

# 2018 Pacific Northwest Wildland Fire Season

Summary of key events and issues

Bureau of Land Management  
Oregon and Washington

USDA Forest Service - Region 6  
Oregon, Washington, Alaska







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## The 2018 Wildland Fire Season



Shawna Legarza, director of fire and aviation for the USDA Forest Service, at an incident command post during a tour of the Pacific Northwest. The fire management response in 2018 relied on a wide range of personnel — from incident management teams to local staff and interagency cooperators.

# Long days, smoke, and managed risk

### EXECUTIVE SUMMARY

The *Pacific Northwest 2018 Wildland Fire Season: Summary of key events and issues* offers an overview of key lessons and issues from the 2018 fire season.

This document gathers key events from sub-regions and from specific fires; synthesizes key data and lessons learned from the events of the season; and shares these insights in a concise format. It may serve as a framework to support future discussions and further analyses.

Key issues center around the following general topic areas and observations:

- **RISK:** Risks, costs, challenges and successes of ...
  - Initial attack response;
  - Extended-attack, mid- to long-term fire management incidents; and
  - Multiple-objective, long-term fire incidents.
- **WEATHER and CLIMATE:** Longer fire seasons, shifting fire regimes, and health/safety concerns.

- **RESPONSE:** Agency and interagency response, interagency mobilization, and fatigue.
- **FUELS:** Fuel-treatment effectiveness. Cost-effectiveness of integrated fire management. Role of smoke in wildfire, restoration and maintenance phases.
- **ENGAGEMENT:** Community engagement in forest, fuels and fire management. Planning for climate and fuel changes.
- **SMOKE:** Extended air quality impacts, and related effects on public/firefighters.
- **AVIATION:** Effective, safe application of aviation resources to meet resource and management objectives.

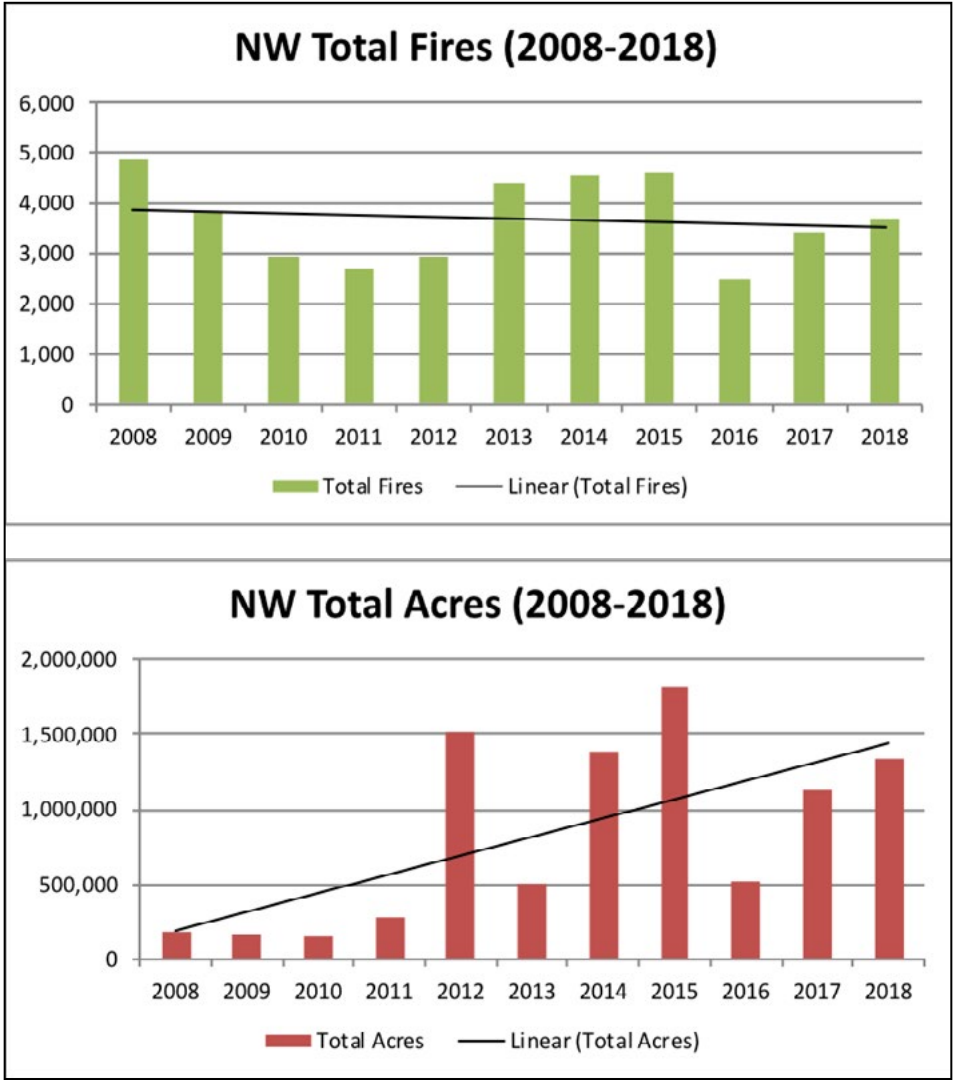
In some cases, these topic areas are not specifically addressed but are discussed in context. The information collected may support and guide further analyses of these topic areas.

This summary seeks to compile the intersection of wildfire, fuels, communities, landscapes and climate experienced in the 2018 fire season — which we will likely continue to experience and which our long-term strategies will seek to manage.



# 2018 Fire Statistics

10-year trend: fire ignitions stable, acres burned are increasing.



**FIRE OCCURRENCE AND SIZE**

For the 2018 fire season (through November 13) approximately 1,340,481 reported acres were affected by wildfire in the Northwest (NW):

- 901,613 acres in Oregon
- 438,868 acres in Washington

There were a total of 3,686 reported fires in the NW Geographic Area:

**1,953 fires in Oregon**

- Human-caused: 1,267 (65%)
- Lightning-caused: 686 (35%)

**1,732 fires in Washington**

- Human-caused: 1,448 (84%)
- Lightning-caused: 284 (16%)

Of the reported fires, 97% were contained during initial attack (a success rate consistently met or exceeded over the last 20 years or more). Of the 121 fires (3 percent) that met large fire\*\* criteria:

- 61 were in Oregon
- 60 were in Washington

In Oregon, the largest fire/complex was the Klondike Fire for a total of 175,258 acres.

In Washington, the largest fire/complex was the Grass Valley Fire at 75,573 acres.

**LIGHTNING**

A total of 45,203 lightning strikes have been recorded. The largest number of strikes occurring in one day was 8,273 (recorded on June 20).

**FIRE MANAGEMENT**

Incident Management Teams from the NW mobilized 59 times.

- Type 1 Teams - 6 times
- Type 2 Teams - 32 times
- Oregon Department of Forestry - 9 times
- Oregon State Fire Marshall (OSFM) - 11 times
- National Incident Management Organization (NIMO) - 1 time

**FIRE COSTS**

The estimated total firefighting cost to date exceeds \$706,780,738.

These costs\*\*\* are divided by state, with:

- \$533,095,697 in Oregon
- \$173,685,041 in Washington

**FIRE AND SAGE GROUSE**

In Oregon, fires affected 10,402 acres of Sage-Grouse habitat:

- Very high priority habitat = 3,617
- High priority habitat = 1,577 acres
- Moderate habitat = 5,206 acres

In Washington, fires affected 160,472 acres of Sage-Grouse habitat.

**NOTES**

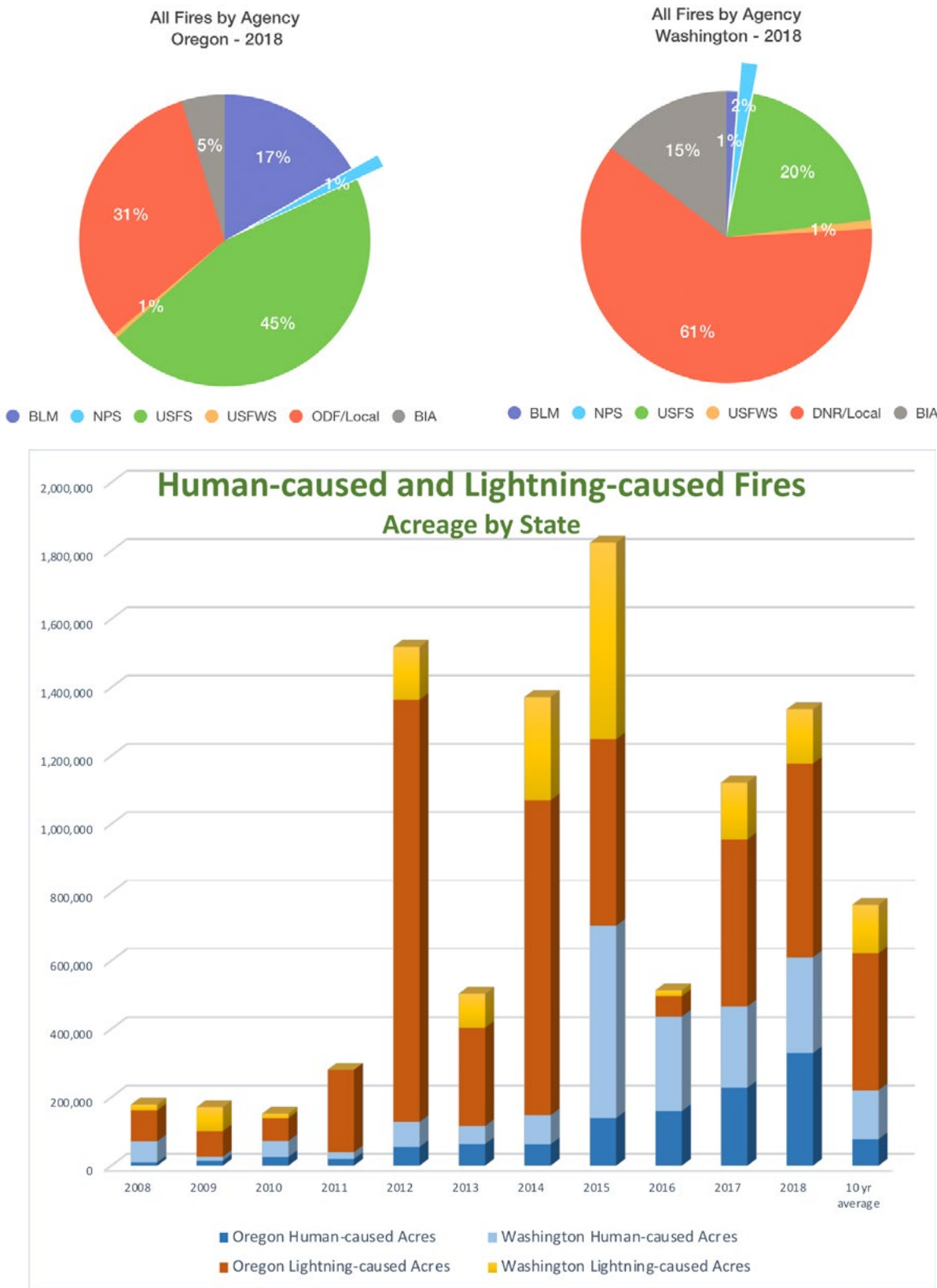
\* OR and WA individual counts may not equal NW total. NW dispatch offices report for small portions of neighboring states.

\*\* To be considered a “large fire,” a wildfire must be at least 100 acres in timber or 300 acres in grass/brush and have a completed ICS-209.

\*\*\* Not all costs have been reported. Data current November 13, 2018.

# Where fires burned, how they ignited

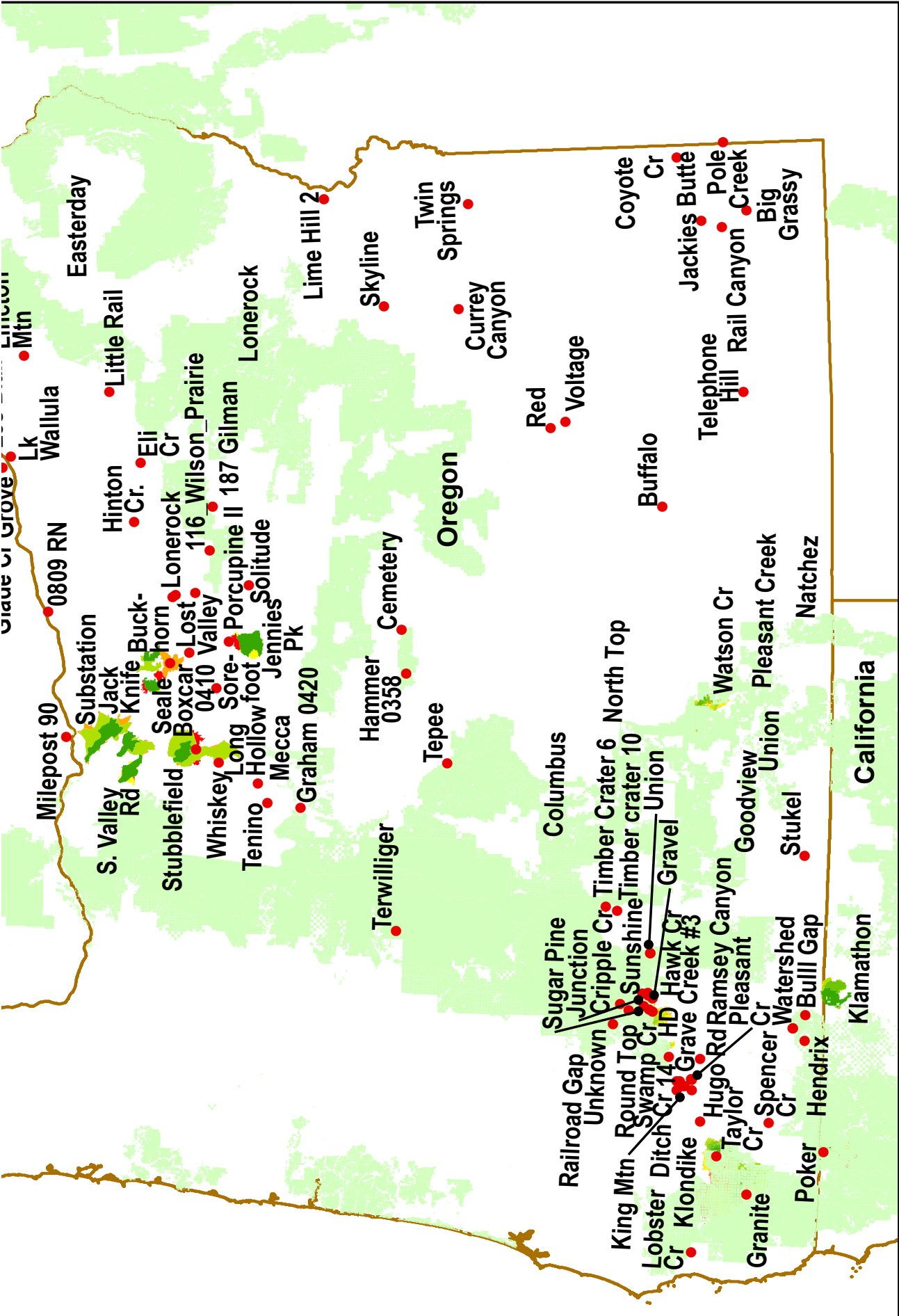
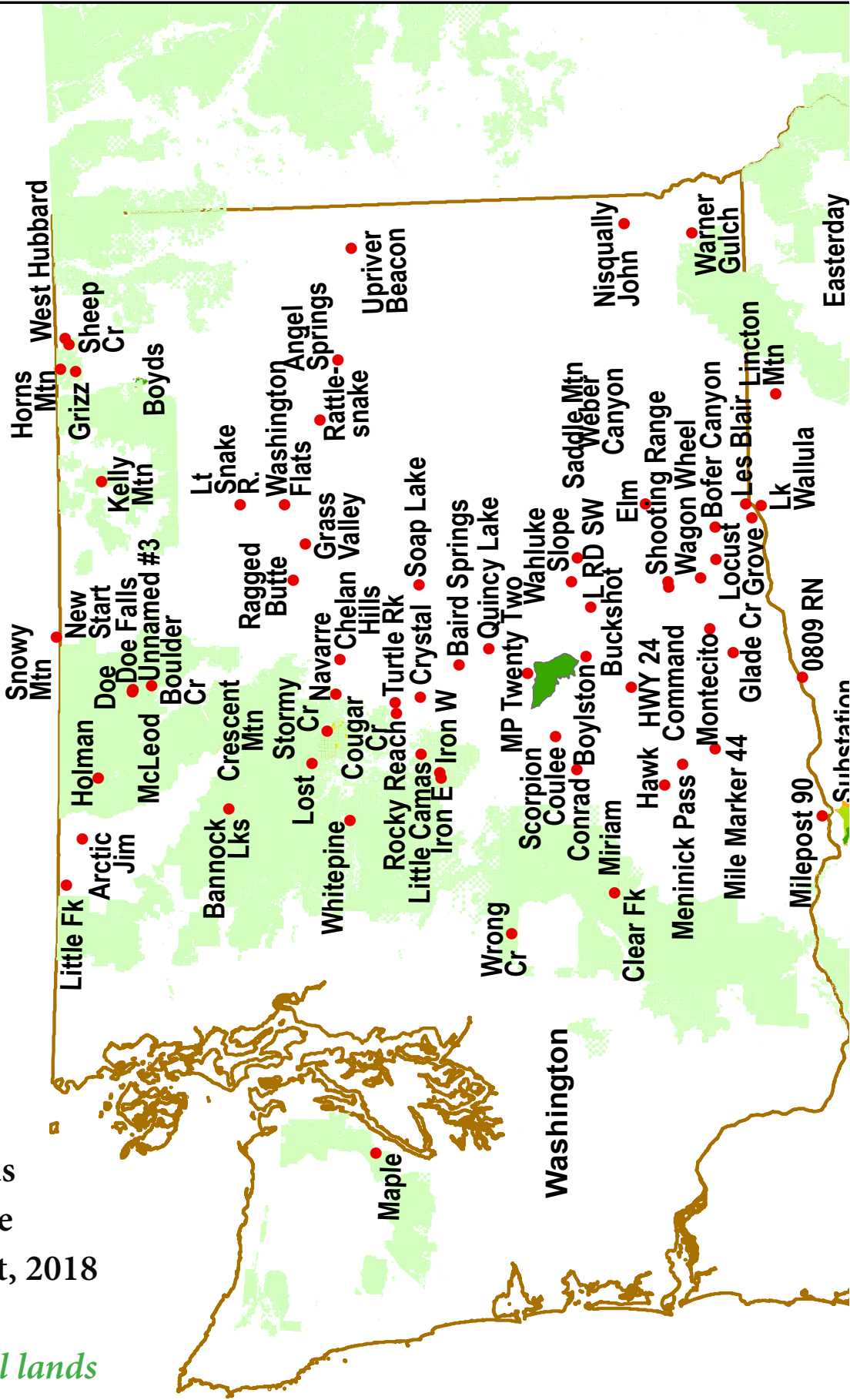
**IN OREGON (CHARTS ON LEFT), MORE FIRES IGNITED ON FEDERALLY PROTECTED LAND THAN STATE PROTECTED LANDS. IN WASHINGTON (CHARTS ON RIGHT), STATE AND LOCAL LANDS DOMINATE THE IGNITION LOCATION. IN BOTH STATES, HUMAN IGNITIONS ARE THE PRIMARY CAUSE — 65% OF FIRES IN OREGON AND 84% OF IN WASHINGTON WERE HUMAN-CAUSED.**



# Large Fires, 2018

● Large fires (plus perimeters) in the Pacific Northwest, 2018 (NWCC).

*Federal and tribal lands mapped in light green.*





The Fire Environment

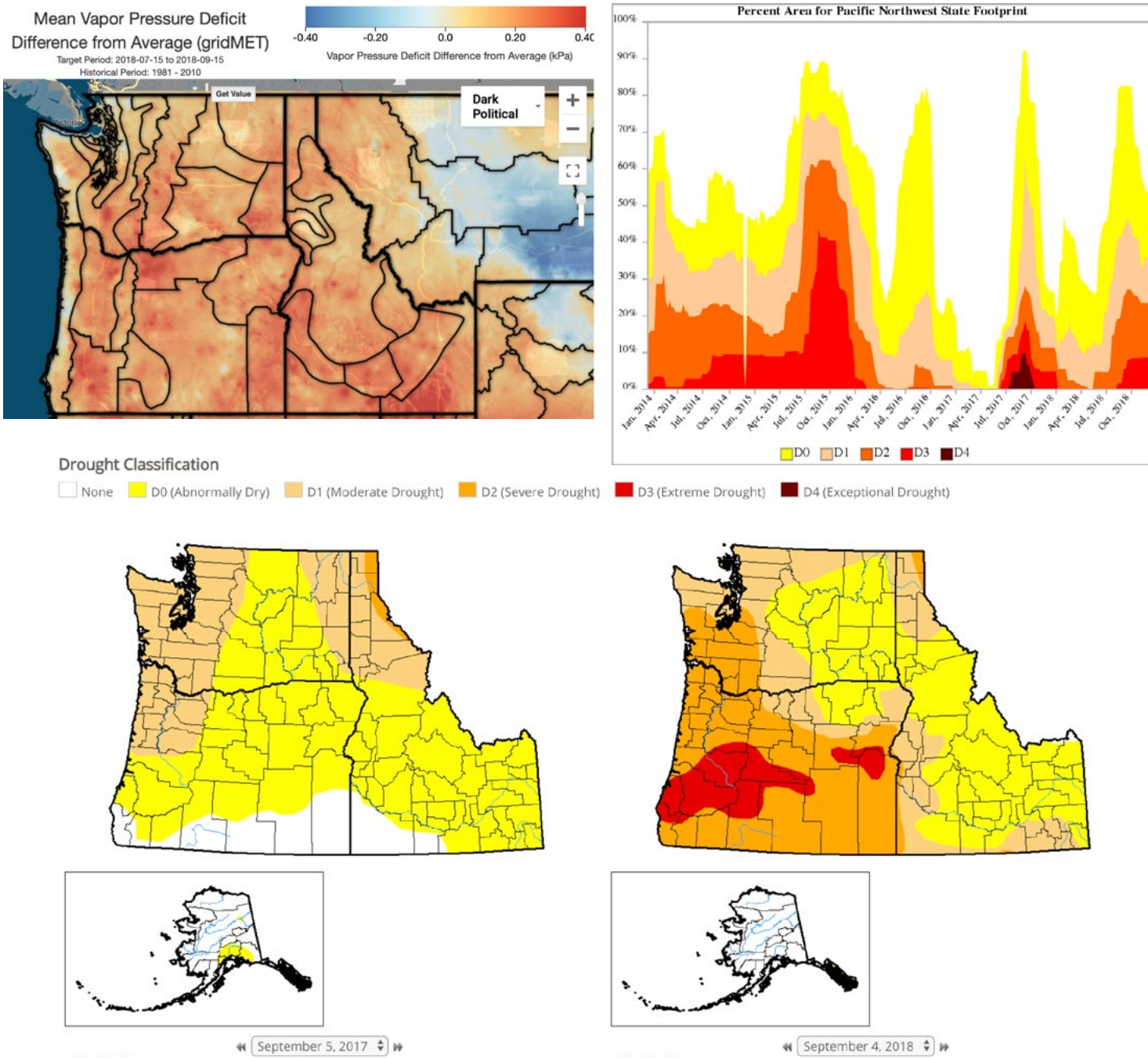
# Weather, Climate

## Long-term drought and impacts

Wildfire activity results from the combination of fuel availability, ignition sources, and heat. The graphics here and on the next page offer general insights into the timing, intensity and active zones for the 2018 fire season. (Top left) The mean Vapor Pressure Deficit (VPD), Difference from 30-year Average for the period from July 15-September 15, 2018, indicates a greater than average deficit during the most-active portion of the 2018 fire

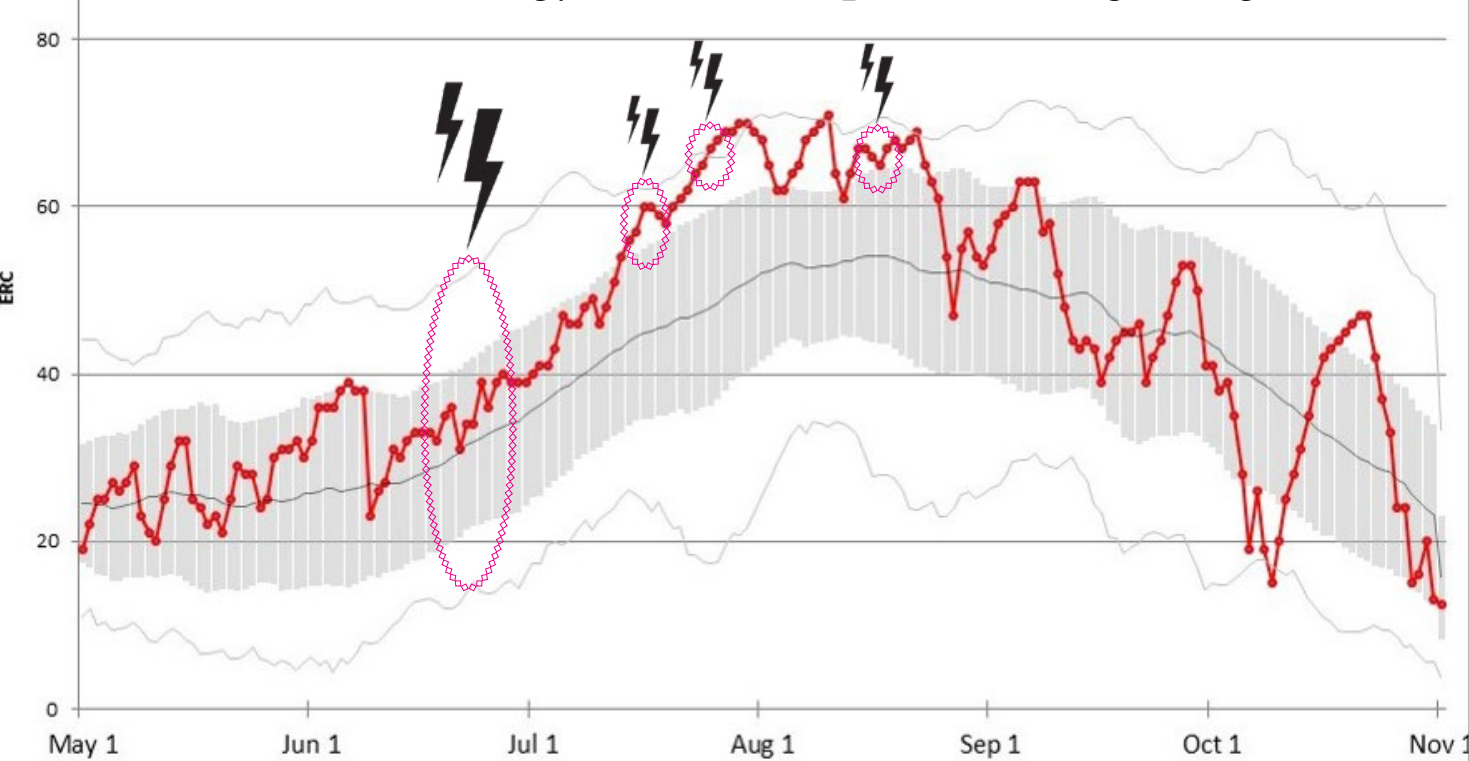
season. The VPD metric indicates evaporative potential and stress response in plants and has been correlated to increases in burned areas. The “deficit” observed this fire season likely resulted in increased evaporation and drying of live fuels during the 2018 fire season. Data visualizations from a range of drought mapping and assessment tools include:

- A four-year time-scale drought footprint for the Pacific Northwest (top-right), which notes the persistence and return of drought after a comparatively wetter period from 2016 to mid-2017.
- The two-week drought comparison tool (below) indicates areas more likely to have active fires (such as southwest Oregon). The drought maps compare early September 2017 to the same period in 2018.



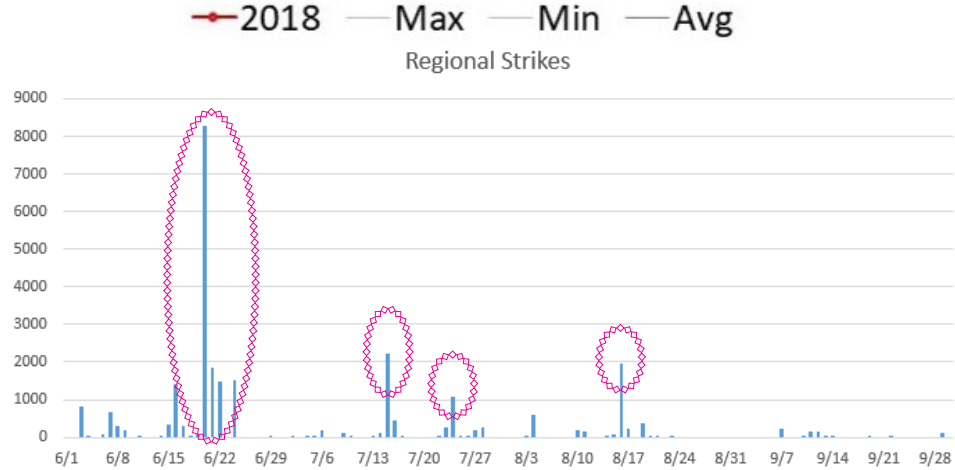
## The Fire Environment

### Fire-season variables: Energy Release Component and lightning trends



#### ENERGY RELEASE COMPONENT

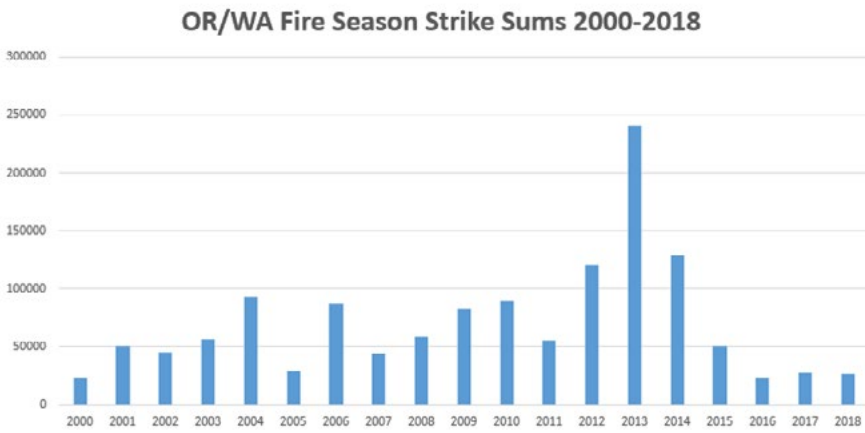
In 2018, the energy release component (ERC, top graph) was at or above average for much of the fire season, based on an average for Pacific Northwest Coordination Center ERC sites.



#### LIGHTNING

When the ERC graph is aligned with the regional lightning strike map (center graph, purple circles noting lightning busts), we observe that the majority of lightning occurred in early season (mid-June) during relatively low ERCs with reduced fuel availability. Where lightning occurred in dry, flashy fuels (grasslands), fires burned actively.

In contrast, three smaller lighting busts in mid/late July and mid-August were correlated with higher ERCs. Most strikes occurred during an ERC decline. Overall, the observed 2018 Fire Season Strike Sums (bottom) was in the lower quarter of the typical sum of lightning strikes, which may explain the ratio of human to lightning ignitions in the 2018 season.





Sub-Region Summaries

# Southwest Oregon

Long-duration fires, smoke, and cooperators engaging fire across borders.



On July 15, 2018, a lightning storm passed through the area, igniting over 100 fires on public lands managed by the Forest Service, the Oregon Department of Forestry and the Bureau of Land Management. From the early stages of suppression, Rogue River-Siskiyou Forest Supervisor Merv George, Jr. provided clear direction through an oft repeated “Leaders Intent” message: Put the fires out as quickly as

possible, as safely as possible and with as small a footprint as possible. This message was widely shared with fire teams, cooperating agencies, elected officials, stakeholders, the public and local media. Initial and extended attack success benefited from fuels treatments (such as on the Timber Crater 6 Fire). A combination of multi-ignition days and access challenges led to a number of larger, long-term fires, such as Klondike,

Taylor Creek, Klamathon, Ramsey Canyon and South Umpqua Complex. The last two years of managing large, complex fires on federal, state, and private land have emphasized the importance of agencies and partners working closely. In 2018, the amount of additional resources mobilized to southwest Oregon for pre-positioning made a significant contribution to response capacity. The Medford Air Tanker Base (MATB) experienced another very active year in providing aerial support and gallons of retardant pumped, with a combined interagency total of nearly 1.5 million gallons delivered between June 1st and October 29. This is partially due to the installation of a new ramp to support Very Large Air Tankers, taxi-way system improvements made by the Rogue Valley International-Medford Airport and the increased fuel capacity support by the local Fixed Base Operator.

From July 21-September 11, a southwest Oregon interagency Joint Information Center (JIC) provided a one-stop shop for public information on all fires, providing a daily summary from all fire teams via a daily update summary and blog. The JIC served an integral role with Josephine, Jackson and Douglas County Sheriff Departments in conveying and clarifying evacuation status. At the peak of the fire threat to communities, the JIC fielded approximately 750 calls daily. During JIC operations, the Public Information Officers helped register 8,295 people to Citizen Alert for Jackson and Josephine Counties. A primary concern of local communities in southwest Oregon has been the health and economic impacts related to wildland fire smoke. During the last two years in particular, the significant amount of smoke, the duration of its presence, and the number of days with unhealthy smoke levels has prompted growing concern from the public and elected officials. Land managers are working together to plan and implement forest restoration

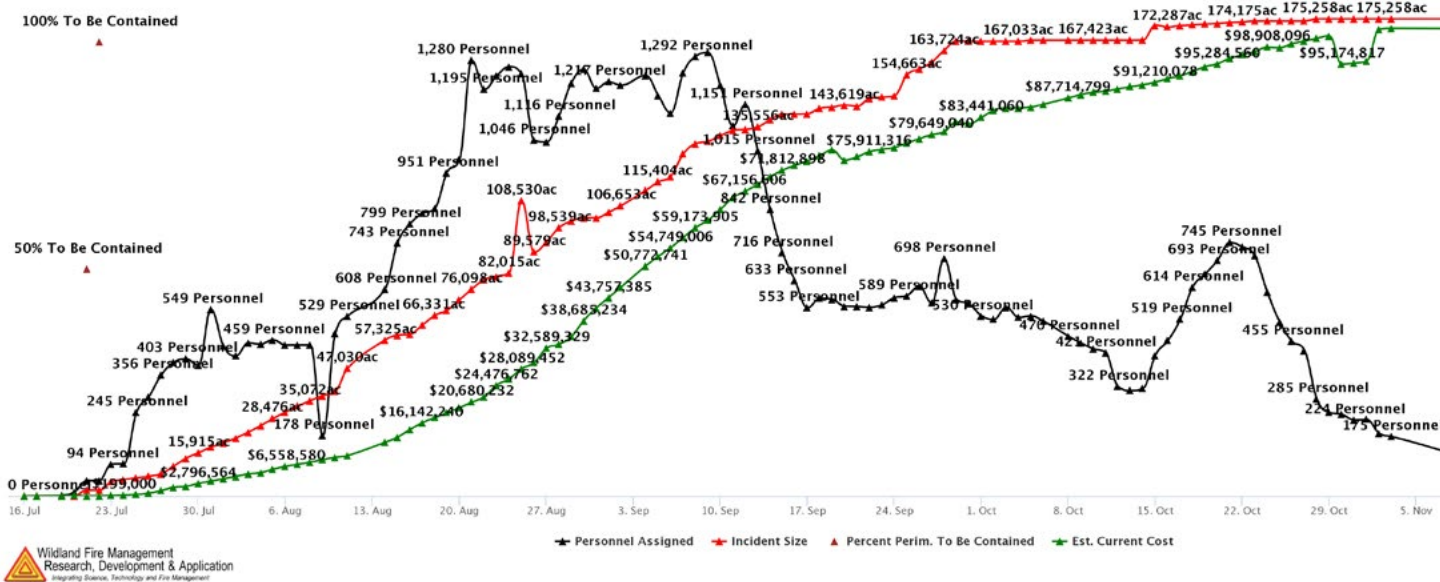
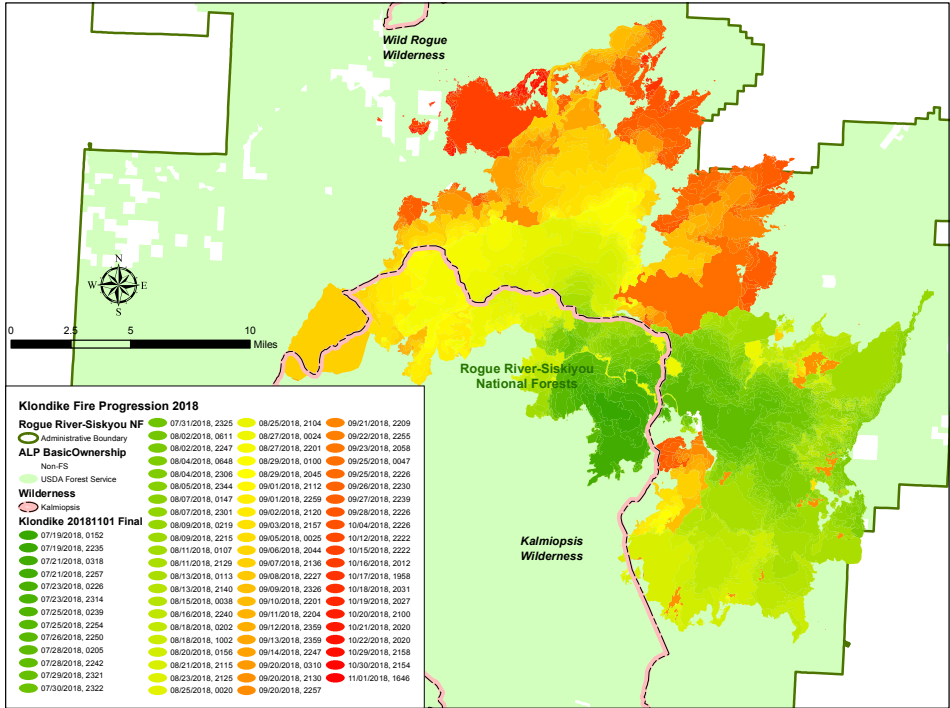
and fuels reduction projects that will help reduce smoke impacts and increase defensible space to protect local communities. Excellent work has already been accomplished through a nationally recognized partnership, the Ashland Forest Resiliency Project, in cooperation with the City of Ashland, the Nature Conservancy, Lomakatsi Restoration and National Resource Conservation Service/private landowners. By utilizing a variety of funding sources, the project has treated approximately 6700 acres of hazardous fuels in the Ashland watershed.

In southwest Oregon, the Rogue River-Siskiyou National Forest, Southern Oregon Forest Restoration Collaborative, The Nature Conservancy, and other partners have launched the Rogue Basin Cohesive Restoration Strategy to integrate wildfire risk and restoration needs to guide restoration efforts in the Rogue Basin and beyond. Multiple fuels reduction projects are underway with partners including Oregon Department of Forestry, Oregon Department of Fish and Wildlife, Oregon Hunters’ Association, Natural Resource Conservation Service, and private landowners.

KLONDIKE FIRE:  
Daily Fire Progression Map (right)  
and Timeline of  
Personnel, Incident Size and Cost (below).



A USFS engine supports burning operations in the Ashland watershed. Cooperative planning and implementation prior to and during the fire season supports protection of this key community watershed.





# Central and Eastern Oregon

## Early-season lightning fires and the role of Rangeland Fire Protection Associations



Fire suppression activities on the Boxcar Fire included aviation support in the hills above the Deschutes River and jet boat transport by BLM river rangers. IMAGE: Lisa McNee, BLM.

**JUNE LIGHTNING BUSTS AND THE BOXCAR FIRE**  
 Hundreds of lightning strikes on June 20 and 21 caused nearly 70 wildfires throughout central Oregon. In Wasco County, lightning ignited the Boxcar and South Junction fires near Maupin. On June 23, the South Junction and Boxcar fires merged. There were temporary road closures on Highway 197 and Bakeoven Road, and Level 1 evacuation notifications for areas around the Deschutes River but the river stayed open. Prineville District BLM River Rangers transported firefighters via jet boat to inaccessible areas to

secure the fire’s edge along the river and protect the community of Dant. Interagency firefighters working alongside the local Rangeland Fire Protection Association engines and ranchers contained the fire by July 6 at 100,207 acres. This fire was characterized by heavy sage brush and grass, with scattered juniper. Grass in the area was unseasonably dry, facilitating rapid fire spread. The fire was predominantly wind-driven with gusts documented at 34 mph moving through the area. On July 17, winds again spread fire rapidly. The Substation Fire east of The Dalles burnt through wheat fields and

adjacent wildland fuels in a mix of private and BLM lands. During the second day of the fire, a private tractor operator died while attempting to suppress a section of the fire. Three communities were evacuated and the loss to the wheat crop was estimated to be nearly \$12 million.

**THE CENTRAL & EASTERN OREGON FIRE ENVIRONMENT**  
 Central and eastern Oregon is predominantly a high desert region roughly 3,000 feet above sea level. Sitting in the rain shadow of the Cascade Mountains provides on average 300 days of sunshine a year with moisture falling

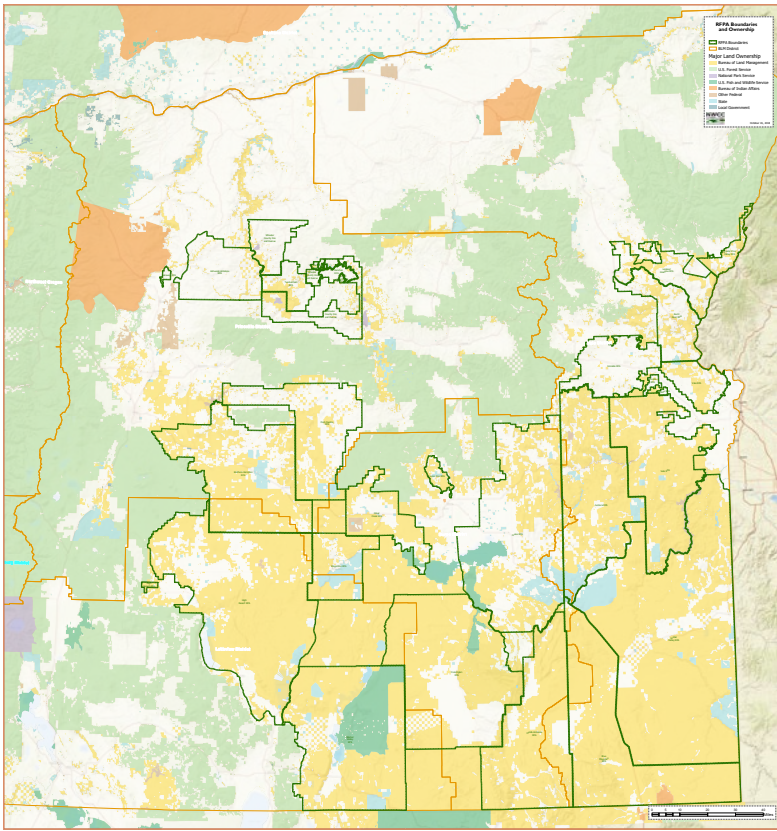
mostly as snow fall during the winter. Smoke from prescribed fire and wildfire may hang low to the ground at night and in the early morning due to a phenomenon known as a temperature or weather inversion. Smoke is monitored and regulated by the Oregon Department of Forestry.

**THE CHALLENGE OF MANAGING FIRE IN UNPROTECTED LANDS**  
 Fires in this area move rapidly, as demonstrated in the June fire bust. This risk is magnified by longer fire seasons and drought that makes fuel available earlier and with more intense fire spread. Within the region are areas where fire response is not managed under any specific agency fire protection agreements, and thus the fire response in these “unprotected lands” raises coordination, staffing, financial and safety challenges.

**THE ROLE OF RANGELAND FIRE PROTECTION ASSOCIATIONS (RFPAs)**  
 Like any large, rural and fire-prone state, Oregon has a finite number of state and federal firefighting resources, and their ability to respond to new fires can be constrained by location and the number of fire ignitions. To



2018 Incidents	# of Incidents	RFPAs involved	Total Acres Burned
COFMS	38	6	290,642
Burns BLM	11	3	2852
Lakeview BLM	26	2	59.200
Vale BLM	30	7	13,993
TOTAL	105	18	307,546



Map of 23 Rangeland Fire Protection Associations (boundaries in green)

supplement existing capacity, BLM and Oregon Department of Forestry have been promoting the formation of Rangeland Fire Protection Associations (RFPAs). The RFPAs are trained and equipped to fight wildland fires, and have proven to be valuable assets in protecting sage-grouse habitat. They receive equipment, often military surplus vehicles, through Oregon Department of Forestry and via grants from county, state, or federal partners. As a result, RFPAs have engines, water tenders, dozers, and lowboys for transporting heavy equipment. Grants also help the RFPAs purchase radios and personal protective equipment (PPE), such as fire shirts, hardhats, and fire shelters. Both ODF and BLM provide training and additional PPE, with all RFPAs receiving some form of training, with total training contacts up 10% from 2017. RFPa members are qualified for suppression tasks, such as line construction and burnout operations, that federal and state firefighters do, and operate within the incident command system (ICS). The BLM and Oregon Department of Forestry provide oversight and guidance to the RFPAs, but each RFPa is an independent entity. In 2018, Oregon had 23 RFPAs located across much of eastern Oregon, with another RFPa coming on board in 2019. Eighteen RFPAs responded to wildfires on lands managed by the BLM in 2018. RFPa units responded to 105 wildfires that burned 307,546 acres (three times the acres responded to in 2017).



# Western Oregon

## Terwilliger Fire

The Terwilliger Fire began on August 19, 2018 approximately 5 miles southeast of Blue River, OR, within the McKenzie River Ranger District of the Willamette National Forest. Response by USDA Forest Service and Oregon Department of Forestry firefighters and aerial resources was prompt following the initial report. With record levels of dryness, the fire grew quickly to several hundred acres overnight, spotting across Cougar Reservoir and burning through the popular Terwilliger Hot Springs.

Smoke impacts were mostly localized, with moderate to heavy smoke occasionally filling communities within the McKenzie River Corridor along Highway 126, a part of the West Cascades Scenic Byway. Extensive efforts by Public Information Officers focused on current and anticipated smoke impacts during public meetings, media visits, updates and their robust presence at key businesses in the corridor.

Throughout its duration the fire was managed using a full suppression strategy, which ultimately succeeded in keeping the footprint of the fire contained within the Ranger District, and not impacting nearby private land. As always, firefighter and public safety were maintained as the highest priority and shaped the risk management decisions that were made by fire officials, particularly when access issues arose due to aerial hazards on Aufderheide Road (Forest Road 19) such as falling rocks and fire weakened trees.

The cooperation by the Oregon Department of Forestry from initial response through the joint delegation helped make management cohesive from the standpoint of adjacent landowners. The early and dedicated cooperation



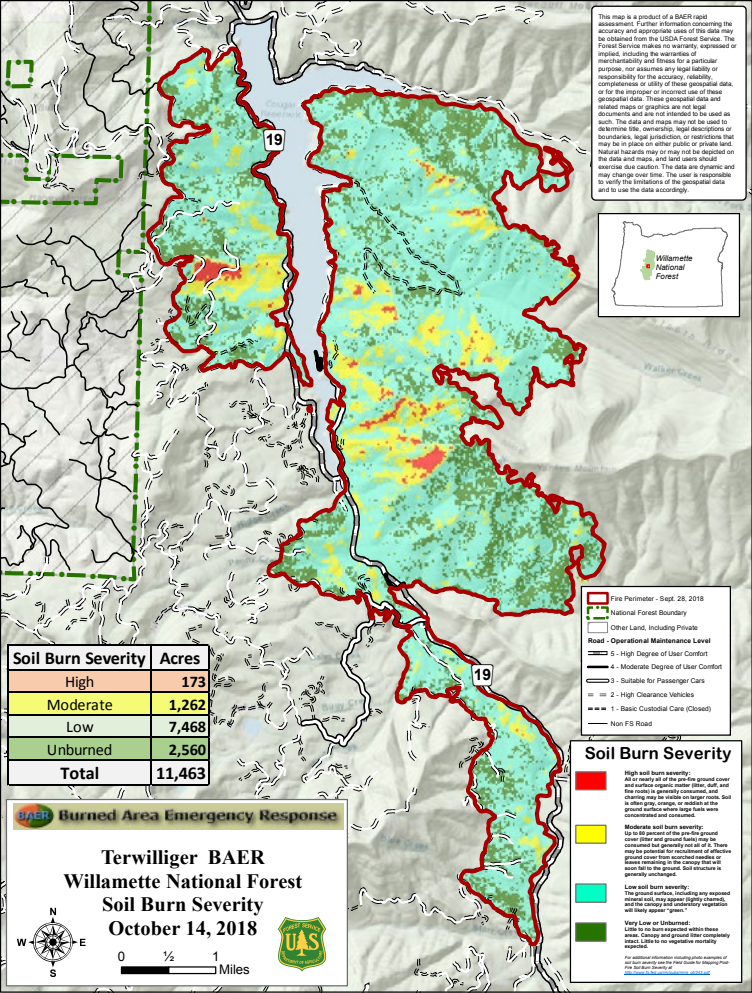
Tactical actions, including water support from helicopters (above), slowed fire spread toward private lands and reduced fire severity in a key watershed (below).

offered by the Lane County Sheriff’s Office helped ensure success, even though the fire didn’t prompt evacuations.

Safety concerns from falling trees, rocks and landslide risk led to the long-duration closure of a section of Aufderheide Road (Forest Road 19) and the Terwilliger Hot Springs continues to generate public interest. The Forest is working with partners to re-open the road, nearby trails and the hot springs.

Burned Area Emergency Response Repairs were successfully completed. At just under 12,000 acres the fire was one of the largest on the Ranger District in recent

years, and offers lessons for the local fire organization on how to best manage long-duration fires. The cause of the fire remains under investigation. The cost to date (November 1, 2018) is \$24,226,712.



# Northeast Washington

Fuels cure, with rapidly growing fires leading to evacuations.



Burning a holding line, Horns Mountain Fire.

**ABOVE NORMAL FIRE DANGER AND FIRES CROSSING BOUNDARIES**  
While precipitation and snow pack during the winter of 2018 remained average across the state of Washington, late spring and summer brought above-average temperatures and below-average precipitation, creating a higher than normal fire danger by mid-July across central and eastern Washington.

Northeast Washington experienced warming and drying trends throughout June and July, with isolated fire activity across the lower elevation areas in early and mid-summer, before a number of lightning and human-caused fires broke out between late July and mid-August. Fast-moving, lower elevation, grass fires across state, private, tribal, and BLM-administered lands along highways and river corridors covered thousands acres and triggered multiple evacuations, while several lightning-caused fires in mid-August burned more than 6,000 acres of higher elevation timber on the Colville National Forest.

**JUNE-JULY: EARLY SEASON BRINGS HUMAN-CAUSED FIRES**  
As summer temperatures heated up and precipitation dropped off, there were early signs that fuel conditions were drying out. The Soap Lake Fire broke out June

11 in Grant County, on lands administered by the Spokane District-BLM, and covered more than 2,000 acres of grass and sage fuels before firefighters contained it three days later. The cause is still undetermined.

The 1,600-acre Ryegrass Coulee Fire erupted July 9 near Vantage, Wash. The fire closed 20 miles of Interstate 90, and forced the complete evacuation of town before it was contained a day later. The Rattlesnake Fire, resulting from a human start July 11, grew to nearly 3,000 acres in the sage and grass fuels across the Colville Indian Reservation, 45 miles southeast of Keller.

On July 30, the Sheep Creek Fire ignited due to unknown cause on private timber lands near Northport and the Colville National Forest, growing to 458 acres before containment. The Milepost 90 Fire in southeast Washington, starting July 31, burned 14,500 acres of grass and sage along State Highway 14, triggering brief evacuations and prompting highway closure between Highways 197 and 97. On August 2, the Angel Springs Fire unintentionally started by equipment on Washington DNR lands near Davenport and burned more than 5,000 acres of grass, brush and timber.

**LINKS**  
<https://www.arcgis.com/apps/MapSeries/index.html?appid=95411f8de94f42edb0504f8a42de673a>

### AUGUST LIGHTNING, MULTIPLE WILDFIRES

On August 6 a lightning storm started numerous fires along Interstate 90, like the Silver Lake Fire near Cheney that briefly forced the evacuation of up to 100 homes. The Ragged Butte Fire, 12 miles east of Bridgeport, burned an estimated 3,000 acres, threatening structures and triggering evacuations and road closures.

Between 8 a.m. on August 10 and 8 a.m. on August 11, Washington experienced 173 lightning strikes creating 18 new fire starts in northeast Washington. Accompanying high winds temporarily grounded air operations in central and eastern Washington, which led to new growth on existing fires and slowed initial attack on new fires.

The Grass Valley Fire near Coulee City ignited Saturday, August 11 and ran for more than 75,000 acres in two days. The fire started along Highway 17 and expanded rapidly across private lands, and some BLM ground, driven by 30 mph winds. That same afternoon, the Boyds Fire erupted just west of Kettle Falls and ran nearly 5,000 acres across timbered hillsides above the Columbia River.

Of the multiple new starts on the Colville National Forest, the Horns Mountain Fire became established in heavy timber near Northport in an area that had not seen fire in more than 100 years. More than 400 firefighters responded as the fire pushed north, burning through large diameter trees with uncharacteristically low moisture content, and crossing the Canadian border into British Columbia. On August 14, the fire made international news headlines when a water scooper plane crashed in the Colville National Forest after scooping water from the Columbia River and returning to the fire. Miraculously, the pilot walked away with only minor injuries. Working with British Columbia Wildfire Services, fire crews (with assistance from Washington National Guardsmen) kept the fire to just under 6,000 acres (about 930 acres of those in Canada) when they contained it a little more than a week after it started.



# Central Washington

## Normal snow pack followed by hot, dry and smoky summer



Chelan Hills Fire.

Central Washington experienced normal snow pack during the winter of 2018, but precipitation dropped sharply by late spring making May one of the driest months on record. In many areas, Washington experienced below average precipitation during the spring and above average temperatures, which led to above average fire potential across central and eastern Washington starting in July and extending through September.

According to Public Lands Commissioner Hilary Franz, there were already nearly 400 wildfires across Washington State by the end of June that burned more than 10,000 acres across multiple jurisdictions.

Predictions were calling for another very challenging fire year across Central Washington, with references to the Jolly Mountain and Norse Peak fires of 2017 that burned more than 90,000 acres on the Okanogan-Wenatchee National Forest, in addition to numerous grass fires.

“We don’t think of them as fire seasons anymore, we think of them as fire years, because they start earlier and go later,” said Chuck Turley, a wildfire division manager for the state Department of Natural Resources, in a March interview with the Yakima Herald.

**EARLY SEASON FIRES**

The prevalence of fire activity in late spring and early summer led many to expect another long fire season.

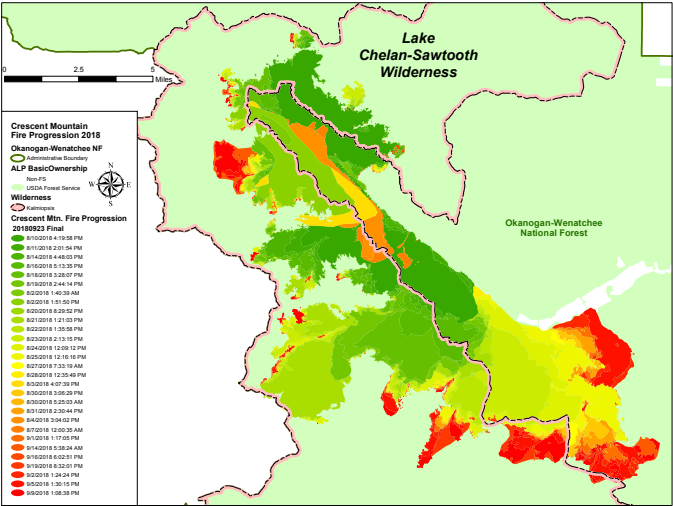
On May 22, a brush fire near Yakima Training Center burned 300 acres and destroyed 14 vehicles near Selah. On June 5, a 2,800-acre grass fire ran across Hanford Site, likely started by lightning and driven by wind.

The Little Camas Fire, unknown cause, started July 5 and burned 317 acres of Washington Department of Natural Resources (DNR) and Forest Service timber units near Cashmere, Wash., between Leavenworth and Wenatchee. The

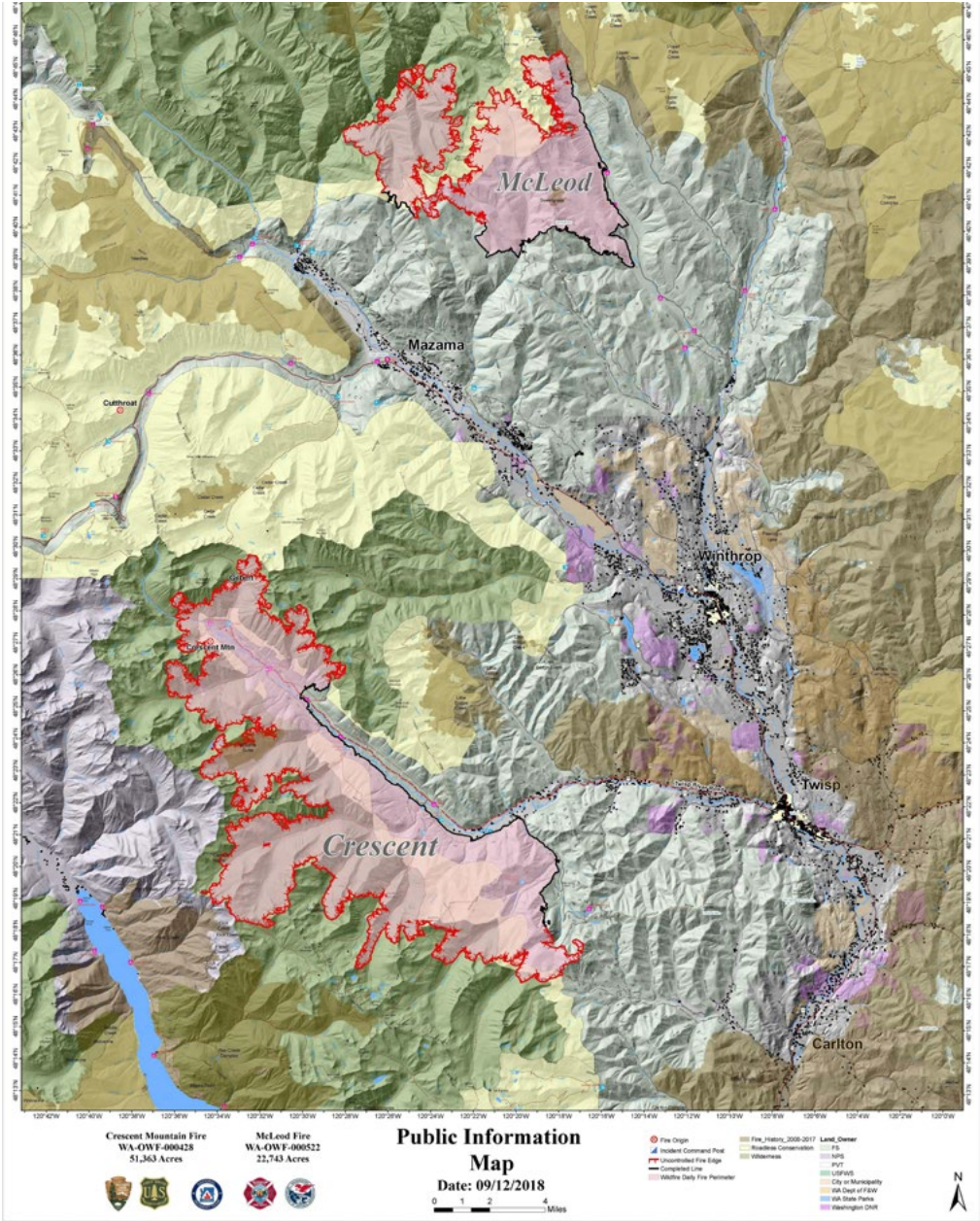
Rocky Reach Fire started July 13, 5 miles northwest of Wenatchee, and burned more than 3,300 acres. A week later several quick-moving grass fires broke out, consuming more than 100,000 acres and temporarily closing more highways.

The Boylston Fire started on July 19 and shut down I-90 east of Ellensburg for 24 hours. It burned 80,000 acres, mostly on the Yakima Training Center, triggering level three evacuations and destroying five buildings. The smoke caused “unhealthy” air conditions in Spokane. On the same day, the L Road Fire ignited south of Vernita, burning more than 29,000 acres over several days and causing the temporary closure of State Route 24.

On July 27, the Chelan Hills Fire broke out just east of Chelan, consuming nearly 2,000 acres of brush and grass over the course of several days.



Crescent Mountain Fire progression.



Crescent Mountain Fire and McLeod Fire - Area maps. September 12, 2018.

**LIGHTNING, STRONG WINDS ARRIVE AS PREPAREDNESS LEVELS AND TEMPERATURES CLIMB**

On July 27, the National Multi-Agency Coordinating Group (NMAC) raised the National Fire Preparedness Level (PL) to its highest point, PL-5. The PL ranges from one, indicating minimal activity, to five, which signals very high activity. Agencies reported erratic fire behavior in multiple geographic areas. The increasing number and complexity of incidents nationwide teamed with no availability of Type 1 and Type 2-IA (Initial Attack) crews, created a resource draw-down.

Against this backdrop, the hot dry weather continued, with almost 90 percent of geographic area weather stations showing less than 13 percent fuel moisture in 1000 hour fuels. The next day, lightning moved across Washington igniting multiple timber fires, while passage of a thermal trough brought erratic winds and unstable conditions for several days. On July 30, just as numerous fires on steep slopes managed by the Okana-

gan-Wenatchee National Forest became established, the Pacific Northwest Wildfire Coordinating Group raised the region’s Fire Preparedness Level (PL) to its highest point, PL-5.

Between July 28 and July 31, a number of lightning-caused fire starts were discovered on the Okanogan-Wenatchee National Forest, northwest of Wenatchee. The Cougar Creek Fire, just outside of Entiat, grew rapidly and eventually covered more than 42,000 acres. Farther north, the Crescent Mountain Fire was first reported July 29, in the headwaters of the Twisp River. The Crescent Mountain Fire grew more than 52,000 acres, triggering multiple evacuation notices in the nearby communities. Much further to the southwest, the Miriam Fire was reported a day later, on July 30, burning within the Goat Rocks Wilderness, two miles south of White Pass. The Miriam Fire burned more than 5,000 acres of timbered wilderness before it was contained.

Further east, the Saddle Mountain Fire broke out August 2 southwest of Othello when an apple truck sparked a grass fire. It burned 1,800 acres and temporarily closed Highway 24.

Two days later, Northwest Incident Management Team 12 (Herrod) was ordered for contingency planning for BLM, DNR and Forest Service lands directly south of the Snowy Mountain Fire burning in British Columbia between Keremeos and Chopa-



# Central Washington (continued)

located northeast of the Crescent Mountain Fire, showed high potential to move south into the United States in an area where there were few geographic barriers to check its spread. New fires continued to emerge throughout central Washington during August and into September, as crews continued working to suppress and contain existing large fires. The Hawk Fire southwest of Yakima broke out August 10, burning 800 acres and causing level three evacuations the first night. A week later, the Holman Fire was discovered burning on the Okanogan-Wenatchee National Forest. A lightning start in the Pasayten Wilderness northwest of Winthrop (and the Crescent Mountain and McLeod Fires), the Forest monitored the Holman Fire, which grew to just over 300



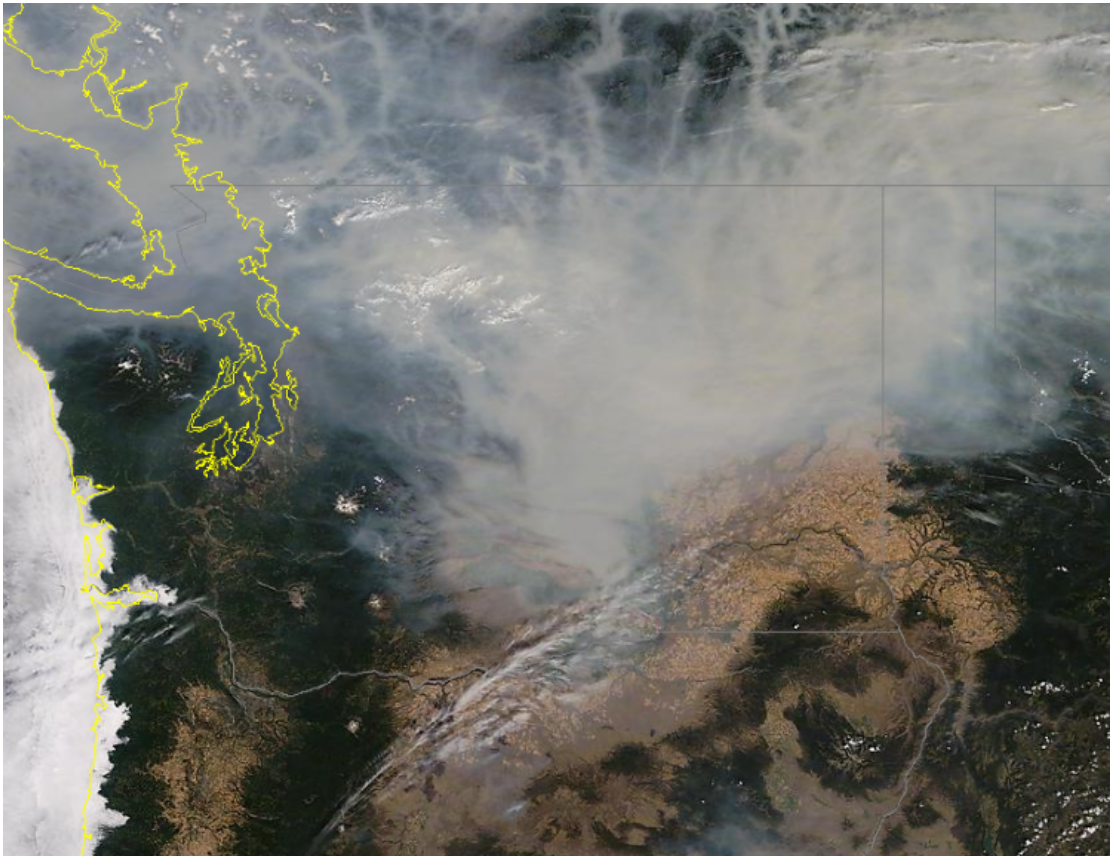
Night burnout operations on the Crescent Mountain Fire.

acres by the end of season. On August 16, another lightning fire emerged on Yakama Indian Trust Land, growing rapidly in dry grasses and driven by strong winds. The Meninick Pass Fire reached more than 5,500 acres. On September 1, the Crystal Fire

erupted east of Wenatchee, burning more than 2,600 acres in Chelan and Douglas Counties. A week later, the Wahluke Slope Fire broke out near State Route 24, burning more than 13,000 acres in Grant County. That same day, Hanford Site experienced another fire that burned more than 3,000 acres, just a few miles from the uncontained Wahluke Slope Fire, causing another temporary closure of the highway. This was the last major fire bust of the season but fire management of long-term fires continued until season-slowing rain occurred

### LINKS

Chelan Hills Fire. <https://inciweb.nwcg.gov/incident/6050/>  
Cougar Creek Fire. <https://inciweb.nwcg.gov/incident/6053/>  
Crescent Mountain Fire. <https://inciweb.nwcg.gov/incident/6093/>  
Miriam Fire. <https://inciweb.nwcg.gov/incident/6066/>  
Holman Fire. <https://inciweb.nwcg.gov/incident/6164/>



August 19 was one of the worst air quality days in central/eastern Washington for the 2018 fire season.



Lookouts on the Miriam Fire.

## Alaska

### Above-normal fire season in Tongass National Forest, and an earthquake.

The Tongass National Forest is approximately 17 million acres, but serves as the protecting agency for all wild-land fire in Southeast Alaska as designated in the state-wide master agreement, with total coverage of nearly 21 million acres, including three national parks as well as state and private lands. Between 15-20 fires burn in an average fire season, with an average size of less than an acre. Fires don't tend to get very big but they burn into the organic soils and can take several days to extinguish. The Tongass NF has 15 primary fire positions on four module: two Type 6 engines at Juneau and Thorne Bay and two IA squads at Wrangell and Hoonah. There are also Helicopter Managers at Ketchikan, Wrangell, and Juneau, considered secondary fire positions but not funded out of WFPR. The other secondary fire positions are in Ketchikan (Fire Management Officer, FMO) and Juneau (assistant FMO). There are dispatch centers in Ketchikan, Petersburg, and Juneau. The three centers are staffed in part due to unreliable Internet connectivity, adding coverage to repeaters in their zone without internet. None of the dispatchers are under a fire position description and are not considered

secondary fire. The majority of their work is flight following and float following for resource work (non-fire). In the 2018 fire season, the Tongass NF response area had 32 fires for a total of 63 acres, all human caused. Seven of those fires started on the Forest, 22 started on State or Private, two were on Native Corporation lands, and one was on Coast Guard land (Lighthouse Reserve). The first fire started on February 4 near the community of Lucky Me (1.5 acres) and the last one occurred on October 10. The most frequent fire cause was abandoned campfires in the Juneau area. The fires that were the greatest threat to communities and structures were from debris burning — one burn barrel and three from slash piles. After fire season, a 7.0 magnitude earthquake on November 30 had no impact on the Tongass and limited impacts in the leased building that houses the Chugach National Forest Supervisor's office. Employees in the office during the quake took shelter and most departed quickly to check on family and homes. One end of the building was structurally damaged and cosmetic damage occurred throughout with drywall damage. Elsewhere on the forest, no injuries or damages were reported.



'Predictable fire is preventable'

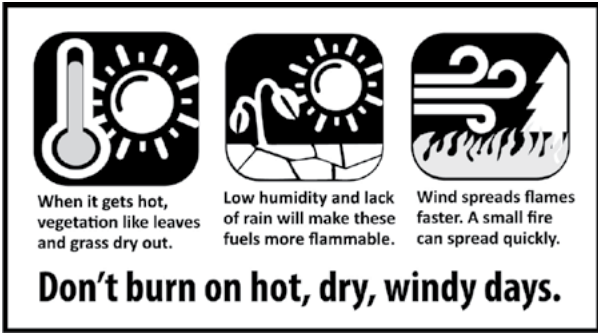
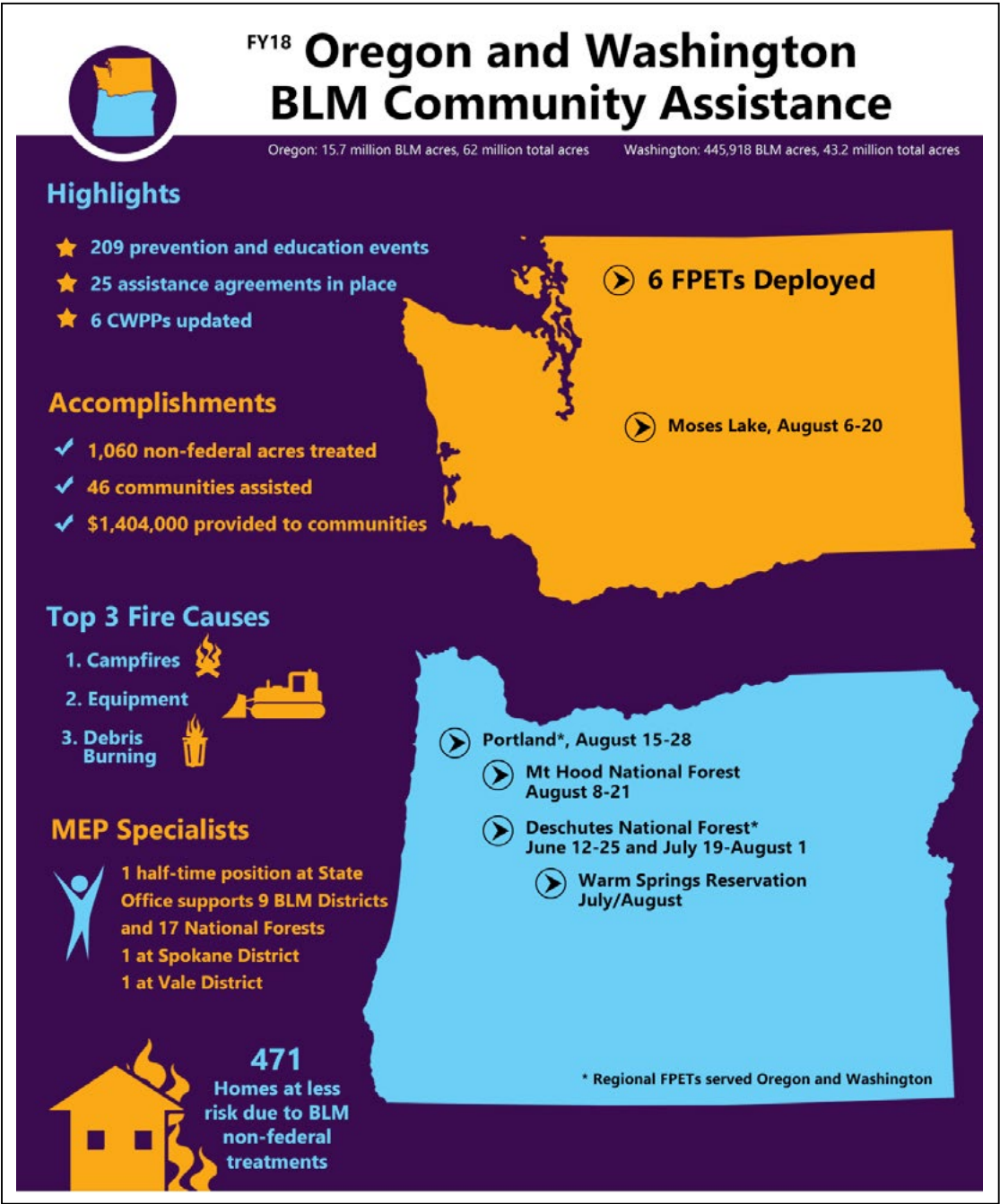
TEAMS FOCUS ON EDUCATION, ENGINEERING AND EDUCATION

A total of six fire prevention and education teams (FPETs) were activated during the fire season. Three were regional, with teams activated for June, July and August. The other three teams were based within sub-regions: one in eastern Washington, working with BLM and partners; one based in Mt. Hood National Forest in northwest Oregon; and one based in the Warm Springs Reservation focused on prevention activities with the Bureau of Indian Affairs. The campaigns focused generally on developing plans, messaging and implementation for the three components of prevention: education, engineering and enforcement.

TALKING POINTS

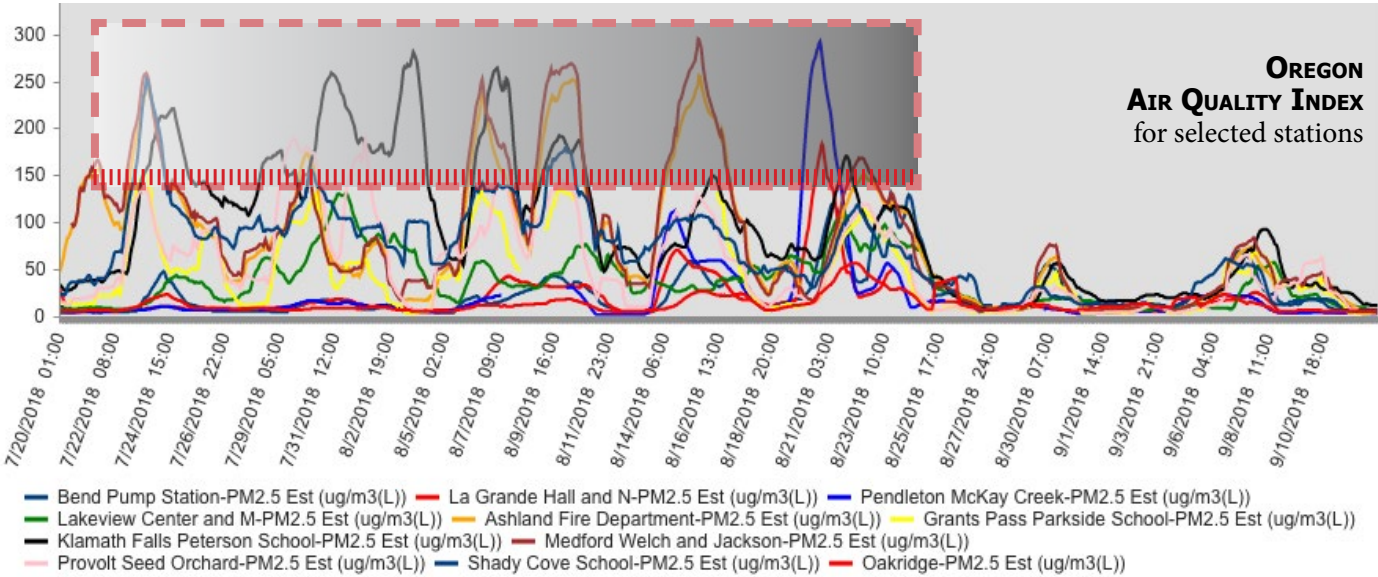
These specific talking points and graphic (below right) demonstrate the outreach efforts and content created by the FPETs. These were developed during mid-August by the NW Area Fire Prevention and Education Team, with a specific focus on Mt. Hood National Forest and prevention of human-caused wildfire.

- Human causes such as abandoned campfires and target shooting are responsible for the majority of wildfires on the Mt. Hood National Forest.
- Fire personnel have been occupied extinguishing 200 abandoned campfires in the past several weeks.
- Only one of 30 fires was caused by lightning.
- Predictable fire is preventable. If you think what you are doing might create a spark, find an alternative.



Smoke Impacts

Overview of daily average air quality at selected sites in Oregon (top) and Washington (bottom) during the active period of the 2018 wildfire season. Air Quality Index/PM 2.5 readings above 150 (as noted in the highlight boxes) are considered very unhealthy.



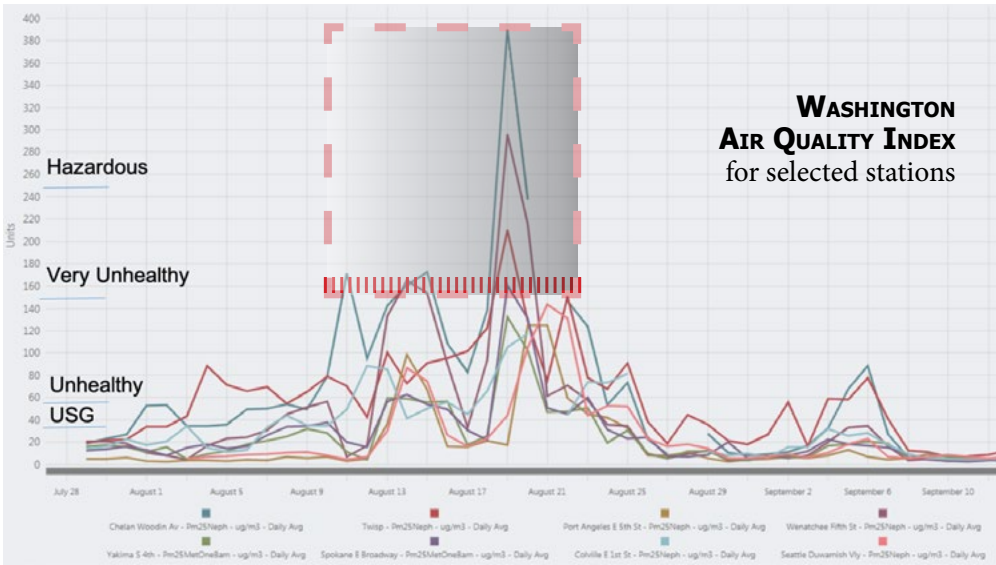
Smoke incursions during the 2018 wildfire and prescribed fire seasons are undergoing analysis. Initial analyses and discussions with smoke managers indicate that smoke from wildfires are a significant health concern among community members and policy managers, with lesser concern about prescribed fires, in part the result of smoke management practices.

- Smoke events were mostly from large and persistent fires in:
- southwest Oregon and northern California, with regional impact;
  - central Oregon (with impacts on Eugene and Bend);
  - north-central Washington (with impacts in the Twisp Valley);
  - and British Columbia (with impacts on Seattle).

Air quality monitoring is the responsibility of state agencies (see Links), with significant engagement at the regional/interagency and federal levels.

Smoke monitoring by community members has increased via the use of distributed air quality monitoring systems such as PurpleAir.

Smoke impacts in and near incident fire camps and among firefighters are also of increased concern.

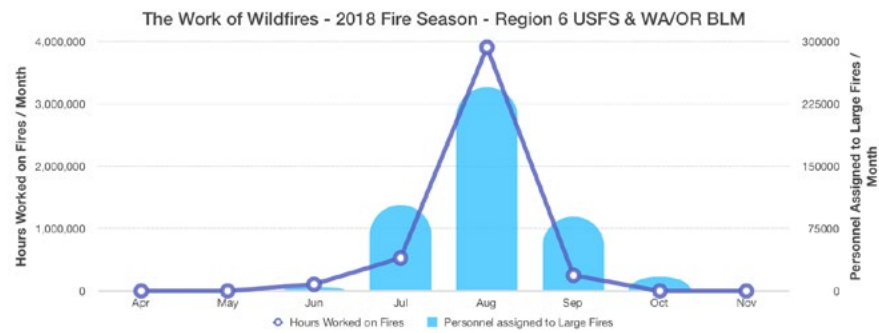


LINKS

AirNow - Oregon. [https://airnow.gov/index.cfm?action=airnow.local\\_state&stateid=38](https://airnow.gov/index.cfm?action=airnow.local_state&stateid=38)  
Oregon Department of Environmental Quality. Wildfires and Air Quality. <https://www.oregon.gov/deq/air/pages/wildfires.aspx> and <https://oraqi.deq.state.or.us/Report/CustomGraphs>  
Oregon Health Authority. Crisis and Emergency Communications: Toolkits -Wildfire Smoke. <https://www.oregon.gov/oha/ph/Preparedness/Partners/Pages/riskcommunicationtools.aspx>  
Oregon Smoke Information. <http://oregonsmoke.blogspot.com/>  
Oregon Wildfire Response Protocol for Severe Smoke Episodes (June 28, 2018). <https://www.oregon.gov/deq/FilterDocs/WFresponse.pdf>

AirNow - Washington. [https://airnow.gov/index.cfm?action=airnow.local\\_state&stateid=49](https://airnow.gov/index.cfm?action=airnow.local_state&stateid=49)  
Washington Smoke Information. <http://wasmoke.blogspot.com/>

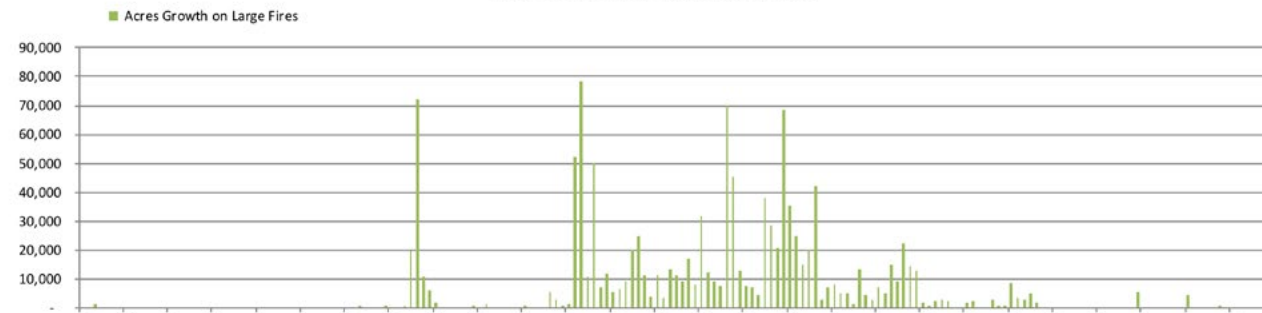




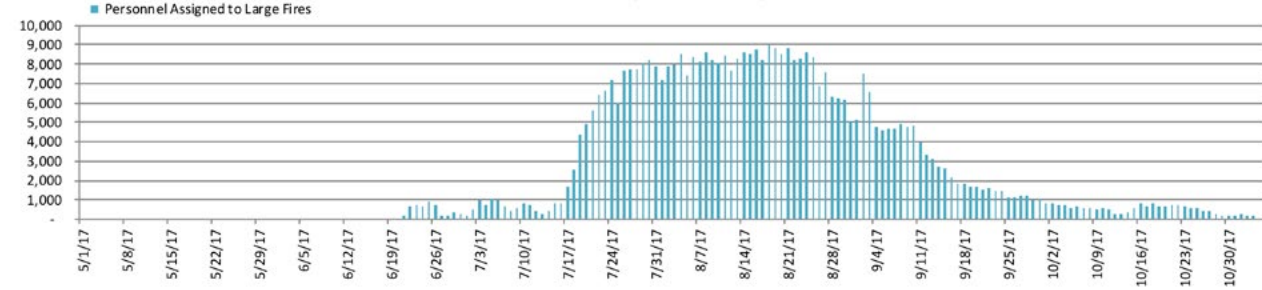
## Fire Response and Operations

# Fire Personnel and Costs

Acres Growth on Large Fires



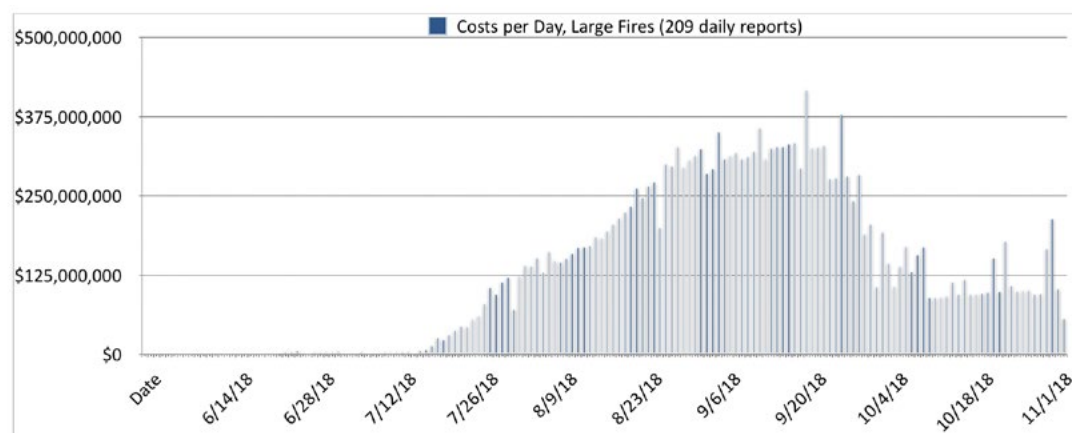
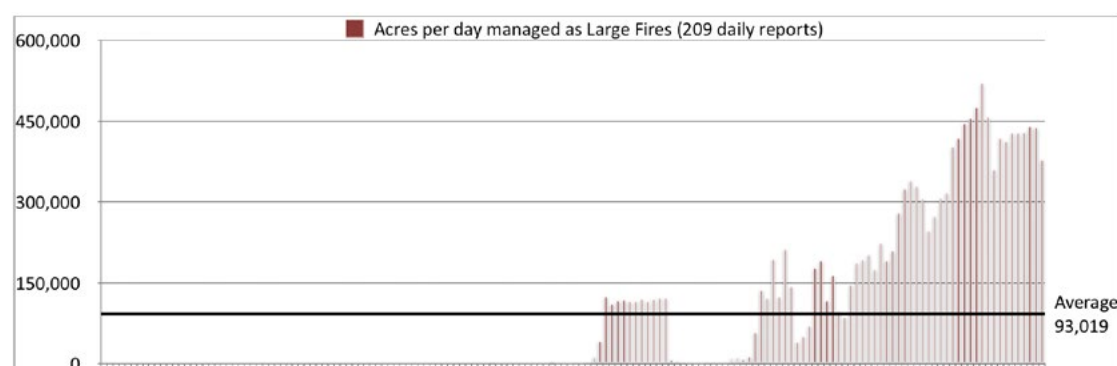
Personnel Assigned to Large Fires



These fire data summaries, as reported on daily 209 reports, convey trends in acres managed, fire personnel, and costs. It is provisional data, based on daily reporting from fire management teams, prior to long-term cost analysis.

The graphs above (hours/personnel worked, daily Acres of Growth and Personnel Assigned) display a correlation of acres burned and personnel assigned.

The graphs on the right show a management role that extends later into the fire season and the timelag of cost reporting typical on large fires.



# Fire Aviation

Unmanned aerial systems, record use of retardant, retired airtanker.

During the 2018 fire season, the Pacific Northwest region saw a full implementation of unmanned aerial systems (UAS) and the benefits to safety, information, and cost that these platforms offer. The season also saw a record use of aerial platforms, including the largest daily volume of retardant flown at the Medford Tanker Base.

## MANNED AIRCRAFT

- Total 2018 retardant delivery for PNW of 5,180,007 gallons, compared with a five-year average of 4,566,085 and a 10-year average of 2,907,938 gallons. (See Appendix for specific usage.)
- 1,468,417 gallons of retardant were delivered in 438 total loads delivered from Medford Airtanker Base in Southwest Oregon.
- 3-Day Biggest Total from July 16-18, with 14 incidents flown, 370,666 gallons in 136 loads.
- A retired airtanker was decommissioned as an exhibit and memorial at Klamath Falls airport.
- Fewer than average number of SAFECOMS for BLM, more than average SAFECOMS for USDA Forest Service.

## UNMANNED AERIAL SYSTEMS

Key innovations in the use of UAS included over 300 flights, 41 hours flown on 10 fires in Oregon and Washington.

This was supported in part by the initiation this season of a new Red Card position of UAS Manager, as well as UAS modules and three DOI UAS contracts awarded.

While initial program development has been centered in Department of the Interior; training, credentialing, module funding and staffing has expanded to include the USDA Forest Service, which graduated its first class of 30 UAS remote pilots in 2018 and is expanding its training and support.

Additionally, GIS training is now incorporating UAS data gathering and integration with geospatial mapping, so that real-time geo-referenced maps can be produced.



As Matthew Noss, a supervisory range technician from BLM's Prineville District and a newly trained pilot, observes, "In fire, I think the UAS program will become a new tool that will allow us to gain situational awareness quickly and efficiently. The biggest takeaway I have from the class is that the program is in its infancy and as technology advances, who knows what can become of it."

Specific applications this season included three UAS teams deployed around the Klondike Fire (image above), with a priority of using infrared mapping to identify hotspots and holding concerns. While some limited IR mapping did occur, most was done by manned aircraft. The Klondike mainly used UAS for real-time IR video surveillance in support of night operations and

firefighter situational awareness. Future applications will include the addition of aerial ignition platforms to the UAS fleet.

Safety remains a concern with the public use of UAS/drones in areas where active fire operations and fire aviation assets are deployed. When unofficial drones incur into incident airspace, the air operations are shut down, affecting aviation safety and the safety of firefighters and communities that rely on aviation support in fire management operations.

While jamming devices exist, they tend to be cost-prohibitive and raise other concerns. Management of these safety concerns will likely require the typical prevention methods combining education, enforcement and engineering techniques.



Fire Management Issues

# Risk and Mitigation

## Safety Summary – 2018 Fire Season

(SEE APPENDIX FOR A LIST OF ANALYSES COMPLETED IN OREGON AND WASHINGTON DURING THE 2018 FIRE SEASON)

SYNTHESIS OF SAFETY AND RISK

In the 2018 fire season, it became clear that we are dealing with a new normal in regard to the length and severity of fire season. Fire personnel were exposed to over 7 million work hours over that season within the Pacific Northwest and Alaska regions. Statistically we know that we can expect a serious accident or fatality at about a tenth of that number. In that regard, the work our people did in managing risk at all levels can be considered successful.

LESSONS LEARNED FROM SAFETY ANALYSES PROCESSES

From the perspective of the Safety Working Group, the mobilizing of a Fire and Aviation Safety Team (FAST) is a significant accomplishment in itself. Gathering a group of subject matter experts, in an interagency capacity during a busy season shows a commitment by all agencies for the safety and well-being of our responders. This report, along with other analyses focusing on complex fire operations in the Pacific Northwest, captured commendations as well as issues and concerns that are being considered. The intent is to develop action items for improvement before next fire season, with applications throughout the region. The coordinating group is committed to this important work.

Additionally, Risk Management Assistance Teams (RMAT) were deployed during the fire season to provide deeper analytical support to both Agency Administrators (AA) and Team Incident Commanders (IC). The RMATs are designed to be small groups which include experts in the areas of Fire Weather, Fire Analysis, Research, Fuels, Operations, Agency Administration, Incident Command, and Risk Management. This is currently a model being used by the Forest Service, but it

is designed to support interagency fires. The goal is continued organizational learning in order to improve the wild-land fire system. The immediate intent is to provide the AAs and ICs with a deeper dive into strategic risk management decisions focused on integrating the lessons learned into a best practices model that can help bolster decision quality for those managing large fires.

LESSONS LEARNED FROM FATIGUE MANAGEMENT AND INJURY ANALYSES

The impact of fatigue on fire responders and managers was one observed result of the long fire season. Dialogue is ongoing with our regional leadership on the topic of fatigue; it is being highlighted by our operators, teams, and managers at every coordinated meeting and continues to be a key issue for leadership at the national level. There is agreement that we will need to take a common-sense approach to managing fatigue and use the flexibility we have built into policy to mitigate the impacts. Recognition of the issue and commitment to supporting the overall health and well-being of our people is a clear and loud message as we take lessons from 2018 and enter into 2019. It will be a common theme and managers will need the support of our line and executive leadership as the pressures of elevated planning levels compels us to staff fires.

It is clear that there is work to do to provide consistent language and understanding of risk management principles to all employees. There is a commitment from leadership to provide access to tools and training that will help with this. Additionally, support and participation in the Safety Working Group, as well as commitment of the coordinating group to have a safety position on the Multi-Agency Coordination Group, will significantly improve safety

communication and risk management for the Region next fire season.

An additional lesson from the 2018 season is that there is still an inconsistent understanding of reporting responsibilities and requirements related to serious accidents and injuries within our community. Understanding of the learning tools available is also an area in which we can work on improving.

Connectivity and partnerships internally between our Risk, Aviation Safety, and Occupational Safety Professionals is critical and will be a focus as we prepare for next year.

LINE OF DUTY DEATH

Firefighter II Eric Aarseth worked the Horns Mountain Fire on the Colville National Forest in Washington and was released from the incident on August 27.

On August 28, he was found unresponsive at his home in Oregon. Reports indicated Aarseth developed pneumonia which became septic.

Aarseth passed away on September 4. The U.S. Fire Administration designated his death a line of duty death.

SUMMARY OF SAFETY REPORTS, INCLUDING FAST

The PNW Coordinating Group hosted a Fire Aviation and Safety Team for southwest Oregon to review a range of injuries and concerns across many fires in the area. Additionally, the Northwest Coordination Center supported six 24-Hour Reports, 10 Rapid Lesson Sharing (RLS) reports and 11 USFS Weekly Reports.

Topics for these reviews included vehicle accidents, chainsaw injuries and use, aviation incidents (including unmanned aerial systems), insect and snake bites, and aerial extraction of a civilian hiker in a fire zone.

See the Appendix for a complete list and a link to the reports.

After the fire

# Burned Area Emergency Response teams identify post-fire risk, plan treatments

The Burned Area Emergency Response (BAER) program is designed to identify and manage potential risks to resources on National Forest System and Bureau of Land Management lands and reduce these threats through appropriate emergency measures to protect human life and safety, property, and critical natural or cultural resources.

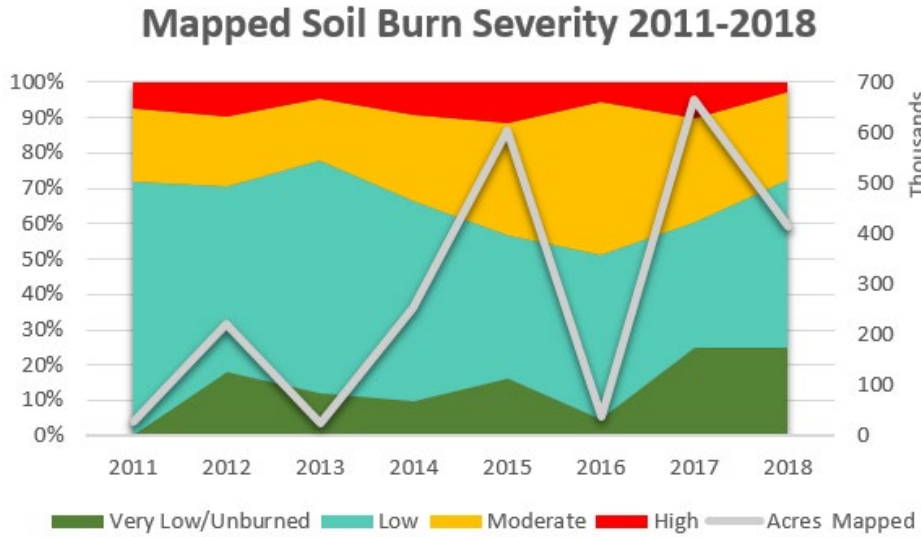
The BAER teams completed assessments on over 500,000 acres on 21 fire incidents. Soil Burn Severity across all the fires in the region was:

- 3% high severity,
- 25% moderate severity,
- with the remainder (72%) in low and very low severity.

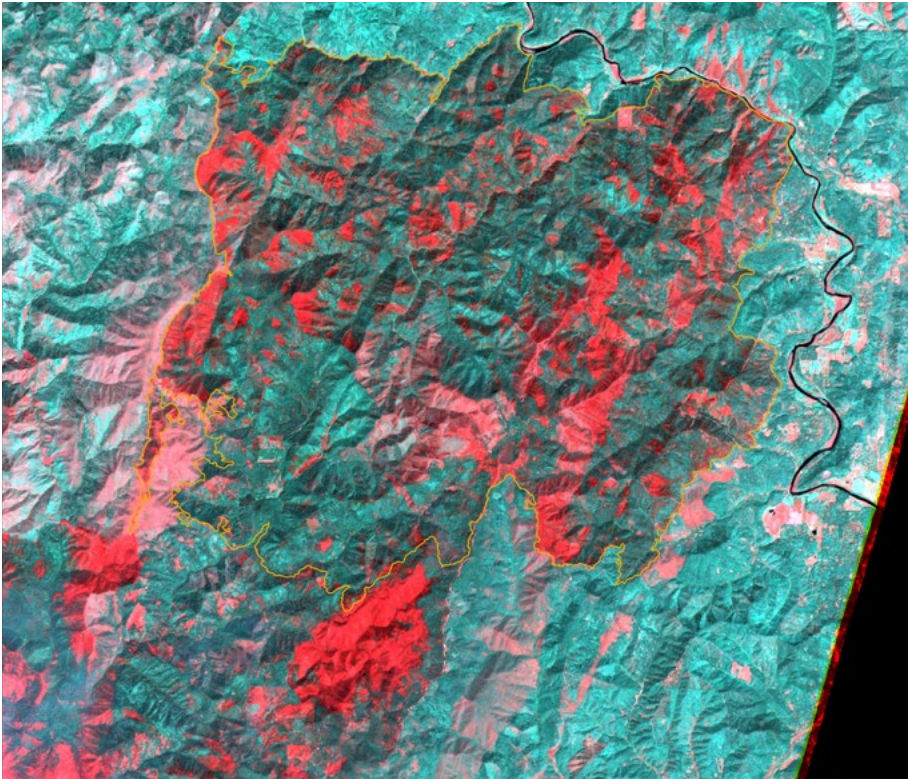
BAER treatments include approximately 7,000 acres of invasive weed treatments, 275 miles of road improvements, 80 miles of trail improvements, and numerous safety actions including hazard signs and removal of hazardous trees at developed recreation sites

Link to the publicly available soil burn severity mapping: <https://fsapps.nwcg.gov/afm/baer/download.php?year=2018>.

Screen shot (below) from a series of short videos documenting the work of Burned Area Emergency Response teams, with a focus on the Taylor Creek/Klondike fires. <https://vimeo.com/album/5558587>.



Soil burn severity trends in the region from 2011-2018. While there has been a wide range of acres burned per year receiving BAER assessments on USFS lands (right axis), the soil burn severity mapping is not showing an increase in percentage of high severity fire effects. Severity surveys consistently see around 8-12% high soil burn severity and greater than 50% low and very low soil burn severity in Oregon and Washington USDA Forest Service lands.



Taylor Creek Fire in southwest Oregon — Map of burn severity and potential impacts on soils and drainages from the publicly available BAER download site. Red is highest severity, green lowest or no impact. [https://fsapps.nwcg.gov/afm/baer/download/2018/or4252812357120180715\\_20180819\\_post.jpg](https://fsapps.nwcg.gov/afm/baer/download/2018/or4252812357120180715_20180819_post.jpg)



# Community Risk Analysis

A comprehensive assessment of housing at risk from wildfire identifies the top 50 at-risk communities in Washington and Oregon.

### FIRE EXPOSURE IN NORTHWEST COMMUNITIES

At the request of the United States Forest Service Pacific Northwest Regional Office, the research group Pyrologix assessed the exposure to

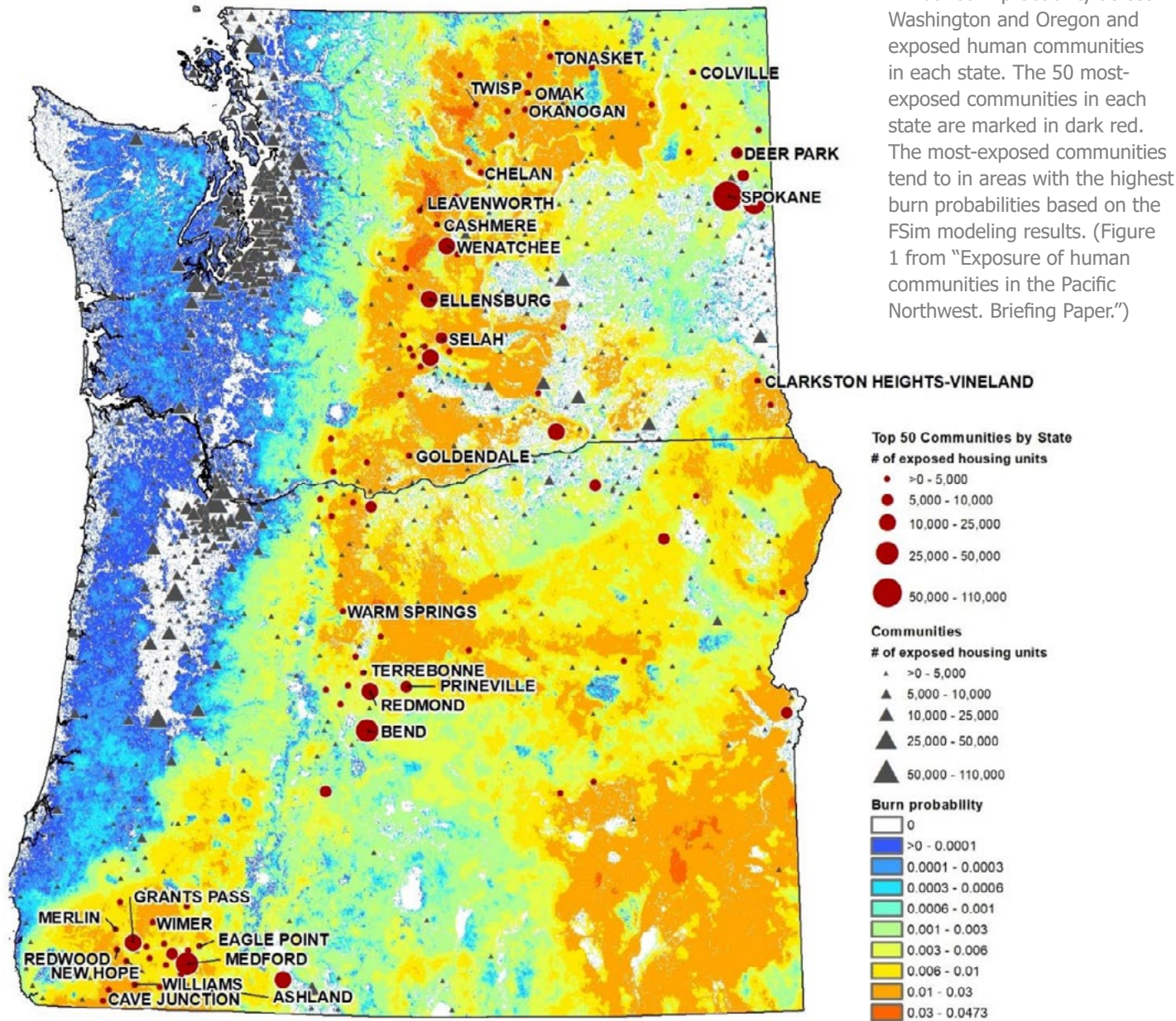
wildfire of housing units within named human communities across the Pacific Northwest Region (Oregon and Washington). The objective of the assessment was to identify the communities most threatened by wildfire.

The 50 most-threatened communities in each state were identified. The results have a range of applications.

- A home buyer can use these results for comparing the relative wildfire exposure of homes in

different communities, and homeowners can gauge their wildfire exposure compared to their peers in neighboring communities.

- Governments and other organizations can potentially use the results to prioritize communities for home-loss mitigation efforts, allocate mitigation funding, inform building codes, and guide residential development.
- Land owners and land management agencies can use the exposure-source results to identify locations within their ownerships that produce damaging wildfires.



### SPATIAL INEQUALITY IN HOUSING-UNIT EXPOSURE TO WILDFIRE

The study shows results for the 50 most-exposed communities in both Washington and Oregon, but exposure was assessed for all 1,005 named communities across the two states.

In Washington, the 50 communities most exposed to wildfire comprise only 12% of the 2,196,244 housing units located on or near burnable land cover in the state. However, those same communities represent roughly 70% of the cumulative housing-unit exposure.

In Oregon, the 50 most-exposed communities comprise only 19% of the

1,196,187 housing units located on or near burnable land cover, but 80% of the cumulative housing unit exposure.

Across both states combined, the 100 most-exposed communities comprise 15% of the housing units located on burnable land cover but 76% of the cumulative housing-unit exposure.

These results illustrate an unequal distribution of wildfire exposure among human communities—most of the wildfire exposure occurs in a relatively small number of communities. The unequal distribution suggests that focusing mitigation efforts on the most-exposed communities is likely to result in the greatest benefit.

### OWNERSHIP AT SOURCE LOCATIONS OF HOUSING-UNIT EXPOSURE

In contrast with other "risk transmission" analyses, we did not focus on the effects of fires originating on any particular land ownership (e.g., USFS land) on housing-unit exposure. Instead, locations were identified with greater potential for reaching housing units using a purely spatial approach. When USFS land ownership is overlaid on this map, it is evident that USFS land is not the dominant contributor to overall housing-unit exposure in the Pacific Northwest. Fires with potential to affect

housing units tend to start near housing units, and the land surrounding housing units is generally not in USFS ownership.

Exceptions exist, however. Fires originating on some portions of USFS land ownership, especially east of the Cascade Mountains in Washington, can indeed reach significant numbers of housing units.

### MORE INFORMATION

The full list of communities in Washington and Oregon and their exposure to wildfire is available as a Microsoft Excel workbook ([http://pyrologix.com/ftp/Public/Data/Housing-unit%20exposure--Supplemental%20table\\_20181029.xlsx](http://pyrologix.com/ftp/Public/Data/Housing-unit%20exposure--Supplemental%20table_20181029.xlsx)).

Additional detailed spatial information about wildfire hazard and risk to homes in Oregon can be found at the Oregon Wildfire Risk Explorer (<https://oregonexplorer.info/topics/wildfire-risk?topic=2>).

### SOURCE

Scott, Joe H.; Gilbertson-Day, Julie; Stratton, Richard D. 2018. Exposure of human communities to wildfire in the Pacific Northwest. Briefing paper. 10 p. Available at: [http://pyrologix.com/ftp/Public/Reports/RiskToCommunities\\_OR-WA\\_BriefingPaper.pdf](http://pyrologix.com/ftp/Public/Reports/RiskToCommunities_OR-WA_BriefingPaper.pdf)

## Fuel Treatments and Community Risk: Cougar Creek Success Story

Hazardous fuels reduction efforts on the Okanogan-Wenatchee National Forest were instrumental in changing the course of the Cougar Creek Fire as it burned along the central Washington Cascades.

These treatments included thinning and burning over the course of a decade to reduce fuel loading and restore dry, fire adapted Ponderosa pine forests.

The lightning-caused Cougar Creek Fire started on July 28, 2018, on the Okanogan-Wenatchee National Forest 12 miles northwest of the community of Ardenvoir, Wash. After a century of fire suppression and a high intensity wildfire in 1994, the area was

unnaturally dense, overstocked, and loaded with dead and down timber.

By August 11, 2018, the fire had grown to more than 18,000 acres with intense fire behavior and spotting. A wind event that evening pushed the fire down-drainage in 33mph winds toward homes and infrastructure in the river valley. Fortunately, fire managers had implemented proactive hazardous fuels treatments beginning in 2009 on national forest lands surrounding private lands along both sides of the Entiat River.

As a high wind event began aggressively pushing the head of the fire into treatments on the east side of the river at a high rate of speed, firefighters were

able to actually gain ground on the fire spread because extreme behavior moderated and growth dramatically slowed.

In the words of the IMT Long Term Fire Analyst, "those treatments spared the community a wave of fire".

Two days later when the fire spotted across the river, firefighters were able to successfully halt the eastern spread of the fire due to additional hazardous fuels projects that slowed fire growth and lessened fire intensity.

In both cases, years of proactive thinning and burning also directly decreased risk to firefighters working to contain fire spread.



# Fuel treatment effectiveness survey



(top) On the Cougar Creek Fire, prior fuel treatments were utilized during burn operations. IMAGES: Kari Greer.  
(bottom-left) Fuels effectiveness monitoring shown in two excerpted analysis tables from the Fuels Treatment Effectiveness Dashboard.

### FUEL TREATMENTS CONTRIBUTED TO SAFER, MORE EFFECTIVE FIRE CONTROL

Fuel treatments proved to be a considerable advantage to firefighters in halting portions of several wildfires. In most cases, treatments reduced the fire intensities to a level in which firefighters were safer and more successful in controlling the fire in those previously treated areas than while trying to suppress fire in untreated areas.

### ...AND REDUCED FIRE INTENSITIES RESULTED IN BETTER ECOLOGICAL OUTCOMES

There were several instances in which fire intensity levels and rates of spread were reduced when these fires encountered fuel treatments, especially where a combination of mechanical and prescribed fire had been implemented. Fire effects in units that had received prescribed fire treatments were often similar to what you would expect in a natural fire regime of frequent low-intensity fire.

### ...AND CONTRIBUTED TO SAFER AND MORE FIRE-ADAPTED COMMUNITIES

Treatments that supported fire-adapted communities are distributed throughout the Northwest. Examples include the Ashland, Ore., watershed, the Taylor Creek Fire (Ore.), and in intermix zones west of the Twisp valley and on the Boyd Fire (Wash.).

### TREATMENTS WERE EFFECTIVE AT CHANGING FIRE BEHAVIOR

Treatment units in 20 different fires and fire complexes on 13 different ranger



districts and seven different National Forests were monitored by field crews during the month of October, 2018. Observations from the field crews have been summarized by treatment types and whether those treatments were effective at altering fire behavior or were utilized in fire control actions.

Of the 253 treatments sampled, 153 altered fire behavior and 127 were determined to have assisted with fire control operations. Of those utilized for fire control, 88 were coded as hazardous fuels treatments. The remaining 39 consisted of thinning and or brush disposal projects. The majority of treatments, as well as the treatments determined as effective, involved thinning with some type of follow-up treatment.

Only a handful of the total units (eight) were prescribed burning only, but they were shown to be highly effective. Only one of the prescribed fire units did not change fire behavior. Of the eight units, five of those treatments were utilized to assist with fire control actions.

This season, a new Fuels Treatment Effectiveness Dashboard was piloted in the Northwest and will be adopted in other USFS regions See screen-shots on prior page for examples of the analyses.

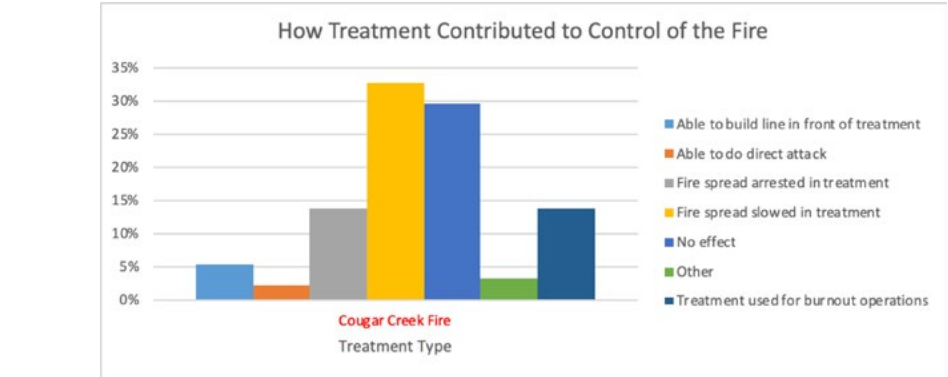
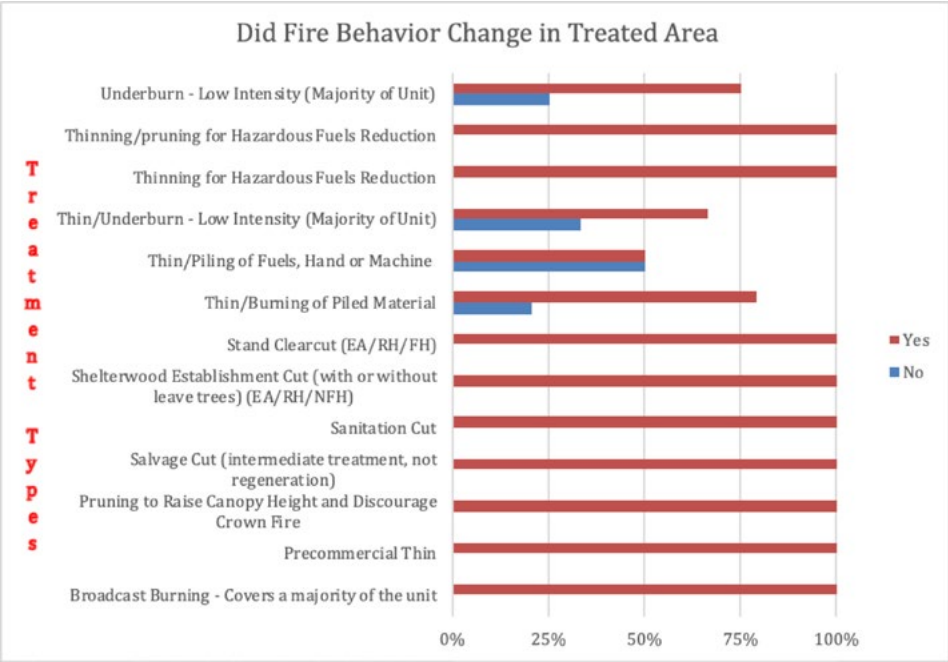
### A FUELS TREATMENT SUCCESS STORY: TIMBER CRATER 6 FIRE

In mid-July, a lightning storm passed through southern Oregon, igniting multiple fires in the drought-stressed forest in and around Crater Lake National Park. Firefighters quickly contained most of these fires but several grew together and became the Timber Crater 6 Fire.

It was projected to grow as large as 20,000 acres. Instead, fuels treatments in Crater Lake National Park and on the Fremont-Winema National Forest were used to contain the fire in less than three weeks at just 3,126 acres.

Ultimately, these treated areas were critical in keeping the wildfire shorter in duration, less costly, safer for firefighters, less threatening to private property, and with fewer smoke and economic impacts to local communities.

See the video at <https://vimeo.com/287892212>.



### OVERALL EFFECTIVENESS OF FUEL TREATMENTS IN PACIFIC NORTHWEST - SUMMARY OF MONITORING

Treatments effective at changing fire behavior	Total	Changed Fire Behavior
Thinning Only	112	75
Thinning with Follow-up Treatments	116	71
Broadcast Burning	8	7

Treatments utilized for control actions	Total	Utilized for Control
Thinning Only	113	47
Thinning with Follow-up Treatments	116	69
Broadcast Burning	8	5



# The Fire Future in the Pacific Northwest

## Initiatives, Innovations



### LAKEVIEW BECOMES FIRST VETERANS IHC CREW

On October 23, 2018, the Bureau of Land Management announced the conversion of the Lakeview Veterans Crew to the Lakeview Veterans Inter-agency Hotshot Crew (IHC). Of the 112 IHC's nationally, Lakeview Veterans IHC is the 10th BLM-funded hotshot crew, and the only one focused on recruiting and developing veterans.

In March 2016, Lakeview Crew 7 and the Lakeview BLM fire organization

requested that the crew begin the process to be certified as an IHC. The crew proceeded to take steps to meet the requirements in the Standards for Interagency Hotshot Crew Operations. The crew went through the arduous review process in 2017 and 2018 before being formally certified as a national Interagency Hotshot Crew.

The intent of this crew is not to build a single, long-term work relationship only within the crew, but rather to provide an opportunity to reunite with other veterans in a team environment to build skills and experience.

Team members will also learn about opportunities to work for and become competitive for employment with the Federal Government in other natural resource arenas. "What makes this crew unique is our ability to work together through stressful situations, including long-duration fires. Vets are used to that," Crew Superintendent Mike McGirr said. "The ability to lead and follow

The **Lakeview 7 fire crew** works on the Cougar Creek Fire in central Washington, Aug. 17, 2018. Lightning started the fire July 28 and it grew to over 41,000 acres a month later. The Lakeview crew became the first Interagency Hotshot Crew focused on recruiting and developing veterans. Learn more about BLM veteran fire crews: [www.blm.gov/careers/veterans/veteran-fire-crews](http://www.blm.gov/careers/veterans/veteran-fire-crews)

is apparent from their military time. And the medical experience on our crew is well above standard. Several of our vets have combat paramedic experience."

The Lakeview Veterans IHC also has four licensed unmanned aviation system (UAS or drone) pilots, who flew more than 100 missions on fires this year to provide everything from mapping and scouting fire lines to spot fire detection and aerial ignitions.

The crew also has experience with fireline explosives as some of the crew members were explosive experts in the military and have earned qualifications in wildland fire as well.

"We're proud of the Lakeview crew and the continued efforts to develop a workforce of Veterans. We recognize the diligence and tenacity required to meet Hotshot crew standards, which demonstrates the exemplary quality and performance ingrained in this crew," says Jeffrey Fedrizzi, Deputy Director, Fire and Aviation. BLM OR/WA.

### FIRE DETECTION CAMERA NETWORK EXPANDS

The wildfire detection camera network expanded in 2018. BLM Oregon installed two cameras in southeast Oregon (see map) with five more planned for 2019. The cameras complement cameras within the same system in Idaho and Nevada, supporting shared viewsheds. Originally, and one of the biggest users of the system is the USDA FS. These cameras are being integrated into the Oregon/Washington system. Additionally, Washington DNR has cameras in northeast Washington, with plans to fill gaps between these cameras and SE Oregon.

### UAS (DRONE) INNOVATIONS EXPAND

See Aviation section.



### MAPPING INNOVATIONS ADD SPEED, PRECISION TO POST-FIRE SUPPORT

Fire managers utilize geospatial information systems (GIS) for multiple facets, from initial attack mapping and incident support to post-fire Burned Area Emergency Response (BAER) and Rapid Assessment Team (RAT) analysis. This year, the Data Resource Management (DRM) team has been instrumental in organizing and implementing innovations for the BAER and RAT segments of post-fire support. One goal for this year was to have consistent data from the initial incident through the BAER and RAT phases. Other goals were to increase efficiency, standardization, ease of collection and improve data processing. Two efforts stood out in 2018.

Dorothy Thomas, R6 Regional Geospatial Coordinator, led the BAER GIS coordination effort in conjunction with Cara Farr, Region 6 BAER Coordinator, to streamline field data collection for BAER teams using Survey 123. Dorothy created

a template that can be easily deployed on any BAER team to streamline BAER field data collection, that implements context sensitive questions, so each team member only need to answer and see the questions needed for their own resource area. BAER teams can now use and analyze the live field data while it's being collected. BAER teams efficiently use this data for validating Soil Burn Severity mapping, allowing the team quick and easy access to the photos and data collected by the entire team. The template was successfully used, in 2018, on every Region 6 BAER team, as well as in many other regions. This tool is becoming the standard to support the rapid assessment required of BAER, providing efficiencies that result in significant cost saving for each BAER team.

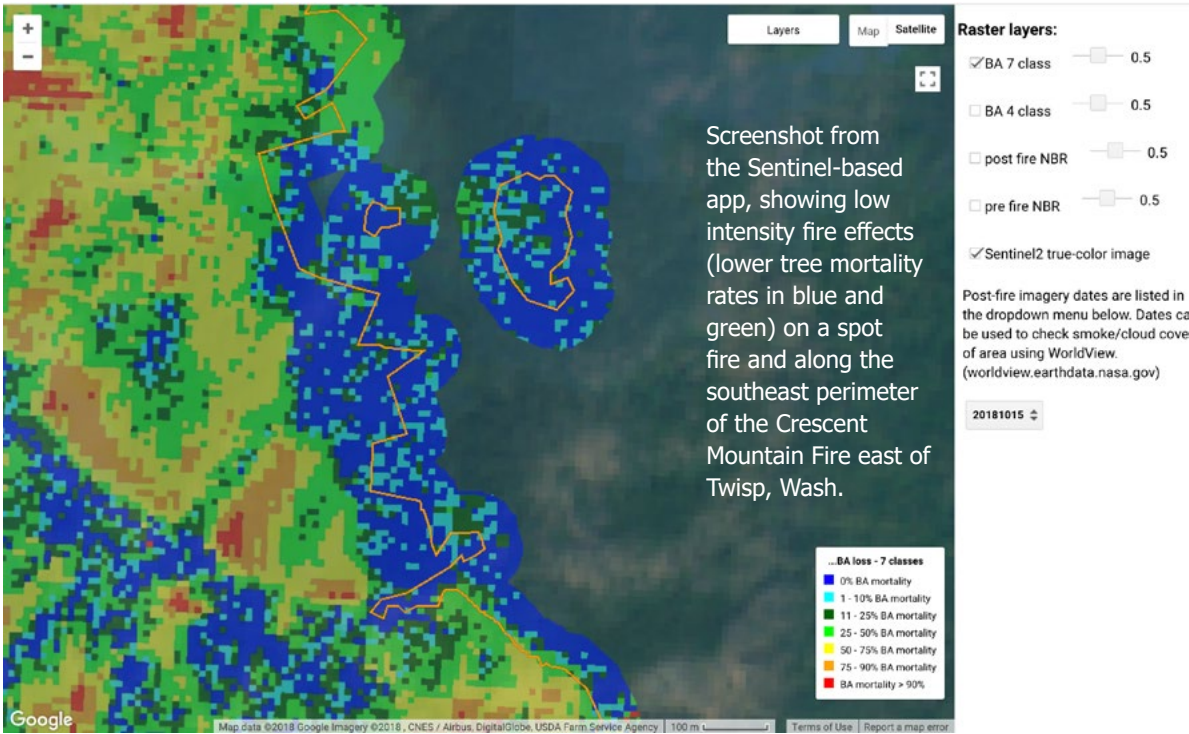
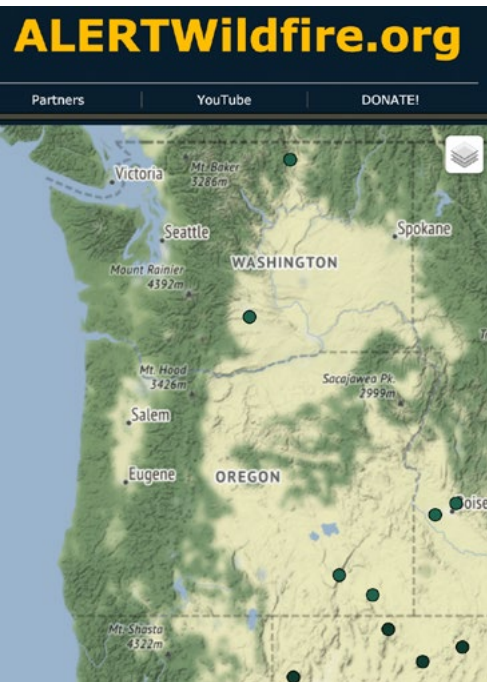
Andrew Stratton, R6 Geospatial Systems Specialist, in collaboration with Ray Davis from the Pacific Northwest Research Station, developed a Google Earth Engine (GEE) application that utilizes Sentinel2 multi-spectral imagery to produce post-fire assessment data products. After selecting a fire perimeter, the application creates pre- and post-fire Normalized Burn Ratio (NBR) images. To examine the difference between pre- and post-fire vegetation conditions within the fire perimeter, the application then uses the pre- and post-fire NBR products to compute a Relativized

Differenced Normalized Burn Ratio (RdNBR). For use by forest specialists, the RdNBR is then classified into seven basal area (BA) loss classes from unburned or 0% BA loss to 90% or greater BA loss. The GEE Sentinel2 NBR and BA Mortality Viewer application has made it possible for GIS specialists in the Forest Service to provide basal area vegetation mortality products for post-fire assessment and contributes to the Forest Service goal of using the best available science information to inform forest planning. The application was tested and used during the 2018 RAT season and was found to be highly efficient in supporting the analysis needs of post-fire assessment teams. Of particular note: by adopting Sentinel2 imagery, with new imagery about every five days vs. every 15 days and higher resolution (20 meter cell size instead of 30 meter in Landsat), there is a much better chance of obtaining cloud free imagery both during the course of the fire and after the fire.

The GEE Sentinel2 NBR and BA Mortality Viewer application will be transferred to the National Geospatial Technology and Application Center for use across the agency.

### LINK

To browse the view-only app: <https://as-stratton.usfs.users.earthengine.app/view/sentinel2-nbr-and-ba-viewer-app>.





# Safety Reports

Rapid Lesson Sharing, Weekly, and 24-Hour Reports - 2018 fire season, PNW

## Oregon Incidents

Date	Title	Incident Type	Key Words	Report Type
5/8/18	Umpqua NF Prescribed Fire Burn Injury	Water Tender Incident or Accident	#Oregon, #WaterTenderIncidentorAccident, #Driving, #RLS	RLS
6/7/18	Prescribed Fire Smoke Exposure	Exposure	#Oregon, #Exposure, #PrescribedFire	USFS Weekly Summary Report
7/19/18	Hendrix Fire Chainsaw Cut	Chainsaw Cut	#Oregon, #ChainsawCut, #Chainsaws, #HandCrews, #Medevac, #RLS	RLS
7/19/18	Hendrix Fire Heat Related Injury	Medical or Exertion or Heat	#Oregon, #MedicalorExertionorHeat, #HeatInjury, #Medevac	USFS Weekly Summary Report
7/22/18	South Umpqua Fire Complex Ankle Injury	Fall	#Oregon, #Fall, #HeavyEquipment	USFS Weekly Summary Report
7/22/18	Taylor Fire Hit by Tree	Hit by Tree	#Oregon, #HitbyTree, #Chainsaws, #FallingOperation	USFS Weekly Summary Report
7/24/18	White River Fire Springpole Strike	Hit by Tree	#Oregon, #HitbyTree, #Chainsaws	USFS Weekly Summary Report
7/26/18	South Umpqua Fire Complex Water Tender Rollover	Water Tender Incident or Accident	#Oregon, #WaterTenderIncidentorAccident, #Driving	24 Hr
7/27/18	Gardner Complex Broken Leg	Unknown	#Oregon, #Unknown	24 Hr
7/29/18	Taylor Creek Fire Felling Incident	Hit by Tree	#Chainsaws, #ExtendedAttack, #Medevac, #HitbyTree, #Oregon, #RLS	RLS
7/29/18	Sugar Pine Fire Helicopter Alternate Landing Site	Helicopter Incident or Accident	#Oregon, #HelicopterIncidentorAccident, #Aviation, #Helicopters, #RLS	RLS
7/30/18	Sugar Pine Fire Dozer Rollover and Extraction	Heavy Equipment	#Oregon, #ExtendedAttack, #Dozer, #HeavyEquipment, #RLS, #Medevac	RLS
7/30/18	Taylor Creek Fire Chainsaw Cut	Chainsaw Cut	#ChainsawCut, #Oregon, #RLS, #HandCrews, #ExtendedAttack, #Medical Emergency	RLS
7/31/18	South Umpqua Fire Complex Vehicle Accident	Vehicle Incident or Accident	#Oregon, #VehicleIncidentorAccident, #Driving, #RLS	24 Hr
7/31/18	Garner Complex Burn Injury	Burn Injury	#Engines, #BurnInjury, #Oregon, #Medevac	24 Hr
8/12/18	Miles Fire Water Tender Rollover	Water Tender Incident or Accident	#Oregon, #WaterTenderIncidentorAccident, #Driving, #RLS	RLS
8/20/18	Columbus Fire Bee Sting Incident	Animals or Insects	#Oregon, #AnimalsorInsects, #Medevac	24 Hr
8/24/18	Taylor Creek Fire Use of Drones	Drones (Unmanned Aircraft Systems [UAS])	#Oregon, #Multiple, #Aviation, #mapping	RLS

## Washington Incidents

8/1/18	Crescent Mountain Fire Civilian Hiker Extraction	Narrow Escape	#Washington, #NarrowEscape, #Helicopters, #RLS	R
8/3/18	Miriam Fire Logging Truck Accident	Heavy Equipment	#Washington, #HeavyEquipment, #Medevac	R
8/4/18	Cougar Creek Fire Dozer Operator Injury	Heavy Equipment	#Washington, #HeavyEquipment	USFS Summa
8/6/18	Miriam Fire Tree in Powerline	Power Line Incident	#Washington, #PowerLineIncident, #RLS	R
3/11/18	Crescent Mountain Fire Pulaski Injury	Medical or Exertion or Heat	#Washington, #MedicalorExertionorHeat	USFS Summa
3/18/18	McLeod Fire Bee Sting Incident	Animals or Insects	#Washington, #AnimalsorInsects, #MedicalEmergency, #RLS	USFS Summa
3/18/18	Cougar Creek Fire Water Tender Accident	Water Tender Incident or Accident	#Washington, #WaterTenderIncidentorAccident, #Driving, #Medevac	USFS Summa
3/20/18	Cougar Creek Fire Chainsaw Cut	Chainsaw Cut	#Washington, #ChainsawCut, #Chainsaws, #Medevac	USFS Summa
3/21/18	McLeod Fire Hit by Branch	Hit by Tree	#Washington, #HitbyTree, #Medevac	USFS Summa
3/23/18	Miriam Fire Shooting Incident	Close Call / Shooting Incident	#Washington, #CloseCall, #RLS	R

# Retardant Usage, 2018

Figures in Gallons, Feb 25, 2019 data. Moses Lake not listed by agency.

Heavy Airtanker Bases	FS-R6	FS-Other	BIA	BLM	NPS	ODF	DNR	CalFire	FWS	Other	Total by Base
Redmond	321,548	8,023	111,692	451,960	0	331,694	30,676	5,903	0	100,865	1,362,361
Moses Lake	0	0	0	0	0	0	0	0	0	1,761,761	1,761,761
Medford	369,391	26,750		20,623	0	286,619	0	207,648	0	26,023	940,054
LaGrande	23,192	59,447	2852	2,852	0	46,162	16,591	0	0	0	151,099
K-Falls	30,180	144,842	0	59,426	0	51,212	0	150,709	0	0	436,369
MFR VLAT	162,111	47,236	0	18,829	0	0	0	0	0	300,187	528,363
Agency Use	906,422	286,298	114,547	553,690	0	718,687	47,267	364,260	0	2,188,836	5,180,007





(Photos above and right) On the Klondike Fire in southwest Oregon. Managing fire with fire and the challenge of large-scale, long-term fire.  
(Below) Firefighters at work, in Okanagan-Wenatchee NF. (Lower right) Responding to the Angel Springs Fire (Washington), by boat.  
Photos in the **2018 Fire Season Summary** are by Kari Greer unless otherwise noted.



(Above) Public meeting on the Garner Complex north of the community of Rogue River in Jackson County, Oregon. (Left) Air support on the Taylor Creek and Klondike Fires. (Below) Community support for fire fighters was expressed in many ways.  
Photos in the **2018 Fire Season Summary** are by Kari Greer unless otherwise noted.





