SM: Alaska has an opportunity to learn from everywhere else in the world that has lost wild salmon. We're faced with the same challenges of how do we develop our communities? How do we have good local economies? How do we continue to move forward as a as a society and somehow not make all the same mistakes.

PS: Welcome to From the Field, a Podcast logging real life scientists and their efforts to improve the world one study at a time. I'm Priya Shelly.

In this episode I speak with Sue Mauger, the science director of Cook Inlet Keeper in Homer, Alaska. Over the last 20 years, Sue has studied the impacts of climate and land-use change in wild salmon streams by collecting water temperature data.

Part of Sue's work, and personal belief, is to connect with the local community to generate connectivity between people and the wild Alaskan landscape. This crucial realization, generated out of a memory Sue had as a child while growing up in the suburbs of Massachusetts.

SM: I remember playing in milkweed field that got completely leveled for housing development. And that was my first like, like sense of loss of, of an environment. And that really stuck with me like that like the joy of running around in this fields, and then to see it being transformed into paving a parking lots and, and, and buildings was, yeah, it was it was, I think really my first sense of, of loss for a, a landscape. But I, I didn't feel terribly connected to rivers to be honest that we didn't live on one. I remember playing in a local swamp but I didn't have and I didn't feel like the community had any really strong connection to rivers.

SM: And I, I think I've kind of reflected on that a lot. When a river isn't a healthy, vibrant place, it doesn't really connect with people.

PS: As her interest in science flourished, Sue continued to explore her curiosities on the interconnectedness of water systems through several ecological endeavors. And her first encounter with a salmon jumping upstream was the catalyst in Sue's journey to begin her work with the Cook Inlet Keeper.

SM: I feel like my interest in science has been a long and winding road. my dad was a math teacher, so that made me really curious about math and, and then I got an internship right out of high school where I got an opportunity to work with electrical engineers. And so I got really curious about that. And I ended up with a degree in zoology from Duke University. But it really, it was my first job out of college where I really got exposed to ecology. And I studied blue crabs in the Chesapeake bay. And that's when it became really clear to me that being outside and thinking about ecological connections was a really happy place for me.

SM: We were learning from a bunch of local ecologist and entomologists about what makes a a river healthy and learning about the caddisflies and stone flies. And we were hiking up this one river, the salmonberry river. And I saw, fish jumping up a small waterfall and having never seen that before. It was this life force trying to move against all of that force to go upstream. And that, that instinctual drive was really impressive and, and kind of seductive to see that behavior. And, and although at the time I was looking at the insects, I think the the power of a salmon moving upstream is really inspiring.

it wasn't until I moved to Alaska and started doing the work here at cook inlet keeper that I really had the opportunity to be doing fieldwork and to have salmon, you know, in stream with

me and to really begin to see what a healthy, intact river system looks like and, and how many salmon it can support.

PS: You may be wondering why watersheds are so important and why there's a need to protect them. A watershed is a piece of land that drains rainwater, snow or ice into one body of water like a lake or stream. They're so important to us because they supply our drinking water amongst other functions like water supply for agriculture and providing habitat for wildlife. In many ways, our lives depend on the watersheds which is why disruption of its health from waste run off, chemicals and climate change can be a pretty big problem.

The Cook Inlet Watershed in Alaska has stood the test of time and currently much of Alaska's population is concentrated in and around it. This includes Alaska Native villages whose centuries old subsistence hunting lifestyle depends on the watersheds to provide them with salmon. Cook Inlet water and salmon have become interwoven with the cultural fabric and the economy, drawing in many tourists who admire its natural beauty.

SM: The Cook Inlet watershed is huge. It's about the size of the state of New York or West Virginia where most of the people in Alaska live with anchorage, the biggest city kind of in the middle of it. It is a landscape with glaciers. We have both glacial and Non Glacial rivers. So there's this amazing blue color that comes from the glacial flower of, of certain rivers. So if the source of a river is a glacier, there's all of this ground down rock that's really a fine, fine sediment that we c all it glacial flower. And as that flows into the river, it reflects this just gorgeous blue color.

SM: We have these other rivers that we think of as like a tea colored river, and it's this organic rich chocolatey color that comes from all their organic matter in the wetlands that that watershed might drain. And then we have other rivers that are much clearer and they have probably snow melts source of water and they run really crystal clear., it's a really diverse, varied landscape of rivers. We have bears and Moose and eagles that we see.

I don't see bears regularly, which is probably a good thing, but I'd see Moose and Eagles daily in some parts of the year. And there's just this richness about the, the sounds and the smells of this place. And I think one of the, the things that I love most about Alaska is that it is a part of our day to day life. It is something that we remark on, you know, what we've seen what, what the cycle of the season that we're in. You know, if it's a good year for Lupin or fire weed, is it a good berry year? we're very connected to to that natural environment and that's something that having lived in a number of places on the east coast and on the west coast, I didn't have that sense of connection to place as strongly as I feel it here. And I feel like the community really connects to here.

PS: Over the last 25 years, Cook Inlet keeper, the non profit organization and Sue's workplace, has combined education and science in order to protect the watershed. With scientific backing, the community can engage in stewardship of their land which creates a deeper connection with the watershed and an understanding of what it provides for the landscape amidst threats from climate change and pollution.

SM: We'll be celebrating our 25th anniversary next year. So it started in 1995 and we were one of the first waterkeepers in the country. There's now hundreds across the country and, and more across the world. And it's a model of organizing around a particular watershed. Hudson river

keeper was one of the first in the country and we were, I think maybe the eighth here in cook inlet and they are very locally driven. It's about the issues and in a particular watershed and they have local boards of directors. Mostly we're interested in keeping a river healthy, so it's around clean water. In Alaska we started after there had been a whole bunch of pollution violations from oil and gas companies developing and cooking lit. And as part of the settlement for that, we received some startup money.

SM: A bunch of folks who felt very passionate about clean water and healthy fisheries and wanting to keep cook inlet a vibrant place to live. They helped start the organization. I think we have evolved over the years from a group that would spend a lot of time getting people to write comments for different projects that were coming into the area and kind of trying to use the science to, to push back on bad decision making.

SM: I think now we're realizing that these issues are even bigger than that and that we need to be really connecting people with their their values around the place that they live. And to be thinking about this as part of a larger movement that environmental ism is not, can't just be siloed. You know, that science can't just be siloed. That all of all of the things that make a place worth living are rooted in its environment, you know, over 25 years, just like a person our organization also continues to evolve and, and how we think about our work. But definitely been very lucky to work in a nonprofit environment that really values science and its role in society and in decision making.

PS: In the late 90's one big community concern revolved around a native bug known as the Spruce Bark Beetle which infested large areas of the lower Kenai Peninsula, leaving behind acres and acres of dead spruce trees. To understand the interconnectedness of trees and salmon streams, Cook Inlet hired Sue to investigate any discrepancies in the streams as a direct effect of the beetles.

SM: When I came up to work for cooking that keeper in the year 2000, I was hired to start working on collecting some baseline information on some of the local salmon streams. And, and that really came out of a community concern about the fact that we had just had a big spruce bark beetle infestation here on the lower Kenai peninsula. We lost about 5 million acres of spruce forest. And when I arrived here, the trees were still standing. They were mostly all dead. And there was this, I really felt like it was sort of a post traumatic stress syndrome at a community scale where people were starting to see trees fall in their yard that they had been on the landscape. People were having to make decisions about cutting down trees.

And it really started to change the way the community looked and felt. And people started to wonder what it means to salmon streams when forest dies. And so that was kind of the, the place that I moved into was, was this real sense of uncertainty about this big change that had just happened. And so it sort of ironic to be hired to do a baseline monitoring project when really we were kind of in the middle of it. We were looking for some information about how these systems were functioning. So I had this really fabulous opportunity to get to know a place by going out in the field all year round. So I would go out hiking to these sites in the summer and then skiing out to sites in the winter and chopping through ice to collect water samples.

PS: Sue decided it was time to collect her own data to see if the warm water temperatures were typical or abnormal for the area. Little did Sue know that the questions she asked based off of her initial research would ultimately become a major part of her seasoned career.

SM: I got to do it by recruiting volunteers around the community to come help me do that work. And so I got to know both the community and the rivers well at the same time. And the work that has really turned out to be the focus of my attention now for 15 plus years is that one of the things that we found early on is that when I put a thermometer in the river in July, I was seeing temperatures that were warmer than I expected from an Alaska Salmon Stream. You know, I was new to Alaska, so I didn't really know, but it seemed surprising to see temperatures in the 60s and I knew that salmon really prefer streams that are about 55 degrees or cooler. So I started to ask around, you know, is that, you know, do we tend to have rivers that are that warm and no one really knew, no one had much data.

so in 2002 was the first time I actually put a a little temperature data logger in the rivers and it was a, you know, to small piece of equipment costs about $125 and you can collect about five years of data. And so I threw that in the river not knowing that that was going to kind of drive my future. And what I found was that there actually were many days throughout the summer that the temperatures were above that 55 degree mark. 2002 2003 2004 2005 were increasingly warm summers here in Cook Inlet. And so it was a little alarming. Every year I would pull the data out in the fall and see that we had even more days that were warm and an and getting warmer, the temperatures, we started to see them top about 68 degrees.

So that kind of started this broader question for me is, well is that just these local streams here or is this everywhere or all the streams this warm. And I was able to cobble together both the money and a bunch of partners who were interested in this question. And we started to collect data in 48 streams around cook inlet. So we did five years of temperature data collection in these 48 streams. And what it found was, one, the streams that I knew of locally were kind of middle of the road rivers.

SM: They weren't the warmest systems out there and too that the, these temperatures that we were seeing these rivers was not the results of a forest dying. But likely to be the similar responding to the same thing. So the spruce bark beetle infestation that we saw was the result of these warm summers and the Beatles were able to reproduce twice as fast. And we had this huge explosion of Beatles and that was related to our warmer summers and the warmer stream temperatures were related to that same thing. That work has really kind of been the foundation of what I've done since. And looking at where are those warmest rivers and what are they going to look like in the future.

PS: Preparing for the future of the rivers also means protecting a way life of life. Without these spawning events, many residents in Alaska would lose access to a source of protein, culture and income. When a lot of us think of salmon we think about the salmon run, an annual event where salmon come from the ocean and triumphantly jump up in the air in an attempt to make their way upstream to spawn in river systems. I’m sure we’ve all seen a photo or two of a grizzly bear trying to catch one with its claws. The spawns in Alaska are typically successful because of the vibrant water systems which allow for the salmon to move forward in their intricate process of creating new life. It’s a rare treat that much of the world no longer experiences with much of the salmon’s habitat depleted.

SM: Okay. So we have all five species of Wild Pacific Salmon here in Alaska, and they all use our landscape and our ocean in different ways, both in how much time they spend in the ocean or in the freshwater. But generally we have our salmon eggs that are laid by the, the adult

salmon as they come back from the ocean. So we'll start in the freshwater and those eggs or are laid down in these little gravel beds a We call it a red

And then the parents die and the eggs stay in the gravel for varying amount of time. They emerge into these little, little tiny baby salmon that depending on what species they are, they may turn around and go right back out to the ocean or they may actually stay in the river for one to three years. - beat - For a lot of people, even Alaskans, they're not aware that we actually have salmon in our river all year round. That even under the ice we have salmon that are growing. It makes that fresh water system super important.

It's one of the things that make salmon so spectacular is as they have found all of these different life histories to really utilize all of the diverse habitat that we have. In Alaska, we still have a lot of really diverse, intact habitat. And that is why we have such vibrant fish runs. Salmon actually originated, they think in Europe originally and that there used to be thriving runs of Salmon and then on the east coast of the United States.

So the, the place where I was born, there used to be salmon runs in rivers in New England, but I never knew that that habitat had been lost long ago from things like paper mills and that, that freshwater habitat couldn't support those populations anymore. So I didn't ever know that. I used to live on a salmon landscape. And then even in Oregon, in Washington where there still is a lot of memory and culture surrounded with salmon, we've lost an awful lot of that story and that culture and that habitat. -beat - In Alaska we have this such a wonderful opportunity to hold on to all of it and to give salmon the habitat that they need to continue to thrive.

PS: There's something inevitably poetic about the life cycle of a salmon. Salmon quite literally, breathe life into the rivers of Alaska, providing a healthy network of food for animals and people. With that brings industry which stimulates the economy. And even in death, salmon release nutrients that invigorate an otherwise not so nutrient rich landscape.

SM: So our, our landscape in Alaska is a relatively new landscape. It's, in more recent times that the glaciers have gone away and we have this new emerging landscape and it's not a very nutrient rich landscape. It takes a while for all of those cycles to really start to create really vibrant soils and, and and, and really complex food web. And so salmon with their use of both our freshwater and the marine system, they do this amazing job of bringing all of these marine nutrients into our watersheds.

So as a salmon dies on the banks of a river, all of those nutrients that it got from eating out in the ocean have now been brought to the stream bank and are then going to be feeding the caddisflies in the stone flies and the Eagles and the bears. That connection that, that transport in the form of a salmon of nutrients from one ecosystem to another is so vital to what Alaska is. For us to have bears and bear viewing and photographers coming to take pictures of our eagles, all of those industries depend on the salmon coming back to our rivers.

They've even found that, found that signature of marine nutrients in the tops of trees. So in these old growth trees, you can see the salmon nutrient pathways that are helping to grow those trees. It's, yeah, it's not just like the food web of who's eating who, but it's a web of who's absorbing and consuming and being brought to life by, by these creatures. So yeah, it's, it's, yeah, it's crazy. And that's why I love ecology. It's also wonderful and complex and kind of wacky. - beat -

PS: One of the threats to this complex symbiotic relationship is warming water temperatures. This is why Sue's data collection on warming temperature trends is vital to the ecosystem's survival. Sue found that lately, temperatures have been so warm that it's changed the behavior of the salmon. A particular eye opening event in 2019 demonstrated the urgency needed to protect the salmon from the on going climate crisis.

SM: We now have partnerships across the state places like Bristol Bay and Kodiak and southeast Alaska where we've got partners who are off collecting temperature data and trying to create, create those same five-year data sets so that we can sort of understand where the warming systems are and what they might look like in the future. 2019 was a particularly dramatic summer. We broke air temperature records for both July and August as the warmest months on record We saw that reflected in our river temperatures and in fact saw rivers with temperatures in the 80s. So if you're a salmon that prefers temperatures at 55 degrees and you're finding yourself literally in hot water at 80 degrees, that's gonna have an impact. And we saw that expressed in a variety of ways across Alaska. We saw fish kills. So fish that died before they were able to spawn, that they hit those river temperatures during their migration.

SM: And either because of the lower oxygen in the river water cause a little bit of temperature can really decreases how much oxygen can be held in the water. Or that they just didn't have the energy to move through those systems that they want. They wanted to move slower because of that heat and that they just, they couldn't get up to their spawning beds in time. And so they were found with eggs intact inside them, but not they had not spawned. So that's a whole lost generation. In other places, we saw the fish just holding down low in the river you know, in a colder part of the river before moving upstream. And in some cases that was for, you know, 10 days. And that's a long time for salmon to be holding. We know that they're having both physiological and behavioral response to these really warm temperatures.

SM: So for some of these river systems where fish actually died before they spawned, those adults are fish that are not going to end up in somebody's smokehouse. So in some cases, you know, that, and that became an actual you know, specific case of, of people not being able to get the fish that they needed for the for the winter.

PS: Sue explains that the behavioral response of the salmon has left both the local community and commercial fleets with a choice: adapt and understand the vulnerabilities of the ecosystem or lose the opportunity to harvest healthy salmon.

Sue Mauger: If you live in a particular place in a particular village that relies on one river system for your salmon, you're a lot more vulnerable to these changes in climate. For the commercial fleet, they tend to rely on a much larger watershed, a much larger set of rivers that that they can, that they can profit from. And so they can even if one river isn't doing well, I know the river may be doing just fine. And so that commercial fleet has a little bit more resilience to these changing conditions. But we did see that in some cases, the, and this is getting into some of the management of, you know, how we manage our fisheries, the we have a department of fish and game, which does a great job at managing our fisheries.

And they have a lot of local tools that they use to help them decide when it's time to start fishing and how many fish can be taken. And they have what are called weirs on the rivers. And these are basically kind of like a, a fence that allows the water to move through, but it tunnels the fish

into one part of the we're so they can be counted. And those counts are, they're counting the number of fish that can go upstream and that will be able to spawn. And that will be the, the eggs for the next generation of salmon in that river. And so those counting weirs are really important. But what we found this year is that some of those rivers were so warm and the fish were holding downstream of that we're, that there were a lot of fish but they hadn't been counted.

And so the fishing couldn't go forward until those fish moved upstream. Cause the managers have to make sure that enough fish get upstream for future generations. So that's an interesting challenge that we now have is how do we get the tools for the fisheries managers so they know what the river temperatures are. They understand what's going on, they understand that the fish might be there, but they're just behaviorally responding to that temperature and to give them some more tools for making sure that they're making good decisions for both the fish, but also for the fishermen.

So we're seeing, I think, as our climate crisis continues, that we have real winners and losers in this. And I think it's really important for people to understand these patterns so that they understand where their vulnerabilities are.

PS: The temperature data that Sue documented and witnessed in the Summer of 2019 bore a shocking resemblance to the projected climate change models which spanned the course of 50 years. If the current climate crisis is ignored, results from the summer of 2019 could become a regular occurrence for locals and commercial fisheries.

SM: In the Canadian Journal of fish and aquatic sciences that looked at those five year data sets that we had collected in, in cook inlet streams. And we've done some work with folks at, at the University of Alaska Fair banks to to look at what those streams might look like in 30, 50, a hundred years. And this summer in 2019 the temperatures that we recorded in some of these streams was warmer than what we anticipated for 2069 so 50 years ahead of where we thought we were going to be. And that was for our climate models that were kind of the worst case scenario That was pretty eyeopening and to be honest, a little terrifying to see temperatures that we didn't think we'd see for another 50 years. And I think for many of us in Alaska this summer of 2019 really it took the cautionary tale that we've been talking about or hearing about and really brought it home to the reality of what it's going to be like to live in this warming climate. Um here in Alaska.

Some optimism in this moment in time, even after such a dramatic summer, is that everybody's talking about it. And to me, if we're talking about it, then there's some hope because I feel like for the last 20 years in doing this work, people have not really that, you know, it's, oh, that's very interesting and you know, thank you for your work. But it wasn't something that they went home and talked about. And I think after this summer, everybody has a story about how the smoke or the fire or the warm water or the heat, how all of that actually changed what they could do this summer, where they went, how they thought about living in Alaska in the future. And those conversations are what give me some hope because out of those conversations come some solutions and some forward momentum to, to tackling the, the root of the problem, which is our carbon emissions.

PS: Due to the expansiveness of the water systems in the area, Sue explains that it’s important to gather data from multiple agencies to jointly combat the effects of climate change. This is

something that could fill in several blanks for Sue's data collection and offer important answers about warming trends. Sue and her colleagues have set out to create an infrastructure to properly communicate these vital datasets amongst scientists but she says the progress is slow going.

SM: So after we started to collect data in more and more streams and work with a variety of partners, we discovered that not just is our our datasets fairly scarce. We also haven't solved some of the challenges of sharing data. If I had 10 partners, some of them, some of them from the university, some from different state of federal agencies and some from a tribal organization, we all could use the same method to collect the data. And we've actually helped to write some of those protocols so that we have a statewide method for collecting temperature data in Alaska. But we haven't solved the problem of how we actually can share that data and how we manage all that data.

a lot of the work that's happened since we have done some of those big regional studies has been to figure out where we can begin to share information and how do we create publicly facing databases. How do we archive data for the researchers of the future who are going be curious what temperatures were like 50 years ago and how do we begin to create some standardization of that process?

As has with most things the real challenges tend to be the people problems and, and the, the, the data is just a way for us to realize how we've created systems and frameworks that get in our way of doing really good work. I think more and more as we want to understand how climate is being expressed on global scales, down to local scales, this need for sharing data is going to become more and more critical.

I hope that the obstacles that we figure out in this process with stream temperature will basically break down those barriers for all the other data sharing needs in the state. And you know, there's lots of people thinking and working on this and it's really a if, for me it feels like a real breakthrough because 20 years ago we were very, very far from actually getting everybody on the same page about the need to share data collected by a variety of people.

PS: Collecting a broader span of data points allows Sue and the Cook Inlet Keeper to present their relevant and urgent work to the public. It brings that connection between people and nature even closer and challenges scientists to keep their research as current as possible.

The challenge of working for a nonprofit organization is that often our issues are a pretty big and sometimes it can be a challenge to work from a small community based group to, to find the resources, to look at some of the bigger questions. And for me, this is a challenge, but it's also one of the reasons why I love working in a nonprofit environment is that you really have to push yourself to stay relevant. You know, we're a membership based organization and it's important that the, the membership feels like the work that I'm doing as a scientist is relevant for your clean water and healthy salmon, which is why people are members of our organization. So it is it really forces you to stay relevant

And that sort of gets back to my finding meaningful work and having that connection to people and a river system.

We've got this, what I think of as really exciting technology where we can actually map the surface temperature of a river from an airplane a thousand feet in the air. So a plane with this thermal imagery camera can as a thermal sensor on it and it can fly above the stream channel and actually map the surface of the river at about a two meter pixel scale. That to me like I've always been very jealous of the oceanographers who would always have these really cool color maps that they could show about surface seat temperatures and circulation patterns and they just had this great imagery. And now I'm happy to say that as a stream ecologist, I to have really cool color maps of the surface of the river temperatures. And what's neat about that, as you can see where these ground water connections are intersecting with the surface water and we can actually map that all out.

And then we can talk to a local landowner and say, hey, you have a really important critical piece of habitat on your property and we know that you love this river because you bought property on this river. So let's talk about ways to actually protect that. I think that's a really positive, proactive step that we can take to, to try and to give that river as much chance of as possible to continue to support the salmon in a warming world.

PS: Sue says that a conversation she had with two local fishermen was one of the most rewarding interactions of her career because it solidified her choices in devoting her time with bringing science to the community.

SM: I look back over 19 years, I have two hours that I think of as like the favorite two hours of my career.

And it was when I invited some, these two old fishermen who have been on this one particular river [inaudible] river for years and years. They know the river so well have fished it their whole life to come in to my, my gis computer to look at the thermal maps of the anchor river. First of all, it was so fun to actually have people want to come in and look at my thermal maps of the river. So that was a great start. But as we began to, to look at the maps and, and get them oriented to where we were on the landscape, it was just this fascinating back and forth of, of how I saw the river and how they saw the river and how the thermal information was supporting our perspectives of what was going on.

And we learned so much from each other. I remember the showing them this one particular reach of river that had a really strong groundwater connection and one of them said, is that where the orange rocks are and the other guy says Yeah, I think so. You gotta be really careful in the winter if you're on your snow machine to not go where the orange trucks are. And they're like, that must be a really hot spot because it tends to make the ice really thin. So it's not a good place to go near the wintertime. And so what that was telling me was that they understood that there was a temperature story related to the orange rocks. They had interpreted it from the winter perspective, which is that that water temperature was warmer than the surface temperature, which was icing over. But what they didn't understand was that the orange rocks were really an area where the groundwater was coming out.

Our groundwater has a lot of iron in it, and when it comes, the groundwater comes out and gets oxidized. It turns into this rust colored water. And so they had seen the rust colored water in the summer and noted it because they had to worry about it in the winter. But what they didn't understand is that that groundwater was bringing in the same temperature all year round. And in the summertime, those red orange rocks were actually places that were very cold. In the winter,

they're much warmer, but in the, it's the same temperature, but it, the surface water was what was changing. So that was a, for me it was this big win of like, Oh, you know, we've actually, they have observed something and come up with an explanation for it, but I can help inform that by the science.

And then it went right back the other way where I, we started looking at another part of the river and they were like, oh, show us the dead zone. I said, the dead zone. I said, yeah, there's this part of the river that the fish, you never get any fish in it. You can get 'em below this reach and you can get 'em above them, but you never see any efficient this reach. And so we look at the, the imagery and see that the reach that they're talking about shows it's really warm and downstream of it. It's cold and upstream, but it is cold and there must be something in the geology of that reach of water that doesn't let any groundwater come in. So I, I don't know how I would've interpreted that a stretch of river, but they helped me understand that the fish were actually responding to it and that they were holding lower down where a cold water tributary came in and then they would try to blow through it at night when it got a little bit cooler.

But that, that was a chronically warm place and that was something that I would never have understood that the Fisher responding to that temperature and that, that difference in temperature was really important. All of us left just sort of beaming at, at our ability to share information all around our love of salmon and of this river. And yet we had such different pieces to bring to the table.

PS: Whether you're a local, a researcher or a tourist in Alaska there's no denying that we have our work cut out for us when it comes to protecting watersheds and the wildlife within them. Sue believes that there is still hope for our ecosystems and we must all recognize that collectively as a country, we have a hand in the fate of wild Alaskan Salmon.

Some days are harder than others to, to work your way through the headlines and to feel hopeful. But I think there's a lot of people out there who are doing inspired work, who are really thoughtful and, and have great intention and and vision for the world. And I think if we spend a lot more time paying attention to those people and those visions, I think that we can get our selves through the climate crisis and come out on the other side even happier and healthier.

You know, the joy of Alaska wild salmon is something that I know that not everybody will have an opportunity to experience, you know, in a river system. But I think, you know, they're, they're Alaskan wild salmon, but they're American wild salmon. Like we all have a stake in having wildness in the world.