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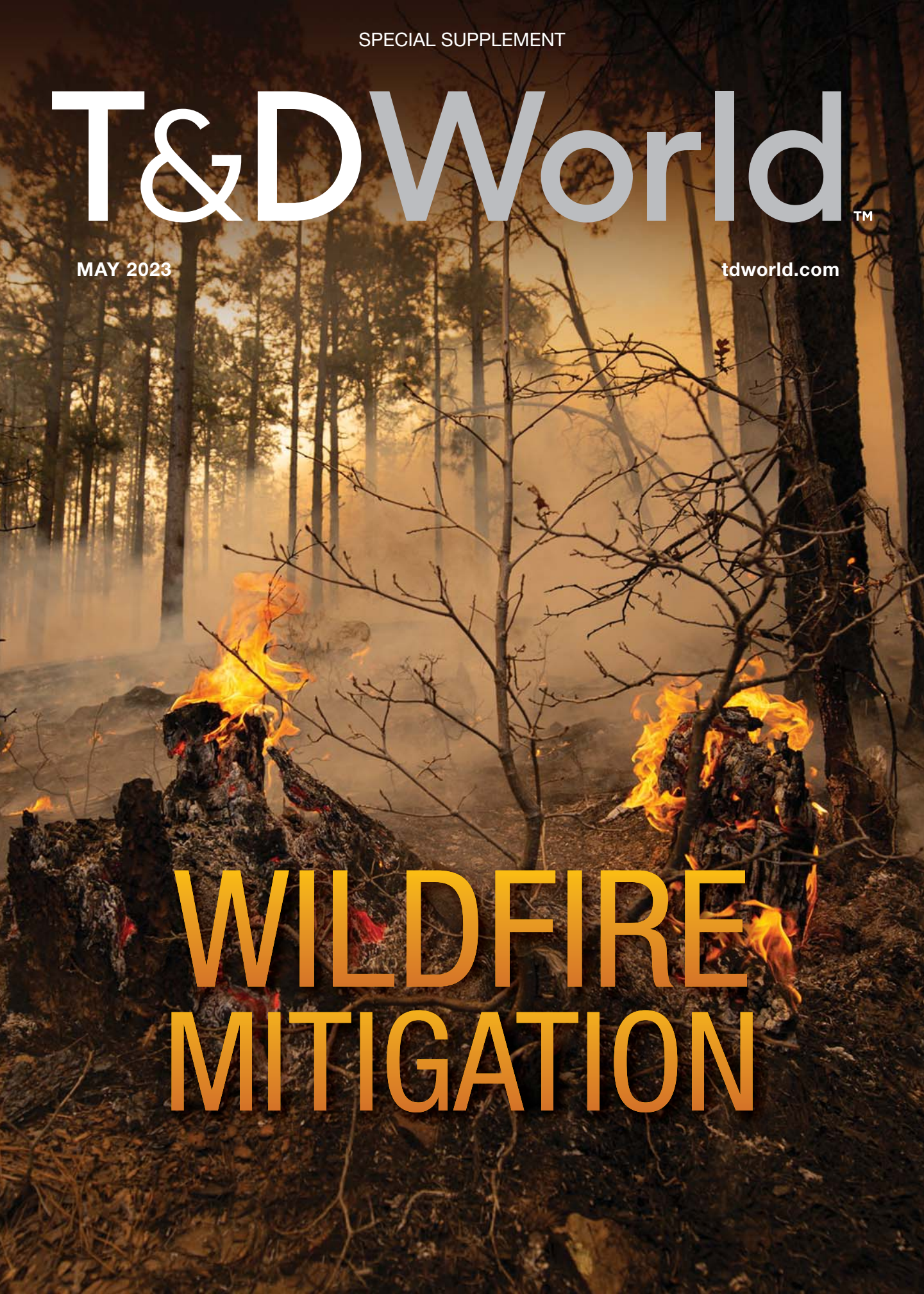

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The Threat of Fires Widens, as Should Industry's Response

By **JEFF POSTELWAIT**, Senior Editor

As I'm writing this, legislators in my home state of Oregon are debating a bill to relieve some of the $3 billion in wildfire-related losses the state has seen since 2020. Further to the south, Californians are welcoming millions in federal funding to help communities prevent wildfires and fight them once they break out as part of the Biden administration's wildfire defense grant program.

Funding from that same $197-million program will be distributed across 22 states and seven tribes – some 100 communities in all, according to the *Los Angeles Times*. This comes on the heels of the $8.25 billion in wildfire management funding made available through the Bipartisan Infrastructure Law and announced this past July.

It's a cliché now on the West Coast to hear that fire now knows no particular season, and that fire season is, in fact, year-round. However, if the wide swath of the nation that the federal government saw fit to support with new funding is any indication, the danger of out-of-control fires devastating communities is present from coast to coast.

The U.S. Department of Agriculture keeps a list of wildfire projects under its purview. In Colorado's Archuleta County, home of segments of the San Juan National Forest, education programs will spread word about fire resistant construction. In the Blackfoot Watershed of Montana, "Fire Refugia" communities will be maintained so fires may pass without destroying homes or infrastructure. In Wyoming's Crooked Creek area, the landscape will be cleared to reduce fuel loads and restore the health of forests. In North Carolina, funding is granted to develop community protection plans and renew ones that expired.

The federal government's National Cohesive Wildland Fire Management Strategy has three parts: 1. Maintain resilient landscapes in accordance with land management objectives, 2. Create fire-adapted communities that can better withstand blazes without loss of life or property, and 3. Improve wildfire response across jurisdictions.

Utilities, too, are responsible for the communities in which they operate — not just in the sense of facing consequences when things go poorly as has occasionally happened, but in the sense of being a critical part of every community that requires electricity.

As I gathered and reviewed the materials we decided to include in this special annual wildfires supplement to *T&D World*, I heard from more utilities than in years past, which is a wonderful thing. We always strive to be a utilities-first publication, after all. But it is encouraging to me personally to see utilities taking this growing problem of wildfires as seriously as many are. We need community-minded utility leaders now more than ever, who see themselves as good stewards of their service territories and the people who live and work within them, as well as for the land itself.

Utilities from California, Arizona and Oregon sent us case studies on how they are using advanced sensors, meteorological equipment, remotely piloted drones armed with thermal cameras, integrated vegetation management techniques and other applications, all networked through powerful computers and occasionally applying artificial intelligence to sift through the massive pile of data generated to find signs of wear and tear or other trouble spots that might one day spark a fire. Because in severely dry and hot conditions, it is vastly easier to prevent a blaze than to fight one.

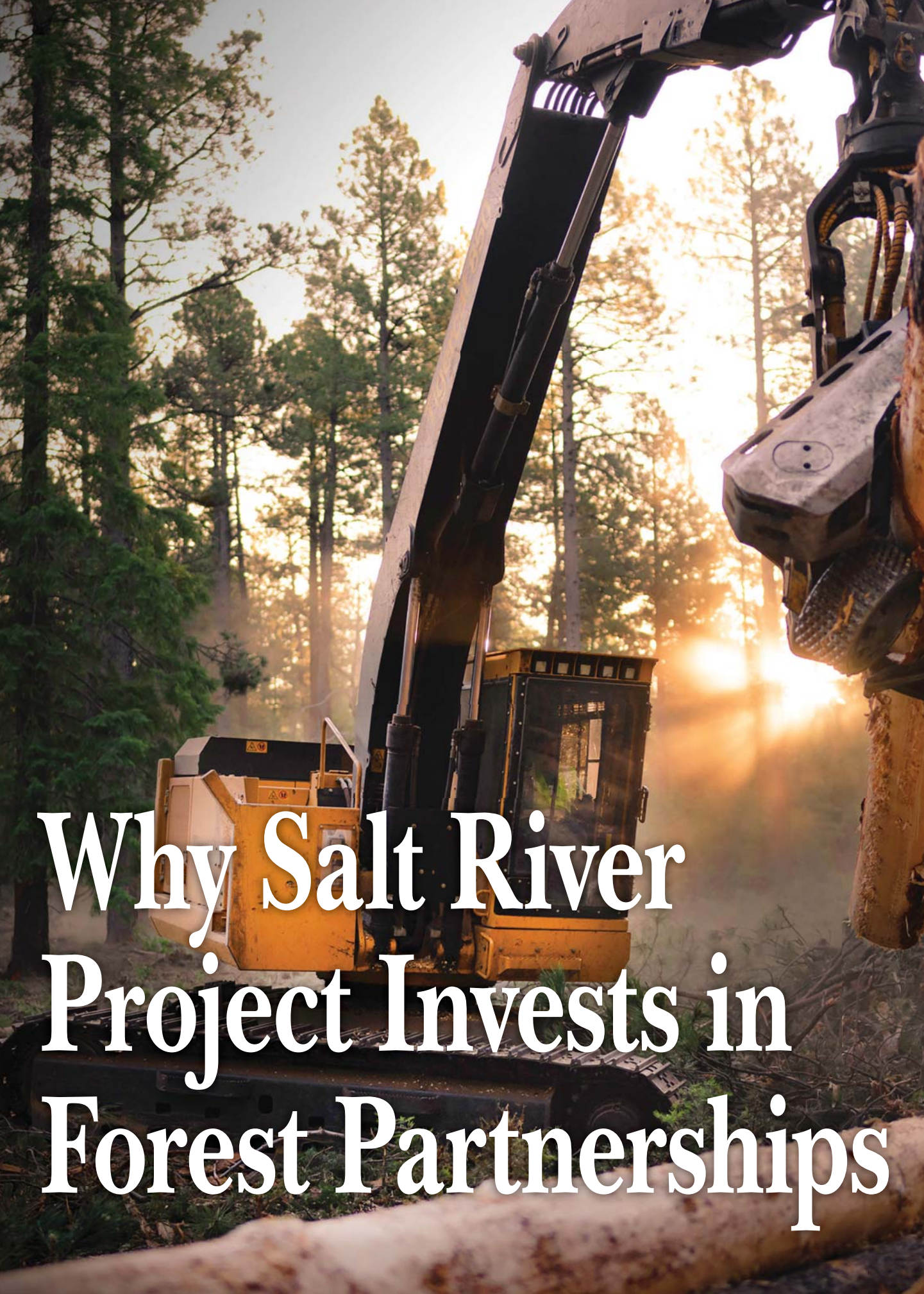
We also heard about the important role of land and water management, which can include things like clearing or thinning our land in strategic areas to minimize the impact of fires on infrastructure, buildings and other property. Utilities, consultants, vegetation management companies and wildfire mitigation firms are even beginning to learn from the traditional practices of Indigenous North Americans who used cultural burning to manage the lands they lived on for thousands of years before colonization by whites. This knowledge is being used by the U.S. Forest Service as well, which has adopted clearing of ladder fuels in heavily wooded areas that are at high fire risk.

Down the road from me at Oregon State University in Corvallis, the College of Forestry teaches these pre-Columbian techniques to students, and OSU's Extension Fire Program notes that controlled burns achieve a number of healthy forestry goals, including lowering wildfire risks, improving rangelands and encouraging native plant species and providing a healthy wildlife habitats.

With so much of the country under threat by wildfires, it is going to take a full spectrum of disciplines and techniques to combat the problem – some old and some brand new. The raison d'être for these supplements is to show that there are solutions for this problem readily at hand. They were developed by our finest minds and constructed with our most skilled people.

What we need now as an industry is to accept these tactics, techniques and technologies to meet the problem, and not to shy away from change. We have already seen the tragic consequences of putting off needed maintenance and saving money that would have been better spent on public safety measures.

Utilities are entrusted with a great responsibility, and it is up to utilities to show that the public faith in them has been well placed. TDW



Why Salt River Project Invests in Forest Partnerships

Salt River Project hires contractors to help strategically remove plants, parts of trees and other vegetation growing close to transmission lines. Photo by Salt River Project.

The utility works closely with partners to clear vegetation, perform strategic thinning, and pilot an early-warning wildfire detection system.

*By **PATTY GARCIA-LIKENS** and **ERICA ROELFS**, Salt River Project*

Over the last 10 years, Arizonans have watched as large wildfires ravaged a critical power corridor and watershed in the northern part of the state. The devastation has proven one important fact that must be addressed now: Arizona's forests are unhealthy.

About 120 miles (193 km) of Salt River Project's (SRP's) high-voltage power lines are located on forest service land located in northeastern Arizona. The lines deliver power to about 1.1 million people in the Phoenix metropolitan area. In addition, SRP provides water to about 2.5 million people in the greater Phoenix area.

Arizona's forested lands have been hit by devastating wildfires over the last decade and are primed for more infernos like those that have impacted California and Colorado. Many forested lands in northern Arizona have thousands of trees per acre, which can fuel large wildfires that are uncontrollable with catastrophic impacts.

Entire State Impacted

Wildfires not only devastate natural ecosystems, recreational areas and local communities, they also degrade water quality and resiliency and can interrupt power delivery if transmission lines are impacted.

Fires near power lines can affect power delivery by damaging lines and transmission towers while smoke and debris also can create a disturbance. After a wildfire, rainfall washes ash and debris into rivers and reservoirs. Then that material washes into SRP's reservoirs, reducing water storage capacity and damaging water infrastructure.

This is concerning because residents of the Phoenix metro area live in a desert environment, where reliable water and power are crucial. Furthermore, a recent study by the Electric Power Research Institute found that costs associated with a catastrophic fire can run up to hundreds of millions of dollars.

Forest 500 Project

To ensure reliable power for its customers, every five years, SRP crews conduct the Forest 500 project, which identifies trees and other vegetation that pose a risk to the utility's power system. SRP hires contractors to help strategically remove plants, parts

During wildfire season, if tall vegetation is not removed, low vegetation can ignite the taller vegetation, forming fuel ladders that bring flames closer to the taller trees and overhead power lines. Photo by Salt River Project.

SRP also conducts vegetation management activities in residential areas as part of its Right Tree Right Place program. Photo by Salt River Project.

of trees and other vegetation growing close to transmission lines. The effort is done in coordination with the Bureau of Land Management as well as state and private land between the forests where brush must be cleared.

During wildfire season, if tall vegetation is not removed, low vegetation can ignite the taller vegetation, forming fuel ladders that bring flames closer to the taller trees and overhead power lines. SRP has been clearing hazardous vegetation since 1996 to improve the health of forests as well as power reliability in the greater Phoenix area.

"Our first priority is bringing reliable energy to our customers," said EJ Cochrum, a utility forester for SRP. "And we want to keep wildfires down. Without the mitigation and clearing efforts we partake in every five years for the Forest 500, we may not be able to ensure the same power reliability to our customers."

SRP also conducts vegetation management activities in residential areas as part of its Right Tree Right Place program. The program removes trees threatening safety and power reliability in cities across the Phoenix metro area.

For each tree removed under the Right Tree Right Place program, SRP plants as many as three more trees in safer, more appropriate areas.

Smoke Detector Pilot Project

In 2023, SRP also is piloting a Smoke Detector project that acts as an early-warning system for wildfires that occur near the utility's transmission line towers in the Tonto and Apache-Sitgreaves national forests. The project uses cutting-edge camera and smoke detector technology to capture physical changes on the utility's 500-kV transmission towers that transmit energy to SRP's customers from power plants located in eastern Arizona.

SRP is setting up two test areas with 12 cameras to capture images of a portion of the 500-kv transmission towers every 10 minutes. The solar-powered infrared cameras can work at night and capture images up to 10 miles (16 km) out with a 360-degree view.

Through artificial intelligence, the cameras learn the surrounding environment, report changes and provide alerts when identifying smoke from wildfires or changes to structures. Cameras also can alert SRP to issues such as downed lines, downed towers and damaged equipment.

The cameras are planned to be up and running by May 2023, just in time for forest fire season.

"Today, if a fire impacts our lines, we may not know until we get an alert that something has interrupted the delivery of power. Our crews could be up to 200 miles [322 km] away and have no visuals to determine what is happening," said Floyd Hardin, SRP fire management officer. "With this tool, we have the potential to see images nearly in real time and can determine our next steps quickly and efficiently."

Strategic Thinning

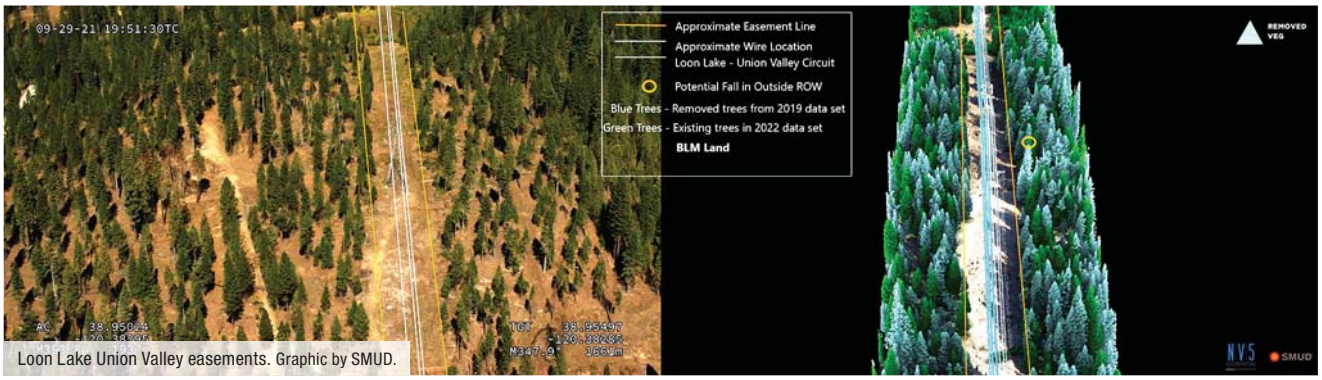
For water resiliency and reliability, SRP also is partnering with the U.S. Forest Service, Arizona cities, towns, counties and other organizations to help prevent the devastating impacts from wildfires by strategically removing small trees that will enable healthier trees to thrive. Preventive strategic thinning will not only improve the health of forests and watersheds but also reduce the need to reforest large sections of our forests.

Thinning the forest not only helps with power and water reliability, it also offers the added benefit of providing rural jobs, increasing infrastructure and equipment investments, and helping to drive rural economic development opportunities.

Through artificial intelligence, the cameras learn the surrounding environment, report changes and provide alerts when identifying smoke from wildfires or changes to structures. Photo by Salt River Project.

As the Phoenix metro area continues to grow and thrive, it is critical for SRP to provide sustainable and reliable power and water. A lot can be learned from the wildfires that have ravaged Arizona, and SRP is acting on those lessons now. With support from partners, industry and researchers, the utility is building the tools needed to reach its forest health goal. TDW

PATTY GARCIA-LIKENS (*patty.likens@srp.net*) and **ERICA ROELFS** (*Erica.roelfs@srpnet.com*) are media relations representatives covering the subject matter areas of water and power on behalf of Salt River Project (SRP) in Arizona. SRP is a community-based, not-for-profit public power utility and the largest electricity provider in the greater Phoenix metropolitan area, serving approximately 1.1 million customers. SRP provides water to about half of the Valley's residents, delivering more than 244 billion gallons of water (750,000 acre-feet) each year, and manages a 13,000-square-mile watershed that includes an extensive system of reservoirs, wells, canals and irrigation laterals.



Loon Lake Union Valley easements. Graphic by SMUD.

Lower Risk Of Wildfires Along T&D Systems Long Term

To achieve the lowest level of risk, some utilities like Sacramento Municipal Utility District are embracing the practice of managing vegetation to tree height.

*By **ERIC BROWN**, Sacramento Municipal Utility District, and **NIEL FISCHER,** JH Land*

The catastrophic fires that have struck the U.S. states of California, Oregon, Washington, Colorado, New Mexico and Arizona in recent years are proving to be part of a new era and no longer isolated occurrences. While not as prominently reported, this theme has been repeated throughout the West, including Idaho, Wyoming, and Montana.

When catastrophic fires occur, it is evident the fire-risk regime utilities operate in has changed significantly. Utility vegetation managers must fully assess and comprehend the risks and how quickly risk is changing to be successful in managing infrastructure and vegetation to protect it from fire and ensure ignition risks are removed from the system.

Western Fire Risk

As Western droughts persist and vegetation continues to be inadequately managed across the landscape, pandemic population shifts have complicated the risk equation. According toa study published on Dec. 8, 2022, in the Frontiers in Human Dynamics journal, Flocking to Fire: How Climate and Natural Hazards Shape Human Migration Across the United States, more people call the interior West their home now, and the result has been an expanded wildland-urban interface (WUI), significantly increasing the population and number of structures at risk from wildfire.

For example, in Santa Fe County, New Mexico, where about 155,000 people reside, more than 34,000 private properties are at high risk of catastrophic fire, according to the Insurance Journal. So, even though New Mexico does not have as large of a population as California, a high proportion of its population is at risk.

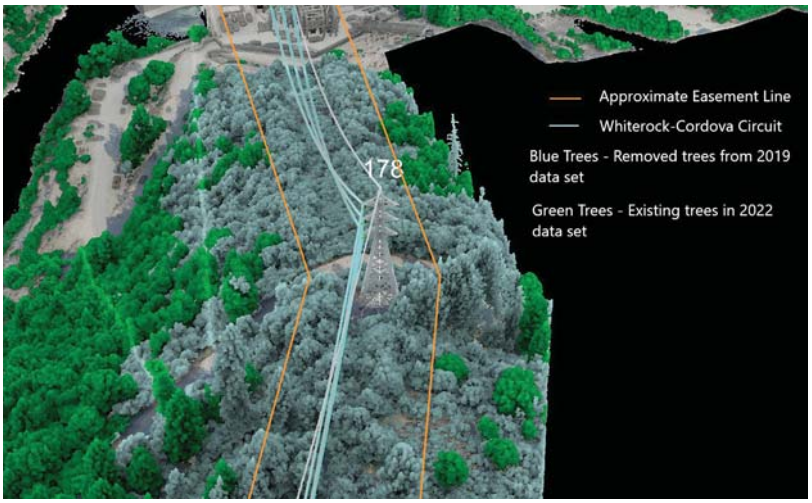
This population expansion into rural areas further complicates fuel treatment where a century of fire suppression and management policies has resulted in a highly combustible buildup of dead and live fuel. Utilities also are under increased pressure to provide highly reliable electric service to meet the demand of the shifting population of remote employees working from their homes.

While no one can put a value on life, there are quantifiable costs to loss of structures and fire suppression. For example, 2021 marked the most expensive year for annual federal suppression, with costs nearing US$4.5 billion, according to the National Interagency Fire Center. Property values have risen dramatically, with some Western states experiencing 40% increases in property value since summer 2020, according to the U.S. Census Bureau and U.S. Department of Housing and Urban Development. As property values have dramatically increased in some Western states, it is presumed that costs associated with fire risk will only increase in future fire events. The values associated with fire risk today are vastly different than those from merely two years ago.

Utility-caused fires have been exceptionally destructive to life and property in recent years. Despite utilities' efforts to manage grow-in risk and hazardous trees, danger-tree failure-related electrical ignitions continue to occur — with devastating impacts. Consider the Dixie Fire in California that raged across five counties from July 13, 2021, until it was declared contained

on Oct. 24, 2021. All told, more than 963,000 acres (389,712 hectares) burned, with one fatality and about 1500 structures lost. The fire was the first to cross the Sierra Nevada — and it did so twice. The cause of the Dixie Fire is alleged to have been a tree failure resulting in contact with energized conductors.

Across the West, regulators have begun requiring utilities — from the largest investor-owned utilities to the smallest electric cooperatives, to document and submit their plans to reduce wildfire risk. Where this has not occurred yet, it is likely to soon and with good reason — because the risk of a catastrophic wildfire occurring and the losses associated with a fire have both increased dramatically, not to mention the significantly increasing insurance premiums.



Whiterock Cordova change detection LIDAR. Graphic by SMUD.

Utility Fire Risk

For utilities, wildfire risk is essentially made up of two components:

1. Ignition risk, or a fire caused by the utility's assets
2. Carry risk, or the risk to the utility's infrastructure when a fire threatens that infrastructure while being carried by adjacent fuel and weather regimes.

Fire contains three basic elements: heat (ignition source), fuel and oxygen. Utilities can manage vegetation to control two of these elements, a heat source and fuel, near utility infrastructure. In other words, ignitions occur when a heat source contacts fuel. Utilities can prevent this from occurring in two ways through vegetation management practices:

1. Prevent infrastructure failure (engineering solution), including tree-caused infrastructure and equipment failure
2. Reduce the likelihood of ignition by removing fuel around the infrastructure in the event a failure occurs.

Going a step further, utilities also can control fuel around or adjacent to infrastructure — mostly vegetation in the West — to protect the infrastructure and nearby communities from an advancing fire.

Two Approaches

One approach to vegetation management is to make decisions following a risk management framework. Determining which vegetation to control is site specific, but the good news is numerous data sets are available and becoming less expensive over time, including remote sensing, light detection and ranging (LiDAR) and other emerging technologies.

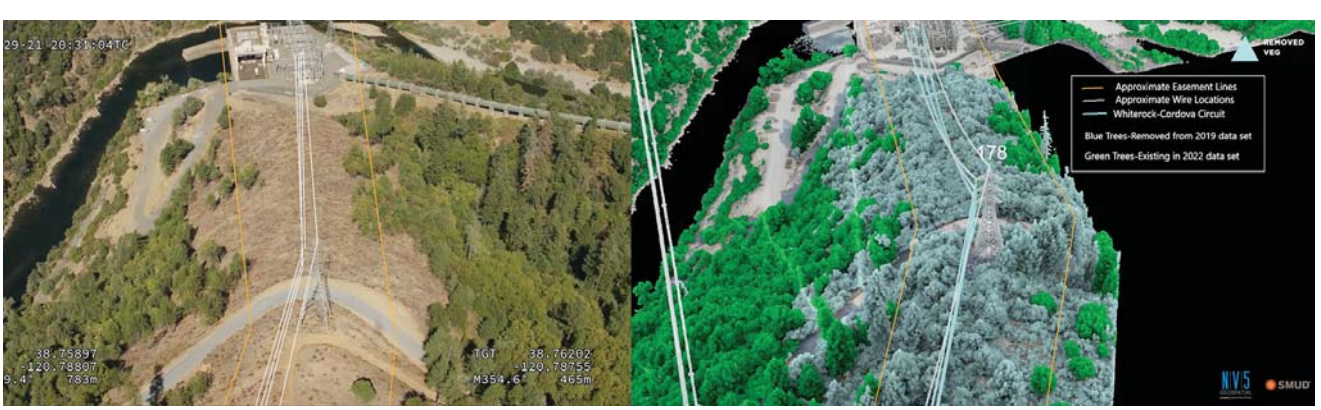
The data sets provide objective information about vegetation and its proximity to infrastructure, but the management decision to apply prescriptions rests with decision makers after evaluating qualitative information and risk tolerance.

A second approach is to manage vegetation to tree height to achieve the lowest level of risk. All vegetation within strike height is removed. Some utilities are embracing this approach, which seemed far-fetched only five years ago.

With the managing-to-tree-height method, any tree tall enough to strike infrastructure is removed, and the zone along the infrastructure is managed thereafter to keep low-growing vegetation under and near the infrastructure — with ongoing integrated vegetation management (IVM) entries and techniques coupled with encroachment prevention.

To gain long-term risk reduction, encroachment prevention also must occur, including regular reentry to capture trees that have grown tall enough to strike facilities, perhaps as often as every 10 years to 15 years, depending on growth rates. This work should be done in conjunction with integrated management activities that minimize vegetation fuel near infrastructure.

To be clear: This method, coupled with managing the area around the infrastructure is a long-term commitment that must



Whiterock Cordova easements. Graphic by SMUD.

Segment of easement cleared to tree height, with logs ready for shipment to sawmill (El Dorado County, CA February, 2023).

be supported across the organization, so the benefits continue in perpetuity.

Real-World Example

The Sacramento Municipal Utility District (SMUD) has been a leader in using technology to identify trees that constitute a risk to its infrastructure. In one case, it used remote sensing and LiDAR along the rights-of-way to detect trees tall enough to strike infrastructure. SMUD also is in the process of thinning the area along the infrastructure to create a shaded fuel break.

It is noteworthy to point out this work was conducted on federal lands, and partners at the agencies took a leadership role with SMUD to conduct work that would meet both parties' objectives.

Engineering Benefits

Utility vegetation managers have long recognized the multiple benefits derived from vegetation management that support the engineering and equipment elements of fire mitigation plans. Concentrated, strategic vegetation management changes the fire environment and resultant engineering and equipment requirement — to the benefit of the utility and surrounding communities. With more outreach and education, utility engineers and maintenance managers may recognize the benefits and forge strong relationships with vegetation managers for mutual benefit.

However, this approach requires comprehensive, sophisticated planning and collaboration on all levels at a utility and that includes a vegetation management team that works closely with landowners, including federal and state owner agencies, regulatory agencies, interested parties, customers, fire prevention agencies, foresters and, ultimately, contractors that conduct the work. It is a complex, dynamic realm that requires sophisticated, nuanced, experienced professionals to navigate. It also requires senior leadership support for the long term.

Opportunities Throughout The West

Throughout the West, there are plenty of locations where managing vegetation near infrastructure to tree height can and should occur. The barriers to doing work like this are formidable but slowly coming down because proponents and opponents of vegetation management are aligned in their opposition to wildfire and understand the wildfire risk profile of the West must change.

One company with experience managing vegetation to tree height for Western utilities is JH Land Consultants. Its approach to vegetation management focuses on reducing both the ignition and carry components that make up wildfire risk while rendering landscape-level results in a cost-effective way. The company offers turnkey solutions, project by project, that provide utility rights-of-way with little or no risk of vegetation interactions with infrastructure and vegetation fuel loads/regimes that are likely to cool off a fire, slow it down and even stop it under the right conditions. In addition, it specializes in selling the timber produced during vegetation management activities to generate funds and offset costs.

With more utilities starting to embrace the practice of managing vegetation to tree height, it is time for vegetation managers to consider how this approach could help to lower risk of wildfires along their utility's T&D systems. TDW

NIEL FISCHER (*niel.fischer@gmail.com*) is a registered professional forester and attorney at law with 35 years of experience in private forest management, utility vegetation management, law and policy. From July 2019 to July 2022, Fischer managed operations on 191,000 acres (77,295 hectares) in California and Oregon and sourced two sawmills. From 1990 until 2005, he practiced nonindustrial forestry throughout northern California on ownerships ranging in size from 3 acres to over 35,000 acres (1.2 hectares to over 14,164 hectares). Fischer spent more than 13 years in between his forestry work at Pacific Gas & Electric Co., where he developed its hazardous tree rating system and authored its vegetation management rate cases. He also is a contributor to the ANSI A-300, Part Nine, Hazardous Tree Arboriculture Standard Best Practices companion publication.

ERIC BROWN (*Eric.Brown@smud.org*) is manager of the vegetation management department at Sacramento Municipal Utility District (SMUD). He is a Certified Arborist, TRAQ certified and a past president of the Utility Arborist Association. Brown has his bachelor's degree in forestry and range management from the University of Nevada, Reno. He is a director of the El Dorado Fire Safe Council and deeply connected to the people and resources of central California. Brown has over 25 years of experience in the utility vegetation management profession, mostly in northern California where he has witnessed firsthand how fire risk has changed.

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Utility workers install a new pole in a forested area of the PGE service territory. Photo by Portland General Electric.

PGE Deploys AI, Advanced Tech to Reduce Wildfire Risk

The Pacific Northwest utility is advancing its wildfire mitigation plan by hardening the grid and enhancing situational awareness with detection systems.

*By **DAN NUÑEZ**, Portland General Electric*

Wildfire risk reduction, wildfire mitigation and wildfire resilience are now common descriptors used to encapsulate the strategic investments, operational modifications and public partnerships utilities throughout the West are leveraging to keep communities safe. An ongoing process, this work is laying the foundation for long-term solutions that will enable utilities to deliver reliable and resilient power to customers through extreme weather events, including wildfires.

Portland General Electric (PGE) is in a multiyear phase of advancing its wildfire mitigation plan, from crunching data to better understand where the greatest and most impactful wildfire threats in its service area currently exist to executing on large capital system-hardening efforts to reduce the chance its equipment is the source of a potentially catastrophic wildfire event.

In 2019, PGE developed its first wildfire mitigation plan and, shortly thereafter, stood up a dedicated wildfire mitigation and

resiliency (WM&R) team. This team is the big-picture planning and boots on the ground that reflects the utility's commitment to wildfire risk reduction. While focused on numerous actions to tackle potential wildfire risks, the team also works closely with key partners across the region, including local and state emergency management and other electric service providers, to foster a coordinated effort to mitigate a risk that potentially impacts everyone.

"There is no one-size-fits-all response to wildfire," said Bill Messner, PGE's director of WM&R. "We have a deeper understanding of where the greatest risk is and we're delivering risk-reduction plans based on that analysis. But this work extends beyond wildfire season — ensuring system resiliency and making risk-management decisions is a year-round, multifaceted effort."

AI Camera Detection System

As of today, PGE is investing approximately US$110 million over five years in technologies, capital hardening of the electric system, data platforms and expertise to enhance its resiliency and situational awareness. These investments are an integral part of the utility's compliance with North American Electric Reliability Corporation standards and enable better geographic information system data quality, thereby improving operational efficiencies — whether that is managing vegetation, surveying, or design and engineering.

As an example, PGE's remote sensing program, a capital investment, uses light detection and ranging data, aerial imagery and hyperspectral imagery. The PGE team then uses analytics to inform predictive modeling for wildfire, asset management and geographic risk modeling. PGE also collaborates with fire and state agencies to make iterative improvements to the modeling. As a result, the technology helps PGE to make decisions that consider public safety, environmental and customer impacts, and costs in high-risk fire zones and public safety power shutoff areas.

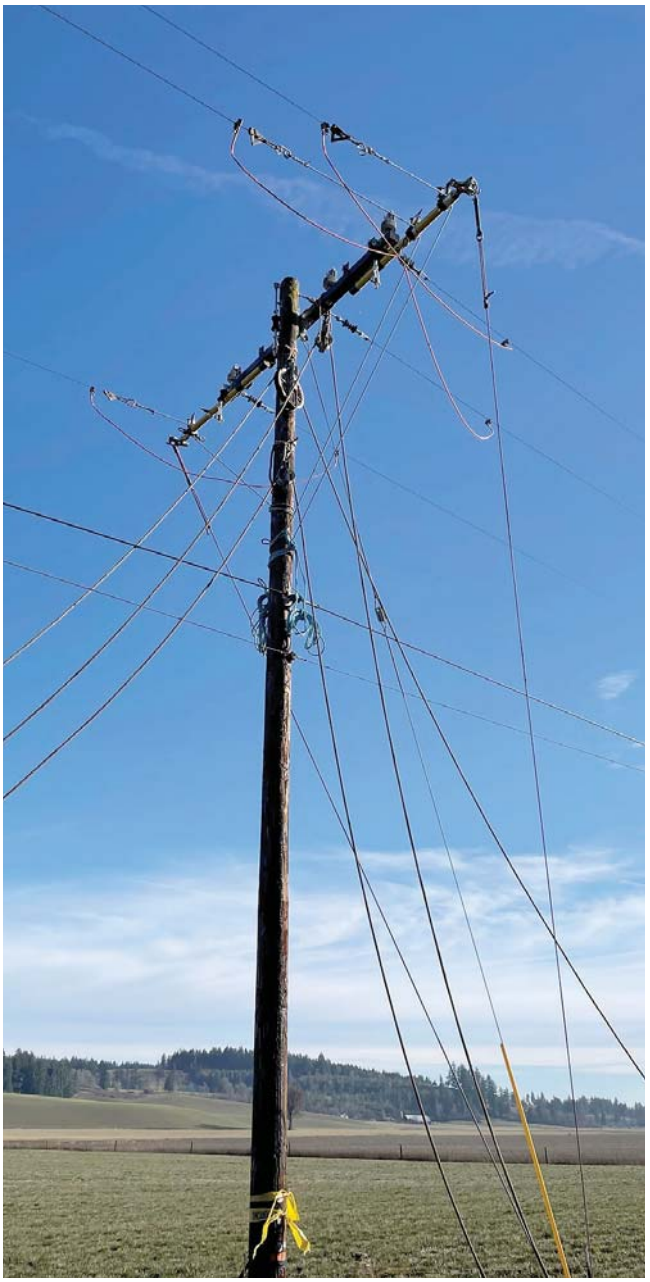
Wildfires are caused by a wide array of factors, and another of PGE's remote sensing investments is a cutting-edge Pano HD artificial intelligence camera detection system, which can detect ignitions and triangulate their location in real time. PGE has 26 Pano AI cameras that cover high-risk

New conductor ready to install in the Willamette Valley. Photo by Portland General Electric.

A utility worker clips in a new conductor to a distribution crossarm. Long-term system hardening projects — including overhead-to-underground conversion, covered wire and intelligent reclosers — are critical to the reduction of wildfire risk. Photo by Portland General Electric.

PGE is investing about US$110 million over five years in technologies, capital hardening of the electric system. Photo by Portland General Electric.

A power pole equipped with a new conductor, X-arm and cutouts. Photo by Portland General Electric.



PGE has deployed an early fault detection system, enabling operators to detect abnormalities in equipment or operations before a failure occurs. Photo by Portland General Electric.

fire zones, and the company shares this increased situational awareness with nearly 40 land management and fire agencies across Oregon.

Minutes matter when managing a fire. In the summer of 2022, PGE's array of AI cameras detected a fire south of Hagg Lake 140 minutes before traditional 911 and satellite detection methods. Fire crews with the Oregon Department of Forestry were able to drive directly to the incident, whereas in the past, it could take hours to identify the location of a fire.

"The Pano AI cameras enable PGE to keep up with the pace of climate change and wildfire risk while system hardening projects go from planning to execution," Messner noted. "We are contributing to wildfire risk reduction across the state of Oregon and are serving as a leader in game-changing wildfire management and situational awareness."

Early Fault Detection System

PGE has deployed an early fault detection (EFD) system, enabling operators to detect abnormalities in equipment or operations before a failure occurs. These cutting-edge risk management devices listen to the electrical noise coursing through power lines, which helps to reduce wildfire risk and improve reliability by minimizing outage time and, more importantly, allows for proactive intervention to correct faults before they occur.

PGE put this new system to use in the summer of 2022, when a power line sustained damage in a high-risk fire zone near Mount Hood, Oregon. Understanding what was going on and where enabled PGE crews to correct the issue before a downed-wire ignition event could take place. PGE is placing EFD sensors in high-risk fire zones, which will help to minimize outage time by reducing the time it takes to travel to the fault location, which, depending on conditions, can take hours.

PGE has 26 Pano AI cameras that cover high-risk fire zones.

Rooted in Safety

Even in historically wet, mild Oregon, summers are getting hotter and drier, resulting in longer fire seasons and an overall increased risk of wildfires. PGE is working harder than ever to reduce that risk while delivering reliable service.

Looking to the future, the company continues to enhance its situational awareness through advanced AI and tech, as well as using data analysis to improve on tried-and-true system hardening tactics for quicker and efficient project delivery. Whether these strategic investments live under the terms risk reduction, mitigation, or resilience the fact remains that this important work is rooted in a core company principle: Safety. TDW

DAN NUÑEZ is Wildfire Planning & Analytics manager at Portland General Electric. He is a certified project management professional and is certified with the Institute of Asset Management. He is also a developer and change manager for ISO-55000 & ISO-31000 business integration and practices for asset management and involved with the Oregon Hispanic Chamber of Commerce. He is a graduate of California Polytechnic State University at San Luis Obispo with a B.S. in structural engineering.

SDG&E sought approval from the Federal Aviation Administration to use drones for multiple use cases, including assessments. It was one of the first utilities to receive approval in 2014. Photo by SDG&E.

SDG&E Expands Drone Program to Detect Damage

The utility takes the use of drones for preventive assessments further by automatically detecting damaged assets from drone-captured images.

*By **TOM FRIES**, San Diego Gas & Electric Co.*

Following the devastating 2007 wildfires, San Diego Gas & Electric Co. launched its wildfire mitigation program, making significant investments in a wide range of technologies designed to help significantly reduce the chances of a utility-related wildfire. One such technology is the use of unmanned aerial systems, or drones.

Drones have proven highly valuable, enabling the utility to complete a wide variety of missions aimed at not only reducing the risk of wildfires but also increasing the safety of its employees while reducing costs. One of these missions, and perhaps the most critical, is the quick and efficient assessment of power lines and equipment within areas at risk of wildfire.

Preventive Assessments

Every year, San Diego Gas & Electric (SDG&E) uses drones to conduct thousands of routine preventive assessments on its infrastructure to identify and repair damage before an outage, but these assessments become particularly critical following extreme weather conditions, in which the utility may have had to proactively turn off power as a last resort to help protect homes and communities from utility-related wildfire risk. Infrastructure must be carefully inspected for damages prior to reenergizing the lines and restoring power as quickly and safely as possible.

Typically, utilities send field crews to visually inspect equipment for damage, which can require significant personnel hours,

increasing costs, the chance of worker injuries and the possibility of damaging the surrounding environment when driving or hiking through sensitive habitats. Utilities, including SDG&E, also have used helicopters, which also comes at a cost. Therefore, SDG&E sought approval from the Federal Aviation Administration to use drones for multiple use cases, including assessments. It was one of the first utilities to receive approval in 2014.

Since then, the company's use of drones has expanded and the utility developed its Drone Investigation, Assessment & Repair (DIAR) program. The DIAR program includes the deployment of numerous highly advanced drones to assess tens of thousands of poles, power lines and equipment and capture millions of images, which are then uploaded to a central database for review by qualified linemen. The advantages of drone inspections over ground inspections were quickly realized, including the top-down and close-up views drones provided. This helped the utility to identify additional issues to repair, leading to a more effective inspection program. However, SDG&E also realized drones could be used for more applications.

"I knew they were collecting the images, so the question was, 'Could we apply computer-vision models to help us be more efficient long term in our maintenance and fire prevention efforts?'" said Gabe Mika, strategic technology and investment manager for SDG&E. "Could we use the drone shots to build machine-learning models, and make this kind of drone program not just real, but something that had real benefits for our customers?"

Key Facts

Drone program start: 2014
Drone Investigation, Assessment & Repair program start: 2020
Number of drones: 26
Key use cases:

- Infrastructure assessments
- Vegetation assessments
- Post-wildfire assessments
- Line pulling
- Construction monitoring
- Accessing remote areas
- Pinpointing outages

Intelligent Image Processing

Analyzing millions of images is an arduous task and takes time. By using artificial intelligence, the digital acceleration team in the Information Technology department was brought in to see if the process could be streamlined further. Through intelligent image processing, SDG&E is now using artificial intelligence and machine learning to automatically detect damaged assets that could lead to an ignition.

"First, machine learning models were created to detect unique asset and damage conditions from the drone program imagery, including insulator, transformer, wooden pole and crossarm damage," Mika explained. "We involved qualified electrical workers to train the machine models to identify specific equipment damage by drawing a bounding box around an example of damaged equipment on an image. Then, that image is used to teach the machine software to automatically identify the same pattern of damaged equipment in future images."

After teaching the image-recognition models to accurately identify the equipment by tagging and confirming the contents of all 2.3 million photos, SDG&E's team applied their experience

The advantages of drone inspections over ground inspections were quickly realized, including the top-down and close-up views drones provided. Photo by SDG&E.

A feedback loop was created within the platform, enabling qualified workers to validate machine learning results to optimize the model performance. The team built a map-based user interface to visualize and browse for imagery and machine learning results stored in the image repository. This helped the utility to identify additional issues to repair, leading to a more effective inspection program. Photos by SDG&E.

to grading the condition of equipment. By adding the insights of experienced linemen upfront, the data and model became far more accurate when analyzing images. And if the technology is unable to analyze the images, the model sends them to qualified technicians for further review.

This technology enables the utility to quickly identify damage that could lead to ignition and helps it to prioritize and initiate work in the field to repair the equipment.

The team built a map-based user interface to visualize and browse for imagery and machine learning results stored in the image repository. To facilitate continuous improvement and refinement of the models, a feedback loop was created within the platform, enabling qualified workers to validate machine learning results to optimize the model performance.

AI & Machine Learning Models

Since officially kicking off in April 2020, the project team has built more than 35 artificial intelligence and machine learning models. Each one of these models is designed to automatically identify an SDG&E asset and identify a specific type of damage or specific type of condition.

The multi-departmental team, together with the asset management and operations departments, has changed the utility's approach to managing the immense electric infrastructure portfolio. Intelligent image processing is truly groundbreaking and promises to be a game-changer in SDG&E's mission to mitigate wildfire risk, minimize outages for customers and ensure the safety of the communities it serves.

The DIAR program is just one of many wildfire mitigation projects included in SDG&E's wildfire mitigation plan filed annually with the California Public Utilities Commission. The plan outlines ongoing practices and additional improvements SDG&E will make to mitigate wildfire threats. TDW

Editor's note: For more information on SDG&E's 2022 plan, visit *sdge.com/2022-wildfire-mitigation-plan*.

TOM FRIES has been with SDG&E Aviation Services for over 5 years. Prior to coming to SDG&E, Tom worked for General Atomics Aeronautical with program and engineering teams. Tom is a retired Marine with 22 years of active duty as an F/A-18 pilot. Tom has his undergraduate degree in Mechanical Engineering Technology from Temple University, master's degrees from both Georgetown University and University of San Diego, and Aviation Safety and Security certificate from University of Southern California.

Wildfire sweeps the mountainside, crossing metal transmission towers. Photo by iStock/Getty Images Plus.

How To Select Pole Material With Wildfires In Mind

Xcel Energy, SDG&E and the Snohomish County PUD share insights on fire hardening and their wildfire protection plans.

*By **BRAD HENNESSEY** and **MEGAN HAPPEL**, POWER Engineers Inc*

Intense wildfires often damage the T&D systems that fall within their paths, making it a challenge for utilities to stay operational in high-risk areas during times of crisis. In some instances, utility poles can even contribute to the ignition and spread of a fire. With no industry agreement on which materials are best in fire-prone areas, it can be difficult to decide which ones to use for wildfire mitigation. However, it is vital utilities thoroughly consider their options now, so they can protect their assets and communities during future catastrophes.

In general, utility poles are made of four primary materials: wood, metal, fiberglass and concrete. Unfortunately, there is no one-size-fits-all solution, and the best option depends largely on a utility's location, design criteria and state of existing systems. To get a better understanding of where these materials work best, Xcel Energy Inc., Snohomish County Public Utility District (PUD) and San Diego Gas & Electric Co. (SDG&E) share insights on fire hardening and their wildfire protection plans.

Xcel Energy

Xcel Energy services many U.S. states, but generally only experiences wildfires in Colorado, said David Flaten, senior distribution engineer at Xcel. In 2021, the utility estimated around 3000 line miles (4828 line km), or 70,000 individual poles, were vulnerable because of their location in wildfire zones. Because of the extra costs of switching to new poles, Xcel continues to use wooden poles, usually southern pine or cedar, in these areas. By covering the wood in fireproof wraps and fire-resistant coatings instead of replacing them, Xcel can harden line miles faster and with lower cost.

Metal transmission tower overlooks a fire scarred mountain. Photo by POWER Engineers.

They also have used laminated wood poles, often in their more mountainous locations. According to Flaten, "As long as it's not priorly damaged, [a laminated pole] is probably going to survive at least as well as a solid wood pole, if not better."

Damaged wooden poles are more vulnerable to fire than solid ones, and lamination provides them with an extra barrier of protection. Xcel's network of wooden utility poles is extensive, and because of this, they are doing all they can to harden their existing wooden structures against fire.

Snohomish PUD

Snohomish PUD, on the other hand, prefers all metal structures, said Gordon Hayslip, the utility's senior manager of transmission engineering and standards. Located in Washington state, wildfires are not typically on the radar for this public utility. However, because of climate change, recent fires have been creeping closer and the utility wants to proactively solidify its wildfire plan before fires become a big problem.

Snohomish started phasing out wooden poles long before it was concerned about fire. Though it was woodpecker damage that inspired the initial transition to metal, the same properties that protect against critters and heart rot also can provide benefits in wildfire hardening.

"It is expensive to replace a transmission pole, but it's such a critical asset the incremental cost of going to a non-wood pole is really minor," Hayslip said.

As Snohomish learned, if poles are regularly subjected to damaging forces, whether that be the beak of a woodpecker or the bite of a flame, then it makes a lot of sense to invest in something sturdier so they don't have to be replaced as often.

The utility tried several non-wood options before arriving at ductile iron. For a while, it used spun concrete poles, courtesy of a local manufacturer. However, because of the weight of the material, this option often is not feasible unless provided by a local supplier. Since transportation and installation of the heavy material is more complicated, Snohomish PUD discontinued this practice in favor of lighter metal structures.

"It has been our experience in wood pole class equivalents that ductile iron is much more cost competitive than classic steel," Hayslip said. "In some cases, we found that the price of ductile iron is almost the same as wood when you're getting into 75- to 80-ft [23- to 24-m] H4 or better pole sizes. There's really almost no cost adder to go with ductile iron."

Overhead view of metal transmission tower surrounded by scorched earth. Photo by POWER Engineers.

Since going with metal poles, Snohomish PUD also has noticed a variety of side benefits of the material. In the event of a phase contact with the arm, because of something like an insulator break or a loose tie, a conductive pole will trigger upstream protection devices much more quickly than a wooden pole, which may burn and allow wires to fall to the ground. With metal, the utility also does not have to worry about grounds being stolen by copper thieves since the pole itself is the ground.

Snohomish PUD hopes that by integrating metal poles into its system, it can create a pole line with a life span of 70 years to 80 years.

SDG&E

SDG&E also prefers metal structures, said Christian Henderson, electric distribution engineering manager at SDG&E. In

2021, the utility estimated it had around 54,000 circuit miles (86,905 circuit km), or 80,000 distribution poles, in what it refers to as high fire threat districts. After enduring some devastating fire damage in 2007 and 2008, wildfire mitigation has become one of its top priorities.

"We transformed from wood to steel," Henderson noted. "We have a requirement now in our high fire threat districts for either steel or fiberglass."

Steel structures usually are SDG&E's first choice, but the conditions do not always allow for it. In known corrosion areas or challenging environments such as wetlands, the utility will often use fiberglass instead. However, fiberglass poles come with their own set of challenges. For instance, fiberglass is not very rigid and can have some issues regarding deflection.

Utility poles and wind turbines in the path of an approaching wildfire. Photo by POWER Engineers.

To avoid unforeseen damage, SDG&E often sizes fiberglass poles slightly larger than normal, and the utility is always mindful of the type of loading and stress the poles will have to endure. It has even built multiple weather stations to assess the wind strain on its poles and account for actual conditions during design, so it can engineer systems that are less likely to fail.

According to Henderson, fiberglass poles also are challenging because "the tools you need to work with a fiberglass pole are considerably different than the tools you need to work with a ductile iron or a steel pole." This means that crews who are new to fiberglass will need to be retrained and familiarized with the new equipment, which takes time.

Wooden poles in the face of fire. Photo by POWER Engineers.

Be Proactive

Wildfires are a recurring threat for utilities in at-risk regions. Being proactive about wildfire mitigation now can end up saving utilities money in the long run. It is time for all electric utilities to start thinking about their wildfire plan and which pole materials will work best for them. TDW

Editor's note: For more information on what to consider during pole material selection, such as how to involve stakeholders, watch POWER's webinar on "Pole Material Selection for Fire-Prone Systems."

BRAD HENNESSEY (*brad.henessy@powereng.com*) is a senior project engineer and business unit director at POWER Engineers. He specializes in underground and overhead T&D systems and currently oversees POWER's 400+ professionals dedicated to distribution engineering and design across North America. He holds a bachelor's degree in electrical engineering from Montana State University and a master's degree in engineering management from the University of Colorado. He is also a licensed electrical engineer in Arizona, California, Idaho, Washington, Oregon and Texas.

MEGAN HAPPEL (*megan.happel@powereng.com*) is a content developer, writer and editor for POWER Engineers. She specializes in transforming complex engineering projects into concise, relevant content for a wide variety of audiences and channels. She holds both a bachelor's degree in engineering management and a bachelor's degree in scientific and technical communication from Michigan Technological University.

Old Practices Are New Again: TEK and Cultural Burning

Fire is being used as a vegetation management tool to promote ecological diversity and reduce the risk of catastrophic wildfires.

*By **M.K. YOUNGBLOOD**, ACRT Pacific*

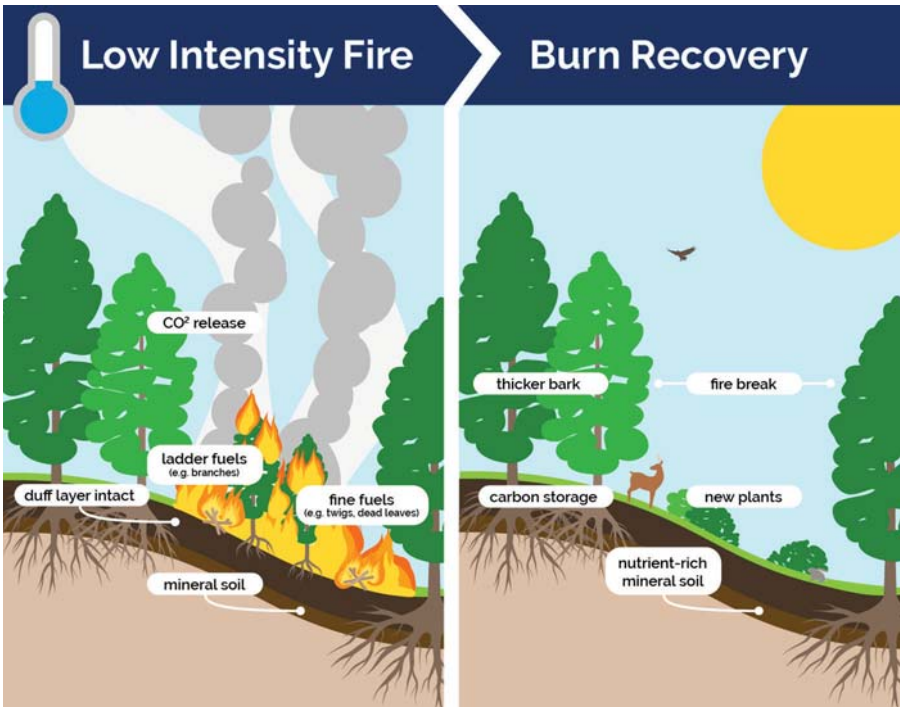
Wildland fires are happening across the United States. According to a June 2022 *T&D World article* by ACRT Services Senior Manager Bob Urban highlighting the sheer amount of damage these fires can produce, 2021 saw nearly 59,000 wildfires burn more than 7.1 million acres (2.8 million hectares), and 2020 saw the highest number of acres burned — 10.1 million (4.1 million hectares) — over the preceding five-year period.

With the volume of land impacted by wildland fires, it is natural to look for environmentally friendly solutions. This is where a basic understanding of traditional ecological knowledge (TEK) and cultural burning can become an asset.

Vegetation Management Practices

Vegetation management practices are always evolving. Early in America, indigenous communities managed their ancestral

(Top) Ron Goode, North Fork tribal elder and cultural burning practitioner. Photo by Pacific Southwest Research Station. (Bottom) In early America, fire was a tool that promoted ecological diversity and reduced the risk of catastrophic wildfires. Photo by ACRT.



lands in a variety of ways. For thousands of years prior to colonization, fire was integral to many Indigenous people's way of life. Indigenous people on what is now called Turtle Island in North America used fire to travel, manage the land for cultivation of fauna (animal life) and flora (plant life), hunt game and more. Fire was a tool that promoted ecological diversity and reduced the risk of catastrophic wildfires.

With wildfire season seemingly year-round now, particularly on the West Coast, it appears new, or rather old, techniques need to be used to combat this. Some new terms are being used in vegetation management regarding the practice of fire as a vegetation management tool: "TEK" and "cultural burning," and periodically they go together.

TEK is defined by the National Park Service as the ongoing accumulation of knowledge, practice and belief about relationships between living beings in a specific ecosystem that is acquired by Indigenous people over hundreds or thousands of years through direct contact with the environment, handed down through generations and used for life-sustaining ways. This knowledge includes the relationships between people, plants, animals, natural phenomena, landscapes and the timing of events for activities such as hunting, fishing, trapping, agriculture and forestry.

TEK encompasses the worldview of a people, including ecology, spirituality, human and animal relationships, and more. In stark contrast to Western society science, TEK uses more holistic and inclusive beliefs.

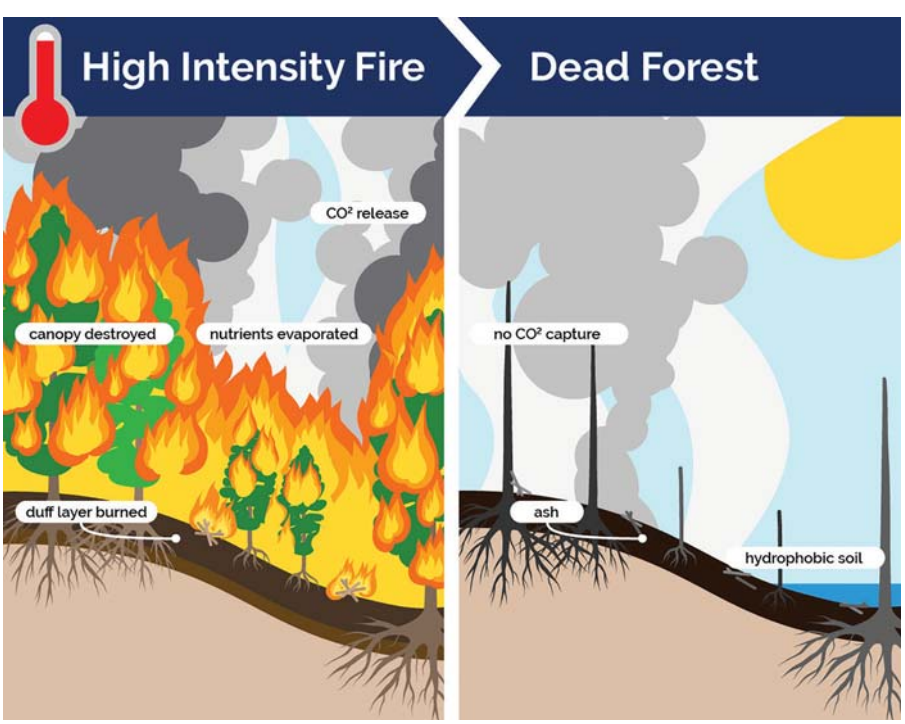
Cultural Burning

Many indigenous communities and tribes use traditional cultural burning practices with TEK to cultivate their lands. This practice typically uses a small, controlled fire to provide a needed result monitored by a tribal burn boss or traditional practitioner of fire. The U.S. Forest Service has seen the value of these traditional fires and adopted some of the uses in clearing ladder fuels from heavily forested areas at risk of a catastrophic fire, and many other entities are taking notice.

"Cultural burning links back to the tribal philosophy of fire as medicine," said Frank Kanawha Lake, a research ecologist with the U.S. Forest Service and wildland firefighter of Karuk, a tribe in Northern California. "When you prescribe it, you're getting the right dose to maintain the abundance of productivity of all ecosystem services to support the ecology in your culture." Most cultural burns use low-intensity fire to aid in burn recovery. This creates a manageable fire, which enables better burn recovery.

Fire Intensities

Low-intensity fire cultural burning is best in these: cool, moist and low wind speeds. However, depending on the specific vegetation to be targeted for cultivation, it may occur in various months. One of the most critical aspects is the fuel load, which



Many Indigenous communities and tribes use traditional cultural burning practices with TEK to cultivate their lands. Photo by ACRT.

needs to be low. The fire should be lit on a high incline to force the fire to work slowly downhill, preventing it from fuel loading uphill and blowing up into a monstrous, uncontrollable fire — like the Hermits Peak Fire in New Mexico, set by the U.S. Forest Service, that escaped containment and caused millions of dollars in damages.

High-intensity fires differ because of the damage the fire does, wiping out the duff and creating hydrophobic soil that can create erosion issues, mudslides and flash flooding issues. Indigenous peoples knew this and, thus, managed their lands with TEK, passing down the traditional knowledge from many generations to today.

Currently, in the Central Valley of California, there is a resurgence in TEK usage and cultural burning, thanks to North Fork Mono Tribal Elder Ron Goode, who has decades of cultural burning experience, and the next generation of tribal burn bosses like Ray Gutierrez, a Wuksachi tribal member, who has advanced degrees in forest ecology. Gutierrez is merging his traditional knowledge with academia to help cultivate gathering materials, such as redbud and sourberry. According to Mono elders, sourberry sticks used for basket making need to be cultivated with fire; otherwise, the plant grows up bushy and the shoots grow crooked, unsuitable for basketry. Mono Elder Julie Dick Tex explained that "a gentle fire clears the brush, regenerates the plant, and coaxes new shoots straight toward the sun."

Wildfire Education

Students in Humboldt County, California, are being introduced to Native American science, technology, engineering, art and math (STEAM) and studying TEK. As part of that, they are learning about cultural burning. A press release in the *North Coast Journal* shared the curriculum for elementary and middle school-aged students, which included teaching how "fighting fire with fire helps prevent wildfires."

Oregon State University's college of forestry is studying TEK and is home to a traditional ecological knowledge lab. Currently, the students are conducting two studies: A three-year Pacific Northwest ethnobotany, seed collection and tribal conservation corps ecocultural restoration pilot project, and a five-year project to expand on an interdisciplinary ethnobotany and TEK pilot project initiated by Dr. Cristina Eisenberg in 2019.

Wildfire Education

As Bob Urban noted in his fire safety *T&D World* article, "Everyone is stewards of the land they manage and work on, and a living fire plan is one of the best ways to ensure it continues to thrive for years to come."

When drafting vegetation management and wildland fire safety plans, it is beneficial to keep TEK top of mind. One might ask: What does TEK truly mean for vegetation management? A well-balanced approach to the future of the electric utility industry is the answer. By using indigenous best practices and Western science — acculturating the best of both — the industry will become more resilient and foster mutual respect for tribal and non-tribal knowledge. In a University of California, Davis article by Kat Kerlin, "Rethinking Wildfire," cultural burning and TEK can be summed up with one quote by Mono Elder Ron Goode, "There's a difference between cultural burning and just setting fire on the land. We use fire as a tool."

M.K. YOUNGBLOOD serves as the safety manager and tribal liaison at ACRT Pacific. He has more than 30 years of public service and first-responder experience with core proficiency in American Indian law, American Indian culture and disaster cleanup. Youngblood also serves as a certified instructor for the U.S. DOE (National Nuclear Security Administration and Center for Radiological Nuclear Training), U.S. Emergency Management Institute and Center for Domestic Preparedness. He has earned his California Naturalist designation from the University of California, Davis and serves as the tribal historic preservation officer for the Haslett Basin Holkama Mono Nation in Fresno, California.

It is not uncommon for utilities to face billions of dollars in wildfire costs, including damage to infrastructure and resources needed for restoration. Photo by panaramka-iStock/Getty Images Plus.

Real-World Wildfire Mitigation From Space

Rural electric cooperative replaces inefficient, manual systems with intelligent vegetation management system to manage wildfire threats.

*By **ABHISHEK VINOD SINGH**, AiDash*

Wildfire season now seems to last all year, without much of an off-season for recovery. Wildfires around the world can be summed up in two words: "escalating" and "devastating." Advancing climate change, with its storms and droughts, supports rapid forest growth, which leads to dry and starving trees and builds an abundant source of flammable kindling.

The impact of wildfires is heartbreaking:

- Lives lost — In the last two decades, wildfires have been responsible for thousands of lives lost around the world.
- Acres burned — In 2021, wildfires burned 7 million acres (2.8 million hectares) of land in the U.S., according to the National Centers for Environmental Information.
- Fiscal impact — It is not uncommon for utilities to face billions of dollars in wildfire costs, including damage to infrastructure and resources needed for restoration.
- Liability — In many cases, insurance is either incomplete or simply unavailable. Even with insurance, utilities can still be held liable for massive amounts of money and even criminal charges.

Regulators now require utilities to have wildfire mitigation plans in place, and many utilities are opting for rolling blackouts or public safety power shutoffs, which come with their own host of reliability and customer satisfaction problems.

Pity the utility vegetation manager who must keep any flame from reaching any point along miles of T&D lines. Nature is not the sole cause of the rising wildfire risk. The expanding wildland-urban interface (WUI) exacerbates the natural dangers. Researchers at the University of Colorado Boulder estimate that 54% of Americans now live within 3 miles (4.8 km) of a forest, making them extremely vulnerable. The National Association of State Foresters also estimates that 63,661 communities are at risk of wildland fire and its dangers to life and property.

Electricity infrastructure is becoming more and more crucial as society demands the clean energy potential of electricity for vehicles, homes and factories. At the same time, utility regulators are requiring more scrutiny of utilities' vegetation management practices while the utilities themselves struggle with workforce shortages, a brain drain of experienced retirees and rising labor costs.

Intelligent Vegetation Management

As a rural electric cooperative in Colorado's mountainous northern front range, United Power, Inc. must be strategic with its

In the last two decades, wildfires have been responsible for thousands of lives lost around the world. Photo by ©gettyimages via Canva.com.

budgets and resources. Its Mountain District covers approximately 400 sq miles (1036 sq km), all of which are in a high-risk wildfire zone. Rugged terrain, high winds, winter storms and densely forested areas increase the coop's fire danger. With a relatively small investment in technology, it has yielded large returns in system resilience and reliability while conserving budget, staff, and resources. Moreover, the technology has helped the utility to manage wildfire threats.

United Power implemented AiDash's Intelligent Vegetation Management System (IVMS) to replace inefficient, manual systems that relied on office software and driving the 400 sq miles of overhead line.

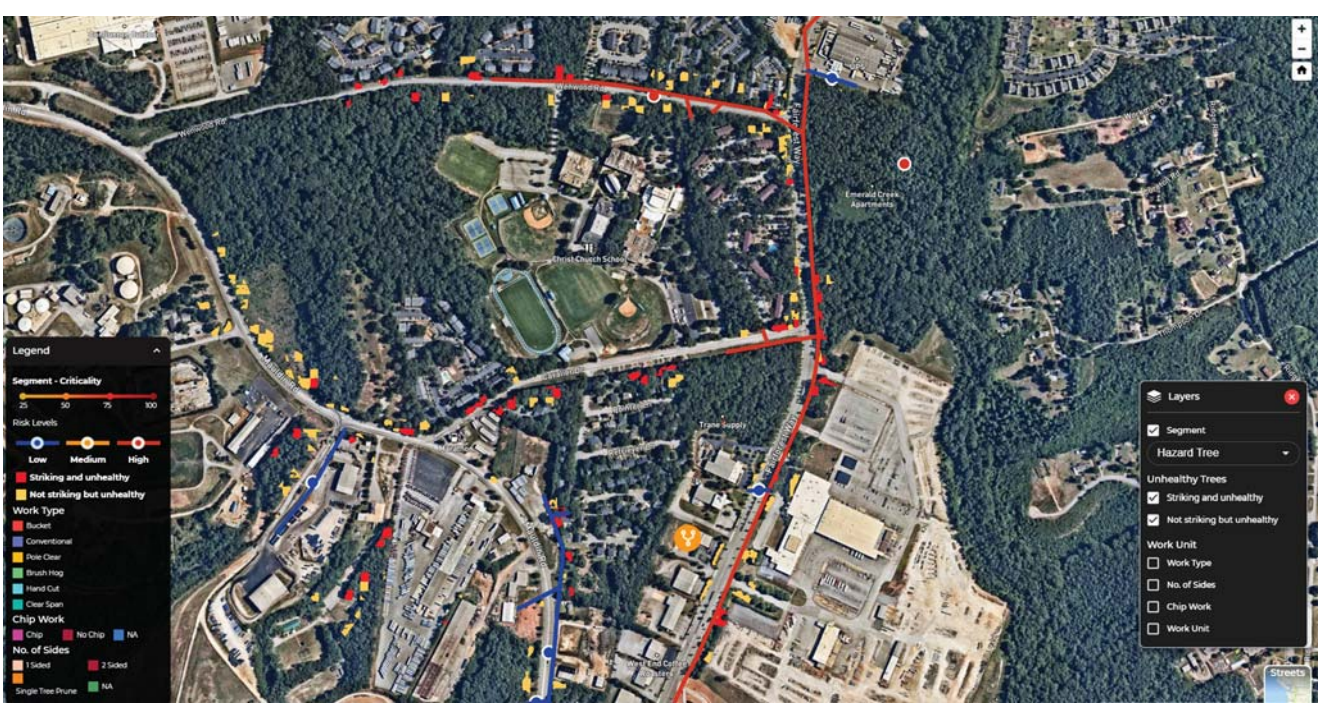
"I'm able to use our budget and strategically remove vegetation where we have the greatest risk of a wildfire and track cycle trims," said Holly Woodings, mountain area manager at United Power. "With satellites and AI, we can remove a hazard tree before it causes a power outage. All it takes is one dry, windy day and one tree to create a natural disaster."

How Innovation Fights Wildfires

Technology innovation is a juggernaut in this world and above it, as well. Specifically, satellite technology has come a long way since 1957's Sputnik. About 1000 new satellites now go up each year, offering seamless accessibility to Earth images. They can assess as many as 10,000 line miles (16,093 line km) per day, and imaging advancements now offer multispectral and even hyperspectral imaging along with synthetic aperture radar (SAR) that detects far more than the human eye. Image resolution has advanced from 88 yards to 12 inches (30 cm), with 4-inch (10-cm) resolutions almost ready for orbit.

With substantial improvements in computing, artificial intelligence and machine learning, these high-resolution images yield astonishing data about the state of wildland vegetation. The red-edge band of the spectrum detects hazard trees with declining health, based on dryness of vegetation. It also measures the chlorophyll and moisture content of all vegetation, identifies species and gauges soil conditions.

The AI also supports effective decision-making by identifying, predicting and monitoring hazard trees and other wildfire threats to T&D grids as well as supporting effective disaster response. It

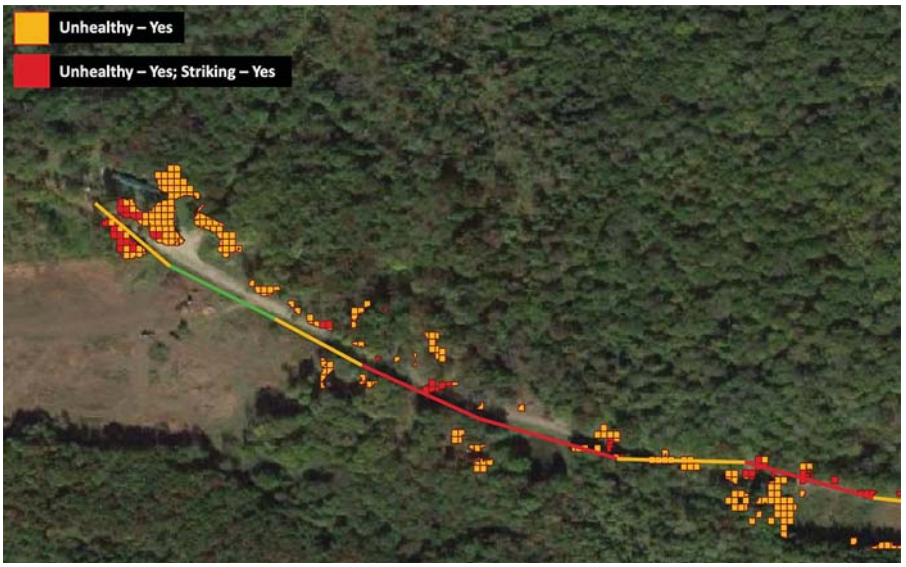


By taking on the data collection and analysis, these AI systems free up their human managers to focus on matters of evaluation and priority. The enhanced situational awareness helps vegetation managers to plan quickly, restore safely and communicate efficiently. Photo by AiDash IVMS product. Base map layer ©Mapbox, ©OpenStreetMap.

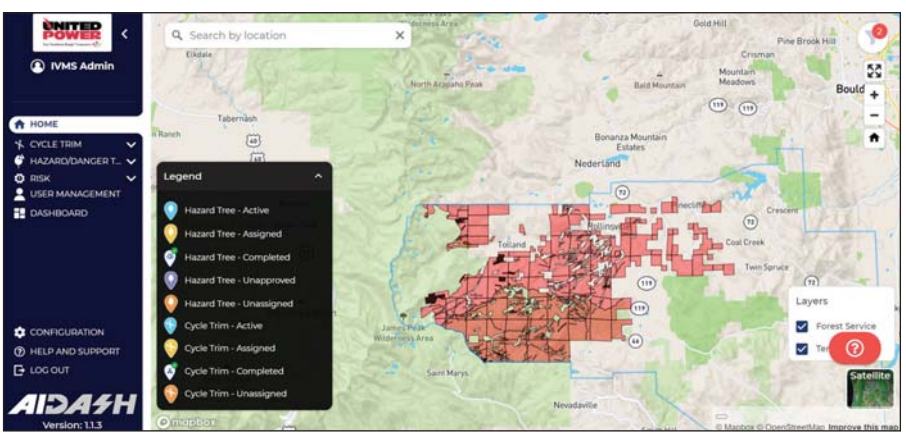
does this by integrating image data with other remote sensing data — such as light detection and ranging (LiDAR) information, ground truth from field inspectors and historical records of outages and causes — into a single workflow.

By taking on the data collection and analysis, these AI systems free up their human managers to focus on matters of evaluation and priority. The enhanced situational awareness helps vegetation managers to plan quickly, restore safely and communicate efficiently.

These advanced AI systems also help to build climate and wildfire resilience. A better view of a utility's network enables them to make more informed decisions to lower risk. Better data helps them to view several options to reach success. If one tree can cause a US$1 billion fire, then what if utilities could identify each tree with that potential anywhere on their network? Driving lines or sending up airplanes just cannot do it with enough speed or accuracy. It is impossible. However, advancements in technology already achieve this — economically.



When disaster strikes, utilities must know at the earliest possible moment. This may be with increased inspections, automated remote sensing and situational action plans. Utilities also need current, accurate data about weather patterns to set up an emergency response. Photo from AiDash IVMS Product. Base satellite image @CNES (2022), Distribution Airbus DS.



With the right mix of processes, technology, people and data, utilities can reduce wildfire risk drastically and offer safe, reliable power to the communities they serve. Photo by AiDash IVMS product. Base map layer ©Mapbox, ©OpenStreetMap.

Data Drives Wildfire Planning

With the abundance of data and insights now available through modern satellites and AI, they must be incorporated into each of the three phases of wildfire risk mitigation:

- **Prevention —** The adage "prevention is the best medicine" is twice as true with wildfires. It may be impossible to stop a natural disaster, but most wildfires are caused by people, and one of the leading drivers is utility related. For prevention, utilities need to apply all their data to gauge the key ignition causes: vegetation connecting with a power line and failed equipment. This means constant reevaluation of the vegetation management strategy to understand where to harden.
- **Detection —** When disaster strikes, utilities must know at the earliest possible moment. This may be with increased inspections, automated remote sensing and situational action plans. Utilities also need current, accurate data about weather patterns and insights on potential spread to set up an emergency response.
- **Response —** Boots on the ground get the power back on for the community as fast as possible. The data guides those boots to the highest priority locations with real-time visualization of the damage. Intelligent vegetation management systems also can alert crews to terrain anomalies and even recommend the necessary equipment. Every second counts in this phase. Homes, businesses, hospitals, prisons, schools and other critical assets should not be without power longer than is absolutely necessary.

Get Ahead Of Wildfire Risk

There is no question that wildfire mitigation is a top priority for utilities around the world. It is getting significant funding and is held under a microscope by the public. With the right mix of processes, technology, people and data, utilities can reduce wildfire risk drastically and offer safe, reliable power to the communities they serve.

United Power's Holly Woodings sums up the advantage she sees in applying advanced satellite and AI technology to prevent wildfires: "Being proactive is extremely important when you're mitigating risk." TDW

ABHISHEK VINOD SINGH (*abhishek@aidash.com*) is CEO and cofounder of AiDash. An alumnus of I.I.T. Kanpur, Singh worked with many IT companies prior to starting and growing a series of successful tech businesses including DbyDx Software & Edureka. He is based in Santa Clara, California.

Conducting regular inspections is an effective way for vegetation managers to prioritize treatment sites from one year to the next. Photo by Corteva.

Four Essentials To Wildfire Mitigation Programs

Investing time and resources in these four practices can significantly impact wildfire mitigation programs for electric utilities across the country.

*By **JEROME OTTO**, Corteva Agriscience*

Everyone has seen the devastation wildfires can cause. Buildings and homes often are decimated; evacuation routes are flooded with families in cars; and countless acres of land are ravaged in a matter of hours or days. Avoiding these unfortunate results can be challenging, but utility vegetation management programs can play an integral role in minimizing their occurrences and severity.

According to the California Department of Forestry and Fire Prevention, one in every 10 wildfires are caused by electricity. Statistically speaking, that means electric power was responsible for nearly 7000 of the 68,988 wildfires reported by the Congressional Research Service in 2022.

From dry conditions and high temperatures to rough terrain and varying densities of incompatible plant species, vegetation managers face numerous challenges as they work to prevent trees and other woody plants from causing wildfires and lapses in electrical service. Fortunately, utility vegetation managers can use the following strategies to prevent trees and other incompatible plant species from impacting utility infrastructure, which significantly enhances electrical transmission reliability and wildfire mitigation efforts as well as a utility's public image.

1. Conduct Regular Inspections

Optimizing resource management is essential for vegetation management programs, as resources often are expected to do more with less. By regularly inspecting managed land for areas where problematic trees and other incompatible plants pose the greatest threat to utility infrastructure, vegetation managers can

effectively prioritize the control and removal of vegetation that either poses a wildfire risk or threat to electrical transmission reliability.

In addition to inspecting vegetation throughout and adjacent to utility right-of-way (ROW) corridors, the following inspections can help to prevent utility pole failures and wildfire ignitions caused by inadvertent sparks:

- Check guy wire poles for wood decay or deterioration.
- Ensure security of guy wires and anchoring systems.
- Confirm bare-ground results around the base of each pole.

From dry conditions and high temperatures to rough terrain and varying densities of incompatible plant species, vegetation managers face numerous challenges as they work to prevent trees and other woody plants from causing wildfires and lapses in electrical service. Photo by Corteva.

2. Effectively Control Incompatible Vegetation

Environmental research studies have shown the exclusive use of mechanical control methods, such as mechanized mowing, generally is ineffective at providing long-term control of incompatible trees and other problematic plant species throughout the wire zone and border zone of utility ROW.

Mechanical control strategies can be used to remove undesirable vegetation. However, incompatible trees and a variety of highly flammable plant species will continue to spread and resprout as long as their roots remain intact, which only creates additional maintenance requirements over time. Vegetation managers are encouraged to use the following herbicide applications to complement mowing practices and effectively control targeted vegetation:

- Basal bark, basal cut-stump or dormant-stem treatments
- Grass-friendly brush mixes

Basal cut-stump treatments and other herbicide applications can be used to enhance mechanical control methods for long-term control of incompatible trees and other woody plants. Photo by Corteva.

- Hack-and-squirt treatments
- Cut-stubble treatments.

These impactful strategies can be used to support the development of desirable grasses and forbs that impede the development of incompatible trees and flammable non-native plant communities. Doing so ensures vegetation management programs successfully meet the power line clearance requirements established by their state while limiting potential fuel sources for wildfires. Moreover, supporting the release of beneficial grasses and forbs can help vegetation managers to establish fuel breaks throughout utility ROW, which provide safer environments for firefighters to combat the flames.

3. Remove Remaining Debris

Mechanical control methods can provide short-term relief to safeguard the integrity of utility infrastructure, and herbicide treatments can help to prevent the reestablishment of incompatible vegetation in the future. However, any debris that remains after these treatments can still provide ample fuel for a wildfire. Utility foresters and vegetation managers can use the following strategies to ensure these fire hazards are effectively removed or repurposed:

- Bale woody biomass for proper off-site disposal.
- Cut trees into lengths that can be sold to local mills.
- Use chippers to break down debris and broadcast to sloped areas for erosion control.

4. Prioritize Communication

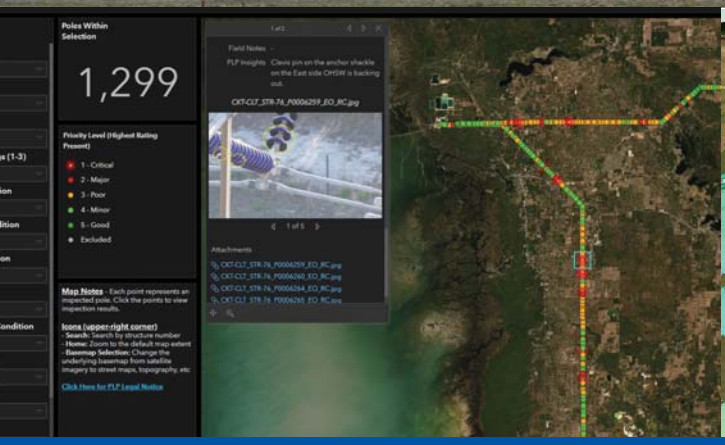
Public and private land often runs adjacent to utility ROW, making the use of effective vegetation control strategies on those sites equally important. While utility vegetation managers can collaborate with a variety of public and private entities to improve fuel load reduction and tree removal strategies in these areas, ensuring landowners and other land entities approve of each applied strategy is essential.

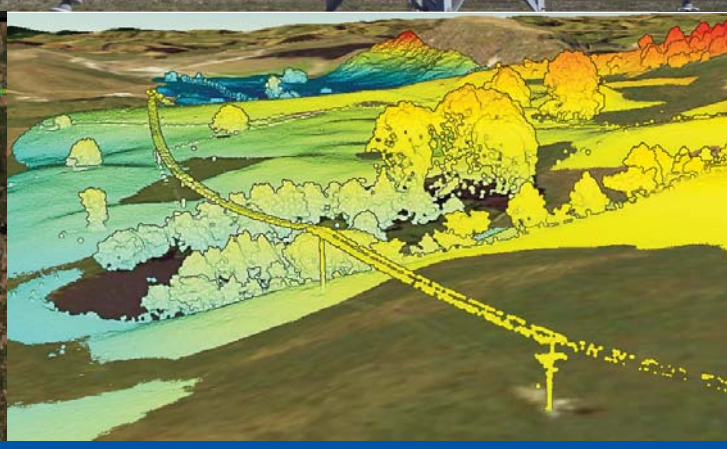
That is why Corteva Agriscience developed Notify Your Neighbor, a resource guide that contains valuable tools to help vegetation managers prepare for effective conversations with concerned members of the public. In addition to strategies, techniques and key messages that can help to increase compliance, reduce complaints and improve productivity, the resource also contains instructional videos and informative brochures that vegetation managers can engage with to refine public communications on their own time. To request access to Notify Your Neighbor, contact your local Corteva vegetation management specialist.

Vegetation managers often are the unsung heroes for utilities, and their impact reaches far beyond the edges of utility ROW. Their work not only enhances electrical transmission reliability and wildfire mitigation efforts but also a utility's public image. Effective vegetation control strategies can be used to ensure these positive outcomes; it is simply a matter of applying them in the right place at the right time. To learn more about best practices for managing incompatible vegetation throughout utility ROW and adjacent lands, visit *Utility.VegetationMgmt.com.* TDW

Supporting the release of beneficial grasses and forbs can help vegetation managers to establish fuel breaks throughout utility ROW, which provide safer environments for firefighters to combat the flames. Photo by Corteva.

JEROME OTTO (*Jerome.Otto@Corteva.com*) is a market development specialist with Corteva Agriscience. Otto uses more than 36 years of experience with agricultural solutions to support vegetation management specialists while serving as the interface between commercial sales and R&D for Corteva. He is based in Scottsbluff, Nebraska.





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