forms to redouble community protection efforts

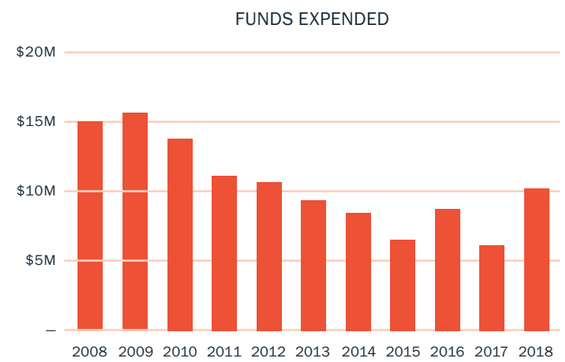
2011

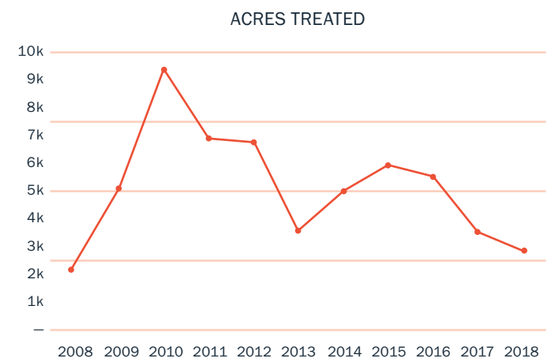
Nevada Tahoe Resource Team begins using prescribed fire to reduce fuels and improve forest health in Lake Tahoe Nevada State Park.

2014

The TFFT revises the Multi Jurisdictional Strategy to align with state and federal priorities

California State Parks completes most of its initial WUI treatments and shifts to maintaining the treatments with prescribed fire





Acres treated lag one to two years behind expenses due to contract timelines. Multiple-year funding from 2008 to 2010 allowed partners to quickly ramp up treatments. Since then, annual funding has reduced significantly.

2016

Partners launch the Lake Tahoe West Restoration Partnership

2017

U.S. Forest Service completes planning for its remaining initial WUI treatments

Nevada Tahoe Resource Team and Nevada fire districts complete their initial WUI treatments

2019

Complete the Lake Tahoe West Landscape Restoration Strategy

2020

Complete planning for all remaining initial WUI treatments

2022

Begin implementing Lake Tahoe West on-the-ground treatments

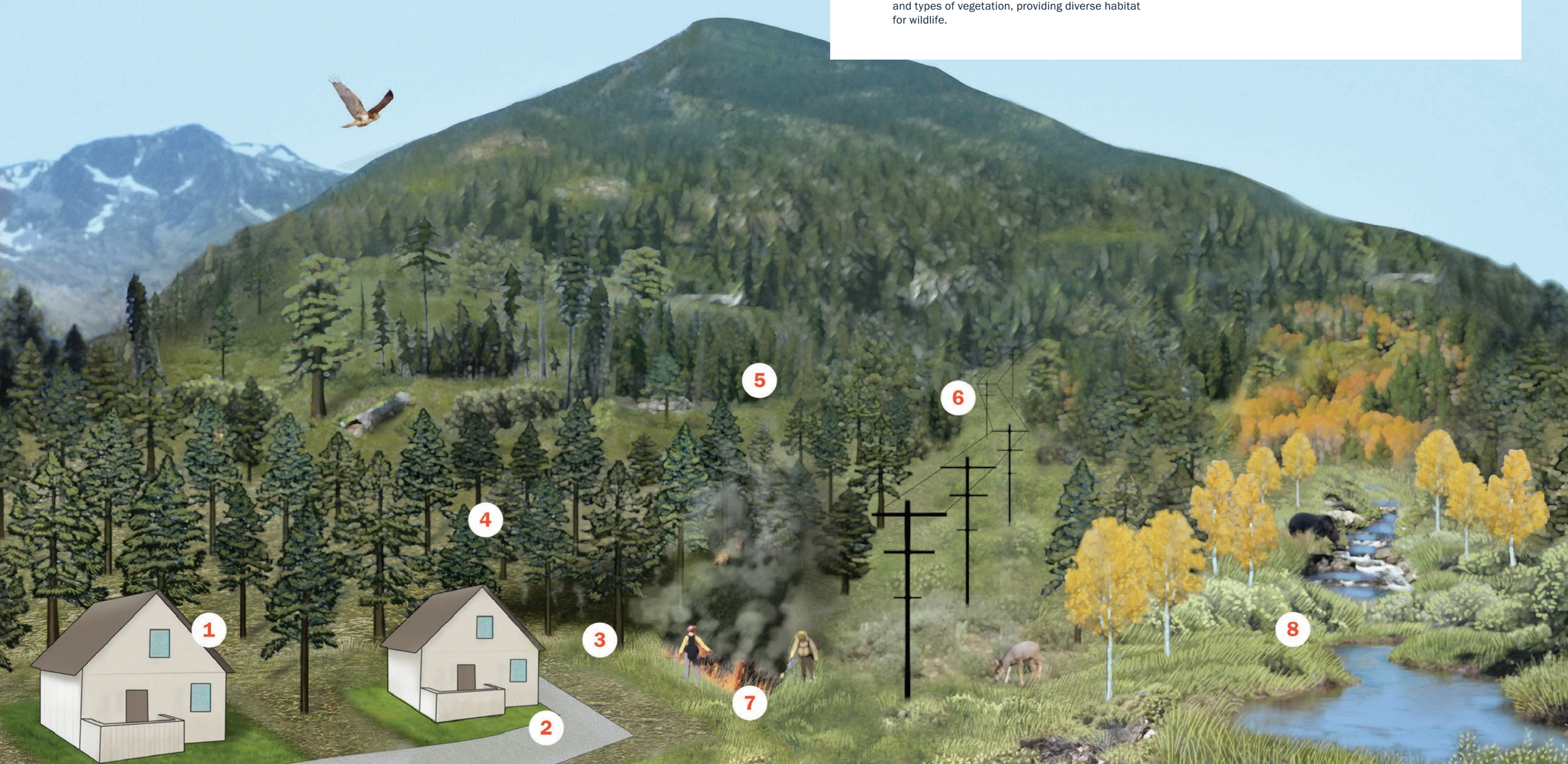
2025 & beyond

Maintain WUI treatments and continue implementing landscape restoration

A VISION FOR RESILIENT LANDSCAPES AND COMMUNITIES

Residents and visitors alike depend on the Lake Tahoe Basin's recreation opportunities (and associated economy), clean water, health benefits, wildlife, and natural beauty. Increasing resilience means taking action from the shoreline to the ridgetop.

1. Homes are built, maintained, and retrofitted to resist ignition by fire embers.
2. Residents and visitors are prepared for evacuation.
3. Defensible space surrounds homes to reduce the wildfire threat.
4. Forests in the wildland-urban interface (about ¼ mile from communities) have tall, healthy trees and little flammable undergrowth.
5. The forests beyond form a mosaic of different sizes and types of vegetation, providing diverse habitat for wildlife.
6. Forests near powerlines are managed to safeguard against ignition, reduce fuels, and improve forest health.
7. Prescribed fires burn mainly on the forest floor, reduce flammable undergrowth, and lead to healthier and more resilient forests.
8. Streams and riparian areas are restored so that natural processes like fires and floods keep hardwoods and meadow vegetation healthy and thriving.



SCALING UP

The climate crisis is outpacing our forest management. Wildfires in the west are becoming larger and more destructive. Insects have killed 150 million trees throughout the Sierra Nevada. The Basin cannot address these threats without matching the scale and pace of management to the scale and pace of climate change. Land managers, fire districts, and regulators are doing this by streamlining planning and permitting, partnering with utilities, developing landscape strategies to support very large projects, and sharing analyses and resources across entire regions.

DEVELOP & IMPLEMENT LANDSCAPE SCALE INITIATIVES

Following the Angora Fire, the Basin's fire districts and land managers focused on protecting the most at-risk neighborhoods through dozens of individual projects. This drive—while dramatically successful—cannot on its own keep pace with the growing risks posed by climate change and high severity fires. Accordingly, the agencies are complementing WUI treatments with landscape-scale projects to restore forest health while reducing fire intensity as it moves from the general forest to residential areas.

Restore 60,000 acres through the Lake Tahoe West Restoration Partnership. Lake Tahoe West will increase resilience along the entire west side of the Basin. Lake Tahoe West partners completed a quantitative, LiDAR-based landscape resilience assessment—the first of its kind in the Basin—and drafted a landscape restoration strategy through agency, stakeholder, and scientist collaboration.

Enhance resilience on 7,000 acres through the Nevada Tahoe Resource Team (NTRT). Coordinated by the Nevada Division of State Lands, NTRT partners have been improving forest resilience and managing wildlife habitat along the east side of Lake Tahoe since the early 2000s. NTRT has completed initial fuels reduction treatments on over 5,200 acres and will continue using a mosaic of thinning, pile burning, and prescribed fire to maintain treatment effectiveness and remove hazardous fuels. Recent projects used cable yarding equipment and helicopters to reduce the environmental impacts of thinning on steep slopes and facilitate more extensive use of forest restoration byproducts.

Restore 7,000 acres of California State Parks (CSP) land. CSP has invested in forest management since the 1980s with an emphasis on using prescribed fire for ecological benefit and wildfire hazard reduction. CSP has completed most initial treatments and is shifting to ongoing rotation management to protect prior investments, maintain treatment effectiveness, and reintroduce fire as an essential ecological process.

Restore 80,000 acres through the Greater Upper Truckee River Watershed Partnership. The more heavily-populated south side of the Basin contains extensive forests and the Upper Truckee River and Marsh. The former contributes sediment that impairs the Lake's famed clarity, and the latter is the largest intact wetland in the Sierra. The partnership is preparing a synthesis of forest, watershed, and recreation projects to create efficiencies for implementation at the landscape scale.

Complete a science based assessment of the entire Basin. Basin partners plan to adapt Lake Tahoe West frameworks, indicators, data sets, modeling results, and automated analyses to the unique ecological conditions and circumstances faced by land managers around the Basin. These tools will help to rapidly assess how to most efficiently and effectively increase resilience.

Go regional through the Tahoe Central Sierra Initiative (TCSI). Led by the California Tahoe Conservancy, Sierra Nevada Conservancy, and three national forests, TCSI links eight landscape collaboratives through a 2.4 million-acre regional resilience initiative. TCSI will overcome the key barriers to scaling up forest restoration, including inflexible funding, limited capacity, and lack of biomass and wood products markets.

STREAMLINE PLANNING & PERMITTING

Basin partners are updating and streamlining planning and permitting processes that accelerate project implementation while enhancing environmental safeguards.

Plan large multiple-benefit projects across ownerships. Basin agencies are shifting from planning dozens of smaller projects—each of which requires separate environmental review, permitting, contracting, and monitoring—to single projects covering thousands of acres across multiple ownerships.

Complete a Program Timberland Environmental Impact Report (PTEIR) for all non-federal lands on the California side of the Basin. Led by CAL FIRE and Basin fire districts, starting in 2020 the PTEIR will provide comprehensive environmental analysis for thousands of acres of projects. CAL FIRE, a key partner in the report, is leading a parallel effort statewide by conducting programmatic environmental review for the California Vegetation Treatment Program. These premier tools will rapidly increase the amount of environmentally sustainable work on state, local government, and private lands

Streamline environmental analyses. The USFS and California agencies are using new Categorical Exclusion/ Exemption authorities under the National Environmental Policy Act and California Environmental Quality Act to scale up scientifically-tested, low-impact treatments. Nevada agencies utilize the state's streamlined permitting processes which provide environmental safeguards through technical advisory and review.

Update local and regional regulations to be consistent with state and federal direction. State and federal legislation and executive orders are rapidly modifying environmental analysis requirements. Partners are working with the Tahoe Regional Planning Agency and the Lahontan Regional Water Quality Control Board to incorporate cutting-edge science and monitoring into their regulatory revisions.

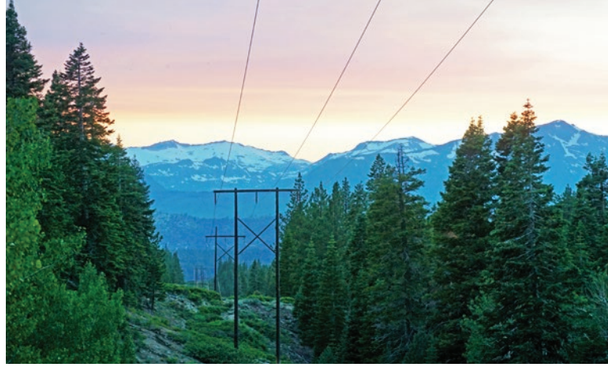


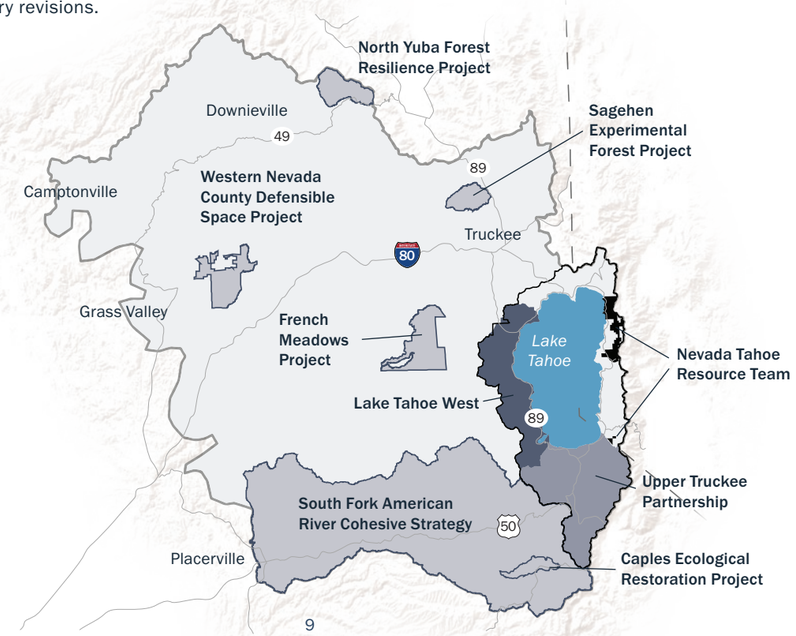
Photo: Ben Fish

CREATE POWERLINE RESILIENCE CORRIDORS

Powerlines are a vital part of the Basin's infrastructure, but are also a major potential source of wildfire ignitions. Through the Powerline Resilience Corridor strategy, utility companies will address their obligation to remove hazards near utility lines, while state and federal land managers treat the surrounding forest.

Prevent ignitions while improving forest health surrounding 64 miles of powerlines. NV Energy and Liberty Utilities have expanded and accelerated their hazard mitigation along powerlines. Liberty Utilities has included the strategy and committed funding in its approved Wildfire Mitigation Plan. The Forest Service is completing environmental analysis for hundreds of acres of resilience corridors in 2019. The partnership of land managers and utility companies is creating new efficiencies by having crews treat public lands at the same time as they treat utility corridors. Among other benefits, this work will reduce the risk of ignitions originating from powerlines and facilitate fire suppression while increasing the forest's structural diversity.

TAHOE-CENTRAL SIERRA INITIATIVE



BUILDING CAPACITY

Last year California and Nevada each committed their largest-ever investments in landscape restoration and community protection. To maximize the efficacy of these historic investments, partners must build and sustain their collective capacity throughout each stage of the **forest landscape management cycle** (see graphic). Four priority areas for building such capacity include the workforce, organizational efficiency, and the use of prescribed fire and restoration byproducts such as biomass.

INVESTMENTS in personnel, facilities, equipment, and contracts build capacity to proceed through the seven stages of the forest landscape management cycle. By strengthening partnerships, technology, and organizational efficiency (the hub) land managers can further build sustainable capacity and proceed through the cycle at greater pace and scale.

EXPAND THE RESTORATION WORKFORCE

To meet the Basin's restoration goals, and to contribute to statewide targets, TFFT partners must rapidly deploy personnel and resources on the landscape. Expanding the restoration workforce will enhance the regional economy and local employment opportunities while promoting healthy and resilient landscapes.

Hire shared resource crews. These crews will be able to work across jurisdictions, and can double the annual amount of hand thinning, prescribed fire, field preparation, and surveys completed in the Basin.

Establish a Basin forestry work center and training academy. As a first step, the TFFT is developing a joint crew training program that will be operational in 2020. This will ensure a steady supply of highly qualified professionals to carry out restoration work each year.

ADAPT FOR ORGANIZATIONAL EFFICIENCY

Moving from projects to landscapes requires improving organizational processes, including training, planning, and contracting, as well as how partners work across jurisdictions. Redesigning these systems with collaboration in mind creates operational efficiencies, enhances policy consistency, expands available resources, and builds trust and political will.

Pioneer Good Neighbor Authority agreements. The Basin has two of California and Nevada's first project agreements under the federal Good Neighbor Authority, which allows state agencies to partner with the USFS in restoring and managing federal and non-federal lands. These agreements will accelerate treatments on thousands of urban lots and the use of specialized cable yarding equipment.

Support restoration industry contractors. Landscape planning and long-term stewardship contracts provide greater certainties on future workloads, and encourage investments in the resources and infrastructure necessary to achieve economies of scale. Master purchasing agreements, such as those used by the State of Nevada, streamline contracting procedures and provide greater flexibility. The TFFT is hosting a contractor summit in 2019 to bring together agency and industry representatives to review the extensive work desired, minimize bidding conflicts and inefficiencies, and coordinate operations.

STRATEGICALLY USE PRESCRIBED FIRE

Prescribed fire is the most cost-effective method of treatment, and essential to restoring landscapes—mechanical treatment cannot cover enough ground quickly. It also provides substantial ecological benefits because Sierra Nevada forests are evolutionarily adapted to fire. Some smoke is inevitable, but compared with extreme smoke impacts from large wildfires, land managers can avoid significant public health impacts by strategically timing and locating their use of fire.

Establish dedicated prescribed fire resources. Prescribed fires can only occur in short seasonal windows and opportune weather conditions, so pre-planning and resource availability are critical. Partners are pooling resources and developing agreements to establish dedicated crews that will enable burning every day possible.

Develop a prescribed fire optimization strategy. Building upon the fire and smoke modeling conducted through Lake Tahoe West, the strategy will guide how managers geographically arrange, time, and sequence prescribed fires to meet ecological and fuels objectives while mitigating air quality impacts.

Enhance prescribed fire outreach. The TFFT's Fire Public Information Team is augmenting prescribed fire notification systems and providing resources to minimize public exposure to smoke.

INCREASE RESTORATION BYPRODUCT UTILIZATION

The lack of markets for biomass and small-diameter wood that can be converted to innovative products, such as cross-laminated timber, severely limits economically viable restoration opportunities. Hauling distance is a critical factor in whether costs pencil; most facilities close enough have closed, while new ones have struggled to open. Basin partners are therefore taking action from the local to the regional scale, and promoting innovations for analysis and material processing.

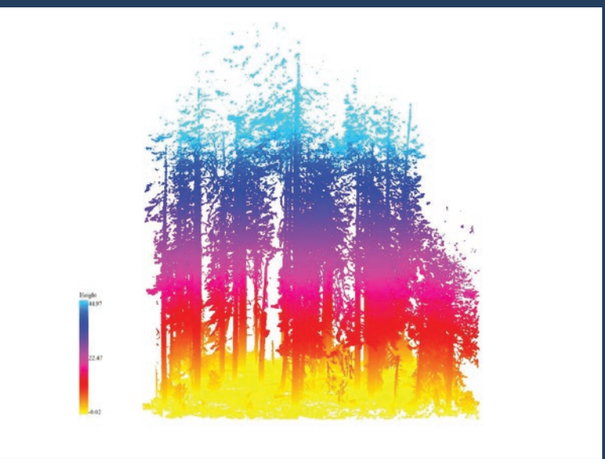
Establish collection sites for thousands of tons of forest materials. Hazardous tree removal near homes, roads, and powerlines, undeveloped lot treatments, community chipping programs, and other small projects create substantial amounts of woody materials. Such materials typically remain on site to decompose or are burned in slash piles. The TFFT is establishing collection sites for stockpiling material and facilitating cost-effective hauling to a facility.

Partner with the private sector. The TFFT's Utilization Working Group is bringing together agency and industry representatives to support existing facilities and pilot emerging technologies that simultaneously bolster restoration projects and the Basin's economy.

LEVERAGING TECHNOLOGY

The public and private sectors are investing in applying emerging technologies in the Lake Tahoe Basin, including high-resolution satellite imagery, ground-based LiDAR, and artificial intelligence. These technologies will expand the scope and quality of planning, accelerate surveys and operations, better evaluate tradeoffs, and measure performance in near real-time.

GROUND BASED LIDAR



▲ *The GEARS lab at the University of Nevada, Reno is using Terrestrial Laser Scanning to map three dimensional forest structure at the individual plant level and calibrate airborne LiDAR data.*

REMOTE WILDFIRE CAMERAS

▲ *The 2016 Emerald Fire as seen by an ALERT Tahoe wildfire camera.*

LAUNCH THE TECHNOLOGY INNOVATION SPRINT

Basin and regional partners have launched a Technology Innovation Sprint (Sprint) to pilot new technologies throughout the Basin, and share results with California, Nevada, and the American West. The Sprint relies on a strong partnership with academia and the private sectors. The Sprint will improve the quality and efficiency of every step in the forest landscape management cycle. To engage the private sector, the nonprofit Tahoe Fund is launching the Smartest Forest Fund to invest in innovative projects, technologies, and ideas that unlock barriers to increasing pace and scale.

Accelerate planning. TCSI partners are assessing and restoring 2.4 million acres. Emerging technologies are essential to meeting this goal. Vibrant Planet, Salo Sciences, and Planet Labs are developing the California Forest Observatory, which combines LiDAR, satellite imagery, and artificial intelligence to automate the mapping of forest structure and wildfire risk. This near real-time data visualization platform will support emergency operations and accelerate forest restoration planning, implementation, and monitoring.

Accelerate resource surveys. The USFS is using acoustic recording devices coupled with remote sensing to better detect and assess the habitat of California spotted owls, and to expedite surveying. The USFS will subsequently expand this pilot to other species.

Improve operations. A complementary set of tools will improve the efficiency and effectiveness of operations. Leveraging the Forest Observatory, scientists are creating a tool that uses modeled, stand-level data to automatically generate vegetation treatment prescriptions. The same team is testing how to take these prescriptions and—using handheld electronic devices in the field—digitally mark which trees to remove or protect, and lay out the roads, log landings, and skid trails in ways that minimize erosion.

Increase restoration byproduct utilization. TCSI partners are modeling the supplies available from restoration projects, potential value-added uses, and optimal transportation routes. The analysis of successful business cases will help spur private investment. This will support expanding existing facilities such as the Loyalton biomass campus, and re-opening closed facilities such as the Carson City cogeneration plant.

Quantify benefits, tradeoffs, and performance. Partners are developing models and tools to better measure the benefits, costs, and risks associated with scaling up forest restoration. These include:

- Modeling smoke from prescribed fire and uncontrolled wildfire to improve the precision of public health notifications and help minimize smoke impacts.
- Using remote sensing to assess carbon storage and better understand the role of large-scale forest restoration in meeting sequestration targets.
- Reaching consensus on a pioneering set of six Resilient Landscape Conditions common to the TCSI landscape, and developing a Resilience Dashboard to track project performance and communicate results.

IMPROVE DECISION-MAKING THROUGH BETTER DATA MANAGEMENT

The Environmental Improvement Program Project Tracker, managed by Tahoe Regional Planning Agency, documents progress and priorities for hundreds of forest and watershed restoration projects. The Tahoe Defensible Space Database, jointly managed by CAL FIRE and the Tahoe Resource Conservation District, catalogs fire agency inspections and compliance information. Together they serve as crucial data repositories for the Basin's community protection and landscape restoration programs. TFFT partners are linking these data systems, and augmenting them with new remote sensing and monitoring data to provide open access to the best available information. Such access improves communication about the status of lands, projects, and prescribed fires, and improves interagency decision-making and operations.

ENABLE RAPID RESPONSE THROUGH A WILDFIRE CAMERA NETWORK

The Basin depends heavily on an effective suppression force to ensure that frequent wildfire ignitions do not become disasters. Since 2013, the pioneering ALERT Tahoe network of wildfire cameras has provided critical real-time information on over 50 Basin fires to fire agencies and land managers. The cameras played a critical role in spotting the 2016 Emerald Fire in the middle of the night. On the same night, an unrelated arson fire was spotted by the cameras. Crews were able to quickly respond and suppress both fires before they damaged nearby homes. The network now covers the greater Lake Tahoe region, and is growing throughout the west under the name ALERT Wildfire with over 250 cameras in operation today. Basin partners continue to update the system and improve its ability to provide real time smoke detection and monitoring to speed-up response, better protect public health, and support prescribed fires.

PARTNER INVESTMENTS & SHARED FUNDING NEEDS 2020–29

THIS TABLE identifies the investments that TFFT partners have jointly secured and made in fuels reduction and forest health since 2008. The table also identifies the full amount needed by federal, state, local, and private partners to jointly fund the key elements of the plan. These are estimates, however, and do not suggest or reflect funding commitments by any project partners. The TFFT agencies will develop a more detailed funding strategy by the end of 2019.

Major Investments	Historical Investments	Total Needed	Annually 2020–24	Annually 2025–29
WILDLAND-URBAN INTERFACE TREATMENTS Protect communities by completing and maintaining all treatments and creating defensible space	$150 M (Since 2008)	$65 M	$10 M	$3 M
POWERLINE RESILIENCE CORRIDORS** Prevent ignitions and improve forest health surrounding 64 miles of powerlines	$5 M (Since 2018)	$15 M	$2 M	$1 M
LAKE TAHOE WEST** Restore forests in the 60,000 acre landscape on the west side of the Basin	$6 M (Since 2016)	$65 M	$8 M	$5 M
TECHNOLOGY INNOVATION SPRINT Pilot new technologies to increase the pace and scale of forest management	$2 M (Since 2017)	$3 M	$3 M (One-time investment)	—
TOTAL	$163 M	$148 M	$23 M	$9 M

PRIVATE, LOCAL, STATE, AND FEDERAL FUNDING SOURCES

- Local, state and federal agency appropriations
- Nevada and California bond expenditures
- Appropriations authorized by the Lake Tahoe Restoration Act
- Grants authorized by the Southern Nevada Public Land Management Act
- Grants through multiple California and Nevada agencies
- Private funding through conservation organizations, foundations, and utility companies.

* Includes expended and secured funding.
** These initiatives are partially within the wildland-urban interface. The table displays only additional needed investments.

PARTNER ORGANIZATIONS

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