

**FIRE IN OREGON'S FORESTS**  
ACHIEVING RESILIENCY IN ALTERED LANDSCAPES



Oregon Forest  
Resources Institute



# STATE OF FIRE



**THE FIRE DILEMMA** “Fire is this wild process in Oregon. It always has been. But it often doesn’t mesh well with what humans want.” – Tom Spies, US Forest Service ecologist

# ALARM BELLS

## Fire’s footprint and price tag are trending up

Describing the 2013 summer fire season, the Oregon Department of Forestry called it “epic.”

On those lands protected by the state, it was the costliest ever, and the first time in over 60 years that more than 100,000 acres burned.

Oregon’s forests are changing. The management objectives and priorities of federal and private landowners are evolving. Drought has afflicted parts of the state, and climate trends are making fire

seasons longer and more intense. And in the wildland-urban interface, more homes have been built in the path of wildfire.

The ways Oregonians prevent, fight, manage and, to some degree, live with wildfire have grown more complicated – and more expensive.

This report examines the state of fire suppression, prevention and management, and describes various efforts to find the way forward.

**On the cover:** A night back-burn on the Government Flats Complex northeast of Mount Hood during 2013’s “epic” fire season.

Photo: J. Pricher

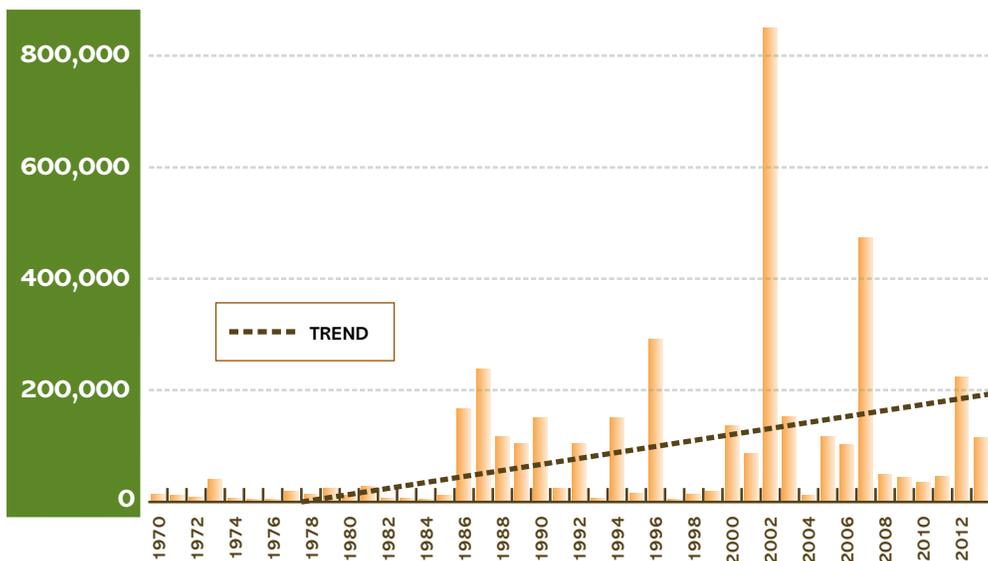
# FURTHER COMPLICATIONS

**Climate:** It's too early to be certain of long-term effects, but climate change may bring longer, hotter, drier fire seasons that make firefighting tougher. Asked how much a changing climate is part of current trends, David Summer, director for fire, fuels and aviation management for the Forest Service's Northwest region, says: "It's real. I can't define it, but indications are that our fire season is going to get longer."

**Housing:** The Oregon Department of Forestry estimates that 750,000 homes exist in areas where they could be affected by wildfire (2013 data). Compared to other states, Oregon's land-use laws have slowed the conversion of forestland to housing, but a Headwaters Economics study says that until the housing crash in 2008, hundreds of new homes were built each year in Oregon's wildland-urban interface. Protecting such homes when a fire starts nearby can cost tens of thousands of dollars per home and put firefighters at risk. Also, more people living in forests increases risks of human-caused fire.



Acres burned in Oregon annually



Following World War II and through the 1980s, Oregon fire crews grew skilled at putting out human-caused and natural wildfires. Land managers strived to suppress all wildfires to protect timber, water, wildlife habitat and recreation opportunities. Since the 1990s, however, and especially on federal lands, the total number of acres burned each year has trended upward. The average fire size is also growing. The cost of fighting those fires has soared.

Includes public and private forestlands in Oregon. (Sources: Northwest Coordination Center and Oregon Department of Forestry)

# ECOLOGY

## The historic role of forest fire in Oregon

### How fire historically behaved in Oregon forest types



- Wet Forests** FIRE FREQUENCY: EVERY 100 TO 450 YEARS. FIRE SEVERITY: HIGH
- Southwest Oregon** FIRE FREQUENCY: EVERY 5 TO 50 YEARS. FIRE SEVERITY: MODERATE/MIXED
- Dry Forests** FIRE FREQUENCY: EVERY 2 TO 50 YEARS. FIRE SEVERITY: LOW/MIXED

For humans, wildfire can be terrifying, economically disastrous, even deadly. For the forest, fire may be a housekeeper, or a way of starting over. Oregon has different kinds of forests that have been shaped by different kinds of fires.

### DRY FORESTS

In the dry ponderosa pine forests of central and eastern Oregon, fire historically burned through an area every two to 25 years. Flames usually stayed low to the ground and burned off understory grass, shrubs and young trees, especially firs.

Mature ponderosa pines tolerate these fires and usually survive with no more than some black char on their thick bark. A few young ponderosas may survive, too. These fires helped create the open, park-like forests



pioneers encountered in eastern Oregon, with widely spaced trees and limited understory. The fires usually were not intense, because their frequency kept the amount of fuel in check.

## WET FORESTS

In the temperate Douglas-fir forests on the west side of the Cascades and in the Coast Range, it's a different story. The cool, wet weather and long growing season create a dense vegetative cover and a much shorter fire season. There are fewer lightning strikes, too, so less opportunity for a fire to start – at least from a natural cause. Fire in any given stand is much less frequent, but because of the large amount of fuel, potentially much more intense if weather conditions are ripe. Under such conditions, these fires historically could be very large, up to several hundred thousand acres.

“When it does happen, it burns with really high intensity and great change – positive or negative, depending on your point of view,”

says US Forest Service ecologist Tom Spies.

It's often what is called a “stand-replacement fire,” killing most of the forest, leaving a sea of snags and scattered living trees or patches of trees, which reseed the area and allow the forest to regrow – eventually.

Of course, it regrows on what Spies calls “forest time.” “It's not like ‘human time,’” he says. “Humans can't relate to an organism that can take decades to recolonize a site and live for 800 years, which Douglas-fir can do, until fire or something else kills it.”

## SOUTHWEST OREGON FORESTS

Interior southwest Oregon forests have the dryness of east-side forests but with productivity and fuel loadings more like west-side forests. They are intermediate in fire behavior but generally lumped with fire-dependent pine forests of eastern Oregon. Dry mixed-conifer forests in eastern and southwestern Oregon typically burned with mixed severity every 25 to 50 years.



# DIFFERENT FORESTS. DIFFERENT FIRE

**In the dry forests:**  
(far left) Low-intensity fire blackens the lower trunks of ponderosa pines, but the trees normally survive this type of fire.

**In the wet forests:**  
High-intensity fire climbs into the canopy, burns intensely hot and kills most of the trees, leaving only scattered patches of live trees. The aftermath of such a fire is seen in this historic image of the Tillamook Burn.

# UNINTENDED CONSEQUENCES

## Humans have changed the face of fire

Living with fire is a conundrum. On the one hand, it's part of the ecosystem. On the other, it takes lives, destroys property, and impacts water and wildlife habitat.

### THE EAST SIDE

In the dry forests of central and eastern Oregon, the historic role of fire as thinner, pruner and housecleaner all but ended in the 20th century.

"Around 1880 or 1890, it's like someone flipped a switch and fire stopped. There was no more fire," Spies says.

Increased livestock grazing removed grasses that carried flames along the ground. The influence of Native American populations, which frequently set fires to enhance wildlife habitat and create open hunting conditions, declined due to disease and relocation. Now-outdated practices led to the harvest of many of the fire-resistant ponderosa pines.

It's in eastern Oregon that these changes have had the most dramatic effect. Small grand firs and Douglas-firs sprang up among the ponderosa pines. Without fire to clear them out, the forests became crowded with smaller trees of species that are less adapted to fire than ponderosa pine. This buildup in the understory has made these forests more susceptible to high-intensity "stand-replacement" fire.

"The fact that there's a big, high-severity fire on the west side, that shouldn't surprise anybody," Spies says. "Whereas

a big high-severity fire on the east side is generally viewed as undesirable and uncharacteristic."

### THE WEST SIDE

Lush forests in the Coast Range and on the western slope of the Cascades have always had large amounts of fuel, but fires here have been kept in check by moisture. Seventy years of fire suppression has had less effect here because the intervals between fires is so long anyway.

But the mosaic of different-aged forests that fire might create on the west-side landscape has changed. Lower-elevation private forestlands managed for timber production typically vary in age from zero to 50 years or so.

On federal land, most of the forests are becoming older, and although there is a legacy of harvested areas from before 1994, these days there are fewer open areas that might come from fire or logging, Spies says.

"If a fire does happen on the west side on federal land, they try to put it out because they don't want it to blow up into a high-severity fire," Spies says. There's too much at risk: adjacent private timberland and homes, not to mention the old-growth habitat that federal managers are now working to preserve and create. "To some degree, we're losing the ecological role of fire on the west side," he says.

# UENCES

Stephen Fitzgerald, a silviculture and fire specialist with the Oregon State University College of Forestry, says, “Conditions are not forcing our hand to think about fire in a different way in northwest Oregon, because it’s so infrequent.”

## SOUTHWEST OREGON

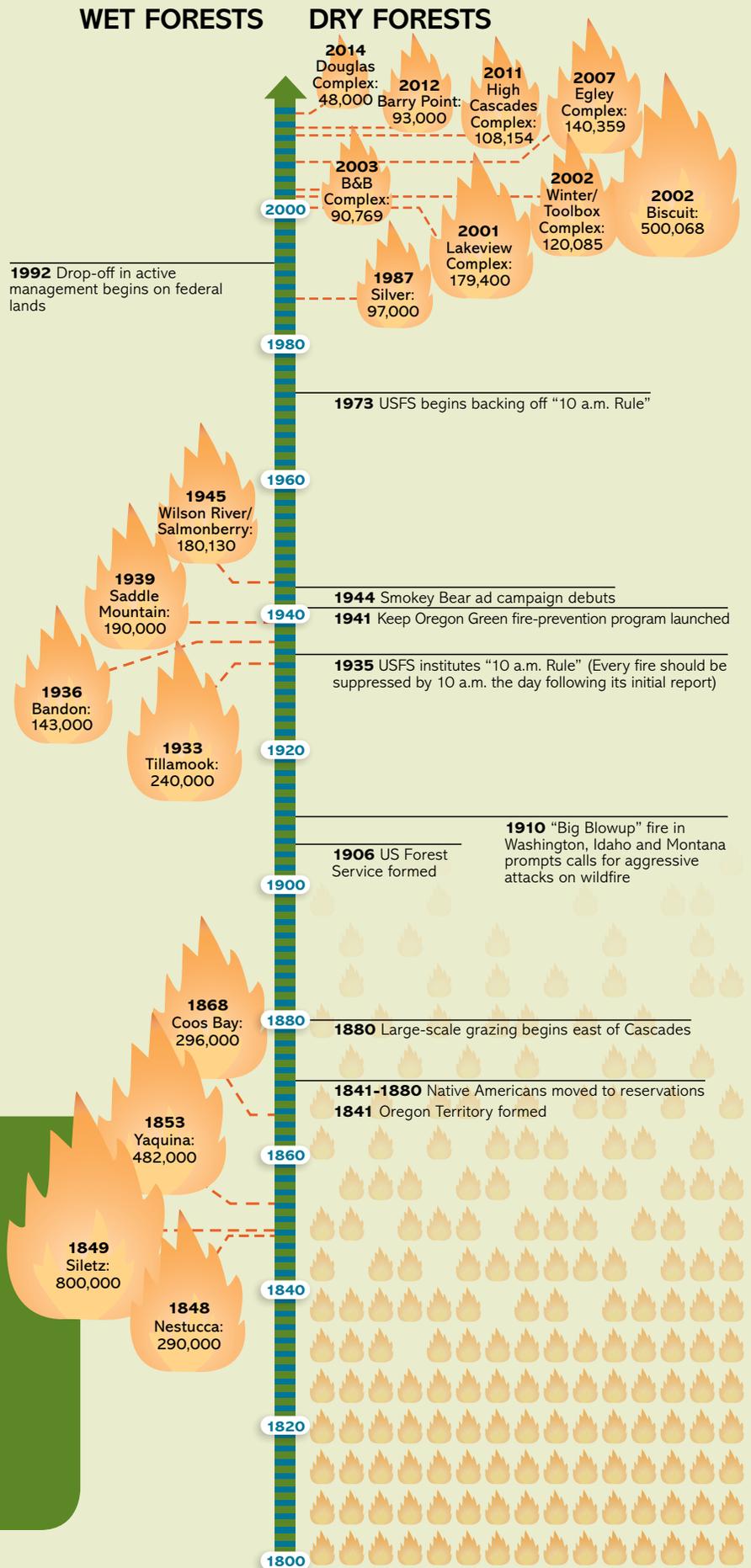
The story in southwest Oregon is somewhere in between, mixing elements of east and west. Melvin Thornton, district manager for the Douglas Forest Protective Association, says, “In southwest Oregon, we have much drier climate than northwest Oregon, and much heavier fuels than eastern Oregon. In some ways we have the worst of the two: dry and heavier fuels.”

The checkerboard of land ownership in much of this region – a square mile of federal land alternating with a square mile of private land – magnifies the differences in the way those lands are managed.

The Douglas Complex Fire in 2013 brought those differences into focus (see page 8).

Historically, there were many smaller fires on dry forests. Before World War II, the biggest severe fires in Oregon history occurred in the wet forests on the west side. Today, many large severe fires occur in the drier forests on the east side and in southwest Oregon. Atypical forest conditions have spawned atypical wildfires in many areas.

Many studies examining fire scars on old trees in eastern and southwestern Oregon prior to Euro-American settlement reveal abundant natural fires up until the late 1800s.



**THE FIRESTORM** A 200- to 300-foot fire whirl erupts off Rabbit Mountain during the Douglas Complex Fire.

“We fight fire aggressively,” says Nancy Hirsch, the Oregon Department of Forestry’s fire division chief. “But when fuel loads are high, there’s a tremendous amount of heat and fire behavior that doesn’t allow for direct suppression tactics.”



Photo: Oregon Department of Forestry

# DOUGLAS COMPLEX

## A southwest Oregon case

### DOUGLAS COMPLEX FIRE

- Ignition: July 26, 2013; lightning strike
- Acreage burned: 48,000
- Private/public: 23,000 acres private/25,000 acres Bureau of Land Management
- Largest single day: 12,000 acres on July 27
- Firefighting cost: \$54 million
- Roseburg Forest Products’ loss: 11,000 acres – 8,000 acres with young trees that will require reforestation; 3,000 acres of older, salvageable trees

On the first afternoon of what became known as the Douglas Complex Fire, Phil Adams, land and timber manager for Roseburg Forest Products, stood with a fire crew on a ridge near Rabbit Mountain.

“We just looked at each other, and we knew something bad was going to happen,” Adams remembers. “The wind changed, and the old-growth stands on the BLM lands

exploded, taking our lands with them. We saw 200-foot crown fires over the top of 150- to 200-foot-tall Douglas-fir. At that point, there was nothing to do. We just backed up.”

The Douglas Complex Fire burned 48,000 acres across what’s known as “the O&C” – which dates to the 19th century when the federal government granted land to the Oregon & California railroad company. The deal eventually went bad, the government got the land back, and the result today is alternating one-square-mile blocks of federal and private land. It’s often called “the checkerboard,” because that’s what it looks like on a map.

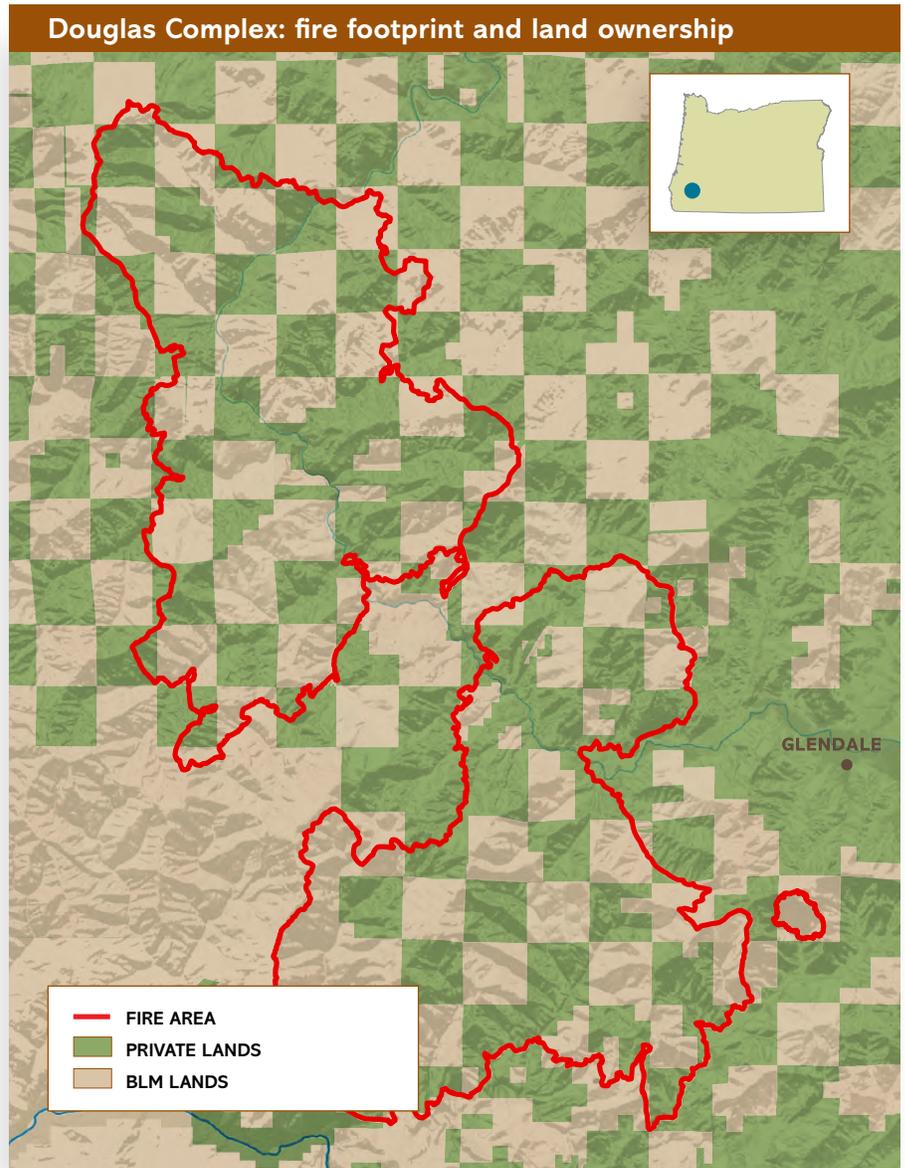
While many of the BLM squares are still managed for timber production, many others have been designated “late-successional reserves” since the 1990s. The goal is to let them develop into old-growth

habitat for the northern spotted owl and other species. There is little, if any, timber harvest on those. Litigation on areas managed for “timber production” has reduced active management there, too.

The privately owned squares typically operate as intensively managed forests, many owned by Roseburg Forest Products, which has 80 percent of its timberland mixed in with the O&C BLM land.

Landowners such as Roseburg worry about the amount of fuel building on those reserved BLM lands. While thinning or other fuels-reduction projects on those lands are possible, policy priorities, lack of funds and opposition from environmental groups make them difficult and in the short term unlikely.

“This is the story of the O&C right now,” Adams says. One group wants to be operating for economic and social considerations, and one envisions long-term, broad-landscape habitat concepts. “How do you reconcile these two things in a patchwork ownership?”



## IN THE WUI: Helping themselves

The Firewise program works locally to reduce the loss of life, property and resources to wildland fire, by building and maintaining communities in ways that are compatible with their natural surroundings. Firewise communities in Oregon number about 50.

“There’s a definite shift in focus these days, from treating fuels on individual properties to mitigation efforts at the community level,” says Keep Oregon Green Executive Director Kristin Babbs. “Homeowners are increasingly looking for a more collaborative approach to not only reduce their own risk, but to protect neighboring homes from the threat of wildfire.”

The Douglas Complex Fire burned in two large patches in the “O&C,” a checkerboard of private and federally owned land in southwestern Oregon. In the map above, the green squares are private land, and the tan squares are public land managed by the BLM. The unnatural ownership pattern makes management complex and sometimes counterproductive.

# BARRY POINT

## An eastern Oregon case

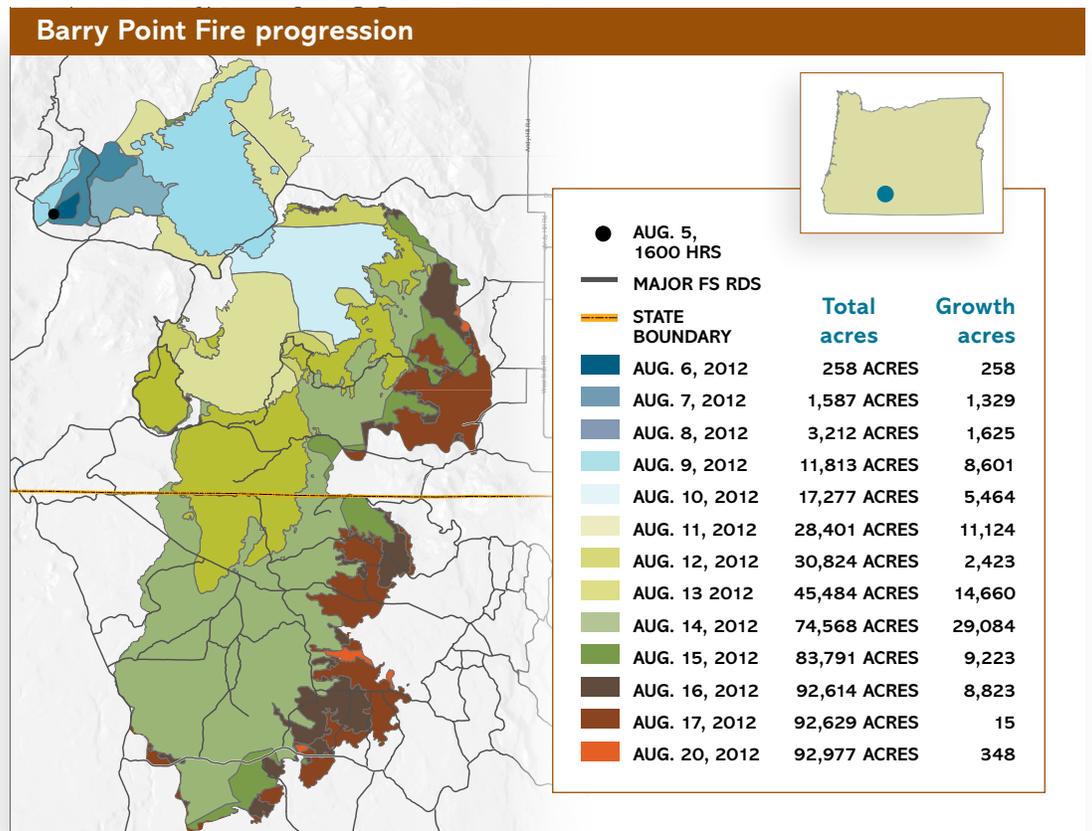


Photo: Fremont-Winema National Forest

In the end, it burned 93,000 acres. Drought, unusual winds and exceedingly low humidity, even at night, converged onto an unnaturally dense dry forest, creating the Barry Point Fire. It burned hot, with large patches of stand-replacing crown fire, historically unusual in a ponderosa forest.

Paul Harlan, vice president of resources at Collins, the major private landowner in southern Lake County, heard the initial report come over the radio on Aug. 5 from a lookout on Dog Mountain.

Within 30 minutes, the lookout estimated the fire at seven acres, with wind-carried embers igniting new fires 300 yards ahead of the main fire.



The map shows the acreage burned each day during the fire. On Aug. 14 alone, 29,000 acres burned.

## BARRY POINT FIRE

- Ignition: Aug. 5, 2012; lightning strike
- Acreage burned: 93,000
- Public/private: 60,000 acres national forest/33,000 acres private
- Largest single day: 29,000 acres on Aug. 14
- Firefighting cost: More than \$23 million
- Collins loss: 23,000 acres of mixed-age timber

The blaze spread to the east and northeast for nearly a week. Then the wind started blowing from the north, unusual in August. The fire turned south, toward California.

“You get that sick feeling in your stomach,” Harlan says.

The fire exploded overnight, burning about 15,000 acres and crossing the state line. Within the next few days it consumed more than 20,000 acres of Collins’ ponderosa-pine timberland.

Jim Walls, who leads the Lakeview Stewardship Group, a collaborative that helps design projects to improve the overstocked conditions in the Fremont-Winema National Forest, was shocked.

“It made me realize we’ve got a bigger problem than I thought,” he says.



# THE TRUE COST OF WILDFIRE

**The price of firefighting is just a fraction of it**

**PROPERTY LOSS:** Standing timber is not an asset that is typically insurable against fire. Burned timber on both private and public land can result in millions of dollars in losses for landowners, usually many times the cost of putting the fire out. It may wipe out decades of investment in planting and nurturing a forest, including taxes paid and growing time.

**WATER:** Fire can damage water quality, which is especially important if it burns in a watershed that is the source of drinking water to a city or town.

**ECONOMY:** Government spending during the fighting of a fire may give a temporary boost to some businesses in an affected community, but wildfires may hurt those who rely on travel, tourism and recreation. River guides, motels, restaurants and many others all suffer as tourists leave or stay away, sometimes for years after the fire. Losses can amount to millions of dollars.

**WILDLIFE:** Fire can create open spaces and dead trees (snags and down logs) that some animals need, but it also can damage old, complex habitat that land managers are trying to protect for endangered or threatened fish or wildlife.

**SMOKE:** Smoke from big fires releases many tons of harmful particulate matter and greenhouse gases. For example, the 2002 Biscuit Fire in southwest Oregon released about one-quarter of the total amount of carbon dioxide exhausted in Oregon that year. Smoke also poses acute risks to public health and exposes firefighters to long-term health risks.



Photo: Oregon Department of Forestry

## EAST SIDE: RESTORATION

Will there be more Barry Point Fires in Oregon's ponderosa forests?

"You're going to have fire on the landscape," says William Aney, east-side restoration coordinator for the Forest Service's Northwest Region. "The question is, 'What kind of fire do you want?'"

Aney is running a pilot project for the

Forest Service in eastern Oregon's Blue Mountains to get more than a million acres of forest back into a more natural, fire-resilient condition. It's on a larger scale than has happened in the past.

"Treatments" involve thinning the forest, pruning low branches to raise the canopy, mowing underbrush and creating firebreaks. Then prescribed fire can be used in a controlled area. All this reduces future wildfire behavior. Planning such restoration projects in eastern Oregon increasingly relies on collaborative groups, which include local residents, state and federal personnel, environmental groups, elected officials, timber industry representatives and scientists.

# WHAT TO DO?

## Opportunities and challenges



**BEFORE AND AFTER** As part of a restoration project, crews thinned trees and removed brush in this ponderosa pine stand in Jack Canyon.



## O&C LANDS: LESS OPTIMISM

After the Douglas Complex Fire, some feel there's excessive fuel buildup in parts of the 2.6 million-acre O&C, too. Could a collaborative work there?

"If we said, 'Let's go do some proactive work to protect habitat and reduce fuels,' I think all the stakeholders would come to the table," says Abbie Jossie, district manager of BLM's Roseburg District. "I'd love to do it, but our budget does not put a high priority on fuels reduction on land designated as endangered species habitat."

Budget cuts have reduced the BLM's fuels-reduction treatments in western Oregon from 26,000 acres in 2004 to 9,000 in 2013. Most of the remaining funds target the wildland-urban interface.

Roseburg Forest Products' Phil Adams says he would participate in collaborative planning, but he has doubts about its

chances in the O&C's late-successional reserves. "I'm open to it, but I don't see the light at the end of the tunnel right now."

## WEST SIDE: PREVENTION

In the productive forests of western Oregon, timber values are higher and more people live near the forest. With more at stake, prevention and immediate suppression remain paramount.

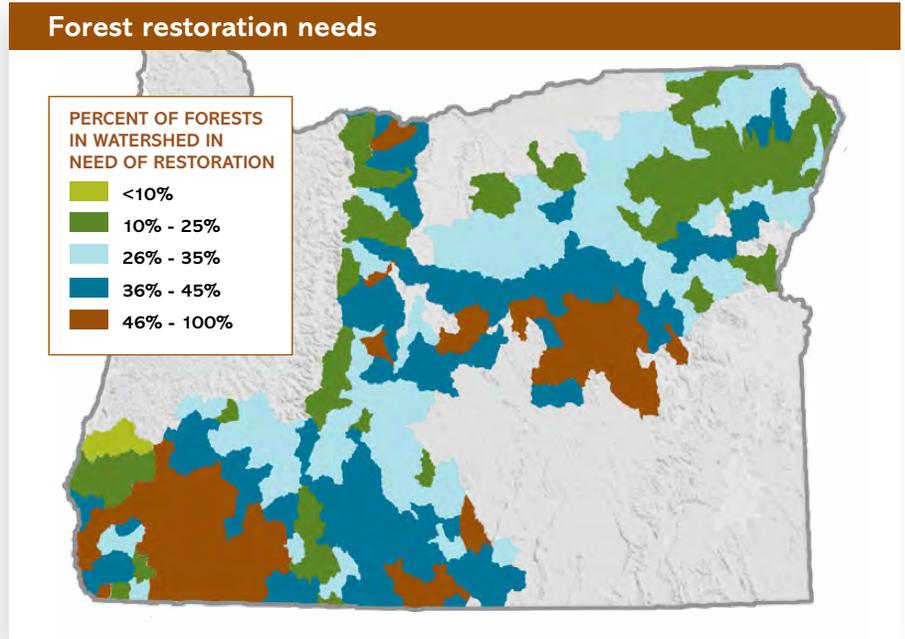
The Oregon Department of Forestry serves as the fire department for 16 million acres of forestland. Most of that is private land, as well as state and municipal forests and, by contract, BLM forests in western Oregon. The US Forest Service maintains its own system to suppress fires on national forests.

ODF's goal is to extinguish 97 percent of wildfires before they reach 10 acres. That means strong initial attack, strategic positioning of crews and aircraft, and the use of technology such as remote cameras, which can be monitored from a central location and are taking the place of human fire lookouts. About 30 cameras are in place around Oregon, primarily in southern Oregon, and more are planned elsewhere.

"The challenge for the west side is, 'Can we use active forest management to produce some of the benefits of fire?'" Spies says. "A clearcut is not entirely like a fire, but you can use forest management to imitate some of the effects of fire."

## LET FIRE DO SOME WORK?

Because the problem of overstocked national forests in eastern Oregon is so vast – millions of acres – there's discussion of letting fire "do some of the work."



The Nature Conservancy and the US Forest Service are jointly analyzing how many acres are in need of treatment to restore more fire resilient and sustainable forests. The analysis compares the structure of today's forested landscapes to the historic range of variation in forest structure prior to European settlement. This map highlights the percentage of all forests within a watershed in immediate need of mechanical thinning and/or fire to reduce tree density and/or canopy cover. Overall, more than 6.6 million acres of fire-adapted forests in Oregon have been identified as being in need of restoration.

Fitzgerald raises the idea: If a fire is burning and can be safely contained, then instead of spending \$3,000 an acre to suppress it, we can manage the fire under prescription. But he stresses this isn't about letting any fire burn. "There's a huge checklist you've got to go through" to do it responsibly, he says. "You're still going to suppress it in August, for instance, but maybe burn in October."

Mike Dykzeul, forest protection director for the Oregon Forest Industries Council, an association of large private landowners, has concerns. He appreciates that the careful use of prescribed fire on previously treated forests can improve forest health, but he's concerned about the potential transfer of risk between landowners that comes with the use of managed fire in the forest, in case the fire gets away.

# AFTER THE FIRE

## Different approaches to recovery

After the fire, the question arises: Should the burned area be managed by salvaging the timber and replanting, or left to recover on its own?



**SALVAGE AND REPLANT** A few months after the Douglas Complex Fire, salvage was well underway on private timberland on Rabbit Mountain. The legacy of Oregon's historic Tillamook and Oxbow burns offers a clear blueprint for forest managers such as Roseburg Forest Products' Phil Adams. This plan calls for salvaging standing dead trees, assuming they're big enough, to recoup some value while removing snags that could fuel future fires, called "reburns" – and then getting seedlings in the ground to start growing a new forest.

It all has to happen within a couple years, as burned trees quickly begin to lose value as they rot and are attacked by fungus and bugs.



**LEAVE IT** Following the Douglas Complex Fire, the BLM removed potentially hazardous burned trees along roads and is selling trees that were cut by crews fighting the fire. Necessary environmental analysis for economic salvage of timber takes time. Given the emphasis on developing old-growth habitat in much of the burned land, BLM's Abbie Jossie acknowledges that a lot of snags will likely remain on the landscape. But standing dead trees provide fuel for a future "reburn," a big concern for Adams, whose company is planning to invest \$6 million in new seedlings to replant its land.

To some extent, Jossie agrees: "If we're going to leave standing fuel, should we be creating some kind of a buffer between it and the private landowner? Or between it and a green patch of BLM land that's still intact and providing good-quality owl habitat? We don't want that to burn either," she says. "We don't want to burn ours or theirs."

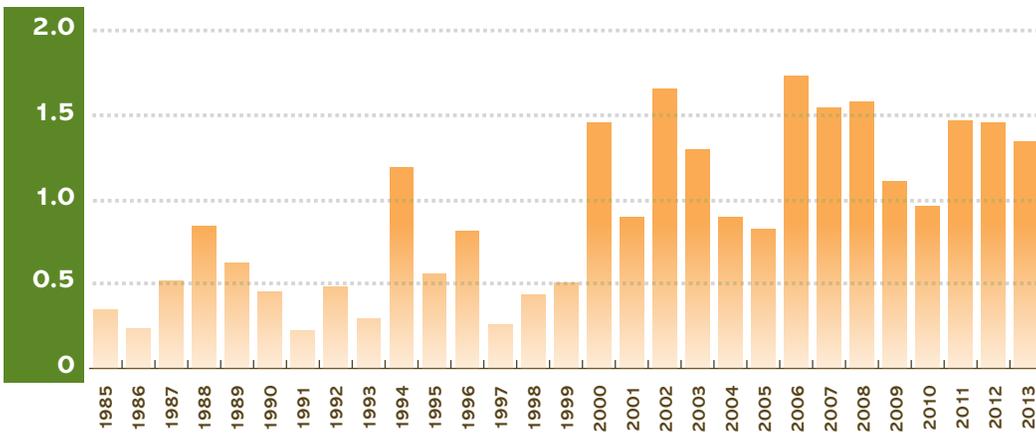
Much of the BLM forests and plantations that burned were "matrix" lands not reserved for habitat. The BLM has more latitude to salvage commercially valuable timber on the matrix land.



Photo: Stephen Fitzgerald

**A MIDDLE GROUND** A salvage project following the 2003 Davis Lake Fire removed some commercial timber but left many large dead trees still standing for habitat. A few seedlings were planted, too. OSU silviculturist Stephen Fitzgerald points to this model as one compromise approach on federal land. "The forest will develop in a more natural way. It won't look like a plantation. It won't look all black, either. We got some economic value out of it, we removed some fuel loading and left some valuable wildlife trees and snags, and we helped jump-start the next generation of forest. I think this works." This forest will likely not burn like a plantation in a future wildfire.

## Forest Service firefighting costs nationwide (billions)



Since 1985, US Forest Service spending on fighting wildfires nationwide has increased about fourfold. These amounts, adjusted for inflation, are in 2013 dollars. (Source: National Interagency Fire Center)

# PICK UP THE PACE

## Building political will and funding prevention

In January 2013, Gov. John Kitzhaber called it “mind-boggling.” The summer before, the federal government had spent more than a billion dollars fighting fires and less than a third of that doing preventive work. “It doesn’t make sense,” he told the Oregon Board of Forestry.

Oregon’s forests have tremendous ecologic and economic value. Basically, we have two kinds of forests, and they require different approaches to minimize fire.

### EASTERN AND SOUTHWESTERN

More than 6.6 million acres of dry forests in Oregon need restoration to reduce the risk of large, uncharacteristic fire. Local collaboration and active management can restore forest health and fire resiliency, but success will mean picking up the pace.

The 2013 Legislature allocated \$2.88 million to support collaborative groups, advance restoration and bring resiliency to forests and rural communities. It’s important to allow enough time to ensure

success, as results won’t happen overnight. Prior achievements show collaboration and restoration work in the long-term.

**WESTERN** On highly productive western Oregon forests, wildfires can be severely destructive, threatening lives and property, so we must be sure that state and federal firefighting capacity are up to the task.

The cost of fighting fires nationally has shot up. The FLAME Act in 2009 was supposed to address the problem by providing a pool of money for expensive fire years, so federal agencies would not have to raid other parts of their budgets, including prevention and restoration, to pay for firefighting. But the program failed to meet expectations.

A new plan, proposed in 2013 by the White House and bills in Congress, would cap Forest Service fire suppression budgets and have the Federal Emergency Management Administration help fund the big, expensive fires. This would protect Forest Service funds earmarked for management.



Photo: Oregon Department of Forestry

### A PLACE FOR POLICY

Oregon’s U.S. Sens. Jeff Merkley and Ron Wyden tour the Douglas Complex Fire in 2013, Oregon’s most challenging fire season in more than 60 years. More than 100,000 acres burned, and firefighting costs of \$122 million set a record. Timber losses were estimated at about \$370 million.

## THE 'EPIC' SEASON

On the lines of the Douglas  
Complex Fire in summer 2013.



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## ABOUT OFRI

The Oregon Forest Resources Institute was created by the Oregon Legislature in 1991 to advance public understanding of forests, forest products and forest management and to encourage sound forestry through landowner education. A 13-member board of directors governs OFRI. It is funded by a dedicated forest products harvest tax.



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