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SPEAKERS

Liz Woodhull, Bret Ladago, Will Eldridge, Alison Adams



Alison Adams 00:08

Welcome to Restoration Roundup, a monthly podcast that explores recent research on, new and emerging best practices for, and stories about riparian forest restoration. I'm Alison Adams, I'm the watershed forestry coordinator with University of Vermont Extension and Lake Champlain Sea Grant and I run the watershed forestry partnership.



Liz Woodhull 00:26

And I'm Liz Woodhall, a junior at UVM's Rubenstein School of the Environment and Natural Resources studying environmental studies and minoring in geography and English. In this podcast we have discussed a wide range of topics from nurseries to bird populations, emerald ash borer, and even talking to farmers who have restored riparian areas themselves. Yet we haven't discussed a major aspect of riparian forests: how they intersect with fish. Being adjacent to a body of water restoring a riparian forest has major positive impacts on fish populations. They rely on these trees adjacent to the streams for nutrients, cooler temperatures from the canopy cover, and improved water quality to name a few. Today to help better understand the specific ways in which riparian forests benefit fish populations, and what we can do to help support that, we're joined with Will Eldridge and Bret Ladago. Will is an aquatic habitat biologist with the Vermont Fish and Wildlife Department where he works to protect and restore habitat for fish and other aquatic organisms. He's been with the Vermont Fish and Wildlife Department for five years and has worked in fisheries for over 20. He started in Minnesota studying walleye and then moved to the Pacific Northwest where he helped tribes around Puget Sound conserve ESA listed salmon. He's excited to be in Vermont putting his understanding of fish ecology into practice. Bret is a fisheries biologist who has been working with the Fish and Wildlife Department in different capacities for about 20 years. He worked his way through their two Green Mountain conservation camps for five summers while earning his undergraduate degree in marine science and environmental policy. In 2013, he earned his graduate degree at UVM Rubenstein school and aquatic ecology and watershed science with a focus on lake trout and has been working as a fisheries biologist since. Welcome to the podcast, Bret and Will.

B

Bret Ladago 02:24

Thanks for having us.

L

Liz Woodhull 02:25

So to get started, how did you guys get interested in working with fish and wildlife?

B

Bret Ladago 02:30

Sure! You know, I've always been really interested in water and the aquatic world and the organisms that are in that arena. And so I just kind of followed that throughout my time. I really enjoyed being outside and working outdoors, so I kind of knew that that was going to be part of what I wanted to do. And growing up in Vermont, I really had an appreciation for sort of the natural world that that we're immersed in here and wanted to spend my time trying to make a difference in a small state. So that was kind of my goal, was to be part of part of this small community and try to try to make a difference.

W

Will Eldridge 03:04

Yeah, no, I was nine when I decided I wanted to be a fish biologist. I had no idea what it was. I grew up in DC. And my only experience with fish to that point was fishing and I just loved being outside, being around fish. You know, a lot of kids at that age want to be a firefighter or policeman and I wanted to be a fish biologist. So [laughs] it's been-- yeah, I feel incredibly fortunate honestly, to be able to follow my passion. And I did at one point contemplate becoming a doctor, and um, realized I am not a good-- a big fan of blood or hospitals. So I came back into fisheries and have loved it and enjoyed every aspect of it.

A

Alison Adams 03:44

And can you tell us, either one of you or both of you tell us about a typical day working as a fisheries or aquatic habitat biologist looks like--what do you guys do? I know, Bret, we were talking earlier about you being up until 1:30 last night doing some sampling for... bass, was it?

B

Bret Ladago 04:00

Yes, yes, this time of year we're out. And so, um, Will's and my responsibilities vary a little bit. Um, I'm one of eight of the district fisheries biologists, so we have five different districts throughout the state. And that's split up by watershed. So we're kind of responsible for overall aquatic resource management within those watersheds. So we really have a diverse job description, so from one day we could be doing anything from being out at 1:30 in the morning sampling bass, but then we're also providing a lot of feedback on regulatory review things such as hydro relicensing or riparian restoration or outreach to let people know that there are more than folks that just stock fish or wardens that check your licenses; there's a whole department

of folks that are that are focused on all these other things that-- our mission is broad. It's the conservation of all fish, wildlife, plants and their habitats; that provides us a lot of flexibility to go to these different areas, work with various folks partners to accomplish that in ways that, you know, we've learned through our education and experience with the state. So day to day can be very different, where Will and I work together is accomplishing some of those projects with partners in my specific area of expertise, which is in sort of central Vermont.

W

Will Eldridge 05:18

Oh, I'll just say, you know, the Vermont Fish and Wildlife Department has a statutory obligation to conserve the Fish and Wildlife of Vermont. So like, that's, that's kind of big picture, what we do, everything we do is, you know, fish, fish and wildlife, aquatic organism focused, and, you know, so as part of that obligation, we have some regulatory responsibilities, and so we'll do some of that, some work, kind of permit review, regulatory type stuff, and then also do a lot of, you know, non regulatory, habitat protection and restoration type stuff. And so I actually don't work with fish directly that often, I actually don't get to handle fish as often as I like. That being said, I really--like I said--I really enjoy what I do. So I'm looking at everything but the fish, you know, the stuff that the fish depend on, the habitat. So water quality issues, temperature, another big one that we deal with is what's called aquatic organism passage. And that's the ability of fish to get past barriers like dams or culverts, things like that. And then, you know, riparian restoration, wood addition, other things that kind of contribute to fish habitat. But day to day, I actually work a lot with partners, watershed groups, conservation districts, universities, others that have an interest in the aquatic world, from various reasons, either water quality, flood resiliency, you know, because there's a lot of overlap between the work that we do in Fish and Wildlife, and the work that that others are doing to protect streams and rivers and lakes and ponds. So it's actually really exciting for me, because we're all trying to do the same thing, but maybe coming at it from different angles. So yeah day to day, it's, you know, like Bret said, we're all kind of working on different things, but at the same time, it's like working towards this common goal of protecting and restoring streams and rivers and lakes and ponds.

L

Liz Woodhull 07:03

That's great, thank you! How do riparian buffers support fish populations? And what are some of the key variables that you guys look at when determining the impact of buffers on fish populations' health?

o

This is a great question and one that may not be entirely obvious, you know, it's like riparian buffers are talking about the land, how does land affect water? And there's actually a really critical interface between what happens on that land that shoreline right next to streams and rivers as well as lakes and ponds, and what happens in the water. So we, uh, I like to say "fish grow on trees." And you can actually draw a little connection between what happens with trees and fish, like the leaves off the tree fall into the stream and river, and then bugs eat the leaves, and then fish eat the bugs. So literally, the trees are the base of the food web in a lot of these streams and rivers, but there's a lot more that they do: temperature is really critical to a lot of

our fish, trout in particular are sensitive to warm temperatures. Trees help shade those waters and really keep them cool. They also help prevent overland flow of like sediment and stuff coming off the land side and they can help with water quality. They can stabilize the bank, their roots are actually can go down up to six feet and help stabilize the bank so you can actually have less erosion in forested areas. And then the other important one, another one aren't catchphrases is "fish hotels." And so when wood falls, and when trees fall into the stream or river, they form log jams. And that's often where you'll find your fish, you know, and so those are like, literally are the fish hotels, that's where the fish live often is in these log jams. So yeah, riparian-- those forested riparian areas are critical to habitat for fish and wildlife. And then what do we get the other question, what do we look for? Yeah, so you know, often we're looking for areas that are largely are actually really good supporting a lot of fish populations. So they have a healthy fish population to begin with, you know, generally we're talking about trout, brook trout is one that we focus on. But rainbow trout, brown trout as well. But anyway, you have a healthy fish population, an intact, a largely intact watershed, you know, with not a lot of other development or any anything else like threats to fish. Ultimately, what we're trying to do is restore natural processes. We want these to be self sustaining systems. So when we do a tree planting, we're ultimately what we're looking for is actually to establish a forest a self sustaining forest. And so you know, sites that have like knotweed or invasive species that can kind of inhibit tree growth and restoration are kind of sites that we may avoid. We're actually doing a lot of research into hay fields, reed canary grass, hay fields, that's another area where we have difficulty but again, you know, it's an it's an important opportunity, there's a lot of that out there. So anyway, yeah, finding where the fish community is. And the other key piece for us is actually capacity. So often we work with partners to do this work. So having like a watershed group or conservation district that has the capacity and the interest to do this work is essential to get it done.

A

Alison Adams 10:06

And you mentioned brook trout, Will, and I've heard a lot from you in previous conversations that you and I have had about the importance of healthy riparian forests for supporting brook trout specifically, are there other fish species or other organisms in the river that benefit from riparian forest conservation or restoration? Which organisms would that be, and in which ways do they benefit?

i

Sure, I mean, absolutely. It's not just brook trout. Brook trout are kind of our charismatic megafauna in Vermont. They're also a really good environmental indicator for you know, water quality and things like that. So we do often pay a lot of attention to brook trout. And we're sort of in a good position where brook trout, unfortunately, throughout their native range, in the northeast--it's shrinking. So in the south, you're seeing populations disappear. Whereas Vermont, we still have really robust populations of brook trout. So we're really fortunate. But that's not the only species, especially fish species that benefit from having really healthy riparian areas. There's many other species that most people don't even know about: the slimy sculpin for one example, which lives with brook trout in a lot of these high elevation mountain streams, that only grows to be about four inches, so nobody's gonna go there targeting it for fishing to take home and eat. But a lot of our funds also come from an excise tax on fishing gear and things like that. So we also have our constituents, our anglers, which are very focused on brook trout angling, that's the most popular species that folks target in the state. So they do

get a lot of attention. But all sorts of animals, not even fish, but amphibians, turtles, deer, all those things, you know, use that forested area to live. So as-- as it gets, you know, more developed and there's less space, then that's obviously not good for fish, but it's also not good for the other animals that use that as a travel corridor to connect one forested block to another forested block. So it goes way beyond fish, but fish really, really do have a lot of benefits that they receive from having those naturally vegetated forested riparian areas.



Liz Woodhull 12:10

That's great. Thank you. Is there a difference in terms of benefits to freshwater fish when a riparian forest is conserved versus restored?



Yeah, we work on both things. Our preference is the conservation route. So if you have something that's already intact, we do our best to try to protect those areas. So we're really involved in a lot of the state lands management, we actually have developed guidelines within the last 10 years that sort of lay out what is allowed to occur within 50 or 100 feet of these streams, because in the past, there was a little bit of conflict between sort of the forestry side of things and the ecology side of things. Whereas that was a resource that folks would go in and harvest, then we're saying there's actually a lot of benefit to leaving those areas undisturbed. And so we've had a lot of feedback through that. And again, through the regulatory review process, we're able to provide feedback through mechanisms like the Act 250 review process, which is one of our really our only mechanisms to get some improvements on private land. So through that process, we provide input to a natural resource board. And then those recommendations are often adopted through a land use permit condition, which is good from when it's adopted throughout the entirety of that property. So if it changes hands, they still need to provide that area of undisturbed riparian forest. And so that's some of our biggest gains, even though it's some of the most challenging work, we-- we really do try to provide a lot of assistance in those groups and going on site visits and saying, you know, this is what's best for this parcel if you leave these areas undisturbed. And, and so much of Vermont is privately owned, that that's one of the hardest areas for us to provide feedback. So that's some of the things that we do in order to get that conservation piece through. And we're always looking for restoration projects, but that's sort of secondary to conservation in my mind, because those are areas that are already pretty highly impacted. And we can definitely do some benefit, but it's kind of trying to like wind back the clock after 100 150 years of pretty substantial impact. And that's met with a bunch of different challenges from invasive species like knotweed, you know, the success of the plantings, the source of where you're gonna get your trees from things like that, that are a little bit more opportunistic, as we see those things arise where we can work with partners to try to fix certain things that have done and try to reverse some of those things that have occurred in the past. But that is-- that is more challenging than sometimes saying "We're just going to leave this alone and conserve this for the benefit of the resource."



Can I add to that a little bit?

A

Alison Adams 14:54

Go for it, Will.

W

Will Eldridge 14:55

Thank you. Yeah, I mean, I think what Bret was saying is spot on, like it's it's harder to restore a site than to protect or conserve what's already functioning. And you know, I think, you know, another another thing, you know, Fish and Wildlife Department and I mean practitioners, riparian practitioners across the state and across the country, across the world even, like we've been-- we've been trying to restore forested riparian areas for decades, if not, you know, 100 years now. And it's still-- it's still an art, if you will, it's not, it's not really a science, like we're still figuring out new things every year. And so, you know, it doesn't always work. We're dealing with invasive species, you know, knotweed, reed canary grass, other things that are inhibiting growth of trees, even planted trees, you know, so there's a lot stacked against us now that kind of makes it really hard to restore a site. So like, protecting what's already functioning is, you know, it's much easier, obviously, you get the benefits right away. And the other piece about restoration is it takes a long time, it takes decades for trees to get big enough to actually provide all the services, you know, that I was talking about earlier, the water quality, the temperature, things like that, you know, some some benefits occur pretty quickly. But you know, like water quality can actually improve pretty quickly, but like temperature, you know, you need that shade, which can take decades to achieve the canopy.

A

Alison Adams 16:16

Yeah, that makes a lot of sense. I was wondering, and I don't know if there even are data to answer this question. But if you have a like really successful restoration planting, and it's pretty mature, say, I don't know, 30 years old, let's not go as far as like 50 100 years old, but maybe like a 30 year old planting, would you expect it to be as effective at providing the benefits that you see from a conserved forest that's maybe been around 100 years? Or potentially even longer In some cases in Vermont... Would you expect to see the same benefits? Or is there something like different about restored riparian forest and the benefits they provide to streams?



Oh, there is research on this! That's a great question, though. Yeah, it definitely changes over time. You know, one thing we're seeing for sure is that wood addition piece, so trees that fall in, you know, even after 30 years are not that big, they're big, you know, they can, they can do a lot. But in terms of like forming log jams, those fish hotel things, they're just not as effective, as you know, a 50 or 100 year old tree. I mean, that's just one example. But I mean, you get a completely different community, forest community there, you know, you really haven't had a whole lot of natural regeneration. So it may just be like a single story, single stand, and, you know, you get a lot more benefits once you get, like different age classes in their different structure, you kind of develop a duff layer, you know, like leaf layer underneath. And then, you know, it really can provide a more holistic suite of benefits. So water quality benefits, you know, habitat, you know, both for wildlife in the riparian zone, as well as the aquatic area.

A

Alison Adams 17:49

Yeah, thanks for explaining that. And really cool to hear that there is research on that I'm gonna go look it up, or maybe make you send it to me.

W

Will Eldridge 17:56

Stroud Water Research Center in Pennsylvania!

A

Alison Adams 17:58

Oh, perfect. I do know where to find them.

W

Will Eldridge 18:02

[laughing] Yes.

A

Alison Adams 18:02

I just I just wanted to say I have heard from a lot of riparian forest restoration practitioners, that it has been a really big challenge to get that sort of understory growth happening in a lot of the restored riparian forest, like that's a thing that a lot of those practitioners are struggling with figuring out. And so, you know, we're huge fans of riparian forest restoration here on this podcast, obviously, and wouldn't want to discourage anybody from doing it, keep doing it so many great benefits. And also, I think I just really want to drive home the point that conserving the forests that are already there is probably going to be the most effective thing, especially with sort of the knowledge and ability we have restoration-wise, right now. And Will, you kind of started to talk about this topic. And so I wanted to bring up this this idea of process based restoration. That's something that's been a lot of discussion in our community recently about something called process based restoration, which is sort of focusing on restoring some of the processes of the stream and the surrounding ecosystems and also often adding woody debris to streams. And there's a lot of overlap with those practices and the riparian forest restoration community, just a lot of conversation happening there. And you sort of started to touch on it, but I wanted to give you the opportunity to expand further on how this practice affects or supports fish populations.

A

Yeah, well, first, I'll just introduce process based restoration. So you know, two key components here first is that streams and rivers are dynamic, right? So they're constantly changing, and the processes the way that you're allowing for that change to occur... it's, it's kind of like, you know, sometimes people talk about dynamic equilibrium, the idea that you have floods and things that are moving material around, but at the end of the day, you still have a stream, and it's going to have meanders, it's going to have you know, its shape, its general shape. But it's

going to move from side to side, you're gonna have flooding that occurs, things like that. So that's like part of the process that you're allowing for. The other is just sort of like a channel evolution process. So the idea that once the channel is incised, it becomes unstable. It actually will continue to incise until it kind of reaches a new equilibrium. And so part of the process is actually helping the river achieve that new equilibrium. And so the way that trees come into this is that a lot of the river ecology, river science has really focused on the physical side of streams and rivers. So the idea that it's the geology, the valley rules the streams, I've heard that said before, and so it's a combination of the geology and the water, the hydrology that kind of determines your streams. And that's sort of like, where a lot of the science has been. What we're learning now is actually another critical component is the biology. And so the trees actually are also critical at shaping streams and rivers. You know, a lot of that is actually through that wood loading that wood jam that I talked about before. And then also the roots just holding-- the the way they hold streams together. And so we're recognizing now that streams with trees with healthy forests, people alive today have rarely seen a stream that's been in its unimpacted state, really, that had intact forests around it for 1000 years, however long it takes to actually form these-- you know, the end of this process, if you will. And so we're just we're just getting there. We're just beginning to learn this now. Like how important the trees are. Another piece is beavers. We talked about important, you know, animals that really like trees, you know, beavers are another key ecosystem engineer. And so in terms of biology, like our understanding of what streams and rivers used to look like, it's changing quite dramatically. And so the idea is, historically, all of the streams and rivers around here were filled with wood jams and beaver dams. And instead of being these, like long, single thread channels, you know, so you think about driving along 89, you see Winooski over there, and it's just like contained in a channel like that's one flume or whatever. Like historically, even though Winooski along 89 could have been this multithread wetland log jam mess, that's sort of like the idea is like, that's probably what rivers look like, and that's sort of where they're going now that we're allowing beavers back in, and we're allowing trees to grow again. And from a fish habitat standpoint, again, fish grow on trees. So we've actually, another fish biologist in St. Johnsbury, Jud Kratzer, has actually done research on this and shown that the fish biomass in these woods jams is up to 300% higher than in streams that don't have wood. And that's the only difference. Same stream, he's looking upstream, downstream. So just adding wood to the stream, just adding these log jams is increasing fish biomass by 300%.



Just to put that in perspective a little bit, I had Jud run some quick numbers, and he's treated about 50 miles of stream that had historically been used as a log drive stream. So they would go in with dynamite, they would blast everything around, they would cut all the trees, push them into the stream, and they'd go all the way down the river. He's gone into these areas, and you know, strategically added these trees to create these log jams, and throughout 50 miles, he's estimated that now they're seeing about 60,000 more brook trout per mile per year, which is a huge increase in biomass, which is great for anglers, but it's also great for the mink, and the eagles and all those other animals that use that as a food source. So, you know, not only is it providing that flood resiliency and all those other processes that we need to survive, it's also providing really good, good opportunities for improvement in brook trout and other fish populations.



Liz Woodhull 23:31

So how do various tree species differ in their benefits toward fish populations, and are there like key species people should plant to maximize their impact on fish populations?



Honestly, like any tree is a good tree, you know, just getting trees established is hard enough. That being said, you know, there are some species that we tend to favor, we tend to favor early successional trees that are gonna establish quickly grow quickly kind of form that canopy quickly. And so like cottonwood's a popular one, we also use a lot of bird species, and obviously species that can handle wet conditions. Something else that we're working with now are a lot of like shrub species, willows, dogwoods and alder that we can actually plant from stakes. So this is another interesting development. Because, you know, the idea is that stakes, you might be able to go out and collect yourself, like a landowner could actually go find a source-- but I'm not sure if I want to advocate for people to chop trees down! Anyway, if you find it a acceptable source! But in general, they're a lot cheaper than actually going out and buying a tree and they can potentially provide a lot of benefits for very little money, stabilizing the banks and helping prevent invasive species from establishing.

A

Alison Adams 24:47

And I like that you brought up the stakes and using live stakes like willow stakes and things like that and that that would be cheaper and also for people who listen to this podcast or are involved in the riparian forest restoration community, we also have a massive native tree stock shortage. And so being able to source tree material from other places outside of nurseries is potentially a benefit, yes, very complicated to talk about, like taking things from other pieces of land and using that for restoration, um talk to somebody who knows about doing that before you do it.



Yeah. And I will say, you know, this is something I feel like the department Fish and Wildlife Department is is one of the services I guess, that we can provide. So we, you know, we do own parcels of land across the state. And we're doing a bunch of experiments trying to improve our understanding of riparian restoration. But I think they also could potentially serves as sources for some of these species. You know, obviously, you need to contact your local fish biologist, or me or Bret before going out and harvesting them. But that is potentially a source for some of this material as well.

A

Alison Adams 25:51

Yeah, definitely. And definitely something that Watershed Forestry Partnership is thinking about as we think about some of these issues and how we might be able to address some of them. And I also like just bringing up, you know, we've been talking a lot about trees, but I like that you mentioned shrubs, too, because that's also important for other benefits, you know, having like a really diverse ecosystem structure, vertical diversity, as well as sort of that horizontal diversity across the landscape is really important for bird populations and other populations

that are out there. So good to mention that it's not just trees, there's a lot of shrub species that are good for riparian restoration work as well. I'm wondering what the intersections are between this like sort of riparian buffer, fish population intersection and climate change, like, is this becoming more important with climate change? If so, why? Sort of what are-- what are some of the key things that you guys are thinking about when you're thinking about the climate change is happening now, and over the next several decades?



Yeah, you know, we've been monitoring these impacts for quite some time. Water temperature is probably our biggest concern. So we do a lot of monitoring in various streams throughout the state where we'll do continuous temperature monitoring from June until October. And some of the work that was looked at throughout the statewide monitoring the Dog River flows not too far from my house here. We've been looking at that for 22 years now, and we are seeing a noticeable trend in warming water temperatures, which do impact fish. So fish are cold blooded, and they can't regulate their temperature, so depending on what that water temperature is, they may need to raise their metabolism feed more, or they just can't survive. So brook trout have sort of this critical threshold of about 68 degrees Fahrenheit, whereas if the temperature is over that for too long, they just can't survive. So they need to go and seek other places where they can either get that temperature and maintain it or they don't survive. So that's another reason we advocate for sort of that aquatic organism passage, if we can open up some of these streams, you'll allow them to move around and find those colder temperatures during the summertime when things get warm. But it's definitely something that we're seeing, especially sort of on the shoulder seasons. So earlier in the season in May, and then later in September, we're seeing warmer temperatures. And, you know, water fluctuates in temperature less than air does every day, but it's still fluctuates pretty considerably. And if you don't get that cooling in the evening, and then more warming during the day during the hot spells, then it can have have more of an impact on those populations. So the more we can do to provide more shade, cool the soils, not only just in the water itself, but also those riparian areas surrounding the water. If we can cool those soils and provide cold water inputs where there are seeps or springs and things like that, then we can really sort of get ahead hopefully of this trend that seems to be happening that is going to continue to happen.



A Alison Adams 28:44

Yeah, definitely, that makes a lot of sense. Will, did you want to add anything?



Yeah. I mean, there's actually another dimension that we're concerned about as well. We're seeing more extreme floods, that's definitely a concern. The other thing we've seen the last couple of years are droughts, we've actually had a bunch of streams that typically have flowing water year-round, we've seeing a couple of streams dry up. And so you know that that's definitely that's definitely a problem for fish! And uh, what we know is that if you can store that water in the headwaters, you know, either in the groundwater or there's some science supporting like wetlands, and it's particularly beaver wetlands as a way to actually capture either snowmelt or stormwater things like that. So you don't get the extreme floods, you know, that's got that benefit, but also that water then gets released more slowly, and so you end up

without the low drought drying up, either. And so restoring headwater wetlands, you know, restoring these forests, that kind of-- the process, you know, that kind of support the base of that that wetland process--is another potential benefit of riparian restoration and climate change in particular.

A

Alison Adams 29:52

That's awesome to hear! Lots of--as usual--lots of ways that riparian forest restoration can help in a lot of different dimensions. So given that, I know that a lot of riparian forest restoration practitioners that I work with and probably that you work with, Will, already know that their work benefits freshwater fish. But are there things they can do to support fish populations in their work even more effectively than they already are? And also, what can the general public do that's not already doing that kind of work?

i

I mean, the thing I always encourage people to do, you know, Bret mentioned at the beginning, is protection. Like, if you have an intact riparian forest, enjoy it for what it is, it's a beautiful thing, it is doing a lot, it's actually doing a lot of work for the environment, you know, so just protection. It's hard to get that message out, because there's no, there's no funding, you know, people don't get paid to go out and say, "You're doing a great job!" But we're trying to do that. So I mean, that's one thing. And then the other is from the state, you know, we're not always the best messengers to landowners, and so often somebody within that landowner's community, who they trust, and so like a neighbor to neighbor conversation, like that can actually be the most effective in terms of getting somebody, you know, "Hey, I saw that you did a tree planting, what's that about?" Starting those conversations, turning landowners into advocates for their stream and river. Something we haven't really hit on, but the reason we do this is not just to help that landowner, but it's really to help the river and the whole watershed. So it's going to take the entire community coming together and restoring their river, their riparian buffers along the whole length of the river together, you know, it takes a community to achieve these benefits. So yeah, I mean, having-- having the landowners be the advocates is, you know, that's awesome.

i

Part of it's also shifting that understanding of the benefits versus how it looks. So a lot of people look at something that's overgrown and got a bunch of messiness, as something they don't want, they mowed down to the edge of the stream, and they think it looks nice. But sort of trying to work through outreach to change that mentality to be like, this is way more of a benefit than it might look nice out your back window. What about these species that you might be seeing? These birds that you might hear sing? These fish that you might see come back to this area? So a lot of what we do is trying to get that outreach to those folks that own 80% of the property in the state to just think about those things as they put together a plan for how they want to manage their yards.

A

Alison Adams 32:19

I really like your point there, Bret, about how appreciating what's in it might help people change their aesthetic appreciation of a restored riparian area or a conserved riparian area. I think about like how my perspective on what's beautiful has changed over time, as I've learned, more and more things are invasive species, and then I don't think they're pretty anymore. So what I hear about this sort of cultural idea that removing the trees from like an agricultural landscape, makes it look neater, and that's better, and it's prettier, and how we could address that sort of cultural aesthetic preference. And like, it hadn't occurred to me like, yeah, my preferences have gone the other direction based on what I've learned, and so maybe there's some amount of just like learning what's there could help you think it's more beautiful. I really liked that idea. I'm gonna think a little bit more about that.

L

Liz Woodhull 33:07

Yeah, my natural resources classes my teachers would say "messy is pretty."



Yeah, we use "mess is best."

A

Alison Adams 33:13

Oh yeah I like that!

L

Liz Woodhull 33:16

Is there anything either of you have been working on recently related to fish and riparian areas that you'd like to share with our audience?

B

Bret Ladago 33:24

Will's got all the, yeah, Will's got all the ongoing projects, I just kind of help out where I can. But he's really the got the boots on the ground and working with the partners to get this stuff done, so--

W

Will Eldridge 33:33

Yeah, so the Fish and Wildlife Department, we are fortunate in that we have the capacity to do a lot of research and practice on riparian restoration. We own land, so we can actually do tree plantings on our land. We can also work with partners to do that. So we can provide opportunities for them. And you know, they can reach out to their constituents or school groups, you know, I love working with school groups doing tree plantings. We can also, like I said earlier, you know, we can try to advance our understanding the science of riparian restoration. And we've been doing a lot of work in that area. So there's another colleague of ours, Pete Emerson, has been looking at ways to restore former hay fields to try and get trees

established there. And so he's been doing a lot of work on what's called hydroseeding. It's a technique of trying to control the hay or a lot of it's reed canary grass, which just-- trees will not grow in reed canary grass. Like even if you plant them, the survival rates are very low. And so he's been doing a lot of work at trying to like how do you take a hay field and turn it into a forest. And then we're also, there's a lot of concern about herbivory, so like beavers and deer that eat planted trees. And so we're doing some experiments working with some partners, National Wild Turkey Federation, we're trying to look at ways either planting designs, so clustered plantings or spaced out, and exclosure, so like putting a fence around the trees, either the clusters or the individual trees. So anyway, these are-- these are ongoing experiments. We don't have any data yet. So that's like, you know, the things that we can do. And then like I said before, another is like, we have this land, trees are growing on it. They could be the source for live stakes. You know, we talked about willow or alder or dogwood, you know, I really hope that Fish and Wildlife can help advance the practice of riparian restoration in the state. We don't have the capacity to do it everywhere ourselves--we really want to work with partners on this. So the extent that we can build everybody's capacity and understanding the better.

A

Alison Adams 35:31

Awesome. Well, I think that this podcast goes maybe a little bit of way to building a little bit more understanding. I hope! So--

L

Liz Woodhull 35:38

Yeah. Thank you both so much for coming on to the podcast and sharing all this information. I feel like every time we do an episode I just learn more and more benefits about riparian buffers. It kind of seems like it's never ending.

B

Bret Ladago 35:51

Yeah, thanks for having us.

W

Will Eldridge 35:52

Yeah, awesome.

A

Alison Adams 35:54

Yeah, absolutely. Thank you so much.

L

Liz Woodhull 36:07

The bird featured in today's episode was the call of the Warbling Vireo. It was recorded by Ezekiel S. Jakob on June 6 2013, in Northfield, Massachusetts.

A

Alison Adams 36:18

For more information on the topics covered in this episode, including links, images and more, visit the Restoration Roundup Podcast tab of Lake Champlain Sea Grant's Watershed Forestry Partnership website. This project has been funded wholly or in part by the United States Environmental Protection Agency under an assistance agreement to NEIWPC in partnership with the Lake Champlain Basin Program.