

SIERRA: You're listening to Brains On, where we're serious about being curious.

SPEAKER 2: Brains On is supported in part by a grant from the National Science Foundation.

SIERRA: We're going to start with a story about how fire came to be. It's from the Yurok people. They've lived on the land that's now Northern California long before it had that name. The story starts when the world was dark-- no light and no way to cook.

MARGO We call those [INAUDIBLE] times.

ROBBINS:

SIERRA: Old women up in the sky had fire, but there were animal spirit beings that didn't.

MARGO So those [INAUDIBLE] spirit beings, they decided that that's what they needed to have. Not only did they need it,
ROBBINS: but the humans that would be coming would also need it.

SIERRA: So the spirit beings got to work.

MARGO And so the most powerful one-- his name was [INAUDIBLE]. And so he said, all right, well, I will make a plan about
ROBBINS: how to go get the fire.

SIERRA: They'd have to steal the fire from the old women in the sky.

MARGO And he called all the animals back together. He said, "but I need everybody's help."

ROBBINS:

SIERRA: All the animal spirit beings agreed to help. So he went up to the sky to see the old women.

MARGO And then, when they fell asleep, he grabbed up the fire, and he stuck it in the basket. And also the sun-- stuck it
ROBBINS: in the basket and he took off.

SIERRA: He ran as fast as he could. The old women didn't want anyone to have their fire.

MARGO And those old women woke up. They're like, what? What's going on? And they took off chasing after them and
ROBBINS: [INAUDIBLE] just went fast as he could. Just as those old women was getting ready to catch him, he passed it off to Bear.

SIERRA: And Bear ran all the way up a mountain. Then, Bear passed it to Eagle.

MARGO Eagle took off flying with it, and those old women-- they just kept chasing them. Eagle, he dropped it off with
ROBBINS: [INAUDIBLE]. That's the mountain lion. And mountain lion-- he can run fast. Man, he was running all as fast as he could. So then he passed it off, and--

SIERRA: He passed it off to Turtle.

MARGO You all know how slow Turtle is, but Turtle was also on top of a mountain. So when Turtle got it, he just pulled his
ROBBINS: head in and pulled his legs in and he just rolled down that mountain until he got down to the bottom.

SIERRA: At the bottom of the mountain, Frog was sitting at the edge of a river.

MARGO And frog took the fire, and he put it in his mouth, and he went under the water. And he just stayed under there.

ROBBINS: And those old women, they was there. They was waiting, waiting, waiting for him to come up.

SIERRA: But Frog didn't come up. And eventually, the old women left.

MARGO And then the frog came up out of the water, and he spit the fire into the roots of the willow tree. And so that's

ROBBINS: why we use willow to make our fire. And that's how we, as humans, were able to have fire to this day.

SIERRA: The end.

MOLLY BLOOM: You are listening to Brains On from American Public Media, I'm Molly Bloom, and my cohost today is Sierra from Mountain View, California. Hi, Sierra.

SIERRA: Hi.

MOLLY BLOOM: The story you just heard is all about fire, and so is today's episode.

SIERRA: A fire can be super useful, like for cooking.

MOLLY BLOOM: Or super cozy, like a fireplace in winter.

SIERRA: Or super magical, like telling stories around a campfire.

MOLLY BLOOM: Ooh, with s'mores?

SIERRA: Of course with s'mores. If you have a campfire, s'mores are practically mandatory.

MOLLY BLOOM: I agree. But a fire can also be super dangerous, like when a fire breaks out in a forest.

SIERRA: These are called wildfires. They can torch miles and miles of woods or grasslands, and they sometimes burn buildings, too.

MOLLY BLOOM: If they burn long and hot enough, they can destroy ecosystems and send lots of harmful smoke into the air. So, Sierra, you wrote into us with a question about wildfires. Do you remember the question you wrote to us with?

SIERRA: I asked, how are wildfires contained?

MOLLY BLOOM: It's a good question, and we're going to answer it in a little bit. So what got you curious about them?

SIERRA: I got really curious about wildfires last year because last year's wildfire season was the longest and worst I've ever experienced. My family was cooped up inside for months. So not only were we stuck at home because of the pandemic, but we also couldn't even go outside due to the smoke.

MOLLY BLOOM: Oof, that sounds very challenging. And what would you say that you learned that will help you this year's wildfire season or future wildfire seasons?

SIERRA: I definitely learned to like to stay inside and definitely not go out when the air quality is bad and definitely to run air filters inside.

MOLLY BLOOM: Was there a favorite indoor activity you had?

SIERRA: Well, I was doing a lot of creative writing.

MOLLY BLOOM: Very cool. And what kind of stuff were you writing?

SIERRA: I remember writing about this day on September 9, when the sky turned a surreal shade of reddish orange. And it stayed that way for the whole day. And it was really eerie. It was like an alien invasion. And I remember writing about just waking up on that day and wondering why it was so dark. And I remember thinking it was the middle of the night.

MOLLY BLOOM: That must have been a really spooky experience.

SIERRA: Yeah, it was.

MOLLY BLOOM: Did your dog react to it at all?

SIERRA: She didn't seem to notice. She was just walking around the house like there is nothing happening.

MOLLY BLOOM: She's an indoor dog. She doesn't pay attention to what's going on out there.

SIERRA: Yeah.

MOLLY BLOOM: Wildfires have always been a part of nature, but according to the US Environmental Protection Agency, they've gotten bigger over the last 40 years.

SIERRA: And scientists think climate change will make wildfires worse because climate change warms up the planet, and that makes it easier for fires to start and spread.

MOLLY BLOOM: Climate change comes from having too much greenhouse gas in our atmosphere-- stuff like carbon dioxide or methane. These gases are released when we burn fossil fuels in vehicles or factories or power plants.

SIERRA: When they go up into the sky, they create a kind of invisible blanket that traps heat down here on Earth.

MOLLY BLOOM: We need some of those gases in the atmosphere to keep us warm, but too much, and things go from cozy to toasty.

SIERRA: It's like when you have on way too many blankets, and suddenly, you're sweating.

MOLLY BLOOM: Right. And the more greenhouse gases we release, the hotter it will get. That will change the climate and weather patterns all around the globe.

SIERRA: That's why we call it climate change.

MOLLY BLOOM: And climate change is part of why we're seeing bigger wildfires now. So let's get to Mara's question.

MARA: do wildfires start, and how can we stay safe from them and make less?

MOLLY BLOOM: It takes three things to make a wildfire. These ingredients are called the fire triangle. So we also have a musical triangle to play. Can you do the honors, Sierra?

SIERRA: Sure.

MOLLY BLOOM: The first thing you need to start a fire is fuel.

SIERRA: That's stuff to burn, like dead grass and brush.

MOLLY BLOOM: Then you need heat.

SIERRA: Enough heat to light the fire, so maybe from a lightning strike or a firework or a campfire that wasn't put out properly.

MOLLY BLOOM: And lastly, you need oxygen.

SIERRA: The chemical element that we breathe from the air, so that's always around us.

MOLLY BLOOM: In the Western United States, the cycle of the seasons feeds this fire triangle every year.

SIERRA: During cool, rainy winters, grasses and brush can grow a lot.

MOLLY BLOOM: But then the hot, dry summer comes.

SIERRA: And those plants die out-- become a perfect food for a hungry fire.

MOLLY BLOOM: So naturally, forests have a lot of burnable fuel and oxygen, so sometimes all it takes is a spark to get things burning.

SIERRA: Even though the big wildfires we see these days can feel very new, there have been fires in the western United States for a really long time.

MOLLY BLOOM: Brains On producer Menaka Wilhelm looked into what this landscape was like a long time ago.

MENAKA Hi, Sierra.

WILHELM:

SIERRA: Hi, Menaka.

MENAKA So Indigenous people have lived with fire for thousands of years. Margo Robbins told me about that. She lives on the Yurok reservation in the land that's now Northern California, and she works with fire today to take care of the land. She told us that fire story that we started the episode with. And I also asked her about what Californian forests were like a few hundred years ago, like before Europeans colonized America.

MARGO At that time, you could easily walk through the forest any place.

ROBBINS:

MENAKA There wasn't a bunch of brush on the ground.

WILHELM:

MARGO There were fewer but bigger and healthier trees.

ROBBINS:

MENAKA The trees shaded the forest and gave animals and people leaves and nuts to eat.

WILHELM:

MARGO There were trails that people use that were kept open.

ROBBINS:

MENAKA And as you walked along a trail, you would have seen a lot of variety. Grass would grow in prairie-like areas,
WILHELM: while in other places, big trees had plenty of space to spread out.

MARGO And it looked that way because native people took care of the land with fire.

ROBBINS:

MENAKA Indigenous tribes carefully burned some of the land each year to keep ecosystems balanced. Burns break dead
WILHELM: brush and trees down so that their nutrients can return to the forest soil. And some plants can only grow from
their seeds with fire.

MONTEREY Oh, that's right. Hi, Monterey Pine here. Can I share something about that?

PINE:

MENAKA Oh, please, by all means.

WILHELM:

MONTEREY Great. Yeah, so I make these baby trees. They grow from my seeds, and my seeds are in pine cones because I'm
PINE: a pine tree. But when I first make my pine cones, they're all closed up with this stuff called resin. It's like a sticky
plant glue, almost like sap. So the seeds can't get out when that resin is holding my cones closed. My seeds only
make it out of my cones when fire burns them up and melts the resin. How cool is that? Or how hot is that?

MENAKA Wow, so no fire, no baby Monterey pine trees. And actually, loads of plants and trees have adapted to fire in
WILHELM: similar ways. So Indigenous people kept the land healthy with fire.

MARGO We didn't mow the grass. We burned it.

ROBBINS:

MENAKA They burned land carefully and slowly, a little bit at a time. And they set fires in very specific places so that the
WILHELM: fires would naturally end at a stream or a path or a shaded area. Big trees could survive these calm fires, but
these burns cleared out grass, brush, and dead plants. So wildfires work differently then too.

MARGO A wildfire that may have been started by lightning, it wouldn't go that far.

ROBBINS:

MENAKA Remember that triangle of things that you need to start a fire? You need fuel, heat, and oxygen. And it's pretty
WILHELM: much impossible for us to control the heat or the oxygen in a forest like California's. They're just always going to
be there. But routine burning kept the fuel part of that triangle in check. With less fuel, fires didn't get so big, and
they didn't travel so far. So that worked for a long time. But about 150 years ago, these routine burns stopped.

SASHA The United States of America's government decided that we were going to put out all fires as fast as possible.

BERLEMAN:

MENAKA That's Sasha Berleman. She's a fire ecologist who also works on using fire to keep the land healthy now. She
WILHELM: says as European-Americans invaded the western part of North America, they ignored how Indigenous tribes
tended the land.

SPEAKER 3: We'll use the trees as we please.

SPEAKER 4: The skies will be smoke free.

MENAKA And in every year without fire, more grass and brush and little trees grow. And that means more fire fuel building
WILHELM: up on forest floors.

SASHA The forest isn't getting cleaned, and it's just accumulating more and more trees, more and more downed
BERLEMAN: vegetation, and that resulted in just very flammable and vulnerable, stressed out forests and landscapes.

MENAKA So if a fire did start in these woodlands, it would spread very, very, very fast. And on top of that, climate change
WILHELM: makes fires more likely too because it doesn't just heat things up. It changes weather patterns. So we have longer time between rains, but then, sometimes, we have more rain all at once, which means more grasses and small trees grow until long hot dry summers crisp them into fuel.

SASHA So this is kind of making all of the weather patterns more extreme. Then it's lengthening the overall fire season.
BERLEMAN:

MENAKA So the way that we treat forests and climate change are working together to make these bigger fires more often.
WILHELM: But there are ways we can keep ourselves safe when fires burn, and we can do a better job of caring for the forest, too. We'll hear more about that after the break.

[MUSIC PLAYING]

MOLLY BLOOM: Sierra, before we move on, we've got some very important business to take care of.

SIERRA: Walking the hamsters? Unclogging the hot sauce fountain? Getting Mark's gravity pants down from the ceiling?

MOLLY BLOOM: No, though remind me to do all of that later. Right now, it's the--

[SHH]

[DING]

CHILD: Mystery sound.

MOLLY BLOOM: Here it is.

[ENGINE ROARING]

[CRUNCHING]

So what is your guess?

SIERRA: Was that an airplane?

MOLLY BLOOM: Very good guess. Did you hear anything else happening?

SIERRA: I kind of heard gravel crunching in the middle.

MOLLY BLOOM: Very good guess. We will give you another chance to hear it and guess and have the answer in just a bit. So stick around.

We're doing an episode about teeth and, of course, we're going to talk about everyone's favorite tooth snatching magical being--

SIERRA: The tooth fairy.

MOLLY BLOOM: The traditional tooth fairy leaves kids some money for teeth, but if you took over the job, what would you leave under those pillows? Sierra, what do you think?

SIERRA: I'd leave good books.

MOLLY BLOOM: Oh, I love that. Any particulars?

SIERRA: Whichever that kid wants.

MOLLY BLOOM: So you kind of know what that kid needs to read at that moment in their life?

SIERRA: Yes.

MOLLY BLOOM: I love that. Well, listeners, we want your answers, too. Tell us what you'd leave behind if you were the tooth fairy.

SIERRA: Record your answer and send it to us at brainson.org/contact.

MOLLY BLOOM: You can send us questions there too, like this one from Holly in California. She wanted to know is the name of a letter considered a word?

SIERRA: We'll answer that at the end of the show.

MOLLY BLOOM: Plus high fives to the latest group of Brains honor rollees.

SIERRA: So keep listening.

MOLLY BLOOM: You're listening to Brains for American Public Media. I'm Molly.

SIERRA: I'm Sierra.

MENAKA
WILHELM: I'm Menaka. And I'm back with ways to keep the forest healthier. Part of that is going back to where we started this episode, when Margo told us the Yurok story of where fire came from.

MARGO
ROBBINS: [INAUDIBLE] spirit beings went and stole it for the people to use. And we're at that time where the people need fire again.

MENAKA
WILHELM: Margo and Sasha both work on doing something called prescribed burning. That's when you start a fire on purpose to get rid of all that extra fuel before it becomes too dangerous. So they start by taking a look at land to see how it's doing, how well plants and trees and animals are doing in a space.

SASHA And so we go out there. We make that assessment and then we write a prescription-- hence prescribed fire--
BERLEMAN: around what conditions we would put fire on the ground in. And then we go out there with a group of trained people, and then we will put fire on the ground in a really methodical way that we know we can control to improve the health of the land.

MENAKA They only burn when conditions are just right-- not too windy with a little bit of moisture in the air. They use tools
WILHELM: to scrape the ground so that there are lines of bare mineral soil. That acts kind of like a wall, so it'll stop the fire from spreading so the fire stays where it's supposed to.

SASHA And so we carry fire a little bit at a time across the landscape so that the animals can move out of the area or
BERLEMAN: underground or go up into the trees, and so we can maintain that really close bond with the fire that we're putting down on the ground.

MENAKA And they're hopeful that, in time, clearing the land this way will keep these ecosystems healthier. They won't fill
WILHELM: up with too much fuel. And if a fire does start, it'll be a less dangerous one.

MARGO The land depends on people to use fire to take care of it, and the land, in turn, takes care of us.
ROBBINS:

MENAKA People took good care of these lands for a long time. And hopefully, we'll do a better job of that in the future.
WILHELM:

MOLLY BLOOM: So, Sierra, you mentioned that day in September where the sky was that very-- how would we describe it? What's the adjective for that orange color of the sky?

SIERRA: Surreal. It's kind of creepy and unreal.

MOLLY BLOOM: It's not something you would imagine seeing in real life.

SIERRA: Yeah.

MOLLY BLOOM: Surreal-- that's a really good answer. Yes, so that surreal orange-reddish color. And the reason it was like that-- you were curious about that too-- is it has to do with sunlight. So sunlight looks white, but it's actually a light that's a mix of every color. And during the wildfires, all the bits of smoke in the sky were absorbing and scattering blue light. So what came through was just that orangey red light. Very surreal.

Even if you are pretty far from the fire itself, its smoke can still reach you, so it's important to pay attention to the air quality during fire season and stay inside when it's necessary. And speaking of staying inside, it's time for house lessons, starring our pals Anya and Amar and a talking house.

[MUSIC PLAYING]

AMAR: Coach Sam was being so mean at practice today. He made us run 10 laps around the soccer field-- 10 laps.

ANYA: What?

AMAR: I know. It doesn't make any sense. We're the math team. When are we going to need to run.

ANYA: Ah, I hear you. Want to watch some cartoons?

AMAR: Yeah, sure.

HARRY: Hey, kids.

ANYA: Ah! Who's that?

HARRY: It's me, Harry the house.

ANYA: Why is our TV talking to us?

HARRY: I'm not just your TV, silly. I'm your entire house. This is just the way I'll be speaking with you both today.

AMAR: I'm still pretty freaked out.

HARRY: How about some soothing bassoon music?

[BASSOON MUSIC]

AMAR: OK, that's a little better, but why are you talking to us anyways?

HARRY: Well, you guys have spent a lot of time inside this year, and I've loved all of it, especially watching your parents learn to cook. I remember the New Year's Eve popcorn disaster.

ANYA: Don't remind me. I'm so picking out stale kernels from our couch to this day. Ugh, I found another one.

AMAR: Ooh, give me that.

[CRUNCH]

HARRY: So obviously, the pandemic was the biggest reason you were inside, but there's something else that also requires staying indoors and spending more time with me.

ANYA: And what's that?

HARRY: Well, do you remember seeing those big wildfires on the news?

AMAR: Yeah, I remember. It looked really scary, especially when the sky turned orange.

HARRY: Yep, that orange color was caused by wildfire smoke.

AMAR: Ooh, like when dad put the chicken pot pie in the oven for too long last week.

HARRY: Exactly, except wildfires are way smokier. That's actually what I wanted to talk about. You see, that smoke can be pretty unhealthy for you. It can make your eyes all itchy and red and even make it hard to breathe. Luckily, your old pal, Harry the house, is here to protect you. I can be your shield against the smoke.

AMAR: Wow, that's good news, but how?

HARRY: It's easy, just hang out with me. Close all my doors, windows, and other openings. That'll block the smoke from getting in. Oh, and don't forget the doggie door in the back.

ANYA: Of course. We won't forget.

HARRY: Great. Next, if it gets really smoky out, you can set up something called a clean room.

AMAR: Oh, you mean like how I need to pick up all the clothes and books on my bedroom floor?

HARRY: No, but also yes, go do that. I hate being messy. But by clean room, I mean a room in your house-- a.k.a. me-- that keeps smoke levels as low as possible. It's a room where you seal everything up, then run air cleaners and fans to keep that air sparkling fresh. You want your clean room to be big enough for your whole family but also not so big that it can't be easily shut off from outside air. Think of it as a secret headquarters for your house, where your whole family can gather if there's too much smoke outside.

AMAR: Ooh, I like that idea. We can all be special agents against the evil Doctor Smoke.

HARRY: Exactly.

AMAR: I don't know if we have a portable air cleaner, though. Is that OK?

HARRY: That's OK. If you're in a pinch, you can make your own by duct taping a pleated air filter to the front of a box fan. It should work pretty well.

ANYA: OK, that all doesn't sound too bad. But what do we do, then? Just sit there?

HARRY: You can do lots of things, but try to stay away from really physical activity. You don't want to work your heart and lungs too hard, especially if smoke is already trying to hurt them. Maybe play some board games, have a costume contest, draw aliens or sharks, or alien sharks, or read a book. The bookshelf next to me has been looking rather dusty recently.

AMAR: Can we watch cartoons?

HARRY: If you'd like, but make sure to also check on the news and local updates for air quality or get an air quality app for your phone. That way, you'll know when it's safe to go outside again. Oh, and no hard feelings if you need to evacuate. I give you my blessing to leave my warm embrace and find a cleaner air shelter or stay at your aunt's house upstate. I know she's always prepared.

AMAR: Thanks, Harry. You sure know a lot for house.

HARRY: Yeah.

AMAR: Oh, and sorry I drew on your walls when I was a kid.

ANYA: Oh, there's no worries, and it's truly my pleasure.

[CLEARING THROAT]

Just tell your parents to go easy on the garlic powder next time.

AMAR: See ya.

MOLLY BLOOM: OK, let's listen to that mystery sound one more time. Are you ready?

SIERRA: Yes.

[ENGINE ROARING]

[CRUNCHING]

MOLLY BLOOM: So what are your new thoughts?

SIERRA: Well, I definitely still hear that airplane, but now I also hear a construction site. I can hear the rocks getting jumbled. And I also can hear a thunderstorm, with the thunder kind of ripping through the sky.

MOLLY BLOOM: Very good. Yeah, there's a lot going on there. Well, here with the answer is Brains On producer Sanden Totten. Hi, Sanden.

SANDEN Hey. That sound you just heard was an airplane dumping fire retardant. So you were really close.

TOTTEN:

MOLLY BLOOM: Nice work, Sierra.

SIERRA: Yeah, I definitely heard the airplane there.

SANDEN Yeah, I think that gravel sound you were talking about, or maybe the thunderstorm, that rumbling, that was this liquid fire retardant kind of falling out after the airplane had passed, kind of like it was dumping it all across this big empty field. They were actually, when I recorded this, they were testing a new plane to see how well it scattered that fire retardant. And I recorded it by putting my microphone into a bucket and then running off to a safe distance to watch as this orange goo just splattered all over the test site.

TOTTEN: This kind of goes back to your original question about how fires are contained. Fire retardant is part of how firefighters do that. But when I talk about fire retardant, Sierra, do you know what that looks like? Have you seen this stuff?

SIERRA: No, I haven't.

SANDEN Sometimes you see it on the news. You'll see pictures of airplanes flying by and sort of dumping what looks like a sort of bright orange slime, or maybe like a big vat of carrot juice or melted orange crayon. It's mostly made of this stuff called ammonium phosphate, and there's a really good reason it's orange. And I want you to try to guess. Why do you think they make it orange?

SIERRA: I honestly have no idea.

MOLLY BLOOM: Hmm, orange-- is it because the fire will see the orange and think the fire is already there, so it'll turn and go the opposite direction.

SANDEN Oh, wow, that's genius, Molly. That's not the answer, but that's a great answer. Actually, the reason it's orange-- it helps firefighters know where they dumped it. So when you're flying really high above a forested area and you're trying to put this fire retardant down, you want to be able to see where you put it and maybe where you need to put more or where you've already sort of laid it down. And if it's bright orange, then you can easily spot from above and say, oh, we already covered that area. The way this stuff works, this liquid retardant-- it doesn't really put out fires so much as it stops them from spreading. And the way it does that is really cool.

So picture this-- a tree gets slimed with this ammonium phosphate thanks to an airplane flying above. It falls down-- splat-- covers the whole stretch of trees there. Then, when a fire comes near-- sizzle, sizzle, crackle, crackle, I'm going to get you-- so then the fires come in here to this orange covered tree, the heat from the fire actually creates a reaction in that goo. It makes the ammonium phosphate in the slime turn the woody material of the tree into an almost pure form of carbon. So think of something like maybe a diamond or graphite.

And get this-- pure carbon doesn't burn. So the fire will reach an area covered in this goo, and the heat from the fire will create this reaction, and then, suddenly, the fire has nothing to burn there. Everything was sort of turned into a fireproof shield. And the fire is out of fuel. Pretty cool, right?

SIERRA: Yeah, that's really interesting.

MOLLY BLOOM: Wow. So when that happens to a tree, can it keep growing afterwards?

SANDEN Yeah, it kind of turns the outside of the tree or the plant sort of into this charred, black material, but I was told by
TOTTEN: firefighters that if you just peel that away, the tree's fine underneath there and it's still growing. So it just kind of grows a second skin of this kind of carbon material that will stop the fire, and then later, that'll just kind of slough off, and then the tree can continue living its tree-y life.

SIERRA: Wow, that's amazing.

SANDEN And this is just one of the many tricks firefighters have to try and fight these growing wildfires. The classic thing--
TOTTEN: you throw water on a fire-- firefighters do that too. Sometimes, they can use the plane and take water from a lake or a reservoir nearby and dump that on a big fire or soak an area to make it less likely to burn. So that helps too.

And they can also block fires in other ways, like they can dig up the plants and trees in an area. And that way, when the fire gets there, it'll find a large stretch of dirt where there's just nothing to torch. So the trees on the other side of this dug up dirt-- they'll still be safe, and the fire can't really get to them. Now if you surround a fire with a border of this kind of dug up dirt area, it's kind of like putting a fence around the fire that'll keep it contained.

MOLLY BLOOM: That is so cool. So if an area burned recently, can it burn again?

SANDEN Actually, not as easily. In fact, you remember those prescribed burns Menaka was talking about? After a
TOTTEN: controlled burn in an area, that area is way less likely to burn again because most of the good fuel was already used up. So every time we do these prescribed burns, we're creating more zones that could block future fires from spreading too far. So yeah, wildfires-- they're getting more intense for sure. But we're also learning a lot about how we can fight them, how we can contain them, and, hopefully, how we can stay safe from them

MOLLY BLOOM: Thanks for all this info, Sanden.

SIERRA: Yeah, thank you.

SANDEN No problem. All right, talk to you all later.

TOTTEN:

MOLLY BLOOM: Bye.

SIERRA: Bye.

Wildfires happen when areas like forest or grasslands burn.

MOLLY BLOOM: They're natural and important for forests, but climate change is expected to make them bigger and last longer.

SIERRA: We can help forests by doing smaller prescribed burns, which helps cut down the amount of fuel for fires.

MOLLY BLOOM: And when it's smoky out, it's good to stay inside and filter the air as best you can.

SIERRA: Firefighters can contain fires using retardants, water, and by removing potential fuel for the fire.

MOLLY BLOOM: That's it for this episode of Brains On.

SIERRA: Brains On is produced by Molly Bloom, Menaka Wilhelm, Marc Sanchez, and Sanden Totten.

MOLLY BLOOM: We had production help from Ruby Guthrie and Christina Lopez and our intern is [INAUDIBLE]. Special thanks to Dr. Rebecca Miller, Nicole Molinari, Amy Windsor, Jennifer and Josh Ellman, [INAUDIBLE], Sam Rounds, Finn Haryu, [INAUDIBLE], and Scott [INAUDIBLE].

SIERRA: Before we go it's time for our Moment of "um."

[CHORUS OF "UM"]

MOLLY BLOOM: Today, we're answering this question from Holly. She wants to know is the name of a letter considered a word?

ARIKA OKRENT: Well, I love this question because it gets at something very subtle and important about language, and it shows the wiggly edges of the concept "word," which it seems like it should be a pretty clear concept. Hi, I'm Arika Okrent. I'm a linguist, and I write about language. And I have a new book out called *Highly Irregular-- Why Tough, Through, and Dough Don't Rhyme and Other Oddities of the English Language*.

Now first of all, the answer is yes. The letters of the alphabet, as we say them, are words. But at the same time, there's something else. They're also symbols. So when we say A, we are using the English spoken word for a symbol. And you can think about other symbols we use in writing, like a comma, for example. We wouldn't say that tiny mark on the page is a word, but we have a word for it, and that word is comma. So the letters of the alphabet are symbols. We make written words out of them. But we also have names for those symbols, and those names are English words.

And we know they're words because the word for the same symbol will be different in different languages. So we say A, B, C, D, E, F, G. But in French, they say, Ah, Eh, Se, De, Eu, Ef, Geh. Now A and Ah are different words. One is an English word. One is a French word. But they're both words for the same written symbol.

We have the word ampersand, but when we see it on a page, we say and. Hash the symbol that we see everywhere-- the hash tags. That's called an octothorpe. And I think that's a fun name that we don't use very often. So sometimes, there's fuzzy edges between are we talking to a symbol? Are we talking the word for the symbol? And how do we read out this symbol? Those are all different things.

MOLLY BLOOM: These names spell awesome. It's time for the Brains Honor Roll. These are the incredible kids who share their drawings, mystery sounds, questions, and high fives with us.

[LISTING HONOR ROLL]

We'll be back soon with more answers to your questions.

SIERRA: Thanks for listening.