But Why: A Podcast for Curious Kids

What Happens To The Forest After A Fire?

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[Jane] This is But Why: a Podcast for Curious Kids from Vermont Public Radio. I'm Jane Lindholm. On this show it's your job to determine what we investigate, sending us questions. And it's our job, mine and Melody to help guide you to the right information.

Sometimes that information comes, at least in part, from you, our question askers. Take today's topic, we're going to be discussing forest fires and some of you listening have experience with this and maybe some advice you can even share with everyone else. Let's start with this question we got from Abby.

[Abby] I am five and a half years old and I come from Australia, Canberra. I want to know what happens to the forest after a big fire?

[Jane] Forest fires or bushfires, as they're typically known in Australia, happen when a fire burns out of control. Sometimes it's a fire started by people. Sometimes it's caused by lightning. And these fires can become very big problems when there's a lot of dry vegetation like trees or grass. That vegetation, those plants act as a fuel. And these fires can get very large and very dangerous.

While forest fires can happen almost anywhere. Some parts of the world are more prone to them than others because of weather conditions and landscape. Many parts of Australia experience wildfires or bushfires. The end of 2019 and the beginning of 2020, summertime in the southern hemisphere was a particularly bad fire season in Australia.

Millions of acres burned. Homes and buildings were destroyed in some areas. And very sadly, some people and many animals were killed. So, when Abby recorded that question from Canberra, her Mom sent it along with a note explaining that they lived very near to where some of the fires had gone through. So, I asked Abby if she'd be willing to share with all of us what it was like to experience that. I sent Abby a few questions back in February, and here's what she and her mom had to say.

[Abby and Megan] Hi there, it's me, Abby, and Abby's mom, Megan. All right, Abbie, are you ready? Yes.

[Megan] Okay, question number one. How did you know the forest fires were nearby? Did you see any changes in the sky? Did the news or adults tell you about it?

[Abby] The news told us about it.

[Megan] What did you hear on the news?

[Abby] Well, we saw, we heard the bushfire survival stuff.

[Megan] So we had to be prepared.

[Abby] And make a bushfire survival plan.

[Megan] What else did you hear?

[Abby] Well, we saw lots of smoke.

[Megan] We did see lots of smoke. What else did you see when the fires were close? What did you see in the backyard?

[Abby] We saw black leaves in the backyard.

[Megan] Hmm. Number three, did you have to leave home for a little while to be safe?

[Abby] I did have to leave home to be safe.

[Megan] Why?

[Abby] Because of all the fires. And my mommy and daddy were a bit scared if I was not going to be okay.

[Megan] That's right. So, what do we have to do?

[Abby] We had to make me leave home.

[Megan] Yeah. And that was part of what?

[Abby] A bushfire survival plan!

[Megan] Yeah. Number four. How did you feel when the fires were nearby?

[Abby] I was a bit scared. I was the scared that the fires would make my house fall down. I wouldn't have any toys left.

[Megan] What do we say now. What does it look like where the fires were? Is there still fires around?

[Abby] There's a little bit of fires around, except not much. They are under control.

[Megan] That's right. They're under control. So, what, what does it look like now out in the bush?

[Abby] It looks that no smoke is coming.

[Megan] Yeah. What are you noticing though in the forest?

[Abby] Well, everything is all burnt out.

[Megan] It is. What do the trees look like?

[Abby] They look burnt and they have it leaves on the branches,

[Megan] Just the branches? I notice some on the trunk as well. Did you notice leaves on the trunk? What do they look like?

[Abby] They look very tiny. And one of them looked fuzzy.

[Megan] The trees did look fuzzy. What about the animals?

[Abby] The animals were coming out when there was lots of fire because they were a bit worried if they would touch it.

[Megan] Yeah. What did we see?

[Abby] Well, some Koalas died.

[Megan]That's right. What do we see on the road?

[Abby] We saw a Wombat on the road

[Megan] In the city. They shouldn't have been there, they should have been in the bush, right?

Yes, but some men took him and made him safe.

[Megan] That's right. I think that's it. Thanks, Jane. Hoped this really helped. Bye. Bye.

[Jane] Wow, that was quite a thing to live through when you're only five. Thanks to Abby and Megan for telling us about what it was like. It's really sad to think about koalas and other animals not surviving the fire, but I'm glad that Wombat was rescued.

It was also interesting to hear Abby and Megan talk about what they were noticing. Pretty soon after the fires had come through that there were green plants and leaves popping up where things had burned. That's a great observation because it helps explain one of the reasons that forest fires can actually be good in many ways. They're a natural part of the ways some landscapes thrive. We're going to talk more about that and get a deeper answer to Abby's question about what happens to the forest after a fire in a little while. But first, let's learn more about what causes wildfires and how humans tried to prevent or control them.

[Hawken] My name is Hawken and I am six years old, I live in Sunnyvale, California and my question is why do forest fires happen?

[Jane] We found a really interesting person to talk to about this.

[Ernesto] I'm Ernesto Alvarado, I am a university professor on forest fires at the University of Washington in Seattle, Washington. Working on forest fires was my first job out of college back in 1980.

[Jane] Ernesto grew up in Mexico and after college he got a job as a firefighter in the northern part of the country near the border with the U.S. states of Arizona and Texas. So, he spent a lot of years learning how to get forest fires under control and to protect people, buildings and animals from the fires.

And then he went on to study more about fires and teach other people about them, which is what he does now. One of the most important things to understand about wildfires is that, as I mentioned, they're a natural part of the forest ecosystem. The way a forest or landscape lives and grows.

[Ernesto] It’s a natural process in the most of the forests of the world and savanas to maintain the health of those and the productivity of those ecosystems.

[Jane] When Ernesto says it maintains the productivity of those ecosystems, he's talking about the natural process that forests go through to stay healthy. When vegetation burns, it helps get important nutrients and energy back into the soil more quickly than natural decomposition, when plants and trees rot and turn back into dirt. So even though some things burn, that can actually help make the forest healthier by giving new plants important energy to start growing again and other plants can grow that were crowded out by the trees that were there before the fire. Wildfires have always been part of a healthy landscape even before humans came around.

[Ernesto]That one goes back to four hundred million years. That's where they were no people. Just plants and oxygen. And you had lightning. So those lightning strikes will start a fire when the conditions were proper, there were no people, so you have the natural fires.

When humans appeared on Earth they learned how they might have to control fuels, how to control food production. And that's what we call the second fire. That's the anthropogenic fire.

[Jane] Anthropogenic is a big word, but it just means something that happens because of humans and human activity. So, if the earliest fires were started by lightning, humans eventually learned how to start fires themselves and how to control them. And so, fire went from being something that occurred only naturally under the right conditions to something that could be used and controlled by humans, anthropogenic fire.

Fire is an extremely important tool for human existence. It's given us warmth, the ability to cook food. It sometimes gives us light and many other things that have helped us become very powerful animals. One of the other ways people have used fire for thousands of years is to help grow crops. The ashes from a fire can kind of act like fertilizer or Ernesto says this type of agricultural practice was something he experienced growing up in Mexico in a family of farm workers.

[Ernesto] When I was growing up, around five, ten years old, I had to help my parents and my grandfather's to be in the land. So, we were burning after clearing the land, but also after the opening those lands for agriculture at the end of the growing season in the fall, we will go and burn all agricultural residues.

[Jane] When Ernesto says his family used to burn all the agricultural residues. He's talking about the plant stocks and other vegetation and stuff that wasn't harvested when the crops were ripe. Burning helps get rid of those parts of the plant that aren't used for food and then the ground is able to use the ashes from the fire. As I said, kind of like a fertilizer and it can help make the land even more ready for plants next growing season.

Fires also sometimes used to clear a landscape so you can start farming on it. There are other kinds of fires, too, and you might want to go back and listen to our earlier episode

that discusses what fire is and how firefighters worked to protect people from building fires. We're going to focus only on forest fires today, but I still think it's probably important to know a little bit about fire in general.

[Lydia] My name is Lydia and I am five years old and I live in Tacoma, Washington. And my question is, how does fire burn stuff?

[Amy] Hi, my name is Amy, and I'm six years and I live in Colorado. And my question is, um, um, how does fire like burn?

[Ernesto] There are three things for a fire to happen. One is, we need something to burn, fuel that is dry and available for burning. What is fuel? Well, fuel could be grasslands, could be grasses, could be a forest, could be a tree, could be anything that burns. We also need oxygen and then we need to keep that fuel, has to reach a temperature of about five hundred and forty degrees or 300 degrees Celsius.

So when you combine the fuel that is available for burning enough oxygen and those high temperatures then you get a fire.

[Bode] I'm Bode, I'm four years old and I live in Burlington, Vermont. The flames in houses that have fire at it, does the flames go to different houses?

[Jane] So Bode wants to know if a house is burning, do the flames jump to other houses and cause those houses to burn? And Ernesto says it's not actually the flames necessarily, alone, that would make another house start to burn its heat. So, if a forest fire or really any kind of fire is burning nearby, the most important factor in whether other houses will start to burn is if they get too hot. Because remember, Ernesto said three things are needed for a fire, oxygen, fuel and heat.

[Ernesto] So it's not the flames, it is the temperature from the house that is burning getting to the next house, so you have the heat house-to-house and also you have sparks flying from the forest or from the houses to other houses.

That is why it's very important urban planning in how far the houses are, if you have the houses close to each other and one house is burning, that one, the heat from that house is going to ignite the next house and once the next house is burn, it is going to go on to the next one and on and on.

[Liam] My name is Liam, I am four years old. I am from San Diego. And my question is, how do I run out of a fire?

[Eliana] Hello, my name is Eliana and I am seven years old and I live in Tacoma, Washington. And my question is, how does water and sand put out fire?

[Jane] Remember how, Ernesto told us that you need three elements for a fire, fuel, oxygen and heat. So, to put out a fire, you need to make sure the fire can't get enough of at least one of those elements when you dump sand on a fire it smothers it and it prevents the fire from getting enough oxygen. Water can actually do the same thing and water can also cool things down, so the fuel isn't hot enough to burn.

Now, it is important to remember that water doesn't put out every kind of fire. If oil is burning, for example, water won't work to put it out.

And bottom line, if you see any kind of fire, you should tell an adult right away and have that adult take care of the fire.

In just a minute, we'll talk more about how people fight forest fires. And we'll learn from some kids who have experienced what it's like to live through a fire.

[Jane] This is But Why: a Podcast for Curious Kids. I'm Jane Lindholm. And today we're learning more about wildfires. Professor, firefighter and wildfire expert, or Ernesto Alvarado is helping us understand both the danger of forest fires and the value.

I asked him to talk about some of the ways people fight wildfires. He told me the first step is to prevent them in the first place. But once a forest fire starts, a key piece of the puzzle is finding a way to detect it, to know that it started because people don't always know about a forest fire right when it starts. If it was sparked by lightning, there might not be any people anywhere around it to notice.

Sometimes fires are started by people who might be leaving a campsite, for example, and they didn't fully put out their campfire. But they might not know the fire is still smoldering when they leave. So, they don't necessarily know that it has started a forest fire either.

So, the first step is detection or discovery. And Ernesto says sometimes people who watch out for wildfires use satellites, drones or planes. If you like to hike in the woods a lot, you might have come across a fire tower at some point. Before drones and planes and satellites, people used to monitor their surrounding forests and hills by climbing into the fire towers to keep an eye out. For some people, that was their whole summer job. They did it for the whole summer. Once a fire is discovered, firefighters will head out to assess what action might be needed. Sometimes these firefighters jump out of airplanes to go fight the fires. These firefighters are often called smoke jumpers. Other fire crews might head to the scene in trucks or other vehicles.

[Ernesto] Once the fire goes out of control, then or is growing, then we use not just people, crews will use the equipment, like bulldozers or fire engines dumping water. Or if it is threatening neighborhoods or homes, or valuable resources, they are fought with airplanes, dumping water mixed with fire retardant on forest fires with helicopters or with airplanes.

[Jane] It can take lots of time and lots of people, money and equipment to get a wildfire under control. And sometimes if a fire comes close to where you live, you might need to leave your home to stay safe, like Abby from Canberra, Australia, who we heard at the beginning of the episode. She and her family came up with a bushfire survival plan. So, they were prepared when they had to leave. They knew what to do to make their house as safe as possible. And they knew how to get out quickly and get to a place they'd already decided where they knew they could be safe. It might be a good idea for your family to come up with a fire plan whether you live where there are forest fires or not. We wanted to hear from some other kids who've had to deal with this. So, I sat down in March with two Vermonters who used to live in California and agreed to talk with me about their wildfire experience.

[Emma] I'm Emma and I'm 14 years old and we live in Waterbury Center, Vermont.

[Liam] Hi, I'm Liam. I am 10 years old and I live in Waterbury Center, Vermont.

[Jane] Where did you live before Vermont.

[Emma & Liam] Santa Rosa, California. It's about an hour north of San Francisco, lots of vineyards and hills, and it's pretty close to the ocean.

[Jane] Emma, tell us a little bit about the most recent fire that you experienced when you were living in Santa Rosa and what it was like as the fire started and you started to hear about it.

[Emma] So I think I first heard about the fire, or I don't know when I first heard about it, but one night my mom woke me up and it was really, really late at night. And she told me to get all my stuff together and like some clothes and then put them in the car and then come help her get the animals. We had lots of animals at the time. And so, it was really scary because I knew we would be able to just get in the car and leave. But we had lots of animals. We had chickens and quail and rabbits and guinea pigs and cats and dogs. So, I was worried just for them that we wouldn't be able to get out in time with all of them.

[Jane] And did you get out in time at all?

[Emma] Yeah, our house wasn't burned, but it was really smoky. And we you could like see the red in the sky and there was like ash falling and stuff. But we did get away and we stayed at our friend's farm for like a week. But our house wasn't burned. It was fine.

[Jane] Liam, what was it like to be woken up in the night and realize you have to get your stuff and go?

[Liam] It was very like I had to make a switch from, like, packing for, like, we're going to go to a hotel. Are then giving my most prized possessions that I would rather take. And it was very hard to change to get like the stuff that was packed away.

[Jane] Yeah. You're not thinking about pack some clothes. We're going on vacation. You're trying to think about what are the things that you want to make sure you have. If your house doesn't make it right.

[Liam] Yeah.

[Jane] What did you decide was most important to you?

[Liam] Like some of my old toys that I've had for like a long time and a few other things that, that were really special to me.

[Jane] What toys?

[Liam] I don't know, there were like a few toys that I like, even forgot I had. But my mom had kept from when I was like one or two.

[Jane] And when you were thinking about that mind switch from, you know, packing for a hotel to take the things that you want to make sure you have, you said that was a hard switch in your head. Why? What was hard? How did you get to, you know, how did you make your mind do that switch or what was hard about it?

[Liam] It was kind of hard like that, all my things might not make it, so what I take I'm going to have.

[Jane] Was that scary?

[Liam] Yeah.

[Jane] Was it scary for you Emma?

[Emma] Yeah. I had always kind of thought about cause we knew there was fires there and so it always kind of thought about what I might take if something happened. So, I had some special things that I took. And then we brought a lot of photographs from when we were little. And I was just mostly focused on getting the animals out and less like stuff. But I knew we weren't going to be able to stay at a hotel or anything with all the animals. So, I brought a lot of, like, outdoorsy kind of clothes and stuff like that.

[Jane] So how were your animals reacting? You said you had quail and chickens and at least one cat. Right? And the and dogs and other animals?

[Emma] they were definitely freaked out at being woken up in the middle of the night. Our dog was like, yeah, we're going on a trip and tail wagging. Yeah. And our cat, one of our cats, we couldn't find her. We had two cats and one, we just got her in a crate and she was fine. The other one got away and she was hiding under the house and it took her it took us a long time to find her. We were like about to pull out of the driveway when we actually finally saw her come out. And we. But she did. We got her and she did come with us. But it was really hard, we didn't, it's kind of hard to put chickens in a car. So, we had to, like, put them in boxes or something. And they were totally freaked out. And the quail and stuff. But they were all, OK, we've got to stay at a farm. So that was better.

[Jane] And you fit all of this Liam, you said, in two cars. Two cars. And where did you go? What was that drive like when you left?

[Liam] We went to, like, towards the coast. We had some friends that owned a cattle ranch and we stayed in the loft of their barn.

[Jane] What did it feel like to be not in your own home for a little while and staying with friends, but not able to go to your school and maybe not able to talk to all of your friends the way you might in a normal time period or in a normal week?

[Emma] It was definitely different. We're homeschooled. So we didn't we weren't like missing school. We could still do schoolwork there. And some of our other friends that lived close to us were also staying at our friend's farm. So, it was actually well, we were at the farm, it was kind of fun, like we all ran around and they had a pond and a hot tub and stuff. So, it was really nice to have a place to go that we knew, we'd been there before and everyone was really nice and we didn't really have to think about it. And we know that other people just had to go wherever, like they didn't know where it was or other places. So, we were really fortunate to have somewhere that we knew, and we'd been there before with friends and such.

[Jane] That's kind of a hard thing, isn't it? When, you know, you went through something scary and hard. But, that you also know that other kids and other families, their houses might not have survived or they didn't have a safe place to go where they could feel comfortable.

And it can be kind of difficult to, you know, to feel what you're feeling, but also to want to know how hard other people have it. How do you think about that? Because it's certainly none of it was your fault. And you're it's great to have a safe place to go. But hard to feel those feelings of maybe feeling a little guilty, too, because you didn't have it as bad as you say as others.

[Emma]Yeah, it was definitely. And we felt very fortunate that nothing happened to our house and were the area right around us. But it definitely there was a lot of places that did get burned very badly and a lot of people who had to leave their houses. And we knew a couple people, not directly or not very well, but we did, you know, a couple of people who had to, who lost their house and a lot of people who had to evacuate. So, it was very scary for everyone.

[Liam] Yeah. Like Emma said, it seem I feel very fortunate that we have, like that we had a safe place to go.

[Jane] Can you describe what the sky looked like when you were when the fires were coming closer? Because what I remember from living in Los Angeles is that the sky is kind of amazing when there's a fire coming. What did that look like?

[Emma] It was like when we I went outside to get the animals and I didn't realize I was still, like, sleepy and stuff. And I didn't realize really what was happening and how close it was. And I went outside and I came around the side of the house and the sky was like bright red and there was ash falling on everything. And for a long time, even after the fires had stopped, it was really like smoggy. And the light almost looks like reddish orange coming through the smoke. And we took a trip to come to Vermont. And when we got to Crater Lake, Oregon we woke up the next morning, we'd gotten there and it was late and the sky was so bright blue, we had, like, forgotten how blue the sky is usually, because it was so, so smoggy from the fires.

[Liam] It was so, like, amazing to see that the sky was blue, like, you think, that's like the most, simplest fact. And then when you see that it actually is, you're like, wow, the sky is blue.

[Jane]You still remember what that felt like?

[Liam] Yeah.

[Jane] So what about now? You live in Vermont now and Vermont doesn't have as many forest fires, but you've already been through something like this. So how would you advise kids who live in places where there are forest fires or other kids who just, you know, get worried about these things and want to be prepared? Do you have advice for other kids?

[Emma] If you have some really special things that you definitely don't want to lose, if you have them all in one place so you can just grab them if you ever needed to go. I had like just a box that had some special things from when I was younger in it. And so, I knew that I could just grab that and like clothes and other things and leave. And that was nice for me

that I knew that I could just leave with some things at least. We did have a little extra time because we got already and we didn't have to leave right away, but we wanted to be ready just in case we had to. But yeah, if you have all your stuff in one place and you don't have to, like, scramble around and worry about finding it.

[Liam] Yeah, that seemed very helpful.

[Jane] It sounds like you've both also talked to your parents and to your adults about what you experienced, and you can ask them questions and talk to them and tell them when you've been feeling worried or scared or just having thoughts about it. Did you find that helpful?

[Emma] Yeah, it was definitely helpful. Our dad is a newspaper reporter, so he had to cover and write stories about a lot of the fires and stuff. And so, it was really nice to have someone who knew a lot about it to talk to.

[Liam] Yeah, that was very nice.

[Jane] What's your favorite thing about living in Vermont so far?

[Emma] I like the snow. Cause there wasn't any snow where we lived before and we didn't get to visit it very much. And now I'm learning how to ski, Liam is learning how to snowboard. And so that's really fun.

[Liam] Yeah, it's very fun.

[Jane] Thank you very much to Liam and Emma for telling us about your experience. It's really helpful to hear you describe what it was like in your own words.

[00:29:52] Before we end this episode, I want to go back to where we started with Abby's question about what happens after a forest fire. Remember how we talked about the fact that fire is actually a natural part of a healthy ecosystem? Those green shoots on the trees and coming out of the ground that Abby and her mom noticed are evidence of why this is a natural part of a healthy ecosystem.

Wild land fires helped clear the land of decaying trees and plants so new ones can grow. The ash from a fire acts like a fertilizer, making the soil more nutritious for new plants. And some plants and animals actually rely on fire for their life cycles. Some species of pine trees, for example, have seeds in pinecones that are encased in resin. So, they're covered in that sticky stuff that slowly drips from the pine trees. I hate to get it on my hands. And these seeds need the resin to burn off in a fire before they can go into the ground and sprout into new pine trees.

Other plants stay underground, not growing at all until a fire sparks their growth. Those trees with the sprouts coming out of the trunk and branches that Abby's mom mentioned, they might be eucalyptus trees. Eucalyptus trees have special buds under the bark of the tree. So, when the fire is gone, the tree can send out new branches from buds that were protected from the flames.

So, while forest fires can be disasters for people and animals, we also need to balance our modern idea of wildfires being the enemy with an understanding of how they work in the ecosystem. And we kind of need to find a way to live with fires.

We need to keep fire in mind when we build buildings and new towns. And we need to learn more from indigenous communities that have figured out the value of fire and how to exist alongside it and have lived on this landscape for thousands of years. That kind of coexistence with fire is happening now in a lot of places where wildfires are common. In some cases there are now what are called prescribed burns, where fires are set intentionally and safely to help mimic the natural cycle of fire and growth. Remember, that's often been used in farming practices, but sometimes it's actually used to help protect communities from a fire that might burn out of control if it's prevented for 100 years.

Whereas if you have smaller fires that are well controlled every 10 or 20 years, you can make things safer for people who live in the area. Ernesto Alvarado says, we humans also need to rethink our relationship to the rest of the plant and animal kingdom. If we want to live in harmony with the landscape.

[Ernesto] People need to learn how to live with fire. Well, let's back up a little. We need to learn how to live with nature, not just fire, any process. We, we have to become, how do you call it, indigenous to the land. Where you arrive to a place, you have to develop the likeness, you have to love the ecosystem of the forest. Instead of bringing your own values, instead of bringing your own way of seeing nature. Accept nature the way it is.

[Jane] Accept nature the way it is. Let's leave it there for this episode.

Thanks to Ernesto Alvarado at the University of Washington, to Abby and her mom, Megan in Canberra, Australia, and to Emma and Liam here in Vermont for helping us learn more about forest fires. But why is produced by Melody Bodette and me, Jane Lindholm at Vermont Public Radio.

Our theme music is by Luke Reynolds. We'll be back in two weeks with a new episode. Until then, stay curious.