

**S**cott Rupp and a few curious co-workers walked into a burned forest of black spruce about 35 miles southwest of Fairbanks in late

June 2015. A lightning strike had ignited a moderately intense fire just a few days earlier. Pockets in the thick ash still smoldered. Open flames licked a few stumps.

Not far into the thicket of blackened, branchless trunks, though, the UAF professor's group found an entirely different forest.

"Here was this giant big green postage stamp of vegetation with most of the trees intact and most of the understory," Rupp said.

"So it really did work," he added.

What worked was an idea Rupp and Alaska's wildland firefighting managers had come up with 10 years earlier: By thinning thickets of black spruce and pruning their lower branches, they might slow down the fires that occasionally tear through such forests and threaten communities.

They tested the idea on that patch of state land at the end of the Nenana Ridge Road. Since then, the evidence from the site has accumulated slowly and sporadically.

The results are encouraging not only for wildland firefighters but also for anyone with a treasured few acres and a home in the potential path of a black spruce inferno — to

protect your property from fire, you don't have to clear-cut it. Thinning and pruning can greatly increase the odds of stopping the flames.

### Ending the data drought

Finding a way to stop Interior Alaska's wildfires had just become an even more urgent need a decade ago when Rupp and others put together the Nenana Ridge project. In the super-dry summers of 2004 and 2005, unstoppable fires in black spruce set new records for acreage burned. Fire managers doubted they could stop a fire if it came down the valleys into Fairbanks suburbs.

Government officials, anxious to do something, arranged to mow multiple lengthy clear-cuts in the black spruce on the outskirts of Fairbanks' urban core — west along Chena Hot Springs Road, north of Goldstream Valley, near Harding Lake and in several other areas.

But no one had much scientific data about how Interior Alaska's fire behaved when it hit such clear-cuts or alternative treatments such as thinning. Some modeling suggested thinning might even increase the speed at which fires spread because it would allow more wind into the thick forest.

So a team of fire managers secured about \$1.5 million in federal, state and university funds to create an experiment and collect that data.

Robert Schmoll, now the state Division of Forestry's

# Facts from Flames

By Sam Bishop

A helicopter flies over the Nenana Ridge experimental fire in 2009. State and federal officials, along with UAF researchers, lit the fire to test how thinning and clearing black spruce affects the spread of wildfire.

fire operations forester in Fairbanks, said he and a group of longtime colleagues put the proposal together. "We got it going beyond our normal jobs," he said.

The team included Rupp, who today leads the Scenarios Network for Alaska and Arctic Planning at UAF's International Arctic Research Center.

In summer 2006, crews under the team's direction drove down the Nenana Ridge Road, a logging track that starts on the Parks Highway southwest of Fairbanks. The road winds 11 miles down the ridge, ending in a muddy, rutted trail near the Tanana River. A wide bend of the river encircles about 1,000 acres of marshy flatland half-covered with black spruce thickets.

There, crews cut lines around a few large areas. They selected four blocks, each about 150 yards square, in two of the areas, called A and B. On two of the four blocks, they sheared all the trees with bulldozers. On the other two, they thinned the trees so none was closer than 8 feet to another. Then they pruned lower branches on remaining trees 4 feet up the trunks. They either hauled out the trees and trimmings from the thinned blocks or burned the piles the next winter.

Then everyone waited for the weather. For three years.

### A wall of orange

In summer 2009, conditions were perfect to set the experiment on fire. Managers scurried to have crews set up the equipment — pumps, sprinklers and hoses to protect the perimeter lines, and fireproof video cameras and

moss surface carries fire well during dry weather. Dead branches crowd the base of many spruce trees, creating a fuel ladder into the flammable needles above.

Firefighters call it gasoline on a stick. The sticks can grow 2,500 or more per acre, and in such places they can torch with a ferocity

By thinning thickets of black spruce and pruning their lower branches, they might slow down the fires that occasionally tear through such forests and threaten communities.

other scientific equipment to record the fire data.

Firefighters walked the southern line of area A, dripping ignited diesel on vegetation. Helicopters dropped plastic spheres of burning fuel, dubbed ping-pong balls.

"The idea was to try to start a fire under fairly extreme fire conditions so we could mimic approaching the worst-case scenario," Rupp said. It worked.

"We had a fully engaged crown fire, so there was a fire burning up in the canopy of the trees as well as down on the ground," he explained.

Black spruce grow in areas that often are classified as wetland. The ground is usually covered with sponge-like mosses, tussocks, sedges and even puddles. But the

matching fires in the dry brush lands of the western United States.

A video camera in a fireproof container set in the untreated forest at Nenana Ridge recorded a wall of orange approaching through the thickets. Twigs near the camera ignited, even though the nearest visible flames were still a dozen yards away. The small blazes quickly converged, and chaotic winds drove the burn into a swirling inferno for several minutes.

Video footage taken from just inside one of the thinned forest blocks started out the same. The wall of orange approached rapidly through the untreated forest. As the wall met the thinned area, though, it paused. The flames collapsed. Dense smoke

rolled over the flame front. Measurements taken later showed the fire dropped out of the canopy within an average of 8 ½ feet of the thinned area's boundary.

Rupp said the ground fire continued to burn into the treated area, but it moved slowly and went out on its own after an average of 259 feet.

Schmoll, the state fire operations forester, said that surprised him. Later investigation indicated that horsetails, which sprouted after the thinning, contained enough moisture to retard the fire, Schmoll explained.

"The spacing of the trees allowed some light in there,"

he said. "It changed the surface herbaceous structure."

Fires usually begin on the surface, then move into the crowns, Schmoll said.

With the surface fire slowed or stopped and no ladder fuels to climb up the trunks, the 2009 fire just died when it hit the thinned block within area A at Nenana Ridge.

### A second chance

That's also where the experiment died. The fire on that first day had only burned around one of the thinned blocks in the A area. The next day, fire conditions were more extreme, and managers decided it would

be too dangerous to continue with the controlled burn experiment.

The right conditions never re-emerged, and the money ran out. Since firefighters were able to torch only one

**"But the result was the same, in that the [thinned] area for the most part did not burn."**

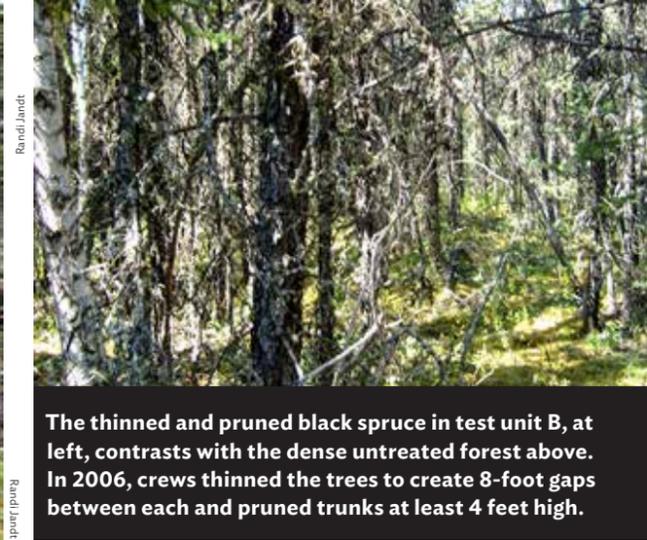
area in a single year, peer-reviewed academic journals had limited interest in publishing the results, Rupp said.

So the project went dormant — until that lightning strike in June 2015.

The lightning bolt hit on the west side of the old experiment area, and the fire burned eastward through area B. However, the scientific equipment needed to record the fire's characteristics was long gone.

"So it was somewhat of a forensic investigation afterward to try to piece things together," Rupp said.

They discovered that the 2015 fire was less intense than the 2009 blaze. "We did not have an active crown fire," Rupp said. "It was more of a fire running along the ground



The thinned and pruned black spruce in test unit B, at left, contrasts with the dense untreated forest above. In 2006, crews thinned the trees to create 8-foot gaps between each and pruned trunks at least 4 feet high.

with individual trees torching and starting on fire."

"But the result was the same, in that the [thinned] area for the most part did not burn," he said.

And when it stopped burning, it left that green postage stamp of untouched forest that Rupp and his co-workers discovered a few days later.

### Who will do it?

Rupp and Schmoll believe the Nenana Ridge results demonstrate the value of thinning

as a way to slow down major wildland fires.

"There are a couple data points out there that now essentially provide some solid evidence that fuel treatments are effective both in changing the physical fire behavior but also providing additional options operationally for the fire managers," Rupp said.

"They're not going to put firefighters into a dog-hair stand of black spruce," he said. "That's too dangerous."

But in a thinned stand, Schmoll said, they may be able to put firefighters in place

for direct attack. Aerial retardant can be more effective. They can set up sprinklers fed by hoses from trucks or pumps placed in nearby ponds.

Thinning might even be more effective than bulldozing, in some conditions. While the bulldozed areas at Nenana Ridge slowed the fires, the slash piles burned for a long time. Also, because grass grows densely in bulldozed areas for many years after the clearing work is done, fires

can move across them very rapidly during dry spring conditions, Rupp said.

All this raises a question, though: Can firefighting agencies do clearing and thinning work on a scale that matters?

Bulldozing land costs up to \$350 per acre, and hand thinning and pruning costs up to \$5,000 per acre, Schmoll said.

The intensive treatment on just the few acres at Nenana Ridge alone cost about \$500,000, according to a 2011

### Protect your property.

Results from the Nenana Ridge research project back up the advice offered by Firewise, a national multiagency effort to help people protect their property from wildfire.

The Alaska Firewise's zone recommendations for homeowners are reproduced here. The goal is to create defensible space, reducing the risk of destruction and damage from wildfires.

#### Is your home in a safe zone?

A defensible space is a buffer zone you create around your home or cabin that is clear of heavy vegetation or anything that could catch fire with embers. This space decreases the intensity of a wildfire as it approaches your home site and provides firefighters with an opportunity to defend and protect your home and outbuildings.

#### Don't get burned!

- Have a detailed evacuation plan so you are prepared to leave at a moment's notice.
- Provide adequate access to your home site; is there room for emergency vehicles to turn around?
- Develop an emergency water supply; have a pump, adequate hose and nozzle close by.
- Contact your local fire department or the state Division of Forestry for information on the burn permit program.
- Maintain your defensible space annually.

#### Zone 3 (within 100-200 feet)

- Manage wooded property in a traditional manner.
- Remove trees that are damaged, dead, infected by disease, or are of poor form. This will improve the health of the forest.
- Prune and thin out trees along driveways and trails.

#### Zone 2 (within 100 feet)

- Remove dead and dying trees, shrubs and brush.
- Prune remaining trees to a height of 8-10 feet above ground.
- Properly dispose of all slash and woody debris.
- Position firewood, vehicles (including four-wheelers and snowmachines), fuels and hazardous materials in appropriate locations away from flammable vegetation.

#### Zone 1 (within 30 feet)

- Remove all flammable vegetation and other materials within 5 feet of home.
- Keep roof and gutters free of branches, leaves and needles.
- Choose non-flammable roofing materials on all structures.
- Keep all firewood, vehicles (including four-wheelers and snowmachines), fuels and hazardous materials out of this zone.



Infographic information courtesy of Firewise.



Professor Scott Rupp talks about the Nenana Ridge experimental fire in 2009.

paper Rupp wrote summarizing the results for the federal Joint Fire Science Program, one of the funding agencies.

In addition, treatments are controversial. The closer they get to people's homes, the more controversial they become.

"No one wants to have a large swath of forest bulldozed in their back yard," Rupp said.

The ecological effects of widespread clear-cutting and thinning also concern scientists. The cuts can fragment wildlife habitat, increase permafrost thawing and cause erosion.

## The homeowner option

While agencies are constrained by such considerations, homeowners may be less so. The effectiveness of the thinning technique in particular might help convince individual property owners in high-risk areas to undertake the work.

Joe Little, a UAF economics professor, is looking into that possibility as part of a broad study of the cost-effectiveness of fire fuel treatments in Alaska. He's working with Rupp and other researchers at UAF's SNAP.

This fall, Little plans to survey up to 2,000 property owners in the Interior and Kenai Peninsula regions of Alaska.

"We're trying to identify those factors which motivate people to mitigate wildfire risk on their own land," Little said.

Clearing or thinning land might seem to be a logical thing to do from a fire protection standpoint, but it's not so simple, Little said.



A fire crew works to control flames along an exterior line of the experimental plot on June 17, 2009.

"I mean, you tend to live in Alaska for the amenities," he said. "So why would you want to, say, clear fuels from your land if you appreciate the trees and the flora and fauna?"

In addition, studies have shown that people tend to free-ride off their neighbors' protective actions, whether those neighbors are public agencies or private property owners. Little identified this tendency in an earlier computer lab experiment he conducted.

"If you're looking at thinning and pruning, those tend to be pretty effective measures," said Little, who grew up in Idaho and spent four years fighting wildfires in that region in the 1990s before attending graduate school. "But it's going to be contingent upon the area where you're working, the actual fire risk and how many of your neighbors are doing the same thing."

## Follow Firewise

Firefighting agencies already have a concerted nationwide

program, called Firewise, that tries to get people in high-risk neighborhoods to act both individually and as organized communities. While the Nenana Ridge experiment was designed primarily as a test of landscape-scale fire treatments, the results reinforced the Firewise recommendations.

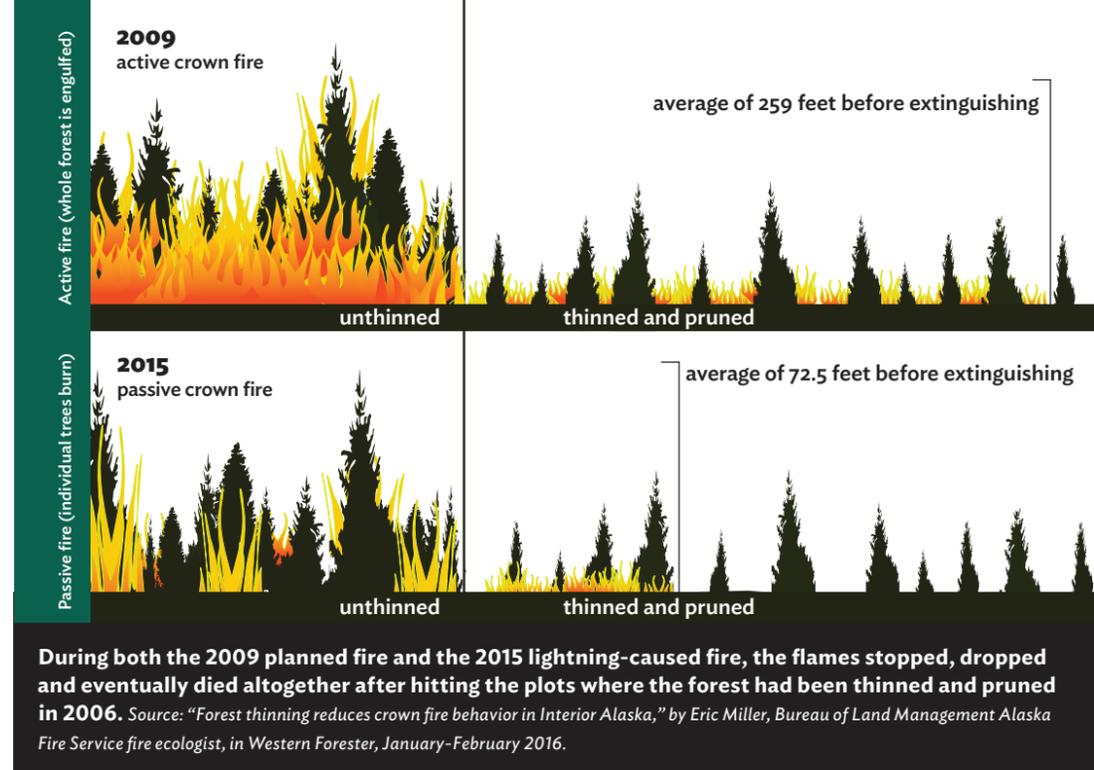
Firewise suggests numerous measures. Maintain a lawn. Edge your house walls with small plants, flowers or gravel. Don't store flammable material and firewood under decks or in sheds against the house. Enclose porches, sheds and vented areas with non-combustible screens to keep out flying embers. Clean gutters of needles and sticks.

However, even these measures won't save a home if a fully engaged crown fire gets close. The heat radiated by such fires can ignite combustible material on the home's exterior, even when visible flames are still far away.

That's in part why Firewise recommends removing all spruce and other conifers within 15 feet of the building. It also recommends thinning conifers in an area extending 100 feet from a home — more if you're on a steep slope.

In the thinned area, branches of remaining individual trees or clumps of trees should have 15 feet between them. If a homeowner opts to keep clumps of black spruce rather than individual trees, the clumps should be no more than 10 feet in diameter.

In addition, limbs of all conifers should be pruned 6 to 8 feet up the trunks. Dead vegetation and shrubs



underneath must be removed to avoid the ladder effect.

Evidence from the Nenana Ridge fires indicates that the Firewise measures will prevent a crown fire from approaching a home and

firefighters will conduct triage on threatened properties. At homes where thinning or clearing has occurred, firefighters are more likely to have time to set up sprinklers or take other protective measures.

Places where the natural forest abuts the buildings aren't as likely to get help. "Those are the ones you write off," he said.

Even in cases where firefighters decide they

do have time to protect a property, the results won't be pretty if a fire is approaching, he said.

"If we come out and do it, we're going to cut everything down," he said. "If you do it yourself, you can do it the way you want to."

Rupp, who lives at 25-mile Chena Hot Springs Road, had to evacuate in 2013 when the Stuart Creek fire approached his home.

Rupp said residents of Fairbanks and other communities should consider the information about fire protection in light of the growing fire danger.

"If it's a fire season of any extent," he said, "Fairbanks is going to suffer through bad smoke, and it's very likely that some part of our community is going to be threatened to the point of evacuation." ❧

Sam Bishop is a writer and editor at UAF University Relations. He worked previously as a newspaper journalist for 27 years in Fairbanks, Anchorage, Juneau and Washington, D.C. As a college student he spent two slow seasons as an emergency firefighter for the state Division of Forestry.

Learn more about Firewise at <http://forestry.alaska.gov/fire/firewise> and the Nenana Ridge project at <http://bit.ly/Aurora-fire>.



An aerial photograph taken in 2009, at left, shows how the flames failed to burn an area of thinned and pruned forest located in the center of the circle. At right, a ground-level photograph taken in that circled area reveals how the active crown fire in the untreated forest stopped when it hit the thinned and pruned forest.

Robert Schmoll

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Fall 2016



*Celebrating a century*

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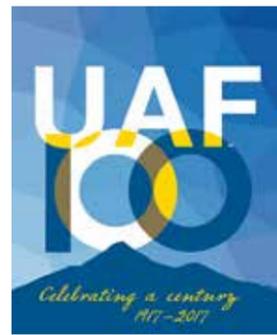
A centennial teaser

We're so excited to celebrate UAF's birthday in 2017. ONE HUNDRED years — wow! James Wickersham, just one guy, had such a vision for Alaska's future and the education of her people. All of us, all of you, have seen it through, and then some, with the same grit and determination he showed back then. I hope the people in 2117 will be as impressed with that vision, and our university today, as I am.

We want you to be part of our festivities. This issue includes information about some of our centennial activities next year plus some fun things for you to do that will help us spread the joy. On the inside back cover is a banner you can use to send us some birthday greetings and get time in the spotlight on our website. Just pull it out, fill it in (write big!), take a selfie photo or video (or have someone take it for you) and post it (publicly) on social media with #uaf100, or email it to [uaf-alumni@alaska.edu](mailto:uaf-alumni@alaska.edu). We'll capture it in our social feed at [www.uaf.edu/centennial/](http://www.uaf.edu/centennial/).

We'd also like you to share your memories of UAF with us. Go to [www.uaf.edu/uaf100/memories/](http://www.uaf.edu/uaf100/memories/) and fill in the form. You can even upload an old photo of yourself on campus if you have one. We'll post them on the website and print a selection in the next issue of Aurora. Following our centennial year, your story will become a permanent part of the university archives.

Speaking of the next issue, we're going to publish just one in 2017, in July. We are fully aware of the difficult budget times we're facing in Alaska, and we know there are some who'd like us to cancel a print version altogether. However, I've also heard from many of you how much you love receiving



Aurora — how much it reminds you of “home,” how much you love seeing what your old classmates are up to, and even more how much you love keeping up with all the things we do at UAF.

We're caught in a budget versus return-on-investment predicament here. We're mindful of our limited resources, but we also know how important it is to connect with you — our alumni and friends — in a warm, friendly, interesting way on a somewhat regular basis. How much value should we place on sending compelling stories about UAF's people, their ideas and accomplishments, and even their failures, to 20,000 mailboxes around the world? How many more people see the magazine as it's passed around? All for less than 75 cents each.

You can't get that sort of connection by going exclusively online. Trust me, I've seen our online viewing stats.

So we'll publish just one issue in 2017, a special commemorative edition. After that, we'll see if the university's budget has recovered enough to increase production to two per year again or whether there is some other way we can stay top-of-mind with all of you.

In the meantime, we hope you will join the fun and wish UAF a happy 100th birthday!

Kim Davis  
Managing editor

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Susan Mitchell

◀ **High-latitude high-tech**  
By LJ Evans

A group of UAF graduates and sometime-students are building their own drones — and a high-tech company — in Fairbanks.



**12 A lifetime on ice**  
By Jeff Richardson

Carl Benson started gathering data on Arctic ice and snow more than 60 years ago. As a glaciologist and UAF professor, he studied and taught about the frozen North long before it was seen as a key element in today's global climate models.

**18 Facts from flames**  
By Sam Bishop

A lightning strike in 2015 resurrected interest in a wildfire experiment and added to the evidence of how thinning a forest can slow the flames.

**29 A state of progress**  
By Sam Bishop

James Wickersham in 1915 called for a university to help “our state” of Alaska progress. The institution has fulfilled his vision in so many ways during its first 100 years.



Scott Rupp



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- 2 Briefly**  
News from around our campuses
- 5 On the shelf**  
Books by alumni
- 16 Full frame**  
Scenes from UAF
- 24 Class notes/In memoriam**  
News about alumni and friends
- 28 Nanook Nook**  
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*Let's give Charlie (Charles Bunnell, UAF's first president) some stylish new colors!*