

# Episode 98: The Story Of Fire and Ecological Restoration wit...

Tue, Dec 13, 2022 11:29AM 36:42

## SUMMARY KEYWORDS

fire, burn, areas, landscape, trees, people, natural, fuels, forest, historically, habitats, rewilding, deborah, nature conservancy, restore, grasslands, wetland, carbon, grasses, ponderosa pines

## SPEAKERS

Deborah Landau, Jack Humphrey

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Jack Humphrey 00:00

We are now in the beginning of what the United Nations has declared to be the decade on ecosystem restoration. And this episode of The rewilding Earth podcast is sponsored by bio habitats a company dedicated to protecting and restoring ecosystems. Bio habitats would like you to enjoy a virtual moment along the Pecos River in northern New Mexico Sangre de Cristo Mountains. Although this river has benefited from previous restoration efforts, some reaches have still been degraded by overuse. But there is good news. The side of a new 3000 acre park along the river which is being created to better manage recreation and restore the riverine Canyon bottom lands survive this year's devastating hermits peak and calf Canyon fire. Even better thanks to New Mexico State Parks and a planning team that includes bio habitats. Ecology is front and center and its new master plan. You're listening to the rewilding Earth podcast. The most recent issue of leaf litter breathes fire. In Bio habitats Fall Equinox issue we meet conservation ecologist and prescribed burn expert for The Nature Conservancy Deborah Landau. Deborah is the director of ecological management at the Maryland DC chapter of Nature Conservancy where she's worked since 2001. Her work focuses on restoration at more than 30 conservancy preserves across Maryland and DC. She works with staff and partners to restore natural communities across the state, ensuring they're healthy and resilient in light of an uncertain climate future. Among the many restoration activities Deborah manages are prescribed burns, and she has planned and implemented more than 100 of them over the course of her career in conservation. So my background



Deborah Landau 02:12

really is in ecological restoration. So working on natural areas and trying to bring them on a trajectory towards towards a natural state, you know, we can't really move backwards, but George's natural status, I think we can get, and again and again, fire just really comes out as the most powerful and effective tool for restoring our natural areas.



Jack Humphrey 02:43

Okay, well, beavers would like to have a word.



Deborah Landau 02:47

So hydrology certainly plays an important role. And I think a large component not entirely by any means, but of the reason that we've, we're so far from the historical cycles that we used to have a fire is we've certainly altered our the hydrology of lots of our natural areas, and, and that certainly caused some areas to be drier than they should and not to burn as historically they would have. But a lot of people don't really realize how much fire plays a role in shaping wetlands as well as uplands and grasslands. And in forested systems,



Jack Humphrey 03:32

I often wonder what North America would look like had we develop with fire in mind. I mean, had we made different choices, what would our landscape look like with humans on it, but in a different way?



Deborah Landau 03:46

Right, so humans on it, but in a different way, is key. Historically, humans have been shaping our landscape with fire for for many 1000s of years, 10 or 15 1000s years, indigenous people were using fire and they had a very good understanding of how to use fire as a tool. They would use it for hunting, they would use it for clearing land, they would use it for pest control. So they absolutely understood how to manage fire and shape their natural environment to benefit them to benefit humans, using fire as a tool. And what's happened is as after European colonization, when essentially we put a stop to these very frequent fires that were occurring across the landscape, and it's it's these new humans that that arrived some 400 years ago, by suppressing that fire that has really resulted in the altered landscapes that we have today. And that's led to these catastrophic fires that we're seeing.



Jack Humphrey 05:02

One of the phrases that caught my eye in your neck of the woods is ecological fire restoration. And it sounds really cool and a heck of a lot deeper. Like it could mean a lot more than just manage burn or prescribed burn. Can you talk about that?



Deborah Landau 05:18

Absolutely. So ecological fire restoration is using the natural process that is fire which we have removed from the landscape, and bringing it back in a way that allows us to bring back the natural communities that evolved with these frequent fires. And it's tricky. In a lot of situations when we try to re introduce fire to an area from which fire has been suppressed. For decades, if not a century or more, you have to be very careful, we'll call those first entry burn. The problem

is that fuels have been building up for so long, that it's no longer a natural fire once you set that fire because there's there's too much fuel the trees are too close together, the duff has built up to this thick layer, that just bringing fire back isn't going to restore your your landscape. On the contrary, sometimes the trees that we're trying the hardest to protect, for example, on the eastern shore of Maryland, we have these big beautiful shortleaf pines that are fire adapted. But what happens is when fire is suppressed for a very long time, you build up this thick layer of duff of leaves of needles, and that coats the the top of the the roots of the trees. And so the tree starts to send in these tiny little feeder routes up into that Duff. So if your first entry burn is hot, and burns off all of that Duff, you're going to damage those feeder routes, and you might actually kill the large mature trees that you're working so hard to protect. So the first time you come in, you have to be really careful, sometimes we'll make that first entry burn, maybe just a couple of days after rain. And we'll just have a light burn to kind of start to burn off some of that dark, some of that fuel there. And then the second or third time, we'll come in with a little bit more intensity. And that's when we'll really start to open it back up. And that's when we'll really start to see the exciting fire effects like once you let in more light to the ground, a lot of the spring ephemerals will show up, or kids love fire and they'll pop out in areas that we hadn't seen them sometimes in decades after just one or two burns. Some other plants that need disturbance, such as Pitcher Plants can come back from areas where they've been extirpated. Similarly for years and years. So once you get that, that natural fire rushing going, once you've burned off those critical fuel there, then you can really see the transformation, you'll you'll kill off some trees. So you'll end up with fewer larger trees with this really amazingly diverse vegetation of components. Between them, you'll get all these grasses and forbs. And wildflowers. And that's when you really walk in and just say, Wow, look how different this landscape looks. A lot of times, you know, when we'll go for a walk in our backyard or in in what we think is a natural forested setting. It's kind of dark and closed. And there's not a lot of stuff underneath or just a whole lot of young trees. But that's not really necessarily what a natural landscape would have looked like historically. When settlers first arrived, they encountered big trees that are very far apart. They were described forests that you could try have your horse drawn carriage through, they were so open. And that's kind of the goal that we have in mind when we're bringing fire back to these fire suppressed systems. But it's a slow process and it's a careful process and you can really bungle it up. If you go in a little too fast.



Jack Humphrey 09:21

I think I might have only been in knowingly one area in the United States where fire reigns supreme unsuppressed for the most part, and that was the healer wilderness and specifically McKenna park in the heart of the healer wilderness and I can picture exactly what you're talking about. It was really strange to me growing up in the kind of forest that you described, formerly, that that was the kind of forest I thought was good, healthy forest. That was a little bit choked up from the sunlight choked off and not a lot of understory but But then I walked in and I luckily had I got to do that with Dave Foreman and Nancy Morton. And I had somebody there to explain it to me. And he talked about this. This is that it was ponderosa pines that were the biggest ponderosa pines I've ever seen. And they were really, really spaced apart. And he started talking about fire, and how that had an eye could see burn marks on bark all throughout the wilderness. And we saw recent burns. And they are in wilderness, so they were allowed to burn pretty much undisturbed. And when you describe that, that's exactly what I pictured.



Deborah Landau 10:40

Yes. So you you absolutely nailed it. That's the landscape that we feel historically, the indigenous people had shaped with fire. And yet those continuous never ending ponderosa pines that we expect to see, say when we go to a national park is not a natural situation, we shouldn't have just an endless line of trees up next to each other. With nothing in between them. It should be groves of large, beautiful pines, with open grassland in between them so that if you envision now a fire sweeping through a diverse mosaic of trees and grasses, then you can see how you'd have that light virus as it races across the grasses. And then it'll slowly push through the trees and then race again as it goes back into the open grasses. And then is really the landscape that historically we had. And that's why we had more megafauna. We had more diversity, we had more grasslands, we had so many more grasslands than we do today. And and it's bringing back that mosaic, that's key, you know, our forests were not homogenous. They were very diverse. We had that we had the wetlands, we had the grasslands, we had the forests all intermixed, and by removing fire from these natural areas, we've just created these very homogeneous situations that are not natural, and unfortunately, on almost literally Tinder boxes.



Jack Humphrey 12:25

Well, that's what I wanted to go to next. There's another place in New Mexico where I worked frequently in Santa Fe and the Sangre de Cristos, and one of the biggest Aspen organism. All anybody who's been to Santa Fe, especially in the fall is seeing the Aspen's turn bright yellow. And it's the whole face anybody's seen pictures of Santa Fe, that's one of the photographer's best pictures you can take of Santa Fe, you get an Adobe in the foreground, and then the background of the and what we were talking about in the 90s is that the fire suppression had built up so much to the point of the 90s. I don't know what's happened since then. I haven't heard of any fires. But people were calling it that a tinderbox. Some people talked about a point of no return, that the only fire that could be there, after a certain point could only be a disaster has, have we cracked the code at doing something positive and good in those situations, or is the only result after so much buildup has occurred? Disaster?



Deborah Landau 13:26

Yeah, that's a really tricky question. I am an optimist at heart. And I like to think that we're heading in the right direction, we are heading in the right direction. Every day, every year, there's a better understanding of the importance of control burns and bringing fire back to the landscape. But every day, every year, we're falling further and further behind. And it's so difficult to really effectively get fire back on the landscape at scale. And as many incredibly successful control burns as are occurring every single day, you'll get one that escapes and that's the one that makes the headlines. And that's very frustrating for fire practitioners. But we know there is hope. We are increasingly learning how to get large scale fire back on the ground. Historically, we would kind of create a box we would come in maybe with bulldozers and scratch and a fire line around the area that we wanted to burn. And then that would be the area that we would burn and that took a lot of energy and it was fairly disruptive to the landscape. But now there's a much better understanding that you can use natural barriers you can use a river you can use an existing road and burning larger areas at using these natural what historically would have been your your Fire breaks. And that's working really well. But I don't really know that how we'll be able to really get back to gain 100 years of last fire, that's a huge challenge. And when we are having these mega fires that that are making the headlines,

they're not natural fires, because those trees are so close together and the fuels have built up for so long. When those fires do occur, they're completely consuming the tree and they're just jumping from tree to tree. And they're so hot that they can actually sterilize the soil. So it can take these systems a really long time to recover, as opposed to an area that has had frequent regular burns, where the fuels are sparser. So the fire intensity is much lower, you still have your healthy soil microorganisms, you've got your Michael mycorrhizal fungi in there, you've got your seed bank. So in those situations after a burn, you get this amazing resurgence of green and of growth and diversity. So it's going to take a lot of work to get back to get these systems back to where they should be with fewer fuels with more spaced out trees with more of that grass component. At the same time, you know, we've got the added stressor of climate change, we've got longer periods of drought, we've got warmer temperatures, and that's certainly exacerbating the challenge of bringing fire back to the landscape at scale. It's certainly the case that we used to have intense fires Absolutely. And their systems when I say that most of North America is fire adapted, that can be from as frequent as the longleaf pine savannas in the southeast, which would burn every one, two or three years, to boreal forests that maybe historically would have burned every 1000 years. Everything has a fire cycle. And it's just a matter of ensuring that those cycles are met. And if if they're artificially suppressed, that's when you're really gonna start to bungle things. And you'll really start to see these these unnatural, unnaturally intense and hot and destructive fires that we're witnessing today.



17:29

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Jack Humphrey 18:07

When these things happen, the really bad burns and there's loss of property and sometimes human lives, people start talking about Smokey the Bear type stuff, like they're not talking about fire is natural. And if we would have let the natural fire regime go through these areas we probably wouldn't have built here. But we certainly wouldn't have probably also had this huge, intense hot fire. That's not the conversation that's happening after these burns, is a different conversation happening behind the scenes with public officials who know a little bit more and are exposed to people like you more often and understand things. And how do they balance that public pressure to say no more fires anywhere ever? versus what you say?



Deborah Landau 18:55

Yeah, that gets really tricky when you start to talk about humans, because what we call the wildland urban interface is when people move into these areas that historically would have had regular fires. So what's happening is yes, on one side, we're trying to increase control burns

across the landscape. But at the same time, as people want to, you know, move into nature. They're building their homes, right in these areas, which again, to them look beautiful and pristine, because you just see this continuous swath of forest without really understanding the true nature of that natural area. And then historically, it should look like that. And by having this continuous swath of trees, you're just moving into a really dangerous area. And we really can't stop people from buying land and moving where they want to, but that's increasingly going to be an issue as we try to get more fire on the ground and we try to restore these areas and make them safer, there has been a lot of improvements in getting the word out to people when they do build these homes, in the forest, on making their houses fire safe. So making sure that there's an area with low vegetation around their house, making sure that their roof say make it of metal instead of asphalt shingles, make sure that there's not a thick layer of pine needles on it, there are things you can certainly do to protect your home if you are living in a fire prone area. But there's, it's very difficult as as more and more people are moving into these areas to safely protect them. And, and safety is key. Because the more people that move into these areas, the more we're going to put our firefighters at risk as they move in to protect the structures where folks have have have moved into. So it's a real tricky situation. And another problem with these wildland urban interface is is. So a lot of times people asked me about carbon emissions with fires. And well when we're doing these control burns. Goodness, isn't that a bad thing because you're releasing all this carbon into the atmosphere. And what I tell them is, well, when when we're burning on purpose, when we do a control burn, it's it really is under very controlled circumstances. It's not too hot, it's not too windy, it's not too dry, we're burning in a very targeted area. And the result of those Burns is this amazing resurgence and growth. So even though you've released some carbon to the atmosphere, you're walking and so much more with the new growth that you get after the burn. And there's a lot of the fuels that don't get completely consumed, they turn into say charcoal or pyrogenic carbon. And those actually get locked into the soil for millennia. But these mega fires that we're seeing are so hot that they're even burning the soil, so the entire trees consumed, the soil is burn and it takes very, very long for those systems to recover and to recover that Harvin that was lost. But when you compound that with houses and cars, and petroleum products, when you're burning all of that the effects are really catastrophic. So it's just a whole other order of magnitude of damage that's occurring now with these these mega fires out west and this combination of a forest with far too much fuel in them and and human structures.



Jack Humphrey 22:59

I was reading the lead up in your interview in the latest issue of bio habitats, leaf litter, and I noticed that well you'd obviously be someone to listen to on this topic as you've managed over 100 prescribed burns. So I wonder what you have seen that people would be really surprised about what did you notice that your training and your experience up to that time never really prepared you for in terms of results or activities during a burn that you know kind of was exposed to you by nature and by the nature of fire.



Deborah Landau 23:39

I can go on all day about the things that excite me during a burn and from I really it just it's what it's what drives me. So one of the first things that you see after a burn is that amazing green that that comes up so quickly. You off during a burn you get this nitrogen pulse into the ground and then the the ground is physically darker so you get more radiant light and you're

warming up the ground. So the the resurgence of vegetation after a burn is just amazing. It's a green like you've never seen a green before. But then when you get the the flowers, the orchids, the the trilliums that come in after a burn. It's just so gratifying to know that you're you're doing something right that the organisms respond so quickly. But at the same time the other animals we've had incredible results with rare insects like there's a rare tiger beetle and one of the areas that we were burning, and it has just absolutely increased not only in numbers, but in spread. It's really increased the area that's accessible to it. because we've opened it up with fire. And the birds that have come back, we've had this amazing population of red headed woodpeckers that entered one of the areas that we've been burning regularly and they're just going bonkers. The bat population is increased. You know, when you're burning, you're opening it up, you're making it easier for predators such as birds and bats, to have sightlines to fly through a forest and to hunt effectively. Another thing that's really surprised me is wetland burning, you would be amazed by how fire can carry across a wetland with water or with wet spagna moss, some of these wetland plants are so fire adapted that even if the wetland still has some moisture in it, the fire will still burn across that vegetation and open it up. And you'll still get the positive regenerating effects the benefits from the fire, even in a wet area. It's just really astounding how so many of these systems have evolved, not just to require fire, but to help the fire move along. Like to encourage the fire.



Jack Humphrey 26:17

I can tell I hit a, I hit a good nerve there. We found the sweet spot here. And I wanted to draw up I wanted you to draw a picture of what it was what we're actually talking about. Because we get awfully academic about this at times. And in the conservation community, we feel that's enough to make an impact. And to get a point across to lay people about this. And all we're really talking about sometimes is fire good. You know, and that's it. And I wanted this picture, I knew this picture existed, it leads me too. Another thing that I often worry about when I see a fire, whether it's a good or a bad fire, and that's the carbon that's released by the fire itself that had been stored. And I and when you describe the vegetative recovery of an area, I start to think well, how much of the burn carbon release is, is taken back up by all that new growth? Has anyone done work in that area to try to quantify such a thing?



Deborah Landau 27:19

There are studies looking at that, but not quite enough. And fortunately, they're increasing and more people are looking at that. But absolutely, there is so much more carbon that is locked into an area that has burns. I'll call it naturally that has burned that has been burning regularly so that you don't have an unnatural, unnaturally heavy fuel load those areas, once they've experienced the burn, the amount of regrowth that you see is just tremendous. And again, they're studies looking at trees, large mature trees will grow larger, faster after a burn. And certainly there herbaceous vegetation. But that pyrogenic Harvin the unburned the parts of the fuels that have not completely burned that charcoal, that then works itself back into the soil, there is so much about that, that we don't understand. First off, yes, that's an enormous amount of carbon that's being locked into the system for millennia. And that carbon plays a role it plays a role with with filtering water, even with retaining water, it plays a role interacting with the nutrients in the plant. And there's so much that we don't even realize is happening by suppressing fire, we're no longer regularly introducing this pyrogenic carbon into the soil throughout the landscape. And who knows how much negative effects that we're having on the

landscape not just above by causing these mega fires because of all the fuel buildup, but below as well. We have very poor understanding of how the microorganisms relied on the fire how all these different systems these different ecological systems were interacting when we had these regular fires. It's



Jack Humphrey 29:21

a lot like the discussion I've had with Keith at bio habitats as well in terms of what we humans just don't know and how everyone at bio habitats and Nature Conservancy and other places are really learning on the job all the time. You know every burn must be an educational experience. There's because there's so many different variables every time you do it. We have to step back at some point and say that's that's it nature. You got to take it from here. We don't understand exactly what you do next.



Deborah Landau 29:53

You're absolutely right. That is right on and that's part of the excitement and the joy A in an ecological restoration is when you restore the systems. So much of it kind of takes over. It's almost like it's just waiting for you to bring that fire back. And we'll take it from here, again that there's areas that we've burned and been so surprised by the orchids that have come back by the pitcher plants that have reemerged after decades. It's just waiting for those processes to return and will really never truly understand what is happening, whether it's that heat pulse, the nitrogen flush the chemical reaction from the smoke, the carbon, who knows what's going on, and maybe one day, we'll have a better understanding of it. But what we know is when we bring fire back to the landscape, in a careful way, the results are really astoundingly positive.



Jack Humphrey 30:59

I imagine there's not enough people doing the kind of work that you do. And if there's not, what would you recommend to people who are listening to this and maybe thinking, hey, I might want to add something to my major, or I'm going into school might want to look at this a little What would people do to prepare themselves to? I'm sure you have to have a license and things like that. And certain kinds of training, of course, what what's that training look like? What should people prepare for if they want to do what you do?



Deborah Landau 31:29

Yeah, so I would strongly encourage anybody who's interested in the ecological world, to tap into fire ecology, I really, truly obviously, I love it. But I think increasingly, as people understand the importance of bringing fire back to our natural areas, it will be more and more recognized as is an important field for people to work in. In order to be certified to burn, it's, it's not too complicated. If you just want to help on a fire line, you have to take a class, it's about a week, and you have to pass a physical fitness test to just show that you can, you can hang in there. But otherwise, it doesn't take too much to be able to participate in a burn. And most of our forest service or State Forest Service agencies offer that class for free. But if you want to move up to be a crew boss, or an engine boss or a burn boss, that takes many, many years of training



and experience, it's so important to really have the experience that it takes to understand fire and fire behavior, and the effects that weather has on fire. And to pre prepare for the unexpected, because when you're working with fire, you always kind of have to prepare for the worst, and hope for the best. But safety is always first. So we're extremely careful when we're looking at planning a burn and making sure that the weather parameters are exactly as we want. We literally write a prescription we write a plan that says exactly how we think it's going to go. And the humidity has to be just so the wind just so from just this direction. And sometimes when everybody hurries up and drives and shows up to the burn, will literally sit around for an hour just waiting for that humidity to be exactly what we need to proceed with the burn. So it's your classic hurry up and wait. But the patients and and putting safety first really do pay off. In the end, the Nature Conservancy has been burning since 1962. So we're actually celebrating our 60th anniversary this year, which is really exciting. So we do a lot of burning, and we do have a lot of wonderful volunteers who help us participate in the burns. And yeah, as long as they've gone through that training, which again, is usually through the forest service. But TNC also provides training often. And as long as they recertify with what we call a pack test, this physical fitness test and and they go through what we call a refresher training every year to make sure you're up to date on all of your credentials, then we're very happy to have you join our burn. And you know, some people will come once and just say no, not for me and others boy, they get the bug and they just can't get enough of it. You know there's a thrill in in seeing this natural process that historically would have occurred all the time, and to really witness it. And when I talk about being on a burn, I'm absolutely not talking about these huge flame lengths and this, this scary situation most of the burns that we consider most successful are kind of boring. It's just low flame length, maybe two or three feet high, just slowly moving through the forest, consuming those fuels. And that really is all it takes to restore some of these natural areas. But if you've got the bog come on and join us.



Jack Humphrey 35:17

So another t shirt slogan is born a good fire as a boring fire.



35:22

There you go. I'm not sure how well the sales would go on.



Jack Humphrey 35:26

I'd buy that T shirt. Well, Deborah, thank you so much. What can what can people do to learn more about this?



Deborah Landau 35:33

Yeah, great question. So I would go to nature.org and enter good fire into the search. And you'll get all sorts of really interesting information on fire ecology and fire history, and the work we're doing to restore natural areas.



Jack Humphrey 35:51

Deborah, thanks so much for being on the rewilding Earth podcast.



35:55

Thanks so much for covering this topic. I'm so excited to talk about it with you. Thank you.



Jack Humphrey 36:02

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