



watersheds
program

treeline

partnering for climate adapted
forests

December 2021

Missed the June Treeline Newsletter? [Click here](#) to learn about what our partners are working on in the realm of floodplain restoration.

Interested in submitting an article? Reach out to [Kayla Seaforth](#).

*Coeur d'Alene Tribe's Willow Nursery.
Photo credit: Thomas Biladeau*

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.

This issue highlights tribal nurseries, and includes our first feature article with partner Ecotrust, who interviewed Michael Durglo, Jr. on Whitebark Pine and Climate Change.

Treeline network partners answer questions relating to adaptation to climate change, including species selection and assisted migration

The Treeline survey closed last spring with a total of **50 responses** from partners in over **14 different ecoregions** in the Pacific Northwest. Here is a snapshot of the energy and work being dedicated to on the ground adaptation actions in the areas of nursery production and ecosystem restoration.

Actions Partners Are Taking

● CURRENTLY DOING ● INTERESTED IN LEARNING MORE ● NOT INTERESTED ● PREVIOUSLY ATTEMPTED AND ABANDONED ● N/A

Collecting seed or cuttings from sources within your seed zone or collection area that appear to be thriving in microhabitats similar to predicted future conditions



Intentionally increasing genetic diversity by collecting seed from multiple locations within your seed zones or collection areas



Intentionally increasing genetic diversity by mixing in seed from areas outside your seed zones or collection areas



Varying timing of seed harvest



Using climate/vegetation models like the Seedlot Selection Tool to inform decisions



Running common garden trials or experiments



Talking to elders and long term residents to learn from them



Documenting phenological observations (bud break, flowering timing)



Pacific Ninebark starts at Confederated Tribes of Grand Ronde's Tribal Native Plant Materials Program. Credit: CTGR



Coeur d'Alene Tribe's Willow Nursery Provides Plant Materials and Enhances Floodplain Function

Thomas Biladeau

Can you give us some background on your nursery and its history?

In 2018, *Gul Hnch'mchinmsh*, the Coeur d'Alene Tribe's (CDAT) Native Willow Nursery, was developed to support ongoing riparian restoration actions by multiple stakeholders and managers throughout the Coeur d'Alene, St. Joe and Spokane River watersheds. To date, ten endemic species of willow and deciduous riparian plants have been established across 16 acres to provide harvest of live poles. These species were sourced from local stocks within the region in order to ensure adaptability to local climate conditions. We estimate over 30,000 individual plants are now established which will ensure an almost unlimited supply of plant material for years to come.

In addition to supporting riparian rehabilitation projects, the willow nursery has also provided improved wildlife habitat conditions within

the nursery itself. What was once a monoculture of nonnative reed canary grass is now a diverse wetland scrub/shrub floodplain. Furthermore, mechanical control (mowing) of the remaining canary grass has allowed native herbs and flowering plants a chance to get reestablished in the area, providing for pollinators and foragers, as well as nesting songbirds and waterfowl.

What makes tribal nurseries unique?

Not only does the CDAT Native Willow Nursery provide support for riparian restoration projects, the species within the nursery also provide a readily available cultural resource to the community. Species such as red osier dogwood and willow were historically used by tribal members for sweat lodge construction and for basket weaving. This nursery provides an easily accessible location for the community to harvest these species.

How have the current drought conditions and heat waves impacted your nursery or other nurseries you've seen?

Gul Hnch'mchinmsh was strategically located to take advantage of the artificially controlled water elevation of Lake Coeur d'Alene due to Post Falls Dam operations. Although the Coeur d'Alene Tribe has experienced countless negative impacts to cultural and ecological resources due to these operations by Avista Corporation, we have an opportunity to use it to our advantage as protection from drought and extreme heat.

Riparian restoration projects throughout the local area however are not as protected from climate change. In 2021, we have observed historically low base flows in local streams and rivers, which inevitably will result in the loss of riparian vegetation throughout the margins of the riparian zone.



The willows at *Gul Hnch'mchinmsh* are growing in a low lying floodplain, enhancing habitat as well as producing plant materials. Credit: Coeur D'Alene Tribe

This nursery will provide a means to replace many of those plants while additional in-stream resiliency projects are undertaken to ensure riparian reestablishment and persistence.

Are you doing anything differently to adapt your practices and operations to these weather extremes?

The Coeur d'Alene Tribe prides itself on landscape-level restoration programs in order to provide ecological resilience in the face of climate change. Beaver have, and will continue to be, an integral part of these programs. As a keystone species, beaver provide habitat conditions and water storage that fish and wildlife will increasingly depend on as drought and extreme summer temperatures become more common in the Pacific Northwest. *Gut Hnch'mchinmsh* in turn will provide beaver with the forage and building supplies they rely on to persist across the landscape. These riparian plants which were historically prevalent across the landscape have been cleared for urbanization and agriculture, and accordingly, the beaver populations have been suppressed to a fraction of their historic size and range. With support from the nursery, we hope to restore habitat conditions that will expand the influence of beaver.

Additionally, willows and other scrub/shrub riparian plants provide a high level of carbon sequestration. The Coeur d'Alene Tribe will continue to advocate for wetland habitat expansion with a natural succession of wetland plants, including willows, to offset carbon outputs. The Tribe recognizes the need for programs such as these in order to create carbon sinks in the natural environment.

Does your nursery track seed zones/sources? Are you seeing requests from customers about climate adapted plant stock?

When the nursery was initially being planned, the Coeur d'Alene Tribe coordinated with multiple stakeholders in the region to identify desirable species for restoration. Even within our local region, soil and water conditions are highly variable and particular riparian species are therefore more adapted to reestablishment in one area versus another. For example, in the Coeur d'Alene and St. Joe watersheds, riparian soils are typically well drained with high levels of sand, gravel and cobble. However, directly south and in the Hangman Creek watershed, soils have much higher levels of silt, clay and loam. Successful reestablishment of willows and other deciduous plants in these areas

therefore depends on species that are adapted to grow in those conditions. We wanted to ensure all of these species were represented in the nursery, and luckily, conditions are such that we were able to get them all successfully established.

What else would you like partners to know? What support or resources would be helpful?

Gut Hnch'mchinmsh would not have been possible without the support from Coeur d'Alene Tribal staff and our funding partners. The Restoration Partnership has provided a means to financially support this program and additional restoration projects throughout the area as mitigation for the loss of resources due to precious metal extraction and mine-waste contamination in the Coeur d'Alene River watershed. To learn more about the history in the Coeur d'Alene basin, the associated Superfund Site, this project and the others sponsored by the Restoration Partnership, visit the following websites:

<https://cumulis.epa.gov/supercpad/cursites/csinfo.cfm?id=1000195&msspp=med>

<https://www.restorationpartnership.org/index.html>



The site conditions at Gut Hnch'mchinmsh are similar to restoration sites within the Coeur d'Alene Tribe's territory. Credit: Coeur D'Alene Tribe

On Whitebark Pine and Climate Change

A conversation with Michael Durglo, Jr.

On a beautiful sunny day in the traditional homelands of the Confederated Salish Kootenai Tribes in western Montana, Michael Durglo, Jr., director of the Tribes' Tribal Historic Preservation Office, virtually spoke with Brent Davies, Emilie Chen, and Lisa Watt about the Tribes' preservation efforts of the whitebark pine tree and why those efforts are important. He also talked about climate change, the impacts he has witnessed in his homeland, and how humans need to shift our thinking to be more conscientious of all life around us.

Good morning, Mike. It's wonderful to see you today. Let's talk about the whitebark pine.

On my screen background, you can see a picture of an old whitebark pine tree with me standing next to it. I call it my llawye. In Salish, llawye means "great-great-grandparent." At one time, I was thinking llawye was around 3000 years old but we don't know that for sure. We'd like to take a core sample but we're debating about that because it's a special tree. I call it my medicine tree. It's good medicine to go up there and be in that place.

[Our Forestry Department] was talking about that tree for about two years before I actually walked up there and got to

touch it. It was just big and beautiful. That was a real special time for me. It became, I would say, a spiritual experience.

What have you witnessed in terms of climate change impacts?

People have a hard time seeing the impacts of climate change. But I tell them, look up on the top of those mountains. All those trees are dying. That's a result of climate change. We're also seeing many more intense wind and rain events that historically we've never seen before.

I think the most visible impact of climate change we see here is the melting glaciers. We historically had glaciers in the Mission Mountains. I remember my grandfather

telling me, "Mike, you see that glacier up there on the side of that mountain, right there? When that glacier melts, you go up there, and you'll find gold."

And I was like, "Yeah right, like that glacier's ever gonna melt." And in those years, it never did. Now, every year, all the snow melts off the mountains. Glacier National Park is just a couple hours north of us, and as you all know, Glacier National Park is losing glaciers every year. They predict that within 20 years all the glaciers will be gone.

What are the Tribes doing to address climate change?

Without thinking about it, a lot of what we were doing already was mitigating the



Michael Durglo, Jr.

Department Head of the Confederated Salish and Kootenai Tribes' Tribal Historic Department

Michael Durglo, Jr. is the Department Head of the Confederated Salish and Kootenai Tribes' (CSKT) Tribal Historic Department and has been a leader in climate change adaptation work for nearly a decade. He facilitated the development of a Flathead Reservation Climate Change Strategic Plan for CSKT, the third Tribe to do so in the United States. After completing the plan, he continued to build on the work by diving deep into the perspectives of the elders and integrating traditional knowledge into the plan. Particularly unique has been Michael's all-inclusive and open approach towards climate planning. He has established monthly meetings of a Climate Change Advisory Committee and welcomes all stakeholders, both tribal and non-tribal. This has opened conversations among multiple jurisdictions, connecting people and adding value to solving the problems that will be faced by the impacts of climate change into the future.

impacts of climate change. A lot of the stream restoration work that we've been doing for many, many years, that's climate mitigation. We just didn't call it that. We just knew that these streams are warming up, and those trout species, those salmonids, need cold water. We just said, "Okay, we're gonna restart the stream because we're losing cold water refugia." This was combined with our concern of earlier runoff from the mountains.

We were one of the first tribes in the country to develop a climate change plan. We started that process in 2012, with the full understanding of our tribal council, our leadership, that this will be a living document. It's always going to be a work in progress. At the time, I was the environmental director so they asked me if I would coordinate the effort of developing a plan. I had never done anything like that before but I said, "Absolutely, I'll do this."

I started going to the Institute for Tribal Environmental Professionals' Climate Change Adaptation Planning Workshop. I was also the co-chair of the National Tribal Science Council and the chair of the Region 8 Tribal Operations Committee, which consists of EPA environmental directors in Montana, Wyoming, Colorado, Utah, and North and South Dakota. So we were talking about climate change a couple years before we even started working on our plan.

How did the whitebark pine become a focus?

Prior to developing our Climate Change Strategic Plan, whitebark pine was really not a big concern of ours. Historically, we are a timber resource tribe—we rely on timber sales and timber harvest for a large part of our budget every year. Whitebark pine is not one of those species that we harvest. It grows above 6,000 feet, up in rocky areas, and it grows very, very slowly. I don't say that whitebark pine was not a part of our forest management plan, but until we developed a [climate] plan, we realized that there were multiple things going on. [Our] Forestry Department started looking at maps to figure out how many acres we have of whitebark pine on the reservation. We saw that instead of 30,000 acres of this tree, there's 90,000, so there's three times as many [as we thought].



Whitebark Pine. Photo credit: Brewbooks

There's a video I'd like to share with you, called [Ghost Forest](#). It's a video we put together about the impacts of climate change and pine beetles and blister rust on our whitebark pine. It talks about how the water flows and how if the whitebark pine isn't there, that water comes out fast and hard. And when it's fast and hard, it picks up sediments, so it's just dirty. When it comes out slow and easy, it's clean, it's pure, it has that chance for all those little macro and micro invertebrates to do their work. Whitebark pine helps retain snowpack. It's a keystone species for over 100 different animals. And it's culturally significant to us.

Also, we're working on a [virtual reality series](#) around whitebark pine and the

Clark's Nutcracker, a bird that distributes the seeds. The seeds and the cones of the whitebark pine grow right at the very top of the tree. They're not dispersed throughout the whole tree like on a ponderosa pine or lodgepole pine.

[Members of our Forestry Department climb] up to the top, and they put cages on the cones in the spring. First of all, they have to find a healthy tree, a resilient tree—we call it a plus tree—that has been resilient to blister rust or pine beetles. Then, in the fall, they climb it again, gather all the cones, and send those to the lab in Coeur d'Alene, Idaho, where they do genetic testing. We're really trying to find the most resilient seeds so we can grow the most resilient trees.

For example, the seedlings that [the Tribes] have growing in the greenhouse—they have to let those grow for three or four years before they can actually plant them in the ground. It takes about 30 or 40 years before the tree can start producing its own cones. Last year was the first year in our history that the Forestry Department planted 3,000 seedlings. I'll never see those come to maturity in my lifetime but that's not what it's about. What we're doing is trying to make this place a better place for those to come. It's about the future.

To me, it's like our own story of survival, of resilience.

What's next?

In talking with the Forest Service, one of our questions was: Can you please make sure that we will still be able to have access to certain areas if we want to gather whitebark pine nuts and cones? Please make sure we'll be able to do that. Because of the potential listing of whitebark pine [as an endangered species], they were thinking it could have an impact on the amount of cones we can collect. We have never collected cones off the reservation but we think it's important that that availability is there.

Based on the new [climate] models, what we thought was going to happen in 50 years is happening now. We've been working on rewriting our climate plan and part of that is to include more traditional knowledge and more cultural significance around food sovereignty, food security, and First Foods. Today, I was talking to some of the folks that were going to do a video recording and the people who prepared our lunch that, someday, it would be nice to have the experience of tasting those whitebark pine seeds again at a traditional feast. That'll happen someday, I hope in my lifetime.

I talk a lot about climate change impacts on cultural resources and how they are impacting what is happening to our food, our medicine. Every year I try to bring on as many interns as I can from the Salish Kootenai College and just pull them onto the boat and tell them, "Grab an oar and start rowing, man. We need all the help we can get getting this boat up the river." That's where we're headed.

Are you hopeful?

I am hopeful because there is no other way. I mean, we don't get a second chance. Just look around and think about all the species that we're losing daily and the impact. It's everything from different trees, different plants, different animals, different insects.

Once I had what I call an "awake vision." Early one morning, I woke up at about three o'clock and I saw, up on the top of the mountain, a pika. It's a little rodent that depends on the cold and high elevation. Kind of like whitebark pine, it lives up there; that's its habitat, cold and high. They're just cute little fuzzy creatures. They cannot go any higher. They're at the top of the mountain.

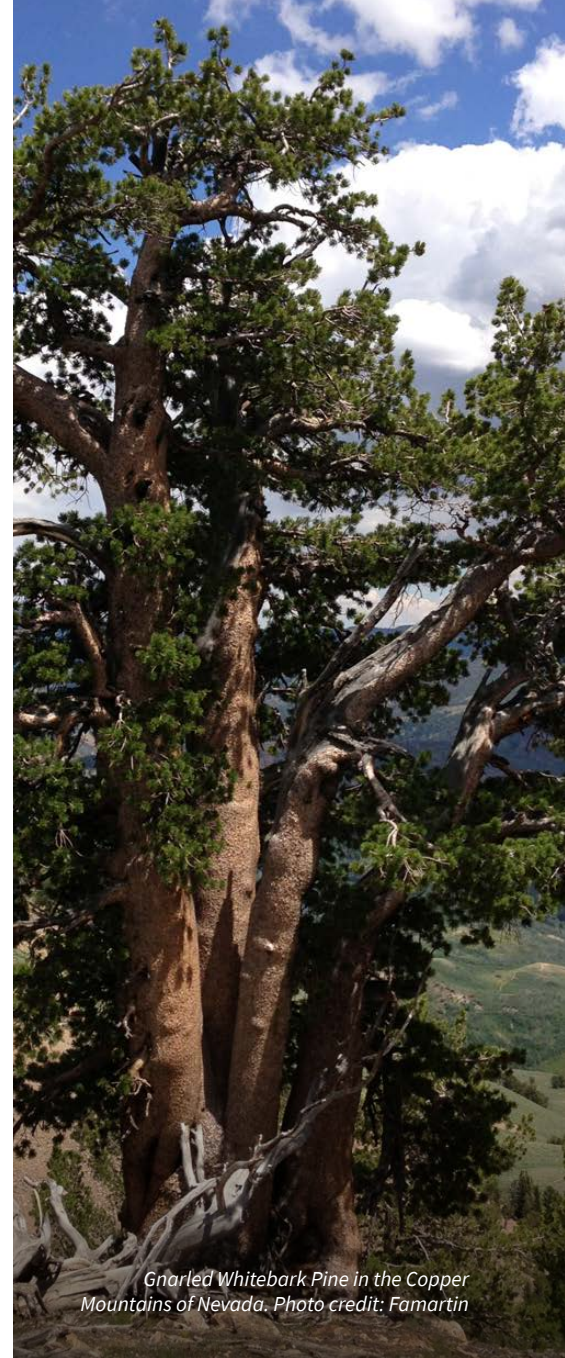
What I saw was the last pika on top of that mountain. And when that pika died, I saw a deer, right out there in my field. She lifted her head and looked around. It was like something just happened. Like she didn't really know what it was but she knew that something just happened in the sacred circle of life.

Everything in that circle is connected. And when we lose bits and pieces of that circle—I mean, we're losing a big piece of that circle now—it has to readjust itself. When we nearly wiped out the wolf, which is the highest predator on the totem pole, that circle took 100 years to mend and adjust. Now here we come and put the wolf back in and all of a sudden the circle has to adjust again and it takes another 100 years. I'm not saying that it's a bad thing to put [the wolves] back in, but we really need to think about how the circle mends and adjusts.

I think the responsibility that we have as human beings is to be part of the circle. The reason a lot of this stuff like climate change is happening is because we took ourselves out of it. Until people understand that, the circle is really going to be hard to mend, to put it back together.

Thank you, Mike.

Ecotrust



Gnarled Whitebark Pine in the Copper Mountains of Nevada. Photo credit: Famartin



Whitebark Pinecone. Photo credit: Jim Morefield



Reflections From Summer 2021 at Sevenoaks Nursery

A conversation with Sevenoaks Nursery owner Scott Anderson

How are the current drought conditions impacting your nursery or other nurseries you've seen?

I feel like the droughts don't really affect nurseries in terms of water use, nurseries use water and there's no way around that and we use a lot of water. So in that regard, I think if you didn't have a good source of water or water rights you wouldn't be able to have a nursery. I think the only thing that would be affected would be the choice of plants to grow, like maybe they'd want to grow more drought tolerant plants because of demand or that's just the better plant to be growing. I don't really see drought affecting nurseries totally because everybody needs the water. Being in Oregon we're a little lucky because there's more water here than in California, but you still need to have access to it. So you have to have

property where you can use as much as you need, so I think in California, those guys are probably really having a problem if they have to use less water or if they only get X amount of water, they'd probably have to grow different crops, but up here it's not as much of an issue.

The other thing that heat and big weather events do is, for us, we collect seed and I feel like the more extreme the weather the more challenges there are with the seed crop. Like last year there were no acorns so we had challenges like that. Like for example we were growing a lot of dogwood cornus and with heat events and continued stuff like that it would make it hard to get enough seed to grow what we need to grow, and we already see that this year, a lot of seeds are ready a lot earlier or are just acting a lot different because of the heat wave and the drought also. No rain forever just makes certain plants

react differently and not set seed so that comes into play. So that's something that we worry about. If we contract to grow a lot of stuff, we still have to find seed for it, and hope that it's available. We do the seed collection on site and have spots we go and we do buy some, but like last year we just couldn't find any acorns anywhere. And that does happen every six or seven years with that plant, but the lack of rain over the last few springs eventually is going to affect that quite a bit.

How was the heat wave for you? How did it affect your operations?

The plants don't like that, so we had a lot of plants where the tops died or got burnt back. It didn't kill a lot of stuff in our case but it did burn tops a lot. I personally think that has to do with having the pot as wet as possible,



everything is soaked and then its 110°, if you take out the root ball it's like 100° in the soil and all of those roots are boiling. So I think that is where most of the damage we saw showed up just from the roots being so hot. Although we do have a lot of plants in the ground that grow around here and have been around for 10 years and they still got burnt tops which is kinda crazy. And then besides the normal start early and end early, which is what we do when it's like that so employees don't have to be out in it. It's brutal. I don't think there will be a long term impact. I think they're feeling the damage that they had and that will be the extent of it. Now if we had several of these every year, I don't think that would be the case.

Are you adapting your practices and operations to these weather extremes?

Not so much. We don't have as high tech of greenhouses and stuff that we could use to keep things cool, so we're kind of stuck with what we have. We can't even adapt what we grow, that would

be hard to do and I wouldn't even know where to begin. I just don't think that it's happening, like climate change or whatever is happening so fast that in five years we won't be able to grow red flowering currant because it's too hot. I don't think we're going to change much. Long term we might think about that. People talk about assisted migration which I don't know if I love so that's where I stand on that. I don't want to start planting redwoods up here because I think they'll be up here in 50 years, but some people do think that, a lot of people do think that. For us, I don't think we'll change much of what we grow.

What are the biggest challenges you're facing as a nursery?

Labor is always an issue, we have people who have been here a long time, but we need seasonal people like every nursery. We fortunately get a lot of the same guys back, but sometimes you just don't know if you have enough people to get what you need to get done. That's probably on our mind the most.



*Madrone Seedling.
Credit: Scott Anderson*

The Target Seedling Concept refers to a set of specific quality characteristics as targets for seedlings as they leave the nursery, aiming for the long term success of seedlings at reforestation sites.

With a changing climate, how might we need to revise and rethink these standards? Will smaller overall plant sizes or bigger root to shoot ratios become the norm? Will these targets need to be adjusted in general or for each individual species?



Seven Oaks Nursery. Credit: Scott Anderson



How The Confederated Tribes of Grand Ronde Built a Nursery that Supports Land and Community

A conversation with Jeremy Ojua, Lindsay McClary and Kayla Seaforth

The Natural Resources Department at the Confederated Tribes of Grand Ronde (CTGR) has been operating the Tribal Native Plant Materials Program since 2014. It started with a vision of producing locally sourced native plants for habitat restoration and cultural education, and was originally funded by an Oregon Watershed Enhancement Board "Plants for the People" grant, which they were awarded in partnership with the Institute for Applied Ecology. These funds allowed the Tribe's Natural Resource staff to establish two raised beds to grow First

Foods plants including great camas (*Camassia leichtlinii*) and Gardner's yampah (*Perideridia gairdneri*). Since that first growing season, the nursery has expanded to include additional capacity for growing containerized plants used in restoration plantings, a hoophouse to start seeds and cuttings in, and stool beds to provide readily accessible cuttings of willows, red-osier dogwood, pacific nine-bark and other shrub species. Currently the nursery grows around 41 species that support native ecosystems and cultural lifeways. These additions were made possible

by subsequent "Plants for the People" awards, as well as the Environmental Protection Agency's Section 319 funding program. Through this performance partnership grant, the Confederated Tribes of Grand Ronde has received non competitive funding to grow their nursery program, which in turn provides plants to reduce nonpoint source pollution to tribal waterways.

Restoration Ecologist and Fish and Wildlife Policy Analyst Lindsay McClary said that the EPA funding has also provided an avenue for greater



Youth unearthing camas bulbs with the digging sticks made by a member of the tribe. Credit: Jeremy Ojua, 2021

collaboration between tribes who are interested in creating or growing their own nurseries. She recalls reviewing a nursery startup plan shared by the Saint Regis Mohawk Tribe and offering feedback based on her own experience with the nursery at Grand Ronde. McClary encourages other tribes to pursue this funding if they are interested in starting their own nursery operation, not only as a means of offsetting the costs, but as a way to share information and foster collaboration between tribes.

In addition to supporting restoration efforts and reducing the effects of pollution, which enhances access to clean air and water for everyone, Grand Ronde's nursery also serves as a point of connection among community members. Nursery Manager Jeremy Ojua said that prior to the Covid-19 pandemic several hundred people visited the nursery each year through tours and work parties. He teaches visitors about the plants that he grows, as well as cultivation and harvest methods. CTGR tribal member Brian Krehbiel made traditional camas digging sticks, which he gifted to the nursery program; staff and volunteers use these sticks to harvest the bulbs in the fall. Prior to the Covid-19 pandemic, Ojua provided yampah, camas and other first foods to community gatherings such as a welcome home dinner following canoe journeys and other first foods celebrations; he is eager to resume these gatherings once it is safe to do so.

As a way to foster deeper relationships between tribal youth and native food plants, Ojua and collaborators at the Marion Polk Food Share and CTGR

Youth Education and Maintenance and Facilities Departments have installed four new raised beds at the Tribe's school where children can regularly interact with camas, yampah, wild strawberries, and more. With guidance from their teachers, the kids learn how these plants are part of the long history of traditional ecological knowledge and contribute to the cultural lifeways of their Tribe.

McClary added that yet another way the nursery is getting more native plants on the landscape is through a partnership with the Polk County Soil and Water Conservation District. The district is offering Natural Resources Conservation Service (NRCS) funding to support oak habitat restoration on private property. Through this partnership, The Confederated Tribes of Grand Ronde will serve as providers of Traditional Ecological Knowledge to landowners who are awarded funding for habitat restoration projects. Landowners will be able to obtain native plants from the Tribal Native Plant Materials Program, and when appropriate, Grand Ronde staff will provide context for the plants and the Traditional Ecological Knowledge associated with them.

The work of the Tribal Native Plant Materials Program provides benefits to the Grand Ronde community that will reach far into the future. Not only will the trees and shrubs grow up to shade waterways that are essential to the survival of so many other species, but the people who have tended these important plants will be connected to all those who did so before them and who will do so after.



(Top) Large camas bulbs. Photo credit: Jeremy Ojua, 2021

(Bottom) Large camas raise bed. Photo credit: Jeremy Ojua, 2021

To learn more about how to apply for section 319 funding please visit:

<https://www.epa.gov/sites/default/files/2015-09/documents/319applying-guide-revised.pdf>





Nesika Wilamut
WHERE PEOPLE AND RIVERS MEET

A New Chapter: Nesika Wilamut Will be Guided by Indigenous Voices

Tana Atchley Culbertson



Tana Atchley Culbertson

Nesika Wilamut, which means “Our Willamette” in the Chinuk Wawa trade language, is a reimagined network of those with a stake in the health and future of the Willamette River with a focus on environmental justice, racial justice, and tribal sovereignty. The network grew out of the last 11 years of work of the Willamette River Initiative and seeks to bring together restoration professionals, tribes, community members, scientists, public agencies, landowners, funders, and more to collaborate on Willamette River restoration and community connection to the River. The board of Nesika Wilamut envisions a network that centers the voices of Indigenous people, and as such has secured funding to create an Indigenous advisory council that will provide leadership and guidance to the network that Nesika Wilamut endeavors to bring together.

Tana Atchley Culbertson shared the vision for the new Indigenous advisory council:

“We believe that the Indigenous people who care for and have historically stewarded this land are deeply invested in the health and wellbeing of the River and all those supported by it. Our board has directed us to create an Indigenous advisory council of intergenerational tribal experts, elders, and youth to guide our network as we work to center racial justice and tribal sovereignty within the environmental movement.”

Members of the Indigenous advisory council will be compensated for their time and travel expenses. Nesika Wilamut also takes the realities of the Covid-19 pandemic seriously and will convene the council virtually until state guidelines allow for larger in-person gatherings to take place.

Currently, Nesika Wilamut is reaching out to folks to gauge interest and availability to participate in the Indigenous advisory council. Atchley Culbertson hopes that the council will be a space for Indigenous people of diverse professional and personal backgrounds to come together to discuss the most pressing issues facing the Willamette River and offer direction to the network. The Treeline project will engage the network on topics of assisted migration and looks forward to hearing the Advisory Group’s thoughts. Tana is seeking participation by members of different tribes, both within



Willamette River. Credit: Intel

and outside of the Willamette Valley, who are educators, activists, elders, youth, environmental health professionals, tribal natural resource managers/scientists, and watershed council staff. Through this diverse representation, the group will be interdisciplinary and intentionally non-governmental. They will operate in a space that is separate from the government-to-government relationships that tribal councils engage in as sovereign nations.

When describing how the group would interact with Nesika Wilamut and its partners, Atchley Culbertson envisions a reciprocal relationship. “I think about it more as we are going to talk to our grandma. We are asking people with wisdom about something that is big and important to us and get their advice about what we should focus our energy on.” They may interact with partners and the board in response to specific questions and priorities. Still, they will primarily focus on issues that the council members believe are most important to address for the overall health of the Willamette and the communities it supports.

While the idea that Indigenous people are central to the stewardship of land and water has slowly been gaining mainstream acceptance, Atchley Culbertson pointed out the Indigenous people have been advocating for their voices to be heard about topics ranging from cultural burning to traditional ecological knowledge to water usage to racism and more for a very long time. “[The Indigenous advisory council] will have the power to really amplify those topics and bring them to the forefront, and get the people who are within our network, that are co-managing and stewarding these lands, to think about [them] in a different way. I’m excited about the role they will play in influencing that work.”

As she builds the relationships that will support the Indigenous advisory council as well as the broader partnerships that makeup Nesika Wilamut, Atchley Culbertson describes the importance of taking things slow. It takes time to build the trust that is foundational for healthy and reciprocal partnerships, and she intends to move slowly to create relationships that can move the conversations and actions around ecosystem and community health forward in a just way.



Willamette River. Credit: Intel

Assisted Migration: Collaboration and Communication are Key

By: Kayla Seaforth

The work of restoring ecosystems is increasingly taking place in the context of extreme weather events and prolonged drought, and with uncertainty around future conditions. As restoration practitioners and those who support their work adapt and respond to rapid climatic changes more are considering whether and how to incorporate assisted migration into the equation.

Assisted migration can refer to a number of actions, from moving seeds from one climatic zone within their current range to another, to shifting a species to a new range altogether based on anticipated future conditions. Dumroese, et al. provide a more detailed discussion of the different facets of assisted migration, as well as consideration for its place in ecosystem restoration in [this paper](#). The diagram below, also by Williams and Dumroese, outlines a more simplified

representation of the spectrum of actions that fall under the category of assisted migration.

Treeline partners and invited researchers recently presented a webinar that focused on both the mechanics and the ethics of assisted migration. Participants and presenters shared case studies and technical expertise, and engaged in thoughtful dialogue about the philosophy of assisted migration. One action item that emerged from the discussion was a desire for a set of principles around assisted migration that could generate a shared framework for restoration practitioners and others to work within when considering climate-adapted planting and propagation strategies.

Professional standards show up in many forms, and range in structure, formality

and breadth. With a topic like assisted migration, where humans have moved species around for millenia, it seems impractical to believe that a single set of recommendations could inform the whole practice, and even less likely that they would be adhered to in all circumstances. What may be more effective is the intentional creation of a shared community of professionals whose expertise sits at the intersection of the many fields that have a stake in how assisted migration takes place. This community, once assembled, could collectively decide what form their guidance takes. It could be the creation of a formal professional society, the generation of a set of widely available, voluntary best management practices, an informal network for sharing information, or so many other things.

Williams & Dumroese (2014)

ASSISTED MIGRATION:



Seed Migration

Seed sources are 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

The following draft of assisted migration principles was created by Dr. David Shaw, a Forest Health Specialist and professor in the Department of Forestry and Natural Resources at Oregon State University and Dr. Patricia Maloney, a professor in the Department of Plant Pathology and Tahoe Environmental Research Center at The University of California, Davis. While they are still being refined, these principles may serve as a framework to consider how greater coordination and collaboration across fields could lead to a more integrated strategy around assisted migration.

Many institutions, organizations and individuals are already pursuing assisted

migration in research and in practice. There are many ways to implement and think about this topic, with different strategies and philosophies emerging across the field. It is important to keep in mind that the work of adapting to a changing climate requires participation from diverse stakeholder groups, and should remain iterative, collaborative and adaptable as conditions change and new information becomes available. Creating consistent forums for sharing information and continuing this conversation will be crucial for our collective ability to manage ecosystems as the climate warms and our baseline conditions change.

In determining the scope of such a group it may be helpful to consider the following:

- What are the geographical boundaries?
- Who gets a seat at the table?
- How “in the weeds” do we get?
- Are recommendations presented as voluntary?
- *Should* there be standards around assisted migration?
- Who can hold center?

Assisted Migration Principles

Principle	Reason	How
Protect native biodiversity	Our planet depends on biodiversity	Do not move pests and pathogens, change forest composition and structure without full knowledge of consequences
Do not transport soil, debris, and plant materials across ecological boundaries	To prevent introduction of non-native invasive insects and pathogens	Use local material and grow as local as possible
Interpret species distribution models with extreme caution, do not make major management decisions based solely on models	Models are predictive and explanatory tools. They are not adequate to consider site-specific outcomes.	Use models to inform, but use on-the-ground testing (common gardens, progeny trials) before deployment/ investments
Look locally and regionally for adaptive traits	Local populations are most resistant/ tolerant of local pathogens and pests.	Focus on survivors of events Use progeny and common garden studies to understand local pest pressures
Use only regionally tested and collected plant material for outplanting	Do not risk planting maladapted trees	Test and collect trees locally
Control pests in plant materials by growing locally and inspecting nurseries	Move to a more dispersed and localized nursery infrastructure. Inspect nurseries and monitor for invasive pests	Support development of local nursery infrastructure, train nursery inspectors, work with BMP nurseries.
Limit the movement of species to that which is required for survival and persistence	Risk is great, weather is fickle	Seek to understand the forest ecosystem in the context of geography, ecology, and evolutionary history

Credit: Shaw & Maloney

The following sectors have an important role to play in shaping strategies around assisted migration, and they are comprised of people from tribal nations, NGOs, government agencies, universities, businesses and other communities:

1. Nurseries (native and ornamental)
2. Forestry
3. Scientific and extension research
4. Ecological restoration
5. Environmental ethics and philosophy

Assisted migration touches upon a range of fields, issues and concerns including:

- Climate data and modeling
- Species specific research and recommendations
- Pests, pathogens and invasive species
- Communications/outreach
- Policy and regulations related to movement of species
- Seed collection and propagation
- Monitoring protocols and tracking
- Action network: Seed exchange, workshops, etc.

If you are interested in continuing this conversation please reach out to Kayla Seaforth at kseaforth@b-e-f.org



*Coeur d'Alene Tribe's Willow Nursery.
Photo credit: Thomas Biladeau*

After Action Review: Need for Immediate Post-Fire Invasive Weed Prevention

By Hannah Buehler with Rebecca McCoun and Jenny Meisel

Following the Beachie Creek fire, the trucks of linemen and loggers lined the Little North Fork. As the community began to rebuild, they were followed by the trucks of septic workers, homebuilders, electricians and cable installers. Invasive plant seeds and spores are often transported within the vegetation, dirt, and mud clinging to the undercarriage, wheels, wheel wells, and bumpers of emergency response, salvage logging and other vehicles and equipment (USDA FS, 2005).

Post-fire environments are particularly ripe for invasive species to become established and spread rapidly. Natural resource managers, watershed councils, state, federal, tribal and county officials, often siloed by jurisdiction, must spend valuable post-fire recovery time on Early Detection Rapid Response (EDRR) programs and long term invasive species assessments, removing invasives through chemical spraying, hand picking, and biological control. Accessing funds for invasive removal post-fire can also be a significant challenge to this work. Immediate post-fire preventative measures could make a big impact on the spread of invasive species post-fire.

Estimated cost of invasive removal post-fire:

Cost estimates from invasive removal following Beachie Creek highlight the role that immediate post-fire prevention could play in lowering costs and labor needed for invasive control. Costs for invasive species removal and control post-fire can vary greatly depending on the site and the entity who is conducting the work (Meisel & McCoun 2020). **In natural vegetation protection areas**

using integrated pest management for invasive control following Beachie Creek, the estimated cost of Spring combo spraying was \$360 an acre (Meisel & McCoun 2020). For Fall spot spraying, the cost was an estimated \$280 per acre. The cost estimate for surveying and monitoring was \$62 an hour. Assuming 1-2 hours per acre for initial survey time, the cost estimate total for surveying and monitoring would be \$46,500 a year, assuming 1.5 hours per acre. The survey time would remain about the same over 5 years as monitoring would continue to cover the same amount of ground to ensure that no new infestations occur.

Prevention:

While the costs per site location and agency may vary significantly, in general, “The cost of eradicating or spraying established infestations exceeds the cost of prevention more than tenfold (USDA FS, 2005)”.

One promising immediate invasive prevention method is setting up portable vehicle washing stations that use high-pressure wands to wash the sides, underbody, wheels and wheel wells of equipment entering and exiting the fire area (USDA FS, 2004). An industrial rubber mat with foam-filled barriers on all sides confines the wash water and pumps it into settling tanks. Large particulates sink to the bottom of the tanks and water passes through a series of filters. Most vehicles are able to be washed in only about 2 to 3 minutes, depending on the vehicle’s size and the amount of dirt (Buehler & Lasley, 2021). The average rental pricing for these devices is \$2,000-\$3,000 a day (USDA FS, 2005, Meisel & McCoun 2020). Working with local contractors, setting up check stations post-fire for equipment entering and exiting the fire area could be a critical and cost effective method to slow the spread of invasive plant species in post-fire environments.

Resources:

Buehler, H., & Lasley, C. (2021, September 25). Interview with Waste 2 Water. personal.

Meisel, J., & McCoun, R. (2020). (rep.). *Beachie Creek Botany ETART*.

United States Department of Agriculture, Forest Service. (2005, October). *Vehicle Cleaning Technology for Controlling the Spread of Noxious Weeds and Invasive Species*. <https://www.fs.fed.us/eng/pubs/pdf/05511203.pdf>.

United States Department of Agriculture, Forest Service. (2004, July). *MTDC Portable Vehicle Washer*. <https://www.co.fresno.ca.us/home/showpublisheddocument/34347/636915437213670000>



Oregon State University
Extension Service

Webinar Series Sparks Port Orford's Quinn Allen Into Action

By Norma Kline, OSU Extension Forester for Coos and Curry Counties and Dan Stark, OSU Extension Forester for Clatsop, Lincoln and Tillamook Counties



Quinn Allen

One of the great things about working in forestry and natural resources extension education is meeting community members who are passionate about growing and caring for their woodlands. Woodland owners are often motivated to learn and help out with issues that extend far beyond their own woodland or community boundaries. Recently, Dan and Norma (along with Marianne Elliott a plant pathologist at Washington State University extension) met a Port Orford community member, Quinn Allen, who is committed to helping get the word out about Sudden Oak Death. Quinn attended a live webinar about the risks of *Phytophthora* introductions in native ecosystems hosted by the Bonneville Environmental Foundation. Quinn engaged in a discussion at the end of the webinar that spanned an audience of experts, learners, restoration groups and practitioners all trying to strengthen networks and address risk prevention strategies across a wide geographic area.

Quinn's connections to the forests and natural resources surrounding her home town of Port Orford, Oregon run deep. Her family connections to the logging and fishing industry highlighted the importance of sustaining the natural resources around her. Quinn wants future generations to experience the forests as she has.

Unfortunately, an invasive pathogen *Phytophthora ramorum*, threatens the health of her beloved forests. *Phytophthora ramorum* is the introduced pathogen that causes Sudden Oak Death killing hundreds and thousands of tanoaks in Oregon and California, the pathogen also causes foliar blights on many native shrub species including rhododendron and evergreen huckleberry. For community members

in Port Orford, Sudden Oak Death was a somewhat distant threat, the closest infestation was 20 miles to the south. Then, in the spring of 2021, a different lineage of the pathogen was discovered in Port Orford. This lineage, named NA2, had never before been found in the wildlands of North America.

It's not surprising that Quinn decided to take action on this invasive threat. Quinn loves to help out with natural resource education and is now the social media chairperson for the local chapter of Oregon Women in Timber. Quinn has recently completed a certificate in Forest Technologies at Southwestern Oregon Community College. When prompted to explain how she decided to study forestry, Quinn responded that she had searched through the class catalogue looking for ideas for an educational path that would lead to a fulfilling career. She saw the listings for the forestry courses and thought, why not study and work in a field that she knows she already loves?

Quinn completed the coursework for a certificate which quickly led to a position as an invasive weed technician with the Coquille Watershed Association, which gave her a new appreciation for the damage caused by invasive species in southern Oregon.

As one opportunity led to another, Quinn attended the Bonneville Environmental Foundation's live webinar on the risks of *Phytophthora* introductions in native ecosystems. This webinar was part of the Bonneville Environmental Foundation's Treeline webinar series which covered topics of assisted migration and climate change. The group of us (Dan, Marianne, and Norma) presented work from an upcoming OSU extension publication,

*Preventing Phytophthora infestations in restoration plant nurseries, a key to protecting wildland plant communities¹ (in press at this writing). We covered the importance of preventing introduced pathogens and discussed *Phytophthora* introductions that have taken off in the wildlands including *Phytophthora ramorum*, the introduced pathogen that causes Sudden Oak Death; *Phytophthora lateralis*, the introduced pathogen that causes Port-Orford-cedar root rot that has killed hundreds of thousands of Port-Orford-cedar in Oregon and the inadvertent introductions of additional *Phytophthora* species in California.*

The conversations at the end of the webinar sparked an idea for collaborating on a prevention message. Quinn, working with Bonneville Environmental Foundation's Hannah Buehler, dove into Sudden Oak Death information, drafted a concept, reviewed it with subject matter experts and finished up an infographic design that could be shared in social media and printed.

What a great project! Quinn produced a really great infographic while increasing her network of natural resource professionals.

Preventing Phytophthora infestations in restoration plant nurseries, a key to protecting wildland plant communities, OSU Extension publication (in press). Kline, N.¹, Elliott, M.², Parke, J.³, Stark, D.¹, Shaw, D.⁴, Christiansen, A.¹

¹ Oregon State University, Forestry and Natural Resource Extension

² Washington State University, Puyallup Research and Extension Center

³ Oregon State University, Dept. of Crop and Soil Sciences, Dept. of Botany and Plant Pathology

⁴ Oregon State University, Dept. of Forest Engineering, Resources, and Management, Forestry and Natural Resources Extension.

WHAT IS SUDDEN OAK DEATH?

Sudden Oak Death (SOD) is an introduced disease caused by *Phytophthora ramorum*, an internationally quarantined plant pathogen. SOD has killed hundreds of thousands of tanoaks, and affects other susceptible species in Curry County, Oregon. In Oregon, the spread of SOD on state, private and federal lands is managed by the designation of a *Phytophthora ramorum* quarantine area.

HOW DOES SOD AFFECT ME?

Tanoak mortality changes urban landscape and forest ecosystems, and quarantine restrictions impact local timber and nursery industries.



How does SOD spread?

- Once SOD gets established in an area, it spreads easily in Oregon's cool, wet coastal climate. Wind and rain can carry the spores for miles!
- Humans can spread the disease to new areas by transporting infected soils and plants.

SLOW THE SPREAD

- Oregon's forest health is paramount, and early detection and landowner cooperation are key to slowing the spread.
- Eradication treatments are the best approach to slowing the spread of the disease on high risk sites, like the most recent case that was found in North Curry County.
- Rapid treatment is necessary to help prevent the disease from spreading across the landscape.



DID YOU KNOW?

A species of *Phytophthora* was also responsible for the Irish Potato Famine in the 1800's.

WHAT ARE SYMPTOMS OF INFECTION?

Tanoak is a primary host of SOD in southern Oregon

- Bleeding trunks, (trunk cankers are fatal for tanoaks), lesions, and foliage dieback on tanoak.
- Leaf blight or shoot and twig dieback on susceptible species like Rhododendron, evergreen huckleberry, and salal.
- Symptoms can look like other diseases, so laboratory test is always required!

How can YOU help?

- Report dead and dying tanoak and suspicious symptoms on hosts to Oregon Department of Forestry Sudden Oak Death Program:
Casara Nichols: 541-435-5031
Randy Weise : 541-294-8425
 - Know the location of the quarantine area:
<https://www.oregon.gov/odf/Documents/forestbenefits/sod-port-orford.pdf>
 - Don't move plant materials or soil
- Questions?
Curry and Coos County OSU Extension Forester
Norma Kline: 541-572-5263 ext.25294

Do you live in Port Orford?



Treeline Webinar Series Presents

Seed and Climate Change: A conversation with seed collectors

When: January 19, 2022, 12:00 PM-1:30 PM PST

What: A conversation with PNW seed collectors about climate impacts, observations and ideas to promote resiliency

A conversation among seed collectors about experiences and observations regarding woody plant seed collection and climate change. This panel, with collectors from Oregon, Washington and California [pending] will share experiences from the summer 2021 collection season and heat dome and fire impacts, as relevant, as well as longer term observations. Seasoned collectors will reflect upon decades of work, in conversation with the next generation of seed collectors. The group will discuss challenges, needs, emerging strategies and areas of hope.

Speakers include:

- Georgia Mitchell from Fourth Corner Nursery
- George Kral from Scholls Valley Native Nursery
- Jon Anderson from Jonny Native Seed
- Forest Shomer from Inside Passage Seed

Additional speakers may be added. This is part of a project called Treeline that aims to bring together nurseries, the research and ecological restoration community around topics relating to woody native plants and climate change. We are grateful to the Climate Resilience Fund for supporting this work.

Register for event for free on eventbrite: <https://www.eventbrite.com/e/seeds-and-climate-change-a-conversation-with-seed-collectors-tickets-218733657257>

Native Plant Materials Virtual Conference

Presented by
Willamette Valley
Native Plant
Partnership &
Southwest Seed
Partnership

When:

January 12 & 13, 2022
9 AM-4 PM PST
10 AM-5 PM MST

Keynote Speakers:

- Doug Tallamy, The Nature of Oaks
- Olivia Messinger Carril, Bees in Your Backyard

Register: <https://appliedeco.org/calendar/virtual-native-plant-materials-conference/>



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.

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