



watersheds  
program

# treeline

partnering for climate adapted forests

December 2023

**Treeline aims to:** Engage PNW restoration practitioners, nursery partners and researchers who work for or represent Tribes, Indigenous groups, non-profits, agencies, businesses and more. We gather, disseminate, and discuss information and knowledge across a broad region.

## The Adaptation Action Issue

This issue of Treeline focuses on the work federal, state, local and Tribal governments and NGO organizations are taking on to facilitate adaptation to climate change in the ecological and social realms.

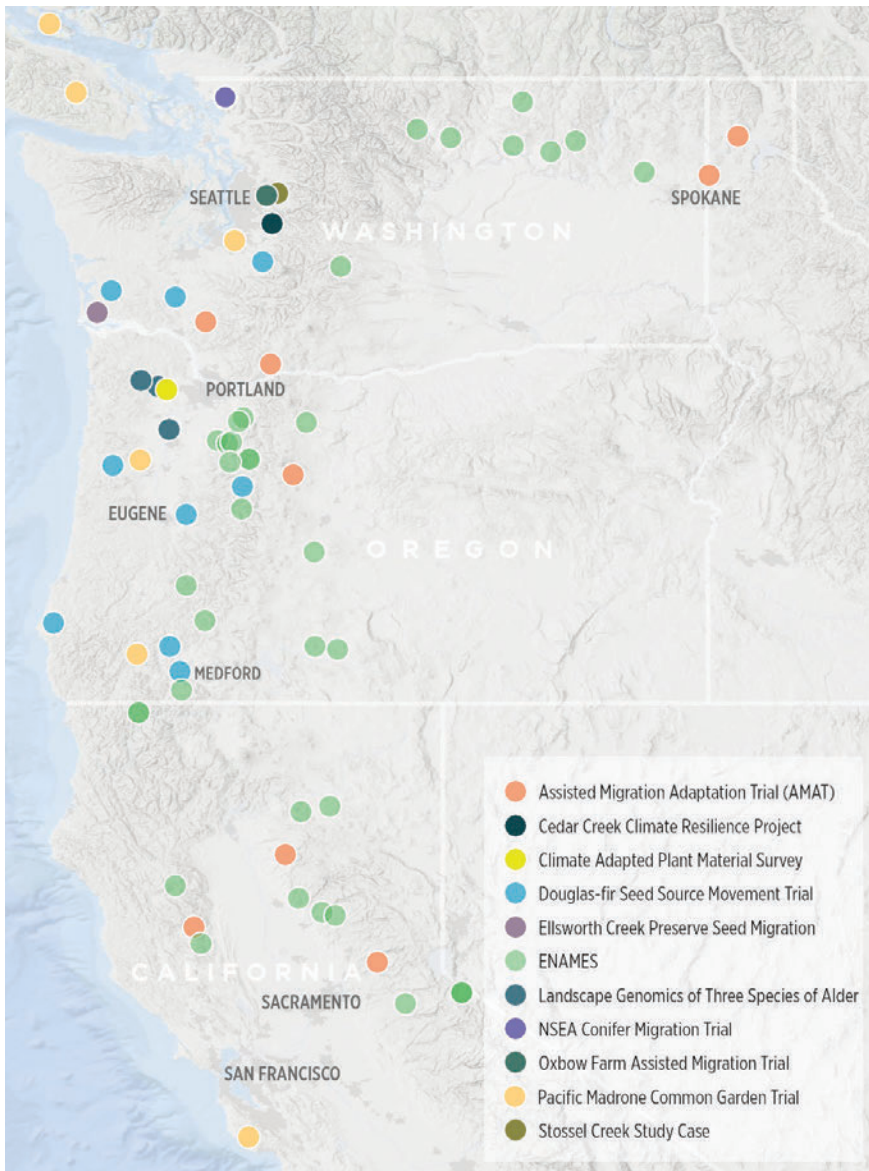
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**Missed the September Treeline Newsletter?** Click [here](#) to learn about how our partners are building capacity to deal with climate change.

**Interested in submitting an article?** Reach out to Kayla Seaforth [kseaforth@b-e-f.org](mailto:kseaforth@b-e-f.org)

# Past, Ongoing and Planned Assisted Migration Trials

The map below shows planting locations for assisted migration trials that have been implemented or are planned across the Pacific Northwest. These include trials examining assisted population migration, range expansion, and assisted species migration.



For more details on the trials shared click [here](#).

## Assisted Migration: Climate Adaptation on a Spectrum



### Seed Migration

Seed sources moved climatically or geographically within their current ranges



### Range Expansion

Seed sources or plant materials are moved to suitable areas just outside of ranges



### Species Migration

Species moved outside current ranges to prevent extinction or to be a surrogate for another species in decline

Williams & Dumroese (2014)

The trials shown on the map on the left are information gathering endeavors that tackle a range of potential climate adaptation actions for tree species that fall under the broad category of assisted migration. Seed migration may be referred to as the most conservative option in this framing, and is the focus of the majority of trials. Some trials seek to better understand how particular species will fare just outside of their current identified range, known as range expansion, which is an action with some additional risk compared to seed migration. The third category, assisted species migration, is only being addressed in a handful of the trials depicted. While discussions of assisted migration often jump to this third option, it tends to carry greater risk of unintended consequences, and many of the trials addressing this are small in scale and include species migration in addition to seed migration and/or range expansion.









## A Network Approach to Assisted Population Migration

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*This interview was conducted by Kayla Seaforth (BEF) with Rob Slesak, principal investigator for the Experimental Network for Assisted Migration and Establishment Silviculture (ENAMES) research project being led by the US Forest Service. To learn more about the project and its contributors, please visit the [project website](#).*

**KAYLA SEAFORTH:** Hi Rob, can you tell me a bit about the ENAMES Project?

**ROB SLESAK:** The overall goals of the project are pretty straightforward; we're trying to develop information that can be used by forest managers and landowners to guide how they go about doing reforestation, in the context of implementing climate adaptation strategies. Our big focus is on testing assisted population migration, where we're moving seed

sources from areas where they were historically adapted to areas where we predict that they'll be adapted to under future conditions. We also couple that with testing various practices that can be done at the time of planting that may increase the successful establishment of seedlings. This is especially important since the seed sources won't initially be adapted to these climates, and we want to give them the best chance of survival. The main objective that drives the project is to provide useful information to forest managers. Because of that, we work with partners in a co-production type process, where we work very closely with individual landowners and land managers to develop treatments that are of interest to them, and allow them to pick which species they want

to look at. This ensures they have a lot of buy-in and increases the relevance of the research.

The project is a collaboration between the Pacific Northwest and Pacific Southwest Research Stations. We also work very closely with Region Six of the US Forest Service, which services Oregon and Washington. All the geneticists that work within the region are highly engaged and committed to this project. They're the ones who got this project going through the identification and implementation of some of our first sites. We're working collaboratively to try to build the biggest tent possible in terms of covering as many different entities as we can. This fosters a shared community that we hope will yield positive outcomes. Our partners include



Photo Credit: Tessa Franklin



multiple National Forests, Washington DNR, Oregon Department of Forestry, BLM, and the Confederated Tribes of the Colville Reservation.

We're also trying to branch out to engage with industry. So far, industry hasn't been too interested in this work because they use genetically improved seed, which has been developed through a breeding program to grow trees with the characteristics that they want. Our project uses wild collected seed, so it isn't super applicable to their situation. However, we've recently initiated some conversations with some members of the Northwest Tree Improvement Co-op to see if we can involve them in some trials using improved seed.

Working with improved seed actually presents a unique opportunity for research. The idea is that we can use information from the parent trees that they use to create improved seed sources to come up with an average climate for each one of those and essentially do the same thing that we're doing for the other sites involved in ENAMES. It may take a couple of years to get going, but we're very excited about the prospect of working with them.

**KS:** How are you thinking about monitoring across implementation sites?

**RS:** Right now, we plant the seedlings, and after the first year, we go and assess immediate survival and first year growth. And then, the least we're going to do is every five years thereafter, go back and

measure survival and growth. We'd like to go back more frequently, and we will if we have sufficient resources to do so. But we're up to around 35 sites all the way from California to Washington. It will take a lot of resources and personnel to get out to all of the sites, so we need to be practical with our monitoring commitments.

We're also taking some site characterization measurements; we're going to look at the physical and chemical properties of the soils, and we're also measuring some climate variables like air temperature and precipitation. For the seedlings, because of the scale of this, all we're committed to right now is very basic measurements of survival and height and diameter growth. I do expect that there's going to be interest from individuals to do additional monitoring projects. We have little clusters of certain site conditions and species, for example, we have a nice cluster of ponderosa pine in eastern Washington that I can see somebody doing much more detailed measurements with. We also have a cluster of Douglas-fir in the Willamette Valley, where we're looking at different vegetation control treatments. So that'd be a nice subset where maybe people would do more measurements related to things like quantifying competing vegetation, or drought stress or something along those lines. Right now, we're getting things established and continuing to get the word out that we're very open to collaborating with pretty much anybody on this.

Our experience has been that if we set up a well designed study, especially one that covers a wide geographic range, scientists are typically interested. At the same time, though, even just growth and survival will be enough to provide useful information in terms of determining the optimal climate transfer distance.

**KS:** What is the timeline for your findings becoming available to the general public?

**RS:** This information will start being useful about five years after planting. Now, that's on the practical science level, defining the climate transfer distance. But in the interim, there are going to be other opportunities to provide useful information to move forward the idea of assisted population migration as a climate adaptation strategy for reforestation. I hope introducing the concept to a broad audience will build momentum for all of the steps to make assisted population migration operationally feasible. For example, how do people locate seed from other regions? And how do they get that seed to the nurseries? I hope our project and others serve as catalysts to address some of those questions. I would love to see something like a seed clearing house where there could be an inventory system where all landowners have access to seed that is appropriate for future conditions. It's going to take time, so the sooner we can get going on this, the better.



Snowy planting in the McKenzie Ranger District. Photo Credit: Scott Kolpack



Ponderosa pine germination. Photo Credit: Rob Slesak

**KS:** Have you run into any issues sourcing the seed for the ENAMES project? What do the logistics look like?

**RS:** It hasn't been too bad, because each region does have its own list of what seed they have for a given seed zone. All of the landowners that we work with, in general, have access to seed in some form or another, whether it's wild collected seed or from an orchard. The quantity we've requested, compared to what they use over the course of a regular season, is relatively small. I think it's entirely a function of who we are and the access that we have. For other landowners who don't have the access that we do, this whole process would be pretty impossible. It's a huge barrier for private landowners, or people who don't have access to dedicated sources of seed, to actually implement an assisted population migration project.

**KS:** Has it been challenging to implement comparable projects across different ownership types?

**RS:** There are definitely differences amongst the sites but they largely have to do with how communicative partners are. I would say that's the biggest challenge: open communication and getting information back and forth at the rate we need in order to make decisions. Something we have to be aware of as we go forward and will become a factor when interpreting the data, is that the primary objectives of the different organizations differ slightly. The level of site preparation across partner sites varies greatly. Things like that can have a huge influence on survival. We'll see that pretty clearly in the data and just need to be aware of it.

Other things that are really important to keep track of are things like site conditions at the time of planting. This past spring, we planted five sites in Region Six, and it was a horrible year for planting. We had so much low elevation snow that we couldn't get into the sites until the end of April. Then the rains stopped shortly after, and things warmed up fast.

We haven't been back to the site yet, but I'm guessing we're going to have very high mortality. Once the seedlings are ordered and they're ready to be planted, they have to be put in the ground. It's actually a pretty relevant situation,

because that's what managers have to do — they can't really wait for the perfect conditions or completely mitigate the conditions of a bad planting year.

**KS:** Is there any momentum toward moving from the current "local is best" seed policy to a more climate based seed transfer policy that might be informed by some of this work?

**RS:** That "local is best" mantra has historically fit really well, especially in the western US where we have a lot of species that are evolutionary specialists with narrow climatic ranges, and we have a lot of variation in climate. At this point, there's no concerted effort to create regulations about transfer distances. In fact, for a while there were questions at the Forest Service about whether or not federal policy prohibited use of seeds outside of the traditional zones. There's movement to clarify the language that will reduce ambiguity around considering alternative seed sources, outside of the historic seed zone. At the national level there are also efforts to develop guidance for the national forests about how they can go about doing assisted population migration.

**KS:** With the varied land ownership in the United States, what do you think is the right scale of coordination around this effort?

**RS:** For climate adaptation in general, I think a variety of scales is appropriate. Certainly the stand scale is the easiest; there's much more local control and you can influence exactly what's happening. As you get larger it gets more challenging, and maybe the objectives become more diffuse. I've had conversations with geneticists where we were trying to figure out, on a landscape scale, how much assisted population migration you need in order to make a difference. That it can be viewed in a couple of ways, like providing enough refugia for a given species and enough area where they're probably going to adapt to the future climate so they remain on the landscape, provide a seed source and so on. But also, how much assisted population migration and in what configuration do you need to do in order to start integrating the genetic material from the source climate into the local climate? Nobody ever has a good answer for that.

You could say more is better. But just the practical limitations alone are huge barriers. There's not enough capacity to do the things that we were supposed to be doing all along, much less adapting management in a way that's going to be responsive to climate in the future. More is better, larger scale is better. But there are practical limitations, and if we can start taking on some local efforts to get small scale projects implemented, that's a start. It serves as a baseline to build from.

**KS:** Is there anything else you'd like to share?

**RS:** One big piece of this project is developing really nice engagement tools, which we're doing through the development of a website. It'll be interactive, with some of the basic information about assisted population migration, key concerns, and a summary of existing literature. We'll also share our data and summaries as they become available for each site. It should go live sometime next year.



**Rob Slesak** is a Research Forester in the PNW Research Station based out of Olympia, WA. His professional interests incorporate silviculture, forest soils, forest hydrology, and applied forest ecology. He received his PhD in Forest Soil Science from Oregon State University and holds MSc and BSc degrees in Forest Science and Management from SUNY College of Environmental Science and Forestry. He is currently leading the development of a new experimental network across the western US to evaluate the use of assisted population migration and novel silvicultural practices to increase reforestation success.



# Thermophilization: Definitions and Implications

By BEF Staff

Human-caused climate change is altering ecosystems in real time. One shift that has been quantified in recent years is a change in species composition linked to temperatures and precipitation that deviate from historic norms, where plant communities become dominated by more heat tolerant species — a process known as **thermophilization**.

A [study](#) of California forests looked at the thermophilization of understory plants following disturbances that affected forest canopy cover, and found that thermophilization rates may speed up following large scale disturbances like wildfire ([Stevens et al. 2015](#)). Forests tend to have a buffering effect on the microclimates they host. In areas of contiguous, or near-contiguous forest cover, air and soil temperatures, irradiance and evapotranspiration demands all tend to be lower. The study looked at the locally abundant yellow pine-mixed conifer forests of eastern California, and examined floristic community level metrics in stands that 1) had experienced different levels of disturbance and 2) had plant communities reflecting different biogeographic affinities, ranging from more moderate “northern-temperate” to “southern-xeric” (dry) plant communities. The study found that under increased disturbance severity levels, plants with northern-temperate biogeographic affinities decrease in abundance with increased disturbance severity, while plants with a southern-xeric biogeographic affinity increased. The observed plant community composition changes are likely driven primarily by drought stress. In areas experiencing severe,

frequent, or widespread disturbance, we may see a more rapid rate of thermophilization across the landscape.

This shift isn’t just occurring in the understory. While it takes longer to perceive, [Rosenblad, et al. 2023](#) have found that thermophilization of tree communities across the Western United States is widespread, and is more prevalent in areas that have experienced higher temperatures and greater levels of drying. The authors find that “forest trees are becoming increasingly mismatched with their environments, potentially threatening ecosystem service provision” (p. 1).

## Factors influencing thermophilization rates:

1. Temperature increases
2. Changes in precipitation and hydrologic variables (e.g. Vapor Pressure Deficits)
3. Forest canopy disturbance severity
4. Topographic and aspect features (e.g. hillslope orientation)
5. Presence and degree of insect driven mortality

On one hand, the community composition change known as thermophilization is an adaptive response by plant communities. This adaptive response to environmental change may preserve plant cover and ecological services as the





climate changes. On the other hand, thermophilic plants that thrive in altered conditions may or may not provide the same benefits to wildlife, hydrology, and numerous other physical and biological elements of the ecosystem. This, coupled with the fact that community level species change is not keeping pace with climate change, indicates that interventions will likely be needed to preserve the function of natural areas as providers of wildlife habitat, carbon storage, water filtration, clean air and more that we have come to rely on. Extreme weather events that disrupt pollination may further aggravate the “temporal mismatch” in which plants and pollinators become out of sync with one another.

While changes to ecosystems are happening in real time, there are actions managers and policy makers can take to reduce the impact of these changes. Habitat connectivity is not just important for wildlife. By preserving intact ecosystems, especially forests, we can retain resilience on several levels. First, large and connected forests tend to be more resilient to disturbance. **Evidence suggests** that continuous canopy cover, as well as diversity in topography and elevation, tends to foster more varied microclimates, which can have a buffering effect against extreme heat and drying, and help preserve habitat for existing species. Additionally, connectivity across geographic and elevation gradients may lead to more opportunities for **gene flow** and trait selection among plant populations, which may be helpful, especially following disturbance.

Many researchers and managers are invested in understanding opportunities and risks regarding how plants from other climates can survive and potentially provide ecosystem services in future climate scenarios through assisted population and species migration trials.

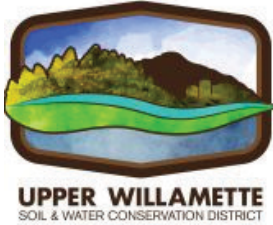
**“The pace of climate warming is clearly accelerating in recent years, leading to not just increased temperatures and associated changes in things like snowpack amount and duration, but also to increasingly potent heatwaves like the record-shattering Heat Dome of late June 2021 in the US Pacific Northwest and western Canada.**

Evidence from long-term forest monitoring sites in this region suggests both short-term and long-term heat stress responses in tree function and growth. These responses were influenced by a variety of factors including species composition, tree age, aspect, and topography. Specifically, the amount of leaf scorch following the Heat Dome was largely determined by sun exposure during the hottest afternoons of the event, leading to south- and west-facing slopes with the greatest leaf mortality. Tree mortality was greatest in seedlings, especially in western hemlock and western red cedar. And tree growth of mature and old-growth Douglas fir trees at multiple locations in the western Cascades was greatly reduced in both 2021 and the following year. These various impacts imply that thermophilization will be influenced by not just long-term changes in the mean temperature and drought stress, but also by extremes in temperature (heat shocks) like the June 2021 Heat Dome event.”

*-Chris Still, Department of Forest Ecosystems and Society, Oregon State University*







## Strength in Numbers: How partnerships can show up for communities in the face of catastrophic wildfire

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*The Pure Water Partners program is a collaboration between organizations that support the stewardship of healthy riparian forests for landowners in the McKenzie River Watershed. Through voluntary stewardship incentives, partners help landowners assess their properties and provide resources to protect and restore riparian forests in an effort to maintain clean water, healthy habitat, and fire resiliency. During the Labor Day fires in 2020, the already-existing Partnership faced many challenges in supporting the wildfire recovery effort, and were able to shift their operations towards immediate on-the-ground support for those affected. Nancy Toth from Eugene Water & Electric Board and Lily Leitermann from the Upper Willamette Soil & Water Conservation District joined BEF's Julia Jaquery to discuss the Partnership's key role in wildfire response, recovery, and future resiliency efforts for the McKenzie River watershed community.*

**JULIA JAQUERY:** Tell me about the Pure Water Partners program and the conditions that led to its formation—what is the program's vision for climate-adapted rural communities?

**NANCY TOTH:** The Pure Water Partners Program began around 2014. It was a collaboration between a number of different watershed organizations and agencies in the area. The idea for it grew out of a proposed drinking water protection and floodplain ordinance in Lane County in 2010 that drew the anger of a lot of upriver residents. Long story short, that whole effort failed.

Karl Morgenstern, the Water Resource Supervisor at the time, had an idea to create a program that was purely

based on voluntary engagement and stewardship upriver. The initial concept was to focus on protecting healthy riparian areas in floodplain forests, because so much funding is dedicated to restoration. We wanted to have a way to reward landowners for maintaining healthy riparian areas and provide them with financial incentives and technical assistance. At the same time we also acknowledged that there's a lot of restoration that still needs to be done. Thus, we integrated both of those components into the Pure Water Partners Program.

The other piece was that we wanted to work together with our partner organizations to achieve common goals in a more efficient and effective way



Photo Credit: Lomakatsi



than each of us pursuing individual grant opportunities here and there. Instead, we wanted to try to create a more programmatic approach to protection and restoration. In terms of climate adaptation, we're hoping that we can help protect water quality while also building resilience in local communities to some of the increasing natural disasters we've seen.

**LILY LEITERMANN:** We had a soft launch of this collaborative model in 2018. We eventually moved away from a pilot phase into working through the program and seeing if everything we had tested in the past was functioning properly. That phase was in place for a couple of years before the Holiday Farm Fire happened, so we already had an established framework for working together leading into the fire. We were able to pivot everything once the fire hit, and our focus expanded dramatically from just water quality protection and restoration. Suddenly, we had to focus on this immediate disaster and the response to pull together our resources quickly. The structure that we had in place for funding really helped leverage more dollars and also positioned many people out on the ground quickly so that we could use or adapt our existing assessment tools to emergency response.

Out of that experience and moving forward, many aspects of the program have changed. For instance, there is more focus on fuels reduction than we planned as part of the last iteration of the program. As for climate adaptation and resilience, pre-fire that was a big goal, but it wasn't in our face so much. Now we are asking, what are the actual impacts of a natural disaster on the community, and how many resources are needed to recover and be resilient? What does resilience mean to us and these communities? We are reimagining our role in the community as a part of that resilience, helping people immediately after the fire and talking to them about their concerns for their property and how to replant an area or recover the ecological conditions. But also, the community social aspect is much more at the forefront of our thinking now. How well are people connected to each other? What are the resources they need? And how are we partnering with local community organizations to support preparedness and resiliency?

**JJ:** Did your partnership expand after that event to include those community organizations? Or did organizations in the existing partnership take on new roles and responsibilities?

**LL:** The partnership didn't formally expand, but we started working with more community organizations. We also started working more closely with the Oregon Department of Forestry and McKenzie Fire and Rescue, but again, not formally, just in more conversations and through grant applications. The roles and responsibilities of the partnership organizations also shifted in many ways, like the expansion of the number of staff members, new types of roles they were playing, and the structure of decision-making.

**NT:** Before the fire, we were calibrated to deal with a certain pace of landowners entering the program. Post-fire, that pace increased dramatically. We needed to expand quickly to meet that demand,

and in addition to the work that we took on, we also worked with additional partners. For instance, we worked with Lane County and their new permit navigator, whose job was created to help McKenzie residents with the recovery and rebuilding process. We wanted to make sure to connect landowners with the appropriate resources around permitting and rebuilding. We also referred landowners to other agencies with different forms of assistance. For example, the PWP does a broad property assessment, but our expertise is not in working in the upland portions of their land. So we might refer them to NRCS or ODF, or other agencies that might be able to provide that type of assistance.

**JJ:** What are the responsibilities of each of your organizations within the partnership?

**NT:** Interestingly, in the beginning, EWEB [Eugene Water & Electric Board] led the formation and funding of this



Photo Credit: North Santiam Watershed Council



partnership, but over time, EWEB has stepped back and other organizations have stepped forward as they have built capacity. It is a good working collaborative in that sense. One entity has to sign the agreements with landowners and EWEB was in the position to do that; we have lots of easements with customers for property access in our organizational model. EWEB signs the protection and restoration agreements with landowners in this partnership and does a lot of program coordination, supported by the other organizations. After the fire, the McKenzie Watershed Council, the Upper Willamette Soil and Water Conservation District [UWSWCD], and McKenzie River Trust were the core organizations that sent project managers out on the ground to do the property assessments for landowners, collect the data, write up the recommendations, coordinate the work, etc. At the beginning, EWEB provided the majority of the funding, but post-fire, we were able to bring in a lot of emergency response grant money, and in the same timeframe, the SWCD got a tax base. So that really helped to bring in additional funds.

**LL:** One thing that shifted with the fire was the funding piece — we could leverage more grants, and then getting the tax base changed UWSWCD's role from just being an implementer to a funder. Each organization has dedicated more resources to the Pure Water Partners Program, and specifically to

the Holiday Farm Fire recovery effort over time. There is now a need for daily coordination and communication efforts rather than weekly or monthly, as in the past. There's much more of a team-oriented work structure. Everybody's in it together even though they're responsible for their individual landowner and property management and working for separate organizations.

**JJ:** Can you tell us about the process to secure the federal funding to achieve wildfire resilience goals, and the challenges to applying for and managing this funding?

**NT:** One of the things that EWEB did right away after the fire was dedicate internal funding to start work on the ground immediately, with the expectation that we'd eventually be reimbursed by FEMA or other grants. That timing was essential, because we wanted to start removing hazardous materials and implementing erosion control measures as soon as possible. We had to work through Lane County to apply for the FEMA relief funds, which we eventually received. The FEMA funding reimbursed us for basically all of that initial assessment and implementation work in the first year after the fire. But that took a while; I know that in other watersheds, getting funding to start work was a huge hurdle, because people were waiting for grant funding to come in before they could do things on the ground. We had a great advantage in being able to begin work as soon as we could get into the fire area, while we were simultaneously applying for grants.

We also received some ARPA [American Rescue Plan Act] funding for septic system repairs and replacements. We received two sources of funding; one came through DEQ [Oregon Department of Environmental Quality], and one came through Lane County and Biz Oregon. However, this took over a year to get this funding on the ground. Additionally, we worked with state legislators who assisted us in getting funding for some of our large-scale floodplain restoration projects.

**JJ:** What do you see as the overarching goal for the McKenzie watershed? What would it look like for landowners to be part of achieving that goal, in terms of fire resiliency and riparian health?

**LL:** We have similar goals to when we started the partnership: protecting the sole source of drinking water for Eugene and Springfield, and providing healthy wildlife and riparian habitat. We're re-evaluating the program goals as a collaborative because we've realized that the fire has changed our scope of work at scale, and it's been a challenge for all of us. Also, there's been new staff entering and high turnover, so it's been a challenge to adhere to the original goals and structure of the program and even see the watershed through the same lens we had. It's changed dramatically — the landscape has changed, people have changed, everything has been impacted. We are learning about what it means to have this kind of mega wildfire change the landscape and people. We know what has happened in the short term, but what does it mean for the long term?

Yet, there are challenges to expanding our scope to include things like fuels reduction. It's a big task, and so many factors go into it. We want to be more integrated with the community and the ecosystem than we were in the past and not look just through the lens of solely riparian areas and water quality protection. We've been working hard to focus on the diversity, equity, inclusion, and socioeconomic considerations of who lives along the river and the tributaries who benefit from the types of programs that we've offered, the funding that we've leveraged, and who needs these resources most. We're asking what that means for resilience over the long term, supporting vulnerable people who don't have the means to rebuild or recover quickly from a disaster's impacts.

**NT:** Since the fire, we've also incorporated a "Firewise" aspect to our program. We worked with the University of Oregon Landscape Architecture program for a term; they had a studio class where they paired teams of students up with landowners in the fire area and worked with them on re-envisioning what their properties could look like as they rebuilt, thinking about these Firewise practices. Out of that studio, a graduate student helped to integrate these suggestions and practices into a fire resilient landscaping guide that we now give to landowners. This provides landowners with information they can use to manage their properties with fire resilience in



Photo Credit: Natalie Collar

mind. We also provide technical assistance and incentives for naturescaping on their properties.

**From the National Fire Protection Association:**

“The national **Firewise USA** recognition program provides a framework to help neighbors in a geographic area get organized, find direction, and take action to increase the ignition resistance of their homes and community and to reduce wildfire risks at the local level.”

**JJ:** What have been some of the specific challenges in engaging some underserved or hard-to-reach groups?

**LL:** From the beginning of the fire, we had a lot of resources, and we didn't put any parameters around who received aid. We were helping everyone who asked for it. But as time went by, it became apparent that those with more resources had more of an ability to engage with the available programs because they were starting from a different level of recovery. As we became more aware of these issues in conversations with impacted residents during fieldwork, we noticed that some people needed more help than others. However, determining the correct and equitable path toward allocating those resources was challenging for our organizations. We were asking, what does equity look like? And what is our measure of that? Our organizations have many different interpretations of what that might mean. We started a Justice, Equity, Diversity, and Inclusion subcommittee to discuss these concerns. We were all aware that our resources were most likely supporting people who have more resources because they have the means to live along the river, and a portion of them have second homes. The committee worked on a DEIJ intake form to better understand the circumstances of the people entering the program. We paused when we were challenged to think about using that information as a tool for equity.

We hired a DEIJ consultant, the Avarna Group, to help us with a broad scope of work — first, an internal culture assessment and DEIJ lens, what's happening internally with our collaboration, the relationship we have as partners, and next, how we are engaging with the public and effectively providing resources with an equity lens. We also collaborated with the McKenzie Valley long-term recovery group and their caseworkers, who provided their data from a needs assessment conducted post-fire to many residents throughout the watershed. We've had various strategies, but in the meantime, we're still challenged for many reasons. Yet, I am hopeful we will commit to DEIJ as part of the PWP and work toward addressing inequities and injustice.

**NT:** We also reached out to disaster case managers to let them know what our program could offer to residents, which resulted in some follow-up engagement with landowners. From a programmatic approach, it's been really challenging to figure out how best to reach and assist underserved groups, and there doesn't seem to be a lot of concrete examples to draw from in terms of how to accomplish this most effectively. We are struggling with that and hope that we can be in a better place in the future to make sure that these resources are going to people who really need them.

**JJ:** Do you think that, in a similar fashion that you've expanded your collaboration with organizations outside of the partnership, there's an opportunity to do that with medical or social organizations as well?

**NT:** I certainly think there are additional opportunities. For instance, there is a new non-profit called the **McKenzie Community Land Trust** that's working on rebuilding affordable housing. There's a group of agencies working to try to find a better solution for wastewater treatment for the town of Blue River, which was largely destroyed during the fire, and we are trying to work with the county and other organizations to see how we can best support them and protect drinking water quality. We are continuing to partner with the McKenzie Valley Long Term Recovery Group, because they have been successful addressing a lot of the social issues and immediate needs of McKenzie

residents. It is critical to look at the whole picture with this work.

**LL:** I think it's important not to be so siloed, to be specific about how we accomplish our goals in the watershed, and to realize how important it is to be connected cross-sector ahead of a disaster or any event like this. So, even if we don't have a definite connection to a particular organization or group at the time, it's good to have those relationships, especially local and community-based.

For example, our focus is on the environmental aspect of recovery, and we are not trauma-informed care providers or healthcare providers. Immediately post-fire, we were communicating with landowners about what we were there to do: slow or stop harmful erosion, protect the water quality, and restore native habitat. During those first few years and even now, we listened to resident's survival stories and the tragedy they had experienced, and they needed people to listen. Staff listened and offered empathetic responses before, during, and after we talked about the plans to restore and protect their riverbanks. Even if there was nothing that I could immediately offer to them, they very much appreciated someone being there and acknowledging that they had been through a traumatic experience. After the fire, people see a burned landscape, and it looks like everything's dead and won't return. We noticed after the first long winter and we started getting plants growing in the ground, around 200,000 that first year, people saw signs of hope. Planting new growth in a burned landscape actively nurtures healing and regeneration, and intentionally focusing on talking with people about what they imagined their property to look like, or what it looked like in the past and what their memories were, what was important to them and what they valued — all of this cultivated hope and healing. I think they could see that this would not last forever, and there was a chance of recovery or perhaps a different but also beautiful land they could call home and belong to.

One of the things we realized too late and might do differently next time is to provide healthcare resources for our partners, ourselves, or project managers



on the ground. We connected with the Trauma Healing Center in Eugene about a year and a half after the fire and had a few workshops with them, which was helpful. Recognizing the need for trauma-informed care sooner would have reduced stress and PTSD among staff, because they were dealing with a lot of trauma in the field, even if it was secondhand by listening to homeowners talk about their loss. In the future, that would be something that we try to implement immediately.

**Interested in learning more about trauma informed training resources?** Check out [Trauma-Informed Oregon: Workplace Wellness](#) and BEF's [TIC for land and water stewards](#) online training modules.

**JJ:** I'm curious about your interface with agriculture and forestry practices in efforts to do fuels reduction work. For the landowners whose properties neighbor industrial tree farms that are typically very dense, monocrop plantation forests, is there much conversation with the timber industry about how to mitigate fire risk?

**NT:** We have worked with some agricultural and small woodlot landowners to the extent that we can. Small woodlot owners are subject to regulations under the Forest Practices Act and soon the Private Forest Accord, so we have to be careful in this area. Our main focus has been on riparian areas, though we broadened our scope after the fire because there was so much need in the community. Most of the landowners we have worked with are very concerned about fuels reduction, and we were able to get some grant funding through ODF that helped to accomplish some of that work. But there is still a lot more that needs to be done and not a lot of organizations with the resources or expertise to conduct that work at scale. That is an ongoing challenge.

Landowners are also concerned about adjacent industrial lands, because of herbicide spraying and fire risk. We are starting to engage more with industrial timber and look for opportunities where we might be able to obtain easements or work together on larger floodplain restoration projects. Some of these projects that we have done in partnership with the Forest Service, McKenzie Watershed Council and McKenzie River Trust have been

instrumental in reconnecting incised stream channels with their floodplains. This helps to drop out sediment and spread out flows, reducing flooding, and filtering pollutants. Spreading water over a broader portion of the floodplain helps to make the landscape less fire prone and promotes resilience to wildfire. We continue to work with partners and are integrating private timber into these conversations about future projects.

**LL:** PWP has always engaged with agriculture and timber. The watershed supports various crops, hazelnut farmers, forestry, and ranchers. The UWSWCD and EWEB have long worked with those folks to try to reduce the amount of pesticide use and change practices. We wrote an NRCS National Water Quality Initiative Strategic Action plan to engage more with non-industrial private forest land. That said, we have had challenges with sustained engagement. We partner in a Regional Conservation Partnership Program with Sustainable Northwest, partnering with all the organizations/ areas involved in wildfire recovery from the Labor Day fires. That program aims to increase our capacity to assist non-industrial private forest landowners in addressing wildfire impacts on natural resources on private lands. The program



Photo Credit: Jeff Gersh



allows funding for invasive vegetation management, replanting, other site prep, forest fuels reduction practices, and implementing other resiliency-building practices. If we can make that successful, we hope to build upon relationships with these landowners to have more complex conversations. In the past our model was focused on direct tributaries and riparian areas and less on the upland. The UWSWCD is also going through a planning phase to define strategies that would be appropriate to advance landscape-scale forest health, fire resilience, and watershed quality activities.

**JJ:** Is there anything else you'd like to mention about what the Partnership is currently working on or hoping to work on?

**NT:** We're recognizing the need to eventually move away from this emergency response world that we've been living in over the last couple of years and figure out what our future program direction looks like. We would like to get back to the work we were doing originally, and figure out how to re-engage some of the landowners that we had worked with pre-fire who may have fallen by the wayside as we were responding to the fire. We are embarking on a strategic planning process to map out new and perhaps slightly different goals for the program based on what we have learned since the Holiday Farm Fire. At the same time, we are working to improve our technology for all of the field work and data collection processes to make our systems operate more efficiently. As Lily mentioned, we are also looking to incorporate diversity, equity, inclusion, and justice considerations into our work over the long term in a way that is meaningful and supportive of upriver residents. Ultimately we are committed to protecting a valuable drinking water resource, improving the overall health of the watershed, and helping to make the community more resilient in the face of a changing climate.

**LL:** Over the years of building this partnership, a lot of time and attention went into building trust and the collaborative process and ensuring that people in all of the partner organizations felt heard. Through the fire recovery process, we are seeing the effects of that underlying relationship/collaboration as a successful tool for

working together in very stressful times. As time has progressed in the recovery effort, we've had new people enter and leave the staff at each organization, and organizational roles and structures have changed. We've realized that along with that strategic planning, we need to do

more to build and earn trust among all of the members of the partnership. I think that will help us achieve all that we hope to accomplish as a collaborative. In anything that we do together, trust is foundational.

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### Bios:



**Nancy Toth** has worked at Eugene Water & Electric Board (EWEB) for 16 years as an environmental specialist/project manager working to protect the McKenzie River, EWEB's sole source of drinking water. She collaborates with local, state and federal agencies, and landowners in the watershed on voluntary programs to improve source water quality. Nancy has a bachelor's degree in Geography from Dartmouth College and a master's degree in Environmental Science from the University of Oregon.



**Lily Leitermann** has worked at the Upper Willamette Soil and Water Conservation District for 8 years, first as a Watershed Specialist for the PWP and now as the UWSWCD Conservation Program Manager, working to support conservation staff in their great work and develop new programs and strategies that align with the mission and vision of our organization. She collaborates with local, state, and federal agencies and landowners across the District boundaries of Eastern Lane County on voluntary conservation programs. Lily holds a Bachelor of Environmental Studies and Anthropology from Western Michigan University and a Master of Natural Resources from Oregon State University.



Photo Credit: North Santiam Watershed Council



# Oregon Fire Resilience Network Hosts Learning Exchange Centered on Engaging Vulnerable and Underserved Communities

By Jean-Paul Zagarola

The combined impacts of violent displacement of Native Americans who used fire to manage healthy ecosystems, over 170 years of fire suppression, and climate change have created forest conditions across the West ripe for unprecedented catastrophic wildfire. By some estimations, area burned in the western United States is expected to double or even triple by mid-century.

The impacts of these megafires are numerous and include significant impacts to ecosystems, natural resources and communities. Moreover, these impacts are spread inequitably across race, ethnicity, age and socio-economic status. For example, Black, Hispanic and Native American populations experience 50% greater vulnerability to wildfire compared to other census tracts in the West.<sup>1</sup> In Oregon, days of heavy smoke exposure for houseless populations tripled from 2011–2015 to 2017–2021. The houseless are some of the most impacted by wildfire due to the lack of refuge from smoke exposure and because of the high rate of underlying health conditions in these populations.<sup>2</sup> Low-income communities often can't afford or don't have access to fire

adapted or recovery resources—such as being able to update HVAC systems, conduct home hardening or create defensible space.<sup>3</sup> In order to achieve wildfire resilience, it is imperative that our recovery and resilience systems engage all sectors of the population, especially the most vulnerable.

Conservation and wildfire practitioners, planners, and decision makers often lack the tools and/or resources to appropriately engage with vulnerable communities that suffer the worst effects of wildfire. This has emerged as a high priority topic for many OR FRN members as we, at BEF, have observed through a series of surveys, facilitated discussions and one-on-one conversations with practitioners. In response, BEF and the Oregon Fire Resilience Network hosted a virtual learning exchange on September 28th to gain a shared understanding of how decision-makers and wildfire practitioners can better serve some of the most vulnerable in their communities in wildfire resilience actions.

Doug Green from Headwaters Economics kicked off the guest presentations with a discussion on the [Wildfire Risk to Communities](#) tool, where a variety of community risk variables can be analyzed. Factors that influence “vulnerability” with this particular tool and that can be selected to identify

vulnerable populations include age (over 65 and under 5), English as a second language, populace of color, access to transportation, prevalence of disabilities, poverty level, and low income homes. Doug followed his explanation of the tool with an example of the tool in practice where Headwaters Economics was able to identify communities in Austin that had historically been underserved and unprepared for wildfire. This work led to a successful campaign to better engage these communities in community wildfire adaptation work.

Focusing closer in on an example of a population that was severely impacted by the 2020 Wildfires, Mackenzie Ni Flainn presented on her work as founding member of Black Thistle Street Aid, a non-profit that provides free healthcare to people experiencing homelessness in the Eugene-Springfield area. Mackenzie expanded upon her discussion in a previous [Treeline interview](#) on Black Thistle Street Aid's role in providing critical aid to people who were experiencing multiple layers of trauma over the summer of 2020. She also shared some of the ways practitioners can be better prepared to support vulnerable populations through major disasters while promoting community resilience at the same time. It was clear from her talk that there is a lack of flexible resources and funding for community based organizations that can quickly and effectively respond to crises. Housing and healthcare are [inherently connected](#) and the work Black Thistle Street Aid does is one of the last lines of defense against perpetual homelessness.

Mackenzie ended her talk with additional suggestions to improve preparation for future disaster

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1 Davies IP, Haugo RD, Robertson JC, Levin PS (2018) The unequal vulnerability of communities of color to wildfire. *PLoS ONE* 13(11): e0205825. <https://doi.org/10.1371/journal.pone.0205825>

2 Lappe, Brooke, and Jason Vargo. (2022). “Disruptions from Wildfire Smoke: Vulnerabilities in Local Economies and Disadvantaged Communities in the U.S.” Federal Reserve Bank of San Francisco Community Development Research Brief 2022-06. doi: 10.24148/cdrb2022-06

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3 Nicole Lambrou, Crystal Kolden, Anastasia Loukaitou-Sideris, Erica Anjum, Charisma Acey (2023) Social drivers of vulnerability to wildfire disasters: A review of the literature, *Landscape and Urban Planning*. <https://doi.org/10.1016/j.landurbplan.2023.104797>

response. These included forming partnerships early, and establishing permanent mutual aid hubs that provide the space and logistics to support communities that might be impacted by future wildfire events. This point provided for a near seamless transition into the next talk by Alessandra de la Torre.

Alessandra de la Torre, former director of Advocacy and Programs at Rogue Climate, a nonprofit dedicated to climate justice in Southern Oregon and the South Coast, also began her talk by speaking about the 2020 Labor Day fires, in this case the Alameda Fire. Rogue Climate was able to rapidly respond to the incident by setting up temporary mutual aid sites, coordinating a massive team of volunteers and providing essential services such as transportation, storage, and funding for gas, groceries and emergency housing. National disaster relief entities did not begin distributing aid until two weeks after the fire, further emphasizing the need for locally based organizations like Rogue Climate to provide immediate and long-term assistance.

Alessandra then pivoted to discuss a wildfire and community resilience solution called **resilience hubs**. A resilience hub is a type of permanent mutual aid site that offers a number of other community benefits. Rogue Climate defines resilience hubs as “trusted community-centered places that are set up to address daily community needs, and that are also equipped to provide support in the face of disasters like fires, earthquakes, and other extreme weather events.” Resilience hubs can facilitate year-round activities like wildfire preparedness workshops, solar energy generation, and community gardening. Additionally, they can be rapidly transformed into mutual aid centers where essential goods and services are distributed, or temporary shelter during major disaster events. Mackenzie, who gave the previous talk, described the chaos that ensued in getting aid out to those most impacted by the 2020 fires and in finding temporary shelter for those affected. Establishing a network of permanent resilience hubs would go a long way in addressing this issue.

### Tour a resilience hub

Interested in seeing what a resilience hub can look like? Watch a video tour of a Puerto Rico resilience hub [here](#).

Supporting community based organizations that reflect and are in tune with the cultural nuances of the communities they serve was the central tenant of the presentation given by the next speaker. Jamila Wilson is the Climate Resilience Manager at United Way of the Columbia-Willamette and is also the principal coordinator for the Disaster Resilience Network. United Way formed the Disaster Resilience Network in collaboration with the Oregon Health Authority and Trauma Informed Oregon and in response to the 2020 wildfires to support leaders of color immersed in local disaster response in their communities. The Network used the Oregon Health Authority’s **Social Resilience Report on Climate Change** to drive its early development. Key principles in that report focus on:

- Fostering social connection and relationship-building
- Supporting work at the state level
- Local and Tribal public health connections and shared planning

At the center of the Network is a heavy emphasis on trust building between members to weave in and take action on these principles. Recognizing the role trauma plays with respect to disasters is also very important in addressing the needs of Network members.

With core principles in place, the Network has brought needed resources to community leaders of color across Oregon. Examples include the development of wellness resources that address burnout for community leaders, education and training opportunities specific to disaster resilience, trust-based resilience funding for activities that generate community joy, health and wellness, and support for members to take leadership roles within the network. In general, the Network has emphasized generating funding that invests in

the human infrastructure in disaster resilience, an area that too often goes unfunded.

Most of the learning exchange speakers discussed or alluded to the extreme trauma that many communities experience after catastrophic wildfire, especially the most vulnerable. Hannah Buehler, project manager with BEF, rounded out the discussions of the day to address this topic directly. Hannah works at the intersections of trauma, homelessness and the environment. Their presentation focused on a trauma informed emergency readiness and response training module that was developed in partnership with Trauma Informed Oregon and Łush Kumtux Tumtum. This training module is ideal for natural resource managers and wildfire practitioners seeking tools to more effectively interact and engage with vulnerable populations. The training module covers topics that include:

- A timeline of the recovery process
- Caring for oneself and community during emergency events
- Building adaptive teams and organizations to respond to crises
- Practices to bring yourself back online
- Equity and accessibility considerations in planning and response
- Cultivating compassion satisfaction, conviviality, and meaning throughout the recovery timeline

### What is Trauma Informed Care?

Trauma informed care is an approach, based on knowledge of the impact and prevalence of trauma, that aims to create environments and organizations that are welcoming, safe and engaging for both staff and the communities and ecosystems they serve. Trauma informed care aims to elevate awareness of trauma and resistance to retraumatization out of the individual and interpersonal levels, and into the program, organization, and system level. To find out more, visit <https://traumainformedoregon.org/>



An added benefit of the training module is that BEF can host a discussion group with the participants. The discussion group allows practitioners to share and reflect on the content of the training, share their own experiences and learn from each other. If you or your colleagues are interested in taking the training module, you can create an account and sign up by following this link: [ticforenviro.learnworlids.com](https://ticforenviro.learnworlids.com) If you are interested in joining a BEF hosted trauma informed care discussion group around the training module, please contact Hannah Buehler at [hbuehler@b-e-f.org](mailto:hbuehler@b-e-f.org).

Each of the speakers throughout the learning exchange touched on common themes. Resources for culturally rooted, community-based organizations in response and recovery processes are

either short-lived or are lacking all together. Large and nationally based organizations do extremely important work post-disaster however they are often not fully attuned to the different characteristics of all the communities they are serving. This can lead to delays in delivering aid to areas where it is most needed. That is where community-based organizations are skilled in taking a culturally appropriate approach to distributing resources that is efficient and effective in addressing the most relevant community needs. Establishing community infrastructure like resilience hubs will further facilitate the flow of resources to where they are most needed while better preparing communities for future disasters. Finally, the trauma that people experience during disasters like catastrophic wildfire can make it extremely challenging

for community organizations and aid workers to distribute much needed resources, slowing or preventing the long-term recovery process. Community leaders are also community members who may experience severe levels of trauma after major disasters. Trauma informed care is an approach to providing support that addresses root causes of trauma and ultimately leads to better recovery outcomes for community members and leaders.

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If you are interested in watching any of the presentations from this OR FRN learning exchange, participating in future OR FRN learning exchanges, or would like to learn more, please contact Jean-Paul Zagarola at [jpzagarola@b-e-f.org](mailto:jpzagarola@b-e-f.org).





## Upcoming Events

### WEBINARS:

#### **The U.S. Fish & Wildlife Service — National Conservation Training Center is launching a new 12-part monthly webinar series**

This series tells a story about how small- and large-scale forest disturbance, such as fire, wind, ice storms, hurricanes, sea-level rise, flooding, introduced and endemic forest pests, and others, impact forest ecosystems. The series will also examine ecological silviculture and climate adaptation approaches to help inform forest and wildlife management. Register [here](#).

### FORUM:

#### **PNW Landscape Conservation Forum**

December 13 - 14, Virtual

This online forum will provide a platform for sharing knowledge, discussing landscape-scale conservation priorities and strategies, addressing common challenges, and fostering partnerships to enhance regional conservation efforts. Register [here](#).

## Additional Reading

#### **Can We Save the Redwoods by Helping Them Move?**

New York Times Oct. 25, 2023

#### **Fifth National Climate Assessment**

#### **To Figure out the Future Climate, Scientists are Researching how Trees Form Clouds**

NPR Nov. 8, 2023



watersheds  
program

Do you have an idea for a future newsletter article or interview, or a suggestion for how we might improve? Please reach out to Kas Guillozet at [kguillozet@b-e-f.org](mailto:kguillozet@b-e-f.org).

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